PN ACP-444
M14461

Private Participation Options Study for the Zambia Electricity Supply Company

Contract No. LAG-I-00-98-00006-00

Submitted By:
BECHTEL NATIONAL, INC.

February 2001

23865-810-0001

Table of Contents

1 Introduction....1-1

Background....1-1

Problem Statement....1-2

Conduct of the Study....1-2

Layout of the Report....1-3

2 Summary of Key Findings....2-1

Primary Recommendations....2-1

Rationale....2-1

Other Options Considered....2-4

Required Legal, Regulatory and Institutional Changes....2-6

Impact on Electrification....2-6

Social Impact of Recommended Option....2-8

Treatment of Potential Environmental Issues....2-8

Action Plan....2-10

Task 1 Report- Situation Assessment and Need for Private Participation

Task 2A Report- Option Identification and Screening

Task 2B Report- Detailed Option Evaluation

Task 3 Report- Legal and Regulatory Review

Task 4A Report- Market Valuation

Task 4B Report- Asset Survey

Task 5 Report- Social Impact

Task 6 Report- Environmental Review

Task 7 Report- Action Plan

Introduction

Nexant, Inc. was selected to conduct a study of the options for private sector participation in the Zambia Electricity Supply Corporation Limited (ZESCO). This study was conducted for the Zambia Privatisation Agency (ZPA) and funded by the US Agency for International Development (USAID). The Nexant team began work in August 2000 and has met with ZPA, the Ministry of Finance, the Ministry of Energy and Water Development, ZESCO, the Energy Regulation Board and other stakeholders in conducting this study and in developing its recommendations. Final recommendations on the preferred privatization option were made in mid-December 2000. This is the final report of this study.

Background

ZESCO was formed in 1970 through an act of Parliament. It is a vertically integrated electric power utility. It provides over 70 percent of the generation in Zambia, operates and maintains a high voltage transmission system, is responsible for all electric power imports and exports in the country and provides retail service to all but the largest mining customers in the Copperbelt region.

ZESCO serves approximately 250,000 retail customers and employs 4 000 workers. It also supplies Copperbelt Energy Corporation (CEC) through a Bulk Supply Agreement, amounting to over 50% of sales. (CEC, in turn supplies most mining customers in the Copperbelt region. ZESCO's transmission facilities include 2 000 km of 330 kV line, 350 km of 220 kV and 3 800 km between 66 kV and 220 kV connecting generating facilities with distribution networks, the largest of which are in Lusaka, Kitwe, Ndola, Kabwe and Livingstone. ZESCO has a 330 kV interconnections with Zimbabwe and with CEC, which is in turn connected with the Democratic Republic of the Congo in the north. It has lower voltage interconnections with Botswana, Namibia and Tanzania.

ZESCO's electricity generation facilities include hydroelectric stations at Kafue Gorge on the Kafue River (900 MW), with units commissioned between 1972 and 1977, and Victoria Falls on the Zambezi (108 MW), with most units commissioned between 1968 and 1972. The Itezhi-tezhi dam, completed in 1978, is located 250 km upstream from the Kafue Gorge station and provides the most of the its storage capacity. There are also three small hydroelectric plants connected to the main grid and several diesel plants serving small isolated systems.

ZESCO has operated under a performance contract since April 1996. The stated purpose of the contracts is to ensure the transformation of ZESCO into a financially sound, commercially viable, and efficient utility. The Performance Contract Review Committee, which is required under the current agreement, has not been established, so there is no strict mechanism for monitoring of compliance. As with the previous contract, there is no indication of the consequences of achieving or failing to achieve the targets specified in the current contract. The Energy Regulation Board (ERB), established by the Energy Regulation Act of 1995, has responsibility for licensing electricity facilities and for setting tariffs. The ERB has issued separate licenses for individual ZESCO generating facilities, its transmission system, distribution system, and for electricity supply (i.e., customer services).

3

Problem Statement

ZESCO is plagued with high levels of technical and non-technical losses, non-recoverable accounts, and accounts receivable coupled with low productivity, collections rates and quality of customer service. Many components of the electricity system are 30 to 40 years old and have received inadequate maintenance, particularly at the distribution level. There is currently a lack of concrete measurement of ZESCO performance and no defined consequences of poor results.

Some improvements can be expected even if ZESCO continues operation under current arrangements. However, this change is likely to be slow combined with a continuing inability to justify moderate tariff increases required to operate and maintain the system. This will result in a declining service quality and difficulty in expanding service. This situation can be corrected with capital investment and access to more business-oriented management skills. These can best be obtained from the private sector.

Conduct of the Study

The study was conducted in a number of tasks that addressed various issues associated with private participation in ZESCO activities. Separate reports were developed for each of the tasks, first as working documents for review by various team members and ZPA and USAID staff, then as part of this final report. as follows:

Task 1- Situation Assessment and Need for Private Participation: The Task 1 report provide an understanding of ZESCO's current situation, present a projection of how it will operate if no private participation is involved, provide a best case scenario for its operation based on operation at benchmark levels, and illustrates how private participation can move ZESCO closer to the best case scenario. A financial model was developed as part of Task 1 that was used in developing the baseline and best case scenarios, the business cases in Task 2 and the market valuation in Task 4.

Task 2- Options Development and Evaluation: The Task 2A report provides a description of the various private participation options for ZESCO that were considered as part of this study and a description by which these options were screened to the three most desirable. The Task 2B report provides a detailed evaluation of these three options.

Task 3- Legal, Institutional and Regulatory Framework: The Task 3 report addresses the legal, institutional and regulatory requirements for implementing the private participation options.

Task 4- Asset Survey and Market Valuation: The Task 4A report summarizes the market valuation of the various business functions of ZESCO. The Task 4B report describes a physical asset survey to develop an estimate of the depreciated replacement cost for ZESCO's technical assets. Task 4B was conducted by our subcontractor American Appraisal Associates, Inc.

Task 5- Social Impact: The Task 5 report is directed at the number of potential retrenchments associated with operating ZESCO on a more commercial basis, the potential cost of retrenchment, the social impact on potential retrenchees and recommended ways of mitigating this impact.

4

Task 6- Environmental Review: The Task 6 report provides an environmental review of ZESCO operations to identify potential environmental liabilities and any environmental impacts that private participation may have. Task 6 was conducted by our subcontractor, Walmsley Environmental Consultants, Inc.

Task 7- Action Plan: The Task 7 report provides a detailed action plan form implementing the preferred option.

Task 8- Communications with Stakeholders: This consisted of interviews with the Ministries of Energy and Water Development (MEWD), Commerce and Finance, the Energy Regulatory Board (ERB) and several consumer groups; attendance at Electricity Industry Restructuring and Market Reform workshop, sponsored by the ERB in August, November and December 2000; formal presentation of privatization options screening results at the November restructuring workshop; attendance at Rural Electrification Workshop sponsored by the Ministry of Energy and Water Development in September 2000; presentations and briefings to ZPA and USAID/Lusaka on a continuing basis; and presentations to the Ambassador in September and in December 2000. We currently plan additional presentations after the submission of this final report.

Layout of the Report

Section 2 provides a summary of the key findings of our study, including a summary of the actions required to implement our recommended option. The separate task reports are presented as appendices.

Primary Recommendations

We recommend that ZESCO be privatized through a two-staged process that would include a master concession for all of ZESCO for a duration of not more than ten years and further sales and/or concessioning of business units after ten years. The master concessionaire will pay a combination of an up-front and an annual concession fee to the Ministry of Finance. During the operation of the master concession:

- ZESCO should be unbundled into generation, transmission, distribution, and rural electrification business units. ;
- Rural electrification should operated under a negative sub-concession under the master concession period once the master concessionaire has developed a program plan in conjunction with the Ministry of Energy and Water Development. (Under a negative sub-concession, the concessionaire would be paid a combination of an up-front and annual fee.)

The disposal of remaining assets at the end of the master concession should be as follows:

- Outright sale of small hydro power stations (Lusiwasi, Musonda Falls and Chishimba Falls) with preference for local investors;
- Joint-venture sale of a majority stake in Victoria Falls and Kafue Gorge Power Stations;
- Concession of the high voltage grid and wholesale marketing function; and
- Concession or joint-venture sale of a majority stake in the distribution subsidiary.

ZPA should fulfill its mandate to lead the privatization effort and international power industry companies and/or consortia should be invited to bid on the master concession and, subsequently, to bid on majority stakes, or the concession, in the subsidiary assets.

Rationale

ZESCO as a provider of electric service is integral to efforts by the Government to move the Zambian economy forward through various measures to promote economic growth. However, in order for ZESCO to be able to fulfil this role, it is critical that ZESCO be operationally efficient, financially strong, and innovative. ZESCO is unable to fulfil these requirements in its current condition. Accordingly, there is an urgent need for privatisation of ZESCO as a way of gaining access to investment capital and management expertise in key commercial areas.

Privatisation of formerly state-owned electric power assets in both developing and developed countries provided over US$ 160 billion in investment over the past decade world-wide. This trend toward privatisation in the electric power sector covers all regions of the world. By the end of 1997, sixty-two developing countries had initiated some form of privatisation in their power sectors. In Africa, Rwanda, Tanzania, Uganda, Cameroon, and Gabon have, or are in the process of, considering privatisation in their respective electric utilities. Increased privatisation of Zambian electric power assets is consistent with both the Electricity Law,

6

which promotes the introduction of private investment in both in electricity generation and transmission, and Government policy calling for the privatisation of electricity distribution.

Electric generation transforms energy in moving water or fuel to electricity. Distribution systems in various towns connect customers to the grid and provide various customer services, such as reading metres, writing bills and collecting payments. The transmission system, operated at a higher voltage than distribution, connects generators and distribution systems. Generally, increased competition has been accomplished in other countries by separating (unbundling) electricity services so that the transmission system can serve generators and distributors in much the same way as a network of roads connects sellers and buyers in other markets. Ideally, generators can compete with one another, distributors are free to buy from the lowest cost provider, and the transmission system is operated in an impartial way.

There are many factors which limit competition in electric power in Zambia in the near term including:

- A well defined commercial market for trading electricity does not exist, either domestically or regionally;
- The relatively small size of the power system causing domestic generation to be dominated by one power station and the distribution system to be too small to be broken up;
- The existing twenty-year Bulk Supply Agreement with CEC to supply the mining industry and accounting for over 50% of ZESCO's total sales;
- Barriers to electricity competition in the power industries of Zambia's neighbours (important because, as in other markets, the encouragement of competition can be done effectively only if it is done in concert with one's neighbours).

Given this situation, the recommended approach for achieving private sector participation in ZESCO is to use a two-staged approach that would commence with the use of a master concession for ten years followed by the unbundling of ZESCO's business units through a combination of joint venture sales and sub-concessions.

A concession is a legal arrangement in which a private firm obtains from the Government the right to provide a particular service. In return, the private firm agrees to meet certain obligations such as investment and other agreed-upon performance targets. A concession does not involve the sale of assets. The Government retains control of the assets. Under the concession agreement the concessionaire would have the obligation to operate and maintain the system, provide high quality electric service, provide needed investment and meet all environmental regulations. The Government would have the obligation to execute and monitor performance of the concession.

Figure 2-1 summarizes the key features of the recommended option. Stage 1, the initial master concession, can be accomplished relatively quickly facilitating the near-term benefits of privatization while providing time to prepare for restructuring. Stage 2 provides the opportunity to restructure the power sector in a way to gain the long-term benefits of competition. In addition, this two-staged approach is most appropriate for the following reasons:

1

- Concessions in the water and power sectors have been successfully used in France, Argentina, Chile, Peru, Brazil, Philippines, and Gabon as a means of attracting private investors;
- Enhance the ability to sell selected unbundled units based on the track record of the master concessionaire;
- Provides a convenient way to minimize retail tariff increases in the near term.

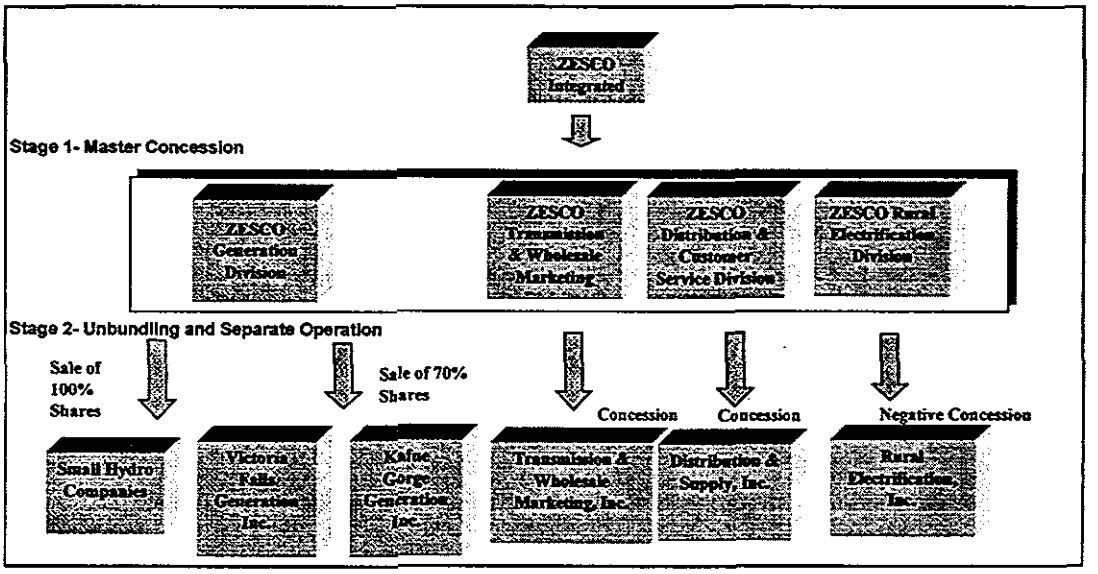


Figure 2-1: Recommended Option

The main features of the recommended private sector participation option are discussed hereafter.

Stage 1 – Master concession

The structure of the master concession would be as follows:

- The concession would need to be explicit as to its purpose and the specific investment and operating requirements needed to prepare the utility for eventual unbundling after ten-year concession ends.
- It would be of a time-limited duration of no longer than 10 years.
- The concession scope would include all of the core assets of ZESCO including the core buildings, workshops and vehicles, generation plants, high voltage transmission lines and substations, dispatching, and low voltage distribution and supply which includes metering, billing and collections.
- The bulk supply contract with CEC would also be included in the concession.
- Non-core assets would be hived off and not be included in the master concession agreement.
- Ownership of the assets would remain with the Government.

8

- The concessionaire would have exclusive right to operate the existing system, however any new capacity could be developed as an independent power produced. However, the concessionaire would have the option of bidding on Kafue Gorge Lower and operating it as an integral part of the existing Kafue Gorge plant.
- The master concession would be required to operate the transmission grid on a restricted access based on approval by the Energy Regulation Board.
- The concessionaire will be responsible for developing a negative sub-concession for rural electrification and the operation of isolated systems within two years of the commencement of the master concession.
- The concessionaire would be required to assist in the development of the transition plan to an unbundled power sector.

Stage 2 - Unbundling of the business units

In Stage 2, ZESCO would need to be organized as a holding company which would allow the creation of at least three subsidiaries – generation which would include Victoria Falls, Kafue Gorge plus the smaller hydro schemes; transmission and wholesale marketing and distribution and supply. Each business unit could then be divested at the appropriate time. The recommended approach at this time would be as follows:

- The generation assets at the Kafue Gorge and Victoria Falls Power Stations would be privatised individually through a joint venture sale with a strategic investor having majority ownership of at least 51 percent and management control.
- The high voltage transmission and wholesale marketing function would be concessioned out through a long-term concession. Government would still retain control of this strategic asset.
- Distribution and supply would be privatised as a single entity due to the small size of individual distribution systems, with the approach either a joint venture sale or a concession depending on its financial performance at that time.
- Rural electrification and operation of isolated electric power systems would be privatised through a negative concession funded from the rural electrification fund or other funding mechanism which may be developed.
- Lusiwasi, Chisamba Falls, and Musondo Falls power stations would be sold outright with preference for local investors.

Other Options Considered

A wide range of options were considered for the privatization of ZESCO including the following:

Retaining the Status Quo: This option has not been recommended as it will it will be accompanied by a further deterioration in its financial condition and service. There would continue to be a constant balancing of priorities- repayment of debt, investment in new connections, wage increases to keep the most skilled people, deferral of essential maintenance. Under this scenario it would continue to be difficult for the company to meet income tax and dividend obligations. Furthermore, domestic competition will be hindered by

9

the vertically integrated structure of the company and, in the long term, this structure will be a disadvantage in what is likely to become a competitive regional market in southern Africa.

Full flotation on the Lusaka Stock Exchange: The large size of ZESCO currently precludes its full flotation on the stock exchange. The full flotation of ZESCO would exceed the Lusaka Stock Exchanges current absorptive capacity by at least a factor of ten. However, after unbundling and sale of selected business units in Stage 2 of the preferred option, it would be possible for the Government to release tranches of shares under its ownership onto the stock exchange when it so wishes.

Management Buy-Out: The large size of ZESCO and the need for additional investment precludes privatisation through the use of a management buy-out.

Management Contract for ZESCO: This option has been rejected because it does not provide for needed capital investment. Furthermore, management contracts have not been effective vehicles for improving performance because the contractor has no stake in the company.

Outright Sale of ZESCO: This option would give majority share ownership to a strategic investor plus management control of the company. We have not recommended this option because it would retain a vertically integrated structure that would become an obstacle to domestic competition and be inappropriate for a competitive regional market. In addition, given the current poor financial condition of the company, this option is likely to result in a low transaction value.

A Long-Term Concession for all of ZESCO: A 25 year concession for all of ZESCO was considered. Concessions have the benefit of providing investment capital, plus management and operational expertise. Proceeds are generated through the payment of concession fees to the government. Of all the privatisation options considered, a long-term concession of the whole company could probably be implemented the fastest, providing private investment in the least amount of time. While this option is attractive for the reasons mentioned, it was rejected on the grounds that it would tend to lock in a vertically integrated structure that will hinder the development of domestic competition and be inappropriate in a competitive regional market.

Unbundling ZESCO into Separate Business Units with the Subsequent Sale of the Units Individually: Under this option ZESCO would be structured as a holding company with separate subsidiaries for generation, transmission and distribution. Each of these business units would then be privatised. This would result in a structure that is most consistent with a competitive electric power market. However, before such a transaction could occur, major changes in the way the Zambian power market operates would be required. Preparing for these changes would require a significant period of time during which there would be little improvement in ZESCO's performance and little new investment. Importantly, this option would require significant near-term increases in retail tariffs in order to privatise the distribution company as a separate entity. This option has been rejected because of the likely delays in implementation and required near-term tariff increases.

10

Required Legal, Regulatory and Institutional Changes

The recommended course of action will require minimal immediate changes to the existing legal, regulatory and institutional structure. The Energy Regulation Act and Electricity Act will require amendment to provide the Energy Regulation Board the authority to review and approve the master concession and subsequent subconcessions.

The complexity of regulation and the need for clearly defined responsibilities will increase with the implementation of the master concession and subsequent unbundling of business units. There will be a need for technical assistance and capacity building within the existing institutions, particularly at the Energy Regulation Board and at the Department of Energy at the Ministry of Energy and Water Development. There will also be a need for assistance to the Zambian Privatisation Agency in developing the terms of the concession agreement.

The Privatisation Trust Fund could provide a convenient mechanism for maintaining Government shares after separation of into business units. Its current mandate of March 2001 will need to be extended to fulfill this function or legislation will be required to revive this function during the course of the master concession.

We expect that power sector restructuring proposals will be developed during the course of the master concession. Stage 2 of the recommended option reflects and unbundled, more competitive sector. There would be a number of regulatory changes which would be required as the system is unbundled. The rules governing the power market should be developed, monitored and enforced by the ERB. These include:

- Creation of market rules in terms of information requirements, rules for technical operation, commercial operation and market administration
- Modification to open access policy
- Methodology and procedures for pricing transmission, distribution and ancillary services
- Oversight for development of grid code and use of system agreements

Some of these actions would be required for the development of independent power projects in any case. There will remain a degree of flexibility in the exact nature of sector restructuring that follow orderly development under Energy Regulatory Board leadership. It may be possible to implement some structural changes during the course of the master concession depending upon their specific characteristics and the terms of the master concession. The end of the master concession will mark a point at which maximum structural changes can be implemented.

Impact on Electrification

Many electrification projects can be expected to be economical over the lifetime of their investment, particularly in areas of high population density. Others will require subsidies to justify initial investment. Township electrification generally addresses the first category while rural electrification generally addresses the latter. The recommended master concession would initially have no impact on the electrification program. It is expected township electrification goals would be set in the master concession agreement in much the

11

same way as they are included in the current performance contract. Funding for rural electrification investment would continue from the Rural Electrification Fund.

Within two years of the initiation of the master concession, the master concessionaire will set up a negative subconcession for rural electrification. This will be based upon a plan agreed upon with the Ministry of Energy and Water Development. Initially, the concession fee to be paid to the concession would be taken from a combination of the following: an extension of the Rural Electrification Fund and proceeds from the concession fee to be paid by the master concessionaire. The fee would be to cover investment and operating cost over average tariff levels. For those rural systems connected to the grid, it can be expected that costs will decline over time as greater numbers of customers utilize the initial electrification investment. When average cost decline to an agreed-upon level the area should be moved from the Rural Electrification Division to the Distribution and Customer Service Division.

As business units are sold and concessioned, the Rural Electrification Division would become an independent Rural Electrification, still operated as a negative concession under government ownership. Proceeds from the sale or concessioning of business units could be used to support the negative concession fee and the Rural Electrification Fund and the associated levy could be phased out.

Some features that could be used with the negative concession arrangement are the following:

- Flexible tariffs should be utilized in rural areas where there is a capacity to pay in order to reflect at least some of the higher costs of production in rural areas. This would reduce the size of negative concession fees.
- Decentralized decision-making- Regional governments should be involved in the identification of needs, choice of solutions, and in decisions about the allocation of funds from the central government. The role of the central government should be limited to providing economic resources and technical assistance to help coordinate the institutions involved in the program
- Competition through outsourcing of customer billing and meter reading services and offering incentives for private sector companies to expand coverage and reduce losses. Energy Services Companies (ESCOs) also have been promoted to provide services to consumers that promote efficient use of energy to enable consumers to lower their overall energy bill
- Cost reduction through local involvement- Efforts in this regard include employing local persons for customer relations and metering and billing functions, involving local institutions and customers in designing and implementing service expansion programs, and utilizing new financing methods to reduce the up-front costs of system connections to consumers
- Use of area concessions to promote competition from private bidders for the right serve a given rural area on the basis of lowest subsidy.

12

Social Impact of Recommended Option

Reduction in staffing levels from 4,000 currently to approximately 3,000 will be required. This reduction in staff is currently planned by ZESCO and, strictly speaking, is not an impact of the recommended option. However, the costs associated with retrenchment are significant and must be addressed before the initiation of the master concession. Figure 2-2 shows the range of these costs based on the Collective Agreement with the National Energy Sector and Allied Workers Union, Conditions of Service for Non-Represented Employees, and estimated unfunded pension liabilities in the Local Authorities Superannuation Fund.

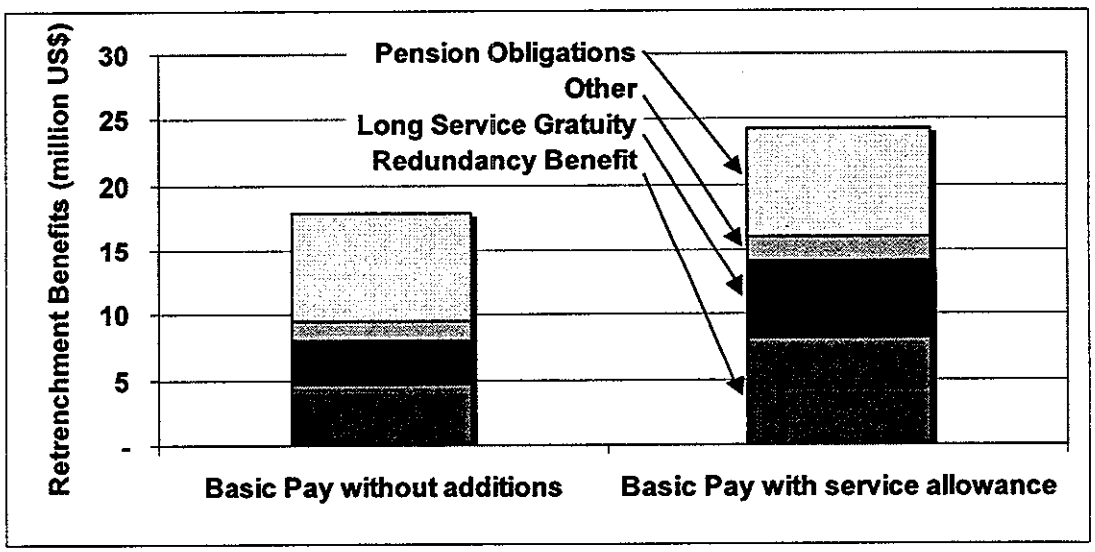


Figure 2-2: Retrenchment Costs

Most non-pension costs are keys off of "basic salary" (i.e., the higher the basis salary, the higher the retrenchment costs.) The components of "basic salary" have become an issue in the Zambia Courts as a result of retrenchments of other parastatals. The range in Figure 2-2 shows the result of if "basic salary" contains no additions and if it has service allowance added to it.

Treatment of Potential Environmental Issues

The degree to which the master concessionaire treats a number of environmental issues will have to be clearly defined in the master concession agreement. Key examples include:

Continuation of existing environmental programs: The master concessionaire will need to continue with most of the current environmental programs directly related to ZESCO activities (e.g., the Victoria Falls rehabilitation programme, the installation of oil interceptors at the diesel plants). We recommend that the Environmental and Social Affairs Unit at ZESCO be maintained under the master concession as the focus of these activities with funding commitments as part of the concession agreement. During the course of the master

13

concession, we further recommend that this unit prepare for operation as a private consulting group. In this way its services can be extended sectorally (e.g., mining) and geographically.

Storage and disposal of poly-chlorinated biphenyls (PCBs): PCBs are synthetic organic compounds, that were added for many years to dielectric oils as a coolant, due to their special properties such as stability, lack of corrosiveness, limited volatilization and solubility. However, PCBs have since been found to be highly hazardous to humans and wildlife and are responsible for reproductive failure, disruption of normal biological functioning and are a suspected carcinogen. A temporary storage facility for Kariba North PCBs has been constructed at Siavonga and another is under construction at Luano for ZESCO PCBs. Either a subconcession under the master concession or a separate government-owned company should be set up for operating the Luano and Siavongo temporary storage facilities and arranging for long-term disposal of PCBs. In the first case, the master concessionaire should be indemnified against any claims of exposure to PCBs up to the initiation of master concession. In the latter case, the master concessionaire can be indemnified against all claims associated with PCB exposure.

ZESCO-owned housing at Kafue Gorge: The village of Kafue Gorge has a population of some 5000 people, of which only about 130 are employed in the power station. Houses and land belong to ZESCO, except for a small plot owned by the Roman Catholic Church. This housing should be sold and responsibility for its maintenance should be hived off.

Supply of water, sewage, and refuse removal services to communities at Kafue Gorge and Itezhi-tezhi: ZESCO provides water and sewage service free of charge to significant numbers of non-ZESCO employees at Kafue Gorge and Itezhi-tezhi. Investment would be required to bring sewage services up to standard and the disposal of general domestic waste requires improvement. Either subconcessions under the master concession agreement should be set up to provide these services or these functions should be hived off and performed by separate entities. In either case, fair pricing of services should be implemented to guarantee safe and reliable service.

Asbestos exposure: Asbestos roofing materials appears to be used in a large number of ZESCO-owned housing and some buildings. A survey needs to be carried out to investigate the state of the asbestos roofing material used in most of the company houses, and a replacement programme should probably be implemented. The master concessionaire should be indemnified against all claims of exposure to asbestos fiber prior to the beginning of the master concession.

Soil contamination: There is evidence of oil spillage surrounding all workshops and diesel power plant sites. There needs to be a concerted clean-up of oil-contaminated soil at these facilities.

Waste and scrap metal disposal: A comprehensive waste management plan needs to be developed to deal with the waste being generated at each of ZESCO's facilities

14

Action Plan

The actions required to implement the master concession are classified in three categories: pre-transaction, transaction-related, and post-transaction. These are summarized in Tables 2-1 through 2-3, respectively. The pre-transaction and transaction-related actions are required to implement the master concession. As shown in Figure 2-4, the schedule for master concession implementation is two years.

The post-transaction actions will be conducted during the course of the master concession. At the end of the master concession additional actions will be required to sell or concession the generation, transmission and distribution subsidiaries.

Table 2-1: Pre-Transaction Actions

Number	Subnumber	Responsible Institution	Action Description
1		ZPA	***Establish ZESCO Privatization Task Force*** Significant coordination will be required to insure the successful privatization of ZESCO. The task force would be given the mandate to implement the action plan. It would cease to exist with the execution of the master concession. The task force would consist of representatives from ZPA, who would chair the task force, MEWD, ERB, Ministry of Finance, Water Board, Ministry of Environment, and ZESCO.
2			***Commercialization/Organizational Changes***
	2.1	ZPA, ZESCO	**Complete financial unbundling and establish divisional structure** Complete process of financial unbundling in a timely manner with the assistance of outside advisors. Create divisional structure and associated organizational changes proposed for the preferred option.
	2.2	ZESCO, Union	**Redeploy staff and complete retrenchment** Transfer ZESCO staff to newly established divisions. In conjunction with this activity, determine the those staff who are redundant. Finalize retrenchment packages.
	2.3	ZPA, ZESCO	**Determine core/non-core assets** Specify which assets are surplus to ZESCO's operations and which will be part of the concession.
3		ZPA	***Finalize Concession Terms*** A model master concession agreement would result from this activity.
4		ERB, MEWD	***Legal and Regulatory Changes***
	4.1		**Legislative actions** Review and modify existing electricity law to insure that the use of concessions is permissible Review and revise if necessary ZESCO corporate charter and articles of association Review and modify legal ownership with respect to non-core assets Review and amend the Energy Regulatory Act
	4.2		**Regulatory actions** Administer and monitor performance of the concession Set tariff policy and methodology Review and approve capital expansion plans Develop appropriate procedures for the determination of obligation to serve In addition it will be necessary to insure that the institutional capacity of the ERB is strengthened to handle its expanded role.
5		MOE, ZESCO	***Resolve Environmental Issues*** Resolve environmental issues in terms of potential liabilities and parties responsible, environmental compliance and reporting requirements.

15

Table 2-2: Transaction-Related Actions

Number	Subnumber	Responsible Institution	Action Description
6		ZPA, ERB	***Pre-qualification Actions*** Develop pre-qualification criteria Prepare and request Expressions of Interest Evaluate, screen and select short list of potential bidders
7		ZPA, ERB, ZESCO, MEWD	***Preparation of Bidding Documents*** Operating strategy and structure of the concession operating company Investment plan and sources of financing Proposed business plan Plan for dealing with rural electrification Tariff strategy The financial bidding documents should address the fixed fee the GRZ is willing to accept and the annual concession fee to be paid by the concessionaire.
8		ZPA, ERB, MOF, MEWD	***Bidding and Award Actions*** Evaluation of bids, clarification of technical issues, and selection of preferred candidates based on technical bids Request for financial bids Evaluation and selection of preferred candidate Final negotiation and award

Table 2-2: Post-Transaction Actions

Number	Subnumber	Responsible Institution	Action Description
9		ERB, MEWD, MOF, Water Board	***Establish power sector transition task force*** Implement necessary changes required to transition to an unbundled power sector.
10		ZPA, MOF	***Change ZESCO corporate structure*** A holding company would be created to facilitate the unbundling process. This action involves a number of activities including legal, technical, financial and human resources
11		ERB	***Regulatory changes*** Creation of market rules in terms of information requirements, rules for technical operation, commercial operation and market administration Modification to open access policy Methodology and procedures for pricing transmission, distribution and ancillary services Oversight for development of grid code and use of system agreements
12		Conces-sionaire, ZPA, ERB	***Development of commercial instruments*** Transitional bi-lateral contracts between unbundled entities.
13		Conces-sionaire, MEWD	***Sub-concession rural electrification*** Develop an electrification plan, and determine the funding levels required and to sub- concession out the program as negative concession.

16

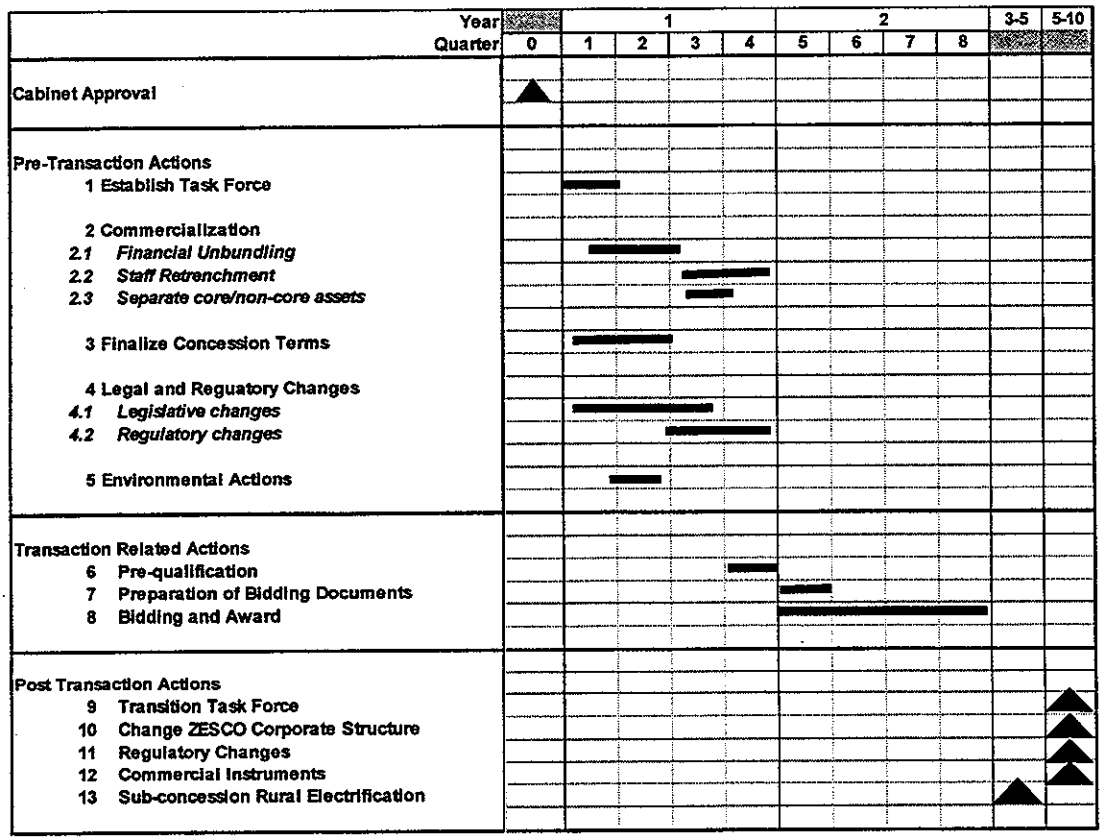


Figure 2-3: Schedule of Stage 1 Actions

17

Private Participation Options Study for the Zambia Electricity Supply Company

Task 1 Report-
Situation Assessment and
Need for Private Participation

18

Table of Contents

1 Introduction 1-1

1.1 Background *1-1*

1.2 Organization Of This Report *1-2*

2 Status of ZESCO 2-1

2.1 Institutional Arrangements *2-1*

2.2 ZESCO Organization *2-2*

2.3 Supply and Demand *2-3*

2.4 Price Regulation *2-5*

2.5 Performance Contract *2-6*

2.6 The Power Rehabilitation Project *2-8*

2.7 Recent Operational and Financial Performance *2-8*

2.8 Cost Structure *2-10*

3 Baseline Performance of ZESCO 3-1

3.1 Overall Projection *3-1*

3.2 Grid Generation *3-2*

3.2.1 Recent Performance 3-2

3.2.2 Projected Baseline Performance 3-3

3.2.3 Baseline Transfer Price for Grid Generation 3-4

3.3 Transmission *3-6*

3.3.1 Projected Baseline Performance 3-6

3.3.2 Baseline Transfer Price for Transmission 3-7

3.4 Wholesale Marketing *3-8*

3.5 Distribution and Customer Service *3-10*

3.6 Isolated Systems and Rural Electrification *3-12*

4 Best Case Performance of ZESCO 4-1

4.1 Grid Generation *4-1*

4.1.1 Projected Best Case Performance 4-1

4.1.2 Best Case Transfer Price for Grid Generation 4-1

4.2 Transmission *4-3*

4.3 Wholesale Marketing *4-3*

4.4 Distribution and Customer Service *4-4*

4.5 Pricing Issues *4-6*

4.6 Isolated Systems and Rural Electrification *4-8*

5 Private Participation Opportunities 5-1

5.1 World Experience in Private Participation in the Power Sector *5-1*

5.2 Benefits of Improved Performance to the Economy *5-3*

19

5.2.1 Measuring Benefits 5-3
5.2.2 Social Benefits 5-4
5.2.3 Microeconomic impacts 5-4
5.2.4 Macroeconomic Impacts 5-5
5.2.5 Impact on Private Sector Investment 5-5

5.3 Rural Electrification 5-6

Appendix A- Future Demand Scenarios....A-1
Appendix B- Basis for Asset Revaluation....B-1
Appendix C- Recent Financial Statements....C-1
Appendix D- Baseline Projection....D-1
Appendix E- Best Case Projection....E-1
Appendix F- Distribution Productivity Benchmarking....F-1
Appendix G- World Experience in Power Sector Reform And Privatization....G-1
Appendix H- World Experience in Rural Electrification....H-1

20

Table of Tables

2-1 Recent ZESCO Financial and Operational Performance....2-8

3-1 Baseline Operations of Entire Company....3-2

3-2 Projected Key Operating and Financial Parameters for Grid Generation Under Baseline Conditions.... 3-4

3-3 Transfer Price of Grid Generation Under Baseline Conditions.... 3-5

3-4 Projected Key Operating and Financial Parameters for Transmission Under Baseline Conditions.... 3-6

3-5 Transfer Price of Transmission Under Baseline Conditions.... 3-7

3-6 Project Key Operating and Financial Parameter for Wholesale Marketing.... 3-9

3-7 Projected Key Operating and Financial Parameters for Distribution Function Under Baseline Conditions....3-11

4-1 Projected Key Operating and Financial Parameter for Grid Generation Under Best Case Assumptions....4-2

4-2 Projected Financial Performance of the Wholesale Marketing Function Under Best Case Conditions....4-3

4-3 Comparison of Baseline and Best Case Distribution Assumptions for 2004/05....4-4

4-4 Projection of Key Operations and Financial Parameters for Distribution Under Best Case Conditions....4-5

5-1 Private Participation in the Power Sector- 1990-98 (millions US$)....5-1

5-2 Major Performance Indicators of Privatization of Argentina's Electric Power Sector (1992-1995)....5-2

5-3 Comparison of Best Case Results with Baseline (millions US$, present worth to 2000 @ 6% discount rate)....5-5

Table of Figures

2-1	Current ZESCO Organization	2-3
2-2	Forecast Demand from CEC and Retail Customers	2-4
2-3	Allocation of the Power Rehabilitation Project	2-7
2-4	Relative Costs of Generation, Transmission and Distribution	2-9
2-5	Contribution of Cost Categories	2-10
3-1	Past Production at Kafue Gorge	3-3
4-1	Kafue Gorge Availability Under Baseline and Best Case Assumptions	4-2
4-2	Projected Number of Employees for Distribution Function	4-5
4-3	Incentive Regulation Options for Meeting Various Regulatory Objectives	4-8

Section 1 Introduction

1.1 *Background*

The Government of the Republic of Zambia (GRZ) has requested the Zambia Privatization Agency (ZPA) to study the options for Private Sector participation in the Zambia Electricity Supply Corporation Limited (ZESCO). The United States Agency for International Development (USAID) has agreed to support ZPA in this effort and has selected Bechtel/Nexant to assist ZPA in developing a report on this subject. Bechtel/Nexant staff have met with ZPA, ZESCO, the Ministry of Finance, the Ministry of Energy and Water Development, the Energy Regulation Board and other stakeholders and has developed a work plan for conducting this work. We have assembled a team of experts to study various aspects of this problem.

The tasks associated with this study are as follows:

- Task 1- Situation Assessment and Need for Private Participation
- Task 2- Options Development and Evaluation
- Task 3- Legal, Institutional and Regulatory Framework
- Task 4- Asset Survey and Market Valuation
- Task 5- Social Impact
- Task 6- Environmental Review
- Task 7- Action Plan
- Task 8- Communications with Stakeholders

This is the Task 1 Report. Its objective is to provide an understanding of ZESCO's current situation, present a projection of how it will operate if no private participation is involved, provide a Best Case scenario for its operation based on operation at benchmark levels, and illustrate how private participation can move ZESCO closer to the Best Case scenario. As part of this task we have developed a financial model for analyzing the Baseline and Best Case scenarios. We intend to continue using this model for conducting financial analysis of the selected private participation options and developing a market valuation of ZESCO assets.

The Task 2 report will provide a description of a variety of private participation options for ZESCO. These options will be reduced to two or three through a screening process which will take a more detailed evaluation of the options. Task 3 will address the legal, institutional and regulatory requirements for implementing the chosen private participation options. Task 4 will consist of a physical asset survey to develop an estimate of the depreciated replacement cost for ZESCO's technical assets and a market value for ZESCO's commercial assests based on a financial analysis. Task 5 is directed at the potential social impact of private participation in ZESCO on potential retrenches and recommending ways of mitigating this impact. Task 6 will provide an environmental review of ZESCO operations to identify potential environmental liabilities and any environmental impacts that private participation may have. Task 7 is an Action Plan for implementing the recommended two to three privatization options. As part of Task 8 we will keep stakeholders informed on a continuing basis of our intermediate results.

1.2 *Organization Of This Report*

The remainder of this report is organized as follows:

- Section 2 provides a summary of ZESCO current situation including current organization, staffing levels, its Performance Contract, the Power Rehabilitation Project, and recent operational and financial performance.
- Section 3 presents a projection of ZESCO operational and financial performance if there is no private participation. We refer to this as the Baseline scenario.
- Section 4 provides benchmarks for how ZESCO could be operated and a projection of operational and financial performance if it were to meet these benchmarks. We refer to this as the Best Case scenario.
- Section 5 summarizes world experience in private participation in the power sector and provides illustrations of how private involvement could improve ZESCO operation.

The following appendices are with the report:

- Appendix A provides the load forecasts upon which the financial projections were made.
- Appendix B provides the basis for the asset valuation used in the financial analysis (This was conducted before the completion of the asset survey and valuation in Task 4).
- Appendix C presents recent ZESCO financial statements adjusted for revalued assets and separated into functional areas.
- Appendix D is a presentation of the financial projection under Baseline conditions.
- Appendix E provide the financial projections under Best Case conditions.
- Appendix F presents the basis the for productivity benchmarks for ZESCO's Distribution function.
- Appendix G is a summary of world experience in power sector reform and privatization
- Appendix H provides a summary of world experience with rural electrification.

Section 2 Status of ZESCO

This section summarizes the current status of the Zambia Electricity Supply Company Limited (ZESCO). This includes the following:

- Summary of current institutional arrangements
- Organization of ZESCO and numbers and types of employees
- Description of physical facilities
- Current prices and price regulation
- ZESCO's current performance contract
- ZESCO's cost structure
- The national and regional supply and demand situation
- The Power Rehabilitation Project
- Recent financial performance.

The following sections will present the future of ZESCO, both without radical change and under optimal conditions.

2.1 *Institutional Arrangements*

Zambia Electricity Supply Company Limited (ZESCO) was formed in 1970 through an act of Parliament. It is a vertically integrated electric power utility. It provides over 70 percent of the generation in Zambia, operates and maintains a high voltage transmission system, is responsible for all electric power imports and exports in the country and provides retail service to all but the largest mining customers in the Copperbelt region. The other major electric power companies in Zambia are the Copperbelt Electricity Corporation (CEC) and Kariba North Bank (KNB). CEC owns and operates a high voltage transmission system and small amount of generating capacity, purchases electricity from ZESCO under a bulk supply agreement and supplies recently privatized mining concerns in the Copperbelt region. Kariba North Bank is the Zambian portion of the Kariba Hydroelectric Project. The assets, liabilities and operations of Kariba North Bank were taken over by ZESCO upon the dissolution of the Central African Power Company (CAPCO). While there has been a degree of separation between Kariba North Bank and ZESCO, payments from ZESCO to Kariba North Bank for its output were in the form of an annual lease payment during the 1999/00 financial year. Kariba North Bank is preparing to operate as a fully independent entity and will negotiate a power purchase agreement with ZESCO.

The Ministry of Finance is the designated owner of ZESCO assets. The Ministry of Energy and Water Development (MEWD) is responsible for setting electricity policy under the Electricity Act of 1995 and sets priorities for rural electrification. In the past, a major role of ZESCO was as a developer of new projects, particularly Kafue Gorge and the high voltage transmission system. In 1998 the GRZ established a clear policy of developing all new generation and transmission projects through the use of private capital. The MEWD has developed a framework that spells out the concessions and incentives offered to attract private participation in the power industry and the Office for Promotion of Private Power Investment (OPPPI) was formed to be a

one-stop shop for investors in the power sector. With the development of new projects designated for the private sector, ZESCO's need for new capital is now limited to requirements for rehabilitation of existing facilities.

The electrification program in Zambia is divided into township electrification, which consists of extending the central grid to un-electrified areas. For example only 40% of the people living in the Lusaka area have access to electricity, providing ample opportunity for this type of electrification.

Rural electrification refers to the development of isolated, non-grid-supplied systems. Outside cities, access to electricity is approximately 2%. The only source of electricity is generally diesel generation and, in some cases small hydroelectric plants. A 10% levy surcharge on retail electricity sales from the grid is used to create the Rural Electrification Fund, managed by the Ministry of Finance and intended to finance investment in equipment for rural electrification according to guidelines set by the MEWD. In recent years, this fund has been used for other purposes and in 1997 and 1998, no investment was made in rural electrification. ZESCO executes the electrification for the MEWD when funding is available. Tariffs are equal to grid-supplied electricity, well under the operating cost of supply of isolated systems. Therefore, even if the Rural Electrification Fund were operating as intended, the rural electrification program would represent a financial loss to ZESCO.

2.2 *ZESCO Organization*

ZESCO is generally organized along functional lines with six major directorates as shown in Figure 2-1. This figure also shows the number of union and management employees in each Directorate.[1] The Generation and Transmission Directorate operates and maintains all generation facilities, all transmission facilities above 66 kV and some 66 kV lines, and the National Control Center. It is responsible for bulk power supply and imports and exports of electricity. Distribution and Customer Service operates and maintains all lower voltage equipment and is responsible for retail sales, metering, billing and customer service. The Power Rehabilitation Program (PRP) Directorate administers work performed under the World Bank PRP loan. The Engineering Development Directorate provides a variety of technical services, such as hydrology modeling and civil engineering and develops new projects, such as electrification. Corporate Development and Accounting and the Human Resources Directorates provide support services to the other directorates.

The Distribution and Customer Service Directorate is divided geographically in the Lusaka, South, North, and Copperbelt Divisions.

[1] Human Resource employees are included in other Directorates.

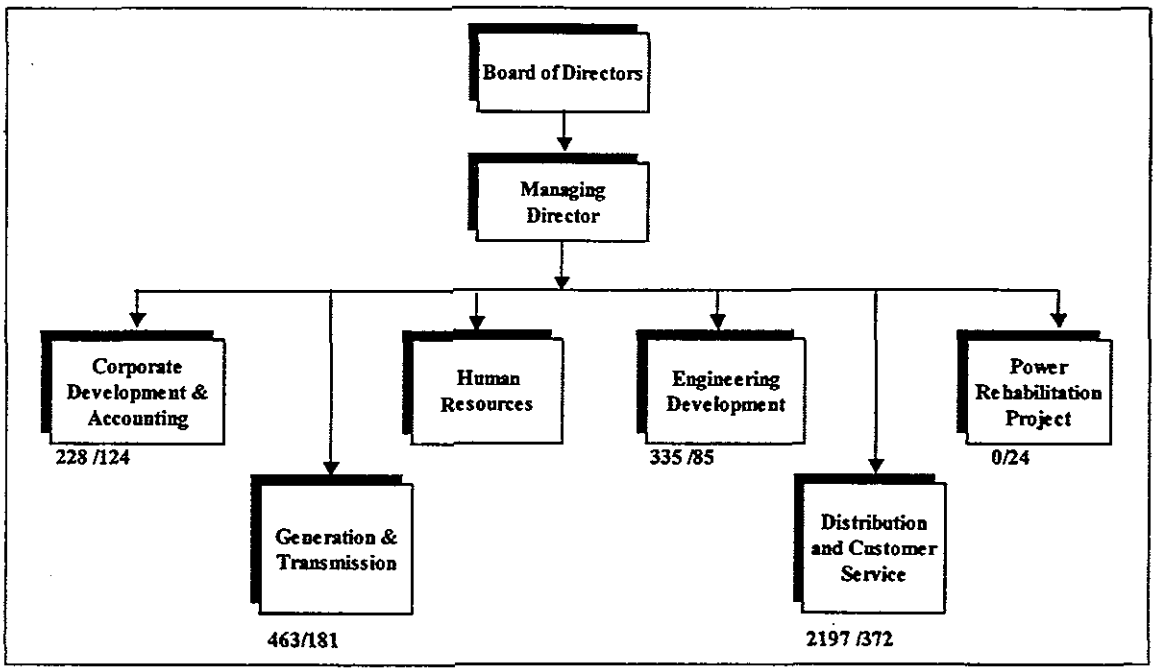


Figure 2-1. Current ZESCO Organization

2.3 *Supply and Demand*

ZESCO provides wholesale electricity to the Copperbelt Energy Corporation (CEC). and retail electricity to most of the rest of the country. CEC is the primary supplier of the mining sector. Historically, mining has dominated the demand for electricity in Zambia. However, mining energy demand in 1999 was below what it was in 1980, while demand from industry, services, agriculture, and residential consumers almost doubled during that same period. Nevertheless mining demand still represented about 60% of total demand in 1999. Overall, demand has grown at only about 0.9% per year since 1980.

CEC- is the primarily electricity provider for the mining sector. ZESCO supplies CEC through a Bulk Supply Agreement, most recently amended upon completion of the mine privatization in April 2000. Under the agreement, ZESCO is to supply up to 700 MW to CEC through November 2012 and declining amounts after that. (ZESCO's supply limit is expected to be reduced to 329 MW by the end of the term of the agreement in April 2020.) While no specific limit on energy sales is made in the agreement; ZESCO commitments would vary depending on the amount of available hydro generation.

The mine privatization has already had a positive effect on payments to ZESCO from CEC under the Bulk Supply Agreement, as will be discussed in the next section. And increased investment in mining operaations should result in increased electricity demand in the long term. However, there will be a decrease in demand under the Bulk Supply Agreement in the near term. Subsequent to the mine privatization, CEC transferred 80,000 residential customers to ZESCO,

thereby reducing its demand under the Bulk Supply Agreement and increasing ZESCO's retail sales. The increase in customers resulted in the formation of the Copperbelt Division of ZESCO's Distribution and Customer Service Directorate.

For purposes of making financial projections for ZESCO, we developed a forecast of sales to CEC and to retail customers. A detailed presentation of the methodology is provided in Appendix A. The results are illustrated in Figure 2-2. These results fall within the envelope of high and low forecasts for Zambian electricity demand in the near term; however it follows the low trajectory in the near term, reflecting lead time before mining investment leads to significant higher demand and the expected impact of likely price increases on retail demand under any ownership scenario. The decrease in the mining demand and increase in retail demand in 2000 reflects the transfer of residential customers from CEC to ZESCO who have been considered part of mining sector demand in the past. If mining demand were to increase more rapidly than projected, ZESCO would have only limited ability to supply this demand except through imports.

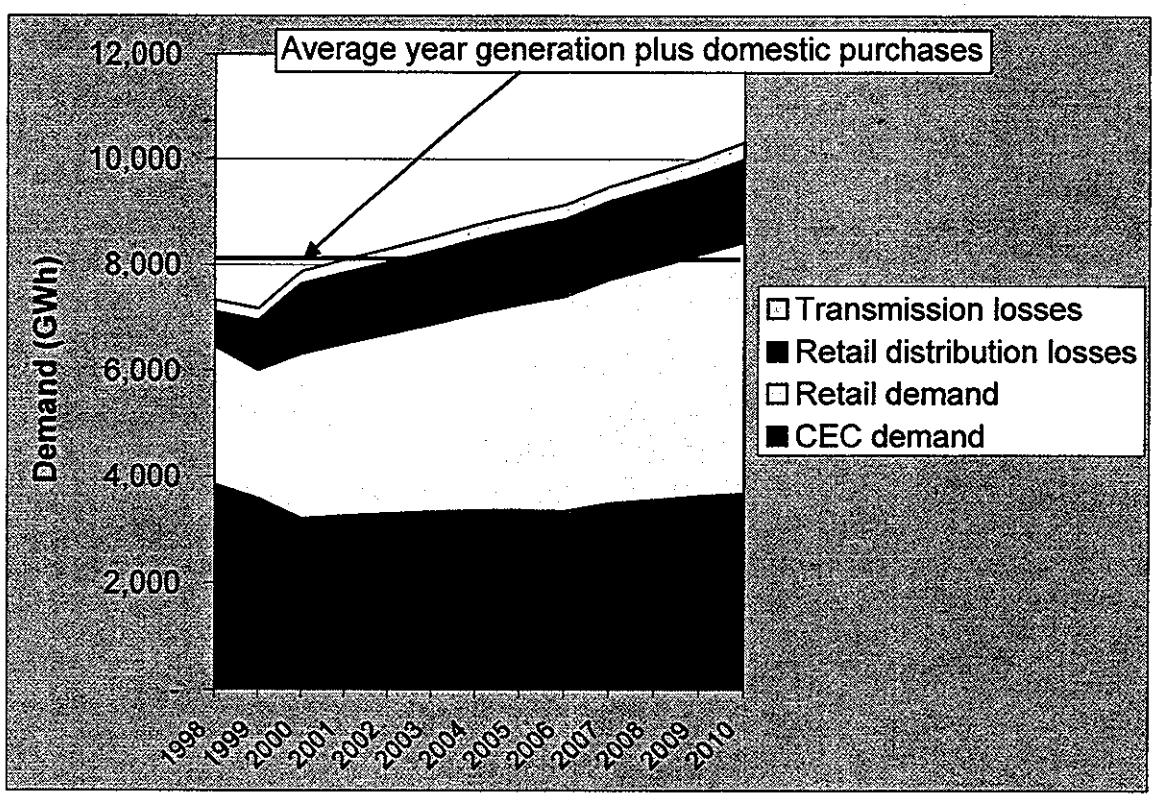


Figure 2-2. Forecast Demand from CEC and Retail Customers

ZESCO's primary sources of generation are from hydroelectric plants at Kafue Gorge on the Kafue River (900 MW) and Victoria Falls on the Zambezi (108 MW). There are also three small hydroelectric plants and several diesel plants serving small isolated systems. Hydroelectric generation has been at times limited by the availability of equipment and depends on the hydrology of the plants' respective river basins. ZESCO also purchases from the Kariba North Hydroelectric Plant. Under average hydrologic conditions, the average generation reaching the

main grid, plus purchases from Kariba, is 8100 GWh. Currently, this amount of generation and purchases allows ZESCO to export a small amount of power, but soon ZESCO will become a net importer.[1]

ZESCO's current role as an exporter depends on its membership to the Southern African Power Pool, which provides access to the regional market. If Kariba North were to become a member of the Southern African Power Pool, which is currently under consideration, and were to export a portion of its generation using ZESCO's transmission system, ZESCO would need to import power sooner than under current projections.

According to the GRZ, all new generation and transmission projects are to be developed by the private sector. The Office for Promoting Private Power Investment (OPPPI) has been formed to coordinate this activity. Consortiums have expressed interest in the 120 MW Itezhi-tezhi Project and the 600 MW Kafue Gorge Lower Project. Requests for Proposals are under development for these projects. Should they be developed ZESCO would be a potential purchaser of their output.

The pricing of supply to CEC is defined by contract at approximately 21.3 US$/MWh with escalation clauses to adjust for inflation and devaluation of the Kwacha. Exports and imports to and from the regional market are defined within individual contracts, the terms of which tend to reflect regional market conditions. With the current excess of capacity versus demand regionally, current prices for power trades are relatively low. Based on regional market studies we performed for OPPPI earlier this year, we have estimated regional prices through 2010.[2] Under average load growth conditions, these range from less than 10 US$/MWh currently to approximately 25 US$/MWh in 2010, plus transmission costs.[3] The existing level is higher than ZESCO's marginal cost of supply, so exports are attractive. At the same time the cost of imports is currently low enough that the need to import should not have a significant cost impact on ZESCO. However, by the end of the decade, the price of imports should be higher than the cost of supplying CEC and will have the effect of increasing the cost of supplying retail customers.

2.4 *Price Regulation*

The Energy Regulation Board (ERB), established by the Energy Regulation Act of 1995, has responsibility for licensing electricity facilities and for setting tariffs. The ERB has issued separate licenses for individual ZESCO generating facilities, its transmission system and its

[1] This graph is based on the forecast under Baseline assumptions, discussed in Section 3. These include that retail consumers will continue to pay less than full cost. Higher retail prices will result in lower demand. Under Best Case conditions, discussed in Section 4, ZESCO hydro generation and purchases from Kariba come much closer to meeting total demand.

[2] Nexant, Inc. (formerly part of Bechtel National, Inc.), Southern Africa Power Market Study: the Value of Additional Zambian Hydroelectric Projects and an Interconnection with Tanzania, performed for the Office for Promoting Private Power Investment under USAID funding, July 2000

[3] When supply and demand become balanced regionally, it is reasonable to expect that the regional market price will be around 45 US$/MWh. This will occur outside of the scope of our financial analysis (i.e., the next ten years) in all but the most optimistic load growth projections for regional demand.

distribution system. Contracts between parties, such as the ZESCO/CEC bulk supply agreement and any future power purchase agreement between KNB and ZESCO, is negotiated without ERB intervention or approval authority. The ZESCO/CEC bulk supply agreement has automatic price adjustments reflecting the effects of inflation.

The GRZ has made commitments to allow tariff increases to reflect increasing costs and inflation as part of the Power Rehabilitation Loan from the World Bank. Prior to 1995 the average retail electricity tariff in Zambia was under 5 US$/MWh. It was increased to 18.5 US$/MWh (expressed in year 2000 dollars) and has gradually been increased to 33 US$/MWh. Devaluation of local currency from around 50 Kwacha/US$ at the beginning of the decade to 3300 Kwacha/US$ today has tended to erode tariff levels in real terms if adjustments are not made. There is an Automatic Tariff Adjustment Formula (ATAF) now in place,but adjustments are subject to ERB approval. After disagreements in October 1999 between ZESCO and ERB on the application of the formula, two tariff increases have been made (in April and September of this year). These tariff increases only serve to maintain the tariff in real terms and do not represent a real price increase in US$ terms.

2.5 *Performance Contract*

ZESCO has operated under a performance contract since April 1996. The stated purpose of the contract is to ensure the transformation of ZESCO into a financially sound, commercially viable, and efficient utility. The signatories are the Ministers of Energy and Water Development, and of Finance and Economic Development for the GRZ, and the Board Chairman for ZESCO.

The first performance contract ended in March 1999. The subsequent contract is in effect until March 2002. Only a modest number of the targets set in the first performance contract were met and the Performance Contract Review Committee, which isrequired under the agreement, has not been established, so there is no strict mechanism for monitoring of compliance. As with the previous contract, there is no indication of the consequences of achieving or failing to achieve the targets specified in the current contract.

ZESCO's short-term general objectives are to improve financial viability, quality of supply, customer service management, and safety and health. Longer term general objectives address return on net assets, timeliness of collections, the quality of customer service, electrification, and training and development of personnel.

On the part of the GRZ, some of the specific provisions of the current contract include:

- To permit full commercial freedom to ZESCO in all areas subject to the provisions of relevant legislation, the contract itself, and ZESCO's Articles of Association.
- To decide on the preferred industry structure by 31 March 2001.
- To review the operations of the Rural Electrification Fund with a view to make it more effective and efficient.
- Agreement in principle on cost-based tariffs adequate to cover all necessary costs with minimum cross-subsidies.

ZESCO goals under the contract include:

- To achieve a 6% rate of return on assets
- To extend service to 15,000 customers per year during the contract term
- Develop a set of customer service metrics and associated performance targets
- Maintain a generation plant availability average of 90%, excluding planned shutdowns arising from implementation of the PRP
- Achieve and maintain transmission average reliability of 95%
- Reduce distribution system interruptions to1 per 100 customers per month
- Achieve a customer to employee ration of 80
- Complete the next revaluation of assets by March 2002
- Develop transfer prices for generation, transmission and distribution services by March 2001
- Provide specified percentage contributions to the capital investment program

Some reviewers have questioned the realism of some of the goals, particularly the 6% return on assets. The last tariff increase requested by the company (October 1999) would have achieved less than a 1% return on assets and it was denied by ERB. The company has yet to set up a Review Committee, as provided in the contract, to monitor operating performance.

2.6 *The Power Rehabilitation Project*

At the request of the GRZ, the World Bank is providing a concessionary loan focused on the power sector. Many components of the system are 30 to 40 years old and have received inadequate maintenance. The MEWD and ZESCO are the executing agencies under the loan. As discussed earlier, ZESCO has a specific Directorate administering preparation and execution of projects under the loan. The loan is directed primarily at ZESCO facilities and operations.[1] Figure 2-3 summarizes how the disbursements from the loan are to be allocated. The total size of the loan is approximately 200 million US$. The amount going to ZESCO generation, transmission and distribution equipment is approximately 145 million US$.

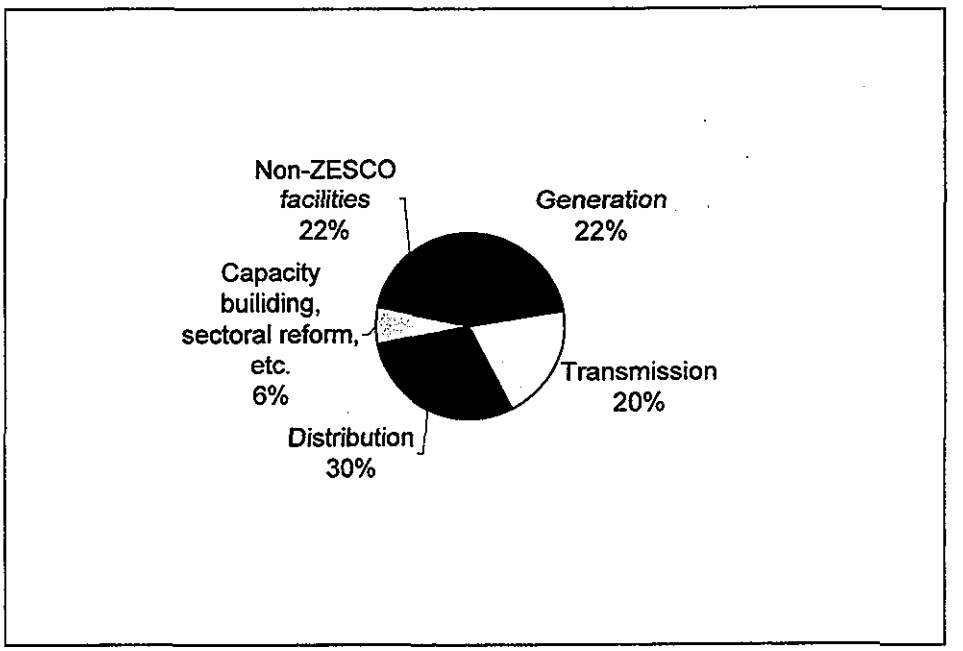


Figure 2-3. Allocation of the Power Rehabilitation Project

2.7 *Recent Operational and Financial Performance*

Table 2-1 summarizes ZESCO's recent operational and financial performance. Audited financial statements for the 1999/2000 fiscal year and numerous sales statistics were unavailable at the time of this writing. During the period covered by the table, overall sales declined and the Kwacha lost over 50% of its value. The output of Kafue Gorge was limited by its availability in all but one year. Despite sales declines, the company managed to maintain productivity levels in

[1] The exceptions are primarily those projects associated with the Kariba North Hydroelectric Plant. Approximately 22% of the loan is directed toward its rehabilitation and to the Rehabilitation and Development Program for the Gwembe-Tonga people, a group who were unsuccessfully resettled during the construction of the Kariba Dam. Relatively small amounts also go to sectoral reform in the implementation of hydropower and transmission policies.

terms of sales per employee at a fairly steady level; gains were made in terms of customers per employee.

Tariffs are expressed in year 2000 US$ per MWh in Table 2-2 so that effects of devaluation are removed from the analysis. In 1997/98, average tariff increased in real terms primarily due to the implementation of the CEC/ZESCO Bulk Supply Agreement in that year. Average tariffs have declined in real terms since then. The recent increases based on application of the ATAF have tended to maintain the tariff in real terms since last spring; however tariffs are still lower in real terms than in 1997/98.

The effect of the Kwacha devaluation has been removed from the calculation of return on assets. ZESCO's assets were last revalued in 1995/96 so that its asset base has declined considerably in real terms due to devaluation. The return on revalued assets based on a 1995/96 revaluation will be different (higher if there is a positive return) than is the case if the effect of devaluation is fully corrected. The detailed calculations associated with this implicit revaluation of assets implied by this correction is presented in Appendix B.

Table 2-1. Recent ZESCO Financial and Operational Performance

	Unit	1995/96	1996/97	1997/98	1998/99
Average exchange rate	Kwacha/US$	951	1274	1435	2155
Sales Growth					
Retail sales	%	3.4%	7.3%	-0.7%	9.2%
ZCCM/CEC	%	-0.5%	1.2%	-3.1%	-4.2%
Exports	%	31.1%	-39.7%	-4.1%	-16.1%
Overall	%	5.1%	-4.4%	-2.4%	-1.1%
Kafue Gorge availability	%	82.2%	75.3%	90.7%	82.1%
Sales/employee	MWh/employee	1690	1719	1720	1716
Customers/employee		30	35	38	41
Average tariff	US$/MWh	18.7	18.5	23.2	22.1
Return on assets	%	1.8%	-1.5%	-0.1%	1.3%
Days receivable	days	91	163	173	127

ZESCO has experienced a loss in two of the four years and it has never reached a 2% real return on assets.

The financial situation, as reflected in the low return on assets and large amount of receivables, has worsened since 1998/99. At times, during the past year ZESCO has had to resort to short-term borrowing and bank overdrafts to meet monthly payroll. ZESCO has built up large receivable from both CEC and its retail customers. The situation with CEC has begun to

33

improve since the privatization of ZCCM.[1] However, GRZ agencies often do not pay their electricity bills and collections rates from remaining retail customers varies between 45% and 75%.

A detailed presentation of ZESCO's recent financial results is provided in Appendix C.

2.8 *Cost Structure*

We performed a analysis on ZESCO's 1998/99 costs, the last year for which audited data was available at the time of this writing. We adjusted the financial results in the following way. All values were expressed in terms of year 2000 US$. Fixed asset and depreciation values since 1995/96, the time of the last revaluation of assets were expressed in year 2000 US$ to remove the effect of devaluation of the Kwacha.

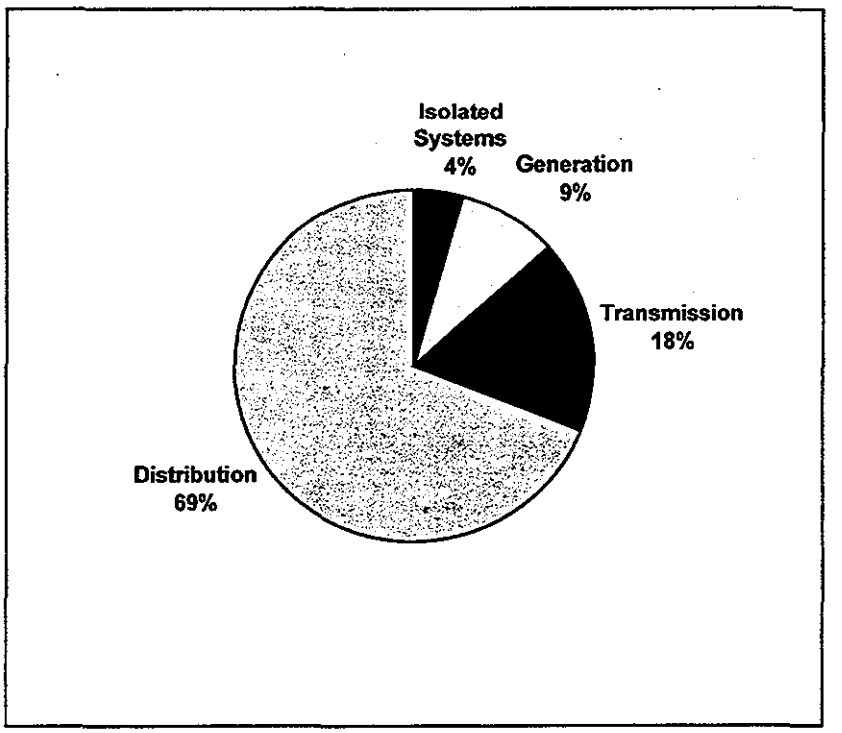


Figure 2-4. Relative Costs of Generation, Transmission and Distribution

ZESCO's cost structure in terms of the functions it performs are illustrated in Figure 2-1 based on an analysis of 1999/98 data. In that year less that 40% of ZESCO sales units were to retail customers, yet the cost of servicing these customers accounted for approximately 70% of its costs. Approximately 0.2% of sales were made to isolated systems served primarily by diesel generation while the cost of providing these sales represent about 4% of total cost.

[1]For two years prior to ZCCM privatization, ZESCO provided electricity to CEC without only partial payment under a GRZ credit agreement. By the end of 1999, CEC/ZCCM owed ZESCO about 150 million US$. This is to be reimbursed to ZESCO during the coming year as the GRZ clears ZCCM liabilities.

Figure 2-5- shows the costs according to cost category. Even when depreciation values are corrected for devaluation of the Kwacha, labor is the dominant cost for ZESCO.

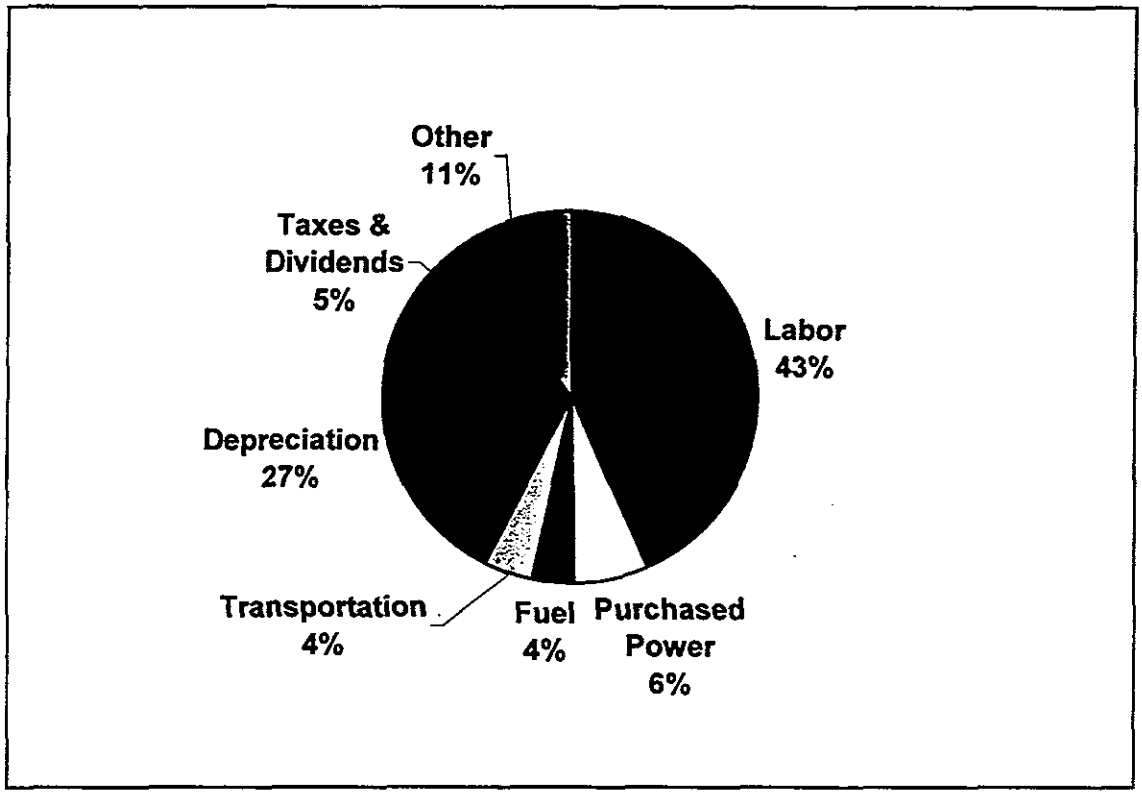


Figure 2-5. Contribution of Cost Categories

35

Section 3 Baseline Performance of ZESCO

This section provides a presentation of the expected performance of ZESCO without the introduction of any type of private participation into its operations. We recognize that changes have taken place in the power sector, and that even without the introduction of private participation ZESCO will continue to change. The analysis presented in this section provides the basis on which to compare the benefits of private participation options in later tasks. Section 4 provides a presentation of how well ZESCO could perform under best case conditions, providing another reference point for evaluating private participation options. A detailed presentation of the projected financial performance under baseline conditions is provided in Appendix D.

The following presentation first addresses the Baseline Projection for the overall company, then individual functional areas. The issue of transfer pricing will be addressed for the generation, transmission and wholesale marketing functions. We will review retail pricing issues for distribution and customer services and for isolated systems.

3.1 *Overall Projection*

Under the assumed baseline conditions, ZESCO would remain a vertically integrated utility. Based on its Performance Contract, ZESCO would begin to consider generation, transmission and distribution separately; however, there would likely be a tendency to spread problems caused by inadequate tariffs throughout all business functions.

Under the Performance Contract, ZESCO is to revalue its assets by March 2000. Such a revaluation should at a minimum correct for currency devaluation over the four years since the last revaluation. If such a revaluation is completed, the Electricity Regulation Board (ERB) will be faced with the following choices in order of impact on real tariff increases:

- Raise tariffs in real terms to reflect increased depreciation and return on assets associated with a revaluation
- Accept higher depreciation levels associated with a tariff increase, but continue to not consider return on assets in setting tariff levels
- Reject the revaluation but strive to maintain tariffs in real terms.

To date, return on assets has not been included in tariff calculations by the ERB and there has been public resistance to maintaining tariffs in real terms. For this reason, we assume for the purpose of this analysis that ERB will take a middle course and reject fully cost-reflective tariffs but allow some real tariff increase. Table 3-1 shows the implications of this scenario to the overall company.

	2000/01	2001/02	2002/03	2003/04	2004/05	2009/10
Total Sales (GWh)	6,330	6,518	6,699	6,881	7,083	8,214
Total Retail Sales (GWh)	3,115	3,254	3,392	3,537	3,708	4,577
Average overall price (US$/MWh)	27.2	27.4	27.7	28.0	28.3	29.8
Average retail tariff (US$/MWh)	33.2	33.5	33.8	34.2	34.5	36.3
Revenues	171,801	178,490	185,132	192,010	199,744	244,046
Operating expenses	145,614	141,562	139,476	148,596	157,755	265,661
Depreciation	51,998	54,650	56,249	57,165	57,949	61,366
Other expenses	(8,188)	(12,394)	7,275	7,878	10,942	11,121
Profits/(Loss)	(17,623)	(5,327)	(17,868)	(21,630)	(26,902)	(94,102)
Annual funding gap	-	-	-	-	14,018	63,534

Table 3-1. Baseline Operations of Entire Company

Under this scenario, tariffs would be high enough to meet operating expenses, but not depreciation on revalued assets. There also would be a constant balancing of priorities-repayment of debt, investment in new connections, wage increases to keep the most skilled people, deferral of essential maintenance. Moreover, under this scenario it would continue to be difficult for the company to meet income tax and dividend obligations. We have not tried to balance all these priorities. Our projections are based on meeting the goals for new connections and repaying all loans. However, in 2005/06 and beyond there is an annual funding gap as indicated that would have to be met by cutting back in some areas.

As harsh as this projection is, this overall view masks the true nature of the difficulties. The remainder of the discussion will be directed toward the following functional areas of ZESCO activities: generation, transmission, wholesale marketing, distribution and customer services, and isolated systems.

3.2 *Grid Generation*

3.2.1 Recent Performance

All of ZESCO's grid generation is hydroelectric consisting of two large plants at Kafue Gorge and Victoria Falls and three small plants at Lusiwasi, Musondo, and Chishemba. The reservoir formed by the dam Itezhi-tezhi, upstream from Kafue Gorge, provides storage for the Kafue Gorge and forms an integral part of its operation.

The Kafue Gorge Plant is responsible for nearly 90% of the grid generation in Zambia. It is equipped with automatic generation control and essentially operated by the National Control Center under normal conditions. Figure 3-1 shows the generation sent out from Kafue Gorge over its history. Most of the variation in plant output is due to varying hydrologic conditions. Original design generation was 7800 GWh under average hydrologic conditions. Actual average

generation has been much less. The plant has been demand-constrained at times, particularly early in its life. These factors are beyond the control of ZESCO. However, the availability of equipment has also constrained output at times. This is most obvious in 1989 when a cable-tray fire caused the plant to shut down for several months.

Over the past five years, the availability of Kafue Gorge has averaged approximately 83%. With proper maintenance, this level should be 90% or higher. One of the goals under ZESCO's Performance Contract is to increase the availability of all generating plants to 90% not counting outages that are expected under the Power Rehabilitation Project (PRP). Funds are earmarked for rehabilitation of both Kafue Gorge and Victoria Falls and with the rehabilitation proposed it is reasonable to assume that the 90% availability goal can be met. However, under baseline conditions, generating plant will be returned to the constrained financial situation at the end of the PRP, with associated limitations on maintenance that have been experienced in the past.

3.2.2 Projected Baseline Performance

Table 3-2 summarizes key operating performance for the 1998/99 fiscal year and projected operation of grid generation over the period under consideration. The projection is based on the following assumptions:

- There will be no change in the number of employees directly employed at the five plants
- The initial decreases in availability at Kafue Gorge are due to repairs associated with the Power Rehabilitation Project
- At the completion of the Power Rehabilitation Project, 90% availability will be obtained.
- Labor costs will rise in real terms (3% per year for management and 4% for union employees)

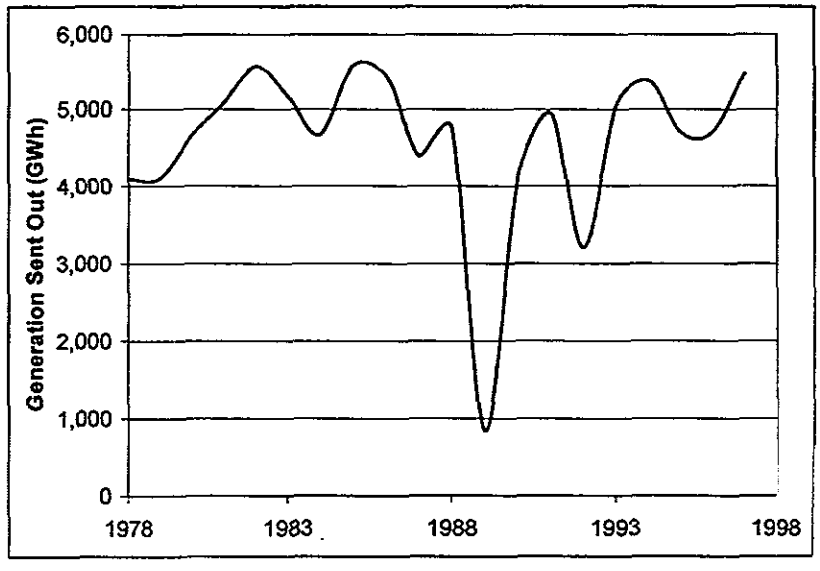


Figure 3-1. Past Production at Kafue Gorge

38

Equipment availability has limited generation at the Kafue Gorge Plant in the past and the increase of availability is expected to increase generation at the plant. Rehabilitation of Victoria Falls should also impact availability and increase generation; however the overall impact of this effect is low and was not include in our analysis.

As a point of reference, estimated operating costs for ZESCO Generation are approximately 10% of the contract selling price to CEC. Based on the assumptions used for the baseline analysis, the real operating costs for grid generation should rise by about 2% over the next 10 years.

Table 3-2. Projected Key Operating and Financial Parameters for Grid Generation Under Baseline Conditions

	2000/01	2001/02	2002/03	2003/04	2004/05	2009/10
Generation (GWh)	**5,411**	**5,706**	**6,000**	**6,000**	**5,921**	**5,529**
Kafue Gorge	4,711	5,006	5,300	5,300	5,221	4,829
Victoria Falls	633	676	760	760	749	692
Small Hydro	40	40	40	40	40	40
Productivity (MWh/employee)[1]	**14,315**	**15,094**	**15,873**	**15,873**	**15,665**	**14,627**
Kafue Gorge[2]	24,410	25,936	27,461	27,461	27,054	25,020
Victoria Falls	5,278	5,630	6,333	6,333	6,240	5,770
Small Hydro	615	615	615	615	615	615
Availability (%)						
Kafue Gorge	80%	85%	90%	90%	89%	82%
Victoria Falls	75%	80%	90%	90%	89%	82%
Operating expenses (thousands year 2000 US$)						
Labor	6,434	6,643	6,858	7,103	7,357	8,772
Maintenance	2,892	3,008	3,128	3,253	3,383	4,116
Transportation	261	232	232	232	232	232
Total Operating Costs	**9,587**	**9,882**	**10,218**	**10,588**	**10,972**	**13,120**
US$/MWh	**1.8**	**1.7**	**1.7**	**1.8**	**1.9**	**2.4**

1 Productivity values are based on estimated employee directly employed at plants.
2 Itezhi-tezhi employers are considered part of Kafue Gorge for productivity calculation.

3.2.3 Baseline Transfer Price for Grid Generation

The costs that are reflected in a transfer price for grid generation depend on how it is to be applied. If capital decisions are to be made centrally, the manager of a business unit has little control over capital-related costs such as depreciation, return on investment and income taxes. In such a case, it is appropriate for the transfer price to reflect operating costs only. This type of transfer price acts as a mechanism to encourage efficient operations.

However, if the goal of forming business units is to simulate real business operations, capital-related decisions should be decentralized. Managers are not only responsible for the operating efficiency of their business, but also have responsibility for capital versus labor trade-offs, capital investment requirements to maintain, or increase, equipment availability, and tax implications of these decisions. In this case, the transfer price should reflect capital-related, as well as operating costs. Capital-related costs include depreciation, return on investment and income taxes.

Table 3-3 summarizes the projected cost-reflective transfer prices for grid generation for the entire ZESCO system .[1] The capital-related component reflects a revaluation that corrects for the devaluation of the Kwacha over the past four years. The full ten-year levelized transfer price for grid generation is slightly under 6.5 US$/MWh (i.e., 6.5 cents/kWh).

The transfer prices developed are based on the assumption that the only services provides by grid generation is energy delivery. However, the Kafue Gorge plant also provides system regulation services, which makes it a particularly valuable asset.

Table 3-3. Transfer Price of Grid Generation Under Baseline Conditions

	2000/01	2001/02	2002/03	2003/04	2004/05	2009/10
Costs (thousand US$)						
Operating Costs	9,587	9,882	10,218	10,588	10,972	13,120
Capital- related Costs	22,531	26,324	28,451	29,364	28,183	23,928
Total	32,118	36,207	38,669	39,952	39,155	37,048
Generation (GWh)	5,384	5,721	6,100	6,100	6,010	5,561
Annual cost (US$/MWh)	6.0	6.3	6.3	6.5	6.5	6.7
Levelized operating cost transfer price (US$/MWh)	1.9					
Levelized transfer price (US$/MWh)	6.4					
Before-tax real return on revalued assets	6%					

[1] If applied to individual plants, this rate would result in differing levels of profitability.

40

3.3 *Transmission*

3.3.1 Projected Baseline Performance

Performance Contract goals include achievement of 95% transmission reliability throughout the contract period and not more than .03 interruptions per year per 1000 km of 330 kV line (.04 per year per 1000 km of 220 kV line). The intent of the investments under the PRP with respect to transmission is to increase reliability and achieve some reduction in transmission losses. However, the projected improvements are small compared to current performance; rather, the investments are to prevent future deterioration. Therefore, our projection is based on an assumption of maintaining current reliability and transmission loss levels. Table 3-4 summarizes the performance of the transmission system for 1998/99 and projections for the coming ten years under baseline conditions.

Table 3-4. Projected Key Operating and Financial Parameters for Transmission Under Baseline Conditions

	2000/01	2001/02	2002/03	2003/04	2004/05	2009/10
Transmission services (GWh)	**7,978**	**8,188**	**8,390**	**8,594**	**8,823**	**10,063**
Wholesale	7,247	7,457	7,659	7,863	8,092	9,332
Wheeling	731	731	731	731	731	731
Productivity (MWh/employee)[1]	**33,805**	**34,696**	**35,551**	**36,416**	**37,386**	**42,640**
Losses (%)	**3%**	**3%**	**3%**	**3%**	**3%**	**3%**
Operating expenses (thousands year 2000 US$)						
Labor	4,753	4,844	4,938	5,116	5,302	6,337
Maintenance	4,266	4,436	4,614	4,798	4,990	6,071
Transportation	1,566	1,627	1,691	1,757	1,825	2,210
Total Operating Costs	**10,585**	**10,908**	**11,242**	**11,671**	**12,117**	**14,618**
US$/MWh	**1.3**	**1.3**	**1.3**	**1.4**	**1.4**	**1.5**

1 Productivity values are based on estimated employees directly employed in transmission activities.

41

3.3.2 Baseline Transfer Price for Transmission

Table 3-5 summarizes the projected transfer price requirements for the transmission system based on a revaluation of assets to reflect devaluation of the Kwacha since 1996 and a 6% return on revalued assets. There are numerous ways that this price could be structured. For example, depending on pricing approach, it could have location-specific components, various methods of sharing the price between generators and users, capacity charges and other components. The value shown in Table 3-5 represents the overall price level.

Table 3-5. Transfer Price of Transmission Under Baseline Conditions

	2000/01	2001/02	2002/03	2003/04	2004/05	2009/10
Costs (thousand US$)						
Operating Costs	10,585	10,908	11,242	11,671	12,117	14,618
Capital- related Costs	35,073	37,312	38,371	39,291	37,998	36,337
Total	45,657	48,220	49,613	50,963	50,115	50,955
Transmission (GWh)	7,978	8,188	8,390	8,594	8,823	10,063
Annual cost (US$/MWh)	5.7	5.9	5.9	5.9	5.7	5.1
Levelized operating cost transfer price (US$/MWh)	1.4					
Levelized transfer price (US$/MWh)	5.6					
Before-tax real return on revalued assets	6%					

V2

3.4 *Wholesale Marketing*

The wholesale marketing function represents the activity of purchasing generation (both internal to ZESCO, from producers such as Kariba North and importing) and selling wholesale (both direct sales such as to CEC and internally to ZESCO distribution). The Generation and Transmission Directorate handles wholesale metering and billing; ZESCO does not have a formal wholesale marketing organization. Nevertheless, this is the most profitable portion of its business.

Table 3-6 summarizes the projected operation of the Wholesale Marketing function over the next decade. The Wholesale Marketing function would realize a financial surplus over the next several years (We estimate until 2014/15 under baseline conditions) if it were to pay transfer charges to Generation and Transmission developed in previous sections, purchase power from Kariba, import power at market rates to meet demand, and supply CEC and ZESCO Distribution. The Wholesale Marketing function supplies ZESCO Distribution at cost; the surplus comes from the difference in supply costs and the CEC contract price. This scenario shows that supply costs from ZESCO Generation and Transmission will increase moderately over time, reflecting real cost increases. More importantly, both the amount and price of imports are expected to increase over time. The quantity of imports will increase as demand increases and ZESCO Generation remains essentially fixed. The price will increase as regional supply and demand come closer to being in balance. If ZESCO purchases from one of the Zambian hydro projects being considered for development (i.e., Kafue Gorge Lower or Itezhi-tezhi), rather than importing, the price will likewise be higher than current regional market levels.

Currently, the surplus realized by the Wholesale Marketing function acts to subsidize ZESCO Distribution. This approach could continue to be used for the next few years, although the surplus will diminish over time. By 2014/15 (not shown on Table 3-6), under baseline conditions, the Wholesale Marketing function would also be operating at a loss and would no longer be a source of support for ZESCO Distribution.

43

Table 3-6. Project Key Operating and Financial Parameter for Wholesale Marketing

	2000/01	2001/02	2002/03	2003/04	2004/05	2009/10
Demand (GWh)	**7,646**	**7,855**	**8,055**	**8,258**	**8,486**	**9,712**
ZESCO Distribution	4,430	4,591	4,748	4,913	5,111	6,074
CEC	3,215	3,264	3,307	3,344	3,376	3,638
Exports	-	-	-	-	-	-
Supply (GWh)	**7,882**	**8,098**	**8,304**	**8,513**	**8,749**	**10,012**
ZESCO Generation	5,384	5,721	6,100	6,100	6,010	5,561
KNBC	2,000	2,000	2,000	2,000	2,000	2,000
Imports/Purchases	498	377	204	413	739	2,451
CEC Wheeling (MW)	*250*	*262*	*279*	*296*	*317*	*420*
(thousands year 2000 US$)						
Revenues						
ZESCO Distribution	41,573	45,515	48,690	51,200	52,494	102,219
CEC	68,486	69,525	70,441	71,233	71,900	77,485
Exports	-	-	-	-	-	-
Total Revenues	**110,059**	**115,041**	**119,131**	**122,433**	**124,394**	**179,704**
Operating expenses						
Supply costs	94302	100183	102907	108022	110112	169579
ZESCO Generation	*32118*	*36207*	*38669*	*39952*	*39155*	*37048*
ZESCO Transmission	*45175*	*47737*	*49128*	*50482*	*49630*	*49591*
Other	*17009*	*16240*	*15111*	*17588*	*21327*	*82940*
Labor	184	187	189	195	201	233
Total Operating Costs	**94,486**	**100,370**	**103,096**	**108,217**	**110,313**	**169,812**
Operating Margin						
thousands US$	**15,573**	**14,671**	**16,035**	**14,216**	**14,081**	**9,892**
US$/MWh	**2.04**	**1.87**	**1.99**	**1.72**	**1.66**	**1.02**

44

3.5 *Distribution and Customer Service*

For purposes of this analysis, we have combined the distribution and customer service functions and will refer to them as ZESCO Distribution. It is this function that employs the greatest number of people at ZESCO, maintains the low voltage wires and transformers, connects new customers, and carries out the tasks of retail meter reading, billing and payment collection.

Statistics have only begun to be kept; however, most would judge that ZESCO Distribution falls short in most of these areas. The standards established for ZESCO Distribution are reasonable for a utility in a developed country and are reasonable goals for ZESCO. However, it would be useful to establish a transition plan for achieving these goals, rather than having standards that consistently are not met.

Table 3-7 summarizes the projected operation of ZESCO Distribution. ZESCO has been increasing productivity, reducing the number of unrecoverable accounts and decreasing receivables for the distribution function. The projection also reflects goals in connecting new customers, and projects retail prices to increase by 1% per year in real terms. This assumption reflects the current difficulties in maintaining real price levels and the ability to partially mask financial losses at the distribution level with surpluses realized through the CEC contract. However, the ATAF can do no more than maintain real price levels. Under baseline assumptions, ZESCO will apply for and receive moderate real tariff increases in addition to the ATAF. With these moderate tariff increases, the Distribution function will maintain about the same level of unprofitability throughout the decade. The surpluses realized through wholesales sales can offset a small portion of these losses. However, a combination of more severe cost-cutting and scaling back of needed investments would probably be required to minimize financial losses in Distribution. Some improvement in billing and collections will likely take place, but overall the quality of service would likely deteriorate over the decade.

45

Table 3-7. Projected Key Operating and Financial Parameters for Distribution Function Under Baseline Conditions

	2000/01	2001/02	2002/03	2003/04	2004/05	2009/10
Retail sales (GWh)	3,088	3,225	3,361	3,505	3,674	4,534
Productivity (MWh/employee)	1,096	1,206	1,261	1,289	1,317	1,458
Technical & non-technical losses (%)	30%	29%	29%	28%	28%	25%
Unrecoverable accounts (%)	20%	15%	10%	10%	10%	10%
Receivables (days)	75	60	60	45	45	30
New connections	15,000	30,000	45,000	60,000	80,000	180,000
(thousands year 2000 US$)						
Revenues	102,378	108,000	113,695	119,754	126,784	164,427
US$/MWh	33.2	33.5	33.8	34.2	34.5	36.3
Operating expenses (thousands year	143,397	141,715	142,911	150,887	158,371	247,340
Supply cost from Wholesale Marketer	41,573	45,515	48,690	51,200	52,494	102,219
Labor	58,251	58,129	60,914	64,491	68,663	92,214
Maintenance	16,593	16,385	16,990	18,024	19,228	26,076
Allowance for Bad Debt	23,899	18,485	12,992	13,717	14,397	22,485
Transportation	3,081	3,201	3,325	3,455	3,589	4,345
Depreciation	34,379	35,713	36,548	36,848	37,248	39,248
Other expenses	(2,384)	(5,234)	7,240	7,787	7,405	5,109
Profits/(losses)	(73,014)	(64,193)	(73,004)	(75,769)	(76,241)	(127,271)

1 Productivity values are based on estimated employees directly employed in distribution activities to meet productivity projections for case.

46

3.6 *Isolated Systems and Rural Electrification*

Our analysis indicates that the full cost of supply to isolated systems based on diesel generation is nearly 15 times the retail tariff. Thus operating the isolated systems results in a financial loss to ZESCO. This is not sustainable, particularly if the goal of the government is to increase electricity access in rural areas.

47

Section 4 Best-Case Performance of ZESCO

This section provides a presentation of our estimated best case performance of ZESCO. While it is our judgment that such performance is usually only achieved with significant private sector involvement, our analysis is not associated with a particular proposal for private sector involvement. This is be done as part of Task 2.

The best-case conditions developed provide a set of benchmarks for the various functional areas of ZESCO's activities, recognizing its size and customer base, the physical characteristics of its power system, the geography of the country, and regional market. As such we believe they are reasonable goals that can be achieved. However, in some cases, they may differ from the goals in ZESCO's Performance Contract guidelines developed by the Energy Regulation Board (ERB).

A detailed presentation of the projected financial performance under best-case conditions is provided in Appendix E.

As with the analysis of baseline operation in the previous section, results are presented according the following functional areas of ZESCO activities: generation, transmission, wholesale marketing, distribution and customer services, and isolated systems. The issue of transfer pricing and retail pricing will be addressed to reflect what we consider best-case conditions.

As will be demonstrated, the most dramatic difference between the Best Case and the Baseline performance is in the Distribution function, although there are improvements projected in all areas of ZESCO's operations.

4.1 *Grid Generation*

4.1.1 Projected Best Case Performance

Figure 4-1 shows that the primary performance difference between Baseline and Best Case conditions for Grid Generation is the future availability of Kafue Gorge. The deterioration in availability under Baseline conditions, which results from deferred maintenance due to continuing poor overall ZESCO financial performance is not experienced under Best Case conditions.

Table 4-1 summarizes the projected performance of Kafue Gorge, Victoria Falls and the three small hydro plants under the Best Case conditions. Higher generation at Kafue Gorge results in higher generation and productivity.

4.1.2 Best Case Transfer Price for Grid Generation

The increased availability of Kafue Gorge results in a slightly lower transfer price for generation of 6.2 US$/MWh versus 6.4 US$/MWh under Baseline conditions.

48

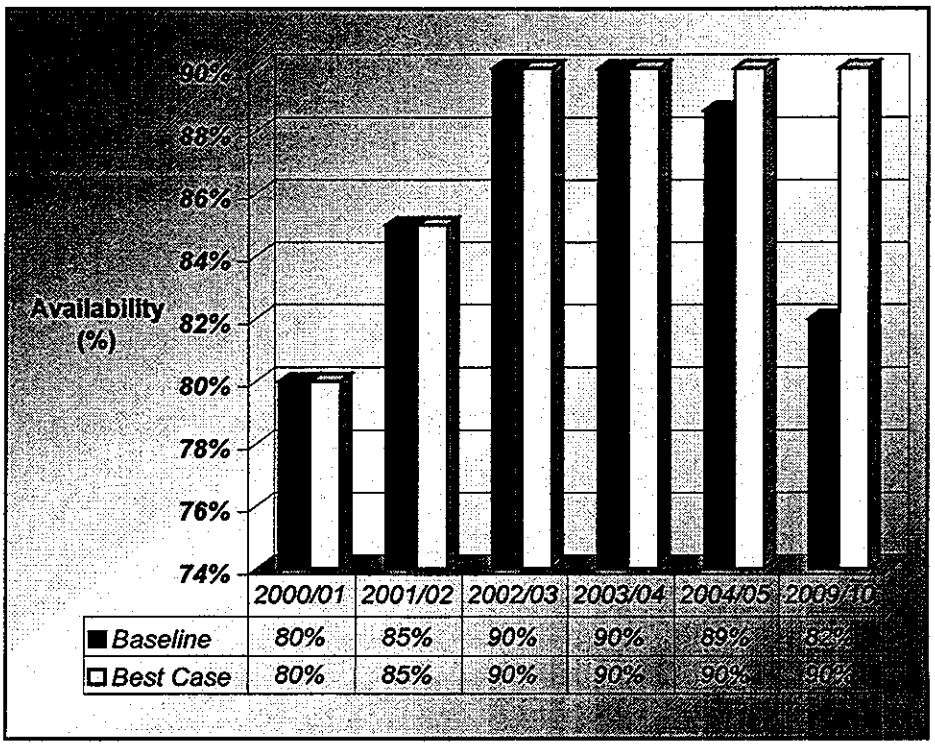


Figure 4-1 Kafue Gorge Availability Under Baseline and Best Case Assumptions

Table 4-1 Projected Key Operating and Financial Parameter for Grid Generation Under Best Case Assumptions

	2000/01	2001/02	2002/03	2003/04	2004/05	2009/10
Generation (GWh)	**5,411**	**5,706**	**6,000**	**6,000**	**5,921**	**5,529**
Kafue Gorge	4,711	5,006	5,300	5,300	5,300	5,300
Victoria Falls	633	718	760	760	760	760
Small Hydro	40	40	40	40	40	40
Productivity (MWh/employee)[1]	**14,315**	**15,094**	**15,873**	**15,873**	**15,665**	**14,627**
Kafue Gorge[2]	24,410	25,936	27,461	27,461	27,461	27,461
Victoria Falls	5,278	5,981	6,333	6,333	6,333	6,333
Small Hydro	615	615	615	615	615	615
Availability (%)						
Kafue Gorge	80%	85%	90%	90%	90%	90%
Victoria Falls	75%	85%	90%	90%	90%	90%
Operating expenses (thousands year 2000 US$)						
Labor	6,401	6,574	6,753	6,994	7,244	8,637
Maintenance	2,892	3,008	3,128	3,253	3,383	4,116
Transportation	261	232	232	232	232	232
Total Operating Costs	**9,554**	**9,814**	**10,113**	**10,479**	**10,859**	**12,985**
US$/MWh	**1.8**	**1.7**	**1.7**	**1.7**	**1.8**	**2.3**

1 Productivity values are based on estimated employee directly employed at plants.
2 Itezhi-tezhi employers are considered part of Kafue Gorge for productivity calculation.

49

4.2 *Transmission*

It is expected that higher retail prices will have a dampening effect on ZESCO's Distribution sales. The lower sales volume will increase the per unit cost of transmission from 5.6 US$/MWh to 5.8 US$/MWh. We do not project any other differences from Baseline results for the Transmission function.

4.3 *Wholesale Marketing*

Table 4-2 summarizes the projected financial performance of the Wholesale Marketing function under Best Case condition. Under Baseline conditions, increased import requirements and high import costs are projected to make the Wholesale Marketing function unprofitable by the end of the decade. However, lower retail demand under Best Case conditions reduces import/purchase demands, which increases the financial surpluses achieved by the Wholesale Marketing function under Baseline conditions and allows it to remain profitable throughout the timeframe considered.

Table 4-2 Projected Financial Performance of the Wholesale Marketing Function Under Best Case Conditions

	2000/01	2001/02	2002/03	2003/04	2004/05	2009/10
Demand (GWh)	**7,515**	**7,543**	**7,884**	**7,883**	**7,881**	**8,164**
ZESCO Distribution	4,270	3,837	3,656	3,648	3,683	4,498
CEC	3,244	3,293	3,336	3,373	3,404	3,667
Exports	-	413	892	862	794	-
Supply (GWh)	**7,747**	**7,763**	**8,100**	**8,100**	**8,100**	**8,417**
ZESCO Generation	5,384	5,763	6,100	6,100	6,100	6,100
KNBC	2,000	2,000	2,000	2,000	2,000	2,000
Imports/Purchases	363	-	-	-	-	317
CEC Wheeling (MW)	*250*	*253*	*259*	*268*	*281*	*378*
(thousands year 2000 US$)						
Revenues						
ZESCO Distribution	40,147	41,872	45,415	46,184	45,545	51,943
CEC	69,100	70,139	71,054	71,846	72,514	78,099
Exports	-	3,917	8,488	8,127	7,548	-
Total Revenues	**109,247**	**115,928**	**124,958**	**126,157**	**125,607**	**130,041**
Operating expenses						
Supply costs	92926	96122	100059	102948	101682	110857
ZESCO Generation	*32085*	*36138*	*38564*	*39843*	*39042*	*36912*
ZESCO Transmission	*45112*	*47609*	*48933*	*50279*	*49420*	*49338*
Other	*15729*	*12375*	*12563*	*12826*	*13220*	*24607*
Labor	181	182	182	188	193	224
Total Operating Costs	**93,108**	**96,304**	**100,241**	**103,136**	**101,876**	**111,081**
Operating Margin						
thousands US$	**16,139**	**19,624**	**24,716**	**23,021**	**23,731**	**18,961**
US$/MWh	**2.15**	**2.60**	**3.14**	**2.92**	**3.01**	**2.32**

50

4.4 *Distribution and Customer Service*

As stated earlier, the difference between Best Case and Baseline results are greatest for the Distribution function. Table 4-3 summarizes some of the key differences for the year 2005/05. Retail pricing is at the top of the list with its impact on retail demand. While improvements in the Distribution function are made under Baseline conditions, additional improvements can be made to further reduce technical and non-technical losses, unrecoverable accounts, receivables. These are shown under the Best Case scenario. Productivity levels at ZESCO are typically measured in customers or sales per employee. We recommend that productivity levels be analyzed and monitored by function for better comparison purposes with other utilities. We have conducted a detailed analysis of the level of productivity that should reasonably be expected from ZESCO Distribution function (Appendix F). Based on this, ZESCO's distribution productivity should be between 1700 and 1800 MWh sales per distribution employee. In terms of customers per distribution employee, the benchmark should be between 170 and 180.

Table 4-3 Comparison of Baseline and Best Case Distribution Assumptions for 2004/05

	2004/05	
	Baseline	Best Case
Retail price (US$/MWh)	53.2	61.2
Demand (GWh)	3,674	3,145
Technical & non-technical losses (%)	28%	14%
Unrecoverable accounts (%)	10%	6%
Receivables (days)	45	30
Productivity (MWh/Distribution employee)	1,317	1,627

The productivity gains outlined above can be partially accomplished through growth in sales; however reductions in staff are projected under both Baseline and Best Case scenarios . Figure 4-2 provides a comparison of staffing levels for the Distribution function under both conditions. These levels include allocated Human Resource and Corporate Development and Accounting staff to support the Distribution function.

Table 4-4 summarizes the projected performance of the Distribution function under Best Case conditions. At 55 US$/MWh, the Distribution function is profitable, pays taxes and dividends, can finance modernization measures beyond what is covered by PRP and can support expansion through internal financing.

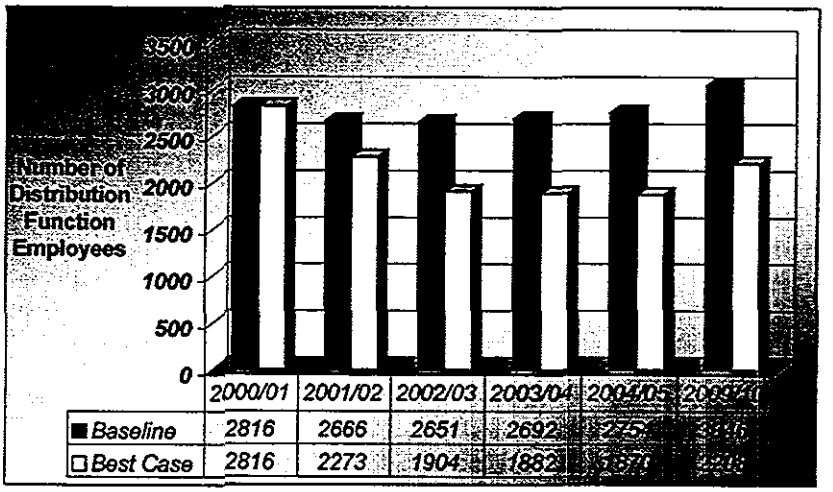


Figure 4-2 Projected Number of Employees for Distribution Function

Table 4-4 Projection of Key Operations and Financial Parameters for Distribution Under Best Case Conditions

	2000/01	2001/02	2002/03	2003/04	2004/05	2009/10
Retail sales (GWh)	2,976	3,055	3,092	3,101	3,145	3,937
Productivity (MWh/employee)	1,057	1,321	1,585	1,606	1,627	1,648
Technical & non-technical losses (%)	30%	20%	15%	15%	14%	12%
Unrecoverable accounts (%)	6%	6%	6%	6%	6%	6%
Receivables (days)	60	60	60	45	30	30
New connections	15,000	30,000	45,000	60,000	80,000	180,000
(thousands year 2000 US$)						
Revenues	113,085	149,157	168,773	192,822	192,427	221,629
US$/MWh	38.0	48.8	54.6	62.2	61.2	56.3
Operating expenses (thousands year	122,330	113,444	109,559	112,105	113,917	151,871
Supply cost from Wholesale Marketer	40,147	41,872	45,415	46,184	45,545	51,943
Labor	55,877	48,003	42,357	43,504	45,205	67,298
Maintenance	15,991	13,659	11,982	12,332	12,839	19,302
Allowance for Bad Debt	7,235	6,710	6,480	6,630	6,738	8,982
Transportation	3,081	3,201	3,325	3,455	3,589	4,345
Depreciation	34,379	35,713	36,548	36,848	37,248	39,248
Other expenses	(2,384)	(5,556)	6,562	6,536	5,293	(1,276)
Profits/(losses)	(41,240)	5,556	16,104	37,333	35,969	31,785

1 **Productivity values are based on estimated employees directly employed in distribution activities to meet productivity projections for case.**

4.5 *Pricing Issues*

Historically, the gas and electricity industries were considered monopolies and prices were heavily regulated. The regulatory model used by power sectors that operated on a financially independent basis allowed for the reimbursement of "reasonable" costs as well as a "reasonable" rate of return on investment. We refer to this as cost-based regulation.

Recently, competition was introduced in gas production and electricity generation. Gas wellhead prices were deregulated and electricity generation market approaches were introduced to the electric sector. However, the natural monopoly characteristics of the transmission and distribution systems continue to persist. Continued cost-based regulation of these areas is one alternative. Incentive-based regulation is another regulatory model that has been applied to transmission and distribution. Advocates of incentive regulation claim that it can provide better financial incentives for utilities to lower electricity costs and that is more flexible and market-based. It is also often argued that incentive regulation can reduce regulatory oversight of the service provider planning process, allowing utilities to be cost-driven and customer-driven rather than regulator-driven.

The fundamental principle behind incentive regulation is that good service provider performance should lead to higher profits, and poor performance should lead to lower profits. While this general principle is widely accepted, regulators designing incentive regulation

mechanisms will need to decide what "good service provider performance" consists of and how a ratemaking formula can be designed to link performance with profits.

Traditional cost-based regulation involves basing prices on annual cost reviews. One of its greatest shortcomings is that the service provider's incentive to reduce costs is severely limited because profit levels are not directly affected by costs. The distinguishing characteristic of incentive regulation methodologies is that either prices or revenues for services are set at a fixed level for 3 to 5 years. Cost reductions during the 3- to 5-year time period translate into greater profits, giving the service provider an incentive for more efficient operation. After the 3- to 5-year time period, prices (or revenue levels) are reset to reflect the more efficient operation so that customers can benefit from lower prices over the long term.

The most commonly discussed incentive regulation mechanism is the "price cap." Maximum prices in real terms are defined for each customer class, in the case of retail tariffs, or for particular types of service, such as high-voltage transmission. A price cap scheme begins by setting the initial rates for each customer class fairly, based on an appropriate allocation of costs. The price cap is then allowed to increase from year to year to allow for inflation, but is also required to decline over time to encourage increased productivity. The generic price cap formula can be defined as:

$$Price_{(t)} + Z_{(t)} \leq Price_{(t-1)} * (1 + I - X) + Z_{(t-1)}$$

where $Price_{(t)}$ is the maximum price that can be charged to a customer class (for retail tariffs) or for a particular service for the current period for services subject to the price cap; $Price_{(t-1)}$ is the average price charged to the same class or classes during the previous period; "I" is the inflation factor; "X" the productivity improvement factor; and "Z" represents the contribution to price of any incremental costs that are not subject to the cap. The costs not subject to the price cap mechanism can be regulated through cost-based approaches. Cost-based approaches, including cost allocation, are commonly used in developing the base-year price cap.

Revenue caps are based on the same principle as price caps – where the cap in one year is based on the previous year with adjustments for inflation and productivity – and can achieve many of the same objectives as price caps. Its generic form is as follows:

$$Revenue_{(t)} + Z'_{(t)} \leq Revenue_{(t-1)} * (1 + I - X) + Z'_{(t-1)}$$

where Revenue(t) is the maximum revenue to be collected from a given customer class (for retail tariffs) or for a particular service in a given period and Z't is the revenue to be collected to cover costs not subject to the revenue cap. Once the revenue cap is set, prices are defined by projected sales. Revenue caps provide significantly different incentives. They tend to stabilize revenue to the service rather than price; however, they may be appropriate for regulating costs that are not sensitive to the level of sales.

Another feature of most incentive regulation methodologies is that the service provider is generally given a certain amount of flexibility in pricing. The price (or revenue) levels defined are maximum levels or caps. Customer discounts are allowed as long as other customers stay at or below the maximum levels. When applied properly, this allows the service provider to target customers that are particularly price sensitive and provide competitive prices if it is in its financial interest to do so. The use of this feature requires clearly defined conflict-of-interest regulation. For example, it is clearly against the public interest for a service provider to provide a discount to a subsidiary company to gain a

competitive advantage. If service providers and major portions of a customer class are state owned, as is the case in Zambia, care would have to be taken in applying price flexibility since it could be used as a mask for state subsidies.

Efficient operation and low costs are not the only objectives of energy regulation. Regulators are also concerned about such issues as price stability, price equity, reliability, quality of service, promotion of energy efficiency, and environmental protection. The incentives used to reduce costs under incentive regulation can potentially affect quality of service. Targeted penalties, incentives, and performance standards have been used in conjunction with incentive regulation methodologies to address many performance-related issues.

Figure 4-3 illustrates how incentive regulation methodologies can be tailored to regulatory priorities. An often advertised potential advantage of incentive regulation methodologies is the reduced amount of regulatory oversight in comparison to cost-based methodologies. However, Figure 3-1 shows that incentive regulation requires its share of regulatory involvement in methodology design and implementation. Designing a incentive regulation mechanism to achieve any one particular objective can frequently require detailed analysis. For example, setting an appropriate productivity performance index requires a complicated and sometimes contentious analysis of industry costs and operating trends. Most incentive regulation mechanisms need to be reviewed over time to monitor their effectiveness, assess ratepayer and shareholder impacts, and prevent unintended outcomes. They then need to be modified where appropriate.

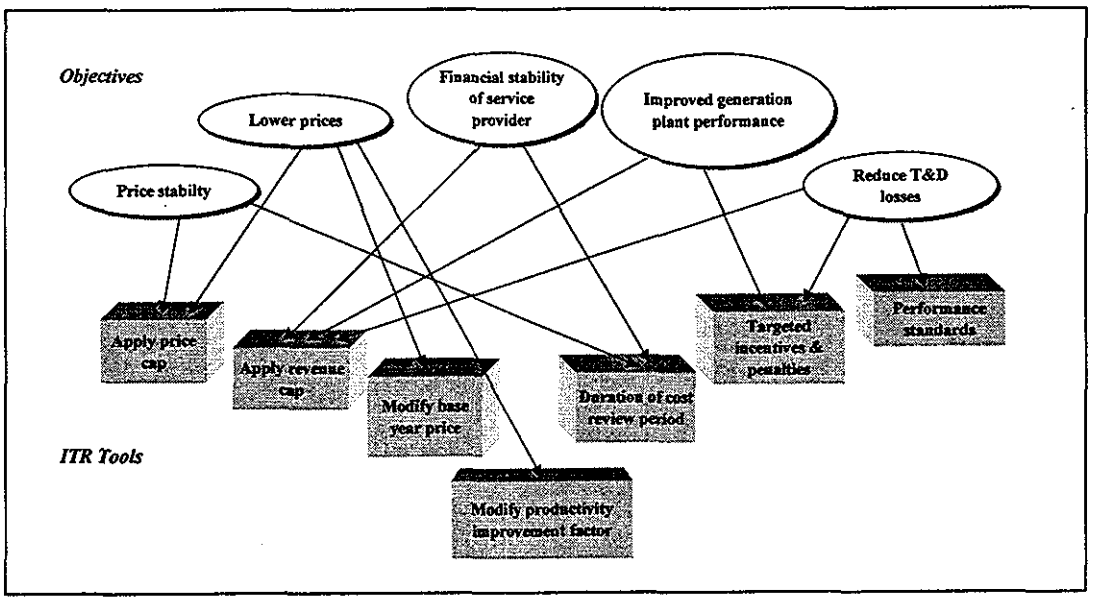


Figure 4-3 Incentive Regulation Options for Meeting Various Regulatory Objectives

4.6 *Isolated Systems and Rural Electrification*

Best Conditions for Isolated Systems involve transparent accounting, decentralized decision-making, involvement of the private sector, involvement of local population to reduce costs, utilization of joint-funding mechanisms and providing MEWD with a strong policy-making

role. The probable need for subsidies and the need for transparency means that the operation of isolated systems should have separate accounting and financing from grid-connected operations. We are inclined to think that isolated system operation should be totally separated from ZESCO operations. For example, the use of concessioning based on a combination of bidding for the lowest subsidy from the Rural Electrification Fund and more flexible pricing than currently exists, may be a way to reduce costs, encourage innovation and provide more separation from political influences.

Section 3 provided a projection of ZESCO operations under status quo condition and Section 4 provided a projection of what we consider the best achievable performance. This section provides a presentation of how private participation can help improve "status quo" performance to "best achievable" results. This presentation is general in nature; more specific private participation options are developed and evaluated as part of Task 2.

5.1 *World Experience in Private Participation in the Power Sector*

A healthy power sector requires a periodic infusion of capital for repair and expansion. The PRP is helping ZESCO provide this on a temporary basis and ZESCO's recently revived wholesale business is providing profits that can utilized for these purposes for a period of time. However, even in the relatively near term, ZESCO will need sources of capital that it can only obtain from the private sector.

Power sector reform and privatization began in the early 1980s and has quickly spread to numerous developed and developing countries. As of the end of 1999, more than 70 developing countries had electricity sector projects with participation by private investment, totaling over US $160 billion. Appendix H provides case studies of power sector reform activities in key countries as well as a summary for sub-Saharan Africa.

Table 5-1 summarizes the private sector capital investment in developing countries from 1990 to 1998. The meaning for full and partial divestiture is self-evident. Greenfield project projects primarily represent generation IPPs. O&M contracts are strictly for the outsosurcing of management operations and maintenance activities. Other types of management contracts have been utilized during this time period, but are not part of the database. "O&M with Major Capital Investment" include concession agreements.

Table 5-1 Private Participation in the Power Sector- 1990-98 (millions US$)

	Full Divestiture	Partial Divestiture	Greenfield	O&M	O&M with Major Capital Investment	Total	
Africa	-	1,602	1,099	1	735	3,437	*2%*
East Asia	11	9,529	44,788	-	1,487	55,814	*35%*
Eastern & Central Europe & former USSR	2,978	4,487	4,516	-	-	11,981	*8%*
Latin America	10,153	37,741	15,095	-	4	62,994	*40%*
Middle East	-	-	980	-	4,760	5,739	*4%*
South Asia	-	1,087	16,772	-	37	17,896	*11%*
Total	13,143	54,447	83,250	1	7,023	157,862	
	8%	*34%*	*53%*	*0%*	*4%*		

Source: World Bank Private Investment Data Base, April 2000

The results are illustrative of some of the lessons leaned over the past decade:

- **Power sector reform and liberalized markets attract capital investment.** The majority of power sector reforms include direct investment by the private sector either through the purchase of existing facilities or through greenfield projects. East and South Asia and Latin America have the most liberalized markets and represent 86% of

57

the capital investment in developing country power sectors during this time period. However, experience has shown that if prices reflect less than the cost of production, private capital will stay away.

- **The political difficulties associated with full divestiture have made partial divestiture a far more common approach for initial privatization.** This is reflected in Table 5-1 by the fact that only 8% of private sector participation involves full privatization of electric utility assets.
- **The method of private participation is related to the level of reform.** For example, concessioning is more popular in areas where reform is less developed, as shown in Table 5-1. Concessioning represents a small portion of total investment, but over 25% of the investment in regions excluding East and South Asia and Latin America.
- **Also, strong independent regulation is critical to attracting private investment.** Those regions listed in Table 5-1 with the greatest level of private investment generally also have the most advanced regulatory process.

What have been the benefits of this private participation in the developing country power sectors? First is the infusion of capital illustrated in Table 5 1. However, when it comes to improvement in performance, measurement is more difficult. This is in part due to lack of consistent statistics on power sector performance worldwide and the difficulty of separating the benefits of restructuring and privatization, which are often happening in rapid succession if not concurrently.

Nevertheless, case study evidence shows impressive results. For example, if we look at the impact of restructuring and initial privatization on Argentina's power sector for 1992 through 1995, we see rapid improvement in most areas as shown in Table 5-2. Labor productivity in the sector increased by 23%, efficiency gains measured through reductions in input requirements increased by 20%, and service quality also improved. Wholesale electricity prices have been reduced by 56% (from about US $50/MWh) translating into a 16% reduction in retail prices. Transmission has shown explosive growth with medium and high voltage lines increasing by 42% in length from 1991-1997. The decreases in spot prices for electricity can largely be attributed to the greater competition as a result of restructuring. The other gains could not have been made without private capital investment.

Table 5-2 Major Performance Indicators of Privatization of Argentina's Electric Power Sector (1992-1995)

Year	Spot Price ($/MWh)	Thermal Generation Availability (%)	Distribution Losses (%)	Transmission Forced Outages (hours)
1992	41.85	48.2	21	1,000
1993	32.12	59.8	20	900
1994	24.99	61.3	18	650
1995	22.30	69.9	12	300

Source: World Bank, Washington, DC, September 1996.

Zambia's power market is small and its future depends on a regional market. Power sector restructuring has begun in Zambia, but the future is not clearly defined because of uncertainties over how the regional market will develop. As a result, it is important that increased private participation be done in a way that will allow the needed, but not yetfully-defined, changes in structure of the sector that should occur over the next few years. Both the size of the market and the technical characteristics of Zambia's predominant hydroelectric generation will limit competition in the near term. However, experience in other countries that have predominantly hydroelectric generation, and have begun privatization, can be helpful for Zambia.

For example, Brazil has shown that unbundling and privatization of a predominately hydroelectric system is feasible as long as efforts are undertaken to ensure fair competition, recovery of high fixed costs, price stability, and coordinated operation of hydro plants located on the same river. Ensuring short-term cost recovery, while also avoiding price instability requires a different approach to system dispatch than that used for thermal-based systems. Unlike thermal-based systems, Brazilian hydro generators recover capital and fuel costs through long-term contracts with users, which also could be traded in a secondary market to help ensure effective competition and to signal the need for new generation.

5.2 *Benefits of Improved Performance to the Economy*

5.2.1 Measuring Benefits

From the point of view of national policy, achieving a financially healthy power sector is not an end in itself. Rather it is undertaken for the benefits that it can confer on society. These benefits have both direct and indirect impacts on consumers. Generally, electricity—as well as broader sector reforms and privatization—are undertaken to improve the welfare of consumers. As such, these impacts are measured through their microeconomic and macroeconomic effects. Microeconomic impacts include direct impacts on consumers through changes in employment, income and consumption. Macroeconomic impacts are the impacts that effect the overall economy and have an indirect impact on consumers. These are measured through such indicators as changes in Gross Domestic Product (GDP), employment, inflation, and productivity.

A third element of the benefits derived from privatization is measured by the distribution of the benefits throughout the economy. That is, which segments of the economy and which income groups receive the most benefit (or harm) from privatization.

As mentioned in previous sections of this report, electricity sector reform and privatization is undertaken in developing countries in order to improve investment and operational efficiency within the sector, reduce prices to consumers, improve service quality, reduce government investment in the sector, and contribute to poverty alleviation. Evidence of the impact of reform and privatization on electricity sector operations, investment, and prices is generally available from those countries where reform programs have been implemented. Data on these impacts is provided throughout this report and the Appendix H. However, data on macroeconomic impacts is less available, and data on the impact of electrification on rural and low income consumers is often not available. However, anecdotal evidence has been

reported and efforts to improve measurement of the impact of reform on rural and low-income populations are underway.

5.2.2 Social Benefits

Improving access to better, cheaper energy services for the poor contributes directly to their welfare in a variety of ways. It frees up cash and human resources for more productive uses (for example, by reducing the time spent collecting fuel and reducing the cost of lighting a home), improves access to health care and education, broadens opportunities for development of local businesses, and improves local and household environmental quality.

However, improved energy service to the poor also has many indirect benefits. These include contributing to sustainable regional and national economic growth, employment and productivity. A more competitive and open energy sector also contributes to similar reforms in other sectors of the economy and reduces opportunities and incentives for corruption and other market abuses, which generally affect the poor disproportionately. Also, an energy sector that is less reliant on government subsidies, following reform, has stronger financial incentives to provide service to low-income consumers, and reduced subsidies free up government resources for more productive uses. Proper prices also provide correct information to service providers and consumers on the relative costs of energy options and help promote cost-effective investments in energy efficiency and conservation. Finally, a financially sound energy sector is more likely to be a net contributor to the tax base and a source—rather than a drain—on government revenue.

5.2.3 Microeconomic impacts

A comparison of the results of the Baseline and Best Case results from previous sections of this report provides an indication of microeconomic impacts of power sector reform. The cost of production under Best Case conditions is lower than from the Baseline conditions, primarily because of higher generation availability, higher labor productivity and lower import power requirements. Higher retail prices[1] projected under Best Case conditions represent increased profitability, which translate into the ability to plough back returns to maintain reliability and extend coverage. Baseline conditions would result in an insolvent power sector. Although lower retail prices would result under Best Case conditions, the reliability of supply would deteriorate and the ability to expand coverage also would be limited. In time, this situation would evolve into one in which industry would depend on diesels for reliable power for a period of each day and another rehabilitation program will have to be performed. This would result in higher long-run costs for the sector.

Table 5-3 compares the additional revenue associated with the higher tariffs under Best Case condition with the outage and rehabilitation costs avoided. On this basis alone, it is a good investment to privatize and liberalize retail tariffs, since the avoided cost of outages and future rehabilitation are greater than the higher retail cost of power. The macroeconomic costs avoided by this strategy may more significant in the way of the reduced economic growth associated with have an unreliable power system.

[1] There would be no change in the contract price with CEC.

Table 5-3 Comparison of Best Case Results with Baseline (millions US$, present worth to 2000 @ 6% discount rate)

Additional revenue required	$298,783
Costs avoided	
Cost of outages	$308,998
Future rehabilitation	$131,697
Total cost	$440,695
Net savings	$141,912

5.2.4 Macroeconomic Impacts

The economic consequences of energy sector reform have both direct and indirect impacts on the economy. Generally, these impact the economy in the following ways:

- Directly, through consumer prices of the privatized services and indirectly through impact on demand for electricity
- Indirectly through changes in the input costs of the industries using these services
- Indirectly through the reduction in prices of the inputs purchased by the privatized firms
- Directly and indirectly through the labor markets, in terms of employment and wages.

The impact of these changes has a macroeconomic impact in terms of changes in GDP employment, prices, and productivity. Distributional impacts measure the relative benefits from privatization received by the various sectors of the economy (e.g., agriculture, mining, metals, transport) and on the several income classes in society. A World Bank study of power sector reform in Argentina found positive results from electricity sector privatization on GDP, industrial production, and prices; but found mixed results on employment. It also found that for Argentina, the Basic Metals and Personal Services sectors gained most from overall utility sector reform. For the income classes, the study determined that the lowest income classes tend to gain most from electricity sector reform, since they spend a larger part of their income on energy than higher income groups.

5.2.5 Impact on Private Sector Investment

A major element of electricity sector reform is to attract private investment to the sector. Private ownership of facilities provides greater incentive for efficiency and innovation in the use of technologies and development of customer services and products. Private sector investment can take the form of development of specific greenfield projects (e.g., generating plants or transmission lines), and also can involve purchase or transfer of existing assets from the public to the private sector.

It is not always clear what impact private investment may have on an electricity utility sector, in terms of higher investment, lower prices, and improved operating procedures, compared with circumstances under public ownership. For example, independent power producers (IPPs) have been criticized at times for increasing (rather than decreasing) electricity prices and for imposing a disproportionate share of the risks of power sector development onto

61

governments. However, analyses of the impact of IPP projects on electricity markets in developing countries reveal that overall:

- IPPs have allowed the transfer of a significant share of project risk to the private sector.
- IPPs have accepted construction and operating risk and share fuel availability risk.
- IPPs help strengthen electricity sector institutions through competition, technology transfer, and the introduction of greater transparency and flexibility.

Likewise, private sector investment in ZESCO, can be expected to reduce risk currently borne by ZESCO. Moreover, in comparison with privately-owned distribution companies, state-owned utilities have a bad track record for technical and non-technical losses and expansion of service to low-income consumers. Decades of experience worldwide have shown the best approach to be private ownership of distribution and restriction of price subsidies to lifeline consumption for the poor.

5.3 *Rural Electrification*

While we recommend that the current approach to rural electrification, involving a centrally administered fund and a continuing customer cross-subsidy be discontinued, we also recognize the importance of rural electrification. Appendix H summarizes key world experience in rural electrification. While rural electrification invariably requires subsidies in the early stages of development, there are a number of characteristics of the best programs including:

- Tariffs should be flexible to reflect at least some of the higher costs of production in rural areas
- Involvement of private sector to implement programs- In Chile this has included private distribution companies with the incentive of a one-time subsidy to develop rural networks
- Decentralized decision-making- Regional governments should be involved in the identification of needs, choice of solutions, and in decisions about the allocation of funds from the central government. The role of the central government should be limited to providing economic resources and technical assistance to help coordinate the institutions involved in the program
- Competition- This has included outsourcing of customer billing and meter reading services and offering incentives for private sector companies to expand coverage and reduce losses. Energy Services Companies (ESCOs) also have been promoted to provide services to consumers that promote efficient use of energy to enable consumers to lower their overall energy bill
- Cost reduction through local involvement- Efforts in this regard include employing local persons for customer relations and metering and billing functions, involving local institutions and customers in designing and implementing service expansion programs, and utilizing new financing methods to reduce the up-front costs of system connections to consumers

- Use of concessions- In Argentina, for example, private bidders compete on the basis of the lowest subsidy to serve a given area.

Experience has shown that the private sector can be involved in rural electrification programs; however, the system employed to attract private investment to rural areas should be transparent and not be a financial burden to potential investors in the Zambian power system.

Appendix A Future Sales Projections

The objective of the task described in this section was to review and update overall electricity energy forecast for subsequent use for this Study. The focus of the analysis was on the next several years; however, the ten-year horizon was used to reflect the impact of long-term investment decision. As part of the Study, the load forecast was developed for Base Case, High and Low Load Growth, separated by customer class.

A recent load forecast for Zambia made by Harza and Ekono Energy for the Feasibility Study of the Development of Hydroelectric Power in the Luapula and Northern Areas of Zambia (Reference A-1) was used as a point of reference for our review. However, overall forecast results were modified to reflect price elasticity effects and the forecast of sales to Copperbelt Energy Corporation and to ZESCO Distribution were separated to reflect the commercial structure of the sector.

A.1 Development Scenarios

We developed Baseline and Best Case forecasts for the purposes of conducting financial analysis. The primary difference between the two is that the Best Case assumptions include higher retail tariffs than the Baseline scenario and retail (non-CEC) demand is lower.

We recognize that there is uncertainty in the forecast based on a number of factors. Reference B-1 describes the development of High, Low and Medium growth scenarios. The Baseline and Best Case scenarios that we developed fall between the High and the Low growth scenarios developed in Reference B-1.

The overall performance of the Zambian economy over the last decade can be described as a prolonged stagnation. Future economic development and associated electricity demand scenarios cannot be based on recent trends, but should reflect realistic targets set by the government and expert opinions and on external and internal factors affecting the economy.

Both the Baseline Best Case scenarios are characterized by:

- Resolution of balance of payment problems
- Increase in domestic and foreign investment
- Increase in mining sector production with improved efficiency
- Increase in manufacturing industry utilization, private and commercial service activities
- Development of the agricultural sector

The load forecasts were developed based on projected economic development and associated electricity consumption for CEC wholesale demand and for ZESCO retail demand. We developed demand forecasts for each. CEC demand was based on forecasts of mining demand plus residential load served by CEC. Residential demand was based on the following customer classes:

- Residential
- Industry (other than mining)
- Services
- Agriculture

A.2 Sales to CEC

The mining sector is the largest electricity consumer in Zambia representing 60-70% of total consumption. Historically electricity consumption kept pace with copper production. However, copper production has been decreasing steadily since 1980's. Recently, the copper production has decreased from 400,000 tons/year in year 1993 to below 300,000 tons in year 1997. This production decrease was not followed by the decrease in electricity consumption that went from 4,359 GWh in year 1993 to 4,097 GWh in year 1997, clearly indicating increasing trend in electricity intensity in the mining sector. This increase is attributed to declined content of the excavated ore, greater excavation depths and shifting to more electricity consuming processes in the refining activities.

The projection for electricity use in the mining sector is based on copper production estimates for six major mines and projection for overall specific consumption. Under the base case scenario it is projected that copper production will increase from 282 thousand tons in year 1997 to 455 thousand tons in year 2005 and to 385 thousand tons in year 2010. At the same time specific consumption is projected to improve from 14.5 GWh/Cu-ton in 1997 to 11 GWh/Cu-ton in 2005 and be at 11.5 GWh/Cu-ton in 2010.

It was found that the results closely corresponded to the historical sales to CEC/ZCCM. However these sales included 80 thousand residential customers that have since been transferred to ZESCO. The

A.3 Retail Demand

A.3.1 Residential Load Forecast

Residential consumption in ZESCO accounts for 18% of total electricity consumption. The acquisition of residential load from CEC after the privatization of ZCCM has increases this percentage.

The residential load forecast for residential loads served by ZESCO prior to 2000 is based on historical electricity use in households and two key assumptions: projected number of residential connections and average electricity consumption per connection. This was modified by an estimate of the residential load acquired from CEC this year.

Historical consumption for residential sector increased from 802 GWh in 1993 to 1154 GWh in 1997 closely following the population growth. Under the base case scenario total number of

residential connections is projected to increase to 254,000 in year 2005 and to 314,000 in year 2010. During this time is expected that specific consumption per connection will decrease from 7.3 MWh per connection in 1997 with a declining intensity per connection each year due to real tariff increases. For the Baseline, the intensity per connection in 2010 is 6.5 MWh per year corresponding to a real price of 36.4 US$/MWh. For the Best Case, the tariff in 2010 was projected to be 55 US$/MWh and the intensity per connection was 5 MWh per year.

A.3.2 Industrial Load Forecast

Consumption in industrial sector (other than mining) accounts for only 4% of total electricity consumption. The load forecast for this sector assumes successful implementation of the structural adjustment process, leading to higher specific consumption of electricity as production output will rise due to rehabilitation and modernization of production units.

Historical consumption for industrial sector decreased from 312 GWh in 1993 to 211 GWh in 1996. Projection for electricity use in the industrial sector is based on GDP growth and projections for specific consumption. Under the both the Baseline and Best Case scenarios it is projected that GDP will increase from 627 million Kwacha in year 1996 to 807 million Kwacha in year 2005 and to 982 million Kwacha in year 2010.

No differentiation was made between the Baseline and Best Case scenarios for industrial demand.

A.3.3 Services Load Forecast

Between 1993 and 1996 the electricity consumption in the service sector has been stable at about 800 GWh closely following the GDP in this sector estimated at about 1,000 million. Service sector has a diverse group of customers including trade, hotels and restaurants, transport and communication, financial institutions, business services, as well as community, social and personal services. This sector accounts for 12% of total electricity consumption.

Projection for electricity use in the services sector is again based on GDP growth and projection for specific consumption. Under the base case scenario it is projected that GDP will increase from 1,229 million Kwacha in year 1996 to 807 million Kwacha in year 2005 and to 1,496 million Kwacha in year 2010.

For both the Baseline and Best Case scenario specific consumption is projected to decrease from 0.81 GWh/million Kwacha in 1996 to 0.80 GWh/million Kwacha in 2010. For the Best Case

A.3.4 Agricultural Load Forecast

Historically agriculture has been the fastest growing sector of the economy with large annual variations. Irrigation is contributing to more than half of electricity consumption in this sector. Between 1993 and 1996 the electricity consumption in the agriculture sector has been stable at about 200 GWh closely following the GDP in this sector estimated at about 457 million Kwacha. This sector accounts for around 4% of total electricity consumption.

Projection for electricity use in the services sector is again based on GDP growth and projection for specific consumption. Under the base case scenario it is projected that GDP will increase from 421 million Kwacha in year 1996 to 554 million Kwacha in year 2005 and to 707 million Kwacha in year 2010. Specific consumption is projected to increase from 0.48 GWh/million Kwacha in 1998 to 0.54 GWh/million Kwacha in 2010 for the Baseline scenario. High prices lowered this value to 0.50 GWh/million Kwacha in 2010 in the Best Case.

A.4 References

A-1 Feasibility Study of the Development of Hydroelectric Power in the Luapula and Northern Areas of Zambia – Volume 4, Harza and Ekono Energy, March 2000

ZESCO assets were revalued in 1995/96. Since that time the Kwacha has devalued by over 70%. The financial analysis in the Task 1 report is based on an adjusted to the 1995/96 revaluation to reflect the devaluation of the Kwacha and the addition and retirement of assets during the past four years. This revaluation does not reflect a physical inspection of assets or a valuation based on their market value. This will be conducted as part of Task 4- Asset Survey. The following appendix summarizes the adjustment to the 1995/96 revaluation that is used in this report.

B.1 Fixed Asset Transactions

Table B-1 shows the exchange rate and US inflation assumptions used in the revaluation calculation.

Table B-1 Exchange Rate and US Inflation Data

	1995/96	1996/97	1997/98	1998/99	1999/00
Exchange rate (Kwacha/US$)					
Average	951	1274	1435	2155	2610
Closing	1135	1313	1725	2420	2800
US inflation factors (Year 2000 US$/ current US$)	0.8958	0.9153	0.9445	0.9542	0.9737

Table B-2 summarizes the additions, disposals and transfers of fixed assets since the 1995/96 revaluation as recorded by the audited financial statements in millions of Kwacha. These are expressed in millions of Kwacha and converted to thousands of year 2000 US$ according to the following formula.

Adjusted value =

Accounting value/ Exchange rate (Kwacha/US4)/

Year 2000 US$ per current year $ x 1000

Table B-1 Fixed Asset Accounting Data

	Accounting value (millions Kwacha)				
	Civil engineering works and buildings	Generation plant, vehicles and equipment	Transmission and distribution systems	Capital work in progress	Total
Original cost	1,666	11,325	6,813	32,345	52,149
Revaluation 1995/96	132,690	47,580	1,333,988	-	1,514,258
Starting fixed assets	134,356	58,905	1,340,801	32,345	1,566,407
1996/97					
Additions	284	5,074	321	15,057	20,736
Disposals	-	(57)	-	-	(57)
Transfers	-	11,670	1,526	(13,196)	-
At end of year	134,640	75,592	1,342,648	34,206	1,587,086
1997/98					
Additions	79	4,451	1,222	11,359	17,111
Disposals	-	-	-	-	-
Transfers	-	-	21,173	(21,173)	-
At end of year	134,719	80,043	1,365,043	24,392	1,604,197
1998/99					
Additions	94	34	103	15,475	15,706
Disposals	-	(39)	-	-	(39)
Transfers	1,815	-	4,300	(6,115)	-
At end of year	136,628	80,038	1,369,446	33,752	1,619,864
1999/00					
Additions	22	645	22	8,939	9,628
Disposals	(50)	(39)	-	-	(89)
Transfers	1,815	-	3,183	(4,998)	-
At end of year	138,415	80,643	1,372,651	37,694	1,629,403

Table B-2 Adjustment of Fixed Asset Data to Year 2000 US$

	Adjusted value)thousands year 2000 US$)				
	Civil engineering works and buildings	Generation plant, vehicles and equipment	Transmission and distribution systems	Capital work in progress	Total
Original cost	1,956	13,294	7,997	37,967	61,214
Revaluation 1995/96	130,504	46,796	1,312,015	-	1,489,315
Starting fixed assets	132,460	60,090	1,320,012	37,967	1,550,529
1996/97					
Additions	236	4,222	267	12,529	17,255
Disposals	-	(47)	-	-	(47)
Transfers	-	9,711	1,270	(10,980)	-
At end of year	132,696	73,975	1,321,549	39,516	1,567,736
1997/98					
Additions	48	2,732	750	6,972	10,502
Disposals	-	-	-	-	-
Transfers	-	-	12,995	(12,995)	-
At end of year	132,745	76,707	1,335,294	33,492	1,578,238
1998/99					
Additions	41	15	45	6,701	6,801
Disposals	-	(17)	-	-	(17)
Transfers	786	-	1,862	(2,648)	-
At end of year	133,571	76,705	1,337,201	37,545	1,585,023
1999/00					
Additions	8	236	8	3,279	3,531
Disposals	(18)	(14)	-	-	(33)
Transfers	666	-	1,168	(1,833)	-
At end of year	134,227	76,927	1,338,376	38,991	1,588,521

B.2 Depreciation

Depreciation values were likewise adjusted to reflect devaluation of the Kwacha. Table B-4 shows the accounting values for depreciation and Table B-5 shows the values adjusted to year 2000 US$.

Table B-3 Adjustment of Fixed Asset Data to Year 2000 US$

	Accounting value (millions Kwacha)				
	Civil engineering works and buildings	Generation plant, vehicles and equipment	Transmission and distribution systems	Capital work in progress	Total
Beginning accumulated depreciation	132	1,854	2,783	-	4,769
1996/97					
Charge for year	2,716	7,064	62,653	-	72,433
Disposals	-	(46)	-	-	(46)
At end of year	2,848	8,872	65,436	-	77,156
1997/98					
Charge for year	2,748	7,922	62,313	-	72,983
Disposals	-	-	-	-	-
At end of year	5,596	16,794	127,749	-	150,139
1998/99					
Charge for year	2,760	9,185	62,753	-	74,698
Disposals	-	(26)	-	-	(26)
At end of year	8,356	25,953	190,502	-	224,811
1999/00					
Charge for year	4,917	16,364	111,800	-	133,082
Disposals	-	-	-	-	-
At end of year	13,273	42,317	302,302	-	357,893

Table B-5 Adjustment of Fixed Asset Data to Year 2000 US$

	Adjusted value (thousands year 2000 US$)				
	Civil engineering works and buildings	Generation plant, vehicles and equipment	Transmission and distribution systems	Capital work in progress	Total
Beginning accumulated depreciation 1996/97	130	1,823	2,737	-	4,690
Charge for year	2,260	5,878	52,134	-	60,272
Disposals	-	(38)	-	-	(38)
At end of year	2,390	7,663	54,871	-	64,924
1997/98					
Charge for year	1,687	4,862	38,246	-	44,795
Disposals	-	-	-	-	-
At end of year	4,076	12,526	93,117	-	109,719
1998/99					
Charge for year	1,195	3,977	27,175	-	32,347
Disposals	-	(11)	-	-	(11)
At end of year	5,272	16,492	120,292	-	142,055
1999/00					
Charge for year	1,804	6,002	41,007	-	48,812
Disposals	-	-	-	-	-
At end of year	7,075	22,494	161,299	-	190,868

B.3 Summary

The results of both adjustment to fixed asset transactions and to depreciation are summarized in Table B-6. These were used as a basis for analysis of historical financial data in Appendix C.

Table B-6 Summary of Asset Revaluation Results

	1995/96	1996/97	1997/98	1998/99	1999/00
Total fixed assets	1,550,529	1,567,736	1,578,238	1,585,023	1,588,521
CWIP	37,967	39,516	33,492	37,545	38,991
New investments	-	15,659	16,526	2,731	2,053
Fixed assets (not including additions and CWIP)	1,512,562	1,512,562	1,528,220	1,544,746	1,547,477
Accumulated depreciation	4,690	64,924	109,719	142,055	190,868

Appendix C Recent Financial Results

ZESCO recent financial results were developed based on ZESCO financial data adjusted to year 2000 US currency and separated by functions. Appendix includes following tables:

- Table 1- Conversion of Key Financial Data to Year 2000 US Currency ...page 1
- Table 2- Financial Data for Non-core Activities.....page 2
- Table 3- Financial Data for Isolated Systems.....page 3
- Table 4- Financial Data for Generation.....page 4
- Table 5- Financial Data for Transmission.....page 5
- Table 6- Financial Data for Distribution.....page 6

Conversion of Key Financial Data to Year 2000 US Currency

	Actuals				Estimate	Adjustment to Year 2000 US currency				
	1995/96	1996/97	1997/98	1998/99	1999/00	1995/96	1996/97	1997/98	1998/99	1999/00
PROFIT & LOSS	KW Mln	KW Mln	KW Mln	KW Mln	KW Mln	thousands US$	thousands US$	thousands US$	thousands US$	thousands US$
Total Revenue	124,669	161,161	228,111	326,697	375,249	146,339	138,208	168,304	158,870	147,655
Energy Sales Revenue	123,359	159,653	226,534	324,142	371,155	144,801	136,915	167,140	157,628	146,045
Domestic Sales	45,129	66,303	107,128	145,332	174,416	52,973	56,860	79,041	70,674	68,630
CEC Sales	53,687	74,064	101,524	166,162	184,091	63,019	63,516	74,906	80,803	72,437
Exports	24,543	19,286	17,882	12,648	12,648	28,809	16,539	13,194	6,151	4,977
Other Revenue	1,310	1,508	1,577	2,555	4,094	1,538	1,293	1,164	1,243	1,611
Cap, Grants & Contributions	1,002	164	350	552	2,090	1,176	141	258	268	822
Other	308	1,344	1,227	2,004	2,004	362	1,153	905	974	788
Average tariff/transfer price (US$/MWh)						39.8	18.5	23.2	22.1	21.8
Operating Expenses	93,681	118,638	157,662	192,277	245,607	109,965	101,741	116,325	93,583	96,643
Supply costs	31,802	20,432	6,663	17,676	24,882	37,330	17,522	4,916	8,596	9,791
KNBC	*23,878*	*14,228*	*6,054*	*5,017*	*10,792*	*28,029*	*12,202*	*4,467*	*2,440*	*4,247*
Outside Power Purchases	*7,924*	*6,204*	*609*	*0*	*17*	*9,301*	*5,320*	*449*	-	*7*
CEC Wheeling	*0*	*0*	*0*	*12,659*	*14,072*	-	-	-	*6,156*	*5,537*
Own production	2,405	4,586	4,758	10,015	10,242	2,823	3,933	3,511	4,870	4,030
Diesel	*2,405*	*4,586*	*4,758*	*10,015*	*10,242*	*2,823*	*3,933*	*3,511*	*4,870*	*4,030*
Salaries	37,809	50,417	84,100	77,715	126,537	44,381	43,236	62,050	37,792	49,791
Management	*37,809*	*50,417*	*84,100*	*20,333*	*33,024*	*44,381*	*43,236*	*62,050*	*9,888*	*12,995*
Operational				*57,382*	*93,513*	-	-	-	*27,904*	*36,796*
Operations & Maintenance	5,178	9,845	29,920	34,471	49,167	6,078	8,443	22,075	16,763	19,346
Generation & Transmission				*10,341*	*17,667*	-	-	-	*5,029*	*6,952*
Distribution	*5,178*	*9,845*	*29,920*	*24,129*	*31,500*	*6,078*	*8,443*	*22,075*	*11,734*	*12,395*
Administration	11,369	21,321	19,017	9,637	13,073	13,345	18,284	14,031	4,686	5,144
Provisions	634	2,785	3,743	31,449	10,353	744	2,388	2,762	15,293	4,074
Bad Debts	*634*	*2,785*	*3,743*	*31,449*	*10,353*	*744*	*2,388*	*2,762*	*15,293*	*4,074*
Provision for Drought					*0*	-	-	-	-	-
Transport Cost	4,484	9,252	9,461	11,314	11,353	5,263	7,934	6,980	5,502	4,467
Depreciation	2,607	72,433	72,983	74,698	73,746	3,060	60,234	44,795	32,336	48,812
Existing and renewals	2,607	72,433	72,983	74,698	73,746	3,060	60,234	44,795	32,336	48,812
New Investments						-	-	-	-	-
Total Operating Expenses	96,288	191,071	230,645	266,975	319,352	113,025	161,975	161,120	125,839	145,455
Operating Income	28,381	-29,910	-2,534	59,723	55,896	33,314	-23,767	7,183	33,032	2,200
Financial Items	6,976	15,586	7,073	29,527	38,374	8,189	13,366	5,219	14,359	15,100
Interest on Debt	7,398	10,728	3,359	3,863	3,863	8,684	9,200	2,478	1,879	1,520
Overdraft Interest		465	1,019	29,030	29,030	-	399	752	14,117	11,423
Other Interest		4,933	2,900	11,558	11,558	-	4,230	2,140	5,621	4,548
Less: IDC				0	-1,320	-	-	-	-	(519)
Interest income	-422	-540	-205	-14,924	-4,757	(495)	(463)	(151)	(7,258)	(1,872)
Profit after financial items	21,405	-45,496	-9,607	30,196	17,522	25,126	-37,133	1,965	18,673	-12,900
						-	-	-	-	-
						-	-	-	-	-
Total	0		0			-	-	-	-	-
Exceptional Item CEC Provision	7,205		-55,090	-174,793		8,457	-	(40,646)	(85,000)	-
Exchange rate losses	-19,354	-10,707	-13,786	28,091	87,780	(22,718)	(9,182)	(10,172)	13,660	34,540
Prior year adjustments					13	-	-	-	-	5
						-	-	-	-	-
						-	-	-	-	-
Profit before taxes	9,256	-56,203	-78,483	-116,506	105,316	10,865	-46,315	-48,853	-52,667	21,641
						-	-	-	-	-
Taxes and Dividends	154	537	72	15,260	112,334	181	461	53	7,421	44,282
Corporate Tax	154	537	72	15,260	112,334	181	461	53	7,421	44,202
Dividends										
Retained profit after taxes	9,102	-56,740	-78,555	-131,766	-7,018	10,684	-46,776	-48,906	-60,088	-22,561
BALANCE SHEET ITEMS										
Net Fixed Assets	1,561,638	1,509,930	1,454,058	1,395,053	0	1,545,838	1,502,812	1,468,519	1,442,967	1,397,654
Existing	1,534,062	1,552,880	1,579,805	1,579,766		1,512,562	1,512,562	1,528,220	1,544,746	1,547,477
New Investments			0	6,346		-	15,659	16,526	2,731	2,053
Accum. Dep.- existing assets	4,769	77,156	150,139	224,811		4,690	64,924	109,719	142,055	190,868
Accum. Dep.- new assets						-	-	-	-	-
Construction work in progress	32,345	34,206	24,392	33,752		37,967	39,516	33,492	37,545	38,991

74

Non-core activities

Distribution Factors	Market Statistics	Actual 1995/96	Actual 1996/97	Actual 1997/98	Actual 1998/99	Est Actual 1999/00
	PROFIT & LOSS	thousands US$	thousands US$	thousands US$	thousands US$	thousands US$
	Total Revenue	206	414	394	258	328
	Energy Sales Revenue	-	-	-	-	-
	Domestic Sales					
	CEC Sales					
	Exports					
	Other Revenue	206	414	394	258	328
	Cap, Grants & Contributions					
	Other	206	414	394	258	328
	Operating Expenses	197	233	260	161	182
	Supply costs	-	-	-	-	-
	KNBC					
	Outside Power Purchases					
	CEC Wheeling					
	Own production	-	-	-	-	-
	Diesel					
	Salaries	111	108	155	94	124
0.25%	*Management*	*111*	*108*	*155*	*25*	*32*
0.25%	*Operational*	-	-	-	*70*	*92*
	Operations & Maintenance	-	-	-	-	-
	Generation & Transmission	-	-	-	-	-
	Distribution	-	-	-	-	-
0.25%	Administration	33	46	35	12	13
	Provisions	-	-	-	-	-
	Bad Debts	-	-	-	-	-
	Provision for Drought	-	-	-	-	-
1.00%	Transport Cost	53	79	70	55	45
	Depreciation	9	181	134	97	146
	Existing and renewals	9	181	134	97	146
	New Investments	-	-	-	-	-
	Total Operating Expenses	206	414	394	258	328
	Operating Income	-	-	-	-	-
	Financial Items	-	-	-	-	-
0.00%	Interest on Debt	-	-	-	-	-
0.00%	Overdraft Interest	-	-	-	-	-
0.00%	Other Interest	-	-	-	-	-
	Less: IDC	-	-	-	-	-
0.00%	Interest income	-	-	-	-	-
	Profit after financial items	-	-	-	-	-
0.00%	**Total**	-	-	-	-	-
0.00%	**Exceptional Item CEC Provision**	-	-	-	-	-
0.00%	**Exchange rate losses**	-	-	-	-	-
	Profit before taxes	-	-	-	-	-
	Taxes and Dividends	-	-	-	-	-
0.00%	Corporate Tax	-	-	-	-	-
0.00%	Dividends	-	-	-	-	-
	Retained profit after taxes	-	-	-	-	-
	BALANCE SHEET ITEMS					
	Net Fixed Assets	6,303	6,122	5,987	5,890	5,744
0.41%	Existing	6,315	6,315	6,315	6,315	6,315
	New Investments					
0.26%	Accum. Dep.- existing assets	12	193	327	424	571
	Accum. Dep.- new assets					
	Construction work in progress					

75

Isolated systems

Distribution Factors	Market Statistics	Actual 1995/96	Actual 1996/97	Actual 1997/98	Actual 1998/99	Est Actual 1999/00
	Generation (GWh)	21	15	18	14	16
	Domestic Sales (GWh)	17	12	14	12	13
	PROFIT & LOSS	thousands US$	thousands US$	thousands US$	thousands US$	thousands US$
	Total Revenue	398	285	479	314	371
	Energy Sales Revenue	398	285	479	314	371
	Domestic Sales	398	285	479	314	371
	CEC Sales					
	Exports					
	Other Revenue	-	-	-	-	-
	Cap, Grants & Contributions					
	Other					
	Average tariff/transfer price (US$/MWh)	23.7	23.7	33.2	27.1	28.5
	Operating Expenses	3,375	4,637	4,240	5,827	5,150
	Supply costs					
	KNBC					
	Outside Power Purchases					
	CEC Wheeling					
	Own production	2,823	3,933	3,511	4,870	4,030
	Diesel	*2,823*	*3,933*	*3,511*	*4,870*	*4,030*
	Salaries	222	216	310	608	801
0.50%	*Management*	*222*	*216*	*310*	*49*	*65*
2.00%	*Operational*	-	-	-	*558*	*736*
	Operations & Maintenance	-	-	-	50	70
1.00%	*Generation & Transmission*	-	-	-	*50*	*70*
	Distribution	-	-	-	-	-
0.50%	Administration	67	91	70	23	26
	Provisions	-	-	-	-	-
	Bad Debts					
	Provision for Drought					
5.00%	Transport Cost	263	397	349	275	223
	Depreciation	3	60	45	32	49
	Existing and renewals	3	60	45	32	49
	New Investments	-	-	-	-	-
	Total Operating Expenses	3,378	4,697	4,285	5,859	5,199
	Operating Income	(2,980)	(4,413)	(3,806)	(5,544)	(4,827)
	Financial Items	-	-	-	-	-
0.00%	Interest on Debt	-	-	-	-	-
0.00%	Overdraft Interest	-	-	-	-	-
0.00%	Other Interest	-	-	-	-	-
	Less: IDC	-	-	-	-	-
0.00%	Interest income	-	-	-	-	-
	Profit after financial items	(2,980)	(4,413)	(3,806)	(5,544)	(4,827)
0.00%	Total	-	-	-	-	-
0.00%	Exceptional Item CEC Provision	-	-	-	-	-
0.00%	Exchange rate losses	-	-	-	-	-
	Profit before taxes	(2,980)	(4,413)	(3,806)	(5,544)	(4,827)
	Taxes and Dividends	2	5	1	74	442
1.00%	Corporate Tax	2	5	1	74	442
1.00%	Dividends	-	-	-	-	-
	Retained profit after taxes	(2,982)	(4,417)	(3,806)	(5,619)	(5,269)
	BALANCE SHEET ITEMS					
	Net Fixed Assets	1,043	983	938	906	857
0.07%	Existing	1,047	1,047	1,047	1,047	1,047
	New Investments					
0.07%	Accum. Dep.- existing assets	3	64	109	141	190
	Accum. Dep.- new assets					
	Construction work in progress					

Generation

Distribution Factors	Market Statistics	Actual 1995/96	Actual 1996/97	Actual 1997/98	Actual 1998/99	Est Actual 1999/00
	Net Generation (GWh)	5,397	5,394	6,200	5,458	5,589
	Small hydro	41	39	35	39	36
	Victoria Falls	641	648	691	666	622
	Kafue Gorge	4,714	4,707	5,474	4,753	4,932
	PROFIT & LOSS	thousands US$	thousands US$	thousands US$	thousands US$	thousands US$
	Total Revenue	10,867	18,796	20,383	12,152	16,847
	Energy Sales Revenue	10,867	18,796	20,383	12,152	16,847
	Sales to Wholesale Marketer	10,867	18,796	20,383	12,152	16,847
	Other Revenue	-	-	-	-	-
	Cap, Grants & Contributions					
	Other					
	Average tariff/transfer price (US$/MWh)	2.0	3.5	3.3	2.2	3.0
	Operating Expenses	10,420	10,904	14,013	7,110	9,236
		-	-	-	-	-
	Salaries	8,610	8,388	12,038	4,281	5,636
19.4%	*Management*	*8,610*	*8,388*	*12,038*	*1,918*	*2,521*
8.5%	*Operational*	-	-	-	*2,362*	*3,115*
	Operations & Maintenance	-	-	-	2,012	2,781
40.0%	*Generation & Transmission*	-	-	-	*2,012*	*2,781*
	Distribution	-	-	-	-	-
11.6%	Administration	1,547	2,119	1,626	543	596
	Provisions	-	-	-	-	-
	Bad Debts					
	Provision for Drought					
5.0%	Transport Cost	263	397	349	275	223
	Depreciation	447	7,892	6,370	5,042	7,610
	Existing and renewals	447	7,892	6,370	5,042	7,610
	New Investments	-	-	-	-	-
	Total Operating Expenses	10,867	18,796	20,383	12,152	16,847
	Operating Income	-	-	-	-	-
	Financial Items	868	920	248	188	(367)
10.0%	Interest on Debt	868	920	248	188	152
0.0%	Overdraft Interest	-	-	-	-	-
0.0%	Other Interest	-	-	-	-	-
100.0%	Less: IDC	-	-	-	-	(519)
0.0%	Interest income	-	-	-	-	-
	Profit after financial items	(868)	(920)	(248)	(188)	367
0.0%	Total	-	-	-	-	-
0.0%	Exceptional Item CEC Provision	-	-	-	-	-
0.0%	Exchange rate losses	-	-	-	-	-
	Profit before taxes	(868)	(920)	(248)	(188)	367
	Taxes and Dividends	36	92	11	1,484	8,840
20.0%	Corporate Tax	36	92	11	1,484	8,840
20.0%	Dividends	-	-	-	-	-
	Retained profit after taxes	(905)	(1,012)	(258)	(1,672)	(8,473)
	BALANCE SHEET ITEMS					
	Net Fixed Assets	241,242	235,840	219,944	212,958	203,586
15.0%	Existing	230,003	230,003	230,003	230,003	230,003
	New Investments	-	14,122	2,780	825	877
9.0%	Accum. Dep.- existing assets	431	8,284	14,654	19,684	27,295
	Accum. Dep.- new assets					
	Construction work in progress	11,670	-	1,815	1,815	-

77

Transmission

Distribution Factors	Market Statistics	Actual 1995/96	Actual 1996/97	Actual 1997/98	Actual 1998/99	Est Actual 1999/00
	Bulk Deliveries (GWh)	2,617	6,876	6,917	6,890	6,770
	Lusaka & South	1,757	1,830	1,974	2,076	2,194
	North	859	899	923	964	980
	CEC		4,148	4,020	3,851	3,595
	Exports (GWh)	1,397	842	808	678	694
	CEC Wheeling	-	-	-	265	731
	PROFIT & LOSS	thousands US$	thousands US$	thousands US$	thousands US$	thousands US$
	Total Revenue	8,711	19,648	18,631	13,522	18,136
	Energy Sales Revenue	8,711	19,648	18,631	13,522	18,136
	Sales to Wholesale Marketer	8,711	19,648	18,631	13,522	18,136
	Wheeling revenues	-	-	-	-	-
	Other Revenue	-	-	-	-	-
	Cap, Grants & Contributions	-	-	-	-	-
	Other	-	-	-	-	-
	Average tariff/transfer price (US$/MWh)	2.2	2.5	2.4	1.8	2.4
	Operating Expenses	8,190	9,228	10,981	8,089	9,934
		-	-	-	-	-
	Salaries	5,583	5,439	7,806	3,111	4,097
12.58%	*Management*	*5,583*	*5,439*	*7,806*	*1,244*	*1,635*
6.69%	*Operational*	-	-	-	*1,867*	*2,462*
	Operations & Maintenance	-	-	-	2,967	4,101
59.00%	*Generation & Transmission*	-	-	-	*2,967*	*4,101*
	Distribution	-	-	-	-	-
7.70%	Administration	1,028	1,409	1,081	361	396
	Provisions	-	-	-	-	-
	Bad Debts	-	-	-	-	-
	Provision for Drought	-	-	-	-	-
30.00%	Transport Cost	1,579	2,380	2,094	1,651	1,340
	Depreciation	520	10,420	7,649	5,433	8,201
	Existing and renewals	520	10,420	7,649	5,433	8,201
	New Investments	-	-	-	-	-
	Total Operating Expenses	8,711	19,648	18,631	13,522	18,136
	Operating Income	-	-	-	-	-
	Financial Items	2,605	2,760	743	564	456
30.0%	Interest on Debt	2,605	2,760	743	564	456
0.0%	Overdraft Interest	-	-	-	-	-
0.0%	Other Interest	-	-	-	-	-
0.0%	Less: IDC	-	-	-	-	-
0.0%	Interest income	-	-	-	-	-
	Profit after financial items	(2,605)	(2,760)	(743)	(564)	(456)
	Total	-	-	-	-	-
0.00%	Exceptional Item CEC Provision	-	-	-	-	-
0.00%	Exchange rate losses	-	-	-	-	-
	Profit before taxes	(2,605)	(2,760)	(743)	(564)	(456)
	Taxes and Dividends	36	92	11	1,484	8,840
20.00%	Corporate Tax	36	92	11	1,484	8,840
20.00%	Dividends	-	-	-	-	-
	Retained profit after taxes	(2,641)	(2,852)	(754)	(2,048)	(9,296)
	BALANCE SHEET ITEMS					
	Net Fixed Assets	463,898	460,087	448,518	445,112	438,541
29.5%	Existing	452,818	452,818	452,818	452,818	452,818
50.0%	New Investments	-	-	-	-	-
43.4%	Accum. Dep.- existing assets	2,069	12,489	20,139	25,572	33,773
	Accum. Dep.- new assets	-	-	-	-	-
50.0%	Construction work in progress	13,149	19,758	15,839	17,865	19,496

Wholelsale Market Function

Distribution Factors	Market Statistics	Actual 1995/96	Actual 1996/97	Actual 1997/98	Actual 1998/99	Est Actual 1999/00
	Bulk Deliveries (GWh)	2,617	6,876	6,917	6,890	6,770
	Lusaka & South	1,757	1,830	1,974	2,076	2,194
	North	859	899	923	964	980
	CEC		4,148	4,020	3,851	3,595
	Purchases (GWh)	2,409	1,663	1,635	2,170	2,270
	Imports (GWh)	1,426	1,279	593	419	-
	Exports (GWh)	1,397	842	808	678	694
	Wheeling	-	-	-	265	731
	PROFIT & LOSS	thousands US$	thousands US$	thousands US$	thousands US$	thousands US$
	Total Revenue	103,080	96,790	104,894	99,356	94,985
	Energy Sales Revenue	103,080	96,790	104,894	99,356	94,985
	Zesco Distribution	11,252	16,735	16,795	12,402	17,570
	CEC	63,019	63,516	74,906	80,803	72,437
	Exports	28,809	16,539	13,194	6,151	4,977
	Other Revenue	-	-	-	-	-
	Cap, Grants & Contributions					
	Other					
	Average tariff to Zesco Distribution	4.3	6.1	5.8	4.1	5.5
	Operating Expenses	57,484	56,581	44,690	34,416	44,954
	Supply costs	56,907	55,966	43,929	34,270	44,773
	KNBC	*28,029*	*12,202*	*4,467*	*2,440*	*4,247*
	Outside Power Purchases	*9,301*	*5,320*	*449*	-	*7*
	CEC Wheeling	-	-	-	*6,156*	*5,537*
	Zesco Generation	10,867	18,796	20,383	12,152	16,847
	Zesco Transmission	8,711	19,648	18,631	13,522	18,136
	Salaries	444	432	621	99	130
1.0%	*Management*	*444*	*432*	*621*	*99*	*130*
0.0%	*Operational*	-	-	-	-	-
	Operations & Maintenance	-	-	-	-	-
0.0%	*Generation & Transmission*	-	-	-	-	-
	Distribution	-	-	-	-	-
1.0%	Administration	133	183	140	47	51
	Provisions	-	-	-	-	-
	Bad Debts	-	-	-	-	-
	Provision for Drought	-	-	-	-	-
0.0%	Transport Cost	-	-	-	-	-
	Depreciation	-	-	-	-	-
	Existing and renewals	-	-	-	-	-
	New Investments	-	-	-	-	-
	Total Operating Expenses	57,484	56,581	44,690	34,416	44,954
	Operating Income	45,596	40,209	60,204	64,940	50,030
	Financial Items	-	-	-	-	-
0.0%	Interest on Debt	-	-	-	-	-
0.0%	Overdraft Interest	-	-	-	-	-
0.0%	*Other Interest*	-	-	-	-	-
0.0%	Less: IDC	-	-	-	-	-
0.0%	Interest income	-	-	-	-	-
	Profit after financial items	45,596	40,209	60,204	64,940	50,030
0.0%	**Total**	-	-	-	-	-
100.0%	**Exceptional Item CEC Provision**	-	-	(40,646)	(85,000)	-
100.0%	**Exchange rate losses**	-	(9,182)	(10,172)	13,660	34,540
	Profit before taxes	45,596	31,026	9,386	(6,400)	84,571
	Taxes and Dividends	107	272	31	4,378	26,079
59.0%	Corporate Tax	107	272	31	4,378	26,079
59.0%	Dividends	-	-	-	-	-
	Retained profit after taxes	45,489	30,755	9,355	(10,778)	58,491
	BALANCE SHEET ITEMS					
	Net Fixed Assets	-	-	-	-	-
0.0%	Existing	-	-	-	-	-
0.0%	New Investments	-	-	-	-	-
0.0%	Accum. Dep.- existing assets	-	-	-	-	-
	Accum. Dep.- new assets					-
0.0%	Construction work in progress	-	-	-	-	-

Distribution Factors	Market Statistics	Actual 1995/96	Actual 1996/97	Actual 1997/98	Actual 1998/99	Est Actual 1999/00
	Retail Sales (GWh)	2,222	2,390	2,369	2,592	2,399
	Lusaka & South	1,294	1,422	1,333	1,574	1,397
	North	795	822	882	877	865
	Other Rural	133	146	154	140	136
	PROFIT & LOSS	thousands US$	thousands US$	thousands US$	thousands US$	thousands US$
	Total Revenue	53,907	57,455	79,331	71,344	69,541
	Energy Sales Revenue	52,575	56,575	78,562	70,359	68,259
	Domestic Sales	52,575	56,575	78,562	70,359	68,259
	Other Revenue	1,332	879	769	984	1,282
	Cap. Grants & Contributions	1,176	141	258	268	822
	Other	155	739	511	716	460
	Average tariff/transfer price (US$/MWh)	23.7	23.7	33.2	27.1	28.5
	Operating Expenses	61,128	75,337	97,949	75,976	79,739
	Supply costs	11,252	16,735	16,795	12,402	17,570
	from Zesco wholesale marketer	*11,252*	*16,735*	*16,795*	*12,402*	*17,570*
	Salaries	29,411	28,653	41,120	29,600	39,003
66.27%	*Management*	*29,411*	*28,653*	*41,120*	*6,553*	*8,611*
82.59%	*Operational*	-	-	-	*23,047*	*30,391*
	Operations & Maintenance	6,078	8,443	22,075	11,734	12,395
	Generation & Transmission					
	Distribution	*6,078*	*8,443*	*22,075*	*11,734*	*12,395*
78.96%	Administration	10,537	14,437	11,078	3,700	4,062
	Provisions	744	2,388	2,762	15,293	4,074
	Bad Debts	*744*	*2,388*	*2,762*	*15,293*	*4,074*
	Provision for Drought	-	-	-	-	-
59.00%	Transport Cost	3,105	4,681	4,118	3,246	2,636
	Depreciation	2,081	41,681	30,597	21,732	32,805
	Existing and renewals	2,081	41,681	30,597	21,732	32,805
	New Investments	-	-	-	-	-
	Total Operating Expenses	63,209	117,017	128,546	97,708	112,544
	Operating Income	(9,302)	(59,563)	(49,215)	(26,364)	(43,003)
	Financial Items	4,715	9,686	4,227	13,607	15,011
60.00%	Interest on Debt	5,210	5,520	1,487	1,127	912
100.00%	Overdraft Interest	-	399	752	14,117	11,423
100.00%	Other Interest	-	4,230	2,140	5,621	4,548
0.00%	Less: IDC	-	-	-	-	-
100.00%	Interest income	(495)	(463)	(151)	(7,258)	(1,872)
	Profit after financial items	(14,017)	(69,249)	(53,442)	(39,971)	(58,014)
	Total	-	-	-	-	-
0.00%	Exceptional Item CEC Provision	-	-	-	-	-
0.00%	Exchange rate losses	-	-	-	-	-
	Profit before taxes	(14,017)	(69,249)	(53,442)	(39,971)	(58,014)
	Taxes and Dividends	-	-	-	-	-
0.00%	Corporate Tax	-	-	-	-	-
0.00%	Dividends	-	-	-	-	-
	Retained profit after taxes	(14,017)	(69,249)	(53,442)	(39,971)	(58,014)
	BALANCE SHEET ITEMS					
	Net Fixed Assets	854,775	820,472	792,060	766,435	734,894
55.01%	Existing	843,880	843,880	843,880	843,880	843,880
50.00%	New Investments	-	768	6,873	953	588
47.25%	Accum. Dep.- existing assets	2,253	43,934	74,531	96,263	129,068
	Accum. Dep.- new assets					
50.00%	Construction work in progress	13,149	19,758	15,839	17,865	19,496

80

Appendix D Baseline Projection

This appendix includes Baseline financial projections in the following tables:

- Table 1- Market Data page 1
- Table 2- Consolidated Profit and Loss Statement page 4
- Table 3- Consolidated Balance Sheet page 7
- Table 4- Consolidated Cash Flow Statement page 10
- Table 5 Consolidated Profit and Loss Statement for Isolated Systems page 13
- Table 6- Consolidated Balance Sheet for Isolated Systems page 16
- Table 7- Consolidated Cash Flow for Isolated Systems page 19
- Table 8- Consolidated Profit and Loss Statement for Generation page 22
- Table 9- Consolidated Balance Sheet for Generation page 25
- Table 10- Consolidated Cash Flow for Generation page 28
- Table 11- Consolidated Profit and Loss Statement for Transmission page 31
- Table 12- Consolidated Balance Sheet for Transmission page 34
- Table 13- Consolidated Cash Flow for Transmission page 37
- Table 14- Consolidated Profit and Loss Statement for Wholesale Market Function page 40
- Table 15- Consolidated Balance Sheet for Wholesale Market Function page 43
- Table 16- Consolidated Cash Flow for Wholesale Market Function page 46
- Table 17- Consolidated Profit and Loss Statement for Distribution and Customer Services page 49
- Table 18- Consolidated Balance Sheet for Distribution and Customer Services page 52
- Table 19- Consolidated Cash Flow for Distribution and Customer Services page 55

Case = Baseline
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

MARKET DATA	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Sales (GWh)													
Isolated Systems	14	14	15	16	17	17	18	19	20	21	22	23	25
Domestic Grid	3,101	3,239	3,376	3,521	3,691	3,862	4,036	4,209	4,382	4,555	4,735	4,917	5,099
CEC	3,215	3,264	3,307	3,344	3,376	3,373	3,350	3,507	3,572	3,638	3,687	3,687	3,687
Imports or other purchases	498	377	204	413	739	1,028	1,297	1,747	2,100	2,451	2,749	2,998	3,249
Exports	-	-	-	-	-	-	-	-	-	-	-	-	-
KNBC purchases	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Wheeling	731	731	731	731	731	731	731	731	731	731	731	731	731
Generation (GWh)													
Hydro	5,384	5,721	6,100	6,100	6,010	5,920	5,831	5,741	5,651	5,561	5,561	5,561	5,561
Diesel	16	17	18	19	20	21	22	23	24	25	27	28	30
Transmission													
Losses (%)	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Distribution													
Losses (%)	30.0%	29.4%	28.9%	28.3%	27.8%	27.2%	26.7%	26.1%	25.6%	25.0%	25.0%	25.0%	25.0%

Case = Baseline **Consolidated Statement**
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

MARKET DATA	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Sales (GWh)													
Isolated Systems	26	27	28	30	31	33	35	36	38	40	42	44	46
Domestic Grid	5,283	5,469	5,656	5,845	6,036	6,228	6,422	6,617	6,815	7,015	7,216	7,419	7,625
CEC	3,403	3,078	2,753	2,428	2,103	1,778	1,453	-	-	-	-	-	-
Imports or other purchases	3,210	3,130	3,052	2,977	2,903	2,833	2,764	1,535	1,806	2,081	2,357	2,637	2,920
Exports	-	-	-	-	-	-	-	-	-	-	-	-	-
KNBC purchases	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Wheeling	731	731	731	731	731	731	731	731	731	731	731	731	731
Generation (GWh)													
Hydro	5,561	5,561	5,561	5,561	5,561	5,561	5,561	5,561	5,561	5,561	5,561	5,561	5,561
Diesel	31	33	34	36	38	40	42	44	46	48	50	53	56
Transmission													
Losses (%)	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Distribution													
Losses (%)	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%

83

Case = Baseline
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

MARKET DATA	2026/27	2027/28	2028/29	2029/30	2030/31
Sales (GWh)					
Isolated Systems	49	51	54	56	59
Domestic Grid	7,832	8,042	8,254	8,469	8,685
CEC	-	-	-	-	-
Imports or other purchases	3,205	3,493	3,785	4,079	4,377
Exports	-	-	-	-	-
KNBC purchases	2,000	2,000	2,000	2,000	2,000
Wheeling	731	731	731	731	731
Generation (GWh)					
Hydro	5,561	5,561	5,561	5,561	5,561
Diesel	58	61	64	68	71
Transmission					
Losses (%)	3.0%	3.0%	3.0%	3.0%	3.0%
Distribution					
Losses (%)	25.0%	25.0%	25.0%	25.0%	25.0%

84

Case = Baseline
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total Revenue	**171,801**	**178,490**	**185,132**	**192,010**	**199,744**	**207,041**	**214,057**	**225,227**	**234,590**	**244,046**	**253,527**	**262,853**	**271,930**
Energy Sales Revenue	**171,801**	**178,490**	**185,132**	**192,010**	**199,744**	**207,041**	**214,057**	**225,227**	**234,590**	**244,046**	**253,527**	**262,853**	**271,930**
Isolated System Sales	454	482	511	542	574	609	646	685	727	770	817	867	919
Domestic Sales	102,378	108,000	113,695	119,754	126,784	133,987	141,413	148,948	156,597	164,427	172,620	181,011	189,603
CEC Sales	68,486	69,525	70,441	71,233	71,900	71,838	71,357	74,699	76,092	77,485	78,530	78,530	78,530
Exports	-	-	-	-	-	-	-	-	-	-	-	-	-
SAPP Wheeling	482	483	485	481	485	606	641	894	1,175	1,364	1,559	2,446	2,878
Average tariff /transfer price (US$/MWh)	**27.2**	**27.4**	**27.7**	**28.0**	**28.3**	**28.6**	**29.0**	**29.2**	**29.5**	**29.8**	**30.1**	**30.6**	**31.0**
Operating Expenses	**145,614**	**141,562**	**139,476**	**148,596**	**157,755**	**171,533**	**186,569**	**210,898**	**239,403**	**265,661**	**298,716**	**379,773**	**437,520**
Supply costs	17,009	16,240	15,111	17,588	21,327	27,125	31,845	46,808	65,159	82,940	102,082	162,445	202,670
KNBC	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*
Outside Power Purchases	*4,709*	*3,573*	*1,944*	*3,897*	*7,023*	*12,207*	*16,305*	*30,649*	*48,382*	*65,543*	*84,048*	*143,771*	*183,353*
CEC Wheeling	*7,500*	*7,867*	*8,366*	*8,892*	*9,503*	*10,117*	*10,740*	*11,360*	*11,976*	*12,597*	*13,233*	*13,873*	*14,517*
Own production	5,223	4,875	5,119	5,375	5,643	5,926	6,222	6,533	6,860	7,202	7,563	7,941	8,338
Diesel	*5,223*	*4,875*	*5,119*	*5,375*	*5,643*	*5,926*	*6,222*	*6,533*	*6,860*	*7,202*	*7,563*	*7,941*	*8,338*
Salaries	63,155	62,836	65,079	68,678	72,817	77,131	81,652	86,332	91,181	96,240	103,252	110,691	118,580
Management	*15,899*	*15,786*	*16,228*	*16,956*	*17,789*	*18,648*	*19,538*	*20,449*	*21,382*	*22,344*	*23,690*	*25,101*	*26,582*
Operational	*47,256*	*47,051*	*48,851*	*51,721*	*55,028*	*58,483*	*62,114*	*65,883*	*69,799*	*73,896*	*79,562*	*85,589*	*91,998*
Operations & Maintenance	*23,823*	*23,909*	*24,818*	*26,170*	*27,705*	*29,307*	*30,986*	*32,728*	*34,536*	*36,424*	*38,959*	*41,647*	*44,497*
Administration	*7,333*	*7,912*	*8,852*	*9,355*	*9,935*	*10,540*	*11,175*	*11,831*	*12,510*	*13,219*	*14,213*	*15,269*	*16,389*
Provisions	23,899	20,485	14,992	15,717	14,397	15,349	18,300	20,033	22,270	22,485	25,224	34,074	39,043
Bad Debts	*23,899*	*18,485*	*12,992*	*13,717*	*14,397*	*15,349*	*16,300*	*18,033*	*20,270*	*22,485*	*25,224*	*32,074*	*37,043*
Provision for Drought	-	*2,000*	*2,000*	*2,000*	-	-	*2,000*	*2,000*	*2,000*	-	-	*2,000*	*2,000*
Transport Cost	5,171	5,306	5,506	5,714	5,931	6,156	6,390	6,634	6,887	7,150	7,423	7,708	8,003
Depreciation	**51,998**	**54,650**	**56,249**	**57,165**	**57,949**	**58,632**	**59,316**	**59,999**	**60,682**	**61,366**	**62,049**	**62,732**	**63,416**
Existing and renewals	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670
New Investments	3,328	5,980	7,579	8,495	9,279	9,963	10,646	11,329	12,013	12,696	13,379	14,063	14,746
Total Operating Expenses	**197,612**	**196,211**	**195,725**	**205,761**	**215,704**	**230,165**	**245,884**	**270,897**	**300,085**	**327,027**	**360,765**	**442,506**	**500,935**
Operating Income	**(25,811)**	**(17,721)**	**(10,593)**	**(13,751)**	**(15,960)**	**(23,125)**	**(31,827)**	**(45,670)**	**(65,495)**	**(82,980)**	**(107,238)**	**(179,653)**	**(229,006)**
Financial Items	**(8,188)**	**(12,394)**	**7,275**	**7,878**	**10,942**	**7,910**	**13,876**	**13,611**	**12,863**	**11,121**	**9,403**	**7,685**	**6,399**
Interest on Debt	3,599	2,063	14,870	16,119	15,329	14,087	17,155	16,879	15,306	13,729	12,149	10,507	8,996
Less: IDC	(11,787)	(13,433)	(6,709)	(7,154)	(3,169)	(4,808)	(1,763)	(1,629)	(635)	(635)	(635)	(579)	(160)
Interest income	-	(1,025)	(886)	(1,086)	(1,218)	(1,369)	(1,516)	(1,639)	(1,808)	(1,972)	(2,111)	(2,243)	(2,438)
Profit after financial items	**(17,623)**	**(5,327)**	**(17,868)**	**(21,630)**	**(26,902)**	**(31,035)**	**(45,703)**	**(59,282)**	**(78,358)**	**(94,102)**	**(116,641)**	**(187,338)**	**(235,404)**
Profit before taxes	**(17,623)**	**(5,327)**	**(17,868)**	**(21,630)**	**(26,902)**	**(31,035)**	**(45,703)**	**(59,282)**	**(78,358)**	**(94,102)**	**(116,641)**	**(187,338)**	**(235,404)**
Taxes and Dividends	**6,084**	**6,712**	**5,351**	**11,801**	**5,199**	**4,923**	**2,375**	**2,371**	**2,152**	**2,313**	**2,210**	**1,506**	**1,247**
Corporate Tax	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	6,084	6,712	5,351	11,801	5,199	4,923	2,375	2,371	2,152	2,313	2,210	1,506	1,247
Retained profit after taxes	**(23,707)**	**(12,039)**	**(23,219)**	**(33,430)**	**(32,101)**	**(35,958)**	**(48,078)**	**(61,653)**	**(80,510)**	**(96,415)**	**(118,851)**	**(188,844)**	**(236,651)**

85

Case = Baseline
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Total Revenue	274,577	276,824	279,077	281,885	284,624	287,557	290,927	270,475	281,225	292,242	303,533	315,105	326,966
Energy Sales Revenue	274,577	276,824	279,077	281,885	284,624	287,557	290,927	270,475	281,225	292,242	303,533	315,105	326,966
Isolated System Sales	975	1,033	1,096	1,162	1,233	1,307	1,386	1,470	1,559	1,653	1,753	1,860	1,972
Domestic Sales	198,402	207,414	216,644	226,097	235,779	245,697	255,856	266,263	276,925	287,847	299,038	310,504	322,253
CEC Sales	72,489	65,567	58,644	51,722	44,800	37,877	30,955	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-	-	-	-	-	-	-
SAPP Wheeling	2,711	2,810	2,692	2,904	2,812	2,675	2,729	2,741	2,741	2,741	2,741	2,741	2,741
Average tariff /transfer price (US$/MWh)	31.6	32.4	33.2	34.1	35.0	35.9	36.9	40.9	41.3	41.7	42.1	42.5	42.9
Operating Expenses	439,071	455,546	460,512	490,017	499,139	506,980	525,882	478,867	520,493	561,632	604,365	646,779	692,966
Supply costs	190,584	193,064	182,414	191,425	182,733	171,879	171,888	107,138	122,423	137,854	153,436	169,172	185,068
KNBC	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*
Outside Power Purchases	*170,619*	*172,446*	*161,139*	*169,488*	*160,128*	*148,602*	*147,933*	*82,500*	*97,096*	*111,833*	*126,714*	*141,743*	*156,925*
CEC Wheeling	*15,166*	*15,818*	*16,476*	*17,138*	*17,805*	*18,477*	*19,155*	*19,838*	*20,527*	*21,222*	*21,922*	*22,629*	*23,343*
Own production	8,755	9,192	9,652	10,135	10,641	11,173	11,732	12,319	12,935	13,581	14,260	14,973	15,722
Diesel	*8,755*	*9,192*	*9,652*	*10,135*	*10,641*	*11,173*	*11,732*	*12,319*	*12,935*	*13,581*	*14,260*	*14,973*	*15,722*
Salaries	126,946	135,817	145,222	155,191	165,758	176,957	188,825	201,401	214,725	228,841	243,796	259,638	276,419
Management	*28,135*	*29,765*	*31,473*	*33,265*	*35,143*	*37,113*	*39,178*	*41,343*	*43,612*	*45,991*	*48,484*	*51,098*	*53,837*
Operational	*98,811*	*106,053*	*113,749*	*121,927*	*130,615*	*139,844*	*149,647*	*160,058*	*171,113*	*182,850*	*195,312*	*208,540*	*222,582*
Operations & Maintenance	*47,519*	*50,722*	*54,116*	*57,713*	*61,525*	*65,563*	*69,841*	*74,372*	*79,171*	*84,254*	*89,636*	*95,336*	*101,370*
Administration	*17,577*	*18,838*	*20,175*	*21,593*	*23,096*	*24,689*	*26,379*	*28,169*	*30,066*	*32,076*	*34,205*	*36,461*	*38,851*
Provisions	39,379	39,283	39,970	44,651	45,718	46,677	46,788	44,635	49,920	53,335	56,887	58,583	62,430
Bad Debts	*37,379*	*39,283*	*39,970*	*42,651*	*43,718*	*44,677*	*46,788*	*44,635*	*47,920*	*51,335*	*54,887*	*58,583*	*62,430*
Provision for Drought	*2,000*	-	-	*2,000*	*2,000*	*2,000*	-	-	*2,000*	*2,000*	*2,000*	-	-
Transport Cost	8,311	8,630	8,963	9,308	9,668	10,041	10,429	10,833	11,253	11,690	12,144	12,616	13,107
Depreciation	64,099	65,126	65,809	66,493	67,176	67,859	68,543	69,226	69,909	37,787	38,470	39,154	39,837
Existing and renewals	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	15,864	15,864	15,864	15,864
New Investments	15,429	16,456	17,140	17,823	18,506	19,190	19,873	20,556	21,240	21,923	22,606	23,290	23,973
Total Operating Expenses	503,170	520,672	526,321	556,509	566,314	574,839	594,424	548,093	590,402	599,419	642,836	685,933	732,803
Operating Income	(228,593)	(243,848)	(247,244)	(274,624)	(281,690)	(287,282)	(303,498)	(277,618)	(309,177)	(307,177)	(339,303)	(370,828)	(405,837)
Financial Items	4,773	2,920	1,967	1,130	318	(462)	(1,249)	(1,187)	(936)	(723)	(605)	(106)	-
Interest on Debt	7,530	5,732	4,803	3,926	3,047	2,111	993	791	589	387	-	-	-
Less: IDC	(160)	(160)	(160)	(160)	(160)	(160)	(47)	(47)	(47)	(47)	-	-	-
Interest income	(2,597)	(2,652)	(2,676)	(2,636)	(2,569)	(2,413)	(2,195)	(1,931)	(1,478)	(1,062)	(605)	(106)	-
Profit after financial items	(233,365)	(246,768)	(249,211)	(275,755)	(282,008)	(286,820)	(302,248)	(276,430)	(308,241)	(306,455)	(338,698)	(370,723)	(405,837)
Profit before taxes	(233,365)	(246,768)	(249,211)	(275,755)	(282,008)	(286,820)	(302,248)	(276,430)	(308,241)	(306,455)	(338,698)	(370,723)	(405,837)
Taxes and Dividends	718	276	-	-	-	-	-	-	-	-	-	-	-
Corporate Tax	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	718	276	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	(234,083)	(247,044)	(249,211)	(275,755)	(282,008)	(286,820)	(302,248)	(276,430)	(308,241)	(306,455)	(338,698)	(370,723)	(405,837)

86

Case = Baseline
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2026/27	2027/28	2028/29	2029/30	2030/31
Total Revenue	339,124	351,588	364,367	377,468	390,901
Energy Sales Revenue	339,124	351,588	364,367	377,468	390,901
Isolated System Sales	2,091	2,218	2,352	2,494	2,645
Domestic Sales	334,292	346,630	359,273	372,232	385,515
CEC Sales	-	-	-	-	-
Exports	-	-	-	-	-
SAPP Wheeling	2,741	2,741	2,741	2,741	2,741
Average tariff /transfer price (US$/MWh)	43.3	43.7	44.1	44.6	45.0
Operating Expenses	741,021	790,333	842,485	896,831	953,491
Supply costs	201,126	217,354	233,754	250,332	267,094
KNBC	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*
Outside Power Purchases	*172,264*	*187,764*	*203,430*	*219,267*	*235,280*
CEC Wheeling	*24,063*	*24,790*	*25,524*	*26,266*	*27,014*
Own production	16,508	17,334	18,200	19,110	20,066
Diesel	*16,508*	*17,334*	*18,200*	*19,110*	*20,066*
Salaries	294,194	313,021	332,961	354,080	376,448
Management	*56,707*	*59,716*	*62,868*	*66,172*	*69,635*
Operational	*237,487*	*253,305*	*270,093*	*287,908*	*306,813*
Operations & Maintenance	*107,759*	*114,522*	*121,682*	*129,261*	*137,284*
Administration	*41,382*	*44,062*	*46,900*	*49,906*	*53,088*
Provisions	66,435	69,893	74,288	78,867	83,642
Bad Debts	*66,435*	*69,893*	*74,288*	*78,867*	*83,642*
Provision for Drought	-	-	-	-	-
Transport Cost	13,617	14,148	14,699	15,273	15,870
Depreciation	40,520	33,593	34,277	34,960	35,643
Existing and renewals	15,864	8,254	8,254	8,254	8,254
New Investments	24,656	25,340	26,023	26,706	27,390
Total Operating Expenses	781,541	823,926	876,762	931,791	989,135
Operating Income	(442,417)	(472,338)	(512,395)	(554,323)	(598,234)
Financial Items	-	-	-	-	-
Interest on Debt	-	-	-	-	-
Less: IDC	-	-	-	-	-
Interest income	-	-	-	-	-
Profit after financial items	(442,417)	(472,338)	(512,395)	(554,323)	(598,234)
Profit before taxes	(442,417)	(472,338)	(512,395)	(554,323)	(598,234)
Taxes and Dividends	-	-	-	-	-
Corporate Tax	-	-	-	-	-
Dividends	-	-	-	-	-
Retained profit after taxes	(442,417)	(472,338)	(512,395)	(554,323)	(598,234)

Case = Baseline
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

BALANCE SHEET	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Assets													
Current Assets	125,480	115,074	127,919	129,591	138,891	147,952	148,879	159,640	170,084	179,264	188,169	200,183	210,479
Cash	51,235	44,109	54,306	60,909	68,436	75,806	81,927	90,382	98,623	105,552	112,144	121,893	129,870
Trade debtors	58,965	55,208	57,490	52,465	54,175	55,820	50,577	52,836	54,991	57,194	59,460	61,677	63,948
Deferred CEC debtor	5	5	5	5	5	5	5	5	5	5	5	5	5
Other debtors	6,423	6,371	6,318	6,266	6,214	6,161	6,109	6,057	6,004	5,952	5,900	5,847	5,795
Stores	8,853	9,382	9,800	9,945	10,060	10,160	10,260	10,360	10,460	10,560	10,660	10,760	10,860
Net Fixed Assets	1,394,346	1,495,615	1,541,773	1,537,678	1,446,565	1,350,150	1,283,556	1,227,097	1,186,467	1,145,153	1,103,157	1,060,477	1,017,113
Existing	1,526,942	1,526,995	1,527,047	1,527,099	1,527,152	1,527,204	1,527,256	1,527,309	1,527,361	1,527,413	1,527,466	1,527,518	1,527,570
New Investments	99,629	177,067	223,908	253,039	276,070	296,070	316,070	336,070	356,070	376,070	396,070	416,070	436,070
Acc. Depreciation- existing	238,753	287,370	335,988	384,605	433,222	481,839	530,456	579,074	627,691	676,308	724,925	773,542	822,159
Acc. Depreciation- new	3,328	9,308	16,888	25,383	34,662	44,625	55,271	66,601	78,613	91,310	104,689	118,752	133,498
CWIP	10,098	88,527	144,040	167,926	111,678	53,844	26,513	10,000	10,000	10,000	10,000	10,000	10,000
Investments (financial)	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Assets	1,519,826	1,610,689	1,669,692	1,667,269	1,585,455	1,498,103	1,432,435	1,386,737	1,356,551	1,324,417	1,291,325	1,260,660	1,227,592
Liabilities													
Current liabilities	47,281	43,929	59,718	54,377	54,709	55,928	49,518	52,734	56,345	60,057	49,637	60,475	68,182
Accounts Payable	35,309	30,194	31,298	24,665	25,366	26,620	18,580	20,905	23,967	26,959	30,339	40,400	47,267
Other Payables	7,029	6,542	8,508	8,972	9,278	9,570	10,914	11,462	11,696	11,936	12,378	12,848	13,379
Taxes Payable	1,473	2,553	2,649	2,747	2,858	2,961	3,060	3,217	3,347	3,480	3,612	3,733	3,857
Consumer Deposits	1,563	1,709	1,855	2,001	2,187	2,373	2,559	2,745	2,931	3,117	3,303	3,489	3,675
Current portion long-term loan	1,907	2,930	15,409	15,992	15,019	14,405	14,405	14,405	14,405	14,565	5	5	5
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
Bank Overdraft	-	-	-	-	-	-	-	-	-	-	-	-	-
Liabilities over 1 year	28,420	28,276	29,286	30,905	32,768	34,709	36,743	38,849	41,031	43,308	46,463	49,811	53,361
Existing Loans	7,841	6,079	4,316	2,553	790	-	-	-	-	-	-	-	-
New long term loans	83,637	150,891	172,757	167,370	153,145	138,920	124,520	110,120	95,721	81,321	66,921	53,797	40,672
PRP Loans	83,637	150,891	172,757	167,370	153,145	138,920	124,520	110,120	95,721	81,321	66,921	53,797	40,672
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	10,492	16,060	21,628	27,196	32,764	38,332	43,900	49,468	55,036	60,604	66,172	71,740	77,308
Provision for drought	-	2,000	4,000	6,000	3,000	-	2,000	4,000	6,000	3,000	-	2,000	4,000
Equity	1,342,155	1,363,455	1,377,988	1,378,868	1,308,281	1,230,214	1,175,754	1,131,565	1,102,417	1,076,128	1,062,131	1,022,837	984,069
Share Capital	89	89	89	89	89	89	89	89	89	89	89	89	89
Revaluation reserve	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167
Revenue reserve	(136,101)	(114,801)	(100,268)	(99,388)	(169,975)	(248,042)	(302,502)	(346,691)	(375,839)	(402,128)	(416,124)	(455,418)	(494,187)
Total Liabilities & Equity	1,519,826	1,610,689	1,669,692	1,667,269	1,585,455	1,498,103	1,432,435	1,386,737	1,356,551	1,324,417	1,291,325	1,260,660	1,227,592

88

Case = Baseline
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

BALANCE SHEET	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Assets													
Current Assets	214,990	218,130	217,916	216,447	210,595	201,686	190,583	167,728	149,827	129,918	107,975	105,782	108,955
Cash	132,590	133,804	131,796	128,445	120,650	109,735	96,560	73,887	53,109	30,253	5,289	-	-
Trade debtors	65,692	67,508	69,254	71,087	72,982	74,941	76,965	76,736	79,565	82,465	85,438	88,486	91,612
Deferred CEC debtor	5	5	5	5	5	5	5	5	5	5	5	5	5
Other debtors	5,743	5,690	5,638	5,586	5,533	5,481	5,429	5,376	5,324	5,272	5,219	5,167	5,115
Stores	10,960	11,124	11,224	11,324	11,424	11,524	11,624	11,724	11,824	11,924	12,024	12,124	12,224
Net Fixed Assets	973,067	946,921	894,855	848,415	801,291	753,484	704,994	655,820	605,964	588,229	569,811	550,709	530,924
Existing	1,527,623	1,527,675	1,527,727	1,527,780	1,527,832	1,527,884	1,527,937	1,527,989	1,528,041	1,528,094	1,528,146	1,528,198	1,528,251
New Investments	456,070	488,689	508,689	528,689	548,689	568,689	588,689	608,689	628,689	648,689	668,689	688,689	708,689
Acc. Depreciation- existing	870,777	919,394	968,011	1,016,628	1,065,245	1,113,862	1,162,480	1,211,097	1,259,714	1,275,526	1,291,337	1,307,149	1,322,961
Acc. Depreciation- new	148,927	165,384	182,524	200,347	218,853	238,043	257,916	278,472	299,712	321,635	344,242	367,531	391,504
CWIP	10,000	16,309	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Investments (financial)	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Assets	1,188,057	1,165,052	1,112,771	1,064,862	1,011,886	955,170	895,577	823,549	755,790	718,147	677,785	656,491	639,879
Liabilities													
Current liabilities	67,771	69,879	69,947	73,305	73,927	74,297	76,503	69,720	74,460	79,348	84,347	89,607	95,039
Accounts Payable	46,043	47,351	46,432	48,731	48,231	47,427	48,402	40,506	43,608	46,776	50,012	53,319	56,700
Other Payables	13,965	14,550	15,317	16,154	17,050	17,995	18,993	20,216	21,514	22,892	24,308	25,910	27,606
Taxes Payable	3,896	3,926	3,960	3,996	4,036	4,079	4,125	3,830	3,983	4,140	4,301	4,466	4,635
Consumer Deposits	3,861	4,047	4,233	4,419	4,605	4,791	4,977	5,163	5,349	5,535	5,721	5,907	6,093
Current portion long-term loan	5	5	5	5	5	5	5	5	5	5	5	5	5
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
Bank Overdraft	-	-	-	-	-	-	-	-	-	-	-	-	-
Liabilities over 1 year	57,126	61,118	65,350	69,836	74,591	79,631	84,971	90,630	96,626	102,978	109,708	116,837	124,389
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	27,547	22,074	16,602	11,129	5,656	183	183	183	183	183	183	183	183
PRP Loans	27,547	22,074	16,602	11,129	5,656	183	183	183	183	183	183	183	183
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	82,876	88,444	94,012	99,580	105,148	110,716	116,284	121,852	127,420	132,988	138,556	144,124	149,692
Provision for drought	6,000	3,000	-	2,000	4,000	6,000	3,000	-	2,000	4,000	6,000	3,000	-
Equity	946,737	920,536	866,861	809,012	748,564	684,344	614,635	541,163	455,101	398,649	338,991	302,740	270,577
Share Capital	89	89	89	89	89	89	89	89	89	89	89	89	89
Revaluation reserve	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167
Revenue reserve	(531,519)	(557,719)	(611,395)	(669,244)	(729,692)	(793,912)	(863,620)	(937,093)	(1,023,155)	(1,079,607)	(1,139,265)	(1,175,516)	(1,207,679)
Total Liabilities & Equity	1,188,057	1,165,052	1,112,771	1,064,862	1,011,886	955,170	895,577	823,549	755,790	718,147	677,785	656,491	639,879

89

Case = Baseline
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

BALANCE SHEET	2026/27	2027/28	2028/29	2029/30	2030/31
Assets					
Current Assets	112,207	114,954	118,409	121,951	125,582
Cash	-	-	-	-	-
Trade debtors	94,816	97,515	100,923	104,417	108,000
Deferred CEC debtor	5	5	5	5	5
Other debtors	5,062	5,010	4,958	4,905	4,853
Stores	12,324	12,424	12,524	12,624	12,724
Net Fixed Assets	510,456	496,915	482,691	467,783	452,192
Existing	1,528,303	1,528,355	1,528,408	1,528,460	1,528,512
New Investments	728,689	748,689	768,689	788,689	808,689
Acc. Depreciation- existing	1,338,773	1,346,974	1,355,175	1,363,377	1,371,578
Acc. Depreciation- new	416,161	441,501	467,524	494,230	521,620
CWIP	10,000	10,000	10,000	10,000	10,000
Investments (financial)	-	-	-	-	-
Total Assets	622,664	611,869	601,100	589,734	577,774
Liabilities					
Current liabilities	111,035	105,280	111,357	117,644	124,152
Accounts Payable	60,159	62,522	66,220	70,006	73,883
Other Payables	29,401	31,302	33,313	35,443	37,696
Taxes Payable	4,808	4,986	5,168	5,354	5,545
Consumer Deposits	6,279	6,465	6,651	6,837	7,023
Current portion long-term loan	10,388	5	5	5	5
Unpaid Debt Service	-	-	-	-	-
Bank Overdraft	-	-	-	-	-
Liabilities over 1 year	132,387	140,859	149,832	159,336	169,401
Existing Loans	-	-	-	-	-
New long term loans	183	183	183	183	183
PRP Loans	183	183	183	183	183
Other Loans	-	-	-	-	-
Capital Grants & Contributions	155,260	160,828	166,396	171,964	177,532
Provision for drought	(3,000)	(6,000)	(9,000)	(12,000)	(15,000)
Equity	226,798	210,719	182,331	152,607	121,506
Share Capital	89	89	89	89	89
Revaluation reserve	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167
Revenue reserve	(1,251,458)	(1,267,537)	(1,295,925)	(1,325,649)	(1,356,750)
Total Liabilities & Equity	622,664	611,869	601,100	589,734	577,774

Case = Baseline
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Source of funds	110,844	124,431	69,124	51,504	36,801	33,351	21,367	8,471	(9,921)	(26,982)	(48,838)	(116,852)	(164,235)
Generation from Operations	34,374	51,323	40,380	37,535	31,047	27,597	15,613	2,717	(15,675)	(32,736)	(54,592)	(122,606)	(169,989)
Operating Income	(25,811)	(17,721)	(10,593)	(13,751)	(15,960)	(23,125)	(31,827)	(45,670)	(65,495)	(82,980)	(107,238)	(179,653)	(229,006)
Financial Items	8,188	12,394	(7,275)	(7,878)	(10,942)	(7,910)	(13,876)	(13,611)	(12,863)	(11,121)	(9,403)	(7,685)	(6,399)
Taxes	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought less Utilization	-	2,000	2,000	2,000	-	-	2,000	2,000	2,000	-	-	2,000	2,000
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	51,998	54,650	56,249	57,165	57,949	58,632	59,316	59,999	60,682	61,366	62,049	62,732	63,416
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	76,470	73,108	28,744	13,969	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754
Capital Contributions	2,784	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568
Sale of Assets	-	-	-	-	-	-	-	-	-	-	-	-	-
Consumer deposits	146	146	146	146	186	186	186	186	186	186	186	186	186
Loans PRP	73,540	67,394	23,030	8,255	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	110,844	124,431	69,124	51,504	36,801	33,351	21,367	8,471	(9,921)	(26,982)	(48,838)	(116,852)	(164,235)
Application of Funds													
Investments including IDC	98,163	77,438	46,841	29,131	23,031	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
PRP	77,967	56,319	27,331	16,513	-	-	-	-	-	-	-	-	-
Other	20,197	21,120	19,509	12,619	23,031	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Repayment of loans	2,254	1,902	2,925	15,404	15,987	15,014	14,400	14,400	14,400	14,400	14,400	13,125	13,125
Existing loans	2,256	1,763	1,763	1,763	1,763	790	-	-	-	-	-	-	-
PRP loans	-	140	1,163	13,642	14,225	14,225	14,400	14,400	14,400	14,400	14,400	13,125	13,125
Other New loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividend	-	6,084	6,712	5,351	11,801	5,199	4,923	2,375	2,371	2,152	2,313	2,210	1,506
Total Application of Funds	100,418	85,424	56,478	49,886	50,819	40,213	39,323	36,775	36,771	36,552	36,713	35,335	34,631
Net In/Outflow of Funds	10,426	39,007	12,646	1,618	(14,018)	(6,861)	(17,956)	(28,304)	(46,692)	(63,534)	(85,551)	(152,187)	(198,865)

Case = Baseline
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Source of funds	(161,512)	(175,888)	(177,648)	(201,508)	(207,078)	(211,207)	(227,952)	(201,450)	(230,578)	(260,914)	(292,474)	(325,815)	(360,246)
Generation from Operations	(167,266)	(181,642)	(183,402)	(207,262)	(212,832)	(216,961)	(233,706)	(207,204)	(236,332)	(266,668)	(298,228)	(331,569)	(366,000)
Operating Income	(228,593)	(243,848)	(247,244)	(274,624)	(281,690)	(287,282)	(303,498)	(277,618)	(309,177)	(307,177)	(339,303)	(370,828)	(405,837)
Financial Items	(4,773)	(2,920)	(1,967)	(1,130)	(318)	462	1,249	1,187	936	723	605	106	-
Taxes	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought less Utilization	2,000	-	-	2,000	2,000	2,000	-	-	2,000	2,000	2,000	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	64,099	65,126	65,809	66,493	67,176	67,859	68,543	69,226	69,909	37,787	38,470	39,154	39,837
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754
Capital Contributions	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568
Sale of Assets	-	-	-	-	-	-	-	-	-	-	-	-	-
Consumer deposits	186	186	186	186	186	186	186	186	186	186	186	186	186
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	(161,512)	(175,888)	(177,648)	(201,508)	(207,078)	(211,207)	(227,952)	(201,450)	(230,578)	(260,914)	(292,474)	(325,815)	(360,246)
Application of Funds													
Investments including IDC	20,000	32,619	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	20,000	32,619	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Repayment of loans	13,125	5,473	5,473	5,473	5,473	5,473	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	13,125	5,473	5,473	5,473	5,473	5,473	-	-	-	-	-	-	-
Other New loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividend	1,247	718	276	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	34,371	38,809	25,749	25,473	25,473	25,473	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Net In/Outflow of Funds	(195,884)	(214,697)	(203,397)	(226,981)	(232,551)	(236,680)	(247,952)	(221,450)	(250,578)	(280,914)	(312,474)	(345,815)	(380,246)

92

Case = Baseline
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2026/27	2027/28	2028/29	2029/30	2030/31
Source of funds	(396,143)	(432,991)	(472,364)	(513,609)	(556,837)
Generation from Operations	(401,897)	(438,745)	(478,118)	(519,363)	(562,591)
Operating Income	(442,417)	(472,338)	(512,395)	(554,323)	(598,234)
Financial Items	-	-	-	-	-
Taxes	-	-	-	-	-
Provision for drought less Utilization	-	-	-	-	-
Exceptional Items	-	-	-	-	-
Depreciation	40,520	33,593	34,277	34,960	35,643
Capital contributions	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-
External Sources	5,754	5,754	5,754	5,754	5,754
Capital Contributions	5,568	5,568	5,568	5,568	5,568
Sale of Assets	-	-	-	-	-
Consumer deposits	186	186	186	186	186
Loans PRP	-	-	-	-	-
Other New Loans	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-
New Equity	-	-	-	-	-
Total sources of funds	(396,143)	(432,991)	(472,364)	(513,609)	(556,837)
Application of Funds					
Investments including IDC	20,000	20,000	20,000	20,000	20,000
PRP	-	-	-	-	-
Other	20,000	20,000	20,000	20,000	20,000
Repayment of loans	-	-	-	-	-
Existing loans	-	-	-	-	-
PRP loans	-	-	-	-	-
Other New loans	-	-	-	-	-
Dividend	-	-	-	-	-
Total Application of Funds	20,000	20,000	20,000	20,000	20,000
Net In/Outflow of Funds	(416,143)	(452,991)	(492,364)	(533,609)	(576,837)

Case = Baseline
Isolated Systems
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total Revenue	454	482	511	542	574	609	646	685	727	770	817	867	919
Energy Sales Revenue	454	482	511	542	574	609	646	685	727	770	817	867	919
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff /transfer price (US$/MWh)	33.2	33.5	33.8	34.2	34.5	34.8	35.2	35.5	35.9	36.3	36.6	37.0	37.4
Operating Expenses	6,425	6,146	6,496	6,867	7,261	7,679	8,123	8,594	9,095	9,628	10,195	10,797	11,439
Supply costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Own production	5,223	4,875	5,119	5,375	5,643	5,926	6,222	6,533	6,860	7,202	7,563	7,941	8,338
Diesel	*5,223*	*4,875*	*5,119*	*5,375*	*5,643*	*5,926*	*6,222*	*6,533*	*6,860*	*7,202*	*7,563*	*7,941*	*8,338*
Salaries	839	915	999	1,090	1,189	1,298	1,416	1,545	1,686	1,840	2,008	2,191	2,391
Management	*67*	*73*	*79*	*85*	*92*	*100*	*108*	*117*	*126*	*137*	*148*	*160*	*173*
Operational	*771*	*842*	*920*	*1,005*	*1,097*	*1,198*	*1,308*	*1,429*	*1,560*	*1,703*	*1,860*	*2,031*	*2,218*
Operations & Maintenance	73	80	87	95	104	113	124	135	147	161	176	192	210
Administration	27	30	34	37	40	44	48	52	57	62	68	74	80
Provisions													
Bad Debts													
Provision for Drought													
Transport Cost	263	246	258	271	284	299	313	329	346	363	381	400	420
Depreciation	52	52	52	52	52	52	52	52	52	52	52	52	52
Existing and renewals	52	52	52	52	52	52	52	52	52	52	52	52	52
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Expenses	6,478	6,198	6,548	6,919	7,313	7,731	8,175	8,647	9,148	9,680	10,247	10,850	11,491
Operating Income	(6,024)	(5,717)	(6,038)	(6,378)	(6,739)	(7,122)	(7,529)	(7,961)	(8,421)	(8,910)	(9,430)	(9,983)	(10,572)
Financial Items	(0)	(0)	(4)	(0)	(1)	(1)	(1)	(1)	0	0	0	0	0
Interest on Debt	1	1	1	1	1	1	0	0	0	0	0	0	0
Overdraft Interest													
Other Interest													
Less: IDC	(2)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(0)	(0)	(0)	(0)	(0)
Interest income	-	-	(4)	-	-	-	-	-	-	-	-	-	-
Profit after financial items	(6,023)	(5,716)	(6,033)	(6,377)	(6,738)	(7,121)	(7,528)	(7,961)	(8,421)	(8,910)	(9,430)	(9,983)	(10,572)
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	(6,023)	(5,716)	(6,033)	(6,377)	(6,738)	(7,121)	(7,528)	(7,961)	(8,421)	(8,910)	(9,430)	(9,983)	(10,572)
Taxes and Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Corporate Tax	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	(6,023)	(5,716)	(6,033)	(6,377)	(6,738)	(7,121)	(7,528)	(7,961)	(8,421)	(8,910)	(9,430)	(9,983)	(10,572)

94

Case = Baseline
Isolated Systems
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Total Revenue	975	1,033	1,096	1,162	1,233	1,307	1,386	1,470	1,559	1,653	1,753	1,860	1,972
Energy Sales Revenue	975	1,033	1,096	1,162	1,233	1,307	1,386	1,470	1,559	1,653	1,753	1,860	1,972
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff /transfer price (US$/MWh)	37.7	38.1	38.5	38.9	39.3	39.7	40.1	40.5	40.9	41.3	41.7	42.1	42.5
Operating Expenses	12,121	12,848	13,623	14,448	15,327	16,265	17,266	18,333	19,473	20,690	21,990	23,380	24,866
Supply costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Own production	8,755	9,192	9,652	10,135	10,641	11,173	11,732	12,319	12,935	13,581	14,260	14,973	15,722
Diesel	*8,755*	*9,192*	*9,652*	*10,135*	*10,641*	*11,173*	*11,732*	*12,319*	*12,935*	*13,581*	*14,260*	*14,973*	*15,722*
Salaries	2,609	2,847	3,107	3,390	3,700	4,038	4,406	4,808	5,247	5,727	6,249	6,820	7,443
Management	*187*	*202*	*218*	*236*	*256*	*276*	*299*	*323*	*350*	*378*	*409*	*442*	*478*
Operational	*2,422*	*2,645*	*2,888*	*3,154*	*3,444*	*3,761*	*4,107*	*4,485*	*4,898*	*5,348*	*5,840*	*6,378*	*6,965*
Operations & Maintenance	229	250	273	298	325	355	388	424	463	505	552	602	658
Administration	88	96	105	114	124	136	148	162	177	193	210	230	251
Provisions													
Bad Debts													
Provision for Drought													
Transport Cost	441	463	486	511	536	563	591	621	652	684	718	754	792
Depreciation	52	52	52	52	52	52	52	52	52	52	52	52	52
Existing and renewals	52	52	52	52	52	52	52	52	52	52	52	52	52
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Expenses	12,174	12,901	13,675	14,500	15,380	16,318	17,318	18,386	19,525	20,742	22,043	23,432	24,918
Operating Income	(11,199)	(11,867)	(12,579)	(13,338)	(14,147)	(15,010)	(15,932)	(16,915)	(17,966)	(19,089)	(20,289)	(21,573)	(22,946)
Financial Items	0	0	0	0	0	0	-	-	-	-	-	-	-
Interest on Debt	0	0	0	0	0	0	-	-	-	-	-	-	-
Overdraft Interest													
Other Interest													
Less: IDC	(0)	(0)	(0)	(0)	(0)	(0)	-	-	-	-	-	-	-
Interest income	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit after financial items	(11,199)	(11,867)	(12,579)	(13,338)	(14,147)	(15,010)	(15,932)	(16,915)	(17,966)	(19,089)	(20,289)	(21,573)	(22,946)
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	(11,199)	(11,867)	(12,579)	(13,338)	(14,147)	(15,010)	(15,932)	(16,915)	(17,966)	(19,089)	(20,289)	(21,573)	(22,946)
Taxes and Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Corporate Tax	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	(11,199)	(11,867)	(12,579)	(13,338)	(14,147)	(15,010)	(15,932)	(16,915)	(17,966)	(19,089)	(20,289)	(21,573)	(22,946)

95

Case = Baseline
Isolated Systems
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2026/27	2027/28	2028/29	2029/30	2030/31
Total Revenue	2,091	2,218	2,352	2,494	2,645
Energy Sales Revenue	2,091	2,218	2,352	2,494	2,645
Other Revenue	-	-	-	-	-
Capital Grants & Contributions					
Other					
Average tariff /transfer price (US$/MWh)	42.9	43.4	43.8	44.2	44.7
Operating Expenses	26,454	28,154	29,974	31,922	34,009
Supply costs	-	-	-	-	-
Own production	16,508	17,334	18,200	19,110	20,066
Diesel	*16,508*	*17,334*	*18,200*	*19,110*	*20,066*
Salaries	8,123	8,864	9,674	10,558	11,522
Management	*517*	*559*	*605*	*654*	*708*
Operational	*7,605*	*8,305*	*9,069*	*9,903*	*10,814*
Operations & Maintenance	718	784	857	935	1,022
Administration	273	298	326	355	388
Provisions					
Bad Debts					
Provision for Drought					
Transport Cost	832	873	917	963	1,011
Depreciation	52	52	52	52	52
Existing and renewals	52	52	52	52	52
New Investments	-	-	-	-	-
Total Operating Expenses	26,507	28,207	30,026	31,974	34,061
Operating Income	(24,415)	(25,989)	(27,674)	(29,480)	(31,416)
Financial Items	-	-	-	-	-
Interest on Debt	-	-	-	-	-
Overdraft Interest					
Other Interest					
Less: IDC	-	-	-	-	-
Interest income	-	-	-	-	-
Profit after financial items	(24,415)	(25,989)	(27,674)	(29,480)	(31,416)
Other	-	-	-	-	-
Exceptional Item CEC Provision					
Exchange rate losses					
Profit before taxes	(24,415)	(25,989)	(27,674)	(29,480)	(31,416)
Taxes and Dividends	-	-	-	-	-
Corporate Tax	-	-	-	-	-
Dividends	-	-	-	-	-
Retained profit after taxes	(24,415)	(25,989)	(27,674)	(29,480)	(31,416)

Case = Baseline

Isolated Systems

(expressed in thousand year 2000 US$)

BALANCE SHEET	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Assets													
Current Assets	122	304	111	89	94	100	72	76	80	85	90	95	100
Cash	-	199	-	-	-	-	-	-	-	-	-	-	-
Trade debtors	117	100	106	84	89	94	67	71	75	80	84	90	95
Deferred CEC debtor													
Other debtors													
Stores	5	5	5	5	5	5	5	5	5	5	5	5	5
Net Fixed Assets	805	752	700	648	595	543	491	438	386	334	281	229	177
Existing	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-
Acc. Depreciation- existing	242	294	347	399	451	504	556	608	661	713	765	818	870
Acc. Depreciation- new	-	-	-	-	-	-	-	-	-	-	-	-	-
CWIP	-	-	-	-	-	-	-	-	-	-	-	-	-
Investments (financial)													
Total Assets	927	1,056	811	737	690	643	563	514	466	419	371	324	277
Liabilities													
Current liabilities	1,842	1,598	3,116	3,128	3,100	2,994	2,627	2,532	2,446	2,375	2,312	2,252	2,213
Accounts Payable	1,148	860	904	712	749	787	551	579	609	640	673	707	744
Other Payables	686	730	2,204	2,407	2,343	2,198	2,067	1,943	1,826	1,724	1,627	1,532	1,456
Taxes Payable	7	7	7	8	8	9	9	10	10	11	12	12	13
Consumer Deposits	-	-	-	-	-	-	-	-	-	-	-	-	-
Current portion long-term loan	1	1	1	1	1	-	-	-	-	0	-	-	-
Unpaid Debt Service													
Bank Overdraft													
Liabilities over 1 year	378	412	449	490	535	584	637	695	759	828	904	986	1,076
Existing Loans	5	4	3	2	1	-	-	-	-	-	-	-	-
New long term loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought													
Equity	(1,298)	(957)	(2,758)	(2,883)	(2,946)	(2,935)	(2,702)	(2,713)	(2,738)	(2,784)	(2,844)	(2,914)	(3,012)
Share Capital	0	0	0	0	0	0	0	0	0	0	0	0	0
Revaluation reserve	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659
Revenue reserve	(4,957)	(4,617)	(6,417)	(6,543)	(6,606)	(6,594)	(6,361)	(6,372)	(6,398)	(6,444)	(6,504)	(6,573)	(6,671)
Total Liabilities & Equity	927	1,056	811	737	690	643	563	514	466	419	371	324	277

Case = Baseline
Isolated Systems
(expressed in thousand year 2000 US$)

BALANCE SHEET	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Assets													
Current Assets	106	112	118	125	133	140	148	157	166	176	186	197	209
Cash	-	-	-	-	-	-	-	-	-	-	-	-	-
Trade debtors	101	107	113	120	127	135	143	152	161	171	181	192	204
Deferred CEC debtor													
Other debtors													
Stores	5	5	5	5	5	5	5	5	5	5	5	5	5
Net Fixed Assets	124	72	20	(33)	(85)	(137)	(190)	(242)	(294)	(347)	(399)	(451)	(504)
Existing	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-
Acc. Depreciation- existing	922	975	1,027	1,079	1,132	1,184	1,236	1,289	1,341	1,393	1,446	1,498	1,550
Acc. Depreciation- new	-	-	-	-	-	-	-	-	-	-	-	-	-
CWIP	-	-	-	-	-	-	-	-	-	-	-	-	-
Investments (financial)													
Total Assets	230	184	138	93	48	3	(41)	(85)	(128)	(171)	(213)	(254)	(295)
Liabilities													
Current liabilities	2,180	2,121	2,154	2,191	2,234	2,281	2,300	2,400	2,505	2,614	2,728	2,848	2,973
Accounts Payable	782	822	864	909	956	1,005	1,057	1,112	1,169	1,230	1,294	1,361	1,432
Other Payables	1,384	1,284	1,274	1,266	1,260	1,257	1,223	1,267	1,313	1,360	1,409	1,460	1,513
Taxes Payable	14	15	16	17	18	19	20	21	22	24	25	27	28
Consumer Deposits	-	-	-	-	-	-	-	-	-	-	-	-	-
Current portion long-term loan	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service													
Bank Overdraft													
Liabilities over 1 year	1,174	1,281	1,398	1,526	1,665	1,817	1,983	2,164	2,361	2,577	2,812	3,069	3,349
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought													
Equity	(3,124)	(3,218)	(3,414)	(3,625)	(3,851)	(4,095)	(4,324)	(4,649)	(4,994)	(5,361)	(5,753)	(6,171)	(6,617)
Share Capital	0	0	0	0	0	0	0	0	0	0	0	0	0
Revaluation reserve	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659
Revenue reserve	(6,783)	(6,877)	(7,073)	(7,284)	(7,510)	(7,754)	(7,983)	(8,308)	(8,653)	(9,021)	(9,412)	(9,830)	(10,276)
Total Liabilities & Equity	230	184	138	93	48	3	(41)	(85)	(128)	(171)	(213)	(254)	(295)

90

Case = Baseline
Isolated Systems
(expressed in thousand year 2000 US$)

BALANCE SHEET	2026/27	2027/28	2028/29	2029/30	2030/31
Assets					
Current Assets	221	234	248	263	279
Cash	-	-	-	-	-
Trade debtors	216	229	243	258	273
Deferred CEC debtor					
Other debtors					
Stores	5	5	5	5	5
Net Fixed Assets	(556)	(608)	(661)	(713)	(765)
Existing	1,047	1,047	1,047	1,047	1,047
New Investments	-	-	-	-	-
Acc. Depreciation- existing	1,603	1,655	1,707	1,760	1,812
Acc. Depreciation- new	-	-	-	-	-
CWIP	-	-	-	-	-
Investments (financial)					
Total Assets	(335)	(374)	(412)	(450)	(487)
Liabilities					
Current liabilities	7,281	3,242	3,385	3,536	3,693
Accounts Payable	1,507	1,585	1,668	1,756	1,848
Other Payables	1,568	1,624	1,683	1,744	1,807
Taxes Payable	30	32	34	36	38
Consumer Deposits	-	-	-	-	-
Current portion long-term loan	4,176	-	-	-	-
Unpaid Debt Service					
Bank Overdraft					
Liabilities over 1 year	3,655	3,989	4,353	4,751	5,185
Existing Loans	-	-	-	-	-
New long term loans	-	-	-	-	-
PRP Loans	-	-	-	-	-
Other Loans	-	-	-	-	-
Capital Grants & Contributions	-	-	-	-	-
Provision for drought					
Equity	(11,271)	(7,604)	(8,151)	(8,737)	(9,365)
Share Capital	0	0	0	0	0
Revaluation reserve	3,659	3,659	3,659	3,659	3,659
Revenue reserve	(14,930)	(11,264)	(11,810)	(12,396)	(13,024)
Total Liabilities & Equity	(335)	(374)	(412)	(450)	(487)

Case = Baseline
Isolated Systems
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Source of funds													
Generation from Operations	(5,971)	(5,664)	(5,981)	(6,325)	(6,686)	(7,069)	(7,476)	(7,908)	(8,369)	(8,858)	(9,378)	(9,931)	(10,520)
Operating Income	(6,024)	(5,717)	(6,038)	(6,378)	(6,739)	(7,122)	(7,529)	(7,961)	(8,421)	(8,910)	(9,430)	(9,983)	(10,572)
Financial Items	0	0	4	0	1	1	1	1	(0)	(0)	(0)	(0)	(0)
Taxes	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	52	52	52	52	52	52	52	52	52	52	52	52	52
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Contributions													
Sale of Assets													
Consumer deposits													
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity													
Total sources of funds	(5,971)	(5,664)	(5,981)	(6,325)	(6,686)	(7,069)	(7,476)	(7,908)	(8,369)	(8,858)	(9,378)	(9,931)	(10,520)
Application of Funds													
Investments including IDC	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Repayment of loans	2	1	1	1	1	1	-	-	-	-	-	-	-
Existing loans	2	1	1	1	1	1	-	-	-	-	-	-	-
PRP loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New loans													
Dividend	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	2	1	1	1	1	1	-	-	-	-	-	-	-
Net In/Outflow of Funds	(5,972)	(5,665)	(5,982)	(6,326)	(6,687)	(7,069)	(7,476)	(7,908)	(8,369)	(8,858)	(9,378)	(9,931)	(10,520)

Case = Baseline
Isolated Systems
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Source of funds													
Generation from Operations	(11,147)	(11,815)	(12,527)	(13,286)	(14,095)	(14,958)	(15,879)	(16,863)	(17,914)	(19,037)	(20,237)	(21,520)	(22,893)
Operating Income	(11,199)	(11,867)	(12,579)	(13,338)	(14,147)	(15,010)	(15,932)	(16,915)	(17,966)	(19,089)	(20,289)	(21,573)	(22,946)
Financial Items	(0)	(0)	(0)	(0)	(0)	(0)	-	-	-	-	-	-	-
Taxes	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	52	52	52	52	52	52	52	52	52	52	52	52	52
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Contributions													
Sale of Assets													
Consumer deposits													
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity													
Total sources of funds	(11,147)	(11,815)	(12,527)	(13,286)	(14,095)	(14,958)	(15,879)	(16,863)	(17,914)	(19,037)	(20,237)	(21,520)	(22,893)
Application of Funds													
Investments including IDC	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Repayment of loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New loans													
Dividend	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	-	-	-	-	-	-	-	-	-	-	-	-	-
Net In/Outflow of Funds	(11,147)	(11,815)	(12,527)	(13,286)	(14,095)	(14,958)	(15,879)	(16,863)	(17,914)	(19,037)	(20,237)	(21,520)	(22,893)

Case = Baseline
Isolated Systems
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2026/27	2027/28	2028/29	2029/30	2030/31
Source of funds					
Generation from Operations	(24,363)	(25,936)	(27,622)	(29,427)	(31,363)
Operating Income	(24,415)	(25,989)	(27,674)	(29,480)	(31,416)
Financial Items	-	-	-	-	-
Taxes	-	-	-	-	-
Provision for drought less Utilization	-	-	-	-	-
Exceptional Items	-	-	-	-	-
Depreciation	52	52	52	52	52
Capital contributions	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-
External Sources	-	-	-	-	-
Capital Contributions					
Sale of Assets					
Consumer deposits					
Loans PRP	-	-	-	-	-
Other New Loans	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-
New Equity					
Total sources of funds	(24,363)	(25,936)	(27,622)	(29,427)	(31,363)
Application of Funds					
Investments including IDC	-	-	-	-	-
PRP	-	-	-	-	-
Other	-	-	-	-	-
Repayment of loans	-	-	-	-	-
Existing loans	-	-	-	-	-
PRP loans	-	-	-	-	-
Other New loans					
Dividend	-	-	-	-	-
Total Application of Funds	-	-	-	-	-
Net In/Outflow of Funds	(24,363)	(25,936)	(27,622)	(29,427)	(31,363)

Case = Baseline
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total Revenue	32,118	36,207	38,669	39,952	39,155	37,741	37,135	36,738	36,889	37,048	37,217	37,395	37,585
Energy Sales Revenue	32,118	36,207	38,669	39,952	39,155	37,741	37,135	36,738	36,889	37,048	37,217	37,395	37,585
Sales to Wholesale Marketer	32,118	36,207	38,669	39,952	39,155	37,741	37,135	36,738	36,889	37,048	37,217	37,395	37,585
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff /transfer price (US$/MWh)	6.0	6.3	6.3	6.5	6.5	6.4	6.4	6.4	6.5	6.7	6.7	6.7	6.8
Operating Expenses	9,587	9,882	10,218	10,588	10,972	11,371	11,784	12,213	12,658	13,120	13,600	14,098	14,614
Supply costs	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
Salaries	5,836	6,044	6,259	6,482	6,712	6,952	7,200	7,457	7,723	7,999	8,285	8,582	8,889
Management	*2,597*	*2,674*	*2,755*	*2,837*	*2,922*	*3,010*	*3,100*	*3,193*	*3,289*	*3,388*	*3,490*	*3,594*	*3,702*
Operational	*3,240*	*3,369*	*3,504*	*3,644*	*3,790*	*3,942*	*4,099*	*4,263*	*4,434*	*4,611*	*4,796*	*4,987*	*5,187*
Operations & Maintenance	2,892	3,008	3,128	3,253	3,383	3,518	3,659	3,806	3,958	4,116	4,281	4,452	4,630
Administration	598	599	599	621	644	668	693	719	746	773	802	832	863
Provisions	-	-	-	-	-	-	-	-	-	-	-	-	-
Bad Debts													
Provision for Drought													
Transport Cost	261	232	232	232	232	232	232	232	232	232	232	232	232
Depreciation	8,747	9,610	10,069	10,369	10,603	10,737	10,870	11,003	11,137	11,270	11,403	11,537	11,670
Existing and renewals	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610
New Investments	1,137	1,999	2,459	2,759	2,993	3,126	3,260	3,393	3,526	3,660	3,793	3,926	4,060
Total Operating Expenses	18,334	19,492	20,287	20,957	21,575	22,107	22,654	23,216	23,795	24,390	25,003	25,634	26,284
Operating Income	13,784	16,715	18,382	18,995	17,580	15,634	14,481	13,522	13,094	12,658	12,213	11,761	11,301
Financial Items	(1,841)	(4,331)	5,859	6,569	6,219	5,539	4,905	4,328	3,961	3,430	2,922	2,413	1,977
Interest on Debt	236	320	6,124	6,840	6,485	5,804	5,171	4,565	3,985	3,454	2,946	2,437	2,001
Overdraft Interest													
Other Interest													
Less: IDC	(2,077)	(4,519)	(265)	(265)	(265)	(265)	(265)	(237)	(24)	(24)	(24)	(24)	(24)
Interest income	-	(132)	-	(5)	-	-	-	-	-	(0)	(0)	-	-
Profit after financial items	15,625	21,046	12,523	12,426	11,360	10,095	9,576	9,194	9,133	9,228	9,292	9,348	9,324
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	15,625	21,046	12,523	12,426	11,360	10,095	9,576	9,194	9,133	9,228	9,292	9,348	9,324
Taxes and Dividends	8,515	11,470	6,825	6,772	6,191	5,502	3,352	3,218	3,197	3,230	3,252	3,272	3,264
Corporate Tax	5,469	7,366	4,383	4,349	3,976	3,533	3,352	3,218	3,197	3,230	3,252	3,272	3,264
Dividends	3,047	4,104	2,442	2,423	2,215	1,969	-	-	-	-	-	-	-
Retained profit after taxes	7,109	9,576	5,698	5,654	5,169	4,593	6,224	5,976	5,936	5,998	6,040	6,076	6,061

103

Case = Baseline
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Total Revenue	37,786	37,999	38,225	38,466	38,720	38,991	39,278	39,582	39,904	40,246	40,608	40,992	41,399
Energy Sales Revenue	37,786	37,999	38,225	38,466	38,720	38,991	39,278	39,582	39,904	40,246	40,608	40,992	41,399
Sales to Wholesale Marketer	37,786	37,999	38,225	38,466	38,720	38,991	39,278	39,582	39,904	40,246	40,608	40,992	41,399
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff /transfer price (US$/MWh)	6.8	6.8	6.9	6.9	7.0	7.0	7.1	7.1	7.2	7.2	7.3	7.4	7.4
Operating Expenses	15,150	15,706	16,283	16,882	17,504	18,149	18,819	19,514	20,235	20,984	21,761	22,568	23,405
Supply costs	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
Salaries	9,207	9,538	9,880	10,235	10,602	10,984	11,379	11,788	12,213	12,653	13,109	13,583	14,073
Management	*3,813*	*3,928*	*4,045*	*4,167*	*4,292*	*4,421*	*4,553*	*4,690*	*4,830*	*4,975*	*5,125*	*5,278*	*5,437*
Operational	*5,394*	*5,610*	*5,834*	*6,068*	*6,311*	*6,563*	*6,826*	*7,099*	*7,382*	*7,678*	*7,985*	*8,304*	*8,636*
Operations & Maintenance	4,815	5,008	5,208	5,416	5,633	5,858	6,093	6,336	6,590	6,854	7,128	7,413	7,709
Administration	895	928	963	999	1,036	1,075	1,115	1,157	1,200	1,245	1,292	1,340	1,390
Provisions	-	-	-	-	-	-	-	-	-	-	-	-	-
Bad Debts													
Provision for Drought													
Transport Cost	232	232	232	232	232	232	232	232	232	232	232	232	232
Depreciation	11,803	11,937	12,070	12,203	12,337	12,470	12,603	12,737	12,870	13,003	13,137	13,270	13,403
Existing and renewals	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610
New Investments	4,193	4,326	4,460	4,593	4,726	4,860	4,993	5,126	5,260	5,393	5,526	5,660	5,793
Total Operating Expenses	26,953	27,643	28,353	29,085	29,840	30,619	31,422	32,250	33,105	33,987	34,898	35,838	36,808
Operating Income	10,833	10,357	9,872	9,380	8,880	8,372	7,856	7,331	6,799	6,259	5,711	5,155	4,590
Financial Items	1,553	1,011	823	639	458	281	-	-	-	-	-	-	-
Interest on Debt	1,577	1,035	847	663	482	305	-	-	-	-	-	-	-
Overdraft Interest													
Other Interest													
Less: IDC	(24)	(24)	(24)	(24)	(24)	(24)	-	-	-	-	-	-	-
Interest income	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit after financial items	9,279	9,346	9,050	8,741	8,422	8,091	7,856	7,331	6,799	6,259	5,711	5,155	4,590
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	9,279	9,346	9,050	8,741	8,422	8,091	7,856	7,331	6,799	6,259	5,711	5,155	4,590
Taxes and Dividends	3,248	3,271	3,167	3,059	2,948	2,832	2,749	2,566	2,380	2,191	1,999	1,804	1,607
Corporate Tax	3,248	3,271	3,167	3,059	2,948	2,832	2,749	2,566	2,380	2,191	1,999	1,804	1,607
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	6,032	6,075	5,882	5,682	5,474	5,259	5,106	4,765	4,419	4,068	3,712	3,350	2,984

Case = Baseline
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2026/27	2027/28	2028/29	2029/30	2030/31
Total Revenue	41,829	35,130	36,068	37,034	38,029
Energy Sales Revenue	41,829	35,130	36,068	37,034	38,029
Sales to Wholesale Marketer	41,829	35,130	36,068	37,034	38,029
Other Revenue	-	-	-	-	-
Capital Grants & Contributions					
Other					
Average tariff /transfer price (US$/MWh)	7.5	6.3	6.5	6.7	6.8
Operating Expenses	24,274	25,176	26,112	27,084	28,093
Supply costs	-	-	-	-	-
	-	-	-	-	-
Salaries	14,582	15,109	15,656	16,222	16,810
Management	*5,600*	*5,768*	*5,941*	*6,119*	*6,303*
Operational	*8,982*	*9,341*	*9,715*	*10,103*	*10,508*
Operations & Maintenance	8,018	8,338	8,672	9,019	9,380
Administration	1,443	1,497	1,553	1,611	1,672
Provisions	-	-	-	-	-
Bad Debts					
Provision for Drought					
Transport Cost	232	232	232	232	232
Depreciation	13,537	6,060	6,193	6,326	6,460
Existing and renewals	7,610	-	-	-	-
New Investments	5,926	6,060	6,193	6,326	6,460
Total Operating Expenses	37,811	31,236	32,305	33,411	34,553
Operating Income	4,018	3,895	3,763	3,623	3,476
Financial Items	-	-	-	-	-
Interest on Debt	-	-	-	-	-
Overdraft Interest					
Other Interest					
Less: IDC	-	-	-	-	-
Interest income	-	-	-	-	-
Profit after financial items	4,018	3,895	3,763	3,623	3,476
Other	-	-	-	-	-
Exceptional Item CEC Provision					
Exchange rate losses					
Profit before taxes	4,018	3,895	3,763	3,623	3,476
Taxes and Dividends	1,406	1,363	1,317	1,268	1,217
Corporate Tax	1,406	1,363	1,317	1,268	1,217
Dividends	-	-	-	-	-
Retained profit after taxes	2,612	2,531	2,446	2,355	2,259

Case = Baseline
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

BALANCE SHEET	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Assets													
Current Assets	14,471	7,406	8,148	6,494	6,431	6,276	4,696	4,683	4,736	4,758	4,782	4,817	4,853
Cash	6,600	-	268	-	-	-	-	-	21	10	-	-	-
Trade debtors	6,600	5,952	6,357	4,926	4,827	4,653	3,052	3,020	3,032	3,045	3,059	3,074	3,089
Deferred CEC debtor													
Other debtors													
Stores	1,272	1,454	1,523	1,568	1,603	1,623	1,643	1,663	1,683	1,703	1,723	1,743	1,763
Net Fixed Assets	229,730	278,580	306,360	316,590	292,994	260,567	241,357	225,366	218,230	210,960	203,556	196,019	188,349
Existing	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003
New Investments	34,981	60,853	74,648	83,635	90,667	94,667	98,667	102,667	106,667	110,667	114,667	118,667	122,667
Acc. Depreciation- existing	34,905	42,515	50,126	57,736	65,347	72,957	80,567	88,178	95,788	103,398	111,009	118,619	126,230
Acc. Depreciation- new	1,137	3,136	5,595	8,354	11,347	14,473	17,733	21,125	24,652	28,311	32,104	36,031	40,090
CWIP	788	33,376	57,430	69,042	49,018	23,327	10,987	2,000	2,000	2,000	2,000	2,000	2,000
Investments (financial)													
Total Assets	244,201	285,987	314,508	323,084	299,425	266,843	246,052	230,049	222,965	215,718	208,338	200,836	193,202
Liabilities													
Current liabilities	1,084	1,282	5,404	5,423	5,173	5,021	4,757	4,687	4,626	4,597	437	453	471
Accounts Payable	771	631	651	506	525	545	377	391	406	421	437	453	471
Other Payables													
Taxes Payable													
Consumer Deposits													
Current portion long-term loan	313	651	4,753	4,917	4,648	4,476	4,380	4,296	4,220	4,176	-	-	-
Unpaid Debt Service													
Bank Overdraft													
Liabilities over 1 year	2,626	2,720	2,816	2,917	3,021	3,128	3,240	3,356	3,475	3,600	3,728	3,862	4,000
Existing Loans	1,181	915	650	384	119	-	-	-	-	-	-	-	-
New long term loans	26,054	49,024	56,275	54,503	49,852	45,323	40,848	36,467	32,171	27,951	23,799	20,070	16,392
PRP Loans	26,054	49,024	56,275	54,503	49,852	45,323	40,848	36,467	32,171	27,951	23,799	20,070	16,392
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160
Provision for drought	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	212,096	230,885	248,201	258,696	240,100	212,210	196,047	184,379	181,533	178,409	179,214	175,291	171,179
Share Capital	13	13	13	13	13	13	13	13	13	13	13	13	13
Revaluation reserve	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501
Revenue reserve	11,582	30,371	47,687	58,182	39,586	11,696	(4,467)	(16,135)	(18,982)	(22,105)	(21,300)	(25,223)	(29,335)
Total Liabilities & Equity	244,201	285,987	314,508	323,084	299,425	266,843	246,052	230,049	222,965	215,718	208,338	200,836	193,202

106

Case = Baseline
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

BALANCE SHEET	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Assets													
Current Assets	4,889	4,927	4,965	5,005	5,046	5,088	5,132	5,177	5,223	5,271	5,321	5,373	5,426
Cash	-	-	-	-	-	-	-	-	-	-	-	-	-
Trade debtors	3,106	3,123	3,142	3,162	3,183	3,205	3,228	3,253	3,280	3,308	3,338	3,369	3,403
Deferred CEC debtor													
Other debtors													
Stores	1,783	1,803	1,823	1,843	1,863	1,883	1,903	1,923	1,943	1,963	1,983	2,003	2,023
Net Fixed Assets	180,546	172,609	164,539	156,336	147,999	139,529	130,926	122,189	113,319	104,316	95,179	85,909	76,506
Existing	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003
New Investments	126,667	130,667	134,667	138,667	142,667	146,667	150,667	154,667	158,667	162,667	166,667	170,667	174,667
Acc. Depreciation- existing	133,840	141,450	149,061	156,671	164,281	171,892	179,502	187,113	194,723	202,333	209,944	217,554	225,164
Acc. Depreciation- new	44,283	48,610	53,069	57,662	62,389	67,248	72,241	77,367	82,627	88,020	93,546	99,206	104,999
CWIP	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Investments (financial)													
Total Assets	185,435	177,536	169,505	161,341	153,045	144,617	136,058	127,366	118,543	109,587	100,500	91,282	81,932
Liabilities													
Current liabilities	488	507	526	546	567	589	612	635	659	685	711	738	767
Accounts Payable	488	507	526	546	567	589	612	635	659	685	711	738	767
Other Payables													
Taxes Payable													
Consumer Deposits													
Current portion long-term loan	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service													
Bank Overdraft													
Liabilities over 1 year	4,143	4,292	4,446	4,606	4,771	4,943	5,120	5,305	5,496	5,694	5,899	6,112	6,333
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	12,760	11,303	9,859	8,429	7,011	5,604	5,604	5,604	5,604	5,604	5,604	5,604	5,604
PRP Loans	12,760	11,303	9,859	8,429	7,011	5,604	5,604	5,604	5,604	5,604	5,604	5,604	5,604
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160
Provision for drought	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	166,883	160,274	153,513	146,600	139,536	132,322	123,561	114,662	105,623	96,444	87,126	77,667	68,068
Share Capital .	13	13	13	13	13	13	13	13	13	13	13	13	13
Revaluation reserve	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501
Revenue reserve	(33,632)	(40,240)	(47,001)	(53,914)	(60,978)	(68,193)	(76,953)	(85,852)	(94,891)	(104,070)	(113,389)	(122,847)	(132,447)
Total Liabilities & Equity	185,435	177,536	169,505	161,341	153,045	144,617	136,058	127,366	118,543	109,587	100,500	91,282	81,932

Case = Baseline
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

BALANCE SHEET	2026/27	2027/28	2028/29	2029/30	2030/31
Assets					
Current Assets	5,481	4,951	5,048	5,147	5,249
Cash	-	-	-	-	-
Trade debtors	3,438	2,887	2,965	3,044	3,126
Deferred CEC debtor					
Other debtors					
Stores	2,043	2,063	2,083	2,103	2,123
Net Fixed Assets	66,969	64,910	62,717	60,390	57,931
Existing	230,003	230,003	230,003	230,003	230,003
New Investments	178,667	182,667	186,667	190,667	194,667
Acc. Depreciation- existing	232,775	232,775	232,775	232,775	232,775
Acc. Depreciation- new	110,925	116,985	123,178	129,504	135,964
CWIP	2,000	2,000	2,000	2,000	2,000
Investments (financial)					
Total Assets	72,451	69,860	67,765	65,538	63,180
Liabilities					
Current liabilities	4,849	827	859	893	927
Accounts Payable	797	827	859	893	927
Other Payables					
Taxes Payable					
Consumer Deposits					
Current portion long-term loan	4,052	-	-	-	-
Unpaid Debt Service					
Bank Overdraft					
Liabilities over 1 year	6,562	6,799	7,045	7,300	7,565
Existing Loans	-	-	-	-	-
New long term loans	5,604	5,604	5,604	5,604	5,604
PRP Loans	5,604	5,604	5,604	5,604	5,604
Other Loans	-	-	-	-	-
Capital Grants & Contributions	1,160	1,160	1,160	1,160	1,160
Provision for drought	-	-	-	-	-
Equity	54,276	55,470	53,096	50,580	47,923
Share Capital	13	13	13	13	13
Revaluation reserve	200,501	200,501	200,501	200,501	200,501
Revenue reserve	(146,238)	(145,045)	(147,418)	(149,934)	(152,591)
Total Liabilities & Equity	72,451	69,860	67,765	65,538	63,180

Case = Baseline
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Source of funds													
Generation from Operations	18,903	23,289	18,209	18,446	17,988	17,299	17,094	16,979	17,073	17,268	17,443	17,613	17,731
Operating Income	13,784	16,715	18,382	18,995	17,580	15,634	14,481	13,522	13,094	12,658	12,213	11,761	11,301
Financial Items	1,841	4,331	(5,859)	(6,569)	(6,219)	(5,539)	(4,905)	(4,328)	(3,961)	(3,430)	(2,922)	(2,413)	(1,977)
Taxes	(5,469)	(7,366)	(4,383)	(4,349)	(3,976)	(3,533)	(3,352)	(3,218)	(3,197)	(3,230)	(3,252)	(3,272)	(3,264)
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	8,747	9,610	10,069	10,369	10,603	10,737	10,870	11,003	11,137	11,270	11,403	11,537	11,670
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	25,549	23,018	7,638	2,716	-	-	-	-	-	-	-	-	-
Capital Contributions													
Sale of Assets													
Consumer deposits													
Loans PRP	25,549	23,018	7,638	2,716	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity													
Total sources of funds	44,452	46,307	25,847	21,162	17,988	17,299	17,094	16,979	17,073	17,268	17,443	17,613	17,731
Application of Funds													
Investments including IDC	34,103	25,873	13,795	8,987	7,031	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
PRP	32,527	24,175	12,340	8,987	-	-	-	-	-	-	-	-	-
Other	1,576	1,698	1,455	-	7,031	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Repayment of loans	340	313	651	4,753	4,917	4,648	4,476	4,380	4,296	4,220	4,152	3,729	3,678
Existing loans	340	265	265	265	265	119	-	-	-	-	-	-	-
PRP loans	-	48	386	4,488	4,651	4,529	4,476	4,380	4,296	4,220	4,152	3,729	3,678
Other New loans													
Dividend	-	3,047	4,104	2,442	2,423	2,215	1,969	-	-	-	-	-	-
Total Application of Funds	34,443	29,233	18,550	16,182	14,371	10,863	10,444	8,380	8,296	8,220	8,152	7,729	7,678
Net In/Outflow of Funds	10,009	17,075	7,297	4,979	3,616	6,436	6,650	8,599	8,777	9,048	9,291	9,884	10,053

Case = Baseline
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Source of funds													
Generation from Operations	17,835	18,011	17,952	17,885	17,811	17,729	17,709	17,502	17,289	17,072	16,849	16,620	16,387
Operating Income	10,833	10,357	9,872	9,380	8,880	8,372	7,856	7,331	6,799	6,259	5,711	5,155	4,590
Financial Items	(1,553)	(1,011)	(823)	(639)	(458)	(281)	-	-	-	-	-	-	-
Taxes	(3,248)	(3,271)	(3,167)	(3,059)	(2,948)	(2,832)	(2,749)	(2,566)	(2,380)	(2,191)	(1,999)	(1,804)	(1,607)
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	11,803	11,937	12,070	12,203	12,337	12,470	12,603	12,737	12,870	13,003	13,137	13,270	13,403
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Contributions													
Sale of Assets													
Consumer deposits													
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity													
Total sources of funds	17,835	18,011	17,952	17,885	17,811	17,729	17,709	17,502	17,289	17,072	16,849	16,620	16,387
Application of Funds													
Investments including IDC	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Repayment of loans	3,632	1,458	1,444	1,430	1,418	1,407	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	3,632	1,458	1,444	1,430	1,418	1,407	-	-	-	-	-	-	-
Other New loans													
Dividend	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	7,632	5,458	5,444	5,430	5,418	5,407	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Net In/Outflow of Funds	10,203	12,554	12,509	12,455	12,393	12,322	13,709	13,502	13,289	13,072	12,849	12,620	12,387

110

Case = Baseline
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2026/27	2027/28	2028/29	2029/30	2030/31
Source of funds					
Generation from Operations	16,148	8,591	8,639	8,682	8,719
Operating Income	4,018	3,895	3,763	3,623	3,476
Financial Items	-	-	-	-	-
Taxes	(1,406)	(1,363)	(1,317)	(1,268)	(1,217)
Provision for drought less Utilization	-	-	-	-	-
Exceptional Items	-	-	-	-	-
Depreciation	13,537	6,060	6,193	6,326	6,460
Capital contributions	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-
External Sources	-	-	-	-	-
Capital Contributions					
Sale of Assets					
Consumer deposits					
Loans PRP	-	-	-	-	-
Other New Loans	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-
New Equity					
Total sources of funds	16,148	8,591	8,639	8,682	8,719
Application of Funds					
Investments including IDC	4,000	4,000	4,000	4,000	4,000
PRP	-	-	-	-	-
Other	4,000	4,000	4,000	4,000	4,000
Repayment of loans	-	-	-	-	-
Existing loans	-	-	-	-	-
PRP loans	-	-	-	-	-
Other New loans					
Dividend	-	-	-	-	-
Total Application of Funds	4,000	4,000	4,000	4,000	4,000
Net In/Outflow of Funds	12,148	4,591	4,639	4,682	4,719

Case = Baseline
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total Revenue	45,657	48,220	49,613	50,963	50,115	49,849	49,897	50,164	50,554	50,955	51,368	51,793	52,232
Energy Sales Revenue	45,657	48,220	49,613	50,963	50,115	49,849	49,897	50,164	50,554	50,955	51,368	51,793	52,232
Sales to Wholesale Marketer	45,175	47,737	49,128	50,482	49,630	49,244	49,256	49,269	49,379	49,591	49,808	49,347	49,354
SAPP Wheeling	482	483	485	481	485	606	641	894	1,175	1,364	1,559	2,446	2,878
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff /transfer price (US$/MWh)	6.2	6.4	6.4	6.4	6.1	5.9	5.8	5.6	5.4	5.3	5.2	5.0	4.9
Operating Expenses	10,585	10,908	11,242	11,671	12,117	12,580	13,061	13,561	14,079	14,618	15,178	15,759	16,362
Supply costs	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
Salaries	4,244	4,397	4,556	4,720	4,890	5,067	5,250	5,440	5,637	5,841	6,053	6,272	6,500
Management	*1,684*	*1,734*	*1,786*	*1,840*	*1,895*	*1,952*	*2,011*	*2,071*	*2,133*	*2,197*	*2,263*	*2,331*	*2,401*
Operational	*2,560*	*2,663*	*2,769*	*2,880*	*2,995*	*3,115*	*3,240*	*3,369*	*3,504*	*3,644*	*3,790*	*3,941*	*4,099*
Operations & Maintenance	4,266	4,436	4,614	4,798	4,990	5,190	5,397	5,613	5,838	6,071	6,314	6,567	6,829
Administration	509	447	382	397	412	427	444	461	478	496	515	535	555
Provisions	-	-	-	-	-	-	-	-	-	-	-	-	-
Bad Debts													
Provision for Drought													
Transport Cost	1,566	1,627	1,691	1,757	1,825	1,896	1,970	2,047	2,127	2,210	2,296	2,385	2,478
Depreciation	8,820	9,275	9,579	9,895	10,045	10,195	10,345	10,495	10,645	10,795	10,945	11,095	11,245
Existing and renewals	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201
New Investments	618	1,073	1,378	1,694	1,844	1,994	2,144	2,294	2,444	2,594	2,744	2,894	3,044
Total Operating Expenses	19,404	20,183	20,821	21,566	22,162	22,775	23,406	24,055	24,724	25,413	26,123	26,854	27,607
Operating Income	26,253	28,037	28,792	29,396	27,953	27,074	26,491	26,108	25,830	25,542	25,245	24,940	24,625
Financial Items	(3,963)	(2,124)	(4,937)	(5,408)	(1,463)	(3,080)	4,281	5,268	4,972	4,554	4,128	3,740	3,697
Interest on Debt	2,496	848	531	517	465	487	4,803	5,790	5,494	5,077	4,651	4,206	3,745
Overdraft Interest													
Other Interest													
Less: IDC	(6,458)	(2,784)	(5,469)	(5,914)	(1,928)	(3,567)	(523)	(523)	(523)	(523)	(523)	(466)	(47)
Interest income	-	(188)	-	(11)	-	-	-	-	-	-	-	(0)	(0)
Profit after financial items	30,216	30,161	33,729	34,804	29,416	30,154	22,210	20,841	20,858	20,988	21,117	21,200	20,928
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	30,216	30,161	33,729	34,804	29,416	30,154	22,210	20,841	20,858	20,988	21,117	21,200	20,928
Taxes and Dividends	10,576	10,556	11,805	18,968	10,296	10,554	7,774	7,294	7,300	7,346	7,391	7,420	7,325
Corporate Tax	10,576	10,556	11,805	12,182	10,296	10,554	7,774	7,294	7,300	7,346	7,391	7,420	7,325
Dividends	-	-	-	6,787	-	-	-	-	-	-	-	-	-
Retained profit after taxes	19,640	19,605	21,924	15,836	19,121	19,600	14,437	13,546	13,558	13,642	13,726	13,780	13,603

Case = Baseline
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Total Revenue	52,685	54,373	54,519	55,005	55,509	56,032	56,575	57,140	57,728	58,339	58,975	59,638	60,329
Energy Sales Revenue	52,685	54,373	54,519	55,005	55,509	56,032	56,575	57,140	57,728	58,339	58,975	59,638	60,329
Sales to Wholesale Marketer	49,974	51,563	51,827	52,101	52,696	53,357	53,846	54,399	54,986	55,598	56,234	56,897	57,588
SAPP Wheeling	2,711	2,810	2,692	2,904	2,812	2,675	2,729	2,741	2,741	2,741	2,741	2,741	2,741
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff /transfer price (US$/MWh)	5.0	5.2	5.3	5.4	5.5	5.6	5.7	6.6	6.5	6.3	6.2	6.1	6.0
Operating Expenses	16,989	17,640	18,317	19,019	19,749	20,507	21,294	22,111	22,961	23,843	24,759	25,711	26,700
Supply costs	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
Salaries	6,736	6,980	7,234	7,497	7,770	8,053	8,347	8,651	8,967	9,294	9,633	9,986	10,351
Management	*2,473*	*2,547*	*2,623*	*2,702*	*2,783*	*2,867*	*2,953*	*3,041*	*3,132*	*3,226*	*3,323*	*3,423*	*3,526*
Operational	*4,263*	*4,433*	*4,611*	*4,795*	*4,987*	*5,187*	*5,394*	*5,610*	*5,834*	*6,068*	*6,310*	*6,563*	*6,825*
Operations & Maintenance	7,102	7,387	7,682	7,989	8,309	8,641	8,987	9,346	9,720	10,109	10,513	10,934	11,371
Administration	577	599	622	645	670	696	722	750	779	808	839	872	905
Provisions	-	-	-	-	-	-	-	-	-	-	-	-	-
Bad Debts													
Provision for Drought													
Transport Cost	2,575	2,675	2,779	2,887	3,000	3,117	3,238	3,364	3,495	3,632	3,773	3,920	4,073
Depreciation	11,395	11,814	11,964	12,114	12,264	12,414	12,564	12,714	12,864	13,014	13,164	13,314	13,464
Existing and renewals	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201
New Investments	3,194	3,612	3,762	3,912	4,062	4,212	4,362	4,512	4,662	4,812	4,962	5,112	5,262
Total Operating Expenses	28,384	29,454	30,280	31,133	32,012	32,920	33,857	34,825	35,824	36,856	37,923	39,025	40,163
Operating Income	24,301	24,919	24,239	23,872	23,497	23,112	22,718	22,315	21,903	21,483	21,053	20,614	20,166
Financial Items	3,276	2,850	2,399	2,004	1,603	1,147	945	744	542	340	-	-	-
Interest on Debt	3,324	2,898	2,449	2,051	1,651	1,194	993	791	589	387	-	-	-
Overdraft Interest													
Other Interest													
Less: IDC	(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)	-	-	-
Interest income	(0)	(1)	(2)	-	(0)	-	-	(0)	-	-	-	-	-
Profit after financial items	21,025	22,069	21,840	21,868	21,893	21,965	21,772	21,571	21,362	21,143	21,053	20,614	20,166
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	21,025	22,069	21,840	21,868	21,893	21,965	21,772	21,571	21,362	21,143	21,053	20,614	20,166
Taxes and Dividends	7,359	7,724	7,644	7,654	7,663	7,688	7,620	7,550	7,477	7,400	7,368	7,215	7,058
Corporate Tax	7,359	7,724	7,644	7,654	7,663	7,688	7,620	7,550	7,477	7,400	7,368	7,215	7,058
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	13,666	14,345	14,196	14,214	14,231	14,277	14,152	14,021	13,885	13,743	13,684	13,399	13,108

113

Case = Baseline
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2026/27	2027/28	2028/29	2029/30	2030/31
Total Revenue	61,050	61,801	62,584	63,401	64,254
Energy Sales Revenue	61,050	61,801	62,584	63,401	64,254
Sales to Wholesale Marketer	58,309	59,060	59,843	60,660	61,513
SAPP Wheeling	2,741	2,741	2,741	2,741	2,741
Other Revenue	-	-	-	-	-
Capital Grants & Contributions					
Other					
Average tariff /transfer price (US$/MWh)	6.0	5.9	5.8	5.7	5.7
Operating Expenses	27,727	28,794	29,902	31,053	32,249
Supply costs	-	-	-	-	-
	-	-	-	-	-
Salaries	10,729	11,122	11,530	11,953	12,391
Management	*3,631*	*3,740*	*3,852*	*3,968*	*4,087*
Operational	*7,098*	*7,382*	*7,677*	*7,984*	*8,304*
Operations & Maintenance	11,826	12,299	12,791	13,303	13,835
Administration	940	976	1,013	1,052	1,093
Provisions	-	-	-	-	-
Bad Debts					
Provision for Drought					
Transport Cost	4,231	4,396	4,568	4,745	4,930
Depreciation	13,614	13,764	13,914	14,064	14,214
Existing and renewals	8,201	8,201	8,201	8,201	8,201
New Investments	5,412	5,562	5,712	5,862	6,012
Total Operating Expenses	41,340	42,557	43,815	45,117	46,462
Operating Income	19,709	19,243	18,769	18,285	17,792
Financial Items	-	-	-	-	-
Interest on Debt	-	-	-	-	-
Overdraft Interest					
Other Interest					
Less: IDC	-	-	-	-	-
Interest Income	-	-	-	-	-
Profit after financial items	19,709	19,243	18,769	18,285	17,792
Other	-	-	-	-	-
Exceptional Item CEC Provision					
Exchange rate losses					
Profit before taxes	19,709	19,243	18,769	18,285	17,792
Taxes and Dividends	6,898	6,735	6,569	6,400	6,227
Corporate Tax	6,898	6,735	6,569	6,400	6,227
Dividends	-	-	-	-	-
Retained profit after taxes	12,811	12,508	12,200	11,885	11,565

Case = Baseline
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

BALANCE SHEET	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Assets													
Current Assets	21,056	10,405	11,251	8,886	8,811	8,809	6,794	6,846	6,908	6,971	7,059	7,123	7,191
Cash	9,382	-	556	-	-	-	-	-	-	-	24	23	25
Trade debtors	9,382	7,927	8,156	6,283	6,179	6,146	4,101	4,123	4,155	4,188	4,222	4,257	4,293
Deferred CEC debtor													
Other debtors													
Stores	2,292	2,479	2,540	2,603	2,633	2,663	2,693	2,723	2,753	2,783	2,813	2,843	2,873
Net Fixed Assets	437,554	467,287	479,861	489,938	465,883	451,238	441,516	435,139	430,494	425,700	420,755	415,660	410,415
Existing	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818
New Investments	24,726	42,935	55,116	67,742	73,742	79,742	85,742	91,742	97,742	103,742	109,742	115,742	121,742
Acc. Depreciation- existing	41,974	50,176	58,377	66,578	74,780	82,981	91,183	99,384	107,585	115,787	123,988	132,189	140,391
Acc. Depreciation- new	618	1,692	3,069	4,763	6,607	8,600	10,744	13,037	15,481	18,074	20,818	23,711	26,755
CWIP	2,602	23,401	33,373	40,719	20,708	10,259	4,882	3,000	3,000	3,000	3,000	3,000	3,000
Investments (financial)													
Total Assets	458,610	477,692	491,112	498,824	474,694	460,046	448,310	441,985	437,402	432,670	427,814	422,783	417,605
Liabilities													
Current liabilities	2,940	2,566	5,918	5,836	5,617	5,517	6,355	6,669	6,661	6,671	2,563	2,506	2,446
Accounts Payable	1,303	1,070	1,099	857	891	926	642	667	694	721	750	780	811
Other Payables	1,080	685	623	637	642	667	1,765	2,032	1,980	1,897	1,813	1,726	1,635
Taxes Payable													
Consumer Deposits													
Current portion long-term loan	557	811	4,196	4,343	4,084	3,924	3,948	3,969	3,988	4,052	-	-	-
Unpaid Debt Service													
Bank Overdraft													
Liabilities over 1 year	1,910	1,979	2,050	2,124	2,201	2,280	2,363	2,448	2,537	2,628	2,724	2,822	2,925
Existing Loans	2,324	1,802	1,279	757	234	-	-	-	-	-	-	-	-
New long term loans	19,028	35,472	40,890	39,440	35,620	31,769	27,845	23,897	19,928	15,940	11,935	8,271	4,595
PRP Loans	19,028	35,472	40,890	39,440	35,620	31,769	27,845	23,897	19,928	15,940	11,935	8,271	4,595
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285
Provision for drought	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	430,123	433,589	438,690	448,383	428,738	418,195	409,463	406,687	405,992	405,147	408,307	406,899	405,356
Share Capital	26	26	26	26	26	26	26	26	26	26	26	26	26
Revaluation reserve	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493
Revenue reserve	(3,397)	70	5,170	14,863	(4,782)	(15,325)	(24,057)	(26,833)	(27,527)	(28,373)	(25,213)	(26,621)	(28,164)
Total Liabilities & Equity	458,610	477,692	491,112	498,824	474,694	460,046	448,310	441,985	437,402	432,670	427,814	422,783	417,605

115

Case = Baseline
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

BALANCE SHEET	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Assets													
Current Assets	7,259	7,568	7,498	7,578	7,639	7,712	7,788	7,863	7,941	8,021	8,104	8,188	8,275
Cash	26	112	-	11	-	-	1	-	-	-	-	-	-
Trade debtors	4,330	4,469	4,481	4,521	4,562	4,605	4,650	4,696	4,745	4,795	4,847	4,902	4,959
Deferred CEC debtor													
Other debtors													
Stores	2,903	2,987	3,017	3,047	3,077	3,107	3,137	3,167	3,197	3,227	3,257	3,287	3,317
Net Fixed Assets	405,020	415,322	403,987	397,873	391,610	385,196	378,633	371,919	365,056	358,042	350,879	343,565	336,102
Existing	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818
New Investments	127,742	144,486	150,486	156,486	162,486	168,486	174,486	180,486	186,486	192,486	198,486	204,486	210,486
Acc. Depreciation- existing	148,592	156,793	164,995	173,196	181,397	189,599	197,800	206,002	214,203	222,404	230,606	238,807	247,008
Acc. Depreciation- new	29,949	33,561	37,323	41,235	45,297	49,509	53,872	58,384	63,046	67,858	72,820	77,932	83,195
CWIP	3,000	8,372	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Investments (financial)													
Total Assets	412,279	422,890	411,484	405,452	399,249	392,908	386,420	379,782	372,997	366,064	358,982	351,753	344,377
Liabilities													
Current liabilities	2,398	2,351	2,301	2,266	2,233	2,188	2,210	2,234	2,261	2,292	2,279	2,366	2,456
Accounts Payable	843	876	911	947	985	1,024	1,064	1,106	1,150	1,196	1,243	1,293	1,344
Other Payables	1,555	1,475	1,390	1,319	1,248	1,164	1,145	1,128	1,111	1,096	1,036	1,073	1,113
Taxes Payable													
Consumer Deposits													
Current portion long-term loan	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service													
Bank Overdraft													
Liabilities over 1 year	3,031	3,141	3,255	3,374	3,497	3,624	3,756	3,893	4,035	4,182	4,335	4,493	4,658
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	907	(716)	(2,340)	(3,964)	(5,589)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)
PRP Loans	907	(716)	(2,340)	(3,964)	(5,589)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285
Provision for drought	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	403,658	415,830	405,984	401,491	396,824	392,027	385,385	378,586	371,631	364,520	357,299	349,824	342,193
Share Capital	26	26	26	26	26	26	26	26	26	26	26	26	26
Revaluation reserve	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493
Revenue reserve	(29,861)	(17,690)	(27,536)	(32,028)	(36,696)	(41,493)	(48,135)	(54,934)	(61,889)	(69,000)	(76,221)	(83,695)	(91,327)
Total Liabilities & Equity	412,279	422,890	411,484	405,452	399,249	392,908	386,420	379,782	372,997	366,064	358,982	351,753	344,377

Case = Baseline
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

BALANCE SHEET	2026/27	2027/28	2028/29	2029/30	2030/31
Assets					
Current Assets	8,364	8,456	8,550	8,648	8,748
Cash	-	-	-	-	-
Trade debtors	5,018	5,079	5,144	5,211	5,281
Deferred CEC debtor					
Other debtors					
Stores	3,347	3,377	3,407	3,437	3,467
Net Fixed Assets	328,488	320,725	312,811	304,747	296,534
Existing	452,818	452,818	452,818	452,818	452,818
New Investments	216,486	222,486	228,486	234,486	240,486
Acc. Depreciation- existing	255,210	263,411	271,612	279,814	288,015
Acc. Depreciation- new	88,607	94,169	99,881	105,743	111,755
CWIP	3,000	3,000	3,000	3,000	3,000
Investments (financial)					
Total Assets	336,852	329,181	321,361	313,395	305,282
Liabilities					
Current liabilities	2,550	2,648	2,749	2,855	2,964
Accounts Payable	1,397	1,452	1,510	1,570	1,632
Other Payables	1,153	1,196	1,239	1,285	1,332
Taxes Payable					
Consumer Deposits					
Current portion long-term loan	-	-	-	-	-
Unpaid Debt Service					
Bank Overdraft					
Liabilities over 1 year	4,828	5,005	5,188	5,379	5,576
Existing Loans	-	-	-	-	-
New long term loans	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)
PRP Loans	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)
Other Loans	-	-	-	-	-
Capital Grants & Contributions	2,285	2,285	2,285	2,285	2,285
Provision for drought	-	-	-	-	-
Equity	334,404	326,458	318,354	310,092	301,672
Share Capital	26	26	26	26	26
Revaluation reserve	433,493	433,493	433,493	433,493	433,493
Revenue reserve	(99,116)	(107,062)	(115,166)	(123,428)	(131,848)
Total Liabilities & Equity	336,852	329,181	321,361	313,395	305,282

Case = Baseline
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Source of funds													
Generation from Operations	28,460	28,879	31,503	32,518	29,166	29,795	24,782	24,041	24,203	24,437	24,671	24,875	24,848
Operating Income	26,253	28,037	28,792	29,396	27,953	27,074	26,491	26,108	25,830	25,542	25,245	24,940	24,625
Financial Items	3,963	2,124	4,937	5,408	1,463	3,080	(4,281)	(5,268)	(4,972)	(4,554)	(4,128)	(3,740)	(3,697)
Taxes	(10,576)	(10,556)	(11,805)	(12,182)	(10,296)	(10,554)	(7,774)	(7,294)	(7,300)	(7,346)	(7,391)	(7,420)	(7,325)
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	8,820	9,275	9,579	9,895	10,045	10,195	10,345	10,495	10,645	10,795	10,945	11,095	11,245
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	18,524	16,478	5,706	2,223	-	-	-	-	-	-	-	-	-
Capital Contributions													
Sale of Assets													
Consumer deposits													
Loans PRP	18,524	16,478	5,706	2,223	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity													
Total sources of funds	46,983	45,357	37,209	34,741	29,166	29,795	24,782	24,041	24,203	24,437	24,671	24,875	24,848
Application of Funds													
Investments including IDC	24,726	18,209	12,181	12,626	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
PRP	19,521	10,450	5,376	1,882	-	-	-	-	-	-	-	-	-
Other	5,205	7,760	6,804	10,744	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Repayment of loans	669	557	811	4,196	4,343	4,084	3,924	3,948	3,969	3,988	4,005	3,664	3,677
Existing loans	669	523	523	523	523	234	-	-	-	-	-	-	-
PRP loans	-	34	288	3,674	3,820	3,850	3,924	3,948	3,969	3,988	4,005	3,664	3,677
Other New loans													
Dividend	-	-	-	-	6,787	-	-	-	-	-	-	-	-
Total Application of Funds	25,395	18,766	12,992	16,822	17,129	10,084	9,924	9,948	9,969	9,988	10,005	9,664	9,677
Net In/Outflow of Funds	21,589	26,591	24,218	17,919	12,036	19,711	14,857	14,093	14,234	14,449	14,666	15,211	15,171

118

Case = Baseline
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Source of funds													
Generation from Operations	25,061	26,158	26,160	26,328	26,494	26,691	26,716	26,735	26,749	26,756	26,848	26,713	26,571
Operating Income	24,301	24,919	24,239	23,872	23,497	23,112	22,718	22,315	21,903	21,483	21,053	20,614	20,166
Financial Items	(3,276)	(2,850)	(2,399)	(2,004)	(1,603)	(1,147)	(945)	(744)	(542)	(340)	-	-	-
Taxes	(7,359)	(7,724)	(7,644)	(7,654)	(7,663)	(7,688)	(7,620)	(7,550)	(7,477)	(7,400)	(7,368)	(7,215)	(7,058)
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	11,395	11,814	11,964	12,114	12,264	12,414	12,564	12,714	12,864	13,014	13,164	13,314	13,464
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Contributions													
Sale of Assets													
Consumer deposits													
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity													
Total sources of funds	25,061	26,158	26,160	26,328	26,494	26,691	26,716	26,735	26,749	26,756	26,848	26,713	26,571
Application of Funds													
Investments including IDC	6,000	16,744	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	6,000	16,744	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Repayment of loans	3,688	1,623	1,624	1,624	1,625	1,626	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	3,688	1,623	1,624	1,624	1,625	1,626	-	-	-	-	-	-	-
Other New loans													
Dividend	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	9,688	18,367	7,624	7,624	7,625	7,626	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Net In/Outflow of Funds	15,373	7,792	18,536	18,704	18,869	19,065	20,716	20,735	20,749	20,756	20,848	20,713	20,571

119

Case = Baseline
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2026/27	2027/28	2028/29	2029/30	2030/31
Source of funds					
Generation from Operations	26,425	26,272	26,113	25,949	25,778
Operating Income	19,709	19,243	18,769	18,285	17,792
Financial Items	-	-	-	-	-
Taxes	(6,898)	(6,735)	(6,569)	(6,400)	(6,227)
Provision for drought less Utilization	-	-	-	-	-
Exceptional Items	-	-	-	-	-
Depreciation	13,614	13,764	13,914	14,064	14,214
Capital contributions	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-
External Sources	-	-	-	-	-
Capital Contributions					
Sale of Assets					
Consumer deposits					
Loans PRP	-	-	-	-	-
Other New Loans	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-
New Equity					
Total sources of funds	26,425	26,272	26,113	25,949	25,778
Application of Funds					
Investments including IDC	6,000	6,000	6,000	6,000	6,000
PRP	-	-	-	-	-
Other	6,000	6,000	6,000	6,000	6,000
Repayment of loans	-	-	-	-	-
Existing loans	-	-	-	-	-
PRP loans	-	-	-	-	-
Other New loans					
Dividend	-	-	-	-	-
Total Application of Funds	6,000	6,000	6,000	6,000	6,000
Net In/Outflow of Funds	20,425	20,272	20,113	19,949	19,778

Case = Baseline
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total Revenue	110,059	115,041	119,131	122,433	124,394	128,100	131,114	145,556	162,882	179,704	198,571	256,915	295,819
Energy Sales Revenue	110,059	115,041	119,131	122,433	124,394	128,100	131,114	145,556	162,882	179,704	198,571	256,915	295,819
ZESCO Distribution	41,573	45,515	48,690	51,200	52,494	56,262	59,757	70,857	86,789	102,219	120,041	178,385	217,289
CEC Sales	68,486	69,525	70,441	71,233	71,900	71,838	71,357	74,699	76,092	77,485	78,530	78,530	78,530
Exports	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff to ZESCO Distribution	9.4	9.9	10.3	10.4	10.3	10.6	10.9	12.4	14.7	16.8	19.0	27.2	32.0
-													
Operating Expenses	94,486	102,370	105,096	110,217	110,313	114,316	120,449	135,036	153,653	169,812	189,347	251,434	291,863
Supply costs	94,302	100,183	102,907	108,022	110,112	114,110	118,236	132,816	151,427	169,579	189,107	249,187	289,609
KNBC	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*
Outside Power Purchases	*4,709*	*3,573*	*1,944*	*3,897*	*7,023*	*12,207*	*16,305*	*30,649*	*48,382*	*65,543*	*84,048*	*143,771*	*183,353*
CEC Wheeling	*7,500*	*7,867*	*8,366*	*8,892*	*9,503*	*10,117*	*10,740*	*11,360*	*11,976*	*12,597*	*13,233*	*13,873*	*14,517*
ZESCO Generation	*32,118*	*36,207*	*38,669*	*39,952*	*39,155*	*37,741*	*37,135*	*36,738*	*36,889*	*37,048*	*37,217*	*37,395*	*37,585*
ZESCO Transmission	*45,175*	*47,737*	*49,128*	*50,482*	*49,630*	*49,244*	*49,256*	*49,269*	*49,379*	*49,591*	*49,808*	*49,347*	*49,354*
Salaries	134	138	142	146	151	155	160	165	170	175	180	185	191
Management	*134*	*138*	*142*	*146*	*151*	*155*	*160*	*165*	*170*	*175*	*180*	*185*	*191*
Operational													
Operations & Maintenance	-	-	-	-	-	-	-	-	-	-	-	-	-
Administration	50	49	47	49	50	52	53	55	57	58	60	62	64
Provisions	-	2,000	2,000	2,000	-	-	2,000	2,000	2,000	-	-	2,000	2,000
Bad Debts	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for Drought	-	*2,000*	*2,000*	*2,000*	-	-	*2,000*	*2,000*	*2,000*	-	-	*2,000*	*2,000*
Transport Cost	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing and renewals	-	-	-	-	-	-	-	-	-	-	-	-	-
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Expenses	94,486	102,370	105,096	110,217	110,313	114,316	120,449	135,036	153,653	169,812	189,347	251,434	291,863
Operating Income	15,573	12,671	14,035	12,216	14,081	13,784	10,665	10,520	9,229	9,892	9,224	5,480	3,956
Financial Items	-	(705)	(882)	(1,070)	(1,218)	(1,369)	(1,516)	(1,639)	(1,808)	(1,972)	(2,111)	(2,242)	(2,437)
Interest on Debt													
Overdraft Interest													
Other Interest													
Less: IDC													
Interest income	-	(705)	(882)	(1,070)	(1,218)	(1,369)	(1,516)	(1,639)	(1,808)	(1,972)	(2,111)	(2,242)	(2,437)
Profit after financial items	15,573	13,376	14,917	13,285	15,299	15,153	12,181	12,159	11,037	11,864	11,335	7,723	6,393
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	15,573	13,376	14,917	13,285	15,299	15,153	12,181	12,159	11,037	11,864	11,335	7,723	6,393
Taxes and Dividends	8,487	7,290	8,130	7,240	8,338	8,258	6,639	6,627	6,015	6,466	6,178	4,209	3,484
Corporate Tax	5,451	4,682	5,221	4,650	5,355	5,303	4,263	4,256	3,863	4,152	3,967	2,703	2,238
Dividends	3,037	2,608	2,909	2,591	2,983	2,955	2,375	2,371	2,152	2,313	2,210	1,506	1,247
Retained profit after taxes	7,086	6,086	6,787	6,045	6,961	6,894	5,542	5,532	5,022	5,398	5,158	3,514	2,909

121

Case = Baseline
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Total Revenue	281,690	281,661	268,714	274,926	264,164	251,445	249,316	179,541	194,054	208,771	223,694	238,827	254,172
Energy Sales Revenue	281,690	281,661	268,714	274,926	264,164	251,445	249,316	179,541	194,054	208,771	223,694	238,827	254,172
ZESCO Distribution	209,201	216,094	210,070	223,204	219,364	213,567	218,361	179,541	194,054	208,771	223,694	238,827	254,172
CEC Sales	72,489	65,567	58,644	51,722	44,800	37,877	30,955	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff to ZESCO Distribution	29.7	29.6	27.9	28.6	27.3	25.7	25.5	20.3	21.4	22.3	23.3	24.1	25.0
-													
Operating Expenses	280,607	282,897	272,745	284,279	276,445	266,530	265,324	201,441	219,646	236,040	252,631	267,425	284,428
Supply costs	278,345	282,627	272,467	281,992	274,150	264,226	265,011	201,118	217,314	233,698	250,279	267,062	284,054
KNBC	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*
Outside Power Purchases	*170,619*	*172,446*	*161,139*	*169,488*	*160,128*	*148,602*	*147,933*	*82,500*	*97,096*	*111,833*	*126,714*	*141,743*	*156,925*
CEC Wheeling	*15,166*	*15,818*	*16,476*	*17,138*	*17,805*	*18,477*	*19,155*	*19,838*	*20,527*	*21,222*	*21,922*	*22,629*	*23,343*
ZESCO Generation	*37,786*	*37,999*	*38,225*	*38,466*	*38,720*	*38,991*	*39,278*	*39,582*	*39,904*	*40,246*	*40,608*	*40,992*	*41,399*
ZESCO Transmission	*49,974*	*51,563*	*51,827*	*52,101*	*52,696*	*53,357*	*53,846*	*54,399*	*54,986*	*55,598*	*56,234*	*56,897*	*57,588*
Salaries	197	202	209	215	221	228	235	242	249	256	264	272	280
Management	*197*	*202*	*209*	*215*	*221*	*228*	*235*	*242*	*249*	*256*	*264*	*272*	*280*
Operational													
Operations & Maintenance	-	-	-	-	-	-	-	-	-	-	-	-	-
Administration	66	67	70	72	74	76	78	81	83	85	88	91	93
Provisions	2,000	-	-	2,000	2,000	2,000	-	-	2,000	2,000	2,000	-	-
Bad Debts	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for Drought	*2,000*	-	-	*2,000*	*2,000*	*2,000*	-	-	*2,000*	*2,000*	*2,000*	-	-
Transport Cost	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing and renewals	-	-	-	-	-	-	-	-	-	-	-	-	-
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Expenses	280,607	282,897	272,745	284,279	276,445	266,530	265,324	201,441	219,646	236,040	252,631	267,425	284,428
Operating Income	1,083	(1,236)	(4,031)	(9,353)	(12,281)	(15,085)	(16,009)	(21,900)	(25,591)	(27,269)	(28,937)	(28,598)	(30,256)
Financial Items	(2,597)	(2,651)	(2,674)	(2,636)	(2,569)	(2,413)	(2,195)	(1,931)	(1,478)	(1,062)	(605)	(106)	-
Interest on Debt													
Overdraft Interest													
Other Interest													
Less: IDC													
Interest income	(2,597)	(2,651)	(2,674)	(2,636)	(2,569)	(2,413)	(2,195)	(1,931)	(1,478)	(1,062)	(605)	(106)	-
Profit after financial items	3,680	1,415	(1,357)	(6,717)	(9,712)	(12,672)	(13,814)	(19,968)	(24,114)	(26,207)	(28,332)	(28,492)	(30,256)
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	3,680	1,415	(1,357)	(6,717)	(9,712)	(12,672)	(13,814)	(19,968)	(24,114)	(26,207)	(28,332)	(28,492)	(30,256)
Taxes and Dividends	2,006	771	-	-	-	-	-	-	-	-	-	-	-
Corporate Tax	1,288	495	-	-	-	-	-	-	-	-	-	-	-
Dividends	718	276	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	1,674	644	(1,357)	(6,717)	(9,712)	(12,672)	(13,814)	(19,968)	(24,114)	(26,207)	(28,332)	(28,492)	(30,256)

122

Case = Baseline
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2026/27	2027/28	2028/29	2029/30	2030/31
Total Revenue	269,733	278,368	294,831	311,524	328,451
Energy Sales Revenue	269,733	278,368	294,831	311,524	328,451
ZESCO Distribution	269,733	278,368	294,831	311,524	328,451
CEC Sales	-	-	-	-	-
Exports	-	-	-	-	-
Other Revenue	-	-	-	-	-
Capital Grants & Contributions					
Other					
Average tariff to ZESCO Distribution	25.8	26.0	26.8	27.6	28.4
-					
Operating Expenses	301,649	311,940	330,074	348,447	367,070
Supply costs	301,264	311,543	329,665	348,027	366,636
KNBC	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*
Outside Power Purchases	*172,264*	*187,764*	*203,430*	*219,267*	*235,280*
CEC Wheeling	*24,063*	*24,790*	*25,524*	*26,266*	*27,014*
ZESCO Generation	*41,829*	*35,130*	*36,068*	*37,034*	*38,029*
ZESCO Transmission	*58,309*	*59,060*	*59,843*	*60,660*	*61,513*
Salaries	289	297	306	315	325
Management	*289*	*297*	*306*	*315*	*325*
Operational					
Operations & Maintenance	-	-	-	-	-
Administration	96	99	102	105	108
Provisions	-	-	-	-	-
Bad Debts	-	-	-	-	-
Provision for Drought	-	-	-	-	-
Transport Cost	-	-	-	-	-
Depreciation	-	-	-	-	-
Existing and renewals	-	-	-	-	-
New Investments	-	-	-	-	-
Total Operating Expenses	301,649	311,940	330,074	348,447	367,070
Operating Income	(31,916)	(33,572)	(35,243)	(36,924)	(38,618)
Financial Items	-	-	-	-	-
Interest on Debt					
Overdraft Interest					
Other Interest					
Less: IDC					
Interest income	-	-	-	-	-
Profit after financial items	(31,916)	(33,572)	(35,243)	(36,924)	(38,618)
Other	-	-	-	-	-
Exceptional Item CEC Provision					
Exchange rate losses					
Profit before taxes	(31,916)	(33,572)	(35,243)	(36,924)	(38,618)
Taxes and Dividends	-	-	-	-	-
Corporate Tax	-	-	-	-	-
Dividends	-	-	-	-	-
Retained profit after taxes	(31,916)	(33,572)	(35,243)	(36,924)	(38,618)

1R3

Case = Baseline
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

BALANCE SHEET	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Assets													
Current Assets	51,788	57,538	67,088	71,228	78,852	86,213	88,819	97,596	105,951	113,026	119,703	129,454	137,429
Cash	35,253	44,109	53,482	60,909	68,436	75,806	81,927	90,382	98,603	105,543	112,119	121,870	129,845
Trade debtors	16,535	13,429	13,606	10,319	10,416	10,407	6,891	7,214	7,349	7,483	7,584	7,584	7,584
Deferred CEC debtor													
Other debtors	-	-	-	-	-	-	-	-	-	-	-	-	-
Stores	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Fixed Assets	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing	-	-	-	-	-	-	-	-	-	-	-	-	-
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-
Acc. Depreciation- existing	-	-	-	-	-	-	-	-	-	-	-	-	-
Acc. Depreciation- new	-	-	-	-	-	-	-	-	-	-	-	-	-
CWIP	-	-	-	-	-	-	-	-	-	-	-	-	-
Investments (financial)													
Total Assets	51,788	57,538	67,088	71,228	78,852	86,213	88,819	97,596	105,951	113,026	119,703	129,454	137,429
Liabilities													
Current liabilities	19,402	17,491	17,952	14,364	14,632	15,125	10,766	12,013	13,563	15,076	16,697	21,636	24,959
Accounts Payable	19,387	16,476	16,924	13,324	13,582	14,075	9,722	10,921	12,451	13,943	15,548	20,486	23,809
Other Payables	14	15	15	16	16	17	17	18	18	19	19	20	21
Taxes Payable		1,000	1,013	1,025	1,034	1,033	1,026	1,074	1,094	1,115	1,130	1,130	1,130
Consumer Deposits													
Current portion long-term loan	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service													
Bank Overdraft													
Liabilities over 1 year	60	62	64	66	68	70	72	74	76	79	81	83	86
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought	-	2,000	4,000	6,000	3,000	-	2,000	4,000	6,000	3,000	-	2,000	4,000
Equity	32,326	37,984	45,072	50,798	61,152	71,018	75,981	81,509	86,312	94,871	102,926	105,735	108,384
Share Capital	18	18	18	18	18	18	18	18	18	18	18	18	18
Revaluation reserve	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186
Revenue reserve	10,122	15,780	22,868	28,594	38,948	48,814	53,777	59,305	64,108	72,667	80,722	83,531	86,181
Total Liabilities & Equity	51,788	57,538	67,088	71,228	78,852	86,213	88,819	97,596	105,951	113,026	119,703	129,454	137,429

Case = Baseline
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

BALANCE SHEET	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Assets													
Current Assets	139,565	140,023	137,459	133,430	124,977	113,393	99,548	73,887	53,109	30,253	5,289	-	-
Cash	132,564	133,691	131,796	128,434	120,650	109,735	96,559	73,887	53,109	30,253	5,289	-	-
Trade debtors	7,001	6,332	5,664	4,995	4,327	3,658	2,989	-	-	-	-	-	-
Deferred CEC debtor													
Other debtors	-	-	-	-	-	-	-	-	-	-	-	-	-
Stores	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Fixed Assets	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing	-	-	-	-	-	-	-	-	-	-	-	-	-
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-
Acc. Depreciation- existing	-	-	-	-	-	-	-	-	-	-	-	-	-
Acc. Depreciation- new	-	-	-	-	-	-	-	-	-	-	-	-	-
CWIP	-	-	-	-	-	-	-	-	-	-	-	-	-
Investments (financial)													
Total Assets	139,565	140,023	137,459	133,430	124,977	113,393	99,548	73,887	53,109	30,253	5,289	-	-
Liabilities													
Current liabilities	23,947	24,200	23,266	23,950	23,207	22,293	22,259	16,563	17,895	19,243	20,606	21,987	23,385
Accounts Payable	22,883	23,235	22,400	23,183	22,539	21,723	21,788	16,537	17,868	19,215	20,578	21,958	23,355
Other Payables	21	22	22	23	24	24	25	26	27	28	28	29	30
Taxes Payable	1,043	943	844	744	644	545	445	-	-	-	-	-	-
Consumer Deposits													
Current portion long-term loan	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service													
Bank Overdraft													
Liabilities over 1 year	88	91	94	97	100	103	106	109	112	115	119	122	126
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought	6,000	3,000	-	2,000	4,000	6,000	3,000	-	2,000	4,000	6,000	3,000	-
Equity	109,530	112,732	114,099	107,382	97,670	84,998	74,184	57,215	33,102	6,895	(21,437)	(25,109)	(23,511)
Share Capital	18	18	18	18	18	18	18	18	18	18	18	18	18
Revaluation reserve	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186
Revenue reserve	87,326	90,528	91,895	85,178	75,466	62,794	51,980	35,011	10,898	(15,309)	(43,641)	(47,313)	(45,715)
Total Liabilities & Equity	139,565	140,023	137,459	133,430	124,977	113,393	99,548	73,887	53,109	30,253	5,289	0	0

Case = Baseline
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

BALANCE SHEET	2026/27	2027/28	2028/29	2029/30	2030/31
Assets					
Current Assets	-	-	-	-	-
Cash	-	-	-	-	-
Trade debtors	-	-	-	-	-
Deferred CEC debtor					
Other debtors	-	-	-	-	-
Stores	-	-	-	-	-
Net Fixed Assets	-	-	-	-	-
Existing	-	-	-	-	-
New Investments	-	-	-	-	-
Acc. Depreciation- existing	-	-	-	-	-
Acc. Depreciation- new	-	-	-	-	-
CWIP	-	-	-	-	-
Investments (financial)					
Total Assets	-	-	-	-	-
Liabilities					
Current liabilities	31,131	25,646	27,137	28,647	30,178
Accounts Payable	24,769	25,614	27,104	28,614	30,143
Other Payables	31	32	33	34	35
Taxes Payable	-	-	-	-	-
Consumer Deposits					
Current portion long-term loan	6,331	-	-	-	-
Unpaid Debt Service					
Bank Overdraft					
Liabilities over 1 year	130	134	138	142	146
Existing Loans	-	-	-	-	-
New long term loans	-	-	-	-	-
PRP Loans	-	-	-	-	-
Other Loans	-	-	-	-	-
Capital Grants & Contributions	-	-	-	-	-
Provision for drought	(3,000)	(6,000)	(9,000)	(12,000)	(15,000)
Equity	(28,261)	(19,780)	(18,275)	(16,789)	(15,325)
Share Capital	18	18	18	18	18
Revaluation reserve	22,186	22,186	22,186	22,186	22,186
Revenue reserve	(50,465)	(41,984)	(40,479)	(38,993)	(37,528)
Total Liabilities & Equity	(0)	(0)	0	(0)	(0)

126

Case = Baseline
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Source of funds													
Generation from Operations	10,122	10,694	11,696	10,635	9,945	9,849	9,918	9,903	9,174	7,711	7,368	7,020	6,156
Operating Income	15,573	12,671	14,035	12,216	14,081	13,784	10,665	10,520	9,229	9,892	9,224	5,480	3,956
Financial Items	-	705	882	1,070	1,218	1,369	1,516	1,639	1,808	1,972	2,111	2,242	2,437
Taxes	(5,451)	(4,682)	(5,221)	(4,650)	(5,355)	(5,303)	(4,263)	(4,256)	(3,863)	(4,152)	(3,967)	(2,703)	(2,238)
Provision for drought less Utilization	-	2,000	2,000	2,000	-	-	2,000	2,000	2,000	-	-	2,000	2,000
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Contributions													
Sale of Assets													
Consumer deposits													
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	10,122	10,694	11,696	10,635	9,945	9,849	9,918	9,903	9,174	7,711	7,368	7,020	6,156
Application of Funds													
Investments including IDC	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Repayment of loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New loans													
Dividend	-	3,037	2,608	2,909	2,591	2,983	2,955	2,375	2,371	2,152	2,313	2,210	1,506
Total Application of Funds	-	3,037	2,608	2,909	2,591	2,983	2,955	2,375	2,371	2,152	2,313	2,210	1,506
Net In/Outflow of Funds	10,122	7,658	9,088	7,727	7,354	6,866	6,963	7,528	6,803	5,559	5,054	4,809	4,650

137

Case = Baseline
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Source of funds													
Generation from Operations	4,392	920	(1,357)	(4,717)	(7,712)	(10,672)	(13,814)	(19,968)	(22,114)	(24,207)	(26,332)	(28,492)	(30,256)
Operating Income	1,083	(1,236)	(4,031)	(9,353)	(12,281)	(15,085)	(16,009)	(21,900)	(25,591)	(27,269)	(28,937)	(28,598)	(30,256)
Financial Items	2,597	2,651	2,674	2,636	2,569	2,413	2,195	1,931	1,478	1,062	605	106	-
Taxes	(1,288)	(495)	-	-	-	-	-	-	-	-	-	-	-
Provision for drought less Utilization	2,000	-	-	2,000	2,000	2,000	-	-	2,000	2,000	2,000	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Contributions													
Sale of Assets													
Consumer deposits													
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	4,392	920	(1,357)	(4,717)	(7,712)	(10,672)	(13,814)	(19,968)	(22,114)	(24,207)	(26,332)	(28,492)	(30,256)
Application of Funds													
Investments Including IDC	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Repayment of loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New loans													
Dividend	1,247	718	276	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	1,247	718	276	-	-	-	-	-	-	-	-	-	-
Net In/Outflow of Funds	3,145	202	(1,633)	(4,717)	(7,712)	(10,672)	(13,814)	(19,968)	(22,114)	(24,207)	(26,332)	(28,492)	(30,256)

138

Case = Baseline
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2026/27	2027/28	2028/29	2029/30	2030/31
Source of funds					
Generation from Operations	(31,916)	(33,572)	(35,243)	(36,924)	(38,618)
Operating Income	(31,916)	(33,572)	(35,243)	(36,924)	(38,618)
Financial Items	-	-	-	-	-
Taxes	-	-	-	-	-
Provision for drought less Utilization	-	-	-	-	-
Exceptional Items	-	-	-	-	-
Depreciation	-	-	-	-	-
Capital contributions	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-
External Sources	-	-	-	-	-
Capital Contributions					
Sale of Assets					
Consumer deposits					
Loans PRP	-	-	-	-	-
Other New Loans	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-
New Equity	-	-	-	-	-
Total sources of funds	(31,916)	(33,572)	(35,243)	(36,924)	(38,618)
Application of Funds					
Investments including IDC	-	-	-	-	-
PRP	-	-	-	-	-
Other	-	-	-	-	-
Repayment of loans	-	-	-	-	-
Existing loans	-	-	-	-	-
PRP loans	-	-	-	-	-
Other New loans					
Dividend	-	-	-	-	-
Total Application of Funds	-	-	-	-	-
Net In/Outflow of Funds	(31,916)	(33,572)	(35,243)	(36,924)	(38,618)

Case = Baseline
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total Revenue	102,378	108,000	113,695	119,754	126,784	133,987	141,413	148,948	156,597	164,427	172,620	181,011	189,603
Energy Sales Revenue	102,378	108,000	113,695	119,754	126,784	133,987	141,413	148,948	156,597	164,427	172,620	181,011	189,603
Domestic Sales	102,378	108,000	113,695	119,754	126,784	133,987	141,413	148,948	156,597	164,427	172,620	181,011	189,603
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff /transfer price (US$/MWh)	33.2	33.5	33.8	34.2	34.5	34.8	35.2	35.5	35.9	36.3	36.6	37.0	37.4
Operating Expenses	143,397	141,715	142,911	150,887	158,371	168,834	179,300	198,360	222,974	247,340	277,463	352,813	407,469
Supply costs	41,573	45,515	48,690	51,200	52,494	56,262	59,757	70,857	86,789	102,219	120,041	178,385	217,289
from Wholesale Marketer	*41,573*	*45,515*	*48,690*	*51,200*	*52,494*	*56,262*	*59,757*	*70,857*	*86,789*	*102,219*	*120,041*	*178,385*	*217,289*
Own production	-	-	-	-	-	-	-	-	-	-	-	-	-
Salaries	52,102	51,342	53,124	56,240	59,874	63,660	67,626	71,725	75,965	80,385	86,727	93,460	100,609
Management	*11,417*	*11,166*	*11,466*	*12,047*	*12,729*	*13,431*	*14,159*	*14,903*	*15,664*	*16,448*	*17,610*	*18,831*	*20,116*
Operational	*40,685*	*40,176*	*41,657*	*44,193*	*47,145*	*50,229*	*53,467*	*56,822*	*60,302*	*63,937*	*69,117*	*74,629*	*80,494*
Operations & Maintenance	16,593	16,385	16,990	18,024	19,228	20,485	21,806	23,174	24,593	26,076	28,189	30,437	32,828
Administration	6,149	6,787	7,790	8,251	8,789	9,349	9,937	10,544	11,173	11,829	12,768	13,766	14,826
Provisions	23,899	18,485	12,992	13,717	14,397	15,349	16,300	18,033	20,270	22,485	25,224	32,074	37,043
Bad Debts	*23,899*	*18,485*	*12,992*	*13,717*	*14,397*	*15,349*	*16,300*	*18,033*	*20,270*	*22,485*	*25,224*	*32,074*	*37,043*
Provision for Drought	-	-	-	-	-	-	-	-	-	-	-	-	-
Transport Cost	3,081	3,201	3,325	3,455	3,589	3,729	3,875	4,026	4,182	4,345	4,515	4,691	4,873
Depreciation	34,379	35,713	36,548	36,848	37,248	37,648	38,048	38,448	38,848	39,248	39,648	40,048	40,448
Existing and renewals	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805
New Investments	1,573	2,908	3,742	4,043	4,443	4,843	5,243	5,643	6,043	6,443	6,843	7,243	7,643
Total Operating Expenses	177,775	177,428	179,459	187,736	195,620	206,482	217,348	236,808	261,823	286,588	317,112	392,861	447,918
Operating Income	(75,397)	(69,428)	(65,764)	(67,981)	(68,836)	(72,495)	(75,935)	(87,859)	(105,226)	(122,162)	(144,491)	(211,850)	(258,315)
Financial Items	(2,384)	(5,234)	7,240	7,787	7,405	6,821	6,206	5,655	5,738	5,109	4,464	3,775	3,162
Interest on Debt	866	895	8,214	8,761	8,379	7,794	7,180	6,524	5,826	5,197	4,552	3,863	3,251
Overdraft Interest													
Other Interest	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: IDC	(3,250)	(6,129)	(974)	(974)	(974)	(974)	(974)	(869)	(88)	(88)	(88)	(88)	(88)
Interest income	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit after financial items	(73,014)	(64,193)	(73,004)	(75,769)	(76,241)	(79,316)	(82,142)	(93,514)	(110,964)	(127,271)	(148,955)	(215,625)	(261,477)
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	(73,014)	(64,193)	(73,004)	(75,769)	(76,241)	(79,316)	(82,142)	(93,514)	(110,964)	(127,271)	(148,955)	(215,625)	(261,477)
Taxes and Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Corporate Tax	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	(73,014)	(64,193)	(73,004)	(75,769)	(76,241)	(79,316)	(82,142)	(93,514)	(110,964)	(127,271)	(148,955)	(215,625)	(261,477)

150

Case = Baseline
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Total Revenue	198,402	207,414	216,644	226,097	235,779	245,697	255,856	266,263	276,925	287,847	299,038	310,504	322,253
Energy Sales Revenue	198,402	207,414	216,644	226,097	235,779	245,697	255,856	266,263	276,925	287,847	299,038	310,504	322,253
Domestic Sales	198,402	207,414	216,644	226,097	235,779	245,697	255,856	266,263	276,925	287,847	299,038	310,504	322,253
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff /transfer price (US$/MWh)	37.7	38.1	38.5	38.9	39.3	39.7	40.1	40.5	40.9	41.3	41.7	42.1	42.5
-													
Operating Expenses	411,164	432,111	439,666	469,160	480,895	491,444	514,664	490,989	527,124	564,690	603,761	644,412	686,726
Supply costs	209,201	216,094	210,070	223,204	219,364	213,567	218,361	179,541	194,054	208,771	223,694	238,827	254,172
from Wholesale Marketer	*209,201*	*216,094*	*210,070*	*223,204*	*219,364*	*213,567*	*218,361*	*179,541*	*194,054*	*208,771*	*223,694*	*238,827*	*254,172*
Own production	-	-	-	-	-	-	-	-	-	-	-	-	-
Salaries	108,197	116,249	124,792	133,854	143,465	153,655	164,459	175,911	188,049	200,911	214,539	228,978	244,272
Management	*21,466*	*22,886*	*24,377*	*25,945*	*27,592*	*29,321*	*31,139*	*33,047*	*35,051*	*37,155*	*39,363*	*41,682*	*44,116*
Operational	*86,731*	*93,364*	*100,415*	*107,909*	*115,873*	*124,334*	*133,320*	*142,864*	*152,998*	*163,757*	*175,176*	*187,296*	*200,156*
Operations & Maintenance	35,372	38,077	40,953	44,010	47,258	50,708	54,373	58,266	62,399	66,786	71,444	76,387	81,632
Administration	15,952	17,147	18,416	19,763	21,191	22,707	24,315	26,020	27,827	29,744	31,776	33,929	36,212
Provisions	37,379	39,283	39,970	42,651	43,718	44,677	46,788	44,635	47,920	51,335	54,887	58,583	62,430
Bad Debts	*37,379*	*39,283*	*39,970*	*42,651*	*43,718*	*44,677*	*46,788*	*44,635*	*47,920*	*51,335*	*54,887*	*58,583*	*62,430*
Provision for Drought	-	-	-	-	-	-	-	-	-	-	-	-	-
Transport Cost	5,063	5,260	5,465	5,678	5,900	6,129	6,368	6,616	6,874	7,142	7,420	7,709	8,010
Depreciation	40,848	41,323	41,723	42,123	42,523	42,923	43,323	43,723	44,123	11,718	12,118	12,518	12,918
Existing and renewals	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	-	-	-	-
New Investments	8,043	8,518	8,918	9,318	9,718	10,118	10,518	10,918	11,318	11,718	12,118	12,518	12,918
Total Operating Expenses	452,013	473,435	481,390	511,283	523,418	534,367	557,987	534,713	571,247	576,408	615,879	656,930	699,644
Operating Income	(253,610)	(266,021)	(264,746)	(285,186)	(287,639)	(288,670)	(302,131)	(268,449)	(294,322)	(288,561)	(316,841)	(346,426)	(377,391)
Financial Items	2,540	1,710	1,419	1,123	825	523	-	-	-	-	-	-	-
Interest on Debt	2,628	1,798	1,507	1,212	913	611	-	-	-	-	-	-	-
Overdraft Interest													
Other Interest	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: IDC	(88)	(88)	(88)	(88)	(88)	(88)	-	-	-	-	-	-	-
Interest income	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit after financial items	(256,150)	(267,731)	(266,165)	(286,310)	(288,464)	(289,193)	(302,131)	(268,449)	(294,322)	(288,561)	(316,841)	(346,426)	(377,391)
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	(256,150)	(267,731)	(266,165)	(286,310)	(288,464)	(289,193)	(302,131)	(268,449)	(294,322)	(288,561)	(316,841)	(346,426)	(377,391)
Taxes and Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Corporate Tax	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	(256,150)	(267,731)	(266,165)	(286,310)	(288,464)	(289,193)	(302,131)	(268,449)	(294,322)	(288,561)	(316,841)	(346,426)	(377,391)

Case = Baseline
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2026/27	2027/28	2028/29	2029/30	2030/31
Total Revenue	334,292	346,630	359,273	372,232	385,515
Energy Sales Revenue	334,292	346,630	359,273	372,232	385,515
Domestic Sales	334,292	346,630	359,273	372,232	385,515
Other Revenue	-	-	-	-	-
Capital Grants & Contributions					
Other					
Average tariff/transfer price (US$/MWh)	42.9	43.4	43.8	44.2	44.7
-					
Operating Expenses	730,788	768,827	817,165	867,542	920,065
Supply costs	269,733	278,368	294,831	311,524	328,451
from Wholesale Marketer	*269,733*	*278,368*	*294,831*	*311,524*	*328,451*
Own production	-	-	-	-	-
Salaries	260,471	277,628	295,795	315,032	335,400
Management	*46,670*	*49,351*	*52,164*	*55,116*	*58,213*
Operational	*213,801*	*228,277*	*243,631*	*259,917*	*277,187*
Operations & Maintenance	87,197	93,100	99,362	106,004	113,048
Administration	38,630	41,192	43,906	46,782	49,827
Provisions	66,435	69,893	74,288	78,867	83,642
Bad Debts	*66,435*	*69,893*	*74,288*	*78,867*	*83,642*
Provision for Drought	-	-	-	-	-
Transport Cost	8,322	8,646	8,983	9,333	9,696
Depreciation	13,318	13,718	14,118	14,518	14,918
Existing and renewals	-	-	-	-	-
New Investments	13,318	13,718	14,118	14,518	14,918
Total Operating Expenses	744,106	782,545	831,283	882,060	934,983
Operating Income	(409,814)	(435,915)	(472,010)	(509,828)	(549,468)
Financial Items	-	-	-	-	-
Interest on Debt	-	-	-	-	-
Overdraft Interest					
Other Interest	-	-	-	-	-
Less: IDC	-	-	-	-	-
Interest Income	-	-	-	-	-
Profit after financial items	(409,814)	(435,915)	(472,010)	(509,828)	(549,468)
Other	-	-	-	-	-
Exceptional Item CEC Provision					
Exchange rate losses					
Profit before taxes	(409,814)	(435,915)	(472,010)	(509,828)	(549,468)
Taxes and Dividends	-	-	-	-	-
Corporate Tax	-	-	-	-	-
Dividends	-	-	-	-	-
Retained profit after taxes	(409,814)	(435,915)	(472,010)	(509,828)	(549,468)

Case = Baseline
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

BALANCE SHEET	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Assets													
Current Assets	36,309	37,921	39,680	41,283	43,149	45,060	47,028	49,025	51,051	53,124	55,290	57,508	59,778
Cash	-	-	-	-	-	-	-	-	-	-	-	-	-
Trade debtors	26,448	27,901	29,372	30,937	32,753	34,614	36,532	38,479	40,455	42,478	44,595	46,762	48,982
Deferred CEC debtor													
Other debtors	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618
Stores	4,242	4,402	4,690	4,728	4,778	4,828	4,878	4,928	4,978	5,028	5,078	5,128	5,178
Net Fixed Assets	727,062	749,747	755,552	731,149	687,688	638,346	600,682	566,591	537,743	508,494	478,846	448,797	418,349
Existing	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880
New Investments	39,922	73,278	94,143	101,661	111,661	121,661	131,661	141,661	151,661	161,661	171,661	181,661	191,661
Acc. Depreciation- existing	161,874	194,679	227,485	260,290	293,096	325,901	358,707	391,512	424,317	457,123	489,928	522,734	555,539
Acc. Depreciation- new	1,573	4,481	8,223	12,266	16,709	21,552	26,795	32,438	38,481	44,924	51,767	59,010	66,653
CWIP	6,708	31,750	53,237	58,165	41,952	20,258	10,643	5,000	5,000	5,000	5,000	5,000	5,000
Investments (financial)	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Assets	763,371	787,668	795,232	772,433	730,837	683,406	647,711	615,616	588,794	561,618	534,136	506,305	478,127
Liabilities													
Current liabilities	23,733	22,285	30,333	28,665	29,192	30,166	27,568	29,289	31,415	33,628	29,851	35,786	40,207
Accounts Payable	13,848	11,817	12,624	9,978	10,368	11,074	7,839	8,926	10,417	11,874	13,604	18,680	22,177
Other Payables	5,818	5,743	7,764	8,236	8,531	8,792	9,065	9,341	9,623	9,941	10,461	11,013	11,628
Taxes Payable	1,473	1,553	1,635	1,722	1,824	1,927	2,034	2,142	2,252	2,365	2,483	2,604	2,727
Consumer Deposits	1,563	1,709	1,855	2,001	2,187	2,373	2,559	2,745	2,931	3,117	3,303	3,489	3,675
Current portion long-term loan	1,032	1,463	6,455	6,728	6,282	5,999	6,071	6,135	6,192	6,331	-	-	-
Unpaid Debt Service													
Bank Overdraft	-	-	-	-	-	-	-	-	-	-	-	-	-
Liabilities over 1 year	23,446	23,104	23,906	25,308	26,943	28,647	30,432	32,276	34,184	36,173	39,027	42,057	45,274
Existing Loans	4,331	3,358	2,384	1,410	436	-	-	-	-	-	-	-	-
New long term loans	38,555	66,395	75,591	73,427	67,673	61,827	55,828	49,757	43,622	37,430	31,188	25,455	19,685
PRP Loans	38,555	66,395	75,591	73,427	67,673	61,827	55,828	49,757	43,622	37,430	31,188	25,455	19,685
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	7,047	12,615	18,183	23,751	29,319	34,887	40,455	46,023	51,591	57,159	62,727	68,295	73,863
Provision for drought	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	666,258	659,912	644,835	619,872	577,274	527,880	493,429	458,271	427,982	397,228	371,344	334,712	299,098
Share Capital	31	31	31	31	31	31	31	31	31	31	31	31	31
Revaluation reserve	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327
Revenue reserve	(152,100)	(158,447)	(173,523)	(198,486)	(241,085)	(290,479)	(324,930)	(360,088)	(390,377)	(421,131)	(447,014)	(483,646)	(519,261)
Total Liabilities & Equity	763,371	787,668	795,232	772,433	730,837	683,406	647,711	615,616	588,794	561,618	534,136	506,305	478,127

Case = Baseline
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

BALANCE SHEET	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Assets													
Current Assets	62,101	64,488	66,923	69,415	71,966	74,578	77,253	79,992	82,796	85,668	88,609	91,621	94,706
Cash	-	-	-	-	-	-	-	-	-	-	-	-	-
Trade debtors	51,255	53,583	55,968	58,410	60,911	63,473	66,098	68,786	71,541	74,362	77,253	80,215	83,251
Deferred CEC debtor													
Other debtors	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618
Stores	5,228	5,287	5,337	5,387	5,437	5,487	5,537	5,587	5,637	5,687	5,737	5,787	5,837
Net Fixed Assets	387,501	358,990	326,329	294,205	261,682	228,759	195,435	161,712	127,589	125,871	123,753	121,235	118,317
Existing	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880
New Investments	201,661	213,536	223,536	233,536	243,536	253,536	263,536	273,536	283,536	293,536	303,536	313,536	323,536
Acc. Depreciation- existing	588,345	621,150	653,955	686,761	719,566	752,372	785,177	817,983	850,788	850,788	850,788	850,788	850,788
Acc. Depreciation- new	74,696	83,214	92,131	101,449	111,167	121,285	131,803	142,721	154,039	165,757	177,875	190,393	203,311
CWIP	5,000	5,938	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Investments (financial)	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Assets	449,602	423,478	393,252	363,620	333,648	303,337	272,688	241,703	210,384	211,538	212,361	212,855	213,023
Liabilities													
Current liabilities	40,832	42,709	43,736	46,417	47,788	49,087	51,275	50,131	53,478	56,953	60,565	64,318	68,222
Accounts Payable	21,829	22,733	22,595	24,054	24,141	24,091	24,938	22,228	23,931	25,680	27,480	29,330	31,235
Other Payables	12,288	12,946	13,792	14,692	15,651	16,671	17,679	18,910	20,215	21,598	23,063	24,615	26,259
Taxes Payable	2,854	2,983	3,116	3,252	3,391	3,534	3,680	3,830	3,983	4,140	4,301	4,466	4,635
Consumer Deposits	3,861	4,047	4,233	4,419	4,605	4,791	4,977	5,163	5,349	5,535	5,721	5,907	6,093
Current portion long-term loan	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service													
Bank Overdraft	-	-	-	-	-	-	-	-	-	-	-	-	-
Liabilities over 1 year	48,689	52,312	56,157	60,234	64,559	69,145	74,007	79,160	84,622	90,410	96,543	103,040	109,922
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	13,880	11,488	9,083	6,665	4,235	1,794	1,794	1,794	1,794	1,794	1,794	1,794	1,794
PRP Loans	13,880	11,488	9,083	6,665	4,235	1,794	1,794	1,794	1,794	1,794	1,794	1,794	1,794
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	79,431	84,999	90,567	96,135	101,703	107,271	112,839	118,407	123,975	129,543	135,111	140,679	146,247
Provision for drought	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	266,770	231,970	193,710	154,170	115,364	76,040	32,774	(7,789)	(53,484)	(67,162)	(81,651)	(96,976)	(113,163)
Share Capital	31	31	31	31	31	31	31	31	31	31	31	31	31
Revaluation reserve	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327
Revenue reserve	(551,589)	(586,389)	(624,649)	(664,189)	(702,994)	(742,318)	(785,584)	(826,147)	(871,843)	(885,521)	(900,010)	(915,335)	(931,521)
Total Liabilities & Equity	449,602	423,478	393,252	363,620	333,648	303,337	272,688	241,703	210,384	211,538	212,361	212,855	213,023

Case = Baseline
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

BALANCE SHEET	2026/27	2027/28	2028/29	2029/30	2030/31
Assets					
Current Assets	97,866	101,103	104,420	107,817	111,299
Cash	-	-	-	-	-
Trade debtors	86,361	89,548	92,814	96,162	99,593
Deferred CEC debtor					
Other debtors	5,618	5,618	5,618	5,618	5,618
Stores	5,887	5,937	5,987	6,037	6,087
Net Fixed Assets	114,999	111,281	107,163	102,645	97,727
Existing	843,880	843,880	843,880	843,880	843,880
New Investments	333,536	343,536	353,536	363,536	373,536
Acc. Depreciation- existing	850,788	850,788	850,788	850,788	850,788
Acc. Depreciation- new	216,629	230,347	244,465	258,983	273,901
CWIP	5,000	5,000	5,000	5,000	5,000
Investments (financial)	-	-	-	-	-
Total Assets	212,865	212,384	211,583	210,462	209,026
Liabilities					
Current liabilities	72,283	75,923	80,363	84,986	89,803
Accounts Payable	33,196	34,628	36,746	38,930	41,180
Other Payables	28,001	29,845	31,798	33,866	36,055
Taxes Payable	4,808	4,986	5,168	5,354	5,545
Consumer Deposits	6,279	6,465	6,651	6,837	7,023
Current portion long-term loan	-	-	-	-	-
Unpaid Debt Service					
Bank Overdraft	-	-	-	-	-
Liabilities over 1 year	117,212	124,932	133,108	141,764	150,930
Existing Loans	-	-	-	-	-
New long term loans	1,794	1,794	1,794	1,794	1,794
PRP Loans	1,794	1,794	1,794	1,794	1,794
Other Loans	-	-	-	-	-
Capital Grants & Contributions	151,815	157,383	162,951	168,519	174,087
Provision for drought	-	-	-	-	-
Equity	(130,240)	(147,649)	(166,633)	(186,601)	(207,588)
Share Capital	31	31	31	31	31
Revaluation reserve	818,327	818,327	818,327	818,327	818,327
Revenue reserve	(948,598)	(966,007)	(984,992)	(1,004,960)	(1,025,947)
Total Liabilities & Equity	212,865	212,384	211,583	210,462	209,026

Case = Baseline
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Source of funds													
Generation from Operations	(38,635)	(28,480)	(36,456)	(38,920)	(38,992)	(41,667)	(44,093)	(55,066)	(72,115)	(88,022)	(109,307)	(175,577)	(221,029)
Operating Income	(75,397)	(69,428)	(65,764)	(67,981)	(68,836)	(72,495)	(75,935)	(87,859)	(105,226)	(122,162)	(144,491)	(211,850)	(258,315)
Financial Items	2,384	5,234	(7,240)	(7,787)	(7,405)	(6,821)	(6,206)	(5,655)	(5,738)	(5,109)	(4,464)	(3,775)	(3,162)
Taxes	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	34,379	35,713	36,548	36,848	37,248	37,648	38,048	38,448	38,848	39,248	39,648	40,048	40,448
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	32,397	33,612	15,400	9,031	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754
Capital Contributions	2,784	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568
Sale of Assets													
Consumer deposits	146	146	146	146	186	186	186	186	186	186	186	186	186
Loans PRP	29,467	27,898	9,686	3,317	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	(6,238)	5,132	(21,057)	(29,890)	(33,238)	(35,913)	(38,339)	(49,312)	(66,361)	(82,268)	(103,553)	(169,823)	(215,275)
Application of Funds													
Investments including IDC	39,334	33,356	20,865	7,518	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
PRP	25,919	21,694	9,615	5,643	-	-	-	-	-	-	-	-	-
Other	13,416	11,663	11,250	1,875	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Repayment of loans	1,246	1,032	1,463	6,455	6,728	6,282	5,999	6,071	6,135	6,192	6,243	5,732	5,770
Existing loans	1,246	974	974	974	974	436	-	-	-	-	-	-	-
PRP loans	-	58	489	5,481	5,754	5,846	5,999	6,071	6,135	6,192	6,243	5,732	5,770
Other New loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividend	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	40,580	34,388	22,328	13,973	16,728	16,282	15,999	16,071	16,135	16,192	16,243	15,732	15,770
Net In/Outflow of Funds	(46,818)	(29,257)	(43,385)	(43,863)	(49,966)	(52,196)	(54,339)	(65,383)	(82,496)	(98,460)	(119,795)	(185,555)	(231,045)

136

Case = Baseline
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$

CASH FLOW STATEMENT	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Source of funds													
Generation from Operations	(215,302)	(226,407)	(224,441)	(244,186)	(245,940)	(246,270)	(258,807)	(224,726)	(250,199)	(276,843)	(304,723)	(333,908)	(364,473)
Operating Income	(253,610)	(266,021)	(264,746)	(285,186)	(287,639)	(288,670)	(302,131)	(268,449)	(294,322)	(288,561)	(316,841)	(346,426)	(377,391)
Financial Items	(2,540)	(1,710)	(1,419)	(1,123)	(825)	(523)	-	-	-	-	-	-	-
Taxes	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	40,848	41,323	41,723	42,123	42,523	42,923	43,323	43,723	44,123	11,718	12,118	12,518	12,918
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754
Capital Contributions	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568
Sale of Assets													
Consumer deposits	186	186	186	186	186	186	186	186	186	186	186	186	186
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	(209,548)	(220,653)	(218,687)	(238,432)	(240,186)	(240,516)	(253,053)	(218,972)	(244,445)	(271,089)	(298,969)	(328,154)	(358,719)
Application of Funds													
Investments including IDC	10,000	11,875	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	10,000	11,875	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Repayment of loans	5,805	2,392	2,406	2,418	2,430	2,441	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	5,805	2,392	2,406	2,418	2,430	2,441	-	-	-	-	-	-	-
Other New loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividend	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	15,805	14,267	12,406	12,418	12,430	12,441	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Net In/Outflow of Funds	(225,353)	(234,920)	(231,093)	(250,850)	(252,616)	(252,956)	(263,053)	(228,972)	(254,445)	(281,089)	(308,969)	(338,154)	(368,719)

137

Case = Baseline
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$

CASH FLOW STATEMENT	2026/27	2027/28	2028/29	2029/30	2030/31
Source of funds					
Generation from Operations	(396,496)	(422,197)	(457,892)	(495,310)	(534,550)
Operating Income	(409,814)	(435,915)	(472,010)	(509,828)	(549,468)
Financial Items	-	-	-	-	-
Taxes	-	-	-	-	-
Provision for drought less Utilization	-	-	-	-	-
Exceptional Items	-	-	-	-	-
Depreciation	13,318	13,718	14,118	14,518	14,918
Capital contributions	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-
External Sources	5,754	5,754	5,754	5,754	5,754
Capital Contributions	5,568	5,568	5,568	5,568	5,568
Sale of Assets					
Consumer deposits	186	186	186	186	186
Loans PRP	-	-	-	-	-
Other New Loans	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-
New Equity	-	-	-	-	-
Total sources of funds	(390,742)	(416,443)	(452,138)	(489,556)	(528,796)
Application of Funds					
Investments including IDC	10,000	10,000	10,000	10,000	10,000
PRP	-	-	-	-	-
Other	10,000	10,000	10,000	10,000	10,000
Repayment of loans	-	-	-	-	-
Existing loans	-	-	-	-	-
PRP loans	-	-	-	-	-
Other New loans	-	-	-	-	-
Dividend	-	-	-	-	-
Total Application of Funds	10,000	10,000	10,000	10,000	10,000
Net In/Outflow of Funds	(400,742)	(426,443)	(462,138)	(499,556)	(538,796)

Appendix E Best Case Projection

This appendix includes Baseline financial projections in the following tables:

- Table 1- Market Data page 1
- Table 2- Consolidated Profit and Loss Statement page 4
- Table 3- Consolidated Balance Sheet page 7
- Table 4- Consolidated Cash Flow Statement page 10
- Table 5- Consolidated Profit and Loss Statement for Isolated Systems page 13
- Table 6- Consolidated Balance Sheet for Isolated Systems page 16
- Table 7- Consolidated Cash Flow for Isolated Systems page 19
- Table 8- Consolidated Profit and Loss Statement for Generation page 22
- Table 9- Consolidated Balance Sheet for Generation page 25
- Table 10- Consolidated Cash Flow for Generation page 28
- Table 11- Consolidated Profit and Loss Statement for Transmission page 31
- Table 12- Consolidated Balance Sheet for Transmission page 34
- Table 13- Consolidated Cash Flow for Transmission page 37
- Table 14- Consolidated Profit and Loss Statement for Wholesale Market Function page 40
- Table 15- Consolidated Balance Sheet for Wholesale Market Function page 43
- Table 16- Consolidated Cash Flow for Wholesale Market Function page 46
- Table 17- Consolidated Profit and Loss Statement for Distribution and Customer Services page 49
- Table 18- Consolidated Balance Sheet for Distribution and Customer Services page 52
- Table 19- Consolidated Cash Flow for Distribution and Customer Services page 55

Case = Best Achievable
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

MARKET DATA	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Sales (GWh)													
Isolated Systems	14	14	15	16	17	17	18	19	20	21	22	23	25
Domestic Grid	2,989	3,069	3,107	3,117	3,162	3,316	3,474	3,635	3,798	3,958	4,107	4,258	4,410
CEC	3,244	3,293	3,336	3,373	3,404	3,401	3,379	3,536	3,601	3,667	3,716	3,716	3,716
Imports or other purchases	363	-	-	-	-	-	-	-	83	317	542	719	897
Exports	-	413	892	862	794	632	486	154	-	-	-	-	-
KNBC purchases	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Wheeling	731	731	731	731	731	731	731	731	731	731	731	731	731
Generation (GWh)													
Hydro	5,384	5,763	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100
Diesel	16	17	18	19	20	21	22	23	24	25	27	28	30
Transmission													
Losses (%)	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Distribution													
Losses (%)	30.0%	20.0%	15.0%	14.6%	14.1%	13.7%	13.3%	12.9%	12.4%	12.0%	12.0%	12.0%	12.0%

145

Case = Best Achievable **Consolidated Statement**
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

MARKET DATA	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Sales (GWh)														
Isolated Systems	26	27	28	30	31	33	35	36	38	40	42	44	46	49
Domestic Grid	4,563	4,718	4,875	5,033	5,192	5,354	5,517	5,682	5,848	6,017	6,187	6,360	6,534	6,711
CEC	3,432	3,107	2,782	2,457	2,132	1,807	1,482	-	-	-	-	-	-	-
Imports or other purchases	784	631	479	329	181	35	-	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	109	1,444	1,249	1,051	852	650	445	238
KNBC purchases	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Wheeling	731	731	731	731	731	731	731	731	731	731	731	731	731	731
Generation (GWh)														
Hydro	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100
Diesel	31	33	34	36	38	40	42	44	46	48	50	53	56	58
Transmission														
Losses (%)	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Distribution														
Losses (%)	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%

Case = Best Achievable
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

MARKET DATA	2027/28	2028/29	2029/30	2030/31
Sales (GWh)				
Isolated Systems	51	54	56	59
Domestic Grid	6,889	7,070	7,254	7,439
CEC	-	-	-	-
Imports or other purchases	-	183	398	615
Exports	29	-	-	-
KNBC purchases	2,000	2,000	2,000	2,000
Wheeling	731	731	731	731
Generation (GWh)				
Hydro	6,100	6,100	6,100	6,100
Diesel	61	64	68	71
Transmission				
Losses (%)	3.0%	3.0%	3.0%	3.0%
Distribution				
Losses (%)	12.0%	12.0%	12.0%	12.0%

1/2

Case = Best Achievable
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total Revenue	168,700	209,826	250,926	251,867	254,444	262,924	269,816	278,846	286,744	297,154	306,601	320,453	334,360
Energy Sales Revenue	168,700	209,826	250,926	251,867	254,444	262,924	269,816	278,846	286,744	297,154	306,601	320,453	334,360
Isolated System Sales	454	634	830	872	916	961	1,009	1,060	1,113	1,169	1,227	1,314	1,407
Domestic Sales	98,664	134,653	170,068	170,541	172,981	181,400	190,088	198,870	207,750	216,523	224,671	237,550	250,931
CEC Sales	69,100	70,139	71,054	71,846	72,514	72,452	71,971	75,312	76,706	78,099	79,143	79,143	79,143
Exports	-	3,917	8,488	8,127	7,548	7,505	6,108	2,708	-	-	-	-	-
SAPP Wheeling	482	483	485	481	485	606	641	894	1,175	1,364	1,559	2,446	2,878
Average tariff /transfer price (US$/MWh)	27.1	31.0	34.2	34.3	34.6	35.8	36.8	38.1	38.8	39.0	39.2	40.2	41.1
Operating Expenses	124,595	112,868	106,544	109,749	111,812	118,416	128,368	136,647	147,528	161,736	179,790	210,785	238,503
Supply costs	15,729	12,375	12,563	12,826	13,220	13,785	14,367	14,955	17,464	24,607	33,269	51,715	68,420
KNBC	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*
Outside Power Purchases	*3,429*	-	-	-	-	-	-	-	*1,916*	*8,474*	*16,581*	*34,466*	*50,607*
CEC Wheeling	*7,500*	*7,575*	*7,763*	*8,026*	*8,420*	*8,985*	*9,567*	*10,155*	*10,748*	*11,332*	*11,889*	*12,449*	*13,013*
Own production	5,223	4,875	5,119	5,375	5,643	5,926	6,222	6,533	6,860	7,202	7,563	7,941	8,338
Diesel	*5,223*	*4,875*	*5,119*	*5,375*	*5,643*	*5,926*	*6,222*	*6,533*	*6,860*	*7,202*	*7,563*	*7,941*	*8,338*
Salaries	61,265	54,292	49,421	50,917	52,924	56,429	60,746	65,338	70,222	75,359	80,612	86,184	92,093
Management	*15,485*	*13,927*	*12,849*	*13,152*	*13,560*	*14,280*	*15,161*	*16,087*	*17,060*	*18,072*	*19,093*	*20,164*	*21,286*
Operational	*45,780*	*40,365*	*36,572*	*37,765*	*39,364*	*42,148*	*45,585*	*49,251*	*53,162*	*57,287*	*61,519*	*66,021*	*70,807*
Operations & Maintenance	*23,221*	*21,182*	*19,810*	*20,478*	*21,316*	*22,645*	*24,245*	*25,945*	*27,751*	*29,651*	*31,600*	*33,666*	*35,855*
Administration	*6,750*	*6,129*	*5,645*	*5,810*	*6,039*	*6,463*	*6,992*	*7,555*	*8,155*	*8,786*	*9,430*	*10,114*	*10,841*
Provisions	7,235	8,710	8,480	8,630	6,738	7,012	9,406	9,688	10,190	8,982	9,892	13,457	14,953
Bad Debts	*7,235*	*6,710*	*6,480*	*6,630*	*6,738*	*7,012*	*7,406*	*7,688*	*8,190*	*8,982*	*9,892*	*11,457*	*12,953*
Provision for Drought	-	*2,000*	*2,000*	*2,000*	-	-	*2,000*	*2,000*	*2,000*	-	-	*2,000*	*2,000*
Transport Cost	5,171	5,306	5,506	5,714	5,931	6,156	6,390	6,634	6,887	7,150	7,423	7,708	8,003
Depreciation	51,998	54,650	56,249	57,165	57,949	58,632	59,316	59,999	60,682	61,366	62,049	62,732	63,416
Existing and renewals	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670
New Investments	3,328	5,980	7,579	8,495	9,279	9,963	10,646	11,329	12,013	12,696	13,379	14,063	14,746
Total Operating Expenses	176,593	167,518	162,793	166,914	169,761	177,048	187,683	196,646	208,211	223,102	241,839	273,518	301,919
Operating Income	(7,893)	42,308	88,133	84,954	84,683	85,876	82,133	82,199	78,533	74,052	64,762	46,935	32,441
Financial Items	(8,188)	(12,261)	7,060	7,062	9,370	5,707	10,911	9,807	8,213	5,625	3,082	626	(1,187)
Interest on Debt	3,599	2,063	14,870	16,119	15,329	14,087	17,155	16,879	15,306	13,729	12,149	10,507	8,996
Less: IDC	(11,787)	(13,433)	(6,709)	(7,154)	(3,169)	(4,808)	(1,763)	(1,629)	(635)	(635)	(635)	(579)	(160)
Interest income	-	(891)	(1,101)	(1,903)	(2,790)	(3,572)	(4,480)	(5,443)	(6,458)	(7,469)	(8,432)	(9,302)	(10,023)
Profit after financial items	295	54,569	81,073	77,892	75,313	80,169	71,222	72,392	70,320	68,427	61,680	46,309	33,628
Profit before taxes	295	54,569	81,073	77,892	75,313	80,169	71,222	72,392	70,320	68,427	61,680	46,309	33,628
Taxes and Dividends	6,297	26,756	35,424	40,800	33,479	35,177	29,491	29,602	28,435	28,153	25,752	19,913	15,353
Corporate Tax	103	19,099	28,376	27,262	26,359	28,059	24,928	25,337	24,612	23,949	21,588	16,208	11,770
Dividends	6,194	7,657	7,048	13,538	7,120	7,118	4,564	4,265	3,823	4,204	4,165	3,705	3,584
Retained profit after taxes	(6,002)	27,813	45,649	37,092	41,833	44,992	41,731	42,790	41,885	40,274	35,927	26,396	18,274

148

Case = Best Achievable
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Total Revenue	342,155	349,883	357,963	366,961	376,270	386,169	402,757	461,275	469,796	478,938	488,727	499,187	510,346	522,232
Energy Sales Revenue	342,155	349,883	357,963	366,961	376,270	386,169	402,757	461,275	469,796	478,938	488,727	499,187	510,346	522,232
Isolated System Sales	1,507	1,614	1,729	1,852	1,983	2,124	2,275	2,436	2,609	2,794	2,993	3,205	3,433	3,677
Domestic Sales	264,834	279,278	294,283	309,871	326,062	342,879	360,347	378,489	397,331	416,900	437,222	458,327	480,244	503,004
CEC Sales	73,103	66,180	59,258	52,335	45,413	38,491	31,568	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	5,837	77,609	67,115	56,503	45,770	34,913	23,928	12,811
SAPP Wheeling	2,711	2,810	2,692	2,904	2,812	2,675	2,729	2,741	2,741	2,741	2,741	2,741	2,741	2,741
Average tariff /transfer price (US$/MWh)	42.8	44.7	46.8	49.0	51.4	53.9	56.7	64.7	66.2	67.8	69.4	71.2	73.1	75.2
Operating Expenses	240,477	243,255	246,007	254,566	259,557	265,992	277,942	295,698	315,154	333,602	353,101	371,712	393,500	416,534
Supply costs	60,064	53,698	44,814	38,847	30,685	23,131	21,897	22,502	23,113	23,729	24,352	24,982	25,618	26,261
KNBC	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*
Outside Power Purchases	*41,682*	*34,743*	*25,280*	*18,730*	*9,981*	*1,833*	-	-	-	-	-	-	-	-
CEC Wheeling	*13,582*	*14,155*	*14,733*	*15,316*	*15,905*	*16,498*	*17,097*	*17,702*	*18,313*	*18,929*	*19,552*	*20,182*	*20,818*	*21,461*
Own production	8,755	9,192	9,652	10,135	10,641	11,173	11,732	12,319	12,935	13,581	14,260	14,973	15,722	16,508
Diesel	*8,755*	*9,192*	*9,652*	*10,135*	*10,641*	*11,173*	*11,732*	*12,319*	*12,935*	*13,581*	*14,260*	*14,973*	*15,722*	*16,508*
Salaries	98,359	105,002	112,046	119,513	127,429	135,819	144,713	154,139	164,129	174,717	185,938	197,830	210,433	223,788
Management	*22,464*	*23,698*	*24,992*	*26,349*	*27,772*	*29,263*	*30,826*	*32,464*	*34,181*	*35,982*	*37,869*	*39,846*	*41,919*	*44,092*
Operational	*75,895*	*81,304*	*87,054*	*93,164*	*99,657*	*106,557*	*113,887*	*121,675*	*129,948*	*138,735*	*148,070*	*157,984*	*168,513*	*179,696*
Operations & Maintenance	*38,173*	*40,628*	*43,229*	*45,983*	*48,899*	*51,987*	*55,256*	*58,718*	*62,383*	*66,262*	*70,369*	*74,717*	*79,318*	*84,189*
Administration	*11,611*	*12,429*	*13,296*	*14,217*	*15,193*	*16,228*	*17,325*	*18,489*	*19,723*	*21,031*	*22,417*	*23,887*	*25,445*	*27,095*
Provisions	15,205	13,674	14,008	16,564	17,043	17,612	16,588	18,699	21,619	22,591	23,620	22,708	23,858	25,075
Bad Debts	*13,205*	*13,674*	*14,008*	*14,564*	*15,043*	*15,612*	*16,588*	*18,699*	*19,619*	*20,591*	*21,620*	*22,708*	*23,858*	*25,075*
Provision for Drought	*2,000*	-	-	*2,000*	*2,000*	*2,000*	-	-	*2,000*	*2,000*	*2,000*	-	-	-
Transport Cost	8,311	8,630	8,963	9,308	9,668	10,041	10,429	10,833	11,253	11,690	12,144	12,616	13,107	13,617
Depreciation	64,099	65,126	65,809	66,493	67,176	67,859	68,543	69,226	69,909	37,787	38,470	39,154	39,837	40,520
Existing and renewals	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	48,670	15,864	15,864	15,864	15,864	15,864
New Investments	15,429	16,456	17,140	17,823	18,506	19,190	19,873	20,556	21,240	21,923	22,606	23,290	23,973	24,656
Total Operating Expenses	304,576	308,381	311,817	321,058	326,733	333,851	346,484	364,924	385,063	371,389	391,572	410,866	433,338	457,054
Operating Income	37,579	41,502	46,146	45,903	49,537	52,318	56,273	96,351	84,733	107,549	97,155	88,320	77,008	65,178
Financial Items	(3,170)	(5,561)	(7,174)	(8,865)	(10,651)	(12,588)	(14,682)	(16,084)	(17,962)	(19,586)	(21,071)	(22,154)	(23,157)	(24,078)
Interest on Debt	7,530	5,732	4,803	3,926	3,047	2,111	993	791	589	387	-	-	-	-
Less: IDC	(160)	(160)	(160)	(160)	(160)	(160)	(47)	(47)	(47)	(47)	-	-	-	-
Interest income	(10,540)	(11,133)	(11,817)	(12,631)	(13,538)	(14,540)	(15,627)	(16,828)	(18,504)	(19,926)	(21,071)	(22,154)	(23,157)	(24,078)
Profit after financial Items	40,749	47,063	53,319	54,768	60,189	64,907	70,954	112,434	102,695	127,135	118,226	110,475	100,165	89,256
Profit before taxes	40,749	47,063	53,319	54,768	60,189	64,907	70,954	112,434	102,695	127,135	118,226	110,475	100,165	89,256
Taxes and Dividends	17,357	19,282	21,010	20,666	22,106	23,321	26,454	52,662	46,951	53,518	48,371	43,975	38,247	48,469
Corporate Tax	14,262	16,472	18,662	19,169	21,066	22,717	24,834	39,352	35,943	44,497	41,379	38,666	35,058	31,239
Dividends	3,095	2,810	2,349	1,497	1,040	604	1,620	13,310	11,008	9,020	6,992	5,309	3,189	17,230
Retained profit after taxes	23,392	27,781	32,309	34,102	38,082	41,586	44,500	59,773	55,744	73,618	69,855	66,499	61,918	40,786

Case = Best Achievable
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2027/28	2028/29	2029/30	2030/31
Total Revenue	534,876	558,141	583,928	610,716
Energy Sales Revenue	534,876	558,141	583,928	610,716
Isolated System Sales	3,938	4,217	4,517	4,837
Domestic Sales	526,639	551,183	576,670	603,137
CEC Sales	-	-	-	-
Exports	1,558	-	-	-
SAPP Wheeling	2,741	2,741	2,741	2,741
Average tariff /transfer price (US$/MWh)	77.3	78.9	80.5	82.1
Operating Expenses	440,436	476,581	515,997	557,135
Supply costs	26,911	37,403	49,603	61,959
KNBC	*4,800*	*4,800*	*4,800*	*4,800*
Outside Power Purchases	-	*9,835*	*21,370*	*33,054*
CEC Wheeling	*22,111*	*22,768*	*23,433*	*24,106*
Own production	17,334	18,200	19,110	20,066
Diesel	*17,334*	*18,200*	*19,110*	*20,066*
Salaries	237,942	252,942	268,838	285,685
Management	*46,370*	*48,757*	*51,259*	*53,882*
Operational	*191,573*	*204,185*	*217,579*	*231,803*
Operations & Maintenance	*89,345*	*94,802*	*100,578*	*106,692*
Administration	*28,844*	*30,698*	*32,662*	*34,743*
Provisions	25,913	27,836	29,932	32,120
Bad Debts	*25,913*	*27,836*	*29,932*	*32,120*
Provision for Drought	-	-	-	-
Transport Cost	14,148	14,699	15,273	15,870
Depreciation	33,593	34,277	34,960	35,643
Existing and renewals	8,254	8,254	8,254	8,254
New Investments	25,340	26,023	26,706	27,390
Total Operating Expenses	474,030	510,857	550,957	592,778
Operating Income	60,846	47,284	32,971	17,937
Financial Items	(24,919)	(25,391)	(25,695)	(25,838)
Interest on Debt	-	-	-	-
Less: IDC	-	-	-	-
Interest income	(24,919)	(25,391)	(25,695)	(25,838)
Profit after financial items	85,765	72,675	58,665	43,775
Profit before taxes	85,765	72,675	58,665	43,775
Taxes and Dividends	48,155	42,058	35,228	27,952
Corporate Tax	30,018	25,436	20,533	15,321
Dividends	18,137	16,621	14,695	12,630
Retained profit after taxes	37,610	30,617	23,438	15,824

145

Case = Best Achievable
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

BALANCE SHEET	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Assets													
Current Assets	93,296	112,403	161,186	206,027	245,564	292,622	342,379	395,012	447,414	497,603	542,999	581,803	610,497
Cash	44,566	54,798	95,124	139,512	178,601	224,019	272,141	322,880	373,444	421,593	465,109	501,156	526,986
Trade debtors	33,449	41,848	49,939	50,299	50,684	52,276	53,863	55,710	57,500	59,493	61,324	64,034	66,850
Deferred CEC debtor	5	5	5	5	5	5	5	5	5	5	5	5	5
Other debtors	6,423	6,371	6,318	6,266	6,214	6,161	6,109	6,057	6,004	5,952	5,900	5,847	5,795
Stores	8,853	9,382	9,800	9,945	10,060	10,160	10,260	10,360	10,460	10,560	10,660	10,760	10,860
Net Fixed Assets	1,394,346	1,495,615	1,541,773	1,537,678	1,446,565	1,350,150	1,283,556	1,227,097	1,186,467	1,145,153	1,103,157	1,060,477	1,017,113
Existing	1,526,942	1,526,995	1,527,047	1,527,099	1,527,152	1,527,204	1,527,256	1,527,309	1,527,361	1,527,413	1,527,466	1,527,518	1,527,570
New Investments	99,629	177,067	223,908	253,039	276,070	296,070	316,070	336,070	356,070	376,070	396,070	416,070	436,070
Acc. Depreciation- existing	238,753	287,370	335,988	384,605	433,222	481,839	530,456	579,074	627,691	676,308	724,925	773,542	822,159
Acc. Depreciation- new	3,328	9,308	16,888	25,383	34,662	44,625	55,271	66,601	78,613	91,310	104,689	118,752	133,498
CWIP	10,098	88,527	144,040	167,926	111,678	53,844	26,513	10,000	10,000	10,000	10,000	10,000	10,000
Investments (financial)	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Assets	1,487,642	1,608,018	1,702,959	1,743,705	1,692,129	1,642,772	1,625,934	1,622,108	1,633,880	1,642,756	1,646,155	1,642,280	1,627,610
Liabilities													
Current liabilities	33,487	32,743	47,490	46,201	42,684	42,628	44,527	45,521	46,665	48,731	36,342	40,170	43,837
Accounts Payable	21,795	19,503	19,867	17,608	14,802	14,850	15,090	15,184	15,756	17,079	18,678	21,861	24,827
Other Payables	6,803	5,655	6,891	7,114	7,145	7,349	8,704	9,244	9,482	9,733	9,987	10,260	10,582
Taxes Payable	1,419	2,946	3,468	3,486	3,531	3,651	3,769	3,944	4,091	4,238	4,370	4,555	4,748
Consumer Deposits	1,563	1,709	1,855	2,001	2,187	2,373	2,559	2,745	2,931	3,117	3,303	3,489	3,675
Current portion long-term loan	1,907	2,930	15,409	15,992	15,019	14,405	14,405	14,405	14,405	14,565	5	5	5
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
Bank Overdraft	-	-	-	-	-	-	-	-	-	-	-	-	-
Liabilities over 1 year	27,569	24,431	22,240	22,912	23,816	25,393	27,336	29,402	31,600	33,911	36,275	38,783	41,442
Existing Loans	7,841	6,079	4,316	2,553	790	-	-	-	-	-	-	-	-
New long term loans	83,637	150,891	172,757	167,370	153,145	138,920	124,520	110,120	95,721	81,321	66,921	53,797	40,672
PRP Loans	83,637	150,891	172,757	167,370	153,145	138,920	124,520	110,120	95,721	81,321	66,921	53,797	40,672
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	10,492	16,060	21,628	27,196	32,764	38,332	43,900	49,468	55,036	60,604	66,172	71,740	77,308
Provision for drought	-	2,000	4,000	6,000	3,000	-	2,000	4,000	6,000	3,000	-	2,000	4,000
Equity	1,324,615	1,375,815	1,430,529	1,471,473	1,435,931	1,397,500	1,383,652	1,383,597	1,398,859	1,415,189	1,440,444	1,435,790	1,420,352
Share Capital	89	89	89	89	89	89	89	89	89	89	89	89	89
Revaluation reserve	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167
Revenue reserve	(153,641)	(102,441)	(47,727)	(6,783)	(42,325)	(80,756)	(94,604)	(94,659)	(79,397)	(63,067)	(37,812)	(42,466)	(57,904)
Total Liabilities & Equity	1,487,642	1,608,018	1,702,959	1,743,705	1,692,129	1,642,772	1,625,934	1,622,108	1,633,880	1,642,756	1,646,155	1,642,280	1,627,610

146

Case = Best Achievable
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

BALANCE SHEET	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Assets														
Current Assets	642,556	679,308	722,551	770,538	823,414	880,717	944,268	1,034,791	1,109,040	1,169,601	1,227,220	1,280,932	1,330,751	1,376,749
Cash	556,655	590,825	631,559	676,887	726,977	781,361	841,377	925,183	996,279	1,053,545	1,107,718	1,157,829	1,203,885	1,245,953
Trade debtors	69,192	71,664	74,126	76,737	79,475	82,346	85,834	92,503	95,608	98,856	102,254	105,808	109,522	113,405
Deferred CEC debtor	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Other debtors	5,743	5,690	5,638	5,586	5,533	5,481	5,429	5,376	5,324	5,272	5,219	5,167	5,115	5,062
Stores	10,960	11,124	11,224	11,324	11,424	11,524	11,624	11,724	11,824	11,924	12,024	12,124	12,224	12,324
Net Fixed Assets	973,067	946,921	894,855	848,415	801,291	753,484	704,994	655,820	605,964	588,229	569,811	550,709	530,924	510,456
Existing	1,527,623	1,527,675	1,527,727	1,527,780	1,527,832	1,527,884	1,527,937	1,527,989	1,528,041	1,528,094	1,528,146	1,528,198	1,528,251	1,528,303
New Investments	456,070	488,689	508,689	528,689	548,689	568,689	588,689	608,689	628,689	648,689	668,689	688,689	708,689	728,689
Acc. Depreciation- existing	870,777	919,394	968,011	1,016,628	1,065,245	1,113,862	1,162,480	1,211,097	1,259,714	1,275,526	1,291,337	1,307,149	1,322,961	1,338,773
Acc. Depreciation- new	148,927	165,384	182,524	200,347	218,853	238,043	257,916	278,472	299,712	321,635	344,242	367,531	391,504	416,161
CWIP	10,000	16,309	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Investments (financial)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Assets	1,615,623	1,626,230	1,617,407	1,618,953	1,624,705	1,634,201	1,649,262	1,690,612	1,715,003	1,757,830	1,797,031	1,831,641	1,861,675	1,887,205
Liabilities														
Current liabilities	43,807	44,261	44,371	45,049	45,494	46,123	47,802	50,946	53,021	55,197	57,435	59,884	62,452	75,531
Accounts Payable	24,133	23,942	23,232	23,025	22,533	22,185	22,840	25,099	25,768	26,469	27,204	27,975	28,783	29,632
Other Payables	10,947	11,297	11,816	12,390	13,007	13,657	14,343	15,235	16,184	17,192	18,217	19,405	20,663	21,996
Taxes Payable	4,861	4,969	5,085	5,210	5,343	5,485	5,637	5,444	5,715	5,997	6,289	6,592	6,908	7,235
Consumer Deposits	3,861	4,047	4,233	4,419	4,605	4,791	4,977	5,163	5,349	5,535	5,721	5,907	6,093	6,279
Current portion long-term loan	5	5	5	5	5	5	5	5	5	5	5	5	5	10,388
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bank Overdraft	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liabilities over 1 year	44,261	47,251	50,421	53,781	57,343	61,119	65,121	69,362	73,858	78,623	83,672	89,024	94,695	100,705
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	27,547	22,074	16,602	11,129	5,656	183	183	183	183	183	183	183	183	183
PRP Loans	27,547	22,074	16,602	11,129	5,656	183	183	183	183	183	183	183	183	183
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	82,876	88,444	94,012	99,580	105,148	110,716	116,284	121,852	127,420	132,988	138,556	144,124	149,692	155,260
Provision for drought	6,000	3,000	-	2,000	4,000	6,000	3,000	-	2,000	4,000	6,000	3,000	-	(3,000)
Equity	1,411,131	1,421,199	1,412,001	1,407,414	1,407,065	1,410,061	1,416,872	1,448,268	1,458,522	1,486,839	1,511,184	1,535,427	1,554,653	1,558,526
Share Capital	89	89	89	89	89	89	89	89	89	89	89	89	89	89
Revaluation reserve	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167	1,478,167
Revenue reserve	(67,125)	(57,056)	(66,255)	(70,842)	(71,191)	(68,195)	(61,383)	(29,988)	(19,734)	8,583	32,928	57,171	76,397	80,270
Total Liabilities & Equity	1,615,623	1,626,230	1,617,407	1,618,953	1,624,705	1,634,201	1,649,262	1,690,612	1,715,003	1,757,830	1,797,031	1,831,641	1,861,675	1,887,205

147

Case = Best Achievable
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

BALANCE SHEET	2027/28	2028/29	2029/30	2030/31
Assets				
Current Assets	1,403,863	1,424,179	1,436,798	1,441,332
Cash	1,269,550	1,284,735	1,291,895	1,290,762
Trade debtors	116,874	121,957	127,369	132,988
Deferred CEC debtor	5	5	5	5
Other debtors	5,010	4,958	4,905	4,853
Stores	12,424	12,524	12,624	12,724
Net Fixed Assets	496,915	482,691	467,783	452,192
Existing	1,528,355	1,528,408	1,528,460	1,528,512
New Investments	748,689	768,689	788,689	808,689
Acc. Depreciation- existing	1,346,974	1,355,175	1,363,377	1,371,578
Acc. Depreciation- new	441,501	467,524	494,230	521,620
CWIP	10,000	10,000	10,000	10,000
Investments (financial)	-	-	-	-
Total Assets	1,900,778	1,906,869	1,904,581	1,893,524
Liabilities				
Current liabilities	66,801	71,352	76,315	81,459
Accounts Payable	29,348	31,864	34,690	37,590
Other Payables	23,409	24,904	26,488	28,165
Taxes Payable	7,575	7,928	8,295	8,675
Consumer Deposits	6,465	6,651	6,837	7,023
Current portion long-term loan	5	5	5	5
Unpaid Debt Service	-	-	-	-
Bank Overdraft	-	-	-	-
Liabilities over 1 year	107,074	113,824	120,977	128,558
Existing Loans	-	-	-	-
New long term loans	183	183	183	183
PRP Loans	183	183	183	183
Other Loans	-	-	-	-
Capital Grants & Contributions	160,828	166,396	171,964	177,532
Provision for drought	(6,000)	(9,000)	(12,000)	(15,000)
Equity	1,571,892	1,564,114	1,547,142	1,520,792
Share Capital	89	89	89	89
Revaluation reserve	1,478,167	1,478,167	1,478,167	1,478,167
Revenue reserve	93,636	85,858	68,886	42,536
Total Liabilities & Equity	1,900,778	1,906,869	1,904,581	1,893,524

Case = Best Achievable
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Source of funds	128,659	165,228	139,690	123,763	112,656	116,496	113,364	114,808	114,144	111,597	107,895	100,587	93,028
Generation from Operations	52,190	92,120	110,946	109,794	106,902	110,742	107,610	109,054	108,390	105,843	102,141	94,833	87,274
Operating Income	(7,893)	42,308	88,133	84,954	84,683	85,876	82,133	82,199	78,533	74,052	64,762	46,935	32,441
Financial Items	8,188	12,261	(7,060)	(7,062)	(9,370)	(5,707)	(10,911)	(9,807)	(8,213)	(5,625)	(3,082)	(626)	1,187
Taxes	(103)	(19,099)	(28,376)	(27,262)	(26,359)	(28,059)	(24,928)	(25,337)	(24,612)	(23,949)	(21,588)	(16,208)	(11,770)
Provision for drought less Utilization	-	2,000	2,000	2,000	-	-	2,000	2,000	2,000	-	-	2,000	2,000
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	51,998	54,650	56,249	57,165	57,949	58,632	59,316	59,999	60,682	61,366	62,049	62,732	63,416
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	76,470	73,108	28,744	13,969	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754
Capital Contributions	2,784	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568
Sale of Assets	-	-	-	-	-	-	-	-	-	-	-	-	-
Consumer deposits	146	146	146	146	186	186	186	186	186	186	186	186	186
Loans PRP	73,540	67,394	23,030	8,255	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	128,659	165,228	139,690	123,763	112,656	116,496	113,364	114,808	114,144	111,597	107,895	100,587	93,028
Application of Funds													
Investments including IDC	98,163	77,438	46,841	29,131	23,031	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
PRP	77,967	56,319	27,331	16,513	-	-	-	-	-	-	-	-	-
Other	20,197	21,120	19,509	12,619	23,031	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Repayment of loans	2,254	1,902	2,925	15,404	15,987	15,014	14,400	14,400	14,400	14,400	14,400	13,125	13,125
Existing loans	2,256	1,763	1,763	1,763	1,763	790	-	-	-	-	-	-	-
PRP loans	-	140	1,163	13,642	14,225	14,225	14,400	14,400	14,400	14,400	14,400	13,125	13,125
Other New loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividend	-	6,194	7,657	7,048	13,538	7,120	7,118	4,564	4,265	3,823	4,204	4,165	3,705
Total Application of Funds	100,418	85,534	57,423	51,584	52,556	42,134	41,518	38,963	38,664	38,223	38,603	37,289	36,830
Net In/Outflow of Funds	28,241	79,693	82,267	72,179	60,100	74,362	71,846	75,845	75,480	73,374	69,291	63,298	56,198

149

Case = Best Achievable
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Source of funds	98,340	101,471	106,221	109,846	114,052	117,803	120,417	148,062	144,415	128,179	123,071	116,716	110,698	104,291
Generation from Operations	92,586	95,717	100,467	104,092	108,298	112,049	114,663	142,308	138,661	122,425	117,317	110,962	104,944	98,537
Operating Income	37,579	41,502	46,146	45,903	49,537	52,318	56,273	96,351	84,733	107,549	97,155	88,320	77,008	65,178
Financial Items	3,170	5,561	7,174	8,865	10,651	12,588	14,682	16,084	17,962	19,586	21,071	22,154	23,157	24,078
Taxes	(14,262)	(16,472)	(18,662)	(19,169)	(21,066)	(22,717)	(24,834)	(39,352)	(35,943)	(44,497)	(41,379)	(38,666)	(35,058)	(31,239)
Provision for drought less Utilization	2,000	-	-	2,000	2,000	2,000	-	-	2,000	2,000	2,000	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	64,099	65,126	65,809	66,493	67,176	67,859	68,543	69,226	69,909	37,787	38,470	39,154	39,837	40,520
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754
Capital Contributions	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568
Sale of Assets	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Consumer deposits	186	186	186	186	186	186	186	186	186	186	186	186	186	186
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	98,340	101,471	106,221	109,846	114,052	117,803	120,417	148,062	144,415	128,179	123,071	116,716	110,698	104,291
Application of Funds														
Investments including IDC	20,000	32,619	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	20,000	32,619	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Repayment of loans	13,125	5,473	5,473	5,473	5,473	5,473	-	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	13,125	5,473	5,473	5,473	5,473	5,473	-	-	-	-	-	-	-	-
Other New loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividend	3,584	3,095	2,810	2,349	1,497	1,040	604	1,620	13,310	11,008	9,020	6,992	5,309	3,189
Total Application of Funds	36,708	41,186	28,283	27,821	26,970	26,513	20,604	21,620	33,310	31,008	29,020	26,992	25,309	23,189
Net In/Outflow of Funds	61,631	60,284	77,938	82,024	87,083	91,290	99,813	126,442	111,106	97,172	94,051	89,725	85,389	81,101

157

Case = Best Achievable
Growth = Medium
Consolidated Statement
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2027/28	2028/29	2029/30	2030/31
Source of funds	95,095	87,269	78,847	69,851
Generation from Operations	89,341	81,515	73,093	64,097
Operating Income	60,846	47,284	32,971	17,937
Financial Items	24,919	25,391	25,695	25,838
Taxes	(30,018)	(25,436)	(20,533)	(15,321)
Provision for drought less Utilization	-	-	-	-
Exceptional Items	-	-	-	-
Depreciation	33,593	34,277	34,960	35,643
Capital contributions	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-
External Sources	5,754	5,754	5,754	5,754
Capital Contributions	5,568	5,568	5,568	5,568
Sale of Assets	-	-	-	-
Consumer deposits	186	186	186	186
Loans PRP	-	-	-	-
Other New Loans	-	-	-	-
Unpaid Debt Service	-	-	-	-
New Equity	-	-	-	-
Total sources of funds	95,095	87,269	78,847	69,851
Application of Funds				
Investments including IDC	20,000	20,000	20,000	20,000
PRP	-	-	-	-
Other	20,000	20,000	20,000	20,000
Repayment of loans	-	-	-	-
Existing loans	-	-	-	-
PRP loans	-	-	-	-
Other New loans	-	-	-	-
Dividend	17,230	18,137	16,621	14,695
Total Application of Funds	37,230	38,137	36,621	34,695
Net In/Outflow of Funds	57,865	49,133	42,225	35,156

157

Case = Best Achievable
Isolated Systems
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total Revenue	454	634	830	872	916	961	1,009	1,060	1,113	1,169	1,227	1,314	1,407
Energy Sales Revenue	454	634	830	872	916	961	1,009	1,060	1,113	1,169	1,227	1,314	1,407
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff /transfer price (US$/MWh)	33.2	44.1	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	56.1	57.2
Operating Expenses	6,425	6,146	6,496	6,867	7,261	7,679	8,123	8,594	9,095	9,628	10,195	10,797	11,439
Supply costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Own production	5,223	4,875	5,119	5,375	5,643	5,926	6,222	6,533	6,860	7,202	7,563	7,941	8,338
Diesel	*5,223*	*4,875*	*5,119*	*5,375*	*5,643*	*5,926*	*6,222*	*6,533*	*6,860*	*7,202*	*7,563*	*7,941*	*8,338*
Salaries	839	915	999	1,090	1,189	1,298	1,416	1,545	1,686	1,840	2,008	2,191	2,391
Management	*67*	*73*	*79*	*85*	*92*	*100*	*108*	*117*	*126*	*137*	*148*	*160*	*173*
Operational	*771*	*842*	*920*	*1,005*	*1,097*	*1,198*	*1,308*	*1,429*	*1,560*	*1,703*	*1,860*	*2,031*	*2,218*
Operations & Maintenance	73	80	87	95	104	113	124	135	147	161	176	192	210
Administration	27	30	34	37	40	44	48	52	57	62	68	74	80
Provisions													
Bad Debts													
Provision for Drought													
Transport Cost	263	246	258	271	284	299	313	329	346	363	381	400	420
Depreciation	52	52	52	52	52	52	52	52	52	52	52	52	52
Existing and renewals	52	52	52	52	52	52	52	52	52	52	52	52	52
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Expenses	6,478	6,198	6,548	6,919	7,313	7,731	8,175	8,647	9,148	9,680	10,247	10,850	11,491
Operating Income	(6,024)	(5,564)	(5,718)	(6,047)	(6,397)	(6,770)	(7,165)	(7,587)	(8,035)	(8,512)	(9,020)	(9,536)	(10,084)
Financial Items	(0)	(0)	(5)	(1)	(1)	(1)	(1)	(1)	0	0	0	0	0
Interest on Debt	1	1	1	1	1	1	0	0	0	0	0	0	0
Overdraft Interest													
Other Interest													
Less: IDC	(2)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(0)	(0)	(0)	(0)	(0)
Interest income	-	-	(5)	(0)	-	-	-	-	-	-	-	-	-
Profit after financial items	(6,023)	(5,564)	(5,712)	(6,047)	(6,397)	(6,769)	(7,165)	(7,586)	(8,035)	(8,512)	(9,020)	(9,536)	(10,084)
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	(6,023)	(5,564)	(5,712)	(6,047)	(6,397)	(6,769)	(7,165)	(7,586)	(8,035)	(8,512)	(9,020)	(9,536)	(10,084)
Taxes and Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Corporate Tax	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	(6,023)	(5,564)	(5,712)	(6,047)	(6,397)	(6,769)	(7,165)	(7,586)	(8,035)	(8,512)	(9,020)	(9,536)	(10,084)

152

Case = Best Achievable
Isolated Systems
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Total Revenue	1,507	1,614	1,729	1,852	1,983	2,124	2,275	2,436	2,609	2,794	2,993	3,205	3,433	3,677
Energy Sales Revenue	1,507	1,614	1,729	1,852	1,983	2,124	2,275	2,436	2,609	2,794	2,993	3,205	3,433	3,677
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions														
Other														
Average tariff/transfer price (US$/MWh)	58.4	59.5	60.7	61.9	63.2	64.4	65.7	67.0	68.4	69.8	71.1	72.6	74.0	75.5
Operating Expenses	12,121	12,848	13,623	14,448	15,327	16,265	17,266	18,333	19,473	20,690	21,990	23,380	24,866	26,454
Supply costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Own production	8,755	9,192	9,652	10,135	10,641	11,173	11,732	12,319	12,935	13,581	14,260	14,973	15,722	16,508
Diesel	*8,755*	*9,192*	*9,652*	*10,135*	*10,641*	*11,173*	*11,732*	*12,319*	*12,935*	*13,581*	*14,260*	*14,973*	*15,722*	*16,508*
Salaries	2,609	2,847	3,107	3,390	3,700	4,038	4,406	4,808	5,247	5,727	6,249	6,820	7,443	8,123
Management	*187*	*202*	*218*	*236*	*256*	*276*	*299*	*323*	*350*	*378*	*409*	*442*	*478*	*517*
Operational	*2,422*	*2,645*	*2,888*	*3,154*	*3,444*	*3,761*	*4,107*	*4,485*	*4,898*	*5,348*	*5,840*	*6,378*	*6,965*	*7,605*
Operations & Maintenance	229	250	273	298	325	355	388	424	463	505	552	602	658	718
Administration	88	96	105	114	124	136	148	162	177	193	210	230	251	273
Provisions														
Bad Debts														
Provision for Drought														
Transport Cost	441	463	486	511	536	563	591	621	652	684	718	754	792	832
Depreciation	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Existing and renewals	52	52	52	52	52	52	52	52	52	52	52	52	52	52
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Expenses	12,174	12,901	13,675	14,500	15,380	16,318	17,318	18,386	19,525	20,742	22,043	23,432	24,918	26,507
Operating Income	(10,666)	(11,286)	(11,946)	(12,648)	(13,396)	(14,194)	(15,043)	(15,949)	(16,916)	(17,948)	(19,050)	(20,227)	(21,485)	(22,830)
Financial Items	0	0	0	0	0	0	-	-	-	-	-	-	-	-
Interest on Debt	0	0	0	0	0	0	-	-	-	-	-	-	-	-
Overdraft Interest														
Other Interest														
Less: IDC	(0)	(0)	(0)	(0)	(0)	(0)	-	-	-	-	-	-	-	-
Interest income	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit after financial items	(10,667)	(11,286)	(11,946)	(12,649)	(13,397)	(14,194)	(15,043)	(15,949)	(16,916)	(17,948)	(19,050)	(20,227)	(21,485)	(22,830)
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision														
Exchange rate losses														
Profit before taxes	(10,667)	(11,286)	(11,946)	(12,649)	(13,397)	(14,194)	(15,043)	(15,949)	(16,916)	(17,948)	(19,050)	(20,227)	(21,485)	(22,830)
Taxes and Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Corporate Tax	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	(10,667)	(11,286)	(11,946)	(12,649)	(13,397)	(14,194)	(15,043)	(15,949)	(16,916)	(17,948)	(19,050)	(20,227)	(21,485)	(22,830)

153

Case = Best Achievable
Isolated Systems
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2027/28	2028/29	2029/30	2030/31
Total Revenue	3,938	4,217	4,517	4,837
Energy Sales Revenue	3,938	4,217	4,517	4,837
Other Revenue	-	-	-	-
Capital Grants & Contributions				
Other				
Average tariff /transfer price (US$/MWh)	77.0	78.6	80.1	81.7
Operating Expenses	28,154	29,974	31,922	34,009
Supply costs	-	-	-	-
Own production	17,334	18,200	19,110	20,066
Diesel	*17,334*	*18,200*	*19,110*	*20,066*
Salaries	8,864	9,674	10,558	11,522
Management	*559*	*605*	*654*	*708*
Operational	*8,305*	*9,069*	*9,903*	*10,814*
Operations & Maintenance	784	857	935	1,022
Administration	298	326	355	388
Provisions				
Bad Debts				
Provision for Drought				
Transport Cost	873	917	963	1,011
Depreciation	52	52	52	52
Existing and renewals	52	52	52	52
New Investments	-	-	-	-
Total Operating Expenses	28,207	30,026	31,974	34,061
Operating Income	(24,269)	(25,809)	(27,457)	(29,223)
Financial Items	-	-	-	-
Interest on Debt	-	-	-	-
Overdraft Interest				
Other Interest				
Less: IDC	-	-	-	-
Interest income	-	-	-	-
Profit after financial items	(24,269)	(25,809)	(27,457)	(29,223)
Other	-	-	-	-
Exceptional Item CEC Provision				
Exchange rate losses				
Profit before taxes	(24,269)	(25,809)	(27,457)	(29,223)
Taxes and Dividends	-	-	-	-
Corporate Tax	-	-	-	-
Dividends	-	-	-	-
Retained profit after taxes	(24,269)	(25,809)	(27,457)	(29,223)

Case = Best Achievable
Isolated Systems
(expressed in thousand year 2000 US$)

BALANCE SHEET	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Assets													
Current Assets	99	390	180	140	100	105	110	115	120	126	132	141	151
Cash	-	254	4	-	-	-	-	-	-	-	-	-	-
Trade debtors	94	131	172	135	95	99	104	110	115	121	127	136	145
Deferred CEC debtor													
Other debtors													
Stores	5	5	5	5	5	5	5	5	5	5	5	5	5
Net Fixed Assets	805	752	700	648	595	543	491	438	386	334	281	229	177
Existing	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-
Acc. Depreciation- existing	242	294	347	399	451	504	556	608	661	713	765	818	870
Acc. Depreciation- new	-	-	-	-	-	-	-	-	-	-	-	-	-
CWIP	-	-	-	-	-	-	-	-	-	-	-	-	-
Investments (financial)													
Total Assets	904	1,143	880	788	695	648	600	553	506	460	413	370	327
Liabilities													
Current liabilities	1,842	1,600	3,121	3,133	2,855	2,737	2,632	2,537	2,451	2,381	2,318	2,258	2,220
Accounts Payable	1,148	860	904	712	499	524	551	579	609	640	673	707	744
Other Payables	686	730	2,204	2,407	2,343	2,198	2,067	1,943	1,826	1,724	1,627	1,532	1,456
Taxes Payable	7	9	12	13	13	14	15	15	16	17	18	19	20
Consumer Deposits	-	-	-	-	-	-	-	-	-	-	-	-	-
Current portion long-term loan	1	1	1	1	1	-	-	-	-	0	-	-	-
Unpaid Debt Service													
Bank Overdraft													
Liabilities over 1 year	378	412	449	490	535	584	637	695	759	828	904	986	1,076
Existing Loans	5	4	3	2	1	-	-	-	-	-	-	-	-
New long term loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought													
Equity	(1,321)	(873)	(2,693)	(2,837)	(2,696)	(2,673)	(2,669)	(2,680)	(2,704)	(2,749)	(2,808)	(2,874)	(2,968)
Share Capital	0	0	0	0	0	0	0	0	0	0	0	0	0
Revaluation reserve	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659
Revenue reserve	(4,981)	(4,533)	(6,352)	(6,496)	(6,355)	(6,332)	(6,329)	(6,339)	(6,363)	(6,408)	(6,467)	(6,533)	(6,628)
Total Liabilities & Equity	904	1,143	880	788	695	648	600	553	506	460	413	370	327

Case = Best Achievable
Isolated Systems
(expressed in thousand year 2000 US$)

BALANCE SHEET	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Assets														
Current Assets	161	172	184	197	210	225	240	257	275	294	315	336	360	385
Cash	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trade debtors	156	167	179	191	205	219	235	252	270	289	309	331	355	380
Deferred CEC debtor														
Other debtors														
Stores	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Net Fixed Assets	124	72	20	(33)	(85)	(137)	(190)	(242)	(294)	(347)	(399)	(451)	(504)	(556)
Existing	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acc. Depreciation- existing	922	975	1,027	1,079	1,132	1,184	1,236	1,289	1,341	1,393	1,446	1,498	1,550	1,603
Acc. Depreciation- new	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CWIP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Investments (financial)														
Total Assets	285	244	204	164	125	87	51	15	(19)	(53)	(84)	(115)	(144)	(171)
Liabilities														
Current liabilities	2,188	2,129	2,163	2,201	2,245	2,293	2,313	2,414	2,520	2,630	2,746	2,867	2,994	7,304
Accounts Payable	782	822	864	909	956	1,005	1,057	1,112	1,169	1,230	1,294	1,361	1,432	1,507
Other Payables	1,384	1,284	1,274	1,266	1,260	1,257	1,223	1,267	1,313	1,360	1,409	1,460	1,513	1,568
Taxes Payable	22	23	25	27	29	31	33	35	38	40	43	46	49	53
Consumer Deposits	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Current portion long-term loan	-	-	-	-	-	-	-	-	-	-	-	-	-	4,176
Unpaid Debt Service														
Bank Overdraft														
Liabilities over 1 year	1,174	1,281	1,398	1,526	1,665	1,817	1,983	2,164	2,361	2,577	2,812	3,069	3,349	3,655
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought														
Equity	(3,076)	(3,166)	(3,358)	(3,563)	(3,784)	(4,022)	(4,245)	(4,563)	(4,900)	(5,260)	(5,643)	(6,051)	(6,487)	(11,130)
Share Capital	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Revaluation reserve	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659
Revenue reserve	(6,736)	(6,826)	(7,017)	(7,223)	(7,444)	(7,681)	(7,904)	(8,222)	(8,560)	(8,919)	(9,302)	(9,711)	(10,147)	(14,789)
Total Liabilities & Equity	285	244	204	164	125	87	51	15	(19)	(53)	(84)	(115)	(144)	(171)

Case = Best Achievable
Isolated Systems
(expressed in thousand year 2000 US$)

BALANCE SHEET	2027/28	2028/29	2029/30	2030/31
Assets				
Current Assets	412	441	472	505
Cash	-	-	-	-
Trade debtors	407	436	467	500
Deferred CEC debtor				
Other debtors				
Stores	5	5	5	5
Net Fixed Assets	(608)	(661)	(713)	(765)
Existing	1,047	1,047	1,047	1,047
New Investments	-	-	-	-
Acc. Depreciation- existing	1,655	1,707	1,760	1,812
Acc. Depreciation- new	-	-	-	-
CWIP	-	-	-	-
Investments (financial)				
Total Assets	(196)	(220)	(241)	(260)
Liabilities				
Current liabilities	3,266	3,412	3,565	3,725
Accounts Payable	1,585	1,668	1,756	1,848
Other Payables	1,624	1,683	1,744	1,807
Taxes Payable	57	61	65	70
Consumer Deposits	-	-	-	-
Current portion long-term loan	-	-	-	-
Unpaid Debt Service				
Bank Overdraft				
Liabilities over 1 year	3,989	4,353	4,751	5,185
Existing Loans	-	-	-	-
New long term loans	-	-	-	-
PRP Loans	-	-	-	-
Other Loans	-	-	-	-
Capital Grants & Contributions	-	-	-	-
Provision for drought				
Equity	(7,451)	(7,985)	(8,557)	(9,170)
Share Capital	0	0	0	0
Revaluation reserve	3,659	3,659	3,659	3,659
Revenue reserve	(11,111)	(11,644)	(12,216)	(12,829)
Total Liabilities & Equity	(196)	(220)	(241)	(260)

Case = Best Achievable
Isolated Systems
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Source of funds													
Generation from Operations													
Operating Income	(5,971)	(5,512)	(5,660)	(5,994)	(6,344)	(6,717)	(7,112)	(7,534)	(7,983)	(8,460)	(8,968)	(9,483)	(10,032)
Financial Items	(6,024)	(5,564)	(5,718)	(6,047)	(6,397)	(6,770)	(7,165)	(7,587)	(8,035)	(8,512)	(9,020)	(9,536)	(10,084)
Taxes	0	0	5	1	1	1	1	1	(0)	(0)	(0)	(0)	(0)
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital contributions	52	52	52	52	52	52	52	52	52	52	52	52	52
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources													
Capital Contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Sale of Assets													
Consumer deposits													
Loans PRP													
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	(5,971)	(5,512)	(5,660)	(5,994)	(6,344)	(6,717)	(7,112)	(7,534)	(7,983)	(8,460)	(8,968)	(9,483)	(10,032)
Application of Funds													
Investments including IDC													
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Repayment of loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing loans	2	1	1	1	1	1	-	-	-	-	-	-	-
PRP loans	2	1	1	1	1	1	-	-	-	-	-	-	-
Other New loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividend	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	2	1	1	1	1	1	-	-	-	-	-	-	-
Net In/Outflow of Funds	(5,972)	(5,513)	(5,661)	(5,996)	(6,346)	(6,717)	(7,112)	(7,534)	(7,983)	(8,460)	(8,968)	(9,483)	(10,032)

Case = Best Achievable
Isolated Systems
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Source of funds														
Generation from Operations	(10,614)	(11,234)	(11,894)	(12,596)	(13,344)	(14,141)	(14,991)	(15,897)	(16,864)	(17,896)	(18,997)	(20,175)	(21,433)	(22,778)
Operating Income	(10,666)	(11,286)	(11,946)	(12,648)	(13,396)	(14,194)	(15,043)	(15,949)	(16,916)	(17,948)	(19,050)	(20,227)	(21,485)	(22,830)
Financial Items	(0)	(0)	(0)	(0)	(0)	(0)	-	-	-	-	-	-	-	-
Taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Contributions														
Sale of Assets														
Consumer deposits														
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity														
Total sources of funds	(10,614)	(11,234)	(11,894)	(12,596)	(13,344)	(14,141)	(14,991)	(15,897)	(16,864)	(17,896)	(18,997)	(20,175)	(21,433)	(22,778)
Application of Funds														
Investments including IDC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Repayment of loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New loans														
Dividend	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net In/Outflow of Funds	(10,614)	(11,234)	(11,894)	(12,596)	(13,344)	(14,141)	(14,991)	(15,897)	(16,864)	(17,896)	(18,997)	(20,175)	(21,433)	(22,778)

159

Case = Best Achievable
Isolated Systems
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2027/28	2028/29	2029/30	2030/31
Source of funds				
Generation from Operations	(24,217)	(25,756)	(27,405)	(29,171)
Operating Income	(24,269)	(25,809)	(27,457)	(29,223)
Financial Items	-	-	-	-
Taxes	-	-	-	-
Provision for drought less Utilization	-	-	-	-
Exceptional Items	-	-	-	-
Depreciation	52	52	52	52
Capital contributions	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-
External Sources	-	-	-	-
Capital Contributions				
Sale of Assets				
Consumer deposits				
Loans PRP	-	-	-	-
Other New Loans	-	-	-	-
Unpaid Debt Service	-	-	-	-
New Equity				
Total sources of funds	(24,217)	(25,756)	(27,405)	(29,171)
Application of Funds				
Investments including IDC	-	-	-	-
PRP	-	-	-	-
Other	-	-	-	-
Repayment of loans	-	-	-	-
Existing loans	-	-	-	-
PRP loans	-	-	-	-
Other New loans				
Dividend	-	-	-	-
Total Application of Funds	-	-	-	-
Net In/Outflow of Funds	(24,217)	(25,756)	(27,405)	(29,171)

160

Case = Best Achievable
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total Revenue	32,085	36,138	38,564	39,843	39,042	37,624	37,014	36,612	36,758	36,912	37,076	37,249	37,434
Energy Sales Revenue	32,085	36,138	38,564	39,843	39,042	37,624	37,014	36,612	36,758	36,912	37,076	37,249	37,434
Sales to Wholesale Marketer	32,085	36,138	38,564	39,843	39,042	37,624	37,014	36,612	36,758	36,912	37,076	37,249	37,434
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff /transfer price (US$/MWh)	6.0	6.3	6.3	6.5	6.4	6.2	6.1	6.0	6.0	6.1	6.1	6.1	6.1
Operating Expenses	9,554	9,814	10,113	10,479	10,859	11,253	11,662	12,087	12,528	12,985	13,459	13,952	14,463
Supply costs	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
Salaries	5,836	6,044	6,259	6,482	6,712	6,952	7,200	7,457	7,723	7,999	8,285	8,582	8,889
Management	*2,597*	*2,674*	*2,755*	*2,837*	*2,922*	*3,010*	*3,100*	*3,193*	*3,289*	*3,388*	*3,490*	*3,594*	*3,702*
Operational	*3,240*	*3,369*	*3,504*	*3,644*	*3,790*	*3,942*	*4,099*	*4,263*	*4,434*	*4,611*	*4,796*	*4,987*	*5,187*
Operations & Maintenance	2,892	3,008	3,128	3,253	3,383	3,518	3,659	3,806	3,958	4,116	4,281	4,452	4,630
Administration	565	531	494	512	531	551	572	593	615	638	661	686	712
Provisions	-	-	-	-	-	-	-	-	-	-	-	-	-
Bad Debts													
Provision for Drought													
Transport Cost	261	232	232	232	232	232	232	232	232	232	232	232	232
Depreciation	8,747	9,610	10,069	10,369	10,603	10,737	10,870	11,003	11,137	11,270	11,403	11,537	11,670
Existing and renewals	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610
New Investments	1,137	1,999	2,459	2,759	2,993	3,126	3,260	3,393	3,526	3,660	3,793	3,926	4,060
Total Operating Expenses	18,301	19,424	20,182	20,848	21,462	21,990	22,532	23,090	23,664	24,255	24,863	25,488	26,133
Operating Income	13,784	16,715	18,382	18,995	17,580	15,634	14,481	13,522	13,094	12,658	12,213	11,761	11,301
Financial Items	(1,841)	(4,252)	5,859	6,573	6,219	5,539	4,905	4,328	3,961	3,430	2,922	2,413	1,977
Interest on Debt	236	320	6,124	6,840	6,485	5,804	5,171	4,565	3,985	3,454	2,946	2,437	2,001
Overdraft Interest													
Other Interest													
Less: IDC	(2,077)	(4,519)	(265)	(265)	(265)	(265)	(265)	(237)	(24)	(24)	(24)	(24)	(24)
Interest income	-	(53)	-	(1)	-	-	-	-	-	(0)	(0)	-	-
Profit after financial items	15,625	20,966	12,523	12,422	11,360	10,095	9,576	9,194	9,133	9,228	9,292	9,348	9,324
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	15,625	20,966	12,523	12,422	11,360	10,095	9,576	9,194	9,133	9,228	9,292	9,348	9,324
Taxes and Dividends	8,515	11,427	6,825	6,770	6,191	5,502	3,352	3,218	3,197	3,230	3,252	3,272	3,264
Corporate Tax	5,469	7,338	4,383	4,348	3,976	3,533	3,352	3,218	3,197	3,230	3,252	3,272	3,264
Dividends	3,047	4,088	2,442	2,422	2,215	1,969	-	-	-	-	-	-	-
Retained profit after taxes	7,109	9,540	5,698	5,652	5,169	4,593	6,224	5,976	5,936	5,998	6,040	6,076	6,061

16

Case = Best Achievable
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Total Revenue	37,629	37,836	38,057	38,290	38,539	38,802	39,082	39,379	39,694	40,028	40,382	40,757	41,155	41,576
Energy Sales Revenue	37,629	37,836	38,057	38,290	38,539	38,802	39,082	39,379	39,694	40,028	40,382	40,757	41,155	41,576
Sales to Wholesale Marketer	37,629	37,836	38,057	38,290	38,539	38,802	39,082	39,379	39,694	40,028	40,382	40,757	41,155	41,576
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions														
Other														
Average tariff /transfer price (US$/MWh)	6.2	6.2	6.2	6.3	6.3	6.4	6.4	6.5	6.5	6.6	6.6	6.7	6.7	6.8
Operating Expenses	14,993	15,543	16,114	16,707	17,322	17,960	18,623	19,311	20,025	20,765	21,534	22,332	23,161	24,021
Supply costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salaries	9,207	9,538	9,880	10,235	10,602	10,984	11,379	11,788	12,213	12,653	13,109	13,583	14,073	14,582
Management	*3,813*	*3,928*	*4,045*	*4,167*	*4,292*	*4,421*	*4,553*	*4,690*	*4,830*	*4,975*	*5,125*	*5,278*	*5,437*	*5,600*
Operational	*5,394*	*5,610*	*5,834*	*6,068*	*6,311*	*6,563*	*6,826*	*7,099*	*7,382*	*7,678*	*7,985*	*8,304*	*8,636*	*8,982*
Operations & Maintenance	4,815	5,008	5,208	5,416	5,633	5,858	6,093	6,336	6,590	6,854	7,128	7,413	7,709	8,018
Administration	738	766	794	824	854	886	920	954	990	1,027	1,065	1,105	1,146	1,189
Provisions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bad Debts														
Provision for Drought														
Transport Cost	232	232	232	232	232	232	232	232	232	232	232	232	232	232
Depreciation	11,803	11,937	12,070	12,203	12,337	12,470	12,603	12,737	12,870	13,003	13,137	13,270	13,403	13,537
Existing and renewals	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610	7,610
New Investments	4,193	4,326	4,460	4,593	4,726	4,860	4,993	5,126	5,260	5,393	5,526	5,660	5,793	5,926
Total Operating Expenses	26,796	27,480	28,184	28,910	29,659	30,430	31,226	32,047	32,895	33,769	34,671	35,602	36,564	37,558
Operating Income	10,833	10,357	9,872	9,380	8,880	8,372	7,856	7,331	6,799	6,259	5,711	5,155	4,590	4,018
Financial Items	1,553	1,011	823	639	458	281	-	-	-	-	-	-	-	-
Interest on Debt	1,577	1,035	847	663	482	305	-	-	-	-	-	-	-	-
Overdraft Interest														
Other Interest														
Less: IDC	(24)	(24)	(24)	(24)	(24)	(24)	-	-	-	-	-	-	-	-
Interest income	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit after financial items	9,279	9,346	9,050	8,741	8,422	8,091	7,856	7,331	6,799	6,259	5,711	5,155	4,590	4,018
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision														
Exchange rate losses														
Profit before taxes	9,279	9,346	9,050	8,741	8,422	8,091	7,856	7,331	6,799	6,259	5,711	5,155	4,590	4,018
Taxes and Dividends	3,248	3,271	3,167	3,059	2,948	2,832	2,749	2,566	2,380	2,191	1,999	1,804	1,607	1,406
Corporate Tax	3,248	3,271	3,167	3,059	2,948	2,832	2,749	2,566	2,380	2,191	1,999	1,804	1,607	1,406
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	6,032	6,075	5,882	5,682	5,474	5,259	5,106	4,765	4,419	4,068	3,712	3,350	2,984	2,612

162

Case = Best Achievable
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2027/28	2028/29	2029/30	2030/31
Total Revenue	34,868	35,796	36,752	37,736
Energy Sales Revenue	34,868	35,796	36,752	37,736
Sales to Wholesale Marketer	34,868	35,796	36,752	37,736
Other Revenue	-	-	-	-
Capital Grants & Contributions				
Other				
Average tariff /transfer price (US$/MWh)	5.7	5.9	6.0	6.2
Operating Expenses	24,913	25,840	26,802	27,800
Supply costs	-	-	-	-
	-	-	-	-
Salaries	15,109	15,656	16,222	16,810
Management	*5,768*	*5,941*	*6,119*	*6,303*
Operational	*9,341*	*9,715*	*10,103*	*10,508*
Operations & Maintenance	8,338	8,672	9,019	9,380
Administration	1,234	1,280	1,328	1,378
Provisions	-	-	-	-
Bad Debts				
Provision for Drought				
Transport Cost	232	232	232	232
Depreciation	6,060	6,193	6,326	6,460
Existing and renewals	-	-	-	-
New Investments	6,060	6,193	6,326	6,460
Total Operating Expenses	30,973	32,033	33,128	34,260
Operating Income	3,895	3,763	3,623	3,476
Financial Items	-	-	-	-
Interest on Debt	-	-	-	-
Overdraft Interest				
Other Interest				
Less: IDC	-	-	-	-
Interest income	-	-	-	-
Profit after financial items	3,895	3,763	3,623	3,476
Other	-	-	-	-
Exceptional Item CEC Provision				
Exchange rate losses				
Profit before taxes	3,895	3,763	3,623	3,476
Taxes and Dividends	1,363	1,317	1,268	1,217
Corporate Tax	1,363	1,317	1,268	1,217
Dividends	-	-	-	-
Retained profit after taxes	2,531	2,446	2,355	2,259

Case = Best Achievable
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

BALANCE SHEET	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Assets													
Current Assets	6,546	4,425	4,756	4,843	4,812	4,716	4,686	4,673	4,725	4,746	4,771	4,805	4,840
Cash	2,637	-	63	-	-	-	-	-	20	9	-	-	-
Trade debtors	2,637	2,970	3,170	3,275	3,209	3,092	3,042	3,009	3,021	3,034	3,047	3,062	3,077
Deferred CEC debtor													
Other debtors													
Stores	1,272	1,454	1,523	1,568	1,603	1,623	1,643	1,663	1,683	1,703	1,723	1,743	1,763
Net Fixed Assets	229,730	278,580	306,360	316,590	292,994	260,567	241,357	225,366	218,230	210,960	203,556	196,019	188,349
Existing	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003
New Investments	34,981	60,853	74,648	83,635	90,667	94,667	98,667	102,667	106,667	110,667	114,667	118,667	122,667
Acc. Depreciation- existing	34,905	42,515	50,126	57,736	65,347	72,957	80,567	88,178	95,788	103,398	111,009	118,619	126,230
Acc. Depreciation- new	1,137	3,136	5,595	8,354	11,347	14,473	17,733	21,125	24,652	28,311	32,104	36,031	40,090
CWIP	788	33,376	57,430	69,042	49,018	23,327	10,987	2,000	2,000	2,000	2,000	2,000	2,000
Investments (financial)													
Total Assets	236,276	283,005	311,115	321,433	297,806	265,282	246,042	230,039	222,954	215,706	208,327	200,824	193,190
Liabilities													
Current liabilities	619	961	5,070	5,245	4,988	4,829	4,747	4,676	4,615	4,586	425	441	458
Accounts Payable	306	310	317	329	341	354	367	381	395	410	425	441	458
Other Payables													
Taxes Payable													
Consumer Deposits													
Current portion long-term loan	313	651	4,753	4,917	4,648	4,476	4,380	4,296	4,220	4,176	-	-	-
Unpaid Debt Service													
Bank Overdraft													
Liabilities over 1 year	2,626	2,720	2,816	2,917	3,021	3,128	3,240	3,356	3,475	3,600	3,728	3,862	4,000
Existing Loans	1,181	915	650	384	119	-	-	-	-	-	-	-	-
New long term loans	26,054	49,024	56,275	54,503	49,852	45,323	40,848	36,467	32,171	27,951	23,799	20,070	16,392
PRP Loans	26,054	49,024	56,275	54,503	49,852	45,323	40,848	36,467	32,171	27,951	23,799	20,070	16,392
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160
Provision for drought	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	204,636	228,225	245,143	257,223	238,666	210,841	196,047	184,379	181,532	178,409	179,214	175,291	171,179
Share Capital	13	13	13	13	13	13	13	13	13	13	13	13	13
Revaluation reserve	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501
Revenue reserve	4,122	27,711	44,629	56,709	38,152	10,327	(4,467)	(16,135)	(18,982)	(22,105)	(21,300)	(25,223)	(29,335)
Total Liabilities & Equity	236,276	283,005	311,115	321,433	297,806	265,282	246,042	230,039	222,954	215,706	208,327	200,824	193,190

Case = Best Achievable
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

BALANCE SHEET	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Assets														
Current Assets	4,876	4,913	4,951	4,991	5,031	5,073	5,116	5,160	5,206	5,253	5,302	5,353	5,406	5,461
Cash	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trade debtors	3,093	3,110	3,128	3,147	3,168	3,189	3,212	3,237	3,262	3,290	3,319	3,350	3,383	3,417
Deferred CEC debtor														
Other debtors														
Stores	1,783	1,803	1,823	1,843	1,863	1,883	1,903	1,923	1,943	1,963	1,983	2,003	2,023	2,043
Net Fixed Assets	180,546	172,609	164,539	156,336	147,999	139,529	130,926	122,189	113,319	104,316	95,179	85,909	76,506	66,969
Existing	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003	230,003
New Investments	126,667	130,667	134,667	138,667	142,667	146,667	150,667	154,667	158,667	162,667	166,667	170,667	174,667	178,667
Acc. Depreciation- existing	133,840	141,450	149,061	156,671	164,281	171,892	179,502	187,113	194,723	202,333	209,944	217,554	225,164	232,775
Acc. Depreciation- new	44,283	48,610	53,069	57,662	62,389	67,248	72,241	77,367	82,627	88,020	93,546	99,206	104,999	110,925
CWIP	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Investments (financial)														
Total Assets	185,422	177,523	169,491	161,327	153,030	144,602	136,042	127,349	118,525	109,569	100,482	91,263	81,912	72,430
Liabilities														
Current liabilities	476	494	512	532	552	573	595	618	642	667	692	719	747	4,828
Accounts Payable	476	494	512	532	552	573	595	618	642	667	692	719	747	776
Other Payables														
Taxes Payable														
Consumer Deposits														
Current portion long-term loan	-	-	-	-	-	-	-	-	-	-	-	-	-	4,052
Unpaid Debt Service														
Bank Overdraft														
Liabilities over 1 year	4,143	4,292	4,446	4,606	4,771	4,943	5,120	5,305	5,496	5,694	5,899	6,112	6,333	6,562
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	12,760	11,303	9,859	8,429	7,011	5,604	5,604	5,604	5,604	5,604	5,604	5,604	5,604	5,604
PRP Loans	12,760	11,303	9,859	8,429	7,011	5,604	5,604	5,604	5,604	5,604	5,604	5,604	5,604	5,604
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160
Provision for drought	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	166,883	160,274	153,513	146,600	139,536	132,322	123,561	114,662	105,623	96,444	87,126	77,667	68,068	54,276
Share Capital	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Revaluation reserve	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501	200,501
Revenue reserve	(33,632)	(40,240)	(47,001)	(53,914)	(60,978)	(68,193)	(76,953)	(85,852)	(94,891)	(104,070)	(113,389)	(122,847)	(132,447)	(146,238)
Total Liabilities & Equity	185,422	177,523	169,491	161,327	153,030	144,602	136,042	127,349	118,525	109,569	100,482	91,263	81,912	72,430

165

Case = Best Achievable
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

BALANCE SHEET	2027/28	2028/29	2029/30	2030/31
Assets				
Current Assets	4,929	5,025	5,124	5,225
Cash	-	-	-	-
Trade debtors	2,866	2,942	3,021	3,102
Deferred CEC debtor				
Other debtors				
Stores	2,063	2,083	2,103	2,123
Net Fixed Assets	64,910	62,717	60,390	57,931
Existing	230,003	230,003	230,003	230,003
New Investments	182,667	186,667	190,667	194,667
Acc. Depreciation- existing	232,775	232,775	232,775	232,775
Acc. Depreciation- new	116,985	123,178	129,504	135,964
CWIP	2,000	2,000	2,000	2,000
Investments (financial)				
Total Assets	69,839	67,742	65,514	63,156
Liabilities				
Current liabilities	806	837	870	903
Accounts Payable	806	837	870	903
Other Payables				
Taxes Payable				
Consumer Deposits				
Current portion long-term loan	-	-	-	-
Unpaid Debt Service				
Bank Overdraft				
Liabilities over 1 year	6,799	7,045	7,300	7,565
Existing Loans	-	-	-	-
New long term loans	5,604	5,604	5,604	5,604
PRP Loans	5,604	5,604	5,604	5,604
Other Loans	-	-	-	-
Capital Grants & Contributions	1,160	1,160	1,160	1,160
Provision for drought	-	-	-	-
Equity	55,470	53,096	50,580	47,923
Share Capital	13	13	13	13
Revaluation reserve	200,501	200,501	200,501	200,501
Revenue reserve	(145,045)	(147,418)	(149,934)	(152,591)
Total Liabilities & Equity	69,839	67,742	65,514	63,156

Case = Best Achievable
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Source of funds													
Generation from Operations	18,903	23,238	18,209	18,443	17,988	17,299	17,094	16,979	17,073	17,268	17,443	17,613	17,731
Operating Income	13,784	16,715	18,382	18,995	17,580	15,634	14,481	13,522	13,094	12,658	12,213	11,761	11,301
Financial Items	1,841	4,252	(5,859)	(6,573)	(6,219)	(5,539)	(4,905)	(4,328)	(3,961)	(3,430)	(2,922)	(2,413)	(1,977)
Taxes	(5,469)	(7,338)	(4,383)	(4,348)	(3,976)	(3,533)	(3,352)	(3,218)	(3,197)	(3,230)	(3,252)	(3,272)	(3,264)
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	8,747	9,610	10,069	10,369	10,603	10,737	10,870	11,003	11,137	11,270	11,403	11,537	11,670
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	25,549	23,018	7,638	2,716	-	-	-	-	-	-	-	-	-
Capital Contributions													
Sale of Assets													
Consumer deposits													
Loans PRP	25,549	23,018	7,638	2,716	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity													
Total sources of funds	44,452	46,256	25,847	21,159	17,988	17,299	17,094	16,979	17,073	17,268	17,443	17,613	17,731
Application of Funds													
Investments including IDC	34,103	25,873	13,795	8,987	7,031	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
PRP	32,527	24,175	12,340	8,987	-	-	-	-	-	-	-	-	-
Other	1,576	1,698	1,455	-	7,031	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Repayment of loans	340	313	651	4,753	4,917	4,648	4,476	4,380	4,296	4,220	4,152	3,729	3,678
Existing loans	340	265	265	265	265	119	-	-	-	-	-	-	-
PRP loans	-	48	386	4,488	4,651	4,529	4,476	4,380	4,296	4,220	4,152	3,729	3,678
Other New loans													
Dividend	-	3,047	4,088	2,442	2,422	2,215	1,969	-	-	-	-	-	-
Total Application of Funds	34,443	29,233	18,535	16,182	14,370	10,863	10,444	8,380	8,296	8,220	8,152	7,729	7,678
Net In/Outflow of Funds	10,009	17,023	7,312	4,977	3,617	6,436	6,650	8,599	8,777	9,048	9,291	9,884	10,053

167

Case = Best Achievable
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Source of funds														
Generation from Operations	17,835	18,011	17,952	17,885	17,811	17,729	17,709	17,502	17,289	17,072	16,849	16,620	16,387	16,148
Operating Income	10,833	10,357	9,872	9,380	8,880	8,372	7,856	7,331	6,799	6,259	5,711	5,155	4,590	4,018
Financial Items	(1,553)	(1,011)	(823)	(639)	(458)	(281)	-	-	-	-	-	-	-	-
Taxes	(3,248)	(3,271)	(3,167)	(3,059)	(2,948)	(2,832)	(2,749)	(2,566)	(2,380)	(2,191)	(1,999)	(1,804)	(1,607)	(1,406)
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	11,803	11,937	12,070	12,203	12,337	12,470	12,603	12,737	12,870	13,003	13,137	13,270	13,403	13,537
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Contributions														
Sale of Assets														
Consumer deposits														
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity														
Total sources of funds	17,835	18,011	17,952	17,885	17,811	17,729	17,709	17,502	17,289	17,072	16,849	16,620	16,387	16,148
Application of Funds														
Investments including IDC	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Repayment of loans	3,632	1,458	1,444	1,430	1,418	1,407	-	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	3,632	1,458	1,444	1,430	1,418	1,407	-	-	-	-	-	-	-	-
Other New loans														
Dividend	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	7,632	5,458	5,444	5,430	5,418	5,407	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Net In/Outflow of Funds	10,203	12,554	12,509	12,455	12,393	12,322	13,709	13,502	13,289	13,072	12,849	12,620	12,387	12,148

168

Case = Best Achievable
Growth = Medium
Generation
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2027/28	2028/29	2029/30	2030/31
Source of funds				
Generation from Operations	8,591	8,639	8,682	8,719
Operating Income	3,895	3,763	3,623	3,476
Financial Items	-	-	-	-
Taxes	(1,363)	(1,317)	(1,268)	(1,217)
Provision for drought less Utilization	-	-	-	-
Exceptional Items	-	-	-	-
Depreciation	6,060	6,193	6,326	6,460
Capital contributions	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-
External Sources	-	-	-	-
Capital Contributions				
Sale of Assets				
Consumer deposits				
Loans PRP	-	-	-	-
Other New Loans	-	-	-	-
Unpaid Debt Service	-	-	-	-
New Equity				
Total sources of funds	8,591	8,639	8,682	8,719
Application of Funds				
Investments including IDC	4,000	4,000	4,000	4,000
PRP	-	-	-	-
Other	4,000	4,000	4,000	4,000
Repayment of loans	-	-	-	-
Existing loans	-	-	-	-
PRP loans	-	-	-	-
Other New loans				
Dividend	-	-	-	-
Total Application of Funds	4,000	4,000	4,000	4,000
Net In/Outflow of Funds	4,591	4,639	4,682	4,719

Case = Best Achievable
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total Revenue	45,594	48,092	49,418	50,760	49,905	49,631	49,671	49,929	50,310	50,702	51,105	51,520	51,949
Energy Sales Revenue	45,594	48,092	49,418	50,760	49,905	49,631	49,671	49,929	50,310	50,702	51,105	51,520	51,949
Sales to Wholesale Marketer	45,112	47,609	48,933	50,279	49,420	49,026	49,030	49,034	49,135	49,338	49,545	49,075	49,071
SAPP Wheeling	482	483	485	481	485	606	641	894	1,175	1,364	1,559	2,446	2,878
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff/transfer price (US$/MWh)	6.3	6.4	6.3	6.4	6.3	6.3	6.3	6.3	6.2	6.1	6.0	5.8	5.7
Operating Expenses	10,521	10,780	11,047	11,469	11,907	12,362	12,835	13,326	13,835	14,365	14,915	15,486	16,079
Supply costs	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
Salaries	4,244	4,397	4,556	4,720	4,890	5,067	5,250	5,440	5,637	5,841	6,053	6,272	6,500
Management	*1,684*	*1,734*	*1,786*	*1,840*	*1,895*	*1,952*	*2,011*	*2,071*	*2,133*	*2,197*	*2,263*	*2,331*	*2,401*
Operational	*2,560*	*2,663*	*2,769*	*2,880*	*2,995*	*3,115*	*3,240*	*3,369*	*3,504*	*3,644*	*3,790*	*3,941*	*4,099*
Operations & Maintenance	4,266	4,436	4,614	4,798	4,990	5,190	5,397	5,613	5,838	6,071	6,314	6,567	6,829
Administration	445	319	187	194	202	209	217	226	234	243	252	262	272
Provisions	-	-	-	-	-	-	-	-	-	-	-	-	-
Bad Debts													
Provision for Drought													
Transport Cost	1,566	1,627	1,691	1,757	1,825	1,896	1,970	2,047	2,127	2,210	2,296	2,385	2,478
Depreciation	8,820	9,275	9,579	9,895	10,045	10,195	10,345	10,495	10,645	10,795	10,945	11,095	11,245
Existing and renewals	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201
New Investments	618	1,073	1,378	1,694	1,844	1,994	2,144	2,294	2,444	2,594	2,744	2,894	3,044
Total Operating Expenses	19,341	20,054	20,626	21,364	21,952	22,557	23,180	23,821	24,480	25,160	25,860	26,581	27,324
Operating Income	26,253	28,037	28,792	29,396	27,953	27,074	26,491	26,108	25,830	25,542	25,245	24,940	24,625
Financial Items	(3,963)	(2,011)	(4,937)	(5,406)	(1,466)	(3,080)	4,281	5,268	4,972	4,554	4,128	3,740	3,697
Interest on Debt	2,496	848	531	517	465	487	4,803	5,790	5,494	5,077	4,651	4,206	3,745
Overdraft Interest													
Other Interest													
Less: IDC	(6,458)	(2,784)	(5,469)	(5,914)	(1,928)	(3,567)	(523)	(523)	(523)	(523)	(523)	(466)	(47)
Interest income	-	(75)	-	(9)	(2)	-	-	-	-	-	-	(0)	(0)
Profit after financial items	30,216	30,048	33,729	34,802	29,418	30,154	22,210	20,841	20,858	20,988	21,117	21,200	20,928
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	30,216	30,048	33,729	34,802	29,418	30,154	22,210	20,841	20,858	20,988	21,117	21,200	20,928
Taxes and Dividends	10,576	10,517	11,805	18,967	10,296	10,554	7,774	7,294	7,300	7,346	7,391	7,420	7,325
Corporate Tax	10,576	10,517	11,805	12,181	10,296	10,554	7,774	7,294	7,300	7,346	7,391	7,420	7,325
Dividends	-	-	-	6,786	-	-	-	-	-	-	-	-	-
Retained profit after taxes	19,640	19,531	21,924	15,835	19,122	19,600	14,437	13,546	13,558	13,642	13,726	13,780	13,603

170

Case = Best Achievable
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Total Revenue	52,391	54,068	54,202	54,676	55,167	55,677	56,207	56,757	57,330	57,926	58,547	59,194	59,868	60,570
Energy Sales Revenue	52,391	54,068	54,202	54,676	55,167	55,677	56,207	56,757	57,330	57,926	58,547	59,194	59,868	60,570
Sales to Wholesale Marketer	49,680	51,258	51,510	51,772	52,355	53,002	53,477	54,016	54,589	55,185	55,806	56,453	57,127	57,829
SAPP Wheeling	2,711	2,810	2,692	2,904	2,812	2,675	2,729	2,741	2,741	2,741	2,741	2,741	2,741	2,741
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions														
Other														
Average tariff /transfer price (US$/MWh)	5.8	6.1	6.2	6.4	6.6	6.8	6.9	6.9	7.0	7.1	7.2	7.3	7.4	7.5
Operating Expenses	16,695	17,335	18,000	18,690	19,407	20,152	20,925	21,729	22,563	23,430	24,331	25,266	26,238	27,247
Supply costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salaries	6,736	6,980	7,234	7,497	7,770	8,053	8,347	8,651	8,967	9,294	9,633	9,986	10,351	10,729
Management	*2,473*	*2,547*	*2,623*	*2,702*	*2,783*	*2,867*	*2,953*	*3,041*	*3,132*	*3,226*	*3,323*	*3,423*	*3,526*	*3,631*
Operational	*4,263*	*4,433*	*4,611*	*4,795*	*4,987*	*5,187*	*5,394*	*5,610*	*5,834*	*6,068*	*6,310*	*6,563*	*6,825*	*7,098*
Operations & Maintenance	7,102	7,387	7,682	7,989	8,309	8,641	8,987	9,346	9,720	10,109	10,513	10,934	11,371	11,826
Administration	282	293	304	316	328	341	354	367	381	396	411	427	443	460
Provisions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bad Debts														
Provision for Drought														
Transport Cost	2,575	2,675	2,779	2,887	3,000	3,117	3,238	3,364	3,495	3,632	3,773	3,920	4,073	4,231
Depreciation	11,395	11,814	11,964	12,114	12,264	12,414	12,564	12,714	12,864	13,014	13,164	13,314	13,464	13,614
Existing and renewals	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201	8,201
New Investments	3,194	3,612	3,762	3,912	4,062	4,212	4,362	4,512	4,662	4,812	4,962	5,112	5,262	5,412
Total Operating Expenses	28,090	29,148	29,963	30,803	31,670	32,565	33,489	34,442	35,427	36,444	37,494	38,580	39,701	40,861
Operating Income	24,301	24,919	24,239	23,872	23,497	23,112	22,718	22,315	21,903	21,483	21,053	20,614	20,166	19,709
Financial Items	3,276	2,850	2,399	2,004	1,603	1,147	945	744	542	340	-	-	-	-
Interest on Debt	3,324	2,898	2,449	2,051	1,651	1,194	993	791	589	387	-	-	-	-
Overdraft Interest														
Other Interest														
Less: IDC	(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)	-	-	-	-
Interest income	(0)	(0)	(2)	-	(0)	-	-	-	-	-	-	-	-	-
Profit after financial items	21,025	22,069	21,840	21,868	21,893	21,965	21,772	21,571	21,362	21,143	21,053	20,614	20,166	19,709
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision														
Exchange rate losses														
Profit before taxes	*21,025*	*22,069*	*21,840*	*21,868*	*21,893*	*21,965*	*21,772*	*21,571*	*21,362*	*21,143*	*21,053*	*20,614*	*20,166*	*19,709*
Taxes and Dividends	7,359	7,724	7,644	7,654	7,663	7,688	7,620	7,550	7,477	7,400	7,368	7,215	7,058	6,898
Corporate Tax	7,359	7,724	7,644	7,654	7,663	7,688	7,620	7,550	7,477	7,400	7,368	7,215	7,058	6,898
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	13,666	14,345	14,196	14,214	14,231	14,277	14,152	14,021	13,885	13,743	13,684	13,399	13,108	12,811

171

Case = Best Achievable
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2027/28	2028/29	2029/30	2030/31
Total Revenue	61,303	62,067	62,864	63,697
Energy Sales Revenue	61,303	62,067	62,864	63,697
Sales to Wholesale Marketer	58,562	59,326	60,123	60,956
SAPP Wheeling	2,741	2,741	2,741	2,741
Other Revenue	-	-	-	-
Capital Grants & Contributions				
Other				
Average tariff/transfer price (US$/MWh)	7.6	7.5	7.4	7.3
Operating Expenses	28,296	29,385	30,516	31,691
Supply costs	-	-	-	-
	-	-	-	-
Salaries	11,122	11,530	11,953	12,391
Management	*3,740*	*3,852*	*3,968*	*4,087*
Operational	*7,382*	*7,677*	*7,984*	*8,304*
Operations & Maintenance	12,299	12,791	13,303	13,835
Administration	478	496	515	535
Provisions	-	-	-	-
Bad Debts				
Provision for Drought				
Transport Cost	4,396	4,568	4,745	4,930
Depreciation	13,764	13,914	14,064	14,214
Existing and renewals	8,201	8,201	8,201	8,201
New Investments	5,562	5,712	5,862	6,012
Total Operating Expenses	42,059	43,298	44,580	45,905
Operating Income	19,243	18,769	18,285	17,792
Financial Items	-	-	-	-
Interest on Debt	-	-	-	-
Overdraft Interest				
Other Interest				
Less: IDC	-	-	-	-
Interest income	-	-	-	-
Profit after financial items	19,243	18,769	18,285	17,792
Other	-	-	-	-
Exceptional Item CEC Provision				
Exchange rate losses				
Profit before taxes	19,243	18,769	18,285	17,792
Taxes and Dividends	6,735	6,569	6,400	6,227
Corporate Tax	6,735	6,569	6,400	6,227
Dividends	-	-	-	-
Retained profit after taxes	12,508	12,200	11,885	11,565

Case = Best Achievable
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

BALANCE SHEET	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Assets													
Current Assets	9,787	6,432	7,037	6,876	6,735	6,742	6,775	6,827	6,888	6,950	7,037	7,100	7,166
Cash	3,747	-	436	101	-	-	-	-	-	-	24	23	24
Trade debtors	3,747	3,953	4,062	4,172	4,102	4,079	4,083	4,104	4,135	4,167	4,200	4,235	4,270
Deferred CEC debtor													
Other debtors													
Stores	2,292	2,479	2,540	2,603	2,633	2,663	2,693	2,723	2,753	2,783	2,813	2,843	2,873
Net Fixed Assets	437,554	467,287	479,861	489,938	465,883	451,238	441,516	435,139	430,494	425,700	420,755	415,660	410,415
Existing	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818
New Investments	24,726	42,935	55,116	67,742	73,742	79,742	85,742	91,742	97,742	103,742	109,742	115,742	121,742
Acc. Depreciation- existing	41,974	50,176	58,377	66,578	74,780	82,981	91,183	99,384	107,585	115,787	123,988	132,189	140,391
Acc. Depreciation- new	618	1,692	3,069	4,763	6,607	8,600	10,744	13,037	15,481	18,074	20,818	23,711	26,755
CWIP	2,602	23,401	33,373	40,719	20,708	10,259	4,882	3,000	3,000	3,000	3,000	3,000	3,000
Investments (financial)													
Total Assets	447,341	473,719	486,898	496,814	472,617	457,980	448,292	441,966	437,382	432,650	427,791	422,760	417,581
Liabilities													
Current liabilities	2,153	2,020	5,352	5,534	5,303	5,191	6,337	6,650	6,641	6,650	2,542	2,483	2,422
Accounts Payable	516	525	534	555	577	600	623	648	674	701	728	757	787
Other Payables	1,080	685	623	637	642	667	1,765	2,032	1,980	1,897	1,813	1,726	1,635
Taxes Payable													
Consumer Deposits													
Current portion long-term loan	557	811	4,196	4,343	4,084	3,924	3,948	3,969	3,988	4,052	-	-	-
Unpaid Debt Service													
Bank Overdraft													
Liabilities over 1 year	1,910	1,979	2,050	2,124	2,201	2,280	2,363	2,448	2,537	2,628	2,724	2,822	2,925
Existing Loans	2,324	1,802	1,279	757	234	-	-	-	-	-	-	-	-
New long term loans	19,028	35,472	40,890	39,440	35,620	31,769	27,845	23,897	19,928	15,940	11,935	8,271	4,595
PRP Loans	19,028	35,472	40,890	39,440	35,620	31,769	27,845	23,897	19,928	15,940	11,935	8,271	4,595
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285
Provision for drought	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	419,641	430,161	435,042	446,676	426,975	416,455	409,463	406,687	405,992	405,147	408,306	406,898	405,355
Share Capital	26	26	26	26	26	26	26	26	26	26	26	26	26
Revaluation reserve	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493
Revenue reserve	(13,879)	(3,359)	1,522	13,156	(6,545)	(17,065)	(24,057)	(26,833)	(27,527)	(28,373)	(25,214)	(26,622)	(28,165)
Total Liabilities & Equity	447,341	473,719	486,898	496,814	472,617	457,980	448,292	441,966	437,382	432,650	427,791	422,760	417,581

173

Case = Best Achievable
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

BALANCE SHEET	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Assets														
Current Assets	7,234	7,542	7,472	7,550	7,611	7,683	7,756	7,832	7,909	7,988	8,069	8,152	8,237	8,325
Cash	25	111	-	10	-	-	-	-	-	-	-	-	-	-
Trade debtors	4,306	4,444	4,455	4,494	4,534	4,576	4,620	4,665	4,712	4,761	4,812	4,865	4,921	4,978
Deferred CEC debtor														
Other debtors														
Stores	2,903	2,987	3,017	3,047	3,077	3,107	3,137	3,167	3,197	3,227	3,257	3,287	3,317	3,347
Net Fixed Assets	405,020	415,322	403,987	397,873	391,610	385,196	378,633	371,919	365,056	358,042	350,879	343,565	336,102	328,488
Existing	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818	452,818
New investments	127,742	144,486	150,486	156,486	162,486	168,486	174,486	180,486	186,486	192,486	198,486	204,486	210,486	216,486
Acc. Depreciation- existing	148,592	156,793	164,995	173,196	181,397	189,599	197,800	206,002	214,203	222,404	230,606	238,807	247,008	255,210
Acc. Depreciation- new	29,949	33,561	37,323	41,235	45,297	49,509	53,872	58,384	63,046	67,858	72,820	77,932	83,195	88,607
CWIP	3,000	8,372	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Investments (financial)														
Total Assets	412,254	422,864	411,458	405,423	399,221	392,879	386,389	379,751	372,964	366,030	358,947	351,717	344,339	336,813
Liabilities														
Current liabilities	2,374	2,326	2,275	2,239	2,204	2,159	2,179	2,203	2,229	2,258	2,244	2,329	2,418	2,511
Accounts Payable	819	851	885	920	956	994	1,034	1,075	1,118	1,162	1,208	1,256	1,306	1,358
Other Payables	1,555	1,475	1,390	1,319	1,248	1,164	1,145	1,128	1,111	1,096	1,036	1,073	1,113	1,153
Taxes Payable														
Consumer Deposits														
Current portion long-term loan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service														
Bank Overdraft														
Liabilities over 1 year	3,031	3,141	3,255	3,374	3,497	3,624	3,756	3,893	4,035	4,182	4,335	4,493	4,658	4,828
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	907	(716)	(2,340)	(3,964)	(5,589)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)
PRP Loans	907	(716)	(2,340)	(3,964)	(5,589)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)	(7,215)
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285	2,285
Provision for drought	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	403,658	415,829	405,984	401,491	396,824	392,027	385,384	378,586	371,631	364,520	357,299	349,824	342,193	334,404
Share Capital	26	26	26	26	26	26	26	26	26	26	26	26	26	26
Revaluation reserve	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493	433,493
Revenue reserve	(29,862)	(17,691)	(27,536)	(32,029)	(36,696)	(41,493)	(48,136)	(54,934)	(61,889)	(69,000)	(76,221)	(83,695)	(91,327)	(99,116)
Total Liabilities & Equity	412,254	422,864	411,458	405,423	399,221	392,879	386,389	379,751	372,964	366,030	358,947	351,717	344,339	336,813

174

Case = Best Achievable
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

BALANCE SHEET	2027/28	2028/29	2029/30	2030/31
Assets				
Current Assets	8,415	8,508	8,603	8,702
Cash	-	-	-	-
Trade debtors	5,039	5,101	5,167	5,235
Deferred CEC debtor				
Other debtors				
Stores	3,377	3,407	3,437	3,467
Net Fixed Assets	320,725	312,811	304,747	296,534
Existing	452,818	452,818	452,818	452,818
New Investments	222,486	228,486	234,486	240,486
Acc. Depreciation- existing	263,411	271,612	279,814	288,015
Acc. Depreciation- new	94,169	99,881	105,743	111,755
CWIP	3,000	3,000	3,000	3,000
Investments (financial)				
Total Assets	329,140	321,319	313,351	305,236
Liabilities				
Current liabilities	2,607	2,707	2,811	2,918
Accounts Payable	1,412	1,468	1,526	1,586
Other Payables	1,196	1,239	1,285	1,332
Taxes Payable				
Consumer Deposits				
Current portion long-term loan	-	-	-	-
Unpaid Debt Service				
Bank Overdraft				
Liabilities over 1 year	5,005	5,188	5,379	5,576
Existing Loans	-	-	-	-
New long term loans	(7,215)	(7,215)	(7,215)	(7,215)
PRP Loans	(7,215)	(7,215)	(7,215)	(7,215)
Other Loans	-	-	-	-
Capital Grants & Contributions	2,285	2,285	2,285	2,285
Provision for drought	-	-	-	-
Equity	326,458	318,354	310,092	301,672
Share Capital	26	26	26	26
Revaluation reserve	433,493	433,493	433,493	433,493
Revenue reserve	(107,062)	(115,166)	(123,428)	(131,848)
Total Liabilities & Equity	329,140	321,319	313,351	305,236

175

Case = Best Achievable
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Source of funds													
Generation from Operations	28,460	28,806	31,503	32,516	29,167	29,795	24,782	24,041	24,203	24,437	24,671	24,875	24,848
Operating Income	26,253	28,037	28,792	29,396	27,953	27,074	26,491	26,108	25,830	25,542	25,245	24,940	24,625
Financial Items	3,963	2,011	4,937	5,406	1,466	3,080	(4,281)	(5,268)	(4,972)	(4,554)	(4,128)	(3,740)	(3,697)
Taxes	(10,576)	(10,517)	(11,805)	(12,181)	(10,296)	(10,554)	(7,774)	(7,294)	(7,300)	(7,346)	(7,391)	(7,420)	(7,325)
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	8,820	9,275	9,579	9,895	10,045	10,195	10,345	10,495	10,645	10,795	10,945	11,095	11,245
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	18,524	16,478	5,706	2,223	-	-	-	-	-	-	-	-	-
Capital Contributions													
Sale of Assets													
Consumer deposits													
Loans PRP	18,524	16,478	5,706	2,223	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity													
Total sources of funds	46,983	45,284	37,209	34,739	29,167	29,795	24,782	24,041	24,203	24,437	24,671	24,875	24,848
Application of Funds													
Investments including IDC	24,726	18,209	12,181	12,626	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
PRP	19,521	10,450	5,376	1,882	-	-	-	-	-	-	-	-	-
Other	5,205	7,760	6,804	10,744	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Repayment of loans	669	557	811	4,196	4,343	4,084	3,924	3,948	3,969	3,988	4,005	3,664	3,677
Existing loans	669	523	523	523	523	234	-	-	-	-	-	-	-
PRP loans	-	34	288	3,674	3,820	3,850	3,924	3,948	3,969	3,988	4,005	3,664	3,677
Other New loans													
Dividend	-	-	-	-	6,786	-	-	-	-	-	-	-	-
Total Application of Funds	25,395	18,766	12,992	16,822	17,129	10,084	9,924	9,948	9,969	9,988	10,005	9,664	9,677
Net In/Outflow of Funds	21,589	26,518	24,218	17,917	12,038	19,711	14,857	14,093	14,234	14,449	14,666	15,211	15,171

176

Case = Best Achievable
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Source of funds														
Generation from Operations	25,061	26,158	26,160	26,328	26,494	26,691	26,716	26,735	26,749	26,756	26,848	26,713	26,571	26,425
Operating Income	24,301	24,919	24,239	23,872	23,497	23,112	22,718	22,315	21,903	21,483	21,053	20,614	20,166	19,709
Financial Items	(3,276)	(2,850)	(2,399)	(2,004)	(1,603)	(1,147)	(945)	(744)	(542)	(340)	-	-	-	-
Taxes	(7,359)	(7,724)	(7,644)	(7,654)	(7,663)	(7,688)	(7,620)	(7,550)	(7,477)	(7,400)	(7,368)	(7,215)	(7,058)	(6,898)
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	11,395	11,814	11,964	12,114	12,264	12,414	12,564	12,714	12,864	13,014	13,164	13,314	13,464	13,614
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Contributions														
Sale of Assets														
Consumer deposits														
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity														
Total sources of funds	25,061	26,158	26,160	26,328	26,494	26,691	26,716	26,735	26,749	26,756	26,848	26,713	26,571	26,425
Application of Funds														
Investments including IDC	6,000	16,744	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	6,000	16,744	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Repayment of loans	3,688	1,623	1,624	1,624	1,625	1,626	-	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	3,688	1,623	1,624	1,624	1,625	1,626	-	-	-	-	-	-	-	-
Other New loans														
Dividend	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	9,688	18,367	7,624	7,624	7,625	7,626	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Net In/Outflow of Funds	15,373	7,792	18,536	18,704	18,869	19,065	20,716	20,735	20,749	20,756	20,848	20,713	20,571	20,425

177

Case = Best Achievable
Growth = Medium
Transmission
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2027/28	2028/29	2029/30	2030/31
Source of funds				
Generation from Operations	26,272	26,113	25,949	25,778
Operating Income	19,243	18,769	18,285	17,792
Financial Items	-	-	-	-
Taxes	(6,735)	(6,569)	(6,400)	(6,227)
Provision for drought less Utilization	-	-	-	-
Exceptional Items	-	-	-	-
Depreciation	13,764	13,914	14,064	14,214
Capital contributions	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-
External Sources	-	-	-	-
Capital Contributions				
Sale of Assets				
Consumer deposits				
Loans PRP	-	-	-	-
Other New Loans	-	-	-	-
Unpaid Debt Service	-	-	-	-
New Equity				
Total sources of funds	26,272	26,113	25,949	25,778
Application of Funds				
Investments including IDC	6,000	6,000	6,000	6,000
PRP	-	-	-	-
Other	6,000	6,000	6,000	6,000
Repayment of loans	-	-	-	-
Existing loans	-	-	-	-
PRP loans	-	-	-	-
Other New loans				
Dividend	-	-	-	-
Total Application of Funds	6,000	6,000	6,000	6,000
Net In/Outflow of Funds	20,272	20,113	19,949	19,778

178

Case = Best Achievable
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total Revenue	109,247	115,928	124,958	126,157	125,607	125,383	124,117	122,536	122,798	130,041	138,668	156,259	172,297
Energy Sales Revenue	109,247	115,928	124,958	126,157	125,607	125,383	124,117	122,536	122,798	130,041	138,668	156,259	172,297
ZESCO Distribution	40,147	41,872	45,415	46,184	45,545	45,425	46,039	44,515	46,093	51,943	59,525	77,116	93,153
CEC Sales	69,100	70,139	71,054	71,846	72,514	72,452	71,971	75,312	76,706	78,099	79,143	79,143	79,143
Exports	-	3,917	8,488	8,127	7,548	7,505	6,108	2,708	-	-	-	-	-
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff to ZESCO Distribution	9.4	10.9	12.4	12.7	12.4	11.8	11.5	10.7	10.6	11.5	12.8	15.9	18.6
-													
Operating Expenses	93,108	98,304	102,241	105,136	101,876	100,634	102,616	102,812	105,574	111,081	120,121	140,277	157,169
Supply costs	92,926	96,122	100,059	102,948	101,682	100,435	100,411	100,601	103,357	110,857	119,891	138,039	154,924
KNBC	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*
Outside Power Purchases	*3,429*	-	-	-	-	-	-	-	*1,916*	*8,474*	*16,581*	*34,466*	*50,607*
CEC Wheeling	*7,500*	*7,575*	*7,763*	*8,026*	*8,420*	*8,985*	*9,567*	*10,155*	*10,748*	*11,332*	*11,889*	*12,449*	*13,013*
ZESCO Generation	*32,085*	*36,138*	*38,564*	*39,843*	*39,042*	*37,624*	*37,014*	*36,612*	*36,758*	*36,912*	*37,076*	*37,249*	*37,434*
ZESCO Transmission	*45,112*	*47,609*	*48,933*	*50,279*	*49,420*	*49,026*	*49,030*	*49,034*	*49,135*	*49,338*	*49,545*	*49,075*	*49,071*
Salaries	134	138	142	146	151	155	160	165	170	175	180	185	191
Management	*134*	*138*	*142*	*146*	*151*	*155*	*160*	*165*	*170*	*175*	*180*	*185*	*191*
Operational													
Operations & Maintenance	-	-	-	-	-	-	-	-	-	-	-	-	-
Administration	48	44	40	41	42	44	45	46	48	49	51	52	54
Provisions	-	2,000	2,000	2,000	-	-	2,000	2,000	2,000	-	-	2,000	2,000
Bad Debts	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for Drought	-	*2,000*	*2,000*	*2,000*	-	-	*2,000*	*2,000*	*2,000*	-	-	*2,000*	*2,000*
Transport Cost	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing and renewals	-	-	-	-	-	-	-	-	-	-	-	-	-
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Expenses	93,108	98,304	102,241	105,136	101,876	100,634	102,616	102,812	105,574	111,081	120,121	140,277	157,169
Operating Income	16,139	17,624	22,716	21,021	23,731	24,749	21,501	19,723	17,224	18,961	18,547	15,982	15,128
Financial Items	-	(675)	(907)	(1,180)	(1,421)	(1,659)	(1,902)	(2,146)	(2,380)	(2,596)	(2,810)	(3,017)	(3,251)
Interest on Debt													
Overdraft Interest													
Other Interest													
Less: IDC													
Interest income	-	(675)	(907)	(1,180)	(1,421)	(1,659)	(1,902)	(2,146)	(2,380)	(2,596)	(2,810)	(3,017)	(3,251)
Profit after financial items	16,139	18,299	23,623	22,201	25,152	26,407	23,403	21,870	19,604	21,557	21,357	18,999	18,378
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	16,139	18,299	23,623	22,201	25,152	26,407	23,403	21,870	19,604	21,557	21,357	18,999	18,378
Taxes and Dividends	8,796	9,973	12,875	12,100	13,708	14,392	12,755	11,919	10,684	11,748	11,640	10,355	10,016
Corporate Tax	5,649	6,405	8,268	7,770	8,803	9,243	8,191	7,654	6,861	7,545	7,475	6,650	6,432
Dividends	3,147	3,568	4,607	4,329	4,905	5,149	4,564	4,265	3,823	4,204	4,165	3,705	3,584
Retained profit after taxes	7,343	8,326	10,749	10,101	11,444	12,015	10,648	9,951	8,920	9,808	9,717	8,645	8,362

179

Case = Best Achievable
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Total Revenue	162,012	153,809	142,907	134,978	125,218	116,266	118,949	180,248	171,159	161,996	152,760	143,447	134,059	124,592
Energy Sales Revenue	162,012	153,809	142,907	134,978	125,218	116,266	118,949	180,248	171,159	161,996	152,760	143,447	134,059	124,592
ZESCO Distribution	88,909	87,628	83,649	82,642	79,805	77,775	81,543	102,639	104,044	105,493	106,989	108,534	110,131	111,782
CEC Sales	73,103	66,180	59,258	52,335	45,413	38,491	31,568	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	5,837	77,609	67,115	56,503	45,770	34,913	23,928	12,811
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions														
Other														
Average tariff to ZESCO Distribution	17.1	16.3	15.1	14.5	13.5	12.8	13.0	15.9	15.7	15.4	15.2	15.0	14.8	14.7
-														
Operating Expenses	149,625	143,052	134,648	131,184	123,862	117,227	114,758	116,207	119,715	121,271	122,879	122,540	124,258	126,035
Supply costs	147,373	142,793	134,380	128,909	121,578	114,935	114,457	115,897	117,395	118,942	120,540	122,191	123,899	125,665
KNBC	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*	*4,800*
Outside Power Purchases	*41,682*	*34,743*	*25,280*	*18,730*	*9,981*	*1,833*	-	-	-	-	-	-	-	-
CEC Wheeling	*13,582*	*14,155*	*14,733*	*15,316*	*15,905*	*16,498*	*17,097*	*17,702*	*18,313*	*18,929*	*19,552*	*20,182*	*20,818*	*21,461*
ZESCO Generation	*37,629*	*37,836*	*38,057*	*38,290*	*38,539*	*38,802*	*39,082*	*39,379*	*39,694*	*40,028*	*40,382*	*40,757*	*41,155*	*41,576*
ZESCO Transmission	*49,680*	*51,258*	*51,510*	*51,772*	*52,355*	*53,002*	*53,477*	*54,016*	*54,589*	*55,185*	*55,806*	*56,453*	*57,127*	*57,829*
Salaries	197	202	209	215	221	228	235	242	249	256	264	272	280	289
Management	*197*	*202*	*209*	*215*	*221*	*228*	*235*	*242*	*249*	*256*	*264*	*272*	*280*	*289*
Operational														
Operations & Maintenance	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Administration	55	57	59	61	62	64	66	68	70	72	75	77	79	81
Provisions	2,000	-	-	2,000	2,000	2,000	-	-	2,000	2,000	2,000	-	-	-
Bad Debts	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for Drought	*2,000*	-	-	*2,000*	*2,000*	*2,000*	-	-	*2,000*	*2,000*	*2,000*	-	-	-
Transport Cost	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing and renewals	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Expenses	149,625	143,052	134,648	131,184	123,862	117,227	114,758	116,207	119,715	121,271	122,879	122,540	124,258	126,035
Operating Income	12,387	10,756	8,260	3,793	1,356	(961)	4,191	64,041	51,444	40,725	29,881	20,907	9,801	(1,443)
Financial Items	(3,483)	(3,655)	(3,785)	(3,883)	(3,978)	(4,057)	(4,117)	(4,214)	(5,005)	(5,533)	(5,974)	(6,320)	(6,555)	(6,682)
Interest on Debt														
Overdraft Interest														
Other Interest														
Less: IDC														
Interest income	(3,483)	(3,655)	(3,785)	(3,883)	(3,978)	(4,057)	(4,117)	(4,214)	(5,005)	(5,533)	(5,974)	(6,320)	(6,555)	(6,682)
Profit after financial items	15,870	14,412	12,044	7,676	5,334	3,096	8,308	68,254	56,449	46,258	35,855	27,227	16,355	5,239
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision														
Exchange rate losses														
Profit before taxes	15,870	14,412	12,044	7,676	5,334	3,096	8,308	68,254	56,449	46,258	35,855	27,227	16,355	5,239
Taxes and Dividends	8,649	7,854	6,564	4,183	2,907	1,687	4,528	37,199	30,765	25,211	19,541	14,839	8,914	2,855
Corporate Tax	5,554	5,044	4,216	2,687	1,867	1,083	2,908	23,889	19,757	16,190	12,549	9,530	5,724	1,834
Dividends	3,095	2,810	2,349	1,497	1,040	604	1,620	13,310	11,008	9,020	6,992	5,309	3,189	1,022
Retained profit after taxes	7,221	6,557	5,480	3,493	2,427	1,409	3,780	31,056	25,684	21,047	16,314	12,388	7,442	2,384

Case = Best Achievable
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2027/28	2028/29	2029/30	2030/31
Total Revenue	107,900	117,056	129,327	141,815
Energy Sales Revenue	107,900	117,056	129,327	141,815
ZESCO Distribution	106,342	117,056	129,327	141,815
CEC Sales	-	-	-	-
Exports	1,558	-	-	-
Other Revenue	-	-	-	-
Capital Grants & Contributions				
Other				
Average tariff to ZESCO Distribution	13.6	14.6	15.7	16.8
-				
Operating Expenses	120,721	132,917	146,883	161,067
Supply costs	120,340	132,525	146,478	160,651
KNBC	*4,800*	*4,800*	*4,800*	*4,800*
Outside Power Purchases	-	*9,835*	*21,370*	*33,054*
CEC Wheeling	*22,111*	*22,768*	*23,433*	*24,106*
ZESCO Generation	*34,868*	*35,796*	*36,752*	*37,736*
ZESCO Transmission	*58,562*	*59,326*	*60,123*	*60,956*
Salaries	297	306	315	325
Management	*297*	*306*	*315*	*325*
Operational				
Operations & Maintenance	-	-	-	-
Administration	84	86	89	92
Provisions	-	-	-	-
Bad Debts	-	-	-	-
Provision for Drought	-	-	-	-
Transport Cost	-	-	-	-
Depreciation	-	-	-	-
Existing and renewals	-	-	-	-
New Investments	-	-	-	-
Total Operating Expenses	120,721	132,917	146,883	161,067
Operating Income	(12,821)	(15,861)	(17,556)	(19,253)
Financial Items	(6,708)	(6,575)	(6,412)	(6,212)
Interest on Debt				
Overdraft Interest				
Other Interest				
Less: IDC				
Interest income	(6,708)	(6,575)	(6,412)	(6,212)
Profit after financial items	(6,114)	(9,286)	(11,144)	(13,041)
Other	-	-	-	-
Exceptional Item CEC Provision				
Exchange rate losses				
Profit before taxes	(6,114)	(9,286)	(11,144)	(13,041)
Taxes and Dividends	-	-	-	-
Corporate Tax	-	-	-	-
Dividends	-	-	-	-
Retained profit after taxes	(6,114)	(9,286)	(11,144)	(13,041)

Case = Best Achievable
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

BALANCE SHEET	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Assets													
Current Assets	40,411	52,432	66,557	78,632	90,560	102,720	114,776	126,494	137,222	148,050	158,489	170,169	181,801
Cash	33,737	45,336	58,997	71,026	82,937	95,106	107,323	118,998	129,814	140,508	150,846	162,526	174,158
Trade debtors	6,673	7,096	7,560	7,607	7,623	7,614	7,453	7,496	7,408	7,542	7,643	7,643	7,643
Deferred CEC debtor													
Other debtors	-	-	-	-	-	-	-	-	-	-	-	-	-
Stores	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Fixed Assets	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing	-	-	-	-	-	-	-	-	-	-	-	-	-
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-
Acc. Depreciation- existing	-	-	-	-	-	-	-	-	-	-	-	-	-
Acc. Depreciation- new	-	-	-	-	-	-	-	-	-	-	-	-	-
CWIP	-	-	-	-	-	-	-	-	-	-	-	-	-
Investments (financial)													
Total Assets	40,411	52,432	66,557	78,632	90,560	102,720	114,776	126,494	137,222	148,050	158,489	170,169	181,801
Liabilities													
Current liabilities	7,656	8,928	9,265	9,514	9,420	9,317	9,309	9,373	9,621	10,258	11,016	12,508	13,897
Accounts Payable	7,642	7,904	8,227	8,465	8,361	8,259	8,257	8,272	8,499	9,116	9,858	11,350	12,738
Other Payables	14	15	15	16	16	17	17	18	18	19	19	20	21
Taxes Payable		1,009	1,022	1,033	1,043	1,042	1,035	1,083	1,103	1,123	1,138	1,138	1,138
Consumer Deposits													
Current portion long-term loan	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service													
Bank Overdraft													
Liabilities over 1 year	60	62	64	66	68	70	72	74	76	79	81	83	86
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought	-	2,000	4,000	6,000	3,000	-	2,000	4,000	6,000	3,000	-	2,000	4,000
Equity	32,694	41,442	53,228	63,053	78,072	93,332	103,395	113,047	121,525	134,714	147,392	155,577	163,818
Share Capital	18	18	18	18	18	18	18	18	18	18	18	18	18
Revaluation reserve	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186
Revenue reserve	10,490	19,238	31,025	40,849	55,868	71,128	81,191	90,843	99,321	112,510	125,189	133,373	141,614
Total Liabilities & Equity	40,411	52,432	66,557	78,632	90,560	102,720	114,776	126,494	137,222	148,050	158,489	170,169	181,801

182

Case = Best Achievable
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

BALANCE SHEET	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Assets														
Current Assets	189,829	195,629	199,860	203,955	207,227	209,557	214,219	256,633	282,142	303,334	319,755	330,601	336,068	336,434
Cash	182,769	189,238	194,137	198,901	202,841	205,840	210,691	250,254	276,626	298,690	315,993	327,732	334,101	335,381
Trade debtors	7,060	6,391	5,723	5,054	4,386	3,717	3,529	6,379	5,516	4,644	3,762	2,870	1,967	1,053
Deferred CEC debtor														
Other debtors	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stores	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Fixed Assets	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acc. Depreciation- existing	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acc. Depreciation- new	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CWIP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Investments (financial)														
Total Assets	189,829	195,629	199,860	203,955	207,227	209,557	214,219	256,633	282,142	303,334	319,755	330,601	336,068	336,434
Liabilities														
Current liabilities	13,190	12,715	11,925	11,376	10,675	10,030	9,892	9,557	9,681	9,810	9,942	10,079	10,220	16,697
Accounts Payable	12,117	11,741	11,050	10,600	9,998	9,452	9,413	9,531	9,655	9,782	9,914	10,049	10,190	10,335
Other Payables	21	22	22	23	24	24	25	26	27	28	28	29	30	31
Taxes Payable	1,051	952	852	753	653	554	454	-	-	-	-	-	-	-
Consumer Deposits														
Current portion long-term loan	-	-	-	-	-	-	-	-	-	-	-	-	-	6,331
Unpaid Debt Service														
Bank Overdraft														
Liabilities over 1 year	88	91	94	97	100	103	106	109	112	115	119	122	126	130
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Provision for drought	6,000	3,000	-	2,000	4,000	6,000	3,000	-	2,000	4,000	6,000	3,000	-	(3,000)
Equity	170,550	179,823	187,842	190,482	192,453	193,425	201,221	246,967	270,349	289,409	303,694	317,400	325,722	322,607
Share Capital	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Revaluation reserve	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186	22,186
Revenue reserve	148,346	157,619	165,638	168,279	170,249	171,221	179,018	224,763	248,145	267,205	281,490	295,196	303,518	300,403
Total Liabilities & Equity	189,829	195,629	199,860	203,955	207,227	209,557	214,219	256,633	282,142	303,334	319,755	330,601	336,068	336,434

Case = Best Achievable
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

BALANCE SHEET	2027/28	2028/29	2029/30	2030/31
Assets				
Current Assets	328,866	320,587	310,595	298,724
Cash	328,738	320,587	310,595	298,724
Trade debtors	128	-	-	-
Deferred CEC debtor				
Other debtors	-	-	-	-
Stores	-	-	-	-
Net Fixed Assets	-	-	-	-
Existing	-	-	-	-
New Investments	-	-	-	-
Acc. Depreciation- existing	-	-	-	-
Acc. Depreciation- new	-	-	-	-
CWIP	-	-	-	-
Investments (financial)				
Total Assets	328,866	320,587	310,595	298,724
Liabilities				
Current liabilities	9,930	10,932	12,081	13,247
Accounts Payable	9,898	10,900	12,047	13,212
Other Payables	32	33	34	35
Taxes Payable	-	-	-	-
Consumer Deposits				
Current portion long-term loan	-	-	-	-
Unpaid Debt Service				
Bank Overdraft				
Liabilities over 1 year	134	138	142	146
Existing Loans	-	-	-	-
New long term loans	-	-	-	-
PRP Loans	-	-	-	-
Other Loans	-	-	-	-
Capital Grants & Contributions	-	-	-	-
Provision for drought	(6,000)	(9,000)	(12,000)	(15,000)
Equity	324,803	318,516	310,372	300,332
Share Capital	18	18	18	18
Revaluation reserve	22,186	22,186	22,186	22,186
Revenue reserve	302,599	296,313	288,168	278,128
Total Liabilities & Equity	328,866	320,587	310,595	298,724

Case = Best Achievable
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Source of funds													
Generation from Operations	10,490	13,894	17,355	16,431	16,349	17,165	17,212	16,215	14,743	14,012	13,882	14,350	13,946
Operating Income	16,139	17,624	22,716	21,021	23,731	24,749	21,501	19,723	17,224	18,961	18,547	15,982	15,128
Financial Items	-	675	907	1,180	1,421	1,659	1,902	2,146	2,380	2,596	2,810	3,017	3,251
Taxes	(5,649)	(6,405)	(8,268)	(7,770)	(8,803)	(9,243)	(8,191)	(7,654)	(6,861)	(7,545)	(7,475)	(6,650)	(6,432)
Provision for drought less Utilization	-	2,000	2,000	2,000	-	-	2,000	2,000	2,000	-	-	2,000	2,000
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Contributions													
Sale of Assets													
Consumer deposits													
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	10,490	13,894	17,355	16,431	16,349	17,165	17,212	16,215	14,743	14,012	13,882	14,350	13,946
Application of Funds													
Investments including IDC	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Repayment of loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New loans													
Dividend	-	3,147	3,568	4,607	4,329	4,905	5,149	4,564	4,265	3,823	4,204	4,165	3,705
Total Application of Funds	-	3,147	3,568	4,607	4,329	4,905	5,149	4,564	4,265	3,823	4,204	4,165	3,705
Net In/Outflow of Funds	10,490	10,747	13,787	11,824	12,020	12,260	12,063	11,652	10,478	10,189	9,678	10,185	10,241

125

Case = Best Achievable
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Source of funds														
Generation from Operations	12,315	9,368	7,829	6,989	5,467	4,012	5,400	44,365	38,692	32,068	25,306	17,698	10,631	3,405
Operating Income	12,387	10,756	8,260	3,793	1,356	(961)	4,191	64,041	51,444	40,725	29,881	20,907	9,801	(1,443)
Financial Items	3,483	3,655	3,785	3,883	3,978	4,057	4,117	4,214	5,005	5,533	5,974	6,320	6,555	6,682
Taxes	(5,554)	(5,044)	(4,216)	(2,687)	(1,867)	(1,083)	(2,908)	(23,889)	(19,757)	(16,190)	(12,549)	(9,530)	(5,724)	(1,834)
Provision for drought less Utilization	2,000	-	-	2,000	2,000	2,000	-	-	2,000	2,000	2,000	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Contributions														
Sale of Assets														
Consumer deposits														
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	12,315	9,368	7,829	6,989	5,467	4,012	5,400	44,365	38,692	32,068	25,306	17,698	10,631	3,405
Application of Funds														
Investments including IDC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Repayment of loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New loans														
Dividend	3,584	3,095	2,810	2,349	1,497	1,040	604	1,620	13,310	11,008	9,020	6,992	5,309	3,189
Total Application of Funds	3,584	3,095	2,810	2,349	1,497	1,040	604	1,620	13,310	11,008	9,020	6,992	5,309	3,189
Net In/Outflow of Funds	8,732	6,273	5,019	4,641	3,970	2,972	4,797	42,745	25,382	21,060	16,285	10,706	5,322	216

Case = Best Achievable
Growth = Medium
Wholesale Market Function
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2027/28	2028/29	2029/30	2030/31
Source of funds				
Generation from Operations	(6,114)	(9,286)	(11,144)	(13,041)
Operating Income	(12,821)	(15,861)	(17,556)	(19,253)
Financial Items	6,708	6,575	6,412	6,212
Taxes	-	-	-	-
Provision for drought less Utilization	-	-	-	-
Exceptional Items	-	-	-	-
Depreciation	-	-	-	-
Capital contributions	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-
External Sources	-	-	-	-
Capital Contributions				
Sale of Assets				
Consumer deposits				
Loans PRP	-	-	-	-
Other New Loans	-	-	-	-
Unpaid Debt Service	-	-	-	-
New Equity	-	-	-	-
Total sources of funds	(6,114)	(9,286)	(11,144)	(13,041)
Application of Funds				
Investments including IDC	-	-	-	-
PRP	-	-	-	-
Other	-	-	-	-
Repayment of loans	-	-	-	-
Existing loans	-	-	-	-
PRP loans	-	-	-	-
Other New loans				
Dividend	1,022	-	-	-
Total Application of Funds	1,022	-	-	-
Net In/Outflow of Funds	(7,135)	(9,286)	(11,144)	(13,041)

Case = Best Achievable
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total Revenue	98,664	134,653	170,068	170,541	172,981	181,400	190,088	198,870	207,750	216,523	224,671	237,550	250,931
Energy Sales Revenue	98,664	134,653	170,068	170,541	172,981	181,400	190,088	198,870	207,750	216,523	224,671	237,550	250,931
Domestic Sales	98,664	134,653	170,068	170,541	172,981	181,400	190,088	198,870	207,750	216,523	224,671	237,550	250,931
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions													
Other													
Average tariff /transfer price (US$/MWh)	33.2	44.1	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	56.1	57.2
-													
Operating Expenses	122,330	113,444	109,559	112,105	113,917	118,563	125,214	129,990	138,482	151,871	167,246	193,714	219,011
Supply costs	40,147	41,872	45,415	46,184	45,545	45,425	46,039	44,515	46,093	51,943	59,525	77,116	93,153
from Wholesale Marketer	*40,147*	*41,872*	*45,415*	*46,184*	*45,545*	*45,425*	*46,039*	*44,515*	*46,093*	*51,943*	*59,525*	*77,116*	*93,153*
Own production	-	-	-	-	-	-	-	-	-	-	-	-	-
Salaries	50,212	42,798	37,466	38,479	39,981	42,957	46,720	50,731	55,006	59,504	64,087	68,954	74,123
Management	*11,003*	*9,308*	*8,087*	*8,243*	*8,500*	*9,063*	*9,782*	*10,541*	*11,342*	*12,175*	*13,013*	*13,893*	*14,820*
Operational	*39,209*	*33,490*	*29,379*	*30,236*	*31,482*	*33,894*	*36,938*	*40,190*	*43,664*	*47,329*	*51,074*	*55,061*	*59,303*
Operations & Maintenance	15,991	13,659	11,982	12,332	12,839	13,823	15,065	16,391	17,808	19,302	20,830	22,456	24,186
Administration	5,665	5,205	4,890	5,025	5,224	5,616	6,111	6,638	7,201	7,794	8,398	9,041	9,723
Provisions	7,235	6,710	6,480	6,630	6,738	7,012	7,406	7,688	8,190	8,982	9,892	11,457	12,953
Bad Debts	*7,235*	*6,710*	*6,480*	*6,630*	*6,738*	*7,012*	*7,406*	*7,688*	*8,190*	*8,982*	*9,892*	*11,457*	*12,953*
Provision for Drought	-	-	-	-	-	-	-	-	-	-	-	-	-
Transport Cost	3,081	3,201	3,325	3,455	3,589	3,729	3,875	4,026	4,182	4,345	4,515	4,691	4,873
Depreciation	34,379	35,713	36,548	36,848	37,248	37,648	38,048	38,448	38,848	39,248	39,648	40,048	40,448
Existing and renewals	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805
New Investments	1,573	2,908	3,742	4,043	4,443	4,843	5,243	5,643	6,043	6,443	6,843	7,243	7,643
Total Operating Expenses	156,709	149,157	146,107	148,953	151,165	156,212	163,263	168,438	177,330	191,119	206,895	233,762	259,460
Operating Income	(58,045)	(14,504)	23,961	21,588	21,816	25,189	26,825	30,432	30,420	25,404	17,776	3,788	(8,529)
Financial Items	(2,384)	(5,323)	7,051	7,075	6,037	4,907	3,628	2,358	1,660	237	(1,158)	(2,510)	(3,610)
Interest on Debt	866	895	8,214	8,761	8,379	7,794	7,180	6,524	5,826	5,197	4,552	3,863	3,251
Overdraft Interest													
Other Interest	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: IDC	(3,250)	(6,129)	(974)	(974)	(974)	(974)	(974)	(869)	(88)	(88)	(88)	(88)	(88)
Interest income	-	(89)	(189)	(713)	(1,368)	(1,913)	(2,578)	(3,296)	(4,078)	(4,872)	(5,622)	(6,285)	(6,772)
Profit after financial items	(55,661)	(9,181)	16,910	14,513	15,779	20,281	23,197	28,074	28,760	25,167	18,934	6,297	(4,919)
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision													
Exchange rate losses													
Profit before taxes	(55,661)	(9,181)	16,910	14,513	15,779	20,281	23,197	28,074	28,760	25,167	18,934	6,297	(4,919)
Taxes and Dividends	-	-	5,919	5,080	5,523	7,098	8,119	9,826	10,066	8,808	6,627	2,204	-
Corporate Tax	-	-	5,919	5,080	5,523	7,098	8,119	9,826	10,066	8,808	6,627	2,204	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-
Retained profit after taxes	(55,661)	(9,181)	10,992	9,434	10,256	13,183	15,078	18,248	18,694	16,358	12,307	4,093	(4,919)

Case = Best Achievable
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Total Revenue	264,834	279,278	294,283	309,871	326,062	342,879	360,347	378,489	397,331	416,900	437,222	458,327	480,244	503,004
Energy Sales Revenue	264,834	279,278	294,283	309,871	326,062	342,879	360,347	378,489	397,331	416,900	437,222	458,327	480,244	503,004
Domestic Sales	264,834	279,278	294,283	309,871	326,062	342,879	360,347	378,489	397,331	416,900	437,222	458,327	480,244	503,004
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions														
Other														
Average tariff /transfer price (US$/MWh)	58.4	59.5	60.7	61.9	63.2	64.4	65.7	67.0	68.4	69.8	71.1	72.6	74.0	75.5
-														
Operating Expenses	223,261	231,199	236,839	246,242	254,337	263,966	280,473	316,153	331,705	348,151	365,544	383,938	403,390	423,963
Supply costs	88,909	87,628	83,649	82,642	79,805	77,775	81,543	102,639	104,044	105,493	106,989	108,534	110,131	111,782
from Wholesale Marketer	*88,909*	*87,628*	*83,649*	*82,642*	*79,805*	*77,775*	*81,543*	*102,639*	*104,044*	*105,493*	*106,989*	*108,534*	*110,131*	*111,782*
Own production	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salaries	79,610	85,435	91,616	98,176	105,135	112,517	120,346	128,649	137,453	146,787	156,682	167,170	178,286	190,066
Management	*15,794*	*16,819*	*17,897*	*19,029*	*20,220*	*21,471*	*22,786*	*24,168*	*25,620*	*27,145*	*28,748*	*30,431*	*32,199*	*34,055*
Operational	*63,816*	*68,616*	*73,720*	*79,147*	*84,915*	*91,046*	*97,560*	*104,481*	*111,833*	*119,642*	*127,934*	*136,739*	*146,087*	*156,011*
Operations & Maintenance	26,026	27,984	30,066	32,279	34,632	37,132	39,789	42,612	45,610	48,795	52,177	55,768	59,580	63,627
Administration	10,448	11,217	12,035	12,902	13,823	14,800	15,838	16,938	18,105	19,343	20,656	22,049	23,525	25,091
Provisions	13,205	13,674	14,008	14,564	15,043	15,612	16,588	18,699	19,619	20,591	21,620	22,708	23,858	25,075
Bad Debts	*13,205*	*13,674*	*14,008*	*14,564*	*15,043*	*15,612*	*16,588*	*18,699*	*19,619*	*20,591*	*21,620*	*22,708*	*23,858*	*25,075*
Provision for Drought	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transport Cost	5,063	5,260	5,465	5,678	5,900	6,129	6,368	6,616	6,874	7,142	7,420	7,709	8,010	8,322
Depreciation	40,848	41,323	41,723	42,123	42,523	42,923	43,323	43,723	44,123	11,718	12,118	12,518	12,918	13,318
Existing and renewals	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	32,805	-	-	-	-	-
New Investments	8,043	8,518	8,918	9,318	9,718	10,118	10,518	10,918	11,318	11,718	12,118	12,518	12,918	13,318
Total Operating Expenses	264,109	272,522	278,563	288,365	296,860	306,890	323,796	359,876	375,828	359,869	377,662	396,456	416,308	437,280
Operating Income	725	6,756	15,721	21,506	29,201	35,989	36,551	18,613	21,503	57,031	59,560	61,871	63,936	65,723
Financial Items	(4,516)	(5,767)	(6,611)	(7,625)	(8,735)	(9,960)	(11,510)	(12,614)	(13,499)	(14,393)	(15,097)	(15,834)	(16,602)	(17,396)
Interest on Debt	2,628	1,798	1,507	1,212	913	611	-	-	-	-	-	-	-	-
Overdraft Interest														
Other Interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: IDC	(88)	(88)	(88)	(88)	(88)	(88)	-	-	-	-	-	-	-	-
Interest income	(7,056)	(7,477)	(8,030)	(8,748)	(9,560)	(10,483)	(11,510)	(12,614)	(13,499)	(14,393)	(15,097)	(15,834)	(16,602)	(17,396)
Profit after financial items	5,241	12,523	22,331	29,131	37,936	45,949	48,061	31,227	35,002	71,424	74,657	77,706	80,538	83,119
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Item CEC Provision														
Exchange rate losses														
Profit before taxes	5,241	12,523	22,331	29,131	37,936	45,949	48,061	31,227	35,002	71,424	74,657	77,706	80,538	83,119
Taxes and Dividends	1,834	4,383	7,816	10,196	13,278	16,082	16,821	10,929	12,251	24,998	26,130	27,197	28,188	45,300
Corporate Tax	1,834	4,383	7,816	10,196	13,278	16,082	16,821	10,929	12,251	24,998	26,130	27,197	28,188	29,092
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-	16,208
Retained profit after taxes	3,407	8,140	14,515	18,935	24,659	29,867	31,240	20,297	22,751	46,425	48,527	50,509	52,350	37,819

189

Case = Best Achievable
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

PROFIT & LOSS	2027/28	2028/29	2029/30	2030/31
Total Revenue	526,639	551,183	576,670	603,137
Energy Sales Revenue	526,639	551,183	576,670	603,137
Domestic Sales	526,639	551,183	576,670	603,137
Other Revenue	-	-	-	-
Capital Grants & Contributions				
Other				
Average tariff /transfer price (US$/MWh)	77.0	78.6	80.1	81.7
-				
Operating Expenses	438,123	470,643	506,077	543,074
Supply costs	106,342	117,056	129,327	141,815
from Wholesale Marketer	*106,342*	*117,056*	*129,327*	*141,815*
Own production	-	-	-	-
Salaries	202,549	215,776	229,790	244,637
Management	*36,005*	*38,052*	*40,202*	*42,460*
Operational	*166,544*	*177,724*	*189,588*	*202,177*
Operations & Maintenance	67,923	72,483	77,321	82,456
Administration	26,750	28,509	30,374	32,350
Provisions	25,913	27,836	29,932	32,120
Bad Debts	*25,913*	*27,836*	*29,932*	*32,120*
Provision for Drought	-	-	-	-
Transport Cost	8,646	8,983	9,333	9,696
Depreciation	13,718	14,118	14,518	14,918
Existing and renewals	-	-	-	-
New Investments	13,718	14,118	14,518	14,918
Total Operating Expenses	451,841	484,761	520,595	557,991
Operating Income	74,798	66,422	56,076	45,146
Financial Items	(18,211)	(18,816)	(19,283)	(19,626)
Interest on Debt	-	-	-	-
Overdraft Interest				
Other Interest	-	-	-	-
Less: IDC	-	-	-	-
Interest income	(18,211)	(18,816)	(19,283)	(19,626)
Profit after financial items	93,010	85,238	75,359	64,772
Other	-	-	-	-
Exceptional Item CEC Provision				
Exchange rate losses				
Profit before taxes	93,010	85,238	75,359	64,772
Taxes and Dividends	50,690	46,455	41,070	35,301
Corporate Tax	32,553	29,833	26,376	22,670
Dividends	18,137	16,621	14,695	12,630
Retained profit after taxes	42,319	38,783	34,288	29,471

Case = Best Achievable
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

BALANCE SHEET	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Assets													
Current Assets	34,696	47,311	81,085	113,976	141,810	176,849	214,599	255,528	297,142	336,470	371,369	398,448	415,461
Cash	4,444	9,462	35,628	68,384	95,664	128,913	164,817	203,882	243,610	281,076	314,240	338,608	352,805
Trade debtors	20,391	27,829	35,148	35,246	35,750	37,490	39,286	41,101	42,936	44,749	46,433	49,095	51,860
Deferred CEC debtor													
Other debtors	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618
Stores	4,242	4,402	4,690	4,728	4,778	4,828	4,878	4,928	4,978	5,028	5,078	5,128	5,178
Net Fixed Assets	727,062	749,747	755,552	731,149	687,688	638,346	600,682	566,591	537,743	508,494	478,846	448,797	418,349
Existing	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880
New Investments	39,922	73,278	94,143	101,661	111,661	121,661	131,661	141,661	151,661	161,661	171,661	181,661	191,661
Acc. Depreciation- existing	161,874	194,679	227,485	260,290	293,096	325,901	358,707	391,512	424,317	457,123	489,928	522,734	555,539
Acc. Depreciation- new	1,573	4,481	8,223	12,266	16,709	21,552	26,795	32,438	38,481	44,924	51,767	59,010	66,653
CWIP	6,708	31,750	53,237	58,165	41,952	20,258	10,643	5,000	5,000	5,000	5,000	5,000	5,000
Investments (financial)	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Assets	761,757	797,058	836,637	845,126	829,498	815,195	815,282	822,119	834,884	844,965	850,214	847,246	833,810
Liabilities													
Current liabilities	22,960	20,443	27,623	25,768	22,873	23,186	24,024	24,707	25,668	27,112	22,228	24,597	26,909
Accounts Payable	13,332	10,510	10,786	8,260	5,523	5,638	5,843	5,882	6,188	6,854	7,666	9,313	10,844
Other Payables	5,614	4,824	6,081	6,327	6,393	6,566	6,817	7,085	7,370	7,696	8,027	8,378	8,781
Taxes Payable	1,419	1,937	2,446	2,453	2,488	2,609	2,734	2,860	2,988	3,114	3,232	3,417	3,609
Consumer Deposits	1,563	1,709	1,855	2,001	2,187	2,373	2,559	2,745	2,931	3,117	3,303	3,489	3,675
Current portion long-term loan	1,032	1,463	6,455	6,728	6,282	5,999	6,071	6,135	6,192	6,331	-	-	-
Unpaid Debt Service													
Bank Overdraft	-	-	-	-	-	-	-	-	-	-	-	-	-
Liabilities over 1 year	22,595	19,259	16,860	17,316	17,992	19,331	21,024	22,829	24,753	26,777	28,839	31,029	33,355
Existing Loans	4,331	3,358	2,384	1,410	436	-	-	-	-	-	-	-	-
New long term loans	38,555	66,395	75,591	73,427	67,673	61,827	55,828	49,757	43,622	37,430	31,188	25,455	19,685
PRP Loans	38,555	66,395	75,591	73,427	67,673	61,827	55,828	49,757	43,622	37,430	31,188	25,455	19,685
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	7,047	12,615	18,183	23,751	29,319	34,887	40,455	46,023	51,591	57,159	62,727	68,295	73,863
Provision for drought	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	666,269	674,989	695,997	703,454	691,206	675,965	673,951	678,804	689,250	696,487	705,234	697,870	679,998
Share Capital	31	31	31	31	31	31	31	31	31	31	31	31	31
Revaluation reserve	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327
Revenue reserve	(152,090)	(143,370)	(122,362)	(114,904)	(127,153)	(142,393)	(144,408)	(139,555)	(129,108)	(121,871)	(113,125)	(120,489)	(138,361)
Total Liabilities & Equity	761,757	797,058	836,637	845,126	829,498	815,195	815,282	822,119	834,884	844,965	850,214	847,246	833,810

191

Case = Best Achievable
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

BALANCE SHEET	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Assets														
Current Assets	439,441	470,100	509,197	553,023	602,578	657,490	716,315	764,357	813,025	852,321	893,441	936,225	980,491	1,026,033
Cash	373,862	401,476	437,422	477,976	524,135	575,521	630,686	674,929	719,653	754,855	791,724	830,097	869,783	910,571
Trade debtors	54,734	57,719	60,820	64,041	67,388	70,863	74,473	78,223	82,117	86,161	90,361	94,723	99,253	103,956
Deferred CEC debtor														
Other debtors	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618	5,618
Stores	5,228	5,287	5,337	5,387	5,437	5,487	5,537	5,587	5,637	5,687	5,737	5,787	5,837	5,887
Net Fixed Assets	387,501	358,990	326,329	294,205	261,682	228,759	195,435	161,712	127,589	125,871	123,753	121,235	118,317	114,999
Existing	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880	843,880
New Investments	201,661	213,536	223,536	233,536	243,536	253,536	263,536	273,536	283,536	293,536	303,536	313,536	323,536	333,536
Acc. Depreciation- existing	588,345	621,150	653,955	686,761	719,566	752,372	785,177	817,983	850,788	850,788	850,788	850,788	850,788	850,788
Acc. Depreciation- new	74,696	83,214	92,131	101,449	111,167	121,285	131,803	142,721	154,039	165,757	177,875	190,393	203,311	216,629
CWIP	5,000	5,938	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Investments (financial)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Assets	826,942	829,090	835,526	847,228	864,260	886,248	911,750	926,069	940,614	978,192	1,017,194	1,057,460	1,098,808	1,141,032
Liabilities														
Current liabilities	27,607	28,554	29,476	30,705	31,852	33,136	34,895	38,311	40,193	42,169	44,243	46,420	48,707	51,109
Accounts Payable	10,722	10,857	10,785	10,973	11,027	11,165	11,798	13,874	14,353	14,858	15,390	15,950	16,541	17,163
Other Payables	9,215	9,634	10,225	10,857	11,530	12,248	12,937	13,830	14,776	15,780	16,843	17,971	19,166	20,432
Taxes Payable	3,809	4,017	4,233	4,457	4,690	4,932	5,183	5,444	5,715	5,997	6,289	6,592	6,908	7,235
Consumer Deposits	3,861	4,047	4,233	4,419	4,605	4,791	4,977	5,163	5,349	5,535	5,721	5,907	6,093	6,279
Current portion long-term loan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service														
Bank Overdraft	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liabilities over 1 year	35,824	38,446	41,227	44,179	47,311	50,633	54,156	57,892	61,854	66,054	70,507	75,226	80,229	85,530
Existing Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New long term loans	13,880	11,488	9,083	6,665	4,235	1,794	1,794	1,794	1,794	1,794	1,794	1,794	1,794	1,794
PRP Loans	13,880	11,488	9,083	6,665	4,235	1,794	1,794	1,794	1,794	1,794	1,794	1,794	1,794	1,794
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Grants & Contributions	79,431	84,999	90,567	96,135	101,703	107,271	112,839	118,407	123,975	129,543	135,111	140,679	146,247	151,815
Provision for drought	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	670,200	665,603	665,173	669,544	679,160	693,415	708,066	709,665	712,798	738,632	765,539	793,340	821,831	850,784
Share Capital	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Revaluation reserve	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327	818,327
Revenue reserve	(148,159)	(152,756)	(153,185)	(148,814)	(139,198)	(124,944)	(110,292)	(108,694)	(105,561)	(79,727)	(52,819)	(25,018)	3,473	32,425
Total Liabilities & Equity	826,942	829,090	835,526	847,228	864,260	886,248	911,750	926,069	940,614	978,192	1,017,194	1,057,460	1,098,808	1,141,032

192

Case = Best Achievable
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

BALANCE SHEET	2027/28	2028/29	2029/30	2030/31
Assets				
Current Assets	1,061,209	1,089,667	1,112,137	1,128,394
Cash	940,812	964,148	981,301	992,038
Trade debtors	108,841	113,914	119,181	124,651
Deferred CEC debtor				
Other debtors	5,618	5,618	5,618	5,618
Stores	5,937	5,987	6,037	6,087
Net Fixed Assets	111,281	107,163	102,645	97,727
Existing	843,880	843,880	843,880	843,880
New Investments	343,536	353,536	363,536	373,536
Acc. Depreciation- existing	850,788	850,788	850,788	850,788
Acc. Depreciation- new	230,347	244,465	258,983	273,901
CWIP	5,000	5,000	5,000	5,000
Investments (financial)	-	-	-	-
Total Assets	1,172,490	1,196,830	1,214,782	1,226,121
Liabilities				
Current liabilities	53,046	56,435	60,082	63,886
Accounts Payable	17,232	18,660	20,248	21,889
Other Payables	21,774	23,196	24,702	26,298
Taxes Payable	7,575	7,928	8,295	8,675
Consumer Deposits	6,465	6,651	6,837	7,023
Current portion long-term loan	-	-	-	-
Unpaid Debt Service				
Bank Overdraft	-	-	-	-
Liabilities over 1 year	91,147	97,099	103,406	110,087
Existing Loans	-	-	-	-
New long term loans	1,794	1,794	1,794	1,794
PRP Loans	1,794	1,794	1,794	1,794
Other Loans	-	-	-	-
Capital Grants & Contributions	157,383	162,951	168,519	174,087
Provision for drought	-	-	-	-
Equity	869,119	878,551	880,981	876,268
Share Capital	31	31	31	31
Revaluation reserve	818,327	818,327	818,327	818,327
Revenue reserve	50,761	60,193	62,623	57,910
Total Liabilities & Equity	1,172,490	1,196,830	1,214,782	1,226,121

193

Case = Best Achievable
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$)

CASH FLOW STATEMENT	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Source of funds													
Generation from Operations	(21,283)	26,532	47,539	46,282	47,505	50,831	53,126	56,696	57,542	55,607	51,956	44,142	35,530
Operating Income	(58,045)	(14,504)	23,961	21,588	21,816	25,189	26,825	30,432	30,420	25,404	17,776	3,788	(8,529)
Financial Items	2,384	5,323	(7,051)	(7,075)	(6,037)	(4,907)	(3,628)	(2,358)	(1,660)	(237)	1,158	2,510	3,610
Taxes	-	-	(5,919)	(5,080)	(5,523)	(7,098)	(8,119)	(9,826)	(10,066)	(8,808)	(6,627)	(2,204)	-
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	34,379	35,713	36,548	36,848	37,248	37,648	38,048	38,448	38,848	39,248	39,648	40,048	40,448
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	32,397	33,612	15,400	9,031	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754
Capital Contributions	2,784	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568
Sale of Assets													
Consumer deposits	146	146	146	146	186	186	186	186	186	186	186	186	186
Loans PRP	29,467	27,898	9,686	3,317	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	11,115	60,144	62,939	55,313	53,259	56,585	58,880	62,450	63,296	61,361	57,710	49,896	41,284
Application of Funds													
Investments including IDC	39,334	33,356	20,865	7,518	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
PRP	25,919	21,694	9,615	5,643	-	-	-	-	-	-	-	-	-
Other	13,416	11,663	11,250	1,875	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Repayment of loans	1,246	1,032	1,463	6,455	6,728	6,282	5,999	6,071	6,135	6,192	6,243	5,732	5,770
Existing loans	1,246	974	974	974	974	436	-	-	-	-	-	-	-
PRP loans	-	58	489	5,481	5,754	5,846	5,999	6,071	6,135	6,192	6,243	5,732	5,770
Other New loans	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividend	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	40,580	34,388	22,328	13,973	16,728	16,282	15,999	16,071	16,135	16,192	16,243	15,732	15,770
Net In/Outflow of Funds	(29,465)	25,756	40,611	41,340	36,531	40,303	42,881	46,379	47,162	45,169	41,467	34,164	25,513

194

Case = Best Achievable
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$

CASH FLOW STATEMENT	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Source of funds														
Generation from Operations	44,255	49,463	56,239	61,058	67,182	72,790	74,563	64,021	66,874	58,143	60,645	63,027	65,268	67,345
Operating Income	725	6,756	15,721	21,506	29,201	35,989	36,551	18,613	21,503	57,031	59,560	61,871	63,936	65,723
Financial Items	4,516	5,767	6,611	7,625	8,735	9,960	11,510	12,614	13,499	14,393	15,097	15,834	16,602	17,396
Taxes	(1,834)	(4,383)	(7,816)	(10,196)	(13,278)	(16,082)	(16,821)	(10,929)	(12,251)	(24,998)	(26,130)	(27,197)	(28,188)	(29,092)
Provision for drought less Utilization	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exceptional Items	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	40,848	41,323	41,723	42,123	42,523	42,923	43,323	43,723	44,123	11,718	12,118	12,518	12,918	13,318
Capital contributions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-	-	-	-	-	-	-	-	-	-	-
External Sources	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754	5,754
Capital Contributions	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568	5,568
Sale of Assets														
Consumer deposits	186	186	186	186	186	186	186	186	186	186	186	186	186	186
Loans PRP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other New Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unpaid Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Equity	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of funds	50,009	55,217	61,993	66,812	72,936	78,544	80,317	69,775	72,628	63,897	66,399	68,781	71,022	73,099
Application of Funds														
Investments including IDC	10,000	11,875	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
PRP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	10,000	11,875	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Repayment of loans	5,805	2,392	2,406	2,418	2,430	2,441	-	-	-	-	-	-	-	-
Existing loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PRP loans	5,805	2,392	2,406	2,418	2,430	2,441	-	-	-	-	-	-	-	-
Other New loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividend	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Application of Funds	15,805	14,267	12,406	12,418	12,430	12,441	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Net In/Outflow of Funds	34,204	40,950	49,587	54,394	60,506	66,104	70,317	59,775	62,628	53,897	56,399	58,781	61,022	63,099

128

Case = Best Achievable
Growth = Medium
Distribution & Customer Services
(expressed in thousand year 2000 US$

CASH FLOW STATEMENT	2027/28	2028/29	2029/30	2030/31
Source of funds				
Generation from Operations	74,174	69,523	63,501	57,020
Operating Income	74,798	66,422	56,076	45,146
Financial Items	18,211	18,816	19,283	19,626
Taxes	(32,553)	(29,833)	(26,376)	(22,670)
Provision for drought less Utilization	-	-	-	-
Exceptional Items	-	-	-	-
Depreciation	13,718	14,118	14,518	14,918
Capital contributions	-	-	-	-
Profit on disposal of fixed assets	-	-	-	-
External Sources	5,754	5,754	5,754	5,754
Capital Contributions	5,568	5,568	5,568	5,568
Sale of Assets				
Consumer deposits	186	186	186	186
Loans PRP	-	-	-	-
Other New Loans	-	-	-	-
Unpaid Debt Service	-	-	-	-
New Equity	-	-	-	-
Total sources of funds	79,928	75,277	69,255	62,774
Application of Funds				
Investments including IDC	10,000	10,000	10,000	10,000
PRP	-	-	-	-
Other	10,000	10,000	10,000	10,000
Repayment of loans	-	-	-	-
Existing loans	-	-	-	-
PRP loans	-	-	-	-
Other New loans	-	-	-	-
Dividend	16,208	18,137	16,621	14,695
Total Application of Funds	26,208	28,137	26,621	24,695
Net In/Outflow of Funds	53,720	47,140	42,634	38,079

Appendix F Distribution Productivity Benchmarking

The objective of the task described in this appendix was to review productivity levels for electricity distribution operations internationally and to make recommendation for achievable benchmarks for ZESCO's Distribution function.

F.1 Methodology

We approached distribution productivity benchmarking in the following way:

- We analyzed the effect of line length per customer and sales per customer on the productivity of distribution companies in the UK based on data from References F-1 and F-2.
- This analysis was applied to ZESCO distribution divisions to obtain idealized productivity goals reflecting the above factors
- Productivity goals for ZESCO distribution divisions were further adjusted to reflect market size and miscellaneous factors, such as supporting infrastructure and level of employee training.

F.2 Basis Cost Analysis

The Office of Electricity Regulation in the UK performed an analysis of distribution prices and published the results in May 1998. They identified two principle cost drivers- line length per customer and customer sales per customer. Using a formulation similar to a Cobb-Douglas production function, they developed adjustment factors for productivity to reflect differences in these basic cost factors amongst the various distributors.

F.2.1 Calculation of Adjustment Factors

Table F-1 shows the basic cost drivers for the UK distributors and for the various divisions of ZESCO along. The Copperbelt division was not part of ZESCO in 1999/00. Data for this division is based on estimated conditions under CEC. The average sales per customer and average line length per customer are defined as U and L, respectively. Adjustment factors were calculated for each UK distributor and for each ZESCO division using the following formula:

Cost Adjustment factor for Distributor i = 1 + b x (deviation from U for Distributor i / U) +

g x (deviation from L for Distributor i / L)

The regulator selected values of b and g equal to 0.15 as most accurately reflecting the cost characteristics of the distributors. Table F-2 shows the resulting calculation of the adjustment factors.

Table F-1 Basic Cost Characteristics of UK Distributors and ZESCO Distribution Divisions

	Number of Customers (thousands)	Total Units Delivered (GWh)	Length of Network (km)	Sales per (kWh/year), U	Length per customer (km/customer), L
Eastern	3156	30,432	89,304	9,643	28.3
East Midlands	2310	25,430	65,846	11,009	28.5
London	2001	21,279	29,798	10,634	14.9
Manweb	1387	13,459	45,434	9,704	32.8
Midlands	2256	24,649	59,498	10,926	26.4
Northern	1472	13,106	41,893	8,904	28.5
NORWEB	2211	22,545	58,010	10,197	26.2
SEEBOARD	2108	17,435	44,745	8,271	21.2
Southern	2650	26,527	71,807	10,010	27.1
SWALEC	977	8,722	32,529	8,927	33.3
South Western	1332	13,041	52,298	9,791	39.3
Yorkshire	2079	21,167	54,753	10,181	26.3
Hydro-Electric	636	7,492	45,252	11,780	71.2
Scottish Power	1853	19,452	63,835	10,498	34.4
Total/Average	26428	264736	755,002	10,017	28.6
Zambia Network Data 1999/00					
Lusaka	62	979	1,567	15,846	25.4
North	56	865	4,070	15,434	72.6
South	44	419	3,442	9,616	79.1
Copperbelt	80	569	2,326	7,115	29.1
Consolidated	241	2,831	11,406	11,732	47.3

198

Table F-2 Calculation of Basic Cost Adjustment Factors

	Deviation from U	Deviation/ U	b* Deviation/ U[1]	Deviation from L	Deviation/L	g* Deviation/ L[2]	Adjustment factor
UK Distributor			A			B	=1+A+B
Eastern	-374.67	-0.04	-0.0056	-0.2717	-0.0095	-0.0014	0.9930
East Midlands	991.40	0.10	0.0148	-0.0635	-0.0022	-0.0003	1.0145
London	616.93	0.06	0.0092	-13.6767	-0.4787	-0.0718	0.9374
Manweb	-313.58	-0.03	-0.0047	4.1888	0.1466	0.0220	1.0173
Midlands	908.72	0.09	0.0136	-2.1950	-0.0768	-0.0115	1.0021
Northern	-1113.72	-0.11	-0.0167	-0.1083	-0.0038	-0.0006	0.9828
NORWEB	179.49	0.02	0.0027	-2.3313	-0.0816	-0.0122	0.9904
SEEBOARD	-1746.38	-0.17	-0.0262	-7.3420	-0.2570	-0.0385	0.9353
Southern	-7.07	0.00	-0.0001	-1.4713	-0.0515	-0.0077	0.9922
SWALEC	-1089.93	-0.11	-0.0163	4.7265	0.1654	0.0248	1.0085
South Western	-226.71	-0.02	-0.0034	10.6945	0.3743	0.0562	1.0528
Yorkshire	164.08	0.02	0.0025	-2.2320	-0.0781	-0.0117	0.9907
Hydro-Electric	1762.62	0.18	0.0264	42.5827	1.4906	0.2236	1.2500
Scottish Power	480.32	0.05	0.0072	5.8813	0.2059	0.0309	1.0381
ZESCO Distribution Division							
Lusaka	5828.28	0.58	0.0873	-3.1942	-0.1118	-0.0168	1.0705
North	5416.65	0.54	0.0811	44.0641	1.5424	0.2314	1.3125
South	-400.96	-0.04	-0.0060	50.5141	1.7682	0.2652	1.2592
Copperbelt	-2902.38	-0.29	-0.0435	0.5056	0.0177	0.0027	0.9592
Consolidated	1715.14	0.17	0.0257	18.6918	0.6543	0.0981	1.1238

1 The Office of Electricity Regulation found a value of b=0.15 to produce satisfactory results.
2 The Office of Electricity Regulation found a value of g=0.15 to produce satisfactory results.

F.2.2 Adjusted Productivity to Reflect Cost Drivers

Table F-3 shows productivity values for the UK distributors and for ZESCO distribution divisions along with an adjusted productivity value to reflect the effect of basic cost drivers. The employee count for ZESCO is based on Distribution and Customer Service employees plus Human Resources staff assigned to Distribution and Customer Services operations plus and allocation of Corporate Development and Accounting staff.

The adjustment factor credits distributors with higher than average sales per customer and longer line length per customer than average by adjusting the actual productivity upwards. The productivity of distributors with lower than average values for their basic cost drivers have their actual productivity values adjusted downwards. This allows comparison of distributors with different cost characteristics. For example, the ZESCO North division has significantly higher sales per customer than average in the UK and higher than average line length per customer. Its productivity values of 951 MWh sales per employee and and 62 customers per employee is adjusted upwards to 1250 MWh per employee and 81 customers per employee to more fairly

reflect its basic cost characteristics. While this adjustment does not bring it to the level of UK distributors, it does bring it close to the level of the Lusaka distribution division.

Table F-3 Adjusted Productivity to Reflect Basic Cost Characteristics

	Sales (GWh)	Number of Customers (thousands)	Number of Employees	Productivity (MWh/ employee)	Productivity (customer/ employee)	Adjustment Factor	Productity Adjustment I (MWh/ employee	Productiivty Adjustment I (customers/ employee)
UK distributors								
Eastern	30,432	3,156	6,403	4,753	493	0.993	4,719	489
East Midlands	25,430	2,310	6,151	4,134	376	1.015	4,194	381
London	21,279	2,001	4,908	4,336	408	0.937	4,064	382
Manweb	13,459	1,387	4,582	2,937	303	1.017	2,988	308
Midlands	24,649	2,256	5,815	4,239	388	1.002	4,248	389
Northern	13,106	1,472	4,456	2,941	330	0.983	2,890	325
NORWEB	22,545	2,211	7,617	2,960	290	0.990	2,932	287
SEEBOARD	17,435	2,108	4,680	3,725	450	0.935	3,484	421
Southern	26,527	2,650	7,091	3,741	374	0.992	3,712	371
SWALEC	8,722	977	3,024	2,884	323	1.008	2,909	326
South Western	13,041	1,332	4,656	2,801	286	1.053	2,949	301
Yorkshire	21,167	2,079	4,924	4,299	422	0.991	4,259	418
Hydro-Electric	7,492	636	3,584	2,090	177	1.250	2,613	222
Scottish Power	19,452	1,853	8,041	2,419	230	1.038	2,511	239
ZESCO distribution								
Lusaka	979	62	774	1,265	80	1.071	1,354	85
North	865	56	908	952	62	1.312	1,250	81
South	419	44	634	660	69	1.259	831	86
Copperbelt	569	80	500	1,138	160	0.959	1,092	153
Consolidated Distribution	2,831	241	2,816	1,005	86	1.124	1,130	96

F.3 Adjustment for Market Size

The National Electricity Regulator in the UK did not adjust for differences in the size of distributors. However, it is clear that higher productivity can be obtained with larger size organizations. This is illustrated in Figure F-1.

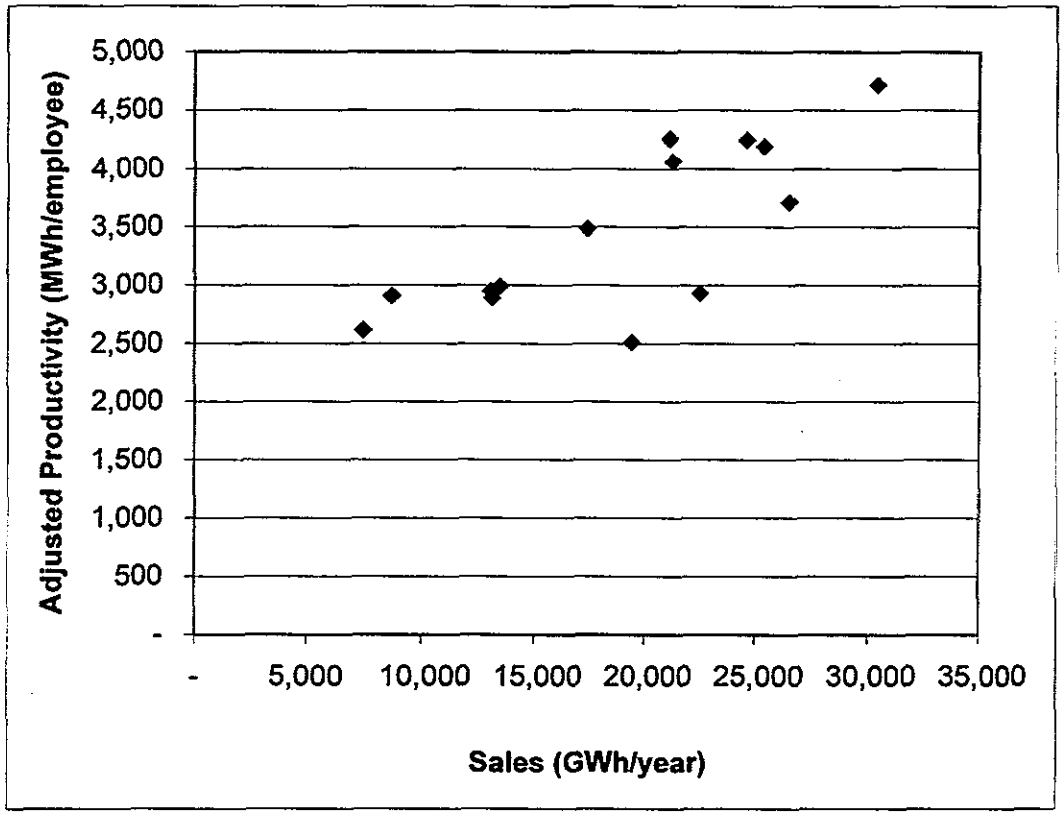


Figure F-1 Adjusted Productivity Versus Annual Sales

The much smaller size of the ZESCO distribution system compared to those in the UK should be expected to have an effect on productivity. A regression analysis was conducted to produce the following results:

Productivity Adjustment 2 (MWh/employee) = 1928.1 + .081 x Annual sales

or

Productivity Adjustment 2 (customer/employee) = 192.1 + .081 x Number of customers

This results in an overall productivity benchmark of 2,158 MWh/employee, or 212 customers/employee for ZESCO Distribution at its size in 1999/00. These productivity levels should improve with growth. This benchmarks compares with 4,064 MWh per employee (382 customers per employee) for London Electric. The differences represent the corrections for sales per customer, line length per customer and for size.

20'

F.4 Final Benchmark

The Productivity Adjustment 2 allows comparison amongst different distributors. The actual benchmark for ZESCO requires removal of the adjustment factor and a final adjustment to reflect other factors. There are differences between ZESCO Distribution and UK distributors in addition to sales per customer, line length per customer and market size that are beyond the control of ZESCO in. In ZESCO must cope with poor road conditions and communications infrastructure. We used the following formula to determine the final benchmark:

Productivity Benchmark = Productivity Adjustment 2 x Infrastructure correction factor / Cost adjustment factor

We estimated the infrastructure correction factor to be 80%. The resulting benchmark for ZESCO is 1,536 MWh per employee (151 customers per employee). As ZESCO grows this benchmark should be raised.

F.5 References

F-1 Office of Electricity Regulation, Reviews of Public Electricity Suppliers, 1998 to 2000 PES Business Plans Consultation Paper, December 1998

F-2 Office of Electricity Regulation, Review of Public Electricity Suppliers 1998 to 2000, Distribution Price Control Review: Consultation Paper, May 1998

Appendix G World Experience in Power Sector Reform And Privatization

G.1 Background

Electric power is expected to be the fastest-growing source of end-use energy supply throughout the world over the next two decades. To meet global power needs, it is estimated that over $1 trillion will have to be spent during the next 10 years on electricity sector infrastructure. The growth in demand for electricity is expected to be particularly high in many developing countries as they strive to accelerate economic growth and also to displace traditional non-commercial fuel sources (biomass, wood, dung) with commercially supplied fuels, in particular with electric power.

The electricity sector has undergone significant change over the past two decades as both developed and developing countries have initiated reform and privatization programs designed to increase the efficiency, reduce costs, and improve the service quality of electricity sector participants.

A driving force of these reform efforts is the recognition that major segments of the sector (generation and commercial services) are not natural monopolies. Therefore, these segments of the industry can be separated from the network functions (transmission and distribution), restructured to ensure effective competition and improved performance, and privatized (if not already under private ownership) to provide maximum incentives for efficiency and investment. Government intervention in the generation and commercial service segments of the industry—following reform—is limited to: (1) establishing the ground rules under which sector participants operate; and (2) oversight authority to ensure that markets remain effectively competitive, minimum standards for quality and reliability of service are maintained; safety and environmental protection are met; and consumers are protected from undue exercise of market power.

Once unbundled, the delivery segments of the industry—transmission and distribution—which are still considered to be natural monopolies require more traditional regulatory intervention. That is, governments acting through an independent regulatory authority need to ensure that these segments of the industry are operated in a manner that provides open access to transmission and distribution facilities by all users, that prices recover the economic cost of providing service, and consumers receive efficient, reliable and quality service.

Arguably, reform of the electricity sector began in the United States in 1978 with passage of the Public Utilities Regulatory Policy Act. This law promoted development of cogeneration and generation by renewable energy resources. Its success in developing these non-utility supply resources provided proof that the generation segment of the electricity sector—which encompasses 65-70% of the total cost of providing service—was no longer a natural monopoly. It, therefore, could be "deregulated" and operated within a competitive market structure.

In the late 1980s and early 1990s, other countries, most notably Chile, the United Kingdom, and Argentina began a more systematic restructuring and privatization of their electricity sectors. The goals of these activities were the same—to reduce costs, improve efficiency, increase reliability and quality of service. However, in these countries where the utility sector was

traditionally under direct government ownership and control, another important benefit derived from reform activities. Government investment in the sector could be drastically reduced or eliminated, thereby freeing up funds for use in other more pressing areas of the economy.

Table G-1 Developing Countries with Energy Sector Reform Programs Involving the Private Sector; by Region: 1990-1999

East Asia & the Pacific	Europe & Central Asia	Latin America & the Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa
Cambodia	Armenia	Argentina	Algeria	Bangladesh	Comoros
China	Belarus	Belize	Bahrain	India	Rep. Of Congo
Indonesia	Croatia	Bolivia	Egypt	Nepal	Cote d'Ivoire
Rep. Of Korea	Czech Republic	Brazil	Morocco	Pakistan	Gabon
Laos	Estonia	Chile	Oman	Sri Lanka	Ghana
Malaysia	Georgia	Colombia	Tunisia		Guinea
Myanmar	Hungary	Costa Rica			Guinea-Bissau
Papas New Guinea	Kazakhstan	Dominican Republic			Kenya
Philippines	Latvia	Ecuador			Mali
Thailand	Lithuania	El Salvador			Mauritius
Vietnam	Moldova	Grenada			Sao Tome & Principe
	Poland	Guatemala			Senegal
	Romania	Guyana			South Africa
	Russian Federation	Haiti			Tanzania
	Turkey	Honduras			Zambia
		Jamaica			Zimbabwe
		Mexico			
		Nicaragua			
		Panama			
		Peru			
		Trinidad & Tobago			
		Uruguay			
		Venezuela			

Source: ESMAP; Energy Services for the World's Poor, Energy Development Report, Washington, DC, April, 2000.

A growing number of developing nations have opened their electricity sectors to the private sector over the past 10-15 years. This interest in attracting private investment to the power sector is driven by 3 major factors:

- Recognition that major segments of the sector are not natural monopolies and, therefore, competition and private sector investment is possible and desirable;

- The need to expand the capacity and/or increase the reliability of the sector; and
- Public sector budget constraints.

In addition, the positive results achieved by earlier privatization efforts in the United Kingdom, Chile, Argentina and other countries has increased interest by both developed and developing countries in privatization programs.

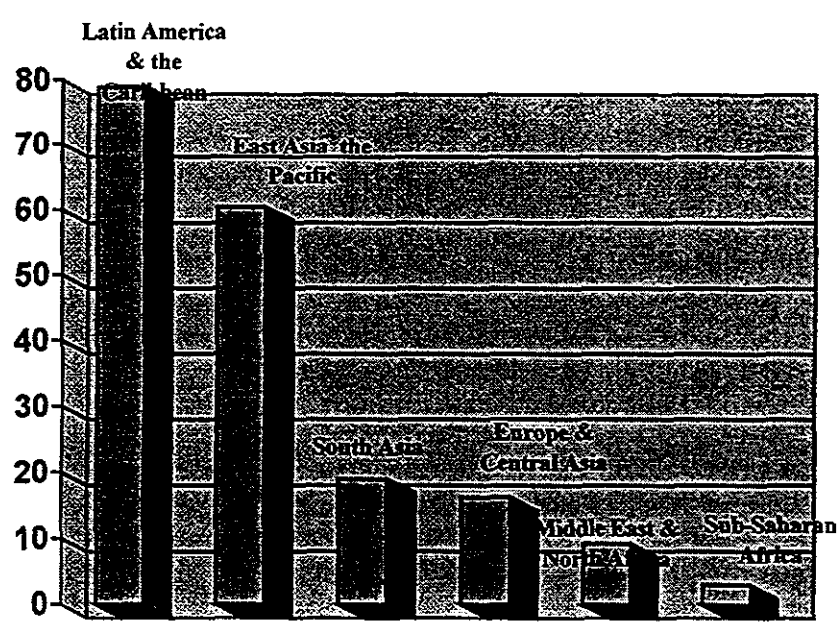
Table G-1 lists, by region, developing countries that have instituted energy sector reforms involving participation by the private sector for the period 1990 through 1999.

G.2 Private Investment

Privatization of formerly state-owned electric power assets in both developing and developed countries also has opened up enormous investment opportunities for the private sector. This trend toward private sector participation in the electric power sector covers all regions of the world. By the end of 1997, sixty-two developing countries had initiated private-sector participation in their electric power sector. By the end of 1999, private sector investment in developing country electricity sectors totaled US $160 billion.

Figure G-1 presents private sector investment in the electricity and natural gas sectors of developing countries for the period 1990 through 1999. It shows that private sector investment varies significantly by region, with Latin America and the Caribbean region having the most private investment, and the Sub-Saharan Africa region the least.

Figure G-1 Private Investment in Developing Country Energy Sectors- 1990-99 (Billions US$)



Source: World Bank, PPI Project Database, April, 2000.

G.3 Elements of Reform

There is a logical sequence to energy sector reform if a country is working toward full private sector participation and competition, which generally is necessary to achieve the full benefits of sector reform activities. This sequence includes:

- The government establishes a formal policy to support and carry out energy sector reforms.
- The government-owned utility is corporatized and commercialized.
- A law permitting private entry, establishing an independent regulator, and setting out the roles and responsibilities of industry participants is passed.
- Effective regulation is implemented.
- The government-owned enterprise is unbundled though vertical and horizontal divestiture.
- Private greenfield investment is allowed (IPPs).
- Existing assets for the government-owned entities are privatized.

Many developing countries have taken only a few of these steps or have altered the order in which they have been implemented. This may be due to the varying goals of government programs and also to economic, social, and political situations. A World Bank survey of 115 developing countries shows that on Average in mid-1998 just 39% of key reform steps have been carried out.

Table G-2 shows the status of power sector reform in developing country by region in 1998, as indicated by a survey taken by the World bank. This table indicates that the majority of countries have not fully implemented reform and privatization of their power sector.

For example, the table indicates that only 44% of the countries in the East Asia and the. Pacific region have corporatized their electric utility, and only 13% of the countries in the Middle East and North Africa region have implemented a law to restructure their power sector. The indicator that scores highest is IPPs, indicating that many countries have allowed private investment in their power sector, even though they have not implemented many other facets of the restructuring process.

It is important to keep in mind that electricity sector reform must be developed to fit the particular circumstances of the specific country where it is undertaken. Political, economic and social circumstances need to be taken into account and will have an important impact on how the reform program is designed and implemented. While this is true, it is equally important to keep in mind the goals of the reform process—to provide efficient, reliable, low-cost electricity supplies to fuel economic growth and eliminate poverty—and to minimize the adverse impact

that outside factors might have on achieving these goals. Generally, this means that the steps outlined above should be followed as thoroughly as possible.

Table G-2 Power Sector Reforms in Developing Countries By Region in 1998 (as a Percent of Total Countries in a Region)

Reform Step	East Asia & the Pacific (9)	Europe & Central Asia (27)	Latin America & the Caribbean (18)	Middle East & North Africa (8)	South Asia (5)	Sub-Saharan Africa (48)
Corporatization	44%	63%	61%	25%	40%	31%
Law Enacted	33%	41%	78%	13%	40%	31%
Regulator	11%	41%	83%	0%	40%	8%
IPPs	78%	33%	83%	13%	100%	19%
Restructuring	44%	52%	72%	38%	40%	4%
Generation Assets Divested	22%	37%	39%	13%	20%	4%
Distribution Assets Divested	11%	30%	44%	13%	20%	4%

Source: The World bank Group, Washington, DC, April 1999.
Note: Numbers in parentheses are the number of countries in each region's sample.

G.4 *Performance Indicators*

Private sector investment in the electricity sector often involves other significant reforms of the sector. Indeed, private investment is unlikely to be forthcoming at affordable interest rates and with satisfactory terms and conditions unless governments also tackle the major infirmities of the sector that often contribute to the sector's poor performance and the need to attract private sector participation. These factors include:

- Subsidized rates,
- Cross-subsidies among electricity users,
- Poor operation and management,
- Lack of transparency in capital allocation,
- Monopolistic market structure,
- Government involvement in day-to-day sector operations, and
- Lack of independent regulation.

Failure to address these issues in a meaningful way will discourage private investment and make it unlikely that the government will be able to achieve its energy sector objectives.

Electricity sector reform and privatization varies, depending on the particular country on which one focuses. However, all countries share some similarities in approach and implementation. While some countries have sought aggressive privatization and reform of their electric power sectors, others have been slow to reform.

A review of electricity privatization efforts by developed and developing countries provides an opportunity to explore the basic principles applied, the major reasons for instituting major sector reform, and also provides an opportunity to look at the results achieved in several countries. This review of electricity sector reform and privatization activities also provides information on how reform activities might be applied to Zambia.

G.5 Summary of Case Studies

Case studies of restructuring and privatization efforts undertaken by several countries are summarized below. A more detailed description and review of these reform efforts is provided in Section 5.1.

G.5.1 United Kingdom

The United Kingdom was among the first of the developed countries to privatize and restructure its electric sector. Privatization of electricity took place within the context of a wholesale privatization of several other state-owned industries. The UK began to privatize its power industry in 1990 and completed the first phase of privatization in July of 1996.

Prior to privatization, the electricity sector in England and Wales was controlled by the nationalized Central Electricity Generating Board (CEGB), which owned all power stations and transmission grids. Distribution was provided by 12 regional power boards which also were publicly owned. The initial steps toward privatization involved the restructuring of the CEGB into four separate companies, still owned by the British government. These included two thermal power generating companies, the national transmission grid and a nuclear power generating company.

In 1990, the two thermal power generating companies, PowerGen and National Power, were privatized through the issuance of equity shares. National Power was the larger of the two companies and accounted for nearly a quarter of UK electricity generating capacity. The national transmission grid is managed by the National Grid Company which was initially owned by twelve regional electricity distribution companies but became an independent company in 1995. The fourth company, Nuclear Electric, (which consists of eight nuclear-fired electricity generating plants) was privatized in July 1996 as the company British Energy.

In Scotland, privatization involved the creation of two integrated companies, Scottish Hydro-Electric and Scottish Power (a distribution and generation company for Scotland), and in Northern Ireland, Northern Ireland Electricity was formed.

Following privatization, through a series of mergers and acquisitions, the regional electricity distribution companies became more vertically integrated. Both National Power and PowerGen and foreign electricity companies, particularly from the United States, placed bids on both the power and distribution companies. There has also been some internal consolidation of Great Britain's electric power and distribution industries and integration with the UK's recently-privatized water utilities.

Several independent power investments in England and Wales have taken place in recent years, involving both U.S. and other foreign investors. There have also been some foreign investments in Northern Ireland following the auction of all power stations to private companies in March 1992. Essentially all of these new suppliers have relied on natural gas as their primary fuel for generation, thereby diversifying the UK's fuel mix, which previously had been predominately based on coal.

Since its initial restructuring program, the UK government through the national regulator has made several modification to the sector to promote effective competition and ensure that the benefits of privatization flow through to consumers. Most noteworthy of these activities is the requirement that the UK's two major generating companies divest a part of their generating assets to improve competition and the requirement that local distribution companies further reduce rates to end users.

The UK model is important to countries contemplating power sector reform because, as one of the first countries to institute major electricity sector reform, it provides an example of how the basic economic principles underlying reform are applied to a real-world situation. It also offers examples of what parts of the reform program worked well and what parts need improvement. Such as:

- The UK model proved that a package of radical reforms to stimulate competition is a plausible alternative to the state-owned vertically integrated utility.
- It showed that industry structure does matter. By initially providing for only two major generating companies, the UK allowed the market to be dominated by these producers resulting in increased profits for suppliers, but little rate reduction for consumers.
- The UK model showed the importance of a strong, independent regulator, which moved aggressively to rectify market distortions once they became evident.
- The UK model was the first to employ an independent entity to operate the transmission system to ensure open access and efficient dispatch of generation. Since then, most large systems undergoing major reform have employed this mechanism.

G.5.2 Chile

Chile was one of the first countries to institute electricity sector reform and privatization. Its reform program began in 1974. Chile instituted pricing reform, followed by commercialization of the government-owned utility companies, and then unbundling of the generation, transmission and distribution functions. Legislation was developed to set out the rules of the market and establish responsibilities and obligations of market participants and also to establish the

authorities of the independent regulator. The unbundled segments of the industry, then, were privatized through the sale of shares to the public.

Distribution and transmission are considered natural monopolies while generation and supply to large consumers (those with demand greater than 2MW) are considered competitive. There are no limits to vertical or horizontal integration. Generation requires a concession. The granting of a generating license is organized as a competitive process where projects are ranked according to costs. Each year, the National Energy Commission (NEC) assesses the minimum cost expansion plan for the system and sets conditions for entry of new generators. Market entry for transmission is free, but service obligations must be met. For distribution, concessions are needed for systems larger than 1,500 MW. These concessions are granted for an indefinite period, but they can be withdrawn if service quality falls below the legal standard.

The sector is controlled by three government institutions: (1) the NEC was created in 1978 to develop medium- and long-term guidelines for the sector and also sets tariffs and grants licenses; (2) the Economic Load Dispatch Center (ELDC) coordinates the activities of all generators and operates the transmission system as a generator's pool; and (3) the Superintendence of Electricity and Fuels was created in 1985 to supervise compliance with laws and regulations and to monitor the quality of services. It also deals with users' and suppliers' complaints and prepares information for the price setting process carried out by the NEC.

Overall performance of the sector has improved greatly following reform and privatization. Availability of generators has reached 97% and more than 70% of required investment has been made by the private sector. Energy losses have been reduced by two-thirds and labor productivity has doubled.

However, several difficulties with the system as implemented have developed. These include the multiplicity of government institutions and their lack of independence and coordination and the ability of generators to also own transmission facilities, which provides opportunities to exercise market power. A major positive element of the reform process was to develop the regulatory mechanism before implementing major restructuring of the sector.Argentina

G.5.3 Argentina

The Government of Argentina adapted the reform models of Chile and the United Kingdom to its electricity sector reform efforts. Its electricity sector restructuring began in 1989 with a revamping of the legal framework, followed by restructuring which began in 1992. The main purposes of the reform process were to achieve efficient pricing and production levels for electricity in the short-term, and an investment level sufficient to meet demand growth in the long-term. To accomplish these goals, unbundling and commercialization of the functions of the major electric utility supplying Buenos Aires and franchising of the distribution segment were initiated in 1989.

A new law to establish an independent regulator—Ente Nacional Regulador de la Electricidad (ENER) was enacted in 1992, and the restructuring process was completed with the privatization of the generation and transmission functions of the utility. Provincial distribution companies are under the authority of the provincial governments. The process of privatizing these entities has

211

not been completed. The regulator is financed through a set of fees levied on all participants in the industry.

The electricity sector in Argentina was unbundled both vertically and horizontally into separate activities. Generation and some supply activities were open to competition while transmission and distribution were concessioned as regional monopolies. There is no partial integration, i.e., the ownership of both generation and transmission as is allowed in Chile.

Generation was restructured through vertical separation from transmission and distribution and was separated horizontally through the creation of 25 business units that were sold separately to private owners. Transmission is considered a natural monopoly but the government also introduced competition by offering concessions for transmission that are subject to renewal from time-to-time. Its regulation is based on the need to ensure open access under a tariff regime. The main transmission provider, Transener, which services the Buenos Aires area, and 4 of the 5 regional transmission companies have been privatized.

Distribution was restructured through vertical separation from generation and transmission and is considered a public service with individual companies established through concession. This sector is regulated through the setting of tariffs based on economic costs and a system of sanctions to ensure quality of service.

There are 22 main distribution companies, most under provincial government jurisdiction. Distributors buy electricity in spot-markets and face competition from large users. The federal government has issued concession contracts for the three largest distributors that service the Buenos Aires area and account for about 60% of demand. Many of the provincial companies are still to be sold. Tariffs are based on economic costs, with a price cap formula and a system of sanctions applied to protect consumers against declining quality of service.

A private, nonprofit company Compania Administradora del Mercado Mayorista Electrico (CAMMESA) is the system operator for the national transmission grid. CAMMESA's main functions are to establish generation dispatch, manage power flows and administer wholesale transactions. The main high voltage network is operated under concession by a regulated private monopoly, Transener SA as par of an unbundled electricity market. Six other private transmission companies hold concession rights to operate and maintain high voltage lines in regional areas.

CAMESSA is responsible for dispatching generation and operating the transmission system. It also performs settlements for all participants in the wholesale market. Its dispatch activities are designed to minimize generation and transmission costs while satisfying demand. It is a non-profit joint stock company owned in equal shares by the Energy Secretary and associations of generators, distributors, transmission carriers, and large users. Large users can contract directly with generators to further increase competition in the sector. However, they must pay access and service fees to the local distribution company.

The results of Argentina's reform process so far have been impressive. Labor productivity in the sector has increased by 23%, efficiency gains measured through reductions in input requirements has increased by 20%, and service quality also has improved. Wholesale electricity prices have been reduced by 56% (from about US $50/MWh) translating into a 16% reduction in retail

212

prices. Transmission has shown explosive growth with medium and high voltage lines increasing by 42% in length from 1991-1997.

However, there is growing concern about the efficiency and fairness of transmission investment rules. In some regions lack of transmission investments has led to outages and reliability problems. More than 90% of power outages are reported to be due to transmission problems that could be substantially avoided with increased investment.

Current arrangements for transmission system expansion are proving to be inadequate to ensure efficient expansion of the network. Therefore, policymakers are considering new methods of ensuring that users have the right of usage of new transmission facilities in order to provide the proper motivation to expand the system. Policymakers also are considering ways to improve the financing of new transmission lines.

G.5.4 Brazil

Brazil's electricity sector is one of the largest in the world. Before restructuring, it was made up of 65 mostly vertically integrated federally and state-owned monopolies. The most pressing issues that led to sector reform were excessive operational costs, the need

for significant capital investment to meet growing demand, limited public finance to meet investment requirements, and inappropriate tariff structures.

Brazil's restructuring effort parallels the reform models in Argentina, Chile, Colombia and the United Kingdom. However, those systems are predominately thermal-based, while Brazil's in predominately hydro. This requires a revised set of operating rules to make the newly competitive system work.

Major elements of Brazil's restructuring program—which is still to be completed—include unbundling of generation, transmission and distribution, with concessions for the generation and distribution sectors. The reforms also created a wholesale market and a system operator, which is responsible for the planning, operation, monitoring and investment decisions for the transmission system. Generation is largely unregulated and service to large users also is subject to competition, transmission and distribution are subject to regulation. There also are restrictions on the share of total and regional markets that can be supplied by a single generator as well as on the share of local markets that can be supplied by a distribution company.

The major challenge for the Brazilian reform effort is to introduce competition in generation, which is more than 90% hydro-based. This involves two main issues. First, to ensure open and fair entry for generation as well as the long-term viability of competition, the government needs to have a clear rule for the allocation of water rights to market participants. Second, the government needs to devise a mechanism to provide incentives for investing in generating capacity and to ensure short-term price stability in the market. To achieve this second goal, a pricing system needs to be developed that will ensure recovery of the high capital costs characteristic of a hydro-based system..

In Brazil, the government owns all water rights. Conferring the right of ownership to specific producers would create an entry barrier to other potential competitors. Therefore, the

government has developed an approach which allocates the right of use of water rights to market participants on a competitive basis.

The Government addressed the second problem by developing a pricing mechanism that utilizes both long-term contracts and a short-term spot market for energy. This system is managed by the system operator and is based on two types of transactions: (1) bilateral long-term contracts between generators and users with 5-year lead times, and (2) short-term spot market sales and purchases. Market participants are required to negotiate 90% of their transactions on the long-term market and agree on contracts specifying prices and volumes. Their remaining needs will be supplied through the spot-market where all users can purchase energy, provided that they have also purchased power under long-term contract.

Brazils' electricity sector reform process is not yet completed. However, indications so far are positive in that a number of generators and distribution systems have been privatized, and the transmission system, which prior to privatization was fragmented among federal and state governments is being transformed into a truly national grid. Importantly, Brazil's reform process shows that unbundling and privatization of a predominately hydroelectric system is feasible as long as efforts are undertaken to ensure fair competition, recovery of high fixed costs, and price stability.

Additional complications of a hydro-based system with which Brazil has had to address include:

- **Optimal Dispatch.** Optimal dispatch of a hydro system depends on the amount and availability of water storage within the system, as decisions need to be made on whether to use the water at the present time or save it for use in the future. To determine the optimal use of water over time requires simulating system operation now and in the future. The length of the simulation period depends on the storage capacity of the system. In Brazil, the time horizon for simulation is five years.
- **Coordination of River Systems.** Often several generating units operate on a single river, so that the generating capability of one unit is influenced by the storage capacity and operation of the others. Resolving this complication requires that the system be operated on a central dispatch basis, where the interrelation of generating units can be taken into account and the system operated to minimize generation costs.
- **Low Marginal Energy Costs.** Marginal energy prices can be quite low for extended periods of time during high water periods. This can hinder the recovery of capital costs if prices are based purely on incremental costs. At the same time during dry periods, the incremental cost of energy can be quite high, resulting in price instability to consumers and also providing incentives for generators to limit competition in supply. Reconciling these competing needs requires focusing competition among generators on both a short-term spot market and on a long-term contracts

G.5.5 Electricity Reform in Sub-Saharan Africa

A number of Sub-Saharan African nations have undertaken programs to reform and privatize their electricity sectors. Although far from complete, these effort may provide some useful input

to the Zambian experience. A review of several African nations' reform programs is presented below.

Ghana

Two state-owned utilities, the Volta River Authority (VRA) and Electricity Corporation of Ghana (ECG), dominate Ghana's power sector, although independent power production is also taking place. VRA owns and operates the hydroelectric facilities on the Volta River, which until recently provided almost all of Ghana's power. VRA also operates the high-voltage transmission grid. VRA jointly owns recently installed thermal capacity at Takoradi in partnership with CMS Energy, with expansion of the plant underway as an Independent Power Producer (IPP). Several additional private power projects also are under development.

The ECG controls distribution in the populous southern and central parts of the country, and the Northern Electricity Department (NED), a separate business unit of VRA, carries out distribution in the sparsely populated northern part of Ghana.

In 1997, an independent regulatory agency, the Public Utilities Regulatory Commission (PURC), was established to take over regulation and tariff-setting from the Ministry of Energy. The Government also set up the Ghana Energy Commission to formulate energy policy and planning for the country. Additional reform legislation, designed to unbundle the electricity sector and establish separate regional distribution companies prior to privatization is pending in Ghana's parliament.

Operations

A crippling drought in 1997-98 forced massive power curtailments and highlighted Ghana's over-dependence on hydro-electricity and lack of a long-term plan for the sector. The severe energy shortage also has led the Government to accelerate IPP development plans. Ghana has purchased power from Cote d'Ivoire since 1995 and also wheels Ivorian power to Togo and Benin. Plans are under development for pipeline delivery of Nigerian and/or Ivorian natural gas to Ghana's power plants.

Prior to the drought, power demand had been growing rapidly for a decade at annual rates higher than 10%, although generating capacity was not expended to meet this increase. A large aluminum smelter accounts for about 40% of national demand, and other large users include several large gold mining operations.

Operating performance in the sector has improved in recent years, particularly in distribution, where customer management and revenue collection have been strengthened. Distribution losses remain high, however, at about 20%. In recent years high demand, supply constraints, system losses and uneconomic tariffs have combined to severely inhibit the economic performance of the sector.

Prices

Ghana has undertaken significant price reform over the last few years. Although a national policy had been to set prices based on marginal cost of production, parliamentary reviews and other delays have slowed implementation. Since 1997, VRA and ECG have been required to submit proposals for bulk supply tariffs and end-user tariffs to the PURC for approval, although

prices remain below economic costs. In recent decisions, the PURC has awarded substantial tariff increases albeit short of the utilities' proposals. In addition, the PURC has declared its intention to link future tariff reviews to the utilities' success in reducing operating losses.

Namibia

Namibia is highly dependent on power imports to meet demand, and domestic resources lack fuel source diversity, being highly dependent on hydropower. The offshore Kudu natural gas field offers the promise of abundant power generation for domestic use and export in the region, but the project structure and stakeholder participation currently remain undetermined.

Total installed generating capacity is about 433 MW, with about 42% thermal and 58% hydro. Peak demand is about 298 MW, and about 32% of the population has access to electricity; 86% in urban areas and 8% in rural areas. Total system losses in 1999 were about 11%, a significant improvement over previous years.

Electricity prices are very low both by international and regional standards. Average bulk power revenue in 1999 was 2.9 US cents/kWh. The present pricing structure and level do not reflect the cost of supply to various areas or customers. Considerable subsidies and cross subsidies exist. In rural areas, distribution of electricity by municipalities is not financially viable due to low consumption levels, high operating costs and inadequate management.

The state-owned utility, NamPower holds a monopoly position over generation and transmission. Power sources are a combination of NamPower generation and imports from Eskom in South Africa. NamPower provides bulk supply to mining and large industrial customers and to about 1,500 commercial farmers. Urban supply is carried out by 46 municipal distribution authorities. In addition, several municipalities overseen by the Ministry of Regional and Local Government and Housing are responsible for supply in rural areas.

In an effort to improve the efficiency and performance of the distribution sector, the operation and management of electricity supply in northern Namibia has been contracted to a Namibian private company—Northern Electricity. This concession is the first of its kind in Namibia and, as such, is a first step in restructuring the power sector.

Namibia passed an Electricity Bill on January 24, 2000. This new law establishes a new regulatory agency, the Electricity Control Board (ECB). The major short-term objectives for the agency are to develop a transparent pricing framework, remove current subsidies, and improve the operations of NamPower.

Namibia is a member of the Southern Africa Development Community (SADC) and participates in the Southern Africa Power Pool (SAPP), which SADC's initiative to develop the regional power market. At present, in addition to imports from South Africa, Namibia exports small quantities of electricity to neighboring areas in Angola and Botswana.

Uganda

Uganda has begun a program of power sector reforms designed to address a number of key issues, including insufficient generating and transmission capacity, high system losses, load

216

shedding, poor quality of service, and poor revenue flow. Technical losses were about 50% in 1999, and the electrification rate is only about 5%. The average price for power in 1999 was about 8.5 US cents/kWh. The level and structure of the tariffs have not been revised since 1993.

The 180 MW Owen Falls hydro plant dominates Uganda's power supply system, supplying the UEB network as well as exports to Kenya, Tanzania and Rwanda. The current generation capacity is inadequate for Uganda's growing economy. At present, load-shedding of around 30% is common at peak hours.

An estimated 80 MW of private generation capacity is in use, of which at least 50MW is in the metropolitan Kampala-Entebbe-Jinja area. It consists mainly of diesel generators. Over 200,000 households are estimated to use car batteries at an estimated delivery cost of US $2.50/kWh.

The Uganda Electricity Board (UEB) a publicly-owned and vertically integrated utility is responsible for generation, transmission, and distribution of electric power in Uganda. Until recent reform, the Ministry of Energy was responsible for oversight of the UEB.

The Electricity Reform Act of January 1998 provides for future unbundling of the UEB and privatization of its distribution and commercial services. The Electricity Bill of 1999 provides for the future regulation of the sector. The government envisions a single-buyer model with multiple generating companies, a single transmission company and a number of distribution companies. In the long-term, a bulk power market could be established with distribution companies and large consumers contracting directly with generators.

The government plans to retain ownership of existing power stations, but will be able to cede them to private operators under long-term leasing agreements. The government would also award new IPP concessions on a competitive bidding basis. The UEB would perform the task of single buyer and operator of the transmission system.

Finally, in order to minimize costs, the government intends to meet rural electricity demand by developing small isolated local generation and distribution systems rather than extending the grid. Evidence of demand for electricity in rural areas and of high willingness to pay for small amounts of electricity per month suggests that such small, decentralized power systems can be financially viable. The long-term goal is to eventually interconnect these systems with each other and with the main grid.

Tanzania

Tanzania's power sector is dominated by a public power system operated by the vertically integrated Tanzania Electric Supply Company, Ltd. (Tanesco). Tanesco's generating capacity is 99% percent hydro, totaling about 600 MW. Average power rates are about 11.7 US cents/kWh. Presently, the Ministry of Energy and Mining (MEM) has regulatory and oversight functions in the sector.

Tanzania's power sector reform program, which envisages unbundling and privatization of the national utility and establishment of a power market, is targeted for implementation within 2 years beginning in late 1999. At present, the rate of electrification is extremely low, at about 10% nationwide and about 1% in rural areas.

Major driving forces for this reform effort are the inadequate collection and billing practices of Tanesco, which have resulted in the poor financial condition of the utility, and the poor quality of service. Total system losses remain high at about 31% in 1999, despite recent improvements. Poor collection (about 66% of total amount billed in 1999) and high O&M costs hamper operations. Moreover, the lack of investment in distribution over the past years has contributed to the poor quality of service, frequent outages, and inability to connect new customers.

Private Generation

The Independent Power Tanzania Limited (IPTL) 100 MW plant outside Dar es Salaam was completed in September 1998, but is still not producing electricity due to a disagreement on the tariff in the power purchase agreement between IPTL and Tanesco/MEM. The dispute is in arbitration at the International Center for Settlement of Investment Disputes (ICSID).

Operations

With a total installed capacity of 598 MW in 1999, the hydroelectricity plants on average accounted for 98% of the total generation of 2.2 GWh. Due to abundant rain and good generation management, Tanesco has been able to meet the demand in 1999 without load shedding as in prior years. Additional emergency capacity was installed in 1997 in the form of the Ubungo power plant (150 MW) outside Dar es Salaam and in the rehabilitation of the Kitadu hydroelectric facility (204 MW). However, total system losses remain high.

Prices

The last tariff increase occurred in January 1999. Existing tariffs include a high level of cross subsidies from industrial and large commercial customers to the domestic and small business customers. For 1999, the average rate for the general use (domestic and small business consumers) was US¢ 12/kWh, while the rate for the industrial and large commercial consumers was US¢ 13/kWh. The average tariff for Zanzibar State Fuel and Power Corporation (ZSFPC), is US¢ 4/kWh. Currently, the Ministry of Energy and Mining (MEM) is in charge of adjusting tariffs.

Policy Outlook

The government approved the Power Policy and Industry Structuring Framework in October 1999. This framework establishes the future structure and operation of the power sector based on the Power Sector Master Plan developed in June 1999. The plan calls for unbundling of the generation, transmission and distribution functions of Tanesco and establishment of an independent regulatory agency.

The government intends to institute a legal framework to accommodate implementation of the new market structure, including establishment of the new regulatory agency. The regulator will ensure that prices adequately reflect supply costs and will act to remove cross subsidies between customer classes. Once the regulatory framework is in place, the government intends to make private sector entry a priority, based on competitive bidding. Privatized distribution is due to be in place by the end of 2000.

Appendix H World Experience in Rural Electrification

H.1 Introduction

A central goal of electricity sector reform in developing countries is to improve the availability of electricity services to poor and remote households. Many electricity reform and privatization programs include a rural electrification or other low-income outreach program as a major element of the overall reform process. Generally, this program is intended to use the reform process as a way to extend service to low-income and remote consumers. However, too often the rural electrification program is an "add-on" to the larger reform process, rather than an integrated part of the larger effort. Also, too often the rural electrification program relies predominately on subsidies and a centrally planned approach, rather than attempting to use the same decentralized, competitive approach involving the private sector that is the major element of the larger reform and restructuring process.

Rural electrification and low-income assistance programs often rely on extension of the existing electricity grid to provide service to new consumers. Extending the grid is an expensive operation not only because of the high cost of the facilities, but also because of the low density of consumers in rural areas and their low consumption levels. This makes the per-unit cost of electricity expensive, as the high fixed costs of the system are spread over a relatively few units of consumption. When combined with the low income of the consumers in these areas, the affordability of electric service becomes a major issue.

The alternative to grid extension is to supply rural areas with off-grid electricity in the form of single unit systems or small, isolated systems serving rural communities. These systems generally use diesels, renewable energy technologies, such as solar or wind technology or small hydroelectric installations. Major difficulties with this option are to adapt the available technology to fit the particular situation and to train local entities and individuals to operate and maintain the systems to ensure their sustainability. Also, quality of service issues may arise, as the quality of service from a remote, isolated system generally is less than that from an on-grid connection. Sometimes, this can cause dissatisfaction among consumers. Finally, the affordability question remains an issue with off-grid service. These systems can be as expensive, or more so, than on-grid technologies, thereby straining the financial resources of rural consumers.

In spite of the many difficulties encountered in rural electrification programs, governments remain committed to their development. This is due to the fact that the welfare gains to rural and low-income communities and individuals is generally much larger than the financial costs of the system. In addition, low-income and rural consumers have indicated a high level of interest and a willingness to pay for electric service. The issue, then becomes how to develop a program that delivers electricity to these consumers in ways that provide a basic, affordable service at the minimum cost.

Several countries have developed rural electrification programs recently that have largely been successful in achieving this goal. A case study on the design and implementation of a rural electrification program in Chile is presented below.

H.2 The Impact of Electricity Reform Programs

For electricity delivered to rural areas either through networks or off-grid, the costs that matter most to poor consumers is the capital cost of connecting to the service, not the unit energy cost. With low incomes, the poor also consume small amounts of energy over which to recover the costs of service expansion. The focus of programs to expand availability of energy services to low income consumers, then, should be on ways to reduce system expansion costs through the application of new technologies, and development of innovative commercial and financing methods.

Electricity sector reform and privatization programs can do much to reduce supply costs overall, thereby reducing the cost of providing service to poor as well as non-poor consumers. This is accomplished through mechanisms that promote competition and private investment in the sector.

The driving force of electricity sector reform efforts is to reduce costs and improve efficiency in the supply sector, as well as to reduce the need for government financing for new supply additions. To the extent that these efforts are successful, the cost of supplying electricity to all consumers should be reduced.

Government-owned monopoly utilities in many developing countries have low incentives for efficiency, and often perform other social service functions that contribute to the high cost and low quality of energy services provided to consumers. Moreover, these utilities also generally rely on government subsidies to recover many of their costs. But since these subsidies often are not forthcoming, due to the financial burdens of governments, the utilities often cannot adequately maintain or expand their systems to meet consumer needs. This results in further deterioration of service quality and the inability to provide service of any kind to poor and remote consumers.

Efforts to reform and privatize electricity systems are designed to eliminate many of the factors that inhibit the ability of utilities to provide adequate and affordable service to poor consumers. Reform efforts in many developing countries (e.g., Chile, Argentina, Brazil) have resulted in significant efficiency improvements, lower costs to consumers, and improved revenue flows to the utilities. This has improved their capability to expand coverage to low-income and remote consumers.

Achieving this goal is difficult, and efforts to expand coverage have not always been successful, due to a myriad of complex factors. But recent efforts to expand the availability of electricity service, in particular, too poor consumers have shown promise.

It is important to remember—and recent successful efforts to expand coverage have shown—that programs to expand coverage of energy service to poor and remote areas need to be consistent with overall efforts to reform and privatize the energy sector of a developing country. This means that such programs:

- Need to be carefully designed and implemented;
- Need to involve all stakeholders, including the private sector;

320

- Need to rely primarily on incentives and competition to achieve program goals; and
- Need to minimize and target the use of government subsidies.

H.3 Competition in Supply

The supply segment of the energy sector—providing energy services to end users—is not a natural monopoly. Therefore the potential for competition in this sector to act as a mechanism to expand coverage to low income consumers is increasingly being realized by developing countries. Competition in this segment of the sector has included outsourcing of customer billing and meter reading services and offering incentives for private sector companies to expand coverage and reduce losses. Energy services companies (ESCOs) also have been promoted to provide services to consumers that promote efficient use of energy to enable consumers to lower their overall energy bill.

In developing countries, energy supply costs also have been reduced by developing new institutional arrangements that reduce costs and improve revenue flow by increasing customer involvement in the supply segment of the industry. Efforts in this regard include employing local persons for customer relations and metering and billing functions; involving local institutions and customers in designing and implementing service expansion programs; and utilizing new financing methods to reduce the up-front costs of system connections to consumers.

H.4 The Impact of Subsidies

Governments have come to recognize that many existing subsidies designed to help the poor afford energy services are poorly designed and implemented. This often results in increased costs and reduced service availability to poor consumers, a direct contradiction to the results that are intended to be achieved. For example, governments often have subsidized electricity prices as a method of reducing costs to residential consumers who often have low incomes and consume small amounts of power. However, unless specifically designed to target this subsidy to low income consumers (for example, through a well designed lifeline rate program), this subsidy provides most of its benefit to higher income consumers who consume significantly higher amounts of electricity than the poor. Moreover, this type of subsidy also contributes to the poor financial conditions of many government-owned utilities, thereby further contribution to poor service quality and to the inability of the utility to expand service to low-income consumers.

The reform and privatization of the energy sector, if properly designed and implemented, will help to significantly improve efficiency of energy supply and reduce costs to consumers. Moreover, by properly pricing energy services, it will also help promote efficient use of energy supplies and encourage consumers to utilize cost-effect energy efficiency and conservation technologies. However, in most cases, effective reform programs alone cannot solve the problem of expanding coverage to low income and remotely located consumers. Such programs also need to incorporate a specific activity to achieve this goal within the overall reform effort.

H.5 Innovative Policy

For most goods and services, it is now generally accepted by policymakers and other industry participants that the best way to respond to consumer needs and to spur innovation is to allow provision of services by a range of service providers that compete in terms of quality and price. The role of government institutions and regulators, then, should concentrate on developing a policy and institutional framework to support development of competitive markets and sets standards of investment and operation that help ensure sustainable quality services to consumers. In this regard, policymakers should focus on four primary areas.

Electricity Sector Restructuring and Privatization Monopoly providers with exclusive franchises have little incentive for efficiency, innovation, or to expand services to low-income areas. Electricity markets should be restructured to facilitate open entry and competition in generation and retail services. For remote and low-income consumers, government policymakers should look to develop mechanisms that utilize competition, private investment and multiple service providers to meet the energy needs of the poor. Subsidies, where needed, should be transparent, targeted and used to reduce the initial cost of delivery system installation.

Pricing Reform Pricing distortions in both developing and developed countries have contributed to the financial difficulties and high cost structure of utility companies and reduced their ability to provide services to consumers. Moreover, price subsidies often do not benefit intended recipients and are not sustainable in the long-term. For example, uniform electricity tariffs set below the full cost of supply make the sector dependent on public subsidies that are not sustainable. These subsidies ultimately result in financially weak service providers and poor quality of service.

Cross subsidies between customer classes also rarely help the poor, who consume very low amounts of energy or are not connected to the grid at all. To address these issues, governments should set prices to reflect the true economic costs of service. Where subsidies are needed, they should be transparent, clearly targeted to reach intended recipients, and delivered in a manner that minimizes market distortions. Taxes on fuel use, imports, and equipment also should be reviewed to determine their impact on energy markets and on the cost and availability of energy services to the poor.

Regulatory Approach: Effective reform of the electricity sector requires an effective, independent regulatory agency to oversee the industry. The role of the regulator should be to set the framework and ground rules within which industry participants operate. This include such activities as (1) ensuring a competitive market structure, including free entry and exit by service providers; (2) preventing exercise of market power; (3) protecting consumers; (4) setting investment, operating and quality of service standards; and (5) establishing economically efficient prices. With regard to low income consumers, regulators should ensure that industry operations and procedures do not place barriers on their ability to acquire affordable service. For example, regulators should review technical and service standards to ensure that they are appropriate for remote communities. Regulators also should review and oversee rate subsidies, such as lifeline rates, to ensure that they reach intended recipients and minimize market distortions.

Government Energy Policy: Government energy policy should take a holistic approach to energy markets. That is, they need to look at the total impact that energy policies and programs have on the ability of suppliers to provide affordable, quality service and on the ability of consumers to have access to these services. This means that governments should not just look at market structure and pricing issues, but also at tax policy, technical standards, import restrictions and other interventions that may impact the cost and availability of energy services to the poor. This, importantly, should include the availability and cost of credit to rural areas and low-income consumers. Policymakers also should look for methods to mobilize communities, consumer groups, service providers and other organizations to help facilitate development of rural energy markets.

H.6 Case Study—Rural Electrification In Chile

H.6.1 Designing the Program

Rural electrification in Chile has traditionally been the domain of state-owned power companies, which followed centrally developed plans and relied on subsidies from the central government and on cross-subsidies from tariffs set above costs for urban consumers. However, lack of funding and pressure from competing priorities made progress on rural electrification slow.

By the mid-1990s, more than half the rural population of Chile still had no access to electricity, while about 97% of urban households were electrified. To increase rural access to electricity, Chile launched a new rural electrification program. This program was specifically designed to be compatible with the government's overall reform program for the electricity sector. The program was initiated in November 1994, and was designed to reach 75% of the rural population by 2000. It was estimated that the central government would need to provide US $150 million in subsidies to allow electrification of about 110,000 dwellings.

The program relies on competition, private investment, and decentralized decision making to achieve its goals. The objective of the program is, with the use of a subsidy, to make rural electrification an attractive business opportunity. To help ensure buy-in, all participants, including the government, private sector, and users, are required to contribute funding for the program.

The government's contribution—the subsidies and the cost of running the program—is delivered through a specific fund set up to competitively allocate a one-time direct subsidy to private electricity distribution companies to cover part of their investment in rural electrification projects.

To apply for a subsidy, companies submit their projects to the local community, which then submits them to the regional government. The regional government, then, allocates funds to those projects scoring best on several objective criteria, including:

- Cost-benefit analysis;
- Amount of investment covered by the local distribution companies; and

223

- Social impact.

Bids are conducted annually. The central government provides funds to regional governments on the basis of two criteria: (1) how much progress a region has made in rural electrification in the previous year; and (2) how many households remain without electricity service. Regional governments also allocate their own funds to the program.

The designers of the program set out to devise a scheme that would promote private investment, stimulate competition, and take into account the structural reforms in the power sector. The program was built around four principles:

Decentralized Decision Making

The program was designed to involve regional governments in the identification of needs, choice of solutions, and in decisions about the allocation of funds from the central government. To involve local communities, the program requires that projects be requested by organizations rather than individuals. The role of the central government also is to provide economic resources and technical assistance to help coordinate the institutions involved in the program. It also developed the criteria and tools for evaluating the projects.

H.6.2 Joint Financing

To ensure sustainability and buy-in, all participants—the central and regional governments, electricity companies and users—contribute to the funding of projects. The central government's subsidy is allocated only to projects with a positive social return and also covers expenditures related to managing the program. Facilities built under the program are owned by the local privately-owned distribution company rather than the government. The goal here was to make rural electrification an attractive opportunity for electric utilities. Companies also are required to invest their own funds in the project and users contribute both at the investment phase of the project and during the operation phase through their monthly bills.

H.6.3 Competition

To reduce the risk of politicization, minimize project costs, and encourage innovation, competition is used at as many levels as possible among project participants. To ensure a fair process in project selection, the rules for deciding among competing projects are transparent and stable and are established by the central government.

H.6.4 Appropriate Technologies

For solutions to rural electrification needs, the program considers grid extension and distributed technologies, including photovoltaic systems for isolated rural dwellings; hybrid systems; small hydroelectric power stations; and biomass systems. To ensure sustainability, all costs over the life of the projects are considered in the appraisal, and organizational programs for operating and maintaining the projects also are included.

H.6.5 Role of the Participants

The central government's role in providing funds, technical assistance and coordinating the program is provided by the electricity sector regulatory agency, the National Energy Commission (CNE), which also regulates the electricity sector. CNE is in charge of preparing the initial planning and management model for the program, which was presented to the technical units of the regional governments for use in their participation in the program. It also created methodological tools to ensure efficient allocation of government subsidies and prepared pre-investment studies to generate initial project portfolios for each region.

Communities in areas lacking electricity generally propose rural electrification projects with the support of local distribution companies interested in providing the service. A community proposes a project to its municipality, which then asks the distribution company to prepare a technical proposal at no cost to the municipality. Once the proposal is prepared, the municipality lists the project in a publicly accessible register.

Using the prescribed criteria and tools established by CNE, the regional agency evaluates competing projects, analyzing their economic and financial costs and benefits and calculating the contribution of the distribution company and the subsidy required for each project. Only projects with a positive social return but a negative private return are considered for subsidy.

After the projects are analyzed, all those meeting the minimum requirements are submitted to the regional government, which then submits a proposal to the regional council. The council allocates government funds to the projects based on the number of beneficiaries, the unit cost, and the financing needs. The funds are allocated to the distribution companies that make the investment in each project.

The responsibility for financing a project is split up among participants, as follows:

- Users must cover the cost of the in-house wiring, the electric meter, and the connection to the grid. These expenditures, which average to about 10% of the total cost of each project, initially are financed by the distribution company and repaid by users over time through their monthly bills. Once the project is operating, the users pay the regulated tariffs set by CNE.
- The distribution company is required to invest an amount established by the government, using a formula established by CNE. The company must also operate, manage and maintain the project, recovering its costs through tariffs established by CNE.
- The government must provide a subsidy for the investment costs that is no more than the negative net present value of the project, which must be less than the total investment
- Grants from international organizations also have been used for projects, especially those involving experimental technologies involving self-generation and other alternative energy sources.

225

H.6.6 Results of the Program

The program has increased the coverage of electricity in rural areas from 53% in 1992 to 76% at the end of 1999, exceeding the target rate of 75% by 2000. The program has shown that it is possible to create market incentives that lead to cost-effective solutions to rural electrification involving the private sector.

An innovative aspect of the program is its reliance on competition among users, central, regional and local governments, and private sector participants to reduce costs and improve the efficiency of specific projects. So far, the government (at all levels) has contributed the most financial assistance to the program, US $112 million from 1995-1999. Private companies have helped define the projects, made investments, undertaken the commercial risk, and continue to own and operate the projects. Private investment has totaled US $60 million. Companies that have participated in the program do so as a strategic move to protect their existing distribution area and discourage entry by competitors.

Most of the projects have involved grid extension. But several have involved alternative technologies, mainly one-house photovoltaic systems. The nonconventional technologies generally provide electricity at a higher cost and poorer service quality (lower voltage, fewer hours of operation). However, they have been attractive in areas where extending the grid is too costly.

H.7 Off-Grid Electrification

For the foreseeable future the prospects of better energy services for many of the rural poor will depend on finding better, cheaper off-grid energy sources. Poor communities and households will need help in making informed decisions between energy services and may have to take collective action to secure them. Financing hurdles also must be overcome and both technical and commercial innovations are needed. While there are many promising developments, the costs of implementing off-grid projects remains high. In this context, two government roles are likely to be critical:

- Reforms are needed not only in electricity markets but also in the broader commercial energy markets on which many of the poor rely; and
- The use of subsidies must be improved in ways that encourage innovation.

Decisions on provision of off-grid electricity services are still made primarily by governments, donors and non-government organizations. But there has been much experimentation with methods of delivering off-grid electricity services. These experiments cast light on the key factors that could drive service improvements in rural areas, including:

- Technological advances that reduce costs and increase ease of use and maintenance of small-scale systems;

- Organizational innovations that help communities choose, implement and maintain improved systems; and
- Innovations in financing—with or without the aid of subsidies—that help poor households over the hurdle of high capital costs.

Technological Advances. Technology selection should mesh with willingness to pay and customer service requirements. Most of-grid technologies differ from on-grid service in that consumption must be adjusted to the supply. For example, some systems provide service for only a few hours a day (solar systems) and would not allow for refrigeration and other continuous uses. And a mini-hydro unit either supplies insufficient power to meet peak demand or has excess power during off-peak hours. Consumers must either ration their electricity consumption or develop off-peak uses to ease the financial burden.

Competition in the market to connect new customers might encourage distribution utilities to become more innovative in the technology and service delivery options they offer. This would require a market structure that allows open entry for the ability to supply new customers. Regulation would focus on simple rules, e.g., for licensing and technical standards and on minimizing transaction costs through provision of standardized contracts and procedures and access to information.

Organizational Innovations. The central planning approach undertaken my most governments and donors to technology selection does not work in most instances, particularly for off-gird systems. Generally with this type of approach, customers and service suppliers are not consulted in any meaningful way, there is no strong sense of ownership of projects by users or suppliers, and users often lack an understanding of the true cost of supply. The government should design off-grid programs to allow customers and service suppliers to make technology decisions, while assuming a facilitating role.

Financing Innovations. Financing of the initial installation and hook-up costs is a major barrier to many low-income consumers taking advantage of the opportunity for electricity service. While many off-grid systems have a log service life, their initial capital cost is high (especially when compared with the incomes of low-income consumers) and this cost usually can be financed only over short time periods.

Countries are exploring several solutions to this problem. Two broad approaches are developing: (1) to subsidize service provision in some way, e.g., by the government providing a one-time payment to cover some—or all—capital costs; and (2) for the government to facilitate the extension of credit for new low-income consumers through financial options offered by the private sector.

Success in extending off-grid energy services to low income consumers will most likely come from policies that open up markets in energy services to the private sector and to competition—and rely less on centralized decisions by policymakers in deciding what technologies to employ and how the delivery system should work.

Evidence suggests that the biggest single hurdle for most low-income households is the up-front capital cost, which can range from US $50 to well over US $1,000. Potential customers have indicated a willingness to take medium-term loans to fund up-front costs, repaying them as part of their monthly bill over the first 5 years or so of service.

Equipment manufacturers, energy service companies, consumer groups, trade groups and others need to become more involved in developing the energy services market for low income households. This can happen only if policymakers create an appropriate environment and if existing distribution entities are provided with incentives to help meet the needs of poor consumers—by being privatized or otherwise loosing their monopoly position in the market. Policymakers need to allow competition in the market for new customers and to provide mechanisms, including directed subsidies to help defray the initial cost of off-grid systems.

H.8 Case Study—Rural Off-Grid Service in Argentina

In 1995, the Government of Argentina established an experimental program for off-grid electrification of dispersed rural populations and for provincial public services, such as schools, health centers, and police stations. The federal Secretariat of Energy set up the program, Programs de Abastecimento Electrico a la Poblacion Rural de Argentina (PAEPRA), to promote electricity supply within 6 years for 314,000 rural households and 6,000 public service entities in 16 provinces. Wherever possible, the program is to give preference to renewable energy systems.

To help ensure funding for off-grid projects, the World Bank is supporting a component concessioning project covering 8 of the provinces over 6 years. This project called Proyecto de Energie Renovable en el Mercado Electrico Rural (PERMER) is intended to provide electricity to about 70,000 households and 1,000 public service entities at an expected cost of US $120 million.

The role of the federal government in supporting these programs is to prepare standards for electricity equipment, training staff of provincial regulatory bodies, developing databases on renewable energy resources, and disseminating information and early implementation lessons through seminars and workshops.

Under this approach, concessions are granted to private bidders that require the lowest subsidy to serve a given area. The concessions will electrify rural markets of 3,000 to 25,000 customers using solar, wind , mini- and micro-hydropower and other renewable technologies.

A model concession contract has been designed by the government to ensure that the concessionaire maximizes private investment and minimizes public subsidies. Once a concession is awarded, the concessionaire chooses the technologies best suited to meet demand and the willingness to pay of each village. The subsidy paid by the government is means-based and depends on the energy service level and chosen technology. In the early years of the program, when subsidies are highest, they will be partially funded by donor agencies. The subsidy can cover a share of the installation cost and, for the very poor, a part of the monthly tariff. The subsidy will decline over the 15-year concession period.

In the early 1999s, Argentina unbundled and privatized its electricity generation and transmission sectors. Distribution companies, mostly owned by provincial governments, were privatized shortly thereafter through concession contracts. Generation is competitive, but distribution concessionaires receive exclusive coverage of their designated areas. However, concessions are subject to review for quality of service and can be contested by potential entrants. The rural electrification program developed by the government needs to be consistent with this new competitive market structure.

H.9 Case Study—Private Provision of Photovoltaic Systems in Kenya

This case study is an indication that decentralized programs with open access, involvement my major stakeholders, and private sector investment can function to meet the energy needs of rural populations when centralized programs have failed to do so. It offers key insights into how a rural electrification program based on off-grid technology might work in other developing countries.

Historically, fewer than 2% of Kenya's rural households have access to network supplied electric service. Efforts by the government-owned monopoly utility to expand coverage have been unsuccessful. This has caused some households to turn to alternative suppliers using a different technology—photovoltaic systems. Since 1990, more than 2.5 MW of photovoltaic systems have been sold in Kenya, mostly to households among the top 25% of rural income earners. However, technical and commercial innovations have reduced costs and brought photovoltaic systems within reach of lower income consumers.

Photovoltaic systems have become smaller and cheaper. And just as important, leasing and financial entities have entered the market, enabling lower income consumers to purchase systems on credit. The government has allowed this market to develop on a competitive basis and has provided support through liberalization of foreign exchange and import regimes.

Photovoltaic systems provide a low-cost option for sustainable private sector-based off-grid rural electrification. Some 120,000 solar photovoltaic systems have been sold in Kenya since 1990, and from 1992-1998 the market grew at 20% per year. Most buyers are middle-income households with some knowledge of the systems. Local entrepreneurs have played a key role in the process by aggressively marketing photovoltaic systems and downsizing the systems to meet the needs of consumers.

The development of this market is due to a number of factors, including:

- The inability of the government-owned utility to provide service to the vast majority of rural households;
- The willingness of rural consumers to pay for electricity service to meet their needs;
- Technological advances that reduced the cost of photovoltaic systems;
- Private sector initiative that sought to develop this market; and
- Government policy that facilitated development of this market.

H.9.1 History

Following a significant drop in the cost of solar modules in the early 1980s, donors and governments began turning to photovoltaic technology for remote power needs in East African nations. In 1982, photovoltaic-power water pumps came into use in Ethiopia and Somalia. Lighting and refrigeration systems found application in Kenya, Tanzania and Uganda. In addition, signaling and telecommunications became an immediate market for solar modules.

Following these events, the market for photovoltaic systems to supply rural households began to develop in Kenya as consumers discovered that these systems provided superior service for household use than generator sets. A small number of donor-initiated projects installed demonstration systems in off-grid schools and missions. These programs trained local workers to install and maintain the systems. Once a threshold level of market awareness was reached, local companies moved to further develop this market.

Aggressive marketing quickly saturated the market for large photovoltaic home systems. Most rural Kenyans cannot afford the cost of a US $1,000 or more 60 peak-watt system. Photovoltaic dealers then began to alter their product to meet the needs of lower-income rural households by developing smaller, lower-cost systems. In 1990, 2,400 12 peak-watt systems were sold at a retail price of US $100. By 1998, more than 22,000 of these systems were sold at a retail price of US $65.

Growing demand for photovoltaic systems inspired local merchants to look for ways to further expand the market. Since middle-income households often could not afford to cover the up-from cost of a photovoltaic system, marketers began to look at ways to reduce this cost through financing methods.

Lease-purchase of consumer goods such as a sewing machines, televisions, stereos, and bicycles, has been a common practice in Kenya for many years. In 1996, a leading photovoltaic company began offering attractive credit terms to lease-purchase retailers and sought a wide base of agents. By 1998, the company sold more than 1,500 systems on credit. Currently at least 4 leading photovoltaic importers supply systems to lease-purchase retailers, and about 15% of systems are sold through this mechanism.

H.9.2 Market Potential

Since 1990, more than 2.5 MW of photovoltaic capacity has been sold in Kenya. More than 60% of these sales were for home solar systems. By 1993, 3% to 4 % of the rural population had acquired a solar system, and 70% of the population were aware of he systems. During that year, the total photovoltaic market was about 480 peak kilowatts. Of this, more than 250 peak kilowatts was represented by modules of 20 peak watts or less. This is an indication of the sustained and growing demand for these systems and a clear indication of the value that the rural population place on commercially available electricity technology.

H.9.3 Consumer Benefits

In real terms, prices for photovoltaic systems have fallen over the past 5 years as the market has grown and competition increased. Photovoltaic systems can save consumers more than $8 a month over more traditional forms of energy use (dry cell batteries and kerosene). Thus, a 10-15 peak-watt system can pay for itself within 1.5 to 2 years. Households also experience an improvement in quality of energy delivered by reducing the need to carry batteries back and forth to a charging station and by reducing internal pollution.

H.9.4 Government Policy

Government energy policy in Kenya has been directed to increase private investment and promote competition in the electricity sector. In 1997, the government passed the Electric Power Act, which privatized Kenya Power and Light, although the government retained a controlling ownership share in the company. The generation sector is open to competition, with 3 IPPs currently operating and more preparing to enter the market. Kenya Power and Light, however, retains its monopoly over distribution. In an effort to reduce costs, the company has placed a priority on urban and industrial customers rather than expanding service to high-cost rural areas.

To support the off-grid rural electrification activities, the Government of Kenya has removed import, price and foreign exchange controls and has opened markets to competition. It also has reduced duties on photovoltaic modules to 5% and removed the value added tax, thereby lowering the price to consumers by 15 to 20%.

Appendix H World Experience in Rural Electrification

H.1 Introduction

A central goal of electricity sector reform in developing countries is to improve the availability of electricity services to poor and remote households. Many electricity reform and privatization programs include a rural electrification or other low-income outreach program as a major element of the overall reform process. Generally, this program is intended to use the reform process as a way to extend service to low-income and remote consumers. However, too often the rural electrification program is an "add-on" to the larger reform process, rather than an integrated part of the larger effort. Also, too often the rural electrification program relies predominately on subsidies and a centrally planned approach, rather than attempting to use the same decentralized, competitive approach involving the private sector that is the major element of the larger reform and restructuring process.

Rural electrification and low-income assistance programs often rely on extension of the existing electricity grid to provide service to new consumers. Extending the grid is an expensive operation not only because of the high cost of the facilities, but also because of the low density of consumers in rural areas and their low consumption levels. This makes the per-unit cost of electricity expensive, as the high fixed costs of the system are spread over a relatively few units of consumption. When combined with the low income of the consumers in these areas, the affordability of electric service becomes a major issue.

The alternative to grid extension is to supply rural areas with off-grid electricity in the form of single unit systems or small, isolated systems serving rural communities. These systems generally use diesels, renewable energy technologies, such as solar or wind technology or small hydroelectric installations. Major difficulties with this option are to adapt the available technology to fit the particular situation and to train local entities and individuals to operate and maintain the systems to ensure their sustainability. Also, quality of service issues may arise, as the quality of service from a remote, isolated system generally is less than that from an on-grid connection. Sometimes, this can cause dissatisfaction among consumers. Finally, the affordability question remains an issue with off-grid service. These systems can be as expensive, or more so, than on-grid technologies, thereby straining the financial resources of rural consumers.

In spite of the many difficulties encountered in rural electrification programs, governments remain committed to their development. This is due to the fact that the welfare gains to rural and low-income communities and individuals is generally much larger than the financial costs of the system. In addition, low-income and rural consumers have indicated a high level of interest and a willingness to pay for electric service. The issue, then becomes how to develop a program that delivers electricity to these consumers in ways that provide a basic, affordable service at the minimum cost.

Several countries have developed rural electrification programs recently that have largely been successful in achieving this goal. A case study on the design and implementation of a rural electrification program in Chile is presented below.

H.2 The Impact of Electricity Reform Programs

For electricity delivered to rural areas either through networks or off-grid, the costs that matter most to poor consumers is the capital cost of connecting to the service, not the unit energy cost. With low incomes, the poor also consume small amounts of energy over which to recover the costs of service expansion. The focus of programs to expand availability of energy services to low income consumers, then, should be on ways to reduce system expansion costs through the application of new technologies, and development of innovative commercial and financing methods.

Electricity sector reform and privatization programs can do much to reduce supply costs overall, thereby reducing the cost of providing service to poor as well as non-poor consumers. This is accomplished through mechanisms that promote competition and private investment in the sector.

The driving force of electricity sector reform efforts is to reduce costs and improve efficiency in the supply sector, as well as to reduce the need for government financing for new supply additions. To the extent that these efforts are successful, the cost of supplying electricity to all consumers should be reduced.

Government-owned monopoly utilities in many developing countries have low incentives for efficiency, and often perform other social service functions that contribute to the high cost and low quality of energy services provided to consumers. Moreover, these utilities also generally rely on government subsidies to recover many of their costs. But since these subsidies often are not forthcoming, due to the financial burdens of governments, the utilities often cannot adequately maintain or expand their systems to meet consumer needs. This results in further deterioration of service quality and the inability to provide service of any kind to poor and remote consumers.

Efforts to reform and privatize electricity systems are designed to eliminate many of the factors that inhibit the ability of utilities to provide adequate and affordable service to poor consumers. Reform efforts in many developing countries (e.g., Chile, Argentina, Brazil) have resulted in significant efficiency improvements, lower costs to consumers, and improved revenue flows to the utilities. This has improved their capability to expand coverage to low-income and remote consumers.

Achieving this goal is difficult, and efforts to expand coverage have not always been successful, due to a myriad of complex factors. But recent efforts to expand the availability of electricity service, in particular, too poor consumers have shown promise.

It is important to remember—and recent successful efforts to expand coverage have shown—that programs to expand coverage of energy service to poor and remote areas need to be consistent with overall efforts to reform and privatize the energy sector of a developing country. This means that such programs:

- Need to be carefully designed and implemented;
- Need to involve all stakeholders, including the private sector;

- Need to rely primarily on incentives and competition to achieve program goals; and
- Need to minimize and target the use of government subsidies.

H.3 Competition in Supply

The supply segment of the energy sector—providing energy services to end users—is not a natural monopoly. Therefore the potential for competition in this sector to act as a mechanism to expand coverage to low income consumers is increasingly being realized by developing countries. Competition in this segment of the sector has included outsourcing of customer billing and meter reading services and offering incentives for private sector companies to expand coverage and reduce losses. Energy services companies (ESCOs) also have been promoted to provide services to consumers that promote efficient use of energy to enable consumers to lower their overall energy bill.

In developing countries, energy supply costs also have been reduced by developing new institutional arrangements that reduce costs and improve revenue flow by increasing customer involvement in the supply segment of the industry. Efforts in this regard include employing local persons for customer relations and metering and billing functions; involving local institutions and customers in designing and implementing service expansion programs; and utilizing new financing methods to reduce the up-front costs of system connections to consumers.

H.4 The Impact of Subsidies

Governments have come to recognize that many existing subsidies designed to help the poor afford energy services are poorly designed and implemented. This often results in increased costs and reduced service availability to poor consumers, a direct contradiction to the results that are intended to be achieved. For example, governments often have subsidized electricity prices as a method of reducing costs to residential consumers who often have low incomes and consume small amounts of power. However, unless specifically designed to target this subsidy to low income consumers (for example, through a well designed lifeline rate program), this subsidy provides most of its benefit to higher income consumers who consume significantly higher amounts of electricity than the poor. Moreover, this type of subsidy also contributes to the poor financial conditions of many government-owned utilities, thereby further contribution to poor service quality and to the inability of the utility to expand service to low-income consumers.

The reform and privatization of the energy sector, if properly designed and implemented, will help to significantly improve efficiency of energy supply and reduce costs to consumers. Moreover, by properly pricing energy services, it will also help promote efficient use of energy supplies and encourage consumers to utilize cost-effect energy efficiency and conservation technologies. However, in most cases, effective reform programs alone cannot solve the problem of expanding coverage to low income and remotely located consumers. Such programs also need to incorporate a specific activity to achieve this goal within the overall reform effort.

H.5 Innovative Policy

For most goods and services, it is now generally accepted by policymakers and other industry participants that the best way to respond to consumer needs and to spur innovation is to allow provision of services by a range of service providers that compete in terms of quality and price. The role of government institutions and regulators, then, should concentrate on developing a policy and institutional framework to support development of competitive markets and sets standards of investment and operation that help ensure sustainable quality services to consumers. In this regard, policymakers should focus on four primary areas.

Electricity Sector Restructuring and Privatization Monopoly providers with exclusive franchises have little incentive for efficiency, innovation, or to expand services to low-income areas. Electricity markets should be restructured to facilitate open entry and competition in generation and retail services. For remote and low-income consumers, government policymakers should look to develop mechanisms that utilize competition, private investment and multiple service providers to meet the energy needs of the poor. Subsidies, where needed, should be transparent, targeted and used to reduce the initial cost of delivery system installation.

Pricing Reform Pricing distortions in both developing and developed countries have contributed to the financial difficulties and high cost structure of utility companies and reduced their ability to provide services to consumers. Moreover, price subsidies often do not benefit intended recipients and are not sustainable in the long-term. For example, uniform electricity tariffs set below the full cost of supply make the sector dependent on public subsidies that are not sustainable. These subsidies ultimately result in financially weak service providers and poor quality of service.

Cross subsidies between customer classes also rarely help the poor, who consume very low amounts of energy or are not connected to the grid at all. To address these issues, governments should set prices to reflect the true economic costs of service. Where subsidies are needed, they should be transparent, clearly targeted to reach intended recipients, and delivered in a manner that minimizes market distortions. Taxes on fuel use, imports, and equipment also should be reviewed to determine their impact on energy markets and on the cost and availability of energy services to the poor.

Regulatory Approach: Effective reform of the electricity sector requires an effective, independent regulatory agency to oversee the industry. The role of the regulator should be to set the framework and ground rules within which industry participants operate. This include such activities as (1) ensuring a competitive market structure, including free entry and exit by service providers; (2) preventing exercise of market power; (3) protecting consumers; (4) setting investment, operating and quality of service standards; and (5) establishing economically efficient prices. With regard to low income consumers, regulators should ensure that industry operations and procedures do not place barriers on their ability to acquire affordable service. For example, regulators should review technical and service standards to ensure that they are appropriate for remote communities. Regulators also should review and oversee rate subsidies, such as lifeline rates, to ensure that they reach intended recipients and minimize market distortions.

Government Energy Policy: Government energy policy should take a holistic approach to energy markets. That is, they need to look at the total impact that energy policies and programs have on the ability of suppliers to provide affordable, quality service and on the ability of consumers to have access to these services. This means that governments should not just look at market structure and pricing issues, but also at tax policy, technical standards, import restrictions and other interventions that may impact the cost and availability of energy services to the poor. This, importantly, should include the availability and cost of credit to rural areas and low-income consumers. Policymakers also should look for methods to mobilize communities, consumer groups, service providers and other organizations to help facilitate development of rural energy markets.

H.6 Case Study—Rural Electrification In Chile

H.6.1 Designing the Program

Rural electrification in Chile has traditionally been the domain of state-owned power companies, which followed centrally developed plans and relied on subsidies from the central government and on cross-subsidies from tariffs set above costs for urban consumers. However, lack of funding and pressure from competing priorities made progress on rural electrification slow.

By the mid-1990s, more than half the rural population of Chile still had no access to electricity, while about 97% of urban households were electrified. To increase rural access to electricity, Chile launched a new rural electrification program. This program was specifically designed to be compatible with the government's overall reform program for the electricity sector. The program was initiated in November 1994, and was designed to reach 75% of the rural population by 2000. It was estimated that the central government would need to provide US $150 million in subsidies to allow electrification of about 110,000 dwellings.

The program relies on competition, private investment, and decentralized decision making to achieve its goals. The objective of the program is, with the use of a subsidy, to make rural electrification an attractive business opportunity. To help ensure buy-in, all participants, including the government, private sector, and users, are required to contribute funding for the program.

The government's contribution—the subsidies and the cost of running the program—is delivered through a specific fund set up to competitively allocate a one-time direct subsidy to private electricity distribution companies to cover part of their investment in rural electrification projects.

To apply for a subsidy, companies submit their projects to the local community, which then submits them to the regional government. The regional government, then, allocates funds to those projects scoring best on several objective criteria, including:

- Cost-benefit analysis;
- Amount of investment covered by the local distribution companies; and

- Social impact.

Bids are conducted annually. The central government provides funds to regional governments on the basis of two criteria: (1) how much progress a region has made in rural electrification in the previous year; and (2) how many households remain without electricity service. Regional governments also allocate their own funds to the program.

The designers of the program set out to devise a scheme that would promote private investment, stimulate competition, and take into account the structural reforms in the power sector. The program was built around four principles:

Decentralized Decision Making

The program was designed to involve regional governments in the identification of needs, choice of solutions, and in decisions about the allocation of funds from the central government. To involve local communities, the program requires that projects be requested by organizations rather than individuals. The role of the central government also is to provide economic resources and technical assistance to help coordinate the institutions involved in the program. It also developed the criteria and tools for evaluating the projects.

H.6.2 Joint Financing

To ensure sustainability and buy-in, all participants—the central and regional governments, electricity companies and users—contribute to the funding of projects. The central government's subsidy is allocated only to projects with a positive social return and also covers expenditures related to managing the program. Facilities built under the program are owned by the local privately-owned distribution company rather than the government. The goal here was to make rural electrification an attractive opportunity for electric utilities. Companies also are required to invest their own funds in the project and users contribute both at the investment phase of the project and during the operation phase through their monthly bills.

H.6.3 Competition

To reduce the risk of politicization, minimize project costs, and encourage innovation, competition is used at as many levels as possible among project participants. To ensure a fair process in project selection, the rules for deciding among competing projects are transparent and stable and are established by the central government.

H.6.4 Appropriate Technologies

For solutions to rural electrification needs, the program considers grid extension and distributed technologies, including photovoltaic systems for isolated rural dwellings; hybrid systems; small hydroelectric power stations; and biomass systems. To ensure sustainability, all costs over the life of the projects are considered in the appraisal, and organizational programs for operating and maintaining the projects also are included.

H.6.5 Role of the Participants

The central government's role in providing funds, technical assistance and coordinating the program is provided by the electricity sector regulatory agency, the National Energy Commission (CNE), which also regulates the electricity sector. CNE is in charge of preparing the initial planning and management model for the program, which was presented to the technical units of the regional governments for use in their participation in the program. It also created methodological tools to ensure efficient allocation of government subsidies and prepared pre-investment studies to generate initial project portfolios for each region.

Communities in areas lacking electricity generally propose rural electrification projects with the support of local distribution companies interested in providing the service. A community proposes a project to its municipality, which then asks the distribution company to prepare a technical proposal at no cost to the municipality. Once the proposal is prepared, the municipality lists the project in a publicly accessible register.

Using the prescribed criteria and tools established by CNE, the regional agency evaluates competing projects, analyzing their economic and financial costs and benefits and calculating the contribution of the distribution company and the subsidy required for each project. Only projects with a positive social return but a negative private return are considered for subsidy.

After the projects are analyzed, all those meeting the minimum requirements are submitted to the regional government, which then submits a proposal to the regional council. The council allocates government funds to the projects based on the number of beneficiaries, the unit cost, and the financing needs. The funds are allocated to the distribution companies that make the investment in each project.

The responsibility for financing a project is split up among participants, as follows:

- Users must cover the cost of the in-house wiring, the electric meter, and the connection to the grid. These expenditures, which average to about 10% of the total cost of each project, initially are financed by the distribution company and repaid by users over time through their monthly bills. Once the project is operating, the users pay the regulated tariffs set by CNE.
- The distribution company is required to invest an amount established by the government, using a formula established by CNE. The company must also operate, manage and maintain the project, recovering its costs through tariffs established by CNE.
- The government must provide a subsidy for the investment costs that is no more than the negative net present value of the project, which must be less than the total investment
- Grants from international organizations also have been used for projects, especially those involving experimental technologies involving self-generation and other alternative energy sources.

H.6.6 Results of the Program

The program has increased the coverage of electricity in rural areas from 53% in 1992 to 76% at the end of 1999, exceeding the target rate of 75% by 2000. The program has shown that it is possible to create market incentives that lead to cost-effective solutions to rural electrification involving the private sector.

An innovative aspect of the program is its reliance on competition among users, central, regional and local governments, and private sector participants to reduce costs and improve the efficiency of specific projects. So far, the government (at all levels) has contributed the most financial assistance to the program, US $112 million from 1995-1999. Private companies have helped define the projects, made investments, undertaken the commercial risk, and continue to own and operate the projects. Private investment has totaled US $60 million. Companies that have participated in the program do so as a strategic move to protect their existing distribution area and discourage entry by competitors.

Most of the projects have involved grid extension. But several have involved alternative technologies, mainly one-house photovoltaic systems. The nonconventional technologies generally provide electricity at a higher cost and poorer service quality (lower voltage, fewer hours of operation). However, they have been attractive in areas where extending the grid is too costly.

H.7 Off-Grid Electrification

For the foreseeable future the prospects of better energy services for many of the rural poor will depend on finding better, cheaper off-grid energy sources. Poor communities and households will need help in making informed decisions between energy services and may have to take collective action to secure them. Financing hurdles also must be overcome and both technical and commercial innovations are needed. While there are many promising developments, the costs of implementing off-grid projects remains high. In this context, two government roles are likely to be critical:

- Reforms are needed not only in electricity markets but also in the broader commercial energy markets on which many of the poor rely; and
- The use of subsidies must be improved in ways that encourage innovation.

Decisions on provision of off-grid electricity services are still made primarily by governments, donors and non-government organizations. But there has been much experimentation with methods of delivering off-grid electricity services. These experiments cast light on the key factors that could drive service improvements in rural areas, including:

- Technological advances that reduce costs and increase ease of use and maintenance of small-scale systems;

- Organizational innovations that help communities choose, implement and maintain improved systems; and
- Innovations in financing—with or without the aid of subsidies—that help poor households over the hurdle of high capital costs.

Technological Advances. Technology selection should mesh with willingness to pay and customer service requirements. Most of-grid technologies differ from on-grid service in that consumption must be adjusted to the supply. For example, some systems provide service for only a few hours a day (solar systems) and would not allow for refrigeration and other continuous uses. And a mini-hydro unit either supplies insufficient power to meet peak demand or has excess power during off-peak hours. Consumers must either ration their electricity consumption or develop off-peak uses to ease the financial burden.

Competition in the market to connect new customers might encourage distribution utilities to become more innovative in the technology and service delivery options they offer. This would require a market structure that allows open entry for the ability to supply new customers. Regulation would focus on simple rules, e.g., for licensing and technical standards and on minimizing transaction costs through provision of standardized contracts and procedures and access to information.

Organizational Innovations. The central planning approach undertaken my most governments and donors to technology selection does not work in most instances, particularly for off-gird systems. Generally with this type of approach, customers and service suppliers are not consulted in any meaningful way, there is no strong sense of ownership of projects by users or suppliers, and users often lack an understanding of the true cost of supply. The government should design off-grid programs to allow customers and service suppliers to make technology decisions, while assuming a facilitating role.

Financing Innovations. Financing of the initial installation and hook-up costs is a major barrier to many low-income consumers taking advantage of the opportunity for electricity service. While many off-grid systems have a log service life, their initial capital cost is high (especially when compared with the incomes of low-income consumers) and this cost usually can be financed only over short time periods.

Countries are exploring several solutions to this problem. Two broad approaches are developing: (1) to subsidize service provision in some way, e.g., by the government providing a one-time payment to cover some—or all—capital costs; and (2) for the government to facilitate the extension of credit for new low-income consumers through financial options offered by the private sector.

Success in extending off-grid energy services to low income consumers will most likely come from policies that open up markets in energy services to the private sector and to competition—and rely less on centralized decisions by policymakers in deciding what technologies to employ and how the delivery system should work.

Evidence suggests that the biggest single hurdle for most low-income households is the up-front capital cost, which can range from US $50 to well over US $1,000. Potential customers have indicated a willingness to take medium-term loans to fund up-front costs, repaying them as part of their monthly bill over the first 5 years or so of service.

Equipment manufacturers, energy service companies, consumer groups, trade groups and others need to become more involved in developing the energy services market for low income households. This can happen only if policymakers create an appropriate environment and if existing distribution entities are provided with incentives to help meet the needs of poor consumers—by being privatized or otherwise loosing their monopoly position in the market. Policymakers need to allow competition in the market for new customers and to provide mechanisms, including directed subsidies to help defray the initial cost of off-grid systems.

H.8 Case Study—Rural Off-Grid Service in Argentina

In 1995, the Government of Argentina established an experimental program for off-grid electrification of dispersed rural populations and for provincial public services, such as schools, health centers, and police stations. The federal Secretariat of Energy set up the program, Programs de Abastecimento Electrico a la Poblacion Rural de Argentina (PAEPRA), to promote electricity supply within 6 years for 314,000 rural households and 6,000 public service entities in 16 provinces. Wherever possible, the program is to give preference to renewable energy systems.

To help ensure funding for off-grid projects, the World Bank is supporting a component concessioning project covering 8 of the provinces over 6 years. This project called Proyecto de Energie Renovable en el Mercado Electrico Rural (PERMER) is intended to provide electricity to about 70,000 households and 1,000 public service entities at an expected cost of US $120 million.

The role of the federal government in supporting these programs is to prepare standards for electricity equipment, training staff of provincial regulatory bodies, developing databases on renewable energy resources, and disseminating information and early implementation lessons through seminars and workshops.

Under this approach, concessions are granted to private bidders that require the lowest subsidy to serve a given area. The concessions will electrify rural markets of 3,000 to 25,000 customers using solar, wind , mini- and micro-hydropower and other renewable technologies.

A model concession contract has been designed by the government to ensure that the concessionaire maximizes private investment and minimizes public subsidies. Once a concession is awarded, the concessionaire chooses the technologies best suited to meet demand and the willingness to pay of each village. The subsidy paid by the government is means-based and depends on the energy service level and chosen technology. In the early years of the program, when subsidies are highest, they will be partially funded by donor agencies. The subsidy can cover a share of the installation cost and, for the very poor, a part of the monthly tariff. The subsidy will decline over the 15-year concession period.

In the early 1999s, Argentina unbundled and privatized its electricity generation and transmission sectors. Distribution companies, mostly owned by provincial governments, were privatized shortly thereafter through concession contracts. Generation is competitive, but distribution concessionaires receive exclusive coverage of their designated areas. However, concessions are subject to review for quality of service and can be contested by potential entrants. The rural electrification program developed by the government needs to be consistent with this new competitive market structure.

H.9 Case Study—Private Provision of Photovoltaic Systems in Kenya

This case study is an indication that decentralized programs with open access, involvement my major stakeholders, and private sector investment can function to meet the energy needs of rural populations when centralized programs have failed to do so. It offers key insights into how a rural electrification program based on off-grid technology might work in other developing countries.

Historically, fewer than 2% of Kenya's rural households have access to network supplied electric service. Efforts by the government-owned monopoly utility to expand coverage have been unsuccessful. This has caused some households to turn to alternative suppliers using a different technology—photovoltaic systems. Since 1990, more than 2.5 MW of photovoltaic systems have been sold in Kenya, mostly to households among the top 25% of rural income earners. However, technical and commercial innovations have reduced costs and brought photovoltaic systems within reach of lower income consumers.

Photovoltaic systems have become smaller and cheaper. And just as important, leasing and financial entities have entered the market, enabling lower income consumers to purchase systems on credit. The government has allowed this market to develop on a competitive basis and has provided support through liberalization of foreign exchange and import regimes.

Photovoltaic systems provide a low-cost option for sustainable private sector-based off-grid rural electrification. Some 120,000 solar photovoltaic systems have been sold in Kenya since 1990, and from 1992-1998 the market grew at 20% per year. Most buyers are middle-income households with some knowledge of the systems. Local entrepreneurs have played a key role in the process by aggressively marketing photovoltaic systems and downsizing the systems to meet the needs of consumers.

The development of this market is due to a number of factors, including:

- The inability of the government-owned utility to provide service to the vast majority of rural households;
- The willingness of rural consumers to pay for electricity service to meet their needs;
- Technological advances that reduced the cost of photovoltaic systems;
- Private sector initiative that sought to develop this market; and
- Government policy that facilitated development of this market.

H.9.1 History

Following a significant drop in the cost of solar modules in the early 1980s, donors and governments began turning to photovoltaic technology for remote power needs in East African nations. In 1982, photovoltaic-power water pumps came into use in Ethiopia and Somalia. Lighting and refrigeration systems found application in Kenya, Tanzania and Uganda. In addition, signaling and telecommunications became an immediate market for solar modules.

Following these events, the market for photovoltaic systems to supply rural households began to develop in Kenya as consumers discovered that these systems provided superior service for household use than generator sets. A small number of donor-initiated projects installed demonstration systems in off-grid schools and missions. These programs trained local workers to install and maintain the systems. Once a threshold level of market awareness was reached, local companies moved to further develop this market.

Aggressive marketing quickly saturated the market for large photovoltaic home systems. Most rural Kenyans cannot afford the cost of a US $1,000 or more 60 peak-watt system. Photovoltaic dealers then began to alter their product to meet the needs of lower-income rural households by developing smaller, lower-cost systems. In 1990, 2,400 12 peak-watt systems were sold at a retail price of US $100. By 1998, more than 22,000 of these systems were sold at a retail price of US $65.

Growing demand for photovoltaic systems inspired local merchants to look for ways to further expand the market. Since middle-income households often could not afford to cover the up-from cost of a photovoltaic system, marketers began to look at ways to reduce this cost through financing methods.

Lease-purchase of consumer goods such as a sewing machines, televisions, stereos, and bicycles, has been a common practice in Kenya for many years. In 1996, a leading photovoltaic company began offering attractive credit terms to lease-purchase retailers and sought a wide base of agents. By 1998, the company sold more than 1,500 systems on credit. Currently at least 4 leading photovoltaic importers supply systems to lease-purchase retailers, and about 15% of systems are sold through this mechanism.

H.9.2 Market Potential

Since 1990, more than 2.5 MW of photovoltaic capacity has been sold in Kenya. More than 60% of these sales were for home solar systems. By 1993, 3% to 4 % of the rural population had acquired a solar system, and 70% of the population were aware of he systems. During that year, the total photovoltaic market was about 480 peak kilowatts. Of this, more than 250 peak kilowatts was represented by modules of 20 peak watts or less. This is an indication of the sustained and growing demand for these systems and a clear indication of the value that the rural population place on commercially available electricity technology.

H.9.3 Consumer Benefits

In real terms, prices for photovoltaic systems have fallen over the past 5 years as the market has grown and competition increased. Photovoltaic systems can save consumers more than $8 a month over more traditional forms of energy use (dry cell batteries and kerosene). Thus, a 10-15 peak-watt system can pay for itself within 1.5 to 2 years. Households also experience an improvement in quality of energy delivered by reducing the need to carry batteries back and forth to a charging station and by reducing internal pollution.

H.9.4 Government Policy

Government energy policy in Kenya has been directed to increase private investment and promote competition in the electricity sector. In 1997, the government passed the Electric Power Act, which privatized Kenya Power and Light, although the government retained a controlling ownership share in the company. The generation sector is open to competition, with 3 IPPs currently operating and more preparing to enter the market. Kenya Power and Light, however, retains its monopoly over distribution. In an effort to reduce costs, the company has placed a priority on urban and industrial customers rather than expanding service to high-cost rural areas.

To support the off-grid rural electrification activities, the Government of Kenya has removed import, price and foreign exchange controls and has opened markets to competition. It also has reduced duties on photovoltaic modules to 5% and removed the value added tax, thereby lowering the price to consumers by 15 to 20%.

Private Participation Options Study for the Zambia Electricity Supply Company

Task 2A Report-
Option Identification and Screening

245

Table of Contents

1 Introduction.....1-1

2 Power Sector Situation and Industry Structure.....2-1

2.1 Current Power Sector Situation *2-1*

2.2 Current Industry Structure *2-2*

3 Overview of Options.....3-1

4 Overview of Risk Issues.....4-1

5 Overview of Financing Issues.....5-1

6 Option Definition and Assessment.....6-1

6.1. Option 1: Concessioning ZESCO to One Concessionaire *6-3*

6.2. Option 2: Unbundling ZESCO into Separate Corporate Business Entities *6-8*

6.3. Option 3: Unbundling ZESCO into Separate Business Units Subject to Management Contract *6-18*

6.4. Option 4: Master Concession or Joint Venture with Subsequent Privatization of Business or Functional Units Through Sub-Concessions, Joint Ventures or Sale *6-22*

6.5. Option 5: Joint Venture between GRZ and Strategic Investor *6-26*

6.6. Option 6: Maintaining GRZ Ownership of the Power Sector *6-30*

7 Option Screening and Recommended Options.....7-1

7.1. Option Screening *7-1*

7.2. Option Screening and Ranking *7-3*

246

Table of Tables

3-1 Power Sector Participation Options Overview.....3-1

5-1 Major requirements of international and domestic private capital markets.....5-4

7-1 Ranking of Options.....7-3

Table of Figures

5-1 Credit Analysis Pyramid 5-3

6-1 Option 1: Concessioning ZESCO to One Concessionaire (10-25 years).....6-2

6-2 Option 2: Unbundling ZESCO into Separate Corporate Business Entities.....6-7

6-3 Option 3: Unbundling ZESCO into Separate Business Units 6-17

6-4 Option 4: Master Concession or Joint Venture.....6-21

6-5 Option 5: Joint Venture between GRZ and Strategic Investor.....6-25

6-6 Option 6: Maintaining GRZ Ownership of the Power Sector.....6-29

Section 1 Introduction

The purpose of this report is to present the recommended Private Sector Participation (PSP) options for ZESCO. We also discuss the associated implications for the reform and restructuring of the Zambian power sector.

One of our primary goals in this assessment of PSP options is to achieve the most reasonable balance between PSP and restructuring of the power sector.

PSP focuses on attracting private capital and industry participants, increasing sector profitability, and reducing the state's role in the power sector. Power sector restructuring involves creating a workably competitive environment, which results in more efficient allocation of resources and lower cost structures. The benefits from PSP can far exceed the benefits of restructuring. Thus, it does not necessarily follow that PSP and restructuring go hand in hand. Poor performance may have more to do with state ownership than the structure of the industry. However, where one can achieve both the gains associated with PSP coupled with the efficiencies introduced by restructuring, the benefits will be superior

In this section we set out and define a wide range of PSP options. We then evaluate these options as to their fit with a number of screening criteria. Based on this assessment, coupled with experience from around the world and our best professional judgment, we have identified two preferred options.

We commence with a review of the current state of the power sector and the implications for reform, restructuring and private sector participation.

Section 2 Power Sector Situation and Industry Structure

2.1 *Current Power Sector Situation*

The power sector can be characterized as in a state of transition. The GRZ controls the sector through ownership (by the Ministry of Finance) of both ZESCO and KNBC. The GRZ does not currently have a unified legislative framework which addresses structure of and competition in the power sector. There has been limited unbundling of the sector however ZESCO is in the process of financially unbundling its system. Kariba North Bank Company (KNBC) has been restructured as a separate company. There is already existing private sector participation in the sector with the existence of the Copperbelt Energy Corporation (CEC).

A functioning regulator, the Energy Regulatory Board (ERB) exists, although its complete independence is an issue. Current policy and legislation allow for continued private sector participation in new investments. The focal point for this new investment activity is the Office for the Promotion of Private Power Investment (OPPPI). Policy allows, in principle, for open access transmission, privatization of ZESCO's distribution business and direct sales by IPP's to distributors. In actuality, however, there is no competition at the wholesale level as ZESCO controls the grid, dispatch and therefore, all generation. At the retail level, all customers must purchase from ZESCO.

The prospect for restructuring and PSP will be affected by the following issues:

- Need for legislative and regulatory clarity to support GRZ's objectives for the power sector and with respect to structure, competition and market mechanism for trading electricity. These necessary changes will reduce the perceived risks (as viewed by potential investors) of doing business in the Zambian power sector. (Task 3 report discusses the legal and regulatory regime in more detail);
- Small size of the system may limit effective competition;
- Ability of potential customers to pay may limit the growth of retail power demand in this market;
- An existing twenty (20) year power sales contract with CEC to supply the mining industry. Accounting for at least50% of ZESCO's total load, this will also limit effective competition;
- Small size may also limit attractiveness of selling off the distribution business;
- ZESCO controls dispatch and most of the grid; Open access to the transmission grid has not yet been approved by the GRZ;
- ZESCO is not required to buy from IPP's, thus the potential exists for discrimination;
- There is no legislation which permits major end users to buy directly from IPP's;
- ZESCO is the instrument of the GRZ's electrification policy responsible for all rural electrification which is currently a non-commercially viable business
- A well defined commercial market for trading electricity does not exist in any context

- Regionally, Zambia is ahead of most other countries with respect to privatization, regulation and establishing the groundwork for eventual domestic and regional competition in the power sector. This could result in problems with respect to the unlimited access to Zambia's market by outside suppliers.

2.2 *Current Industry Structure*

Principal participants in the power industry are:

ZESCO - Vertically integrated utility, 100% owned by the State (Ministry of Finance). ZESCO is in the process of functionally unbundling its operation and has separate operating licenses issued by the ERB for generation, transmission, distribution and supply. Principal functions of ZESCO are as follows:

- **Generation** - has total installed base capacity of 1031 MW or approximately 63% of total existing installed capacity. Essentially a hydro-based system.
- **Transmission** - owns and operates all of the 330 kV transmission line, part of the 220kV system, and the 66kV system.
- **Dispatch** - ZESCO is responsible for all dispatch in the country through its National Control Center.
- **Distribution** - owns and operates the low voltage system (66kV and below) Comprised of four divisions – North, Copperbelt, South and Lusaka.
- **Rural electrification** - ZESCO is responsible for all rural electrification, comprised of 11 districts. Power is supplied by diesel generation totaling 8 MW.

Kariba North Bank Company (KNBC)– A generation company, 100% owned by the State (Ministry of Finance), The company owns the Kariba North Bank plant with a capacity of 600 Mw or 37% of installed capacity. The ERB has issued a separate generation license to this company.

Copperbelt Energy Corporation (CEC) –A private transmission company, licensed by the ERB. CEC owns and operates the 220 kV and 66kV grid serving the mining load in the Copperbelt region

Potential New Entrants – Under the existing legislative and policy framework private participation is possible with respect to new generation and transmission projects. Accordingly, there is potential for new entrants into the power sector. There are two potential generation projects which will be tendered out to the private sector:

- **Itezhi-tezhi** - 120 MW hydroelectric project with an estimated capital cost of $95 million and 5-year construction period.
- **Kafue Gorge Lower** - 600 Mw hydroelectric project with an estimated capital cost of $594 million, and 7-year construction period.

- **Other Possibilities** - CEC has expressed an interest in acquiring generation and extending it's grid to serve additional mining load

Market Size and Composition- ZESCO's existing market is small. There are approximately 200,000 retail customers served by ZESCO. ZESCO's has the following average load mix – 50% mining, 30% industrial, 15% commercial, 10% residential, 5% export. There is potentially a large unmet demand with only 15% percent of the population supplied with electricity.

Regulation – A regulator has been established as required by law. It has been operational since 1998. The regulator is supposed to be independent however, the Minister of Energy and Water Development (MEWD) appoints the Board members. MEWD is also responsible for approving or changing regulations. The Energy Regulation Board controls entry and exit from the sector through the issuance of licenses. ERB has issued ZESCO separate licenses for generation, transmission and distribution, setting the stage for the functional unbundling of these activities. It has also issued a separate generation license to KNBC and a separate transmission license to CEC. The ERB is fully supportive of competition in the power sector.

Commercial/ Market Relationships – the principal relationships are as follows:

- ZESCO, under its obligation to serve as government owned utility sells to all retail consumers who require electricity.
- ZESCO sells under a 20-year negotiated bulk supply contract to CEC who in turn sells power under 20-year supply agreements to the mines. In this regard CEC acts as a single buyer for the mining sector.
- KNBC will sell under a negotiated bulk supply agreement to ZESCO (to be completed this year)
- Under the existing policy framework, ZESCO may be required to purchase from new IPP's under Power Purchase Agreements
- In the export market, ZESCO has short term bilateral contracts with ESKOM, and ZESSA
- There is no provision in the law for the direct purchase of power by distribution companies or large industrial consumers. However, the MEWD lays the policy groundwork for such transactions through its "FPI", ("Framework and Package of Incentives for Private Sector Participation in Hydropower Generation and Transmission Development").

2.1 Current Power Sector Situation *2-1*
2.2 Current Industry Structure *2-2*

Section 3 Overview of Options

Given the discussion in Section 2, our evaluation of various stakeholder groups and, GRZ policy objectives for the power sector, the next section presents and assesses a variety of private sector participation options for ZESCO. We first provide an overview of the major approaches commonly used to introduce the private sector to state owned enterprises. These are summarized in Table 3-1.

Table 3-1 PSP Options Overview

Privatization Option	Description	Other Country Experience
Outright Sale of Assets	GRZ sells the utility through an open tendering process. All utility assets are transferred to the private sector.	United States, UK, Brazil,
Partial sale of Assets	GRZ offers a portion of the shares of the utility to the private sector, maintaining a fixed percentage for later distribution or sale. Management control is given to the private sector. The option exists for GRZ to retain a golden share giving it certain pre-defined voting rights.	Hungary
Management/Operations Contracts	GRZ maintains ownership of the assets, a private company has responsibility for operation and maintenance and is paid a management fee. GRZ maintains responsibility for all investments. As an alternative an operations contract could be used which gives the contractor the right to make short term investments for which the private operator receives revenue from operations.	Philippines
Single Concession	GRZ retains maintains ownership of the assets while giving management control of the utility to the private sector. The private company is given the right to manage, operate, and use the assets in accordance with regulatory licensing requirements.. It also has the obligation to make all staffing conditions and levels, and makes all long term investments in operational and asset improvement. The concessionaire retains revenues form the provision of service and pays a fee to the GRZ	Argentina
Multiple Concession	Has the same characteristics as a single concession but the network operations are unbundled on a functional and/or geographic basis. For ZESCO this could include separate concessions for transmission and distribution. Distribution could also be subject to geographic concessions given the nature of the distribution business.	
Management Buyout	Management or employees buyout the company. Usually done where management has sufficient funds or through use of extensive debt.	United States
Liquidation	All assets of the utility are liquidated and the company seizes to exist. GRZ retains all proceeds from the sale of assets.	United States

Given the range of options presented in Table 2-1, there are several considerations regarding the relevant range of options for ZESCO. First, we can state unequivocally that liquidation is not a viable option. Liquidation typically applies where the enterprise is not viable, and does not warrant the interest of the private sector, and the enterprises activities are not critical to the country's economy. Obviously these conditions do not apply to ZESCO. Second, given the nature of the utility business a management buyout would be inappropriate given the funds required for acquisition, the need to significantly enhance management capacity, and the significant requirements for investment in the system.

The remaining options presented in Table 3-1 represent the relevant range of alternatives for PSP. The following section sets out an assessment of six possible alternatives which reflect not only the PSP modalities defined above but also the structural implications for ZESCO and the power sector in general as discussed in the previous section. The six options are as follows:

1) Single concession for ZESCO for a period ranging from 10 to 25 years;
2) Unbundling ZESCO into separate business units which are then subject to Concessioning/Joint Venture/Sale;
3) Unbundling ZESCO into separate business units which are then subject to management contract;
4) Master concession or joint venture with different business or functional units being managed through separate sub-concessions, joint ventures, or private ownership;
5) Joint venture between GRZ and a private partner with the private partner having a majority/minority share holding and management control;
6) Continuing government ownership of the electricity sector with different business or functional units being commercialized and managed as in Option 3.

Section 4 Overview of Risk Issues

Private Sector Participation in the Zambian electric power industry involves risks for all participants, including:

- GRZ
- ZESCO
- Investors (in the generation, transmission, and distribution systems)
- Capital Providers

These risks fall into three primary categories. These include:

- Commercial Risks
- Political & Country Risks
- Force Majeure Risks

Commercial Risks consist of:

- Completion Risks - potential problems during construction or rehabilitation such as cost and schedule deviations
- Operating Risks - problems during the operating period caused by faulty operation or poor performance
- Supply and Market Risks - potential failure to generate sufficient cash flows due to changes in demand or meet market demand

Political and country risks are specific to Zambia, and include

- Currency and foreign exchange risks
- GRZ Default on contractual obligations
- Expropriation
- Civil turmoil
- Force Majeure risks (mainly related to disasters such as fires, floods, storms, earthquakes).

Successful PSP and power industry restructuring in Zambia will be strongly dependent on the appropriate allocation of risks. The ability of the various participants to agree on how risks will be shared will be the key to successful implementation. The most crucial element is that risks be accepted by the industry participants most suited to bear them. In the following option assessment we have assigned risks in general terms, however the specific allocation of risk will depend on the details of the transaction. This is addressed in Task Report 2B- Detailed Assessment of Recommended Options.

Section 5 Overview of Financing Issues

Private Sector Participation (PSP) and Industry Restructuring will require capital investment decisions from providers of both equity and debt. The most fundamental need is to provide investors with the returns they require, at an acceptable level of risk. Raising private sector financing consists of agreeing upon and implementing a set of transactions that meet the needs of all parties concerned:

- Those raising capital
- Those providing capital
- Third parties and market intermediaries

Which parties are involved in financing of the Zambian electric power industry will depend upon how the industry is restructured and the nature and magnitude of financing required. In our opinion, in Zambia, this will require a diverse array of participants, including ZESCO, ERB, MFED, MEWD, multilateral organizations, independent power producers, financial institutions and various types of investors.

The successful introduction of PSP in Zambia will enhance the GRZ's ability to privately finance it electric utility industry by creating a basis for financing, other than the credit of the GRZ. However, it also makes financing much more complex. Electric power sector participants must meet all of the requirements set by government regulators, as well as the financial community. These requirements may differ and they sometimes conflict.

The fundamental requirement for obtaining financing for PSP in Zambia, is a viable revenue stream to cover costs, thereby earning investors an attractive rate of return. Potential investors will look to the credibility of the customer base to produce revenues and to the ability of management to control costs.

Obtaining private financing will involve matching the needs of the GRZ, power sector entities and investors, each of which will want something different from the others. These include:

GRZ

- GRZ policy-making agencies have to balance multiple concerns, including economic growth, social issues, the environment and sovereignty.
- ERB will play a significant role in PSP in the areas of economic and environmental regulation. Regulatory frameworks for both will vary over time.

Power Sector Entities

- Private Sector Utility Participants are in the business of reliably delivering power to customers and earning a return for their owners. They want to be able to raise adequate capital at an affordable cost.
- Private Project Developers typically want to earn a rapid return on investment. Their attitudes toward actual long-term project operation may vary.

Private Investors

- Equity investors generally want a high rate of return, which will significantly exceed multilateral and bilateral aid costs. However, they are willing to bear some risk of loss of capital.
- Debt investors want to preserve principal and earn interest commensurate with risk. Debt interest rates will also be considerably higher than the IDA interest rates to which the GRZ currently has access.

To finance PSP in the restructured electric power industry in Zambia, these varying perspectives must be matched. The restructured Zambian power sector will be required to perform and coordinate a series of functions, including generation, transmission, distribution and supporting activities from initial planning through daily operations.

As a consequence, financing for specific individual projects is not the fundamental concern. The primary issue is how to finance the development of the entire Zambian electric power industry. Without a financially viable industry, the financing of individual private sector projects becomes extremely difficult, if not impossible.

The Credit Analysis Pyramid (Figure 5-1) represents the structure of the analysis that will be utilized by investors to make investment decisions in the Zambia power industry. This is the type of credit template that will be used to analyze the industry as a complete entity. In addition, this template is used to analyze and rank each company or project in each industry segment (generation, transmission, distribution).

As depicted in the diagram, credit analysis will begin will a broad-based sovereign macro-economic analysis of the GRZ, with more specific domestic and regional power industry analysis. As you move up the diagram, credit analysis will be ever more specific and detailed with respect to the particular company and industry segment being analyzed. Of all the factors, most important are the Quantitative and Qualitative sections, along with an analysis of the Regulatory Environment.

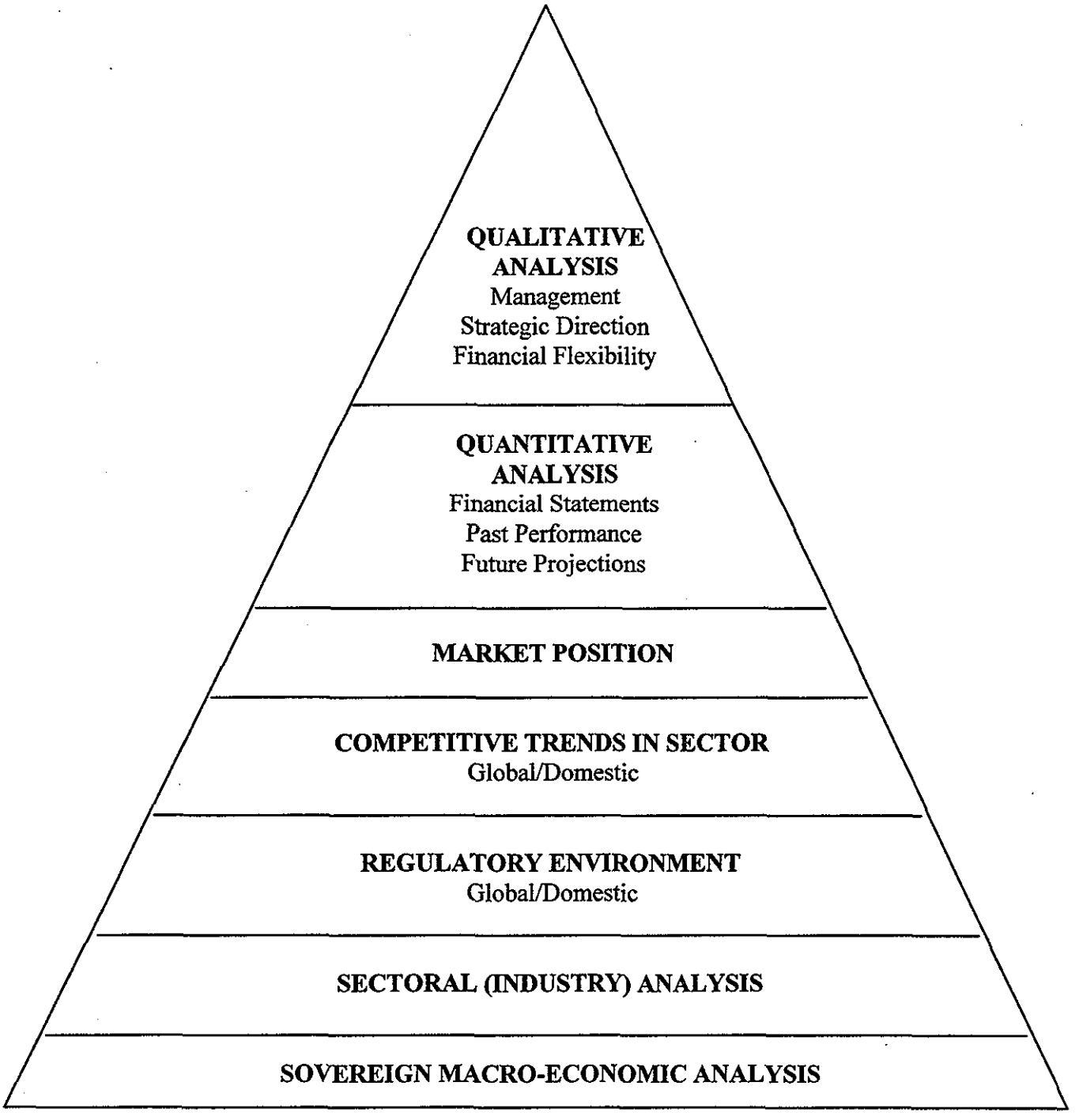
What works for individual projects does not necessarily apply to the industry as a whole. Regardless of how the Zambian power industry is restructured, three conditions are mandatory to obtain private financing:

1. GRZ must commit to a financially independent electric power industry. This is the necessary first step. Without this, investors will always look to the GRZ for ultimate financial responsibility.
2. ZESCO (or its combined PSP successors, together forming the Zambian utility industry) must become economically viable. This requires:
    a. Customer base that has the potential to pay the full costs of power over the long term;
    b. Competent management that is able to control costs and efficiently deliver services;
    c. Business environment that supports private enterprise.

3. Investors must be convinced that their return requirements will be met. These requirements will reflect the degree of risk they must assume, as well as financial market conditions. Private investors will require higher returns than the GRZ is used to paying.

By utilizing international capital markets, multilateral, bilateral and export finance agencies play more of a supporting role in raising private capital. However, for PSP in the Zambia electric power market, these agencies will be critical to structuring financing packages and to reassuring private investors.

Figure 5-1 Credit Analysis Pyramid



260

Table 5-1 depicts the major requirements of international and domestic private capital market stakeholders.

Table 5-1 Major requirements of international and domestic private capital markets

Stakeholder	Requirements of International Private Capital Markets	Requirements of Domestic Private Capital Markets
GRZ	GRZ support for a financially independent power sector	GRZ support for a financially independent power sector
	Satisfy foreign investors as to political and economic stability of Zambia	Meet political needs of ruling and alternative parties to provide social and economic stability
	Satisfy foreign government economic objectives	Plan for and encourage economic growth
		Protect national security to provide a stable domestic economy
Regulators	Satisfy investors that regulations are transparent and fair	Need fair regulations that apply to all competitors
	Satisfy foreign government environmental objectives	Satisfy society's environmental concerns
		Meet political needs
Power Utilities	Reliably produce electricity	Reliably produce electricity
	Have economic viability	Have economic viability
	Have competent management	Have competent management
Private Project Developers	Have competent management	Can influence government to maintain a stable business environment
	Provide rapid payback and high rate of return	Have competent management
	Require solid information about country and its power sector	Provide rapid payback and high rate of return
Equity Investors	Provide affordable capital	Expect adequate return on investment with moderate risk level
	Expect adequate return on investment with moderate risk level	Need adequate equity market infrastructure
	Domestic investors must provide some equity capital	Expect fair treatment compared with international markets
Debt Investors	Adequate return on investment with low risk level	Adequate return on investment with low risk level
	Multilateral banks and bilateral	Need adequate debt market

	agencies support industry with loans or grants	**instrument**
		Expect fair treatment compared with international markets

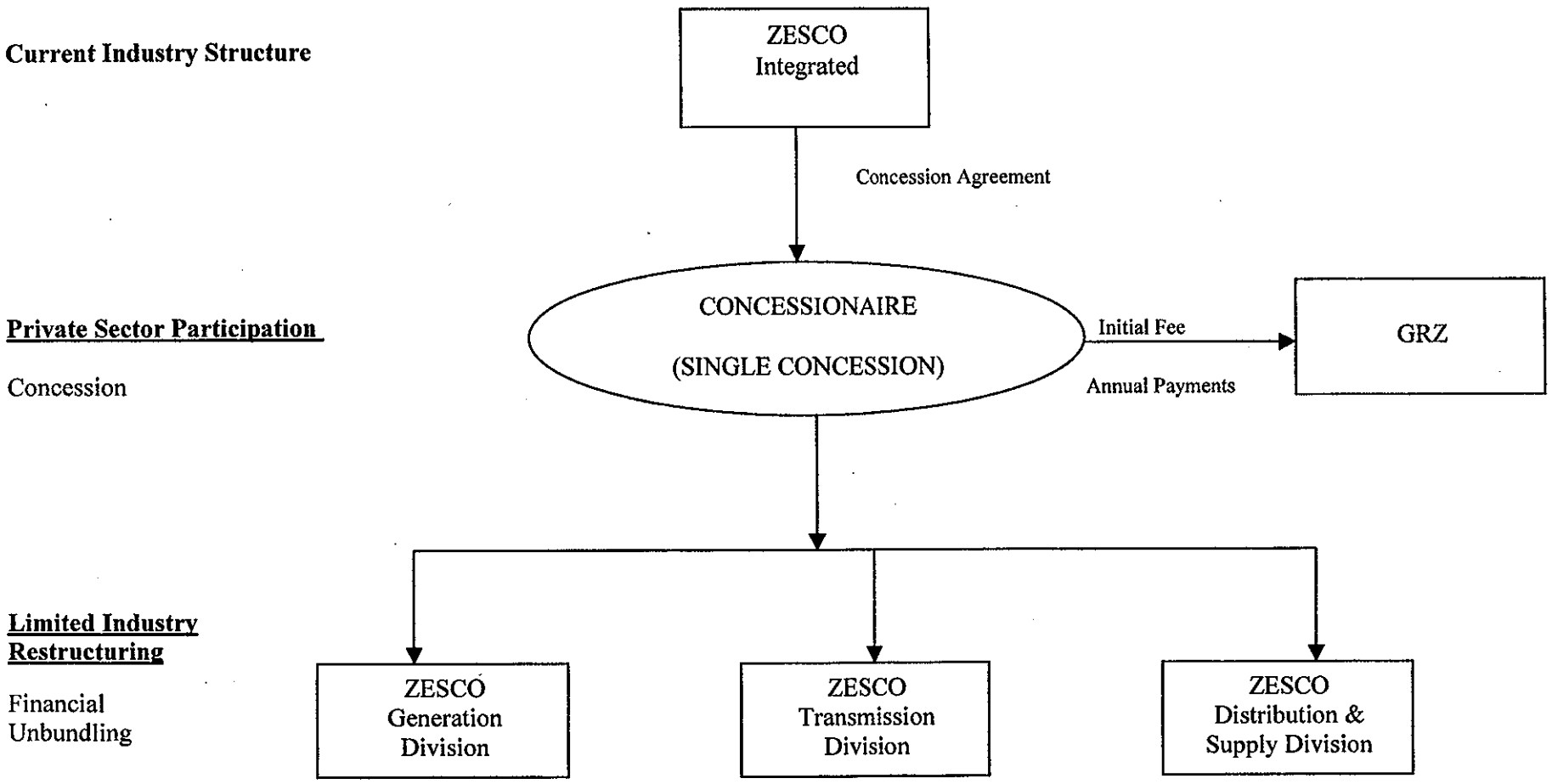
Reconciling these divergent interests and requirements will be the single most important factor for successful PSP and industry restructuring in Zambia. Resolving these differences may be a lengthy, expensive and time-consuming process. Ultimately, all key participants will have to develop a strong, mutual level of comfort and trust. It is often difficult to completely resolve these issues. As a consequence, not all of Zambia's "power needs" may be met by private sector participation. Some sectors such as rural electrification, the poor and the elderly may continue to need support from the GRZ.

Section 6 Option Definition and Assessment

For each of the six option discussed in this section, we will:

- Define the option,
- Discuss the rationale for the option,
- Discuss the restructuring implications for the power sector,
- Discuss the rights and obligations of the parties,
- Discuss how to finance of the option
- Review risk allocation
- Review time to implement the option
- Review the advantages and disadvantages

Figure 6-1 Option 1: Concessioning ZESCO to One Concessionaire (10-25 years)



264

6.1. Option 1: Concessioning ZESCO to One Concessionaire

Under this option a single private company would be granted the exclusive right to operate ZESCO. Ownership of ZESCO in this situation would remain with GRZ. A single concession would be appropriate where there is a legal requirement for public ownership, or where there is little prospect of selling the company for a reasonable price given the financial position of the company. It would also be a less complicated transaction as the entire company would be concessioned out. Accordingly, the transaction costs would be lower.

Option 1: Restructuring Implications

The structural implications of this option are that ZESCO would remain a vertically integrated utility much as it is today. However, ZESCO would be financially unbundled with separate accounting for each functional area – generation, transmission, and distribution. Under this option, new generation would come from IPP's. Expansion of the transmission grid, distribution and maintenance of existing generation would be the responsibility of the concessionaire.

Commercially, the power market would operate in the following manner:

- ZESCO would purchase power from IPP's under long term contracts;
- It would continue to supply power to CEC under the current bulk supply contract;
- Kariba North Bank Company would sell power to ZESCO under a long-term contract, essentially operating as an IPP;
- ZESCO would continue to participate in the regional market through agreements with SAPP.

The existing legislative and regulatory environment could accommodate this option, as there is little change from the current situation. The only significant modification would be that of open access to the transmission grid. Provision for this is already included in the existing laws and regulations. Accordingly, when the GRZ decides that both the domestic and regional power markets are more robustly competitive this structural change could be implemented. The implementation of open access would also introduce competitive pressure on the concessionaire and thereby provide some assurance of optimal efficiency.

Option 1: Rights and Obligations

The obligations and rights of the parties involved would be as follows:

- The Ministry of Finance would be responsible for executing the concession agreement, with concession fees paid to the MOF;
- Responsibility for prequalification and tendering of the concession would rest with the Zambian Privatization Agency (ZPA);

265

- Once the concession is awarded the Energy Regulatory Board should be responsible for its administration. This would include the following:
  - Implementation and administration of the agreement;
  - Oversight of system planning and investment requirements;
  - Tariff approvals;
  - Monitoring the performance of the concession agreement;
  - Issuing penalties or taking corrective action when there is a breach of contract;
  - Dispute resolution;
  - Safety and quality of service;
  - Establishing open access policy;
- The concessionaire would have the following responsibilities
  - Operational autonomy, including staffing;
  - Pricing of services;
  - Investment in maintaining and upgrading the system as specified in the concession agreement;
  - Expansion of the distribution system.

Importantly, with respect to the responsibilities of the concessionaire, the rural electrification program presents some special issues which could effect the attractiveness of a single concession to the private sector and as a consequence the value of the concession. Rural electrification programs have limited commercial value as the unit cost of service is high, while the customer's ability to pay is low. Such programs require direct subsidies from the government. Accordingly it is our view that the implementation of any rural electrification program be separate from the core activities of the utility and therefore not part of the single concession.

Option 1: Financing

The concession would be financed through revenues generated from bulk supply and retail electricity tariffs. To the extent the GRZ decides to create an open access system, there would also be revenues obtained through tariffs for transmission services. The concessionaire would be responsible for collection of all revenues and would, in turn, pay an agreed portion to the GRZ as a concession fee.

Option 1: Risk Allocation

Under a single concession, most of the risks would be shared between the GRZ and the various industry participants. These would include:

- Commercial/revenue risk – This would include any changes in tariffs in accordance with the terms of the concession, or absolute changes in demand, or changes in demand due to problems directly associated with insufficient supply or quality

- Operating risk – This would include increases in operating costs due the concessionaires failure to operate the system properly
- Financial risk –GRZ would most likely bear the risk of local currency fluctuations
- Environmental risk – Adverse environmental impacts directly associated with the concessionaires operation of the system would be borne by the concessionaire, however, any pre-existing conditions would most likely need to be borne by the GRZ
- Force majeure risk – Apply to specifically to changes associated with the legal or regulatory environment due restructuring of the power sector

Option 1: Terms

Given the high sunk cost nature of investments in the power sector which tend to require a long period to recover, a sufficiently long period must be provided for the concessionaire to benefit from these investments. Accordingly, we would recommend that the term of the concession be set initially at 25 years. There would be provision to rebid the concession at the end of an initial 10-year period. The concession would provide exclusivity in all areas except transmission. Exclusivity to use the transmission system would end when GRZ decides to provide open access to the system.

Option 1: Advantage and Disadvantages

There are three principal advantages of a single concession:

1) Overall transaction may be less complex with attendant lower transaction costs. A single concession would involve conducting one prequalification, one tender and consequently a single negotiation. However, developing the detailed specifications for the concession agreement would be quite extensive, as it would require defining the relationships and interactions among the various functional divisions.

2) Limited scope for competition in generation and small system size may favor leaving it as part of vertically integrated company in order to achieve economies of scale and scope. These benefits would derive from more centralized management, corporate and financial services. There also may be some benefits associated with operating the system as an integrated whole which would result from more centralized control and dispatch

3) May permit development of distribution business with least impact on tariffs over the short term. The advantage would result from the ability of the concessionaire to subsidize the development of the distribution system until such time that tariffs could be sufficiently raised to recover all costs of service plus a return. This result could only be achieved if it were specified as part of the terms of the concession agreement.

4) Provides for private investment capital

The disadvantages of a single concession would be as follows:

1) Requires more extensive regulation – due to less transparency and the potential for market discrimination, more regulatory oversight will be required to ensure that the concessionaire does not take advantage of his monopolistic position.

2) Less transparency – since all information and decision-making is centralized within the utility, there is less clarity as to how decisions are made and costs are allocated.

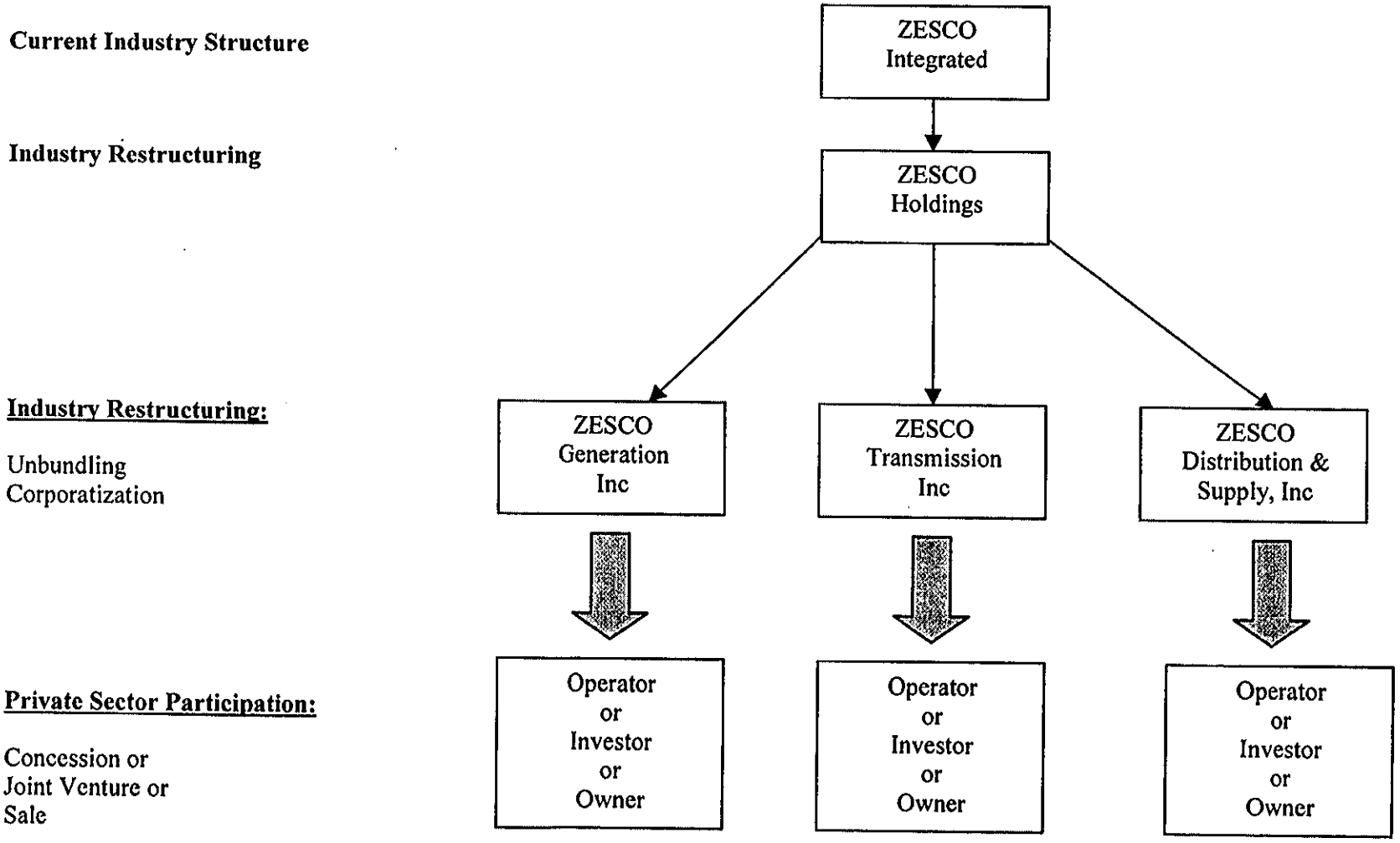
3) May result is market discrimination – the concessionaire may use his position to limit access to the grid or in negotiating power purchase agreements.

4) May result in sub-optimal use of generation – as existing generation will be part of the concession there will be bias to use the generation for meeting internal requirements when it could be more profitably for the export market

5) May result in lower overall value for the concession to GRZ – as discussed in the Task 1 Report the distribution function is not profitable given existing tariffs. Accordingly, by including it as part of the entire entity the value of the concession would be lower reflecting the poor financial performance of the distribution business.

6) GRZ still retains control of the power sector and thus may still be subject to political influence.

Figure 6-2 Option 2: Unbundling ZESCO into Separate Corporate Business Entities
(Each entity subsequently privatized via concession/joint venture/sale)



269

6.2. Option 2: Unbundling ZESCO into Separate Corporate Business Entities

Under this option ZESCO would be unbundled into the following possible units or combinations thereof: generation, transmission, distribution (the physical delivery of lower voltage electricity), and supply (buying and selling of electricity as well as metering, billing and collections). We would also suggest that rural electrification be treated as a separate functional activity. PSP could be tailored to the specific requirements of each of these functional areas. The basis for unbundling already exits in that the ERB has issued separate licenses to ZESCO for these functions with the exception of rural electrification which is treated as part of the distribution business. Furthermore the ERB as part of these licenses has requested ZESCO to establish separate accounting systems for each of these units so they can be managed as separate profit centers.

Organizationally ZESCO would be structured as a holding company with separate subsidiaries for generation, transmission and distribution.

The rationale for this option is that it provides the greatest flexibility for adopting the structure of ZESCO to the current and future requirements of the power sector. Of direct relevance here is the potential for a more competitive environment in the power sector which will result in the efficient allocation of resources and therefore lower costs. There is also the consideration that seeking PSP for the parts may result in a value to GRZ that is greater than concessioning or selling the company as a single entity. Finally, there is the consideration of what makes the most sense from the private investors perspective as to how best structure ZESCO.

Option 2: Restructuring Implications

Structural Options for ZESCO – Before we can discuss the PSP possibilities for this option, we need to first address what makes sense from structural point of view. There are several relevant considerations in this regard which have a direct bearing on restructuring ZESCO which were addressed in section 2.2 and summarized here

1) Existing legislation and regulation allow for the entry of private investors in generation, and there is a policy framework proposed for private sector participation in transmission and also calls for the privatization of distribution. Moreover, current legislation provides for the creation of an open access grid.

2) An unbundling of the power sector has in part occurred, in part, with the sale of ZCCM transmission business to CEC, and the formal separation of Kariba North Bank Company from ZESCO. Prospective IPP's are the Kafue Gorge Lower and Itezhi-tezhi, and the ZCCM hydro plants Mulungushi and Lunsemfwa

3) As mentioned above ZESCO is undergoing a functional/accounting unbundling as part of its licensing requirements.

4) As mentioned in the Task 1 Report, ZESCO's financial position is poor. On a functional basis both, generation and transmission are profitable. Distribution is not profitable given the current level of tariffs

5) The potential for competition has two dimensions: domestic and regional. Domestically it is our view that the potential for wholesale competition is very limited due to the small market size and limited number of generators. Any competition would come through the entry of new IPP's into the market. The opportunities for any meaningful retail competition in the foreseeable future are also very limited given the fact that the major industrial customers are already under long-term contract and the balance of the market is quite small. Accordingly, one could argue that the benefits from competition are limited. On a regional level there exists at least potentially greater scope for wholesale competition given the relatively low cost of generation in Zambia, the diversity and size of regional generating capability. It is important to note that the regional market is governed by the South African Power Pool Agreement which at this time does not explicitly recognize individual generating plants or IPP's as participants in the pool.

6) There is not a well defined commercial or market structure for electricity

Given the above considerations what then are the most appropriate restructuring options for ZESCO. This option envisions a complete unbundling whereby generation, transmission and distribution each become separate entities. We would envision the supply business remaining as part of the distribution business. The structure would operate as follows:

Separation of generation- At issue here is the potential for wholesale competition – To have workable competition there needs to be sufficient number of generators competing on price using base load, mid-merit, and peaking plants. These conditions are not present in Zambia – for the following reasons

i. Small system size – Total installed capacity is only 1600 MW and ZESCO controls over 60 percent.

ii. Limited fuel diversity – hydro-based system – these are basically must run plants; variation in cost among these plants may not be that significant; The ability to compete on price is therefore limited, and complicated by the potential impact of one plant on another since they are located on same river.

iii. Load curve is relatively flat, further limiting the scope of competition.

iv. System dominated by mining load, which could limit liquidity in the market (insufficient volume traded). Effectively 55% of the load is tied up under long-term contracts, leaving approximately 600 MW available for competition. Accordingly, small changes in market conditions could lead to wide swings in price, increasing risk to market participants.

271

v. Regional influence through SAPP – current surplus capacity would exert downward pressure on prices for base load energy, perhaps less so for peaking. Over time, this influence should lessen as supply and demand come into balance

In summary, based on the above factors, there appears to be very limited scope for real priced based competition on the system. Based on GRZ legislation and policy objectives, it is clear that IPP's will play a role in the Zambian power sector with KNBC being characterized as the first, and all new generation developed as IPP's. This new generation will be hydro-based as well. Accordingly, a precedent already exists for the separation of generation, as prescribed by the GRZ's objectives for the sector.

The commercial basis for the market would therefore be based on bilateral contracts with the following entities depending on how the remaining assets of ZESCO are restructured:

a) ZESCO (the transmission entity) as the single buyer.
b) ZESCO and large end users as buyers.
c) Distribution Company, if supply remains with distribution, and distribution is separated from transmission.

In all but situation (a), some form of open or regulated third party access would be required. Responsibility for system dispatch could remain with ZESCO or alternatively, an independent system operator could be established.

Transmission and Distribution Functions – Both are networks requiring regulation as monopolies. Based on the disposition of generation as discussed above, it would appear that, unless ZESCO becomes a single buyer, some type of open access would be required.

Current Situation – The ERB has issued separate licenses for transmission and distribution to ZESCO. These licenses require separate accounting and therefore, functional unbundling should take place. The situation is further complicated by the fact that part of the transmission system is already privatized. CEC owns transmission assets and serves as the single buyer for the mining load. Furthermore existing legislation and policy appear to lay the groundwork for open access system.

Accordingly the most likely range of options:

a) Separate T&D and keep supply part of distribution.

b) Separate T&D and separate supply.

c) Keep T&D including supply, together

Separate T&D and keep Supply as Part of Distribution – This appears to be likely if generation is split off from ZESCO, and the transmission system is open access. There are two possibilities regarding transmission. One, the transmission system could be responsible for system dispatch and planning. Alternatively, the transmission system could be a wires-only business, with system dispatch given to an independent system operator (ISO). The need

for an ISO will depend on whether there is the possibility of discrimination on the part of the transmission company. If generation is separated from ZESCO, then the likelihood of such behavior is minimal. Lastly, the role of CEC in an unbundled system must be addressed. If distribution is separated, then CEC must provide wheeling for the distribution. Apparently, this is permissible under its current agreement with ZESCO.

Distribution would include both the wires business, as well as supply. Distribution as shown in Section 1, is financially and technically the weakest part of ZESCO. It is also critical in terms of revenue generation and commercial activity. The financial viability of the distribution business is a critical issue in light of requirements to expand the system. Directly associated with this is the inadequate level of tariffs. The key issue with distribution is the small existing customer base which may require leaving it as a single entity, as the potential for retail competition is remote. Supply services would also be provided by the distributor in this case.

Commercial/Market Mechanism – There are two possibilities. The transmission company could hold all supply contracts from the generators, selling to the distributor under a bulk supply agreement (effectively a single buyer). Alternatively, generators could negotiate their own PPA's with the large end users and the distributor. In reality, given the small size of the market, this may not be possible, as the distributor would need to maintain these customers in order to remain financially visible. Finally, there is the issue of the existing bulk supply agreement between what is now ZESCO and CEC. This would prevent individual contracts between generators and the mines. Consequently, the transmission company would need to be assigned this contract

Regulation – The networked business would require regulation of the transmission, distribution and retail tariffs. In the case of a single buyer there is less need to be concerned with getting price signals right regarding location and congestion – the concern here is to insure the system is operating efficiently and sufficient investment in the system results. The same applies to the distribution system. Accordingly, this would argue in favor of traditional rate of return regulation until the there has been some track record established for system performance and investment in the network. Furthermore performance based pricing requires a complete understanding of costs versus performance. Given the current state of ZESCO this doesn't exist.

Keeping T&D Together – This is probably the least likely given the current situation but has to be considered if it is deemed more appropriate that ZESCO remain vertically integrated. However because of the likely entry of IPP's we have the potential issue of open access. If generation is split off, the principle reason for keeping T&D together is that the distribution is small and that there maybe economies of scale in running the wires business as single unit. System dispatch would remain part of T&D.

Implications for competition – Assuming generation is split off and there is little scope for wholesale competition then the T&D company would become the single buyer. Under this option there would be no eligible consumers who could contract separately with generators.

Regulation- Both transmission and distribution would require regulation. As T&D would be together the requirements would be for retail tariffs which would reflect the bulk supply agreements plus transmission costs As there are uncertainties regarding development of the distribution system traditional rate base type regulation would be more appropriate than performance based or price cap regulation

Commercial/Market Mechanisms – there is limited scope for competition hence meaningful price competition is not possible. Accordingly, the principle vehicle for commercial transactions would be through negotiated bulk supply agreements.

Recommended Structure

Given all of the above considerations, we believe the most appropriate unbundling strategy would be as follows:

1) Generation, transmission and distribution will become separate entities.

2) Generation would be further separated into two parcels – Kafue Gorge and Victoria Falls. However, Kafue Gorge would operate on what we refer to as the whole river concept. This would entail operating Kafue Gorge Upper and the prospective Kafue Gorge Lower as a single entity.

3) The Transmission entity (the former ZESCO) would initially be required to operate on a regulated third party access basis. The grid company would also retain the dispatch function.

4) There would be a single distribution entity and the supply function would initially remain with distribution.

5) The commercial power market would be based initially on the single buyer concept – all existing bulk supply contracts would remain with the transmission company.

6) Rural electrification would be developed as a separate program.

Option 2: Private Sector Participation Alternatives

Given the recommended unbundled structure, the PSP alternatives would be as follows:

- Generation – Outright sale of assets
- Transmission – Concession
- Distribution and Supply – Concession

The following sections present distinct discussions for generation, transmission and distribution. For each segment, there is a discussion of the segmentation and the structure of private sector participation, implementation timeframe, financing and risk allocation. This is followed by a summary of the pros and cons of this option.

274

Generation – The generation subsidiary could be sold outright through a trade sale. There is considerable precedent for seeking PSP in generation through this approach. Both the Kafue Gorge and Victoria Falls can be considered major plants which can be owned and operated in their own right. The owners of the plants would have the responsibility to operate them in accordance with the requirements of their license. In addition based on our recommended unbundling structure there would need to be put in place a grid code which would explicitly indicate the responsibilities of the generators to insure the proper operation of the grid. The owners would be responsible for all investment and maintenance on the plants. They would be required to meet any environmental regulations which would affect the plant.

GRZ would transfer ownership of the plant to the private investors. GRZ would retain ownership of the water rights, which would be competitively bid for in order to establish a market value for them. GRZ through the ERB would have the obligation to insure the plants are in compliance with the requirements of their licenses. The ERB would also be required to oversee any inter plant agreements which would be required to insure there is no discrimination among the plants operating on the same river.

Generation – Implementation Timeframe

Once the decision has been made to sell the plants, approximately 2 years will be required to implement the option. During this period, several critical determinations must be made, including commercialization and corporatization of ZESCO prior to the transaction; which assets to convey with the purchase; asset valuation; determination of staffing. These actions would be followed by prequalification, tendering and selection of a buyer.

Generation – Risk Allocation

Under an outright sale, most of the operating and market risk would be borne by the private investor. GRZ might be responsible for certain financial risks, and preexisting environmental risks.

Transmission

Transmission includes the 300kV and 220kV system and associated transformers. The principal vehicle for PSP in the transmission system would be through concession. There is also the possibility that the grid could be sold outright. Certainly, a precedent exists for this in the sale of the ZCCM grid to CEC. However, given the strategic value of the grid, both nationally and regionally, GRZ may want to retain control of the assets. GRZ can sell these assets at some future time, when the power sector has more experience operating in an unbundled environment and there is more clarity with respect to regional market operations, and when the regulator has become more experienced. Therefore we would recommend a concession. The term of the concession would be 15 years, with a performance review every five years which if favorable would extend the concession.

Under a concession agreement, the concessionaire would have the following obligations and responsibilities:

- Maintenance and expansion of the grid

275

- System planning and dispatch
- Transmission tariffs
- Maintain system stability
- Function as single buyer purchasing under bulk supply agreements and selling to wholesale and retail customers
- Compliance with grid code and license conditions

GRZ would have the following roles and responsibilities:

- The Ministry of Finance would be responsible for executing the concession agreement, with concession fees paid to the MOF
- Responsibility for pre-qualification and tendering of the concession would rest with ZPA
- Once the concession is awarded the Energy Regulatory Board should be responsible for its administration. This would include the following:
    - Implementation and administration of the agreement
    - Oversight of system planning and investment requirements
    - Tariff approvals
    - Monitoring the performance of the concession agreement
    - Issuing penalties or taking corrective action when there is a breach of condition
    - Dispute resolution
    - Safety and quality of service
    - Establishing open access policy

Transmission – Financing

The financing of the concession would occur through transmission system tariffs. Given that there may be insufficient knowledge or understanding of costs coupled with the uncertainties associated with new investment in the system a regulated rate of return on rate base approach would be more plausible. These tariffs would be subject to regulatory oversight and approval. The single buyer function would be ringfenced and would operate on a non-profit basis.

Transmission – Risk Allocation

Under the transmission concession most of the risk would be borne by the private investor.

Distribution

PSP in the distribution function could be attained under several modalities, based on experience in other countries. There is a basis to either sell the distribution function outright; establish a joint venture arrangement whereby GRZ maintains a percentage share in the company with management control vested in the private investor; or concession the distribution function. The most significant barrier to seeking PSP through any of these alternatives is the financial condition of the distribution function. As mentioned in the Task 1

Report the critical issue here is the insufficient level of tariffs. Given that distribution is a natural monopoly and that we recommend leaving it as a single distribution entity coupled with the fact that the issue of tariffs and electrification are sensitive issues a concession would be the most appropriates way to seek PSP.

Distribution – Obligations and Responsibilities

Under a concession agreement the concessionaire would have the following obligations and responsibilities:

- Maintenance and expansion of the distribution system
- Retail supply services including metering, billing and collections
- Retail tariffs
- Maintaining service quality
- Compliance with grid code and license conditions

GRZ would have the following roles and responsibilities:

- The Ministry of Finance would be responsible for executing the concession agreement, with concession fees paid to the MOF
- Responsibility for pre-qualification and tendering of the concession would rest with ZPA
- Once the concession is awarded the Energy Regulatory Board should be responsible for its administration. This would include the following:
    - implementation and administration of the agreement
    - oversight of system planning and investment requirements
    - tariff approvals
    - monitoring the performance of the concession agreement
    - issuing penalties or taking corrective action when there is a breach of condition
    - dispute resolution
    - safety and quality of service

Distribution – Financing

The financing of the concession would occur through retail tariffs. Insufficient tariffs are probably the single most important issue impacting the viability of the concession and its value to the GRZ. Given that there may be insufficient knowledge or understanding of costs coupled with the uncertainties associated with new investment in the system a regulated rate of return on rate base approach would be more plausible. These tariffs would be subject to regulatory oversight and approval.

Distribution – Risk Allocation

Under the distribution concession most of the risk would be borne by the private investor.

The distribution system requires the most significant improvements both operationally and physically. Therefore, the term of the concession should provide adequate time for the concessionaire to recover this investment. We would recommend a 30-year concession in order to provide for the development of the system; however, there should be a provision to re-compete the concession or subdivide the concession if the market warrants after 15 years.

Option 2 – Advantages and Disadvantages

Option 2 has the following advantages:

1) Provides greatest potential for achieving competition, although this would not be an immediate result of unbundling.

2) Comes closest to meeting GRZ policy objectives for the sector

3) Provides the greatest overall role for PSP which provides more focused management attention on each of the functional areas which should result in the largest improvement in productivity and quality of service

4) May result in highest value to GRZ

5) May require the least amount of regulation relative to the other options

Option 2 has the following disadvantages:

1) Tariffs will have to increase significantly if distribution is to be sold or concessioned

2) May not be applicable to distribution due to the financial position of the distribution function

3) Transaction costs will be higher as the PSP options and structure is more complex

Figure 6-3 Option 3: Unbundling ZESCO into Separate Business Units
(Followed by Management Contract)

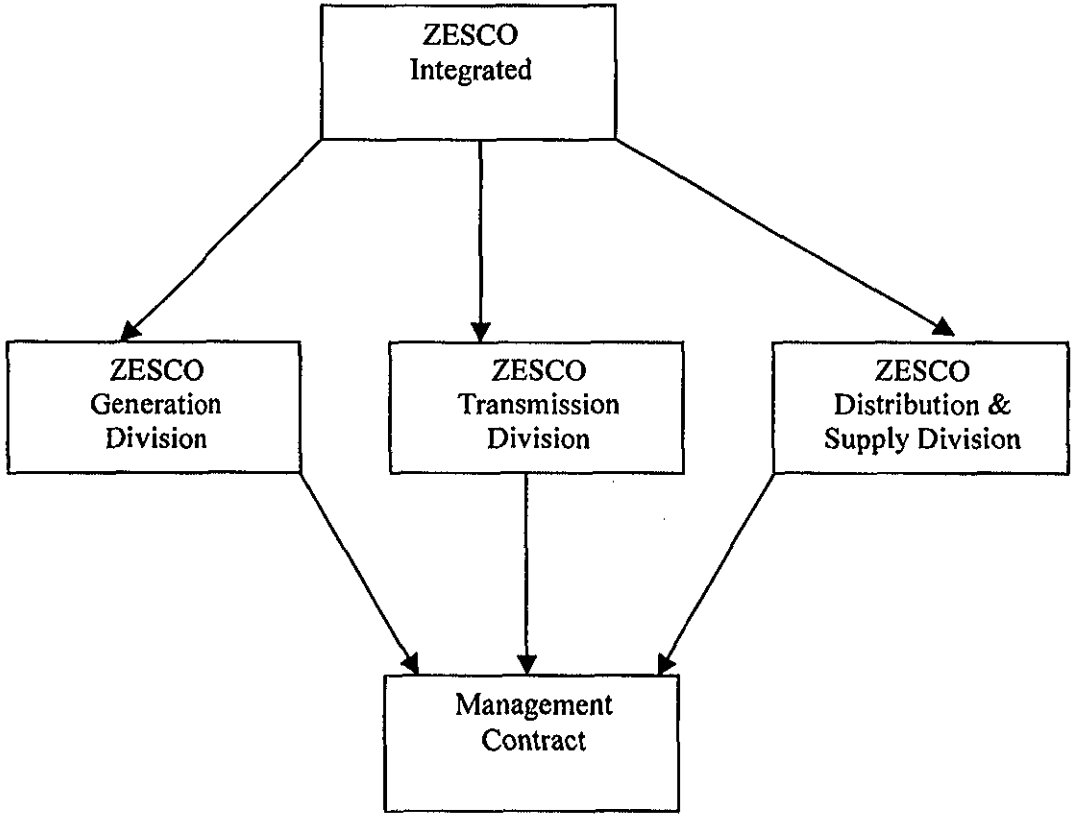
Current Industry Structure

Industry Restructuring:

Financial
Unbundling

Private Sector Participation:

Management Contract
(NOT with ZESCO)



279

6.3. Option 3: Unbundling ZESCO into Separate Business Units Subject to Management Contract

In this option PSP would be developed through a private management contract. GRZ does not receive any type of fixed payment with this form of PSP. Under this option, GRZ would retain ownership of the utility assets and also maintain overall management control. ZESCO would have to be reorganized on a divisional basis with financial and operational unbundling for each division; generation, transmission and distribution completed before the management contract be let. Accordingly, we believe at least one and a half to two years would be required to complete the divisional unbundling, specify, compete and award the contract.

The management contract would be awarded through a competitive bidding process. The success of the contract would depend on the specification of performance targets for each of the business units and the degree of autonomy given the contractor to make decisions without government influence. The performance targets to be set would have the goal of moving ZESCO towards the best-case scenario described in Section 1. Thus there would be performance targets for operational improvement, organizational improvement and financial improvement for each of the business units. With respect to distribution a critical issue will be that associated with retail tariffs and their impact on achieving financial targets.

The private contractor be compensated on a two part fee basis. There would be a fixed component and a success fee, which would be based on a percentage of profits. This two-part structure reflects the uncertainty confronting the contractor when he commences the contract. We would recommend that the fixed component decrease over the three years with a corresponding increase in the success fee. We would further recommend that the contractor be further motivated to reach certain profitability target levels through options to extend the term of the contract.

The principle reason for using management contracts would be twofold. First, the government may want to retain control of the entire utility. Second, use of a management contract could be used as an interim measure to improve performance to a point where other PSP alternatives become viable. More specifically, the ability to concession or sell the distribution business unit may not be possible until it becomes financially self sustaining and revenue collections improve materially. Moreover, because tariffs are the central issue related to the financial viability of the distribution unit, they will need to be increased significantly as indicated in Section 1, however, the ability to raise tariffs to their economic levels may be difficult and hence need to be phased in over time. One way to accomplish this transition would be through a management contract.

Option 3: Industry Restructuring

Under option 3, ZESCO would remain vertically integrated but functionally unbundled. Commercial arrangements would be similar to option 1, whereby ZESCO would remain the buyer and seller of power. It would retain the existing bulk supply contracts with CEC. It would also be responsible for purchasing power from IPP's. We would recommend that IPP's be given the option to sell directly to the export market and large industrial customers. The

former will depend on changes to SAPP rules regarding membership by IPP's. There will also need to be open access to the grid. In this regard we would initially recommend regulated third party access until such time as the functioning of the regional market becomes clearer.

Option 3: Financing

Financing of this option, the payment of the success fees, would be achieved through revenues generated through retail and bulk supply tariffs

Option 3: Obligations and Responsibilities

Obligations and responsibilities of the management contractor would be as follows:

- Obligation to meet requirements of the licenses
- Responsible for the operation and maintenance of all generation facilities, transmission and dispatch, and distribution
- Responsible for central corporate functions including finance, planning procurement, and staffing
- Responsible for meeting specific and reasonable technical, economic and management performance metrics for each unit and at the corporate level

Obligations and responsibilities of the GRZ would be as follows:

- The MEWD would be responsible for signing the contract and have the obligation to meet the terms of the management contract
- ZPA would be responsible for prequalifcation, tendering and contractor selection
- ERB would be responsible for monitoring performance of the contract, license obligations and approving tariff increases
- GRZ through the Ministry of Finance would be responsible for all debt service
- GRZ would be responsible for all investment requirements identified by the contractor

Option 3: Risk Allocation

Under this option, GRZ would bear most of the risk. These risks would be as follows:

- Debt/debt service – GRZ would assume debt related risk as there is no transfer of debt to the management contractor
- Investment risk – as GRZ maintains responsibility for investment in existing generation well as network rehabilitation and expansion as the operators are not requires to finance these investments

- Currency risk –GRZ would need to bear this risk when debt or investment obligations are in another currency, as well as contractor fees which would be indexed to a hard currency.
- Revenue Risk – this risk that ZESCO will not collect sufficient revenues to cover its financial obligations. Given that the level of tariffs will be a critical element and this hinges on the willingness of GRZ to allow the required increases this risk should be borne by the GRZ. Alternatively there may be some sharing of risk with the contractor.
- Operational risk – to the extent that there are delays in getting approval for an changes in operation then GRZ would be in the best position to mitigate these risks
- Environmental risk – GRZ would be responsible for any pre-existing liabilities

The management contractor would bear the following risks:

- Operational risk – this encompasses the risk associated with contractor induced changes in operating or technical conditions which could increase cost.
- Revenue risk – under conditions where tariff changes requested by the contractor have been approved and there is a reduction in demand the contractor would bear this risk
- Environmental risk – *environmental incidents due to improper operational procedures* fault should be borne by the contractor

Option 3: Advantages and Disadvantages

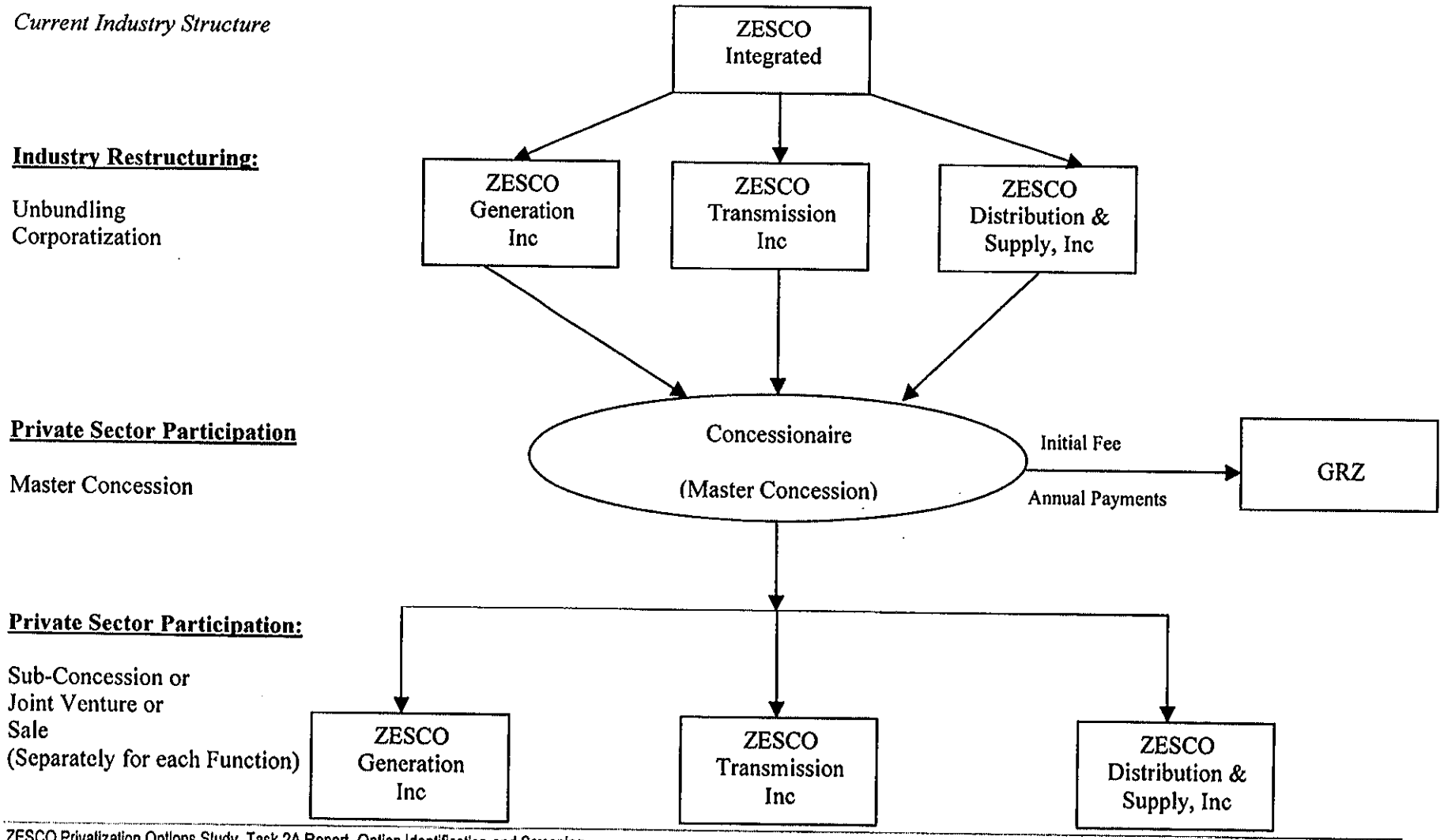
Advantages are:

- May achieve performance targets if contractor is given full discretionary authority over the business units
- Provides means to improve performance of the distribution unit before it can be privatized
- Would have the lowest transaction costs as it is the least complicated

Disadvantages are:

- GRZ essentially still retains control over utility
- GRZ responsible for meeting investment requirements
- Past performance of management contracts in Zambia suggest enforcement of contract may not be effective
- Same as option 1 with respect to enhancing competition
- Same as option 1 with respect to regulation

Figure 6-4 Option 4: Master Concession or Joint Venture
(with Different Business or Functional Units Managed Through Separate Sub-Concessions, Joint Ventures or Private Ownership)



283

6.4. Option 4: Master Concession or Joint Venture with Subsequent Privatization of Business or Functional Units Through Sub-Concessions, Joint Ventures or Sale

The differentiating factor between this option and Option 2 is the use of a master concession. or a joint venture. The use of a master concession would be useful vehicle for PSP where there is a need to bring the entire utility up to a normalized level of performance and financial sustainability before the business units could be privatized. In this regard, the PSP options for the business units would be the same as discussed in Option 2. This option could also be used as a means of subjecting the master concessionaire to the forces of competition.

The structure of the master concession or joint venture would be as follows:

- The concession or joint venture would need to be explicit as to its purpose and the specific investment and operating requirements needed to prepare the utility for unbundling and PSP in the unbundled units
- It would be of a time-limited duration – possibly 10 years.
- The fee structure of the concession would have to reflect it's shorter duration. If a joint venture were used as the PSP alternative the value would be based on the going concern value of the entire entity. The joint venture company would then share the proceeds from any outright sale, or concession fees for the business units in proportion to its share of the joint venture.
- GRZ could elect to limit the level of tariff increases and in turn accept a lower fee structure.

Option 4: Restructuring Implications

Under this option ZESCO would need to be organized as a holding company. Each business unit (i.e. generation, transmission and distribution) would then become a subsidiary which could be divested at the appropriate time. The modality for PSP in the subsidiaries would be the same as in Option 2. The master concessionaire or joint venture company would be either allowed to retain control of one of the business units, or would be given preferential consideration when the business units are put out to competitive tender. The strategy for unbundling ZESCO would be the same as under Option 2.

Option 4: Implementation Time

The time to implement this option would be approximately two years to put the master concession in place if preparatory work is carried out to complete the financial unbundling, establish the holding company structure, and separate the rural electrification activities.

Option 4: Obligations and Responsibilities

The principal obligations and responsibilities of the parties involved would be as follows:

- The Ministry of Finance would be responsible for executing the concession agreement, with concession fees paid to the MOF
- Responsibility for prequalification and tendering of the concession or joint venture would rest with ZPA. ZPA or its successor would also manage any subsequent divesting of the business units.
- Once the concession is awarded the Energy Regulatory Board should be responsible for its administration. This would include the following:
  - Implementation and administration of the agreement
  - Oversight of system planning and investment requirements
  - Tariff approvals
  - Monitoring the performance of the concession agreement
  - Issuing penalties or taking corrective action when there is a breach of condition
  - Dispute resolution
  - Safety and quality of service
  - Establishing open access policy
  - Deciding
- The concessionaire would have the following responsibilities
  - Meeting the obligations and requirements of the licenses
  - Creating holding company structure
  - Operational autonomy including staffing
  - Pricing of services
  - Investment in maintaining and upgrading the system as specified in the concession agreement

The master concessionaire would not be required to undertake any expansion of the system, as this would be required of the sub-concessions or sales. Also as mentioned under option 1 the rural electrification program would be split off as a separate program.

Option 4: Risk Allocation

Under a master concession or joint venture most of the risks would be shared between the GRZ and the various industry participants.

Option 4: Advantages and Disadvantages

Advantages are:

- May provide the best means to facilitate the transition from the current structure to an unbundled structure
- May enhance ability to attract private investors for the unbundled units based on the track record of the master concessionaire or joint venture company
- May bring in capital investment at an earlier stage then Option 2, thereby reducing GRZ responsibility for financing investment requirements
- May provide basis for managing rate of tariff increases over time

Disadvantages are:

- Value to GRZ may be lowest of all the options as it would require seeking PSP before entity is at the appropriate stage of readiness for PSP
- Highest transaction costs as it would be the most complex transaction
- Would require more regulation until the utility is completely unbundled

Figure 6-5 Option 5: Joint Venture between GRZ and Strategic Investor
(Strategic Investor – Majority Shareholder & Management Control)

Private Sector Participation

Joint Venture

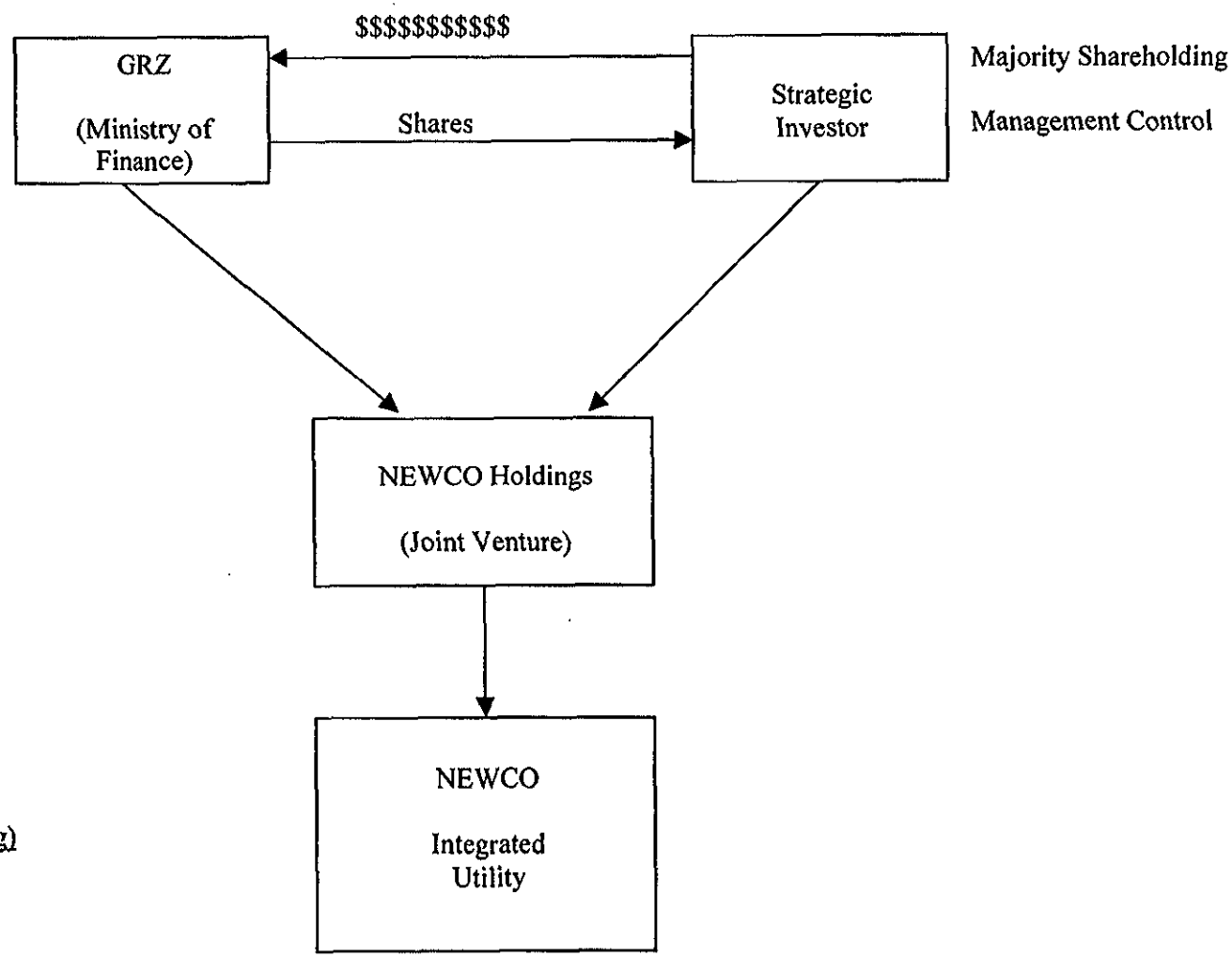
Limited Industry Restructuring

Unbundling

Private Sector Participation:

Commercialization
Corporatization

(Potential for Future Industry Restructuring)



287

6.5. Option 5: Joint Venture between GRZ and Strategic Investor

Option 5 would involve selling a percentage of the shares of ZESCO to a private investor or consortium that would in turn receive management control of the company. The private partner would be selected through a competitive bidding process. ZESCO would remain vertically integrated but financially and operationally unbundled. Based on our discussions with the Ministry of Finance, it appears that GRZ would be amenable to a minority share in the company on the order of 20% to 30%. While management control would pass to the private investor, GRZ could retain a golden share which would give it veto rights under certain specific conditions, in particular the right to approve any subsequent sales of the business units by the private investor. This could be important given the significance of the power sector to the economy and also the need to insure that any divestitures are in line with GRZ policy for the power sector.

The rationale for option 5 would be to seek a strategic investor(s) who would provide investment capital as well as management expertise. In a strategic sale GRZ will define the characteristics it seeks in a strategic partner. At a minimum these would include significant operational experience in the power sector a as well as the financial capacity to provide for system investment. With the exception of any veto rights granted through a golden share GRZ would relinquish its control of the ZESCO. Accordingly, this option comes closes to outright privatization of ZESCO. However, given ZESCO's current financial position as discussed in the Task 1 Report, this option may not be viable until ZESCO becomes profitable on a sustainable basis. Accordingly, some interim measures, such as a management contract or master concession may be required.

Assuming, that these interim measures are not required, we estimate it will require approximately one year to prepare ZESCO for sale once the decision is taken to proceed with this option. The time involved would entail preparation of the company for sale, prequalification, submission of tenders, negotiation and closure.

Option 5: Restructuring Implications

The structural implications of this option are that ZESCO would remain a vertically integrated utility much as it is today. However, ZESCO would be financially unbundled with separate accounting for each functional area – generation, transmission, and distribution. Under this option, new generation would come from IPP's and expansion of the transmission grid and distribution and the maintenance of existing generation would be the responsibility of the private owners.

Commercially the power market would operate in the following manner:

- ZESCO would purchase power from IPP's under long term contracts
- It would continue to supply power to CEC under the current bulk supply contract
- Kariba North Bank Company would sell power to ZESCO under an long-term contract essentially operating as an IPP
- ZESCO would continue to participate in the regional market through agreements with SAPP

The existing legislative and regulatory environment could accommodate this option, as there is little change from the current situation. The only significant modification would be that of open access to the transmission grid. Provision for this is already included in the existing laws and regulations. Accordingly, when the GRZ decides that both the domestic and regional power markets are more robustly competitive this structural change could be implemented. The implementation of open access would also introduce competitive pressure on the joint venture company and thereby provide some assurance that to operate as efficiently as possible.

Option 5: Obligations and Responsibilities

The responsibilities and obligations of the respective parties would be as follows:

- GRZ through the ZPA would be responsible for conducting the trade sale
- The Energy Regulatory Board should be responsible for the following:
  - Implementation and administration of the agreement
  - Oversight of system planning and investment requirements
  - Tariff approvals
  - Monitoring the performance of the company regarding license obligations
  - Issuing penalties or taking corrective action when there is a breach of condition
  - Dispute resolution
  - Safety and quality of service
  - Establishing open access policy
- The joint venture company would be responsible for:
  - Meeting the obligations of the licenses
  - Pricing of services
  - Management and organizational change including staffing
  - Operations and maintenance for existing generation, transmission and distribution
  - Capital expenditures
  - Expansion of the grid and distribution system

Option 5: Risk Allocation

Under this option most of the risk would be shared between by the private joint venture company and the GRZ.

Option 5: Advantages and Disadvantages

Advantages are:

- Puts ZESCO in private ownership with the least influence from government
- Provides for long term investment in the system at lower cost due to financial capacity of the strategic investor
- May have low transaction costs

Disadvantages are:

- May not meet GRZ objectives for enhancing competition in the sector
- Will require heavy regulation, as the utility will essentially remain a monopolistic entity
- May create conflict between financial objectives of the strategic partner and the electrification goals of the GRZ

Figure 6-6 Option 6: Maintaining GRZ Ownership of the Power Sector
(Commercialization of Business/Functional Units; Managed Through Management Contracts)

Current Industry Structure

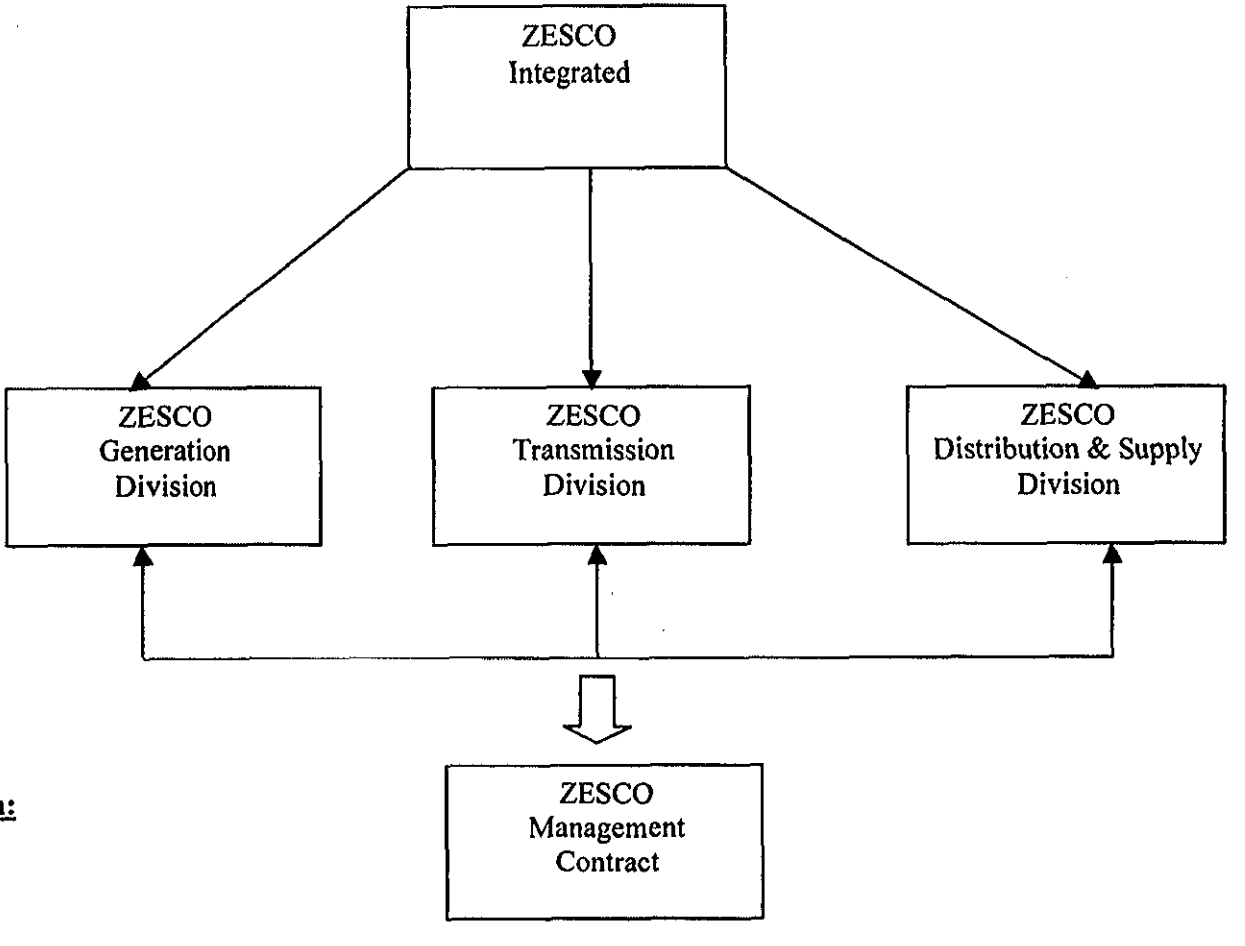
Limited Industry Restructuring

Financial Unbundling

Limited Private Sector Participation:

Management Contract

(With ZESCO)



291

6.6. Option 6: Maintaining GRZ Ownership of the Power Sector

This option essentially represents the status quo situation, whereby GRZ retains control, commercialization of ZESCO continues and ZESCO managers are subject to management contracts. ZESCO would continue to be financially and functionally unbundled in accordance with the requirements of its license. The main difference would be that there would be separate management contracts with each of the business units, which would be monitored by the GRZ. To date the track record on the implementation of public sector management contracts has been proven to be largely ineffective.

Under this option there would be no change in the power sector it remains essentially as it is today as discussed in Section 2.

In this option GRZ bears all the risks and is responsible for the development of the power sector. Accordingly, all new investment requirements will be the responsibility of the GRZ.

Option 6: Advantages and Disadvantages

Relative to the other options Option 6 has little advantage. The disadvantages are as follows:

- May not meet commercialization objectives
- Does not meet GRZ objectives for the power sector
- May not provide for needed investment requirements
- Will result in minimal impact on development of the sector in terms of coverage
- Continues role of government in the operation of the sector

6.1. Option 1: Concessioning ZESCO to One Concessionaire 6-3
6.2. Option 2: Unbundling ZESCO into Separate Corporate Business Entities 6-8
6.3. Option 3: Unbundling ZESCO into Separate Business Units Subject to Management Contract 6-18
6.4. Option 4: Master Concession or Joint Venture with Subsequent Privatization of Business or Functional Units Through Sub-Concessions, Joint Ventures or Sale... 6-22
6.5. Option 5: Joint Venture between GRZ and Strategic Investor..... 6-26
6.6. Option 6: Maintaining GRZ Ownership of the Power Sector 6-30

Section 7 Options Screening and Recommended Options

The purpose of this section is to: (1) develop and set out the screening criteria to be used in selecting the recommended options, (2) explain how the criteria would be applied, and (3) screen the options and recommend those options for more detailed analysis.

7.1. Option Screening

In general the criteria can be broken down into the following categories:

- Meets GRZ Policy Objectives
- Private sector attractiveness
- Financial
- Operational
- Economic
- Political and Social Acceptability
- Ease of Implementation

The screening criteria would be applied in the following manner: Each criterion is given a weight to show its relative importance. Then each option is given a score between 1 and 5 depending on how best it meets the criteria. The scores are then multiplied by the weights to give an overall score for the option. The weights are assigned as follows in descending order:

***Private Sector Attractiveness* – 25 points** – the purpose of this criterion is to reflect the significance of private sector interests relative to governmental interests and to insure there is an appropriate balance. This criterion is given the same weight as the policy/legislative criterion. (**Note** –should it be somewhat higher to reflect country risk)

***Meets GRZ Policy Objectives* – 25 points** – the purpose of this criterion is insure that the selected options will meet or exceed GRZ position with respect to both privatization and restructuring of the power sector. This criterion is given the same weight as Private sector Attractiveness to reflect the need for a balanced program.

***Financial, Economic and Operational Criterion** – 30 points* - the selected options must be able to deliver in terms of significant improvements in performance. Each of these criterions is given a weight of ten, as they are equally important. In total they sum to 30 points, which make them, as a group slightly more important than the aforementioned criterion.

Political and Social Acceptability – 15 points - the selected options should meet the objectives of other key stakeholders. They should have the smallest social impact. This criterion is given a weight of 15 points to reflect that it is important but less so then the other criteria – principally because there may be mitigating measures that can be developed to the option per se.

Ease of Implementation – 5 points – the selected options should be implement able in the context of the Zambian situation. They should also seek to minimize the transaction costs

involved in implementation. The weight given to this criterion reflects that while ideally quick implementation at low costs is desirable, in actuality there is a tradeoff among this criterion and the others.

Description of Selection Criterion

A. Meets GRZ Policy Objectives (25 points)

The principal criteria center on the GRZ policy objectives for the power sector, privatization and any legislative framework that support these objectives. These would include the following:

1) Policy level criteria – does the option meet GRZ objectives for the sector which are to
   - Reduction in involvement in sector by GRZ
   - Improves fiscal responsibility and performance
   - Overall value to GRZ in terms of proceeds, level of investment, lowest prices

2) Option meets GRZ objectives in regard to enhancing competition in the sector, in this regard option should allow for:
   - Allows for entry of new companies
   - Allows for private participation in transmission
   - Potential for open access or regulated third party access
   - Potential for privatization of distribution

B. Private Sector Interest – (25 points)
- Degree of control
- Transparency of transaction
- Risks are manageable

C. Economic Criteria – (10 points)
- Improvement in economies of scale
- Improvement in economic efficiency – prices reflect costs; minimal cross subsidies
- Overall improvement in competitive environment or least potential for abuse of market power
- Results in lowest overall increase in prices

D. Financial Criteria – (10 points)
- Overall level and growth of revenues
- Provides investment capital for system development
- Results in sustainable and growing level of profitability
- Results in return on assets of at least 10 percent

E. Operational Criteria (10 points)
- Degree of overall service improvement - service quality to cost ratio

- Increase in productivity levels relative to the best case scenario
- Provides incentives to reduce costs
- Provides incentives to improve utilization of investment and system utilization

F. Political and Social Acceptability – (15 points)

- Minimizes or mitigates social impacts
- Meets objectives of other stakeholder groups

F. Ease of Implementation (5 points)

- Minimizes transaction costs
- Requires least time to make operational

7.2. Option Screening and Ranking

Table 7-1 summarizes the results of the option screening using the criteria developed above.

Table 7-1 Ranking of Options

Evaluation Criteria (wt)	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
GRZ Objectives: Policy (12.5)	4	5	2	5	4	1
GRZ Objectives: Reform (12.5)	2	5	2	5	2	1
PSA (25)	3	5	4	3	2	0
Economic (10)	3	5	2	4	3	1
Financial (10)	4	4	2	4	5	1
Operational (10)	5	4	4	4	5	1
Political Accep. (15)	4	4	3	4	4	2
Ease of Imp. (5)	2	1	4	1	2	5
Total Score	365	445	305	385	325	90

As shown in Table 7-1 the ranking suggests that Option 2 is the most preferable, followed by Option 4 and Option 1. Accordingly, Options 3, 5, and 6 are not considered for further evaluation.

Option 3, the use of management contracts, has a fundamental weakness in that it does not provide for private capital, does not meet GRZ reform objectives, and it may not be as effective in meeting the financial and economic criteria. Moreover, management contracts, in our view,

present more of an interim solution than a long term one. Accordingly, the use of management contracts may be appropriate where there is a reluctance on the part of the private sector to commit capital where financial viability of a business unit is in question. This situation applies most directly to the distribution business unit. As an interim measure a management contract may be the most appropriate interim strategy in order to return the distribution unit to profitability before a longer term approach can be used.

Option 5 has been eliminated because it would not meet GRZ objectives and transfers ownership and control to the private sector which maintains ZESCO as a vertically integrated utility. In our view this represents a serious limitation. Option 6 has been eliminated because it is a continuation of the current situation and does strongly meet any of the screening criteria with the exception of ease of implementation.

The selected options present the best overall long-term approach for PSP in ZESCO balanced with GRZ's objectives for power sector reform. In this regard Option 2 presents the widest range of PSP possibilities as well as setting the stage for a more competitive environment. Option 4 would accomplish the same aspects as Option 1, through a staged process using a master concession as the first stage. Option 1, would also bring in private management and capital however the utility would remain vertically integrated but financially unbundled, however as GRZ would still own the assets, it would have the option to modify the concession terms in accordance with changes in the power market. These three options are analyzed in detail in Task Report 2B- Detailed Assessment of Recommended Options.

Private Participation Options Study for the Zambia Electricity Supply Company

Task 2B Report-
Detailed Options Assessment

298

Table of Contents

1 Introduction....1-1

2 Detailed Development of Options....2-1

2.1 Option 1 – Single Concession for ZESCO....2-1
2.1.1 Scope....2-1
2.1.2 Concession Term....2-3
2.1.3 Management Structure and Staffing....2-4
2.1.4 Commercial Relationship with Other Companies in the Sector....2-4
2.1.5 GRZ Control....2-5
2.1.6 Taxes....2-5
2.1.7 Classification of Option Conditions....2-5

2.2 Option 2: Unbundling ZESCO into Separate Corporate Business Entities....2-7
2.2.1 Scope....2-7
2.2.2 Terms of the Option....2-10
2.2.3 Unbundling and Infrastructure Management and Staffing....2-12
2.2.4 Relationships within the Power Sector....2-13
2.2.5 GRZ Degree of Control:....2-14
2.2.6 Taxation Issues....2-16
2.2.7 Classification of Option Conditions....2-16

2.3 Option 4: Master Concession with Different Business of Functional Units Managed Through Separate Commercial Arrangements....2-17
2.3.1 Stage 1 : Master Concession....2-18
2.3.2 Stage 2: Unbundling of Subsidiary Companies....2-20

3 Business Case Assessment....3-1

3.1 Purpose....3-1

3.2 Methodology and Assumptions....3-1
3.2.1 Currency....3-1
3.2.2 Disaggregation of Analysis....3-1
3.2.3 Implementation Time....3-1
3.2.4 Supply to CEC....3-2
3.2.5 Impact on Retail Tariffs....3-2
3.2.6 Impact on Demand....3-3
3.2.7 Impact on Competition....3-4
3.2.8 Sales Price and Concession Fees....3-4
3.2.9 Financing Assumptions....3-4

3.3 Results....3-5

3.4 Sensitivity Analysis....3-8
3.4.1 Pricing of Generation....3-8
3.4.2 Sales Growth....3-10
3.4.3 Retail Tariffs....3-12
3.4.4 Delays in Power Sector Restructuring....3-13

4 Preferred Option....4-1

4.1 The Preferred Option....4-1

4.2 Results of the Financial Analysis....4-1

4.3 The Zambian Political Economic Context....4-2

299

4.4 Near-Term Power Sector Restructuring *4-2*
4.5 Unbundling and Regulation *4-3*
Appendix A- Business Cases A-1

300

Table of Tables

2-1 Option 1 Conditions 2-5

2-2 Option 2 Conditions 2-16

2-3 Option 3 Conditions 2-22

3-1 Cash Generation From Wholesale Operations.....3-3

3-2 Impact of Assumed Price Differences on Retail Demand.....3-3

3-3 Financing Assumptions for Option 1 and Option 4, Stage 1.....3-5

3-4 Financing Assumptions for Option 2 and Option 4, Stage 2.....3-5

3-5 Business Case Summary.....3-6

3-6 Value to GRZ.....3-7

3-7 Effect of Generation Pricing Approach on Sales Price of Generation Assets.....3-9

3-8 Impact of Retail Sales Growth on Benefits to GRZ and Investor Return.....3-10

3-9 Impact of Retail Pricing on Benefits to GRZ and Investor Return.....3-13

4-1 Ranking of Options According to Impacts on All Stakeholders.....4-1

Table of Figures

2-1 Schematic of Option 1: (Single Concession).....2-2

2-2 Schematic of Option 2 (Separate Entities).....2-8

2-3 Pre-Privatization Activities.....2-9

2-4 Schematic of Option 4 (Master Concession) 2-17

3-1 Assumed Sales to CEC Under Bulk Supply Agreement.....3-2

3-2 Assumed Impact on Retail Tariffs.....3-3

3-3 Market Versus Cost-Based Generation Pricing in Zambia.....3-8

3-4 Impact of Generation Pricing Approach on Retail Prices.....3-10

3-5 Load Growth Scenarios for Options 1 and 4.....3-10

3-6 Pricing Scenarios for Options 1 and 4.....3-12

3-7 Impact of Option 2 Delay on GRZ Benefits.....3-13

Section 1 Introduction

The purpose of this report is threefold. First is to describe and discuss the recommended options in detail and to classify the various requirements as to their relative significance for successful implementation. The second is to develop business case analysis for each recommended option to determine their business and financial viability. Third is to present the preferred option.

The Task 2A Report- Option Identification and Screening narrowed an initial field of six options to three. The recommended options are as follows:

- Option 1- Single concession
- Option 2- Unbundling of ZESCO with privatization of each business unit
- Option 4- Master Concession with subsequent unbundling privatization of the business units

The detailed assessment of the each of the options is presented in Section 2. Business cases, based on financial projections, were developed for each of the options. These are summarized in Section 3. Section 4 presents the preferred option and discusses the rationale underlying its selection.

Appendix A contains the detailed projections associated with each business case.

Section 2 Detailed Development of Options

This section presents the basic outline of the terms and conditions for each of the options. For each option the following is described:

- Scope of the option
- Concession terms
- Management structure and staffing
- Commercial relations with other companies in the sector
- GRZ control
- Taxation

2.1 *Option 1 – Single Concession for ZESCO*

2.1.1 Scope

Figure 2-1 illustrates Option 1. ZESCO would retain its vertically integrated structure; however, prior to concessioning, ZESCO would be financially and functionally unbundled into the following three divisions:

- Generation – including Kafue Gorge, Victoria Falls and the small hydro facilities
- Transmission – including dispatch and transmission lines 88 kV and higher
- Distribution and Supply – including 66 kV lines and below

The concessionaire would pay a combination of up-front and annual fees to the Ministry of Finance and Economic Development. These would provide revenue for non-commercial power sector uses such as for rural isolated systems and for funding undfunded pension liabilities of ZESCO employees. The concessionaire would at a minimum be responsible for:

- Operation and maintenance of ZESCO's existing system including
  - ◊ Corporate functions including financial management, planning, staffing,
  - ◊ Generation – operate and maintenance of existing plants
  - ◊ Transmission – system operation and dispatch, maintenance of physical plant, maintenance of dispatch/communication systems
  - ◊ Distribution- system operation , maintenance, billing, collections and metering
- Investment Requirements
  - ◊ System upgrade – investment required to bring utility up to normative conditions.
  - ◊ System expansion – no new generation capacity – or allowed to bid against IPP's
    - Transmission responsible for all grid expansion
    - Distribution – responsible for expansion of existing system and grid related expansions in predefined areas
    - Not responsible for isolated systems

◊ Overall level of investment required will be $197 million over ten years allocated as follows:
- Generation : $32 million
- Transmission : $67 million
- Distribution : $ 98 million

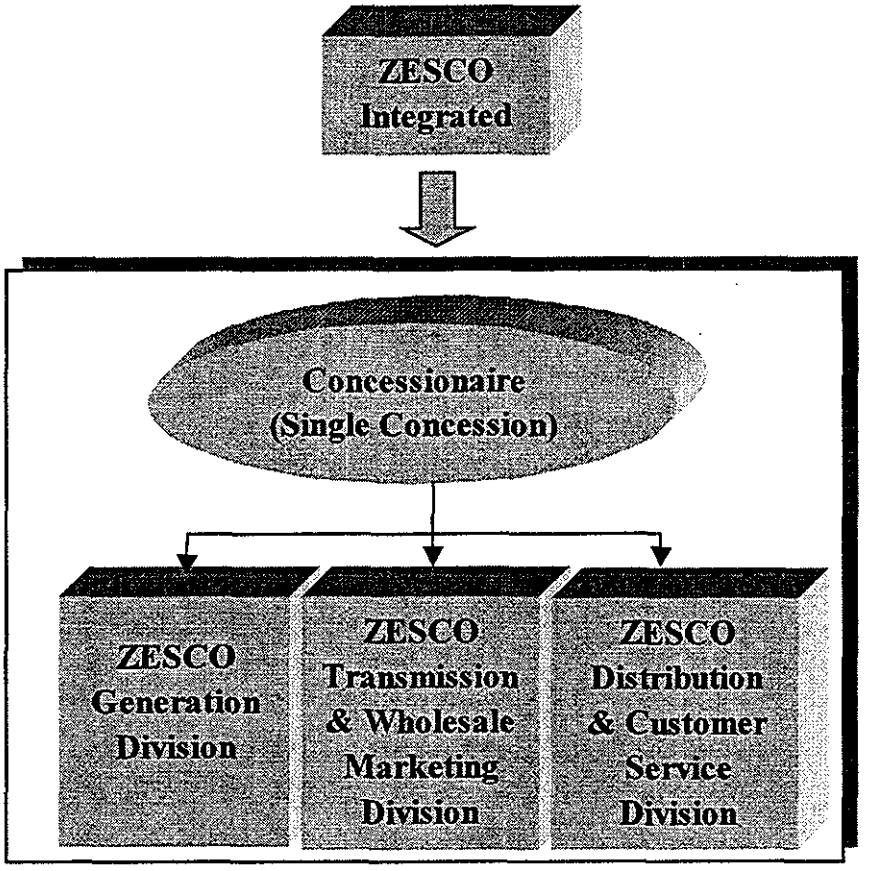


Figure 2-1: Schematic of Option 1: (Single Concession)

305

2.1.2 Concession Terms

1. **Purpose** – provide electricity service on an exclusive basis to all existing customers and new customers connected to the grid . Exclusivity of service subject to review after 10 years. Operation of service :

   - Service shall be provided in accordance with licenses conditions
   - ERB shall have regulatory oversight of service provision
   - Grid will be operated on basis of regulated third party access
   - Provision for export /import of power
   - Obligation to serve new customers

2. **Concessionaire would bid for entire ZESCO system** – including : generation, transmission, distribution and supply. Concession would exclude non- core operations which include housing, canteens, clinics, construction activities, training, security, building maintenance and motor vehicle repair.

3. **Basis for bidding** – Bidding would be conducted on two stage basis:

   a) ***Stage one*** would be technical evaluation based on ability to meet the following performance standards and development targets including:

   - Generation – unit availability, productivity, level of investment required to maintain existing units
   - Transmission – quality of supply, interruptions, level of losses, productivity, level of investment needed to maintain and expand the system
   - Distribution – quality of supply, outages, reduction in technical and non-technical losses, collection efficiency, connections, level of investment required to maintain and expand the system

   b) ***Stage two*** would be based on financial bid the concession bid on basis of the highest value subject to GRZ tariff adjustment formula. This formula would specify a specific time frame for achieving economic tariff levels for retail customers.

4. **Tariffs** – Retail Tariffs would be based on regulated rate of return, level of increases and target level of tariff over a specific period of time to be set out in concession, subject to review by ERB

5. **Term** – In order to provide sufficient time for recovery of investment the concession would be for 25 years. Concession would be open to rebid after 10 years if concessionaire has not met performance requirements.

2.1.3 Management Structure and Staffing

1. **Management Structure** - The organizational structure would be altered to reflect the divisional structure and would consist of the following:

   - Board of Directors

   - Managing Director

   - Corporate Center functions – finance, planning and economics, HR, controller, legal, procurement

   - Divisional structure – (generation, transmission/dispatch, and distribution/supply) – Each division would have a general manager, accountant, personnel, procurement, operations staff, maintenance staff

2. **Staffing** – All personnel shall be employees of the concessionaire, who will be responsible for hiring and firing of personnel. ZESCO will pay for entrenchment to a level of 3000 employees. Concessionaire will select which staff it wants to retain and execute service contracts with those personnel. Retrenchment in excess of 1000 employs will be the responsibility of the concessionaire

2.1.4 Commercial Relationship with Other Companies in the Sector

There are two possibilities :

Alternative 1 - No Open Access – under this situation the commercial relationships would be similar to current conditions -

- ZESCO would sell on exclusive basis to all existing and new customers
- ZESCO would retain bulk supply contract with CEC
- IPP's would be allowed to enter market – they would sell to ZESCO under long term PPA's

Alternative 2 - Regulated Third Party Access - Same as Alternative 1 but would allow for open access in year 10 of Concession

- IPP's could enter market and sell to non- captive customers or sell some portion of their output to export
- Large end users to contract directly with suppliers within Zambia or outside
- Access to the grid would require prior approval of ERB
- Grid code required
- Transmission access charge approved by ERB

Given the timing and nature of the concession we think that Alternative 1 would be the more appropriate approach.

309

2.1.5 GRZ Control

GRZ will continue to own core assets, however, non-core assets will be divested. GRZ – through Ministry of Finance will still own ZESCO and appoint Board of directors. Accordingly, GRZ will still have overall control of the company and therefore may influence company policy and strategic direction not defined in the concession.

2.1.6 Taxes

Concessionaire would be subject to tax breaks and incentives as provided in investment law.

2.1.7 Classification of Option Conditions

The conditions described have varying levels of importance in structuring a workable concession. The table below summarizes classifies each of the above specifications according to their significance for successfully achieving the option.

Table 2-1: Option 1 Conditions

Option Condition	Essential	Strongly Recommended	Negotiable
Scope			
O&M	X		
Investment	X		
Concession Terms			
Purpose	X		
Bid Scope	X		
Bid Basis		X	
Tariffs		X	
Term		X	
Management/Staffing			
Organization	X		
Staffing	X		
Commercial Structure			
Alternative 1	X		
Alternative 2			X
Level of GRZ Control			X
Taxes	X		

The single concession option will be designed to achieve specific financial, operational, and investment requirements. As shown in the table above practically all conditions are either essential or strongly recommended. Accordingly, the consequences of eliminating certain of these conditions would significantly impact the viability of the option. There are areas however where changing the conditionality would be possible. In particular the management and staffing conditions could be subject to negotiation. The term of the concession may be open to change as this will depend on what GRZ specifically wants to achieve from the concession.

2.2 *Option 2: Unbundling ZESCO into Separate Corporate Business Entities*

2.2.1 Scope

Under this option, we envision three stages to developing private participation. Figure 2-2 illustrates the first two phases.

In ***phase one*** of this option, ZESCO is restructured from a vertically integrated company into a holding company with separate corporate entities (shares continue to be owned by the Ministry of Finance and Economic Development (MFED). There would be three subsidiaries:

- ZESCO Generation Division becomes NEWCO Generation, Inc, which would include Kafue Gorge Upper, and Victoria Falls, plus smaller generating plants. Isolated systems would be split off into a rural electrification entity that would be operated under a separate contract.
- ZESCO Transmission Division becomes NEWCO Grid Inc which would include high voltage transmission (88 kV and above), dispatch, hydrology and wholesale marketing
- ZESCO Distribution & Supply Division becomes NEWCO Distribution & Supply, Inc. which would include low voltage distribution, retail supply services including marketing, metering, billing, and collections

In ***phase two***, the subsidiary entities would be hived off in the following manner:

- Large generation assets at Victoria Falls and Kafue Gorge would be privatized through a joint venture transaction. 70% of shares would be sold to investors, five (5%) of the shares will be allocated (but not issued) to former ZESCO management and employees, and the remaining 25% of the shares will be initially held by MFED.
- Small hydro assets and Luswasi, Lusonda Falls and Chishimba Falls will be sold through trade sale with preference to local investors.
- The transmission subsidiary would be concessioned out.
- The distribution subsidiary would be concessioned out.

The sequence of privatization would focus on privatizing generation first followed by transmission. Bidders for the generation assets would also be allowed to bid on distribution.

The participation of private investors in the distribution system presents some special considerations. Distribution requires a significant level of management improvement and investment. As a consequence of these requirements tariffs will need to increase significantly if the concession were bid on the basis of highest value. We believe that one way to ameliorate the level and timing of tariff increases would be to use the proceeds from the sale of the generation assets and initial concession payment for the transmission system for investment in the distribution system. This would allow investment in equipment to improve collections, such as

pre-paid meters, without a significant tariff increase. The viability of this strategy is tested in the business case analysis in Section 3.

In a ***third phase***, not shown in Figure 2-2, we envision greater public participation in ownership. At the end of phase two, MFED would own thirty percent of the NEWCO Generating, Inc . Within five years of the creation of the separate entities, the remaining 30% shares in the generating company could be sold via public share floatation.

At some point in the future depending on the performance of the power market GRZ could decide that it wants to sell NEWCO Transmission & Wholesale Marketing, Inc and NEWCO Distribution and Supply, Inc. MFED could sell 70% ownership of the transmission/ wholesale marketing and distribution and customer service companies. This can be achieved either via competitive bidding to strategic investors or by selling shares into the stock market (created with the initial share floatation). As with the generating company the remaining 30% could be sold via public flotation.

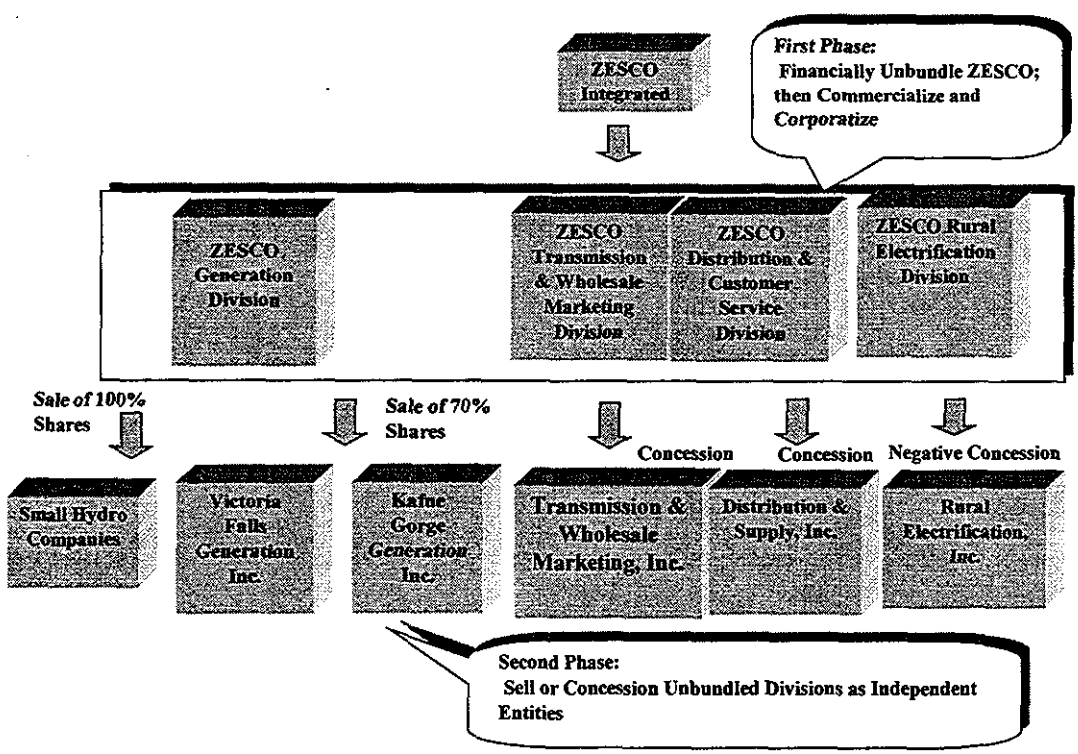


Figure 2-2: Schematic of Option 2 (Separate Entities)

311

Commercial transactions in the power market would be managed by the NEWCO Transmission & Wholesale Marketing Company, which will purchase and resale on a bulk supply basis. Prior to privatization, interim contracts between the generation and transmission subsidiary and the distribution subsidiary would be required to initiate market based transactions.

To support the introduction of this private participation option, several changes to the legal and regulatory framework will be required. In both areas, the GRZ will need a high degree of assistance from experienced legal and regulatory advisors.

There is also significant legal work required to prepare, execute, negotiate and implement in preparation for the transactions:

- Bidding Documents for Sales and Concessions
- Contract Terms and Conditions
- Initial and Subsequent Share Sales and/or Stock Flotations

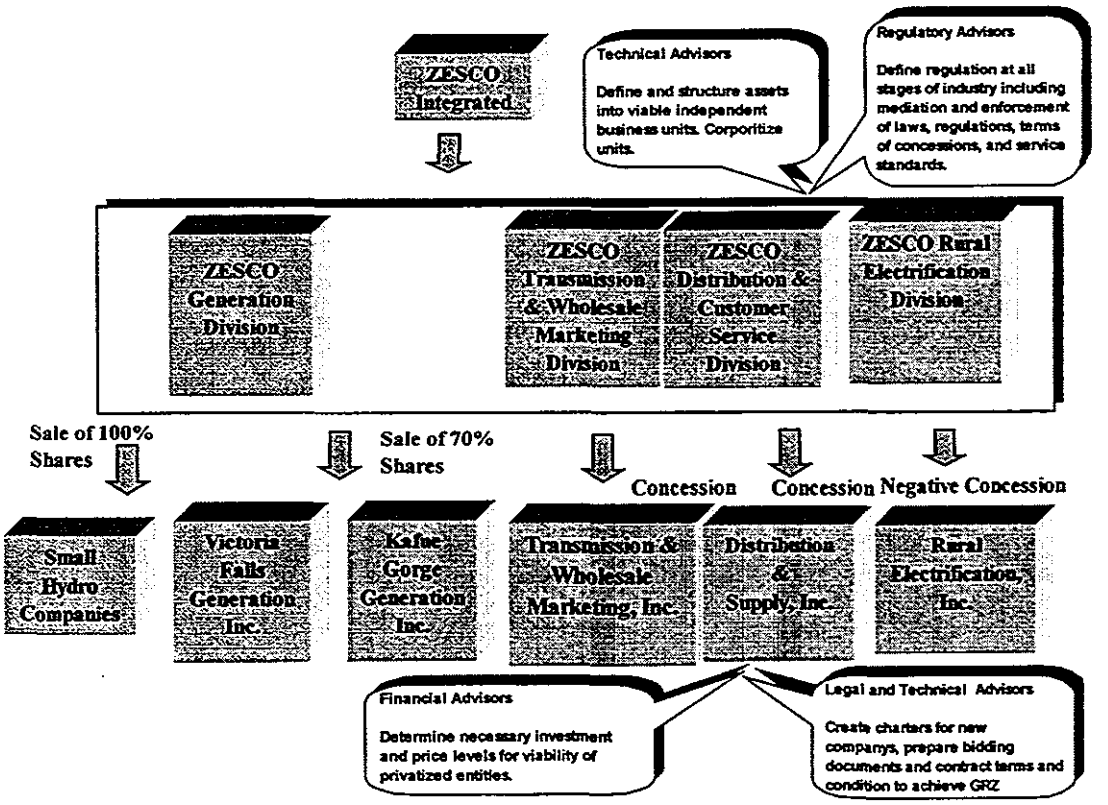


Figure 2-3: Pre-Privatization Activities

Obviously, there are a considerable number of changes needed to the regulatory system in order to support this private participation option. The role of the regulator (ERB) will be greatly

312

expanded, and its impact on industry operations and success will be significant. The ERB will have several major tasks:

- Define and implement regulation for all stages of the industry
- Develop terms of concessions
- Develop regulations
- Define service standards
- Set rates of return for transmission & distribution
- Develop structure for mediation & enforcement of laws
- Play major role in preparation, negotiation, award of bidding activities for all projects

The ERB will need significant strengthening of its management and legal and technical staff in order to successfully complete its mandate. This is discussed in more detail in the Task 3 Report- Development of Legal and Regulatory Framework for the Power Sector.

2.2.2 Terms of the Option

Below we address the specific terms with respect to privatization of each subsidiary.

Generation

Kafue Gorge Upper and Victoria Falls will be sold separately to strategic investors via auction. Itezhi-tezhi facilities will be included with Kafue Gorge Upper. The investors would retain majority ownership and management control of the plants. The bidding process will use a 2-bid ("two-envelope") process. The first part will consist of a technical evaluation to ensure conformity with the bid documents. The second consists of an evaluation of the financial offer. For Kafue Gorge Upper, it is recommended that bidders be given the option of bidding on a 10-year option for the development rights to the planned Kafue Gorge Lower and/or Itezhi-tezhi hydroelectric projects. The financial assessment would include a provision for valuing the water rights allocated to these plants. The bidders will be selected on the basis of the highest financial offer. This approach has the potential to significantly increase the proceeds from this transaction.

The investors will be responsible for:

- Operating and maintaining these generating plants
- Financing and implementing a capital expenditure program (current estimates are US$32 million over the next ten years)
- Ensuring system compatibility with the transmission grid
- Kafue Gorge would be required to provide ancillary services

Both generators would have an obligation to serve domestic power requirements with existing assets before selling to the export market. Additional projects at Kafue Gorge Lower and at Itezhi-tezhi would not have a domestic service requirement.

313

Generating companies would not have responsibility for water and sewage service to communities at Kafue Gorge and Itezhi-tezhi. These would become the responsibility of townships and would be supported by payments from the Generating Companies.

Transmission

A 25-year concession will used to privatize the former ZESCO Transmission subsidiary into NEWCO Grid Inc. The Grid company will serve two functions. First it will provide transmission services and second it will act as the single buyer for power market transactions. The concession will have re-bid option after the initial 10-year period and will be competitively bid (using the "2-part process" described above). The transmission/wholesale marketing concession will be awarded to the bidder offering the lowest cost to provide transmission/wholesale marketing services during the concession period. There will be restricted open access to the transmission system. Transmission charges will be regulated on an incentive pricing (RPI-X) basis.

The concessionaire will be responsible for the following activities:

For Grid Services:

- Operations and maintenance of the transmission system
- Operation and maintenance of dispatch and communications systems
- Financing and implementing a capital expenditure program (current estimates are US$ 67 million over the next 10 years)
- Development and implementation of grid code.
- System planning
- Additional grid expansion and development
- Wheeling services

For power market transactions :

- Administration of the existing CEC contract
- Negotiation of bulk purchase and supply contracts
- Negotiation of contracts for imports and exports of electricity
- Financial settlement of market transactions

Distribution

The former ZESCO distribution and supply subsidiary will be privatized through a single concession. The term of the concession would be for 25 years. The concession will have re-bid option after the initial 10-year period and will be competitively bid (using the "2-part process" described above). The distribution/supply concession will be awarded on the basis of the highest price offered for the right to provide these services during the concession period. As part of the evaluation process GRZ would designate a specific level of investment that it would provide to the distribution entity. Based on this level of investment the bidders would be required to set out what reduction in tariffs could be achieved from the case where they would provide all

investment requirements. Retail tariffs would based on a regulated rate of return basis. The concessionaire would also have to demonstrate how low income customers would be served and the level of tariffs to this segment of the customer base.

The concessionaire will be responsible for the following activities:

- Operations and maintenance of the distribution system
- Billings, collections and metering
- Customer service and quality
- Expansion of coverage for franchise area to be defined, and to distinguish it from the rural electrification program
- Additional low voltage grid expansion and development

The concessionaire would be required to meet certain performance standards including the following:

- Productivity targets
- Reduction of technical and non-technical losses
- Improvement in billing and collections
- Improvement in power quality
- Reduction in frequency of outages and time to repair

In exchange for awarding the concessions, MFED will receive compensation in the form of initial and annual concession fees, as shown in Figure 2-2/

2.2.3 Unbundling and Infrastructure Management and Staffing

Under this option ZESCO would be restructured as a holding company. Accordingly, generation, transmission/wholesale marketing and distribution/supply will be corporatized under MFED ownership. The successor entity to ZESCO – ZESCO Holdings would have a new charter. It's structure would consist of corporate center functions plus subsidiary functions. The corporate center functions would include:

- Finance and accounting
- Corporate Planning
- Legal
- Procurement
- Controller
- Human Resources

Each of the subsidiaries, which would be profit centered, would have its own manager, accounting, legal, procurement, operations and maintenance staff. Subsidiaries would sell to each

315

other on the basis of economic transfer prices, which would be determined by the corporate center function.

Existing ZESCO staff would be transferred to each subsidiary before privatization. Prior to transfer to each subsidiary, appropriate staffing levels would be determined and staff reductions would be accomplished. In total these are estimated to amount to one thousand employees. Retrenchment packages for this level of reduction would be the responsibility of ZESCO. Reductions greater than this level would be the responsibility of the private sector participants.

2.2.4 Relationships within the Power Sector

After privatization, the power market would operate on the basis of a modified single buyer model. The general characteristics of the market follow:

- The large hydro facilities will be dispatched by the NEWCO Transmission & Wholesale Marketing Company. The concessionaire for this company will act as an independent system operator and will be required to be independent from owners of generation companies and from the concessionaire for the distribution company.[1]
- Kafue Gorge and Victoria Falls would have less flexibility than other generating companies. They would be required to sell to the Transmission & Wholesale Marketing Company, which would in turn be required to serve domestic customers before exporting.
- In return, the Transmission & Wholesale Marketing Company would be required to purchase from them prior to meeting requirements through domestic independent power projects or imports. The NEWCO Distribution Company will be restricted to contracting with the Transmission & Wholesale marketing Company or with small hydro companies.
- Kariba North Bank, would be allowed to sell directly to the export market to a level to be determined. (It is currently selling 50 MW to a trading company in Zimbabwe.) Above that level, it will serve the domestic market preferentially as with Kafue Gorge and Victoria Falls, and will contract with the Transmission & Wholesale Marketing Company.
- The degree to which any wheeling charges will be required for Kariba North Bank export transactions will be determined by the outcome of the separation of ZESCO and Kariba North Bank assets in progress.
- Small hydro projects will be able to contract directly with high voltage customers or with the NEWCO Distribution Company or with the Transmission & Wholesale Marketing Company. They will pay wheeling charges to the Transmission & Wholesale Marketing Company for direct customer sales or sales to the distribution company. Wheeling charges will be regulated by ERB.

[1] After phase two, private ownership of at least part of the transmission system is contemplated, the concessionaire will continue the role of independent system operator.

- New independent power projects above 20 MW will be required to contract with the Transmission & Wholesale Marketing Company for domestic transactions, but will not be restricted to providing preferential service to the domestic market.
- The ZESCO Bulk Supply Agreement with CEC will be transferred to the NEWCO Transmission & Wholesale Marketing Company. An amendment to this contract will be required to restrict CEC supply to this contract unless demand is greater than the 700 MW to be supplied under the contract, except for small hydro companies. Fore requirements above the limits of the Bulk Supply Agreement, CEC will be allowed to import directly using its own transmission system and to contract directly with new independent power projects.

It is recommended that the principle of third party access be applied to CEC as well so that the power sector is operated on a consistent basis.

There will be many legal and regulatory changes required to support the industry changes:

- New bulk supply agreements (between generation and transmission/wholesale marketing and distribution/supply) must be prepared and negotiated. Prices paid to generators will be negotiated. Pricing for transmission and distribution will be established by the ERB (on a rate-of-return basis). Both the bulk purchase and supply contracts will include fixed and variable pricing components. The fixed costs cover generation and transmission availability. The fixed fees are payable, regardless of actual amount of generation purchased or transmission throughput. The variable fees are based on generation purchased and moved through the transmission system.
- Legal changes to contracts supporting imports/exports will also need to be implemented.
- Regulatory changes will be required to support the requirement for third party access to the grid.
- A grid code will need to be developed which defines the rights and responsibilities of all participants in the power sector
- The MEWD, along with the ERB, will be responsible for the long-term planning and policy functions.

2.2.5 GRZ Degree of Control:

GRZ's influence over the power industry can be summarizes as follows:

- GRZ will have little control over generation as it will have only 25% of the shares of the generating companies and no management control.
- GRZ will retain ownership of the transmission and distribution companies however the concession agreement would limit its ability to interfere in the day to day management and operation of these companies

317

- GRZ will also exert influence through its participation in the Electricity Regulatory Board (ERB). The MEWD, along with the ERB, will be responsible for long-term planning and policy.
- The MFED can have a significant impact on the degree of privatization as it will decide how the sale proceeds (resulting from private participation) will be directed and utilized.
- GRZ can potentially have a new role in the establishment of a "Kafue River Water Authority", modeled on the Zambezi River Authority. This authority will, inter alia, determine water rights and fees for the Kafue River. In addition, it will serve as arbitrator and enforcer of the regulations adopted to manage the river.

318

2.2.6 Taxation Issues

The change in ownership will allow the new owners to qualify for certain tax breaks. As new private sector investors, the new entities will enjoy all the privileges granted under Zambia's programs to attract private sector investors.

2.2.7 Classification of Option Conditions

The table below classifies each of the above specifications according to their significance for successfully achieving the option.

Table 2-2: Option 2 Conditions

Option Condition	Essential	Strongly Recommended	Negotiable
Scope			
Operations & Maintenance	X		
Invesment	X		
Concession Terms			
Purpose	X		
Bid Scope	X		
Bid Basis		X	
Tariffs		X	
Term		X	
Management/Staffing			
Organization	X		
Staffing			X
Commercial Structure			
Modified single buyer	X		
Third party access	X		
Grid code	X		
Export access	X		
Level of GRZ Control			
Generation	X		
Transmission/Distribution	X		
ERB oversight	X		
MFED impact		X	
Kafue River Authority			X
Taxes		X	

319

This option will use a range of private participation modalities. The consequences of eliminating certain of the conditions would significantly impact the successful implementation of the option and is not recommended. However, some of the conditions could be modified with respect to their classification. In particular these would include staffing conditions, degree of control by GRZ as reflected in the percentage shares it wants to retain in a joint venture, and the specific term of the concession for either transmission or distribution. The conditions related to scope, commercial structure, taxes, and ERB control are not subject to change.

2.3 *Option 4: Master Concession with Different Business of Functional Units Managed Through Separate Commercial Arrangements*

Option 4 is a combination of Option 1 and Option 2, as illustrated in Figure 2-4. The structure of this option attempts to maximize the advantages of both options, while minimizing the disadvantages. Initially, the option is a less complex transaction with lower transaction costs and allows development of the total system by a single concessionaire. It also allows development of distribution system with the least impact on tariffs. Post system development, GRZ can sell shares at higher market valuations. The principle disadvantage of this strategy is that it will take longer to achieve the target structure of Option 2, which will require approximately 14 years in total including the time for the concession.

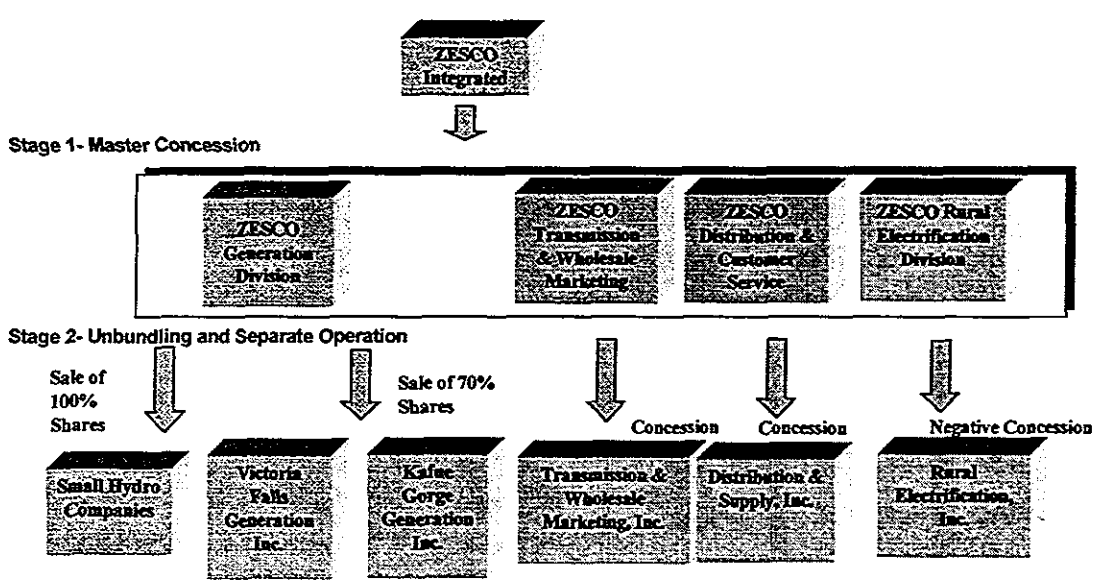


Figure 2-4: Schematic of Option 4 (Master Concession)

In the first stage, there will be a single master concession as in Option 1. In the second stage the corporatized business units are hived off in a manner similar to Option 2, with the exception that

320

distribution and customer service is sold through a joint venture transaction. Accordingly, we will focus on these specific characteristics of this option.

2.3.1 Stage 1 : Master Concession

Scope

Prior to the concession ZESCO would be financially unbundled and reorganized into a holding company as in Option 2. The intent of the first stage concession is to facilitate investment in the distribution subsidiary and at the same time moderate the impact of retail tariff increases over time.

The concessionaire would be responsible for:

- Operation and maintenance of ZESCO's existing system including
- Commercialization and reorganization, staffing,
- Generation – operate existing plants, maintain
- Transmission – system operation and dispatch, maintenance of physical plant, maintenance of dispatch/communication
- Distribution- system operation, maintenance, billing collections and metering
- Investment Requirements
    - ◊ System upgrade – investment required to bring utility up to normative conditions.
    - ◊ System expansion – no new generation capacity – or allowed to bid against IPP's
    - ◊ Transmission responsible for all grid expansion
    - ◊ Distribution – responsible for expansion of existing system and grid related expansions in predefined areas
    - ◊ Not responsible for isolated systems

Overall level of investment required will be $197 million over ten years allocated as follows

- Generation: $32 million
- Transmission: $67 million
- Distribution: $ 98 million

321

Concession Terms

Purpose – A time limited concession designed to achieve specific investment and performance targets in order to achieve maximum value for eventual spin off of each subsidiary.

Operation of service-

- Service shall be provided in accordance with licenses conditions
- ERB shall have regulatory oversight of service provision
- Grid will be operated on basis of regulated third party access
- Provision for export /import of power
- Obligation to serve new customers

Concessionaire would bid for entire ZESCO system – reorganized as ZESCO Holdings – including: generation, transmission, distribution and supply subsidiaries. Concession would exclude non- core operations which include housing, canteens, clinics, construction activities, training, security, building maintenance and motor vehicle repair.

Basis for bidding – Bidding would be conducted on two stage basis:

Stage one would be technical evaluation based on ability to meet the following performance standards and development targets including:

- Generation – unit availability, productivity, level of investment
- Transmission – quality of supply, interruptions, level of losses, productivity, level of investment
- Distribution – quality of supply, outages, reduction in technical and non-technical losses, collection efficiency, connections, level of investment

Stage two would be based on financial bid based on the highest value subject to GRZ tariff adjustment formula. This formula would specify a specific time frame for achieving economic tariff levels for retail customers over the ten-year concession life.

Tariffs – Retail Tariffs would be based on regulated rate of return, subject to review by ERB

Term – The concession would be for 10 years. At the end of the term, the concessionaire would be compensated for any un-recovered investment based on the proceeds from privatization of the subsidiaries.

322

Management Structure and Staffing

Management structure would be the same as option 2. Staffing of the subsidiaries would be the same as Option 2. ZESCO will pay for entrenchment to a level of 3,000 employees. Concessionaire will select which staff it wants to retain and execute service contracts with those personnel. Retrenchment in excess of 1000 employees will be the responsibility of the concessionaire

Commercial Relationship with other companies in the sector –

Under this situation the commercial relationships would be similar to current conditions -

- ZESCO would sell on exclusive basis to all existing and new customers
- ZESCO would retain bulk supply contract with CEC
- IPP's would be allowed to enter market – they would sell to ZESCO under long term PPA's

GRZ Control

GRZ will continue to own ZESCO, however its degree of control will be limited by the concession which will give the concessionaire operational control.

Taxes

As new private sector investors, the new entities will enjoy all the privileges granted under Zambia's programs to attract private sector investors. This includes 10-year tax holidays and other tax incentives.

2.3.2 Stage 2: Unbundling of Subsidiary Companies

Scope

The second stage of Option 4 is basically the same as Option 2, with the exception of the mode of private sector participation in the distribution business. It would be expected that after ten years the utility would be profitable and well performing. The subsidiaries would all be self sustaining including the distribution company. Accordingly, it is anticipated that the at this stage the distribution company could be sold as a joint venture. The privatization of the generation and transmission would be the same as Option 2. Accordingly, we focus specifically on the terms of the distribution privatization.

Terms of Option

Subsequent to the master concession, 75% of the distribution subsidiary will be sold to a strategic investor. The competitive bidding process will use a 2-bid ("two-envelope") process. The first part will consist of a technical evaluation to ensure conformity with the bid documents. The second consists of an evaluation of the financial offer. The bidder will be selected on the basis of

the highest financial offer. This approach has the potential to significantly increase the proceeds from this transaction.

Five (5%) of the shares will be allocated (but not issued) to former ZESCO management. The remaining (20%) of the shares will be initially held by MFED.

Performance Criteria

The owner(s) will be responsible for the following activities:

- Operations and maintenance of the distribution system
- Billings, collections and metering
- Customer service and quality
- Expansion of coverage for franchise area to be defined, as distinguished from the rural electrification program for isolated systems
- Additional low voltage grid expansion and development

The owners would be required to meet certain performance standards including the following:

- Productivity targets
- Reduction of technical and non-technical losses
- Improvement in billing and collections
- Improvement in power quality
- Reduction in frequency of outages and time to repair

Unbundling, Infrastructure Management and Staffing

Management and staffing levels would be the same as Option 2. The owners of the distribution entity would be responsible for all management and staffing decisions.

Relationship with Other Power Sector Companies

Given the timeframe for achieving the private participation in distribution, the commercial structure would be the same as Option 2 Alternative 2 - Regulated Third Party Access – which would allow for open access in stage 2. Commercial transactions would be based principally on bi-lateral contracts. This would operate as follows:

- IPP's could enter market and sell to non- captive customers or sell some portion of their output to export
- Large end users to contract directly with suppliers within Zambia or outside
- Access to the grid would require prior approval of ERB
- Grid code required to coordinate interaction among all participants
- Transmission access charge approved by ERB

Degree of Control by GRZ

GRZ would have minimal control of the power sector in this option. Although, GRZ through the MFED would still own the transmission system it would no influence on day to day management of the system. GRZ would also have a role in setting policy for the power sector and preparing long term forecasts for the sector. It would also be responsible for the rural electrification program for isolated systems. The ERB will provide regulatory oversight of the transmission and distribution systems through licensing and tariff regulation. Finally, the MFED will be holding shares in the distribution entity and could eventually sell these.

Taxation Issues

The private investors would be entitled to any tax benefits

Classification of Option Conditions

The table below classifies each of the above specifications according to their significance for successfully achieving the Option 4. This option is similar to Option 1 in the first stage. Accordingly, the consequence of eliminating or changing the conditions would be the same as Option 1.

325

Table 2-3: Option 3 Conditions

Option Condition	Essential	Strongly Recommended	Negotiable
Scope			
Operations & Maintenance	X		
Investment	X		
Terms			
Purpose	X		
Bid scope	X		
Bid basis			X
Tariffs		X	
Term		X	
Management/Staffing			
Organization	X		
Staffing			X
Commercial Structure			
Bilateral contracts	X		
Third party access	X		
Grid code	X		
Export access	X		
Level of GRZ Control			
Transmission	X		
Distribution	X		
ERB oversight	X		
MFED impact		X	
Taxes		X	

326

3.1 *Purpose*

The purpose of this analysis is to verify the commercial viability of the options under consideration, to quantitatively compare them on an equal basis and to estimate sales or concession fees associated with the various transactions.

3.2 *Methodology and Assumptions*

We used the financial model developed as part of Task 1 to develop pro forma financial statements for each of the options.

3.2.1 Currency

Analysis was conducted in year 2000 US$. Interest rates were adjusted by an assumed general US inflation rate of 3% per year to obtain real interest rates.

3.2.2 Disaggregation of Analysis

The analysis was conducted according to the following functions: isolated systems; generation; transmission; wholesale marketing; and distribution and customer services. For options in which functions are not unbundled (i.e., Option 1 and Option 4, Stage 1) results were consolidated.

Rural electrification is made up of isolated systems and some parts of grid-supplied distribution. Data was not available to separate grid-supplied rural systems from other distribution. Therefore, for purposes of analysis, isolated systems were used to represent rural electrification. Generation includes Victoria Falls, Kafue Gorge and small hydro stations. Transmission was taken to be everything above 88 kV. Wholesale marketing is the administration of all wholesale transactions including the ZESCO/CEC Bulk Supply Agreement. In cases of unbundling the wholesale marketing function was included with transmission.

3.2.3 Implementation Time

The options vary in complexity and ease of implementation. It was assumed that this would translate into differing times required to implement the various options. The following assumptions on time of implementation were used (as measured from the time of a Cabinet decision approving the option):

- Option 1- 2 years
- Option 2- 3 years
- Option 3- 4 years

Section 2 of this report discusses the implementation tasks for each of the options in detail and is used as a basis for the time estimates.

327

3.2.4 Supply to CEC

We assumed that CEC would continue to be supplied according to the existing terms of the ZESCO/CEC Bulk Supply Agreement. Under this agreement up to 700 MW of power will be supplied to CEC at a rate of 21.3 US$/MWh in real terms. The 700 MW limit is in effect until November 2012 and declining amounts after that. (ZESCO's supply limit is expected to be reduced to 329 MW by the end of the term of the agreement in April 2020.) While no specific limit on energy sales is made in the agreement, sales were assumed as per Figure 3-1.

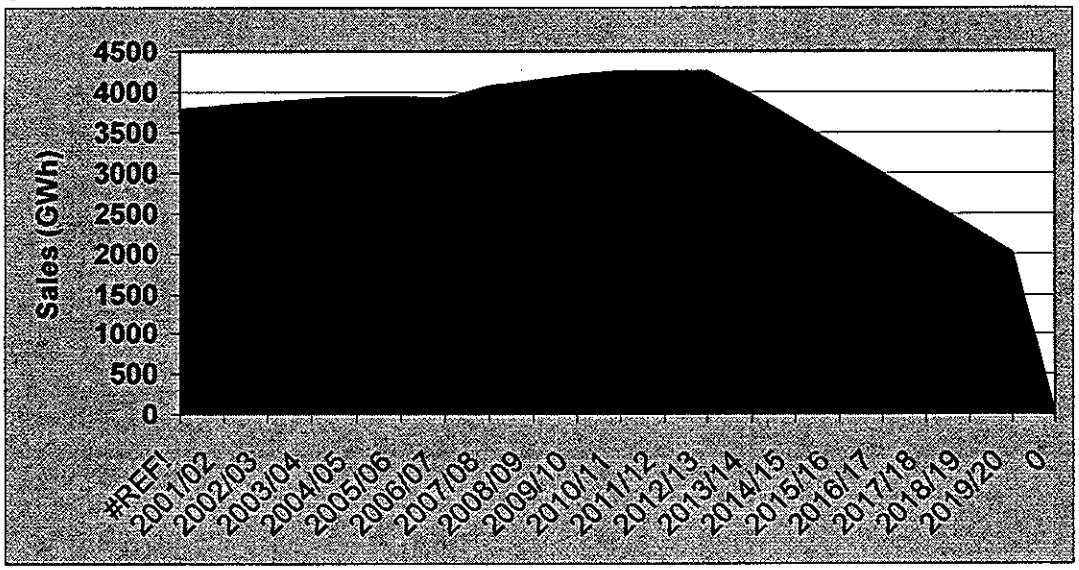


Figure 3-1: Assumed Sales to CEC Under Bulk Supply Agreement

3.2.5 Impact on Retail Tariffs

Our analysis of tariffs in Task 1 indicated that ZESCO was not financially viable at the current retail tariff level. A commitment to increase retail tariffs over the next decade to cost-based levels will be required to attract concessionaires or investors under any of the options.

As discussed in Task 1, the generation, transmission and wholesale marketing functions can be structured as reasonably profitable operations. Table 3-1 show the cash projected case generated by these functions over and above investment in rehabilitation, assuming a 6% return on assets. Option 1 and Option 4, Stage 1 are vertically integrated and at least part of this cash generation can be used in the distribution and customer service function, reducing the retail rate necessary to maintain financial viability. If the functions are unbundled, other mechanisms could be devised, either through the taxation or through the regulatory system to transfer cash to the distribution company; however, these would be inefficient and their use would generally contradict the goals of unbundling.

328

Table 3-1: Cash Generation From Wholesale Operations

	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
(thousands US$)											
Generation	21,432	13,458	13,106	4,985	7,713	7,908	7,965	8,089	8,217	8,380	8,660
Transmission	29,762	21,995	10,776	10,529	9,434	9,095	8,827	8,822	9,135	9,403	9,945
Wholesale Marketing	8,870	6,175	3,958	2,825	2,324	2,343	2,153	2,001	2,186	2,239	2,302
	60,065	41,628	27,839	18,339	19,470	19,346	18,946	18,912	19,538	20,021	20,907
Retail sales (GWh)	3,124	3,192	3,269	3,335	3,445	3,556	3,664	3,770	3,869	3,962	4,091
Potential retail tariff impact (US$/MWh)	19.22	13.04	8.52	5.50	5.65	5.44	5.17	5.02	5.05	5.06	5.11

In the long term, functional cross subsidies should be done away with. In the near term, they can serve the function of reducing the rate of price increase at the retail level. The impact assumed is shown in Figure 3-2. The only price differences assumed were between 2002/03 and 2013/14. Retail prices in all other years were the same for all options.

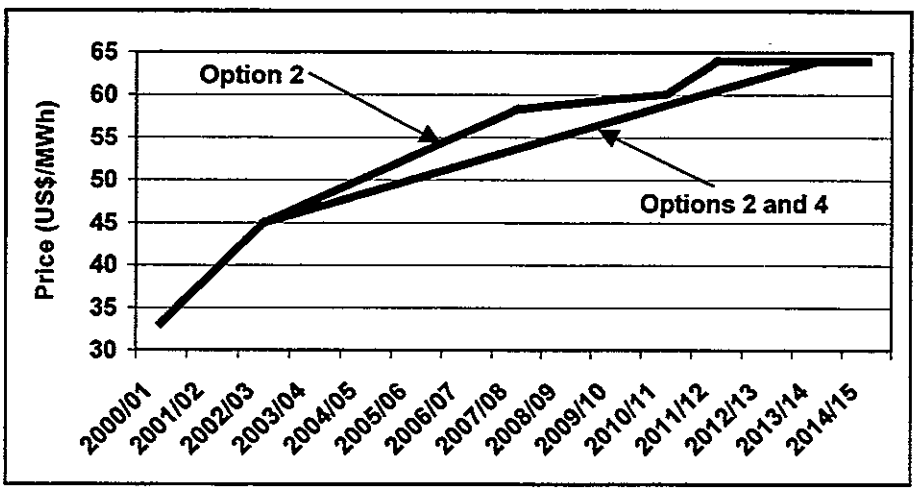


Figure 3-2: Assumed Impact on Retail Tariffs

3.2.6 Impact on Demand

The model used reflected price elasticity effects. Therefore the price differences assumed affected assumed retail demand. Table 3-2 summarizes this impact.

Table 3-2: Impact of Assumed Price Differences on Retail Demand

	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Demand (GWh)										
Options 1 and 4	3,269	3,335	3,445	3,556	3,664	3,770	3,869	3,962	4,091	4,220
Option 2	3,203	3,221	3,303	3,384	3,497	3,654	3,789	3,893	3,972	4,166
Difference	65	114	142	172	167	116	81	70	119	54
Price difference (US$/MWh)	-0.9	-1.9	-2.8	-3.8	-4.7	-3.6	-2.4	-1.3	-3.5	-1.7
Elasticity (GWh per US$/MWh)	-69.7	-61.0	-50.5	-45.8	-35.5	-32.7	-33.5	-54.3	-34.3	-31.4

229

3.2.7 Impact on Competition

Option 2 and Option 4, Stage 2 allow radical restructuring of the power market, including competition among generators and market liberalization. While the intent of market liberalization is generally to benefit consumers over the long term, we have not estimated any benefit associated with restructuring. Therefore, Option 2 and Option 4, Stage 2 both have unquantified benefits that are not fully reflected in our analysis.

The exact nature of the Zambian restructuring approach is yet to be developed. The ERB is currently leading stakeholder workshops with the intent of making recommendations in March 2001. However, these recommendations will be strategic in nature with many details left to be worked out. More importantly, the nature and timing of regional market development are unknown. It is our judgment that investors, faced with this uncertainty, will tend to discount the opportunities associated with the unbundling of assets as is done in our analysis.

As sensitivity for Option 2 and Option 4, State 2, we consider the impact of pricing generation at the marginal regional cost to reflect the impact of full regional competition.

3.2.8 Sales Price and Concession Fees

Sales of generation assets are part of Option 2 and Option 4, Stage 2. In the latter the distribution assets are sold as well. It was assumed that these assets would be sold according to their market valuation. The market valuation analysis is discussed in greater detail in the Task 4a Report. Under this approach, the amount an investor would pay for these assets depends on the projected level of sales from these assets, the projected sales price, and the projected operating cost.

The primary market valuation assumption concerning generation assets were that generation prices would be regulated according to a cost-based pricing approach. The transfer price for generation, calculated as part of Task 1, was used as the cost-based generation price (approximately 6-7 US$/MWh). Pricing a regional marginal cost levels was considered a sensitivity case.

The primary market valuation assumption concerning distribution assets were that retail prices would reach cost-based levels within the next ten years. Slower and faster rates of reaching this level were considered as sensitivity cases.

Concession fees were structured as an up-front fee and an annual percentage of revenues. The concession fees was calculated as a percentage of market value at the time of the concession. The percentage of market value used for the up-front fee and the percentage of sales price used for the annual fees were determined so that an acceptable internal rate of return was achieved from the point of view of the investor. (It was not possible to find an acceptable combination of up-front and annual fees in one case, as will be discussed later.)

The isolated systems function was structured as a negative concession and subsidies from the GRZ to compensate for losses were calculated.

3.2.9 Financing Assumptions

Front-end concession fees for Option 1 and Option 4, Stage 1 were assumed to be financed according to the assumptions shown in Table 3-3. For Option 2 and Option 4, Stage 2,

financing assumptions differed depending on the function being purchased or concessioned. Purchases and front-end concession fees for these options were assumed to financed according to the assumptions shown in Table 3-4.

All debt is assumed to have a 10-year amortization period. Senior debt is to be supplied from commercial banks. Subordinate debt is assumed to be obtained from the International Finance Corporation with a 12-year grace period.

Table 3-3 Financing Assumptions for Option 1 and Option 4, Stage 1

	Value	Structure
Return on equity	30.00%	20%
Senior debt cost	10.50%	40%
Subordinate debt cost	10.00%	40%
Weighted cost of capital	14.20%	100%
General inflation rate	3.00%	
Real weighted cost of capital	10.87%	

Table 3-4 Financing Assumptions for Option 2 and Option 4, Stage 2

	Isolated Systems	Generation, Transmission, Wholesale Marketing	Distribution & Customer Service
Equity	100%	20%	30%
Senior debt	0%	40%	35%
Subordinate debt	0%	40%	35%
Weighted cost of capital	30.00%	14.20%	16.18%
General inflation rate	3.00%	3.00%	3.00%
Real weighted cost of capital	26.21%	10.87%	12.79%

3.3 *Results*

The results of the business case analysis is summarized in Tables 3-5 and 3-6. Table 3-5 shows the following:

- Projected sales price of the assets to be sold
- Amount of concession fees for assets proposed to operated under concession
- Amount of subsidy required for investing in and operating isolated systems
- Projected internal rate of return for investors in the various sales and concession transactions
- Overall value to the GRZ.

The value to GRZ is expressed as the present worth of all sales proceeds, concession fees and income taxes collected over the life of the transactions. (A 12% discount rate is used in the present worth analysis.)

Speed of implementation is a key variable in determining the value to GRZ. Option 1 has the shortest implementation period and can begin generating revenue quickest. Option 4 takes slightly longer and Option 4 takes the longest. The benefits of early revenue generation are accentuated in discounted cash flow analysis because revenue in later years in discounted more. Of the three options, Option 1 generates the highest value to the GRZ and Option 2 the lowest, primarily because of speed of implementation.

Option 2 generates slightly more taxes than the other two options, primarily because unbundling exposes profit-making operations, such as generation and transmission, to more taxes than would be the case if their profit were off-set by losses in other operations, such as the isolated system operation. However, this effect is not enough to offset the loss of value resulting from the longer implementation period for this option.

A more detailed presentation of the analysis supporting Tables 3-5 and 3-6 is presented in Appendix A.

Table 3-5: Business Case Summary

	Market value for sale[1]	Up-front concession fee	Annual concession fee (% of revenue)		Annual subsidy required[2]	Investor internal rate of return	Value to GRZ[3]
	thousands US$	thousands US$	first 10 years	after 10 years	thousands US$		thousands US$
Option 1- Concession whole company		$ 33,836	25%	10%		33%	$ 702,362
Option 2- Unbundle							$ 527,607
Rural electrification					$11,117		
Generation	$ 110,125					15%	
Transmission		$ 33,542	30%	30%		26%	
Wholesale marketing		$ 9,965	10%	0%		24%	
Distribution & customer service		$ 102,361	10%	5%		39%	
Option 4- Master concession and later unbundling							$ 661,810
Stage 1- Master concession		$ 117,870	38%			29%	
Stage 2- Unbundle							
Rural electrification					$ 9,002		
Generation	$102,188					23%	
Transmission		$ 57,181		15%		39%	
Wholesale marketing		$ -		0%		-9%	
Distribution & customer service	$360,026					29%	

1. Sale of generation in Option 2 is at the end of 2001/2. Asset sales for Option 4 are at the end of 2012/13.
2. The value tends to increase over time. The value shown is levelized over the term of the negative concession at a 12% discount rate.
3. Value to GRZ includes payments for sales trasnsactions, taxes, and concession fee. The value of payments to GRZ are present worthed at a discount rate of 12%.

Table 3-6: Value to GRZ

	Sales proceeds & concession payments	Income taxes	Total
Option 1- Concession whole company[2]	$ 552,958	$ 149,404	$ 702,362
Option 2- Unbundle			
Rural electrification	$ (62,061)	$ -	$ (62,061)
Generation	$ 78,384	$ 17,796	$ 96,180
Transmission	$ 111,211	$ 45,146	$ 156,357
Wholesale marketing	$ 58,453	$ 36,688	$ 95,141
Distribution & customer service	$ 184,641	$ 57,349	$ 241,990
Total	$ 370,629	$ 156,979	$ 527,607
Option 4- Master concession			
Stage 1- Master concession[2]	$ 397,429	$ 94,638	$ 492,066
Stage 2- Unbundle			
Rural electrification	$ (31,752)	$ -	$ (31,752)
Generation	$ 26,229	$ 4,917	$ 31,146
Transmission	$ 30,358	$ 13,833	$ 44,191
Wholesale marketing	$ -	$ 9,308	$ 9,308
Distribution & customer service	$ 92,410	$ 24,440	$ 116,850
Stage 2 Total	$ 117,245	$ 52,498	$ 169,743
Grand Total (Stages 1 and 2)	$ 514,674	$ 147,136	$ 661,810

1. Present worth calculations are based on discounting projected values to the beginning of 2001/2 at a 12% discount rate.

2. Present worth values for Option 1 and Option 4, Stage 1 reflect projected subsidies to rural electrification. The value of these subidies are shown for unbundling options (Option 2 and Option 4, Stage 4).

332

3.4 *Sensitivity Analysis*

3.4.1 Pricing of Generation

The sales price of generation assets that was the basis for previous analysis (Option 2 and Option 4, Stage 2) was based on the assumption that generation prices would be regulated using a cost-based approach. However, if Kafue Gorge and Victoria Falls power stations were to participate in an increasing competitive regional market, their sales price would be close to the regional marginal generating cost for the region. Figure 3-3 shows a projection of regional marginal cost along with the cost-based price.[1] There is currently an oversupply of generation with respect to demand resulting the current low marginal regional generating cost. This price is projected to rise until about 2012 when supply and demand come into balance.

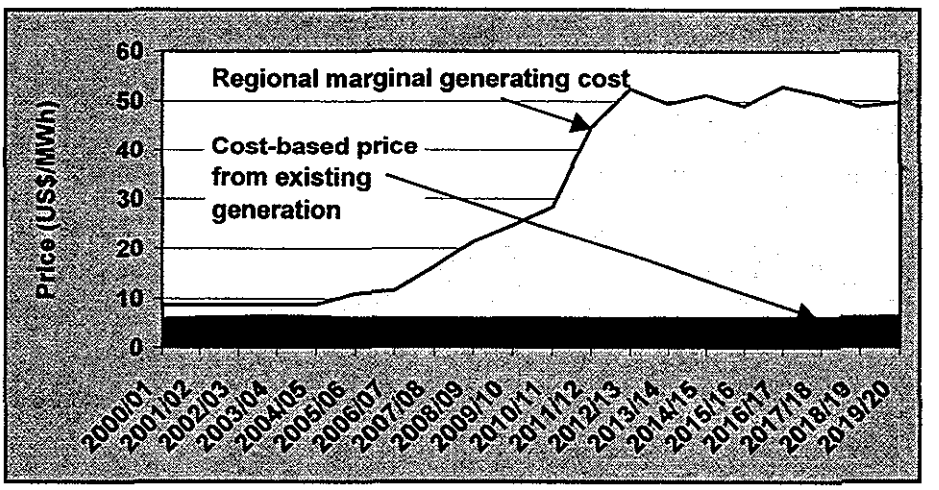


Figure 3-3: Market Versus Cost-Based Generation Pricing in Zambia

There is currently little difference in cost-based or market pricing of generation. However, we expect the marginal price of generation to rise significantly over the next ten years under medium load growth conditions in the region. (Low load growth would delay marginal cost increases, high growth would speed them up.) Thus, the introduction of market pricing through an increasingly competitive generation market would increase the market value of generation assets. Table 3-7 compares the effect of market pricing and cost-based generation pricing on the sales price (market value) of generation assets

The discounted value of the cash flow generated under market pricing of generation is significantly higher than for regulated pricing. Since market prices are increasing with time, the discounted value of the cash flow produced under Option 4, Stage 2 is greater than under Option 2 since the market prices are higher. For both options the discounted value of the projected cash flow is greater than the estimated replacement value of the generation capacity. In practice, this would mean that potential investors would probably look at alternative

[1] The regional marginal cost was as part of work conducted by Bechtel/Nexant for the Office for Promotion of Private Power Investment in June 2000. The particular price shown was developed under assumptions of medium regional load growth.

334

greenfield projects before investing in existing plants. We have taken the estimated replacement value as the maximum that an informed investor would pay.

Market pricing of generation would result in higher proceeds to the GRZ in Options 2 and Option 4 even if asset sales were limited by replacement value. However, the resulting higher wholesale prices would either have to be reflected in retail tariffs or the financial position of the distributor would be in jeopardy. Figure 3-4 shows the impact of the higher wholesale prices on retail tariffs based on the assumption that retail tariffs will adequately reflect costs. In the near future, the impact would be about a 20% increase from levels required if generation prices are cost-based. By 2012 the impact is projected to be a 50% increase.

Table 3-7: Effect of Generation Pricing Approach on Sales Price of Generation Assets

	Option 2	Option 4, Stage 2
	thousands US$	
Value of discounted cash flow based on generation sales at regulated prices[1]	$110,125	$102,188
Replacement value[2]	$842,625	$842,625
Value of discounted cash flow based on generation sales at market prices[3]	$947,746	$1,581,688
Estimated sales price[4]	$842,625	$842,625

1. The regulated price assumed was the cost-based transfer price developed in the Task 1 Report (approximately US$0.6/MWh)

2. Replacement value for Kafue Gorge, Itezhi-tezhi and Victoria Falls are based on the Task 4B Report. The replacement value of small hydro was assumed to be $3000/kW.

3. The market prices are represented by estimated regional marginal costs.

4. Minimum of replacement value and the discounted cash flow produceed by market-priced electricity generation.

325

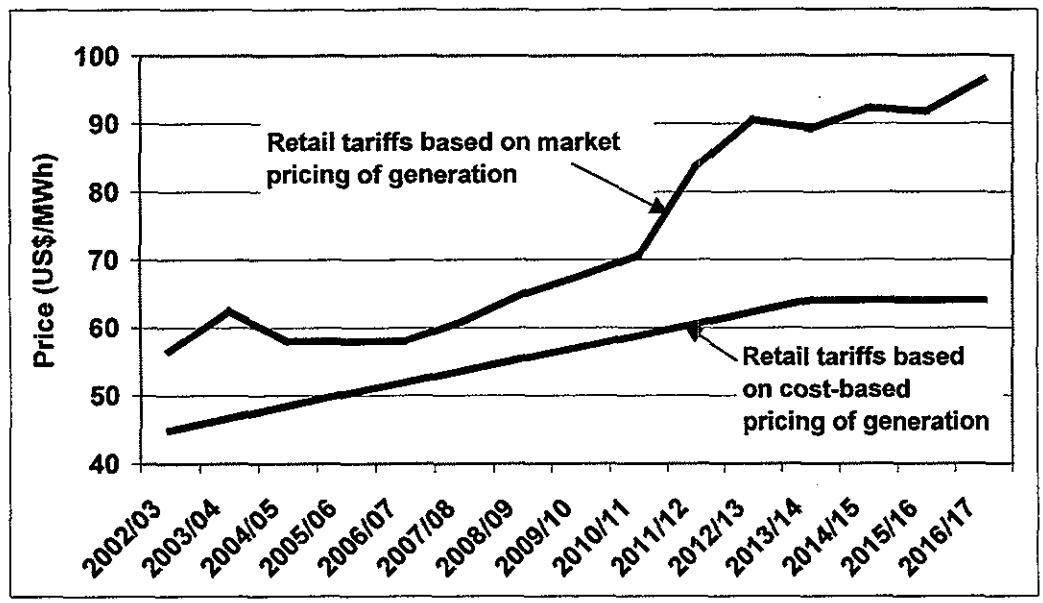


Figure 3-4: Impact of Generation Pricing Approach on Retail Prices

3.4.2 Sales Growth

We investigated the projected impact of differing levels of retails sales on our results. Figure 3-5 shows the medium forecast used in our previous analysis along with high and low projections of retail sales. (Figure 3-5 shows the projections for Options 1 and 4. Because of slight pricing difference prior to 2013/14, the projection for Option 2 was slightly lower in the early years.

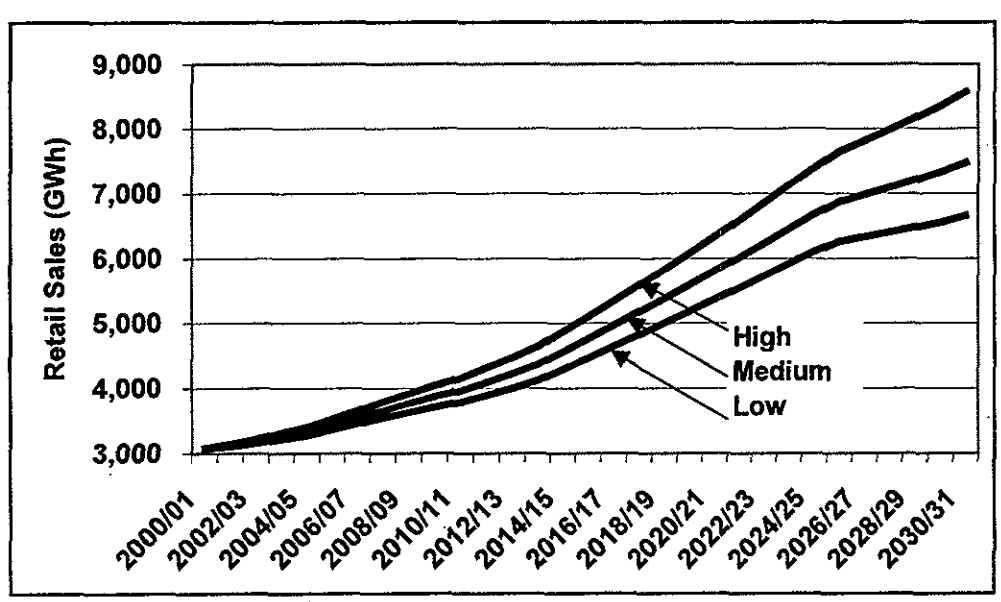


Figure 3-5: Load Growth Scenarios for Options 1 and 4

336

Different levels of retail sales can affect both the potential benefits to the GRZ in terms of sales proceeds, concession payments and income taxes and the projected profitability for investors. For example, if an investor projects lower levels of sales, he or she will be willing to structure concession terms accordingly in order to meet investment goals. If the level of sales fails to meet the level upon which concession terms have been set, rates of return and benefits to the GRZ will differ (normally be lower). Therefore, there are many combinations of investor return and GRZ benefit for a given level of sales.

Table 3-7 shows one set in which investor internal rate of return was required to be at least 25% and benefits to GRZ were allowed to vary. For Option 2 and Option 4, Stage 2, only the investor internal rate of return for the distribution and customer service function is shown. Returns for other functions are unchanged from the base case.

Higher levels of retail sales increase revenue for the distribution function. However, we project that costs will increase more rapidly than revenues. In the base case analysis, generation from existing facilities covered most of retail and CEC contractual needs prior to 2020 with imports never exceeding 15% of retail sales. With the expiration of the CEC contract, existing facilities were projected to generate more than enough for retail demand after that time with excess generation sold at the marginal cost of regional generation. The high growth of retail sales increases the amount of imports required before 2020. These are much more costly than the regulated price of generation from existing facilities resulting in a deteriorating financial condition for the distribution function and lower levels of income taxes. Table 3-7 shows this impact.

Lower levels of sales reduce revenue from the distribution function and some decrease in cost. The lower levels of revenue decrease the projected concession and income tax payments to the GRZ as shown in Table 3-8.

Thus, for a given price projection, medium growth of retail sales produces the best result from the point of view of both the investor and the GRZ. Either higher or lower growth can either reduce benefits to the GRZ or reduce investor return.

Table 3-8: Impact of Retail Sales Growth on Benefits to GRZ and Investor Return

	Low		Medium		High	
	Value to GRZ (thousands US$)	Investor IRR	Value to GRZ (thousands US$)	Investor IRR	Value to GRZ (thousands US$)	Investor IRR
Option 1- Concession whole company	636,265	30%	702,362	33%	698,345	31%
Option 2- Unbundle	577,595		622,465		603,808	
Distribution & customer service		31%		39%		36%
Option 4- Master concession and later unbundling	616,947		680,008		644,768	
Stage 1 [1]		29%		38%		33%
Stage 2 - Distribution & customer service		29%		29%		33%

3.37

3.4.3 Retail Tariffs

The level of and structure of retail tariffs is regulated by ERB. We have assumed in our previous analysis that prices will gradually rise in real terms until they reach cost-based levels in approximately 2013. Other possibilities clearly exist. Figure 3-6 shows the retail price scenarios considered. In the High scenario, prices initially rise faster than in the base case and reach cost-based levels about two years earlier. In the Low scenario, prices rise gradually in real terms and do not reach cost-based levels until 2020. Retail prices do not rise beyond cost-based levels in any scenario.

Retail tariffs most directly affect the distribution and customer service function. For Option 1 and Option 4, Stage 1, this function integrated with generation and transmission and the impact is less severe. For Option 2 and Option 4, Stage 2, the distribution function operates on its own and the impact of retail tariff level has a critical impact on financial health.

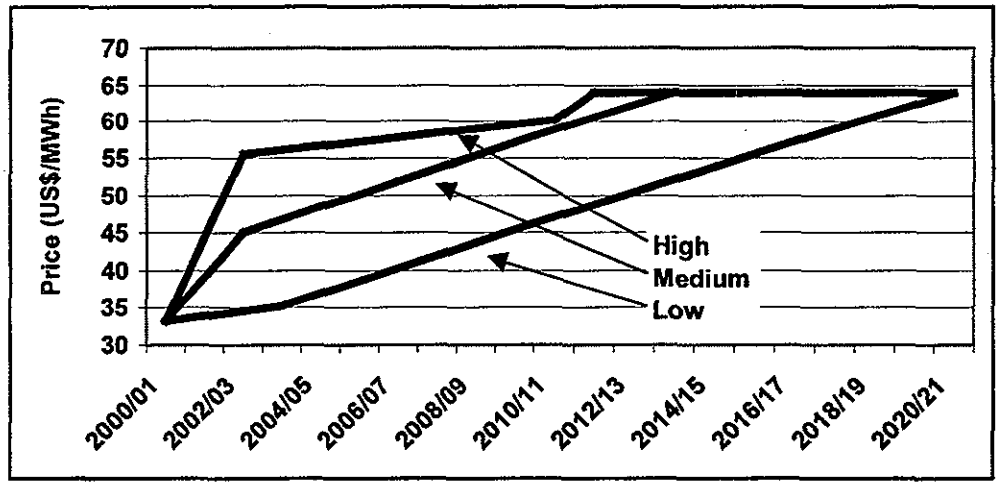


Figure 3-6: Pricing Scenarios for Options 1 and 4

Table 3-9 summarizes the results of the sensitivity analysis. As with load growth, changes in retail price can affect the potential benefits to the GRZ and the attractiveness to investors. There are many ways for the GRZ and investors to divide benefits for any given price level. The results in Table 3-8 illustrate one way in which the interests of the two parties can be balanced.

Higher retail tariffs allow greater benefits in terms of concession fees and income taxes to the GRZ and higher rates of return for investors. Since tariffs are currently below cost-based levels, there is justification for pursuing the High scenario if consumers have the capacity to pay.

In the case of the Low retail price scenario, we held the rate of return at reasonable levels, in order to attract investors, and reduced benefits to the GRZ. In the Low retail tariff scenario we found it necessary to restructure concession terms from the base case terms. We would expect such flexibility would need to exist in any future concession agreements.

Table 3-9: Impact of Retail Pricing on Benefits to GRZ and Investor Return

	Low[1]		Medium		High	
	Value to GRZ (thousands US$)	Investor IRR	Value to GRZ (thousands US$)	Investor IRR	Value to GRZ (thousands US$)	Investor IRR
Option 1- Concession whole company	419,008	33%	702,362	33%	779,088	52%
Option 2- Unbundle	388,651		622,465		638,243	
Distribution & customer service		33%		39%		48%
Option 4- Master concession and later unbundling	402,962		680,008		741,635	
Stage 1		33%		38%		72%
Stage 2 - Distribution & customer service		19%		29%		29%

1. Concession terms were kept the same for high tariffs as for medium. For low tariffs, the concession terms were modified as follows:
- Option 1- Annual concession fees were reduced for 25% of revenues to 18%.
- Option 2- Distribution & customer service- no annual concession fees were charge for the first 10 years.
- Option 4- During the master concession stage, annual concession fees were reduced from 25% of revenues to 18%.

3.4.4 Delays in Power Sector Restructuring

The implementation of Option 2 requires significant restructuring of the power sector. Even with unbundling, we project continued price regulation of generation unless GRZ decision makers are prepared to accept the retail price consequences of full generation market liberalization, as discussed earlier. However, we understand that different stakeholders will have different views on this and other restructuring issues. Furthermore, we are aware that many of the decisions could be affected by the direction of regional market liberalization. For this reason, the potential for delay in coming to consensus on a detailed restructuring plan and in its implementation, are high. Figure 3-7 shows the impact of a 2-year delay on the implementation of Option 2 on its overall benefits to the GRZ. This is compared to the benefits for the options under base case assumptions

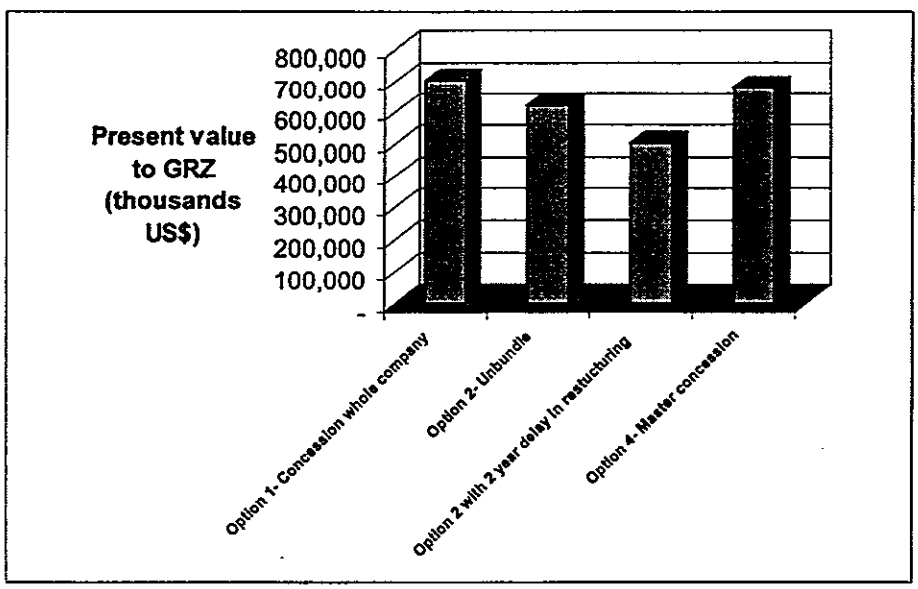


Figure 3-7: Impact of Option 2 Delay on GRZ Benefits

4.1 *The Preferred Option*

In the previous sections of this report we have discussed in detail the recommended options and have also analyzed the financial implications of these options through the business case analysis. Of these options which provides the best overall approach to private sector participation. It is our judgment that Option 4 the Master Concession, provides the best overall approach for private sector participation in ZESCO. This judgment is based on a consideration of a number of factors which include the Zambian political economic context in general; the nature and characteristics of the power sector; the particular requirements of ZESCO, coupled with the results of the business case analysis. In the following sections we elaborate on each of these factors.

4.2 *Results of the Financial Analysis*

Section 3 present the results of the results of the business case analysis. Each option has a differing profile of impacts on potential investor benefits, sales proceeds, concession fees and income taxes to the GRZ and consumer benefits as measured in tariff level. In Table 4-1 the options are ranked according to the categories: investor attractiveness; benefits to GRZ; near-term consumer benefits; and long-term consumer benefits. One (1) is highest and three (3) is lowest. Option 4 has the lowest unweighted average suggesting that it best accommodates all of the factors.

Table 4-1: Ranking of Options According to Impacts on All Stakeholders

	Investor attractive-ness	Benefits to GRZ	Near-term consumer benefits	Long-term consumer benefits	Unweighted average
Option 1- Concession whole company	2	1	2	3	2.00
Option 2- Unbundle	2	3	3	1	2.25
Option 4- Master concession and later unbundling	2	2	1	1	1.50

All options would result in both positive returns to investors and benefits to the GRZ. The financial analysis indicates that all could be structured so as to be attractive to investors with no significant difference among options. Option 1 provides the highest value to GRZ, followed by Option 4 with Option 2 providing the lowest value of the three options. Options 1 and 4 would result in comparable tariffs in the first ten years with Option 2 likely to have slightly higher retail tariffs during this time period. We rank Option 1 lower than Option 4 because its vertically integrated structure is likely to complicate the development of new independent power projects which could have negative near-term and long-term impacts. The benefits of competition were not explicitly quantified, but are considered to be as large a consumer benefit in the long-term as near-term tariff impacts. Options 2 and 4 offer these long-term consumer benefits while Option 1 does not.

The following discussion presents other factors that are not addressed in the quantitative analysis.

4.3 *The Zambian Political Economic Context*

Our selection of the preferred private sector participation option took into account the macro-economic conditions confronted by private investors, as this will have a direct bearing on the approach to and the pace of restructuring and privatization. In general it can be stated that investment environment relative to other countries must be viewed as carrying a high level of risk. The consequence of this condition is that investors will require higher rates of return, as their cost of capital will be higher. They will seek either guarantees from the government or look to financial institutions that have the ability to provide financing to developing countries. The net effect of these requirements will be that asset values are more heavily discounted resulting in less return to the government than estimated in Section 3.

Zambia has made economic progress over the past ten years. Relative to other countries in the region Zambia has been provided a more stable political environment. The country has had a relatively open policy to foreign investment; and, as a consequence, foreign direct investment has amounted to approximately $160 million per year since 1995. The privatization program in general and the privatization of ZCCM in particular has signaled Zambia's ongoing commitment to market based reform and foreign investment. However, Zambia remains a highly indebted country, with a mixed economic outlook. This has contributed to a significant depreciation of the Kwacha and has led to the imposition of foreign exchange controls. The market potential of the country where over 60 percent of the population is below the poverty level appears limited.

All of the above suggest that while Zambia presents a positive environment for private investment, the macroeconomic conditions of the country limit the benefits the GRZ could expect from an outright sale of assets in the short term. Accordingly a privatization strategy that allows private investment now but defers sale of assets into the future, as in Option 4 compared to Option 1, may allow the Government to realize greater benefits as the economic condition of the country and the region may be even more conducive to private investment at lower levels of risk.

4.4 *Near-Term Power Sector Restructuring*

As discussed in previous sections of this report there are several considerations regarding the development of a competitive power sector that support Option 4 over the other recommended options. Our main conclusion here is that while creating a competitive environment is important it is more of a longer run issue.

There are many factors which limit competition in electric power in Zambia in the near term including:

341

- A well-defined commercial market for trading electricity does not exist, either domestically or regionally
- The relatively small size of the power system causing domestic generation to be dominated by one power station and the distribution system to be too small to be broken up;
- The existing twenty-year Bulk Supply Agreement with CEC to supply the mining industry and accounting for over 50% of ZESCO's total sales;
- Barriers to electricity competition in the power industries of Zambia's neighbours (important because, as in other markets, the encouragement of competition can be done effectively only if it is done in concert with one's neighbours).

There are other issues that require more immediate attention such as improving ZESCO's performance, creating a viable rural electrification program, and strengthening the capacity of the institutions that will be directly involved in a liberated power sector. Accordingly, Option 4 provides a viable middle ground that will accomplish all of the above. The two-staged approach of Option 4 initially provides private sector participation through a lower risk master concession and provides crucial time to set the stage for a competitive power sector that will occur in the second stage when ZESCO is completely unbundled.

In contrast, Option 1 would accomplish the objective of bringing in private capital but would not meet the longer run goal of creating a competitive power sector. Option 2, in principle, would also accomplish all of the above factors but has the following critical disadvantage: immediate unbundling of the ZESCO would require significant time to implement with uncertain benefits and potential delays with the effect of deferring benefits of privatization.

4.5 *Unbundling and Regulation*

Option 2 and Stage 2 of Option 4 would involve unbundling of the power sector into generation, transmission and distribution entities. Generally speaking, a major goal of this is to introduce greater competition amongst generators. For this to be successful in Zambia, competition would have to be at a regional level, otherwise Kariba North Bank and Kafue Gorge could effectively control prices at the national level.

We, and others, have projected future regional electricity price increases over the next ten years. A full liberalization of the generation market could expose retail consumers in Zambia to significantly higher tariffs. This exposure is accentuated by the fact that a significant part of generation is committed to CEC under long-term contract and rates that are essentially fixed in real terms. Therefore, we think that moves toward market liberalization will have to be tempered with cost-based pricing of generation currently owned, or contracted by, ZESCO. The following discussion presents one way that this could be done.

- The transmission company would be responsible for operation and maintenance of the transmission system currently operated by ZESCO, planning transmission expansion, dispatch of generation within Zambia and for wholesale marketing of defined levels of Kafue Gorge, Victoria Falls, and Kariba North Bank generation.
- The transmission company would have an obligation to serve the distribution company and meet obligations of the current ZESCO contract with CEC.
- The companies formed from the Kafue Gorge and Victoria Falls power stations and Kariba North Bank would have an obligation to sell the defined levels of generation to the transmission company at a regulated price. The transmission company would have a complimentary obligation to purchase these defined levels of generation.
- The ERB would define the levels of generation required for sale to the transmission company. Initially, the level of generation would be defined by the requirements of the distribution company and the CEC contract.
- As these levels declined the generation market would become increasingly free. This would allow the ERB to control the degree to which the generation market opens in response to regional growth and restructuring. At a minimum, generation levels would have to cover the requirements of the CEC contract.
- At the end of the CEC contract in 2020, it would be possible for ERB to choose to have a completely free generation market in Zambia if that were consistent with the structure of the market in other countries in southern Africa, particularly South Africa. Significant level of generation market freedom could be achieved prior to that if the ERB deemed it appropriate.
- New generation facilities would be free to serve the domestic or export markets and would have access to transmission facilities at a regulated price.

This approach would not allow retail tariff increases to be avoided. We have estimated that in the long term, cost-based tariffs would be almost twice the current level. However, if retail customers were subjected to the full brunt of regional wholesale power price increases an additional 50% increase would be required.

The structural issues discussed have, to our knowledge, yet to be discussed by stakeholders in the public restructuring debate. They are complex and we recognize that there is more than one approach to accomplishing their goals and there is even likely to be debate about the goals themselves. Under Option 2, this structure would have to be implemented before privatization and the complexity of the required restructuring is the primary reason that we feels that delays would be likely.

Under Option 4, there would no immediate need for restructuring of the power sector beyond current requirements during the master concession phase except for the corporatization of the company, the use of transfer prices and the development of a negative concession for the development and operation of rural systems. Transmission access rules will have to be developed for any new generation facilities that would be

developed independently. However, there would be adequate time to debate restructuring issues, to evaluate implications on retail prices and to assess impacts on other stakeholders.

Appendix A Business Case Analysis

This appendix contains the business case analysis.

345

Option 1- Concession
Whole Company

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Revenue	-	-	81,050	90,198	94,077	100,254	97,910	102,355	105,483	109,493
Expenses	-	-	75,252	71,723	84,847	84,667	87,279	90,448	93,448	96,893
Incremental labor	-	-	600	600	600	600	600	600	600	600
Investment	-	-	19,509	12,619	23,031	20,000	20,000	20,000	20,000	20,000
Concession payment	-	-	53,789	57,151	59,862	62,714	65,326	68,495	71,494	74,940
Depreciation of up-front payment	-	-	1,353	1,353	1,353	1,353	1,353	1,353	1,353	1,353
Operating income	-	-	5,798	18,474	9,230	15,587	10,631	11,907	12,035	12,600
Interest	-	-	2,703	2,561	2,419	2,277	2,135	1,993	1,851	1,709
Income taxes	-	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	3,095	15,913	6,811	13,310	8,496	9,914	10,184	10,891
Principal payments	-	-	1,353	1,353	1,353	1,353	1,353	1,353	1,353	1,353
Up-front payment	-	33,836	-	-	-	-	-	-	-	-
Cash flow	-	(33,836)	3,095	15,913	6,811	13,310	8,496	9,914	10,184	10,891

Internal rate of return 33%

Option 1- Concession
Whole Company

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Revenue	**111,509**	**107,611**	**104,186**	**111,496**	**113,404**	**113,915**	**111,490**	**110,648**	**108,986**	**107,835**
Expenses	**100,236**	**104,118**	**56,375**	**57,415**	**70,618**	**58,578**	**59,205**	**59,819**	**60,443**	**61,382**
Incremental labor	600	600	600	600	600	600	600	600	600	600
Investment	20,000	20,000	20,000	20,000	32,619	20,000	20,000	20,000	20,000	20,000
Concession payment	78,283	82,165	34,422	35,462	36,045	36,624	37,252	37,865	38,489	39,428
Depreciation of up-front payment	1,353	1,353	1,353	1,353	1,353	1,353	1,353	1,353	1,353	1,353
Operating income	**11,273**	**3,493**	**47,811**	**54,081**	**42,786**	**55,338**	**52,284**	**50,830**	**48,544**	**46,453**
Interest	**1,567**	**1,424**	**1,353**	**1,353**	**1,286**	**1,150**	**1,015**	**880**	**744**	**609**
Income taxes	-	-	-	-	-	-	-	-	-	-
Profit after taxes	**9,706**	**2,068**	**46,457**	**52,728**	**41,500**	**54,187**	**51,269**	**49,950**	**47,799**	**45,844**
Principal payments	**1,353**	**1,353**	-	-	**1,353**	**1,353**	**1,353**	**1,353**	**1,353**	**1,353**
Up-front payment	-	-	-	-	-	-	-	-	-	-
Cash flow	**9,706**	**2,068**	**47,811**	**54,081**	**41,500**	**54,187**	**51,269**	**49,950**	**47,799**	**45,844**

Option 1- Concession
Whole Company

	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30
Revenue	**128,525**	**115,968**	**92,255**	**79,053**	**65,955**	**51,318**	**53,673**	-	-	-
Expenses	**66,364**	**66,386**	**66,408**	**66,431**	**66,454**	**66,474**	**69,276**	-	-	-
Incremental labor	600	600	600	600	600	600	600	-	-	-
Investment	20,000	20,000	20,000	20,000	20,000	20,000	20,000	-	-	-
Concession payment	44,410	44,432	44,455	44,477	44,500	44,521	47,323	-	-	-
Depreciation of up-front payment	1,353	1,353	1,353	1,353	1,353	1,353	1,353	-	-	-
Operating income	**62,161**	**49,582**	**25,847**	**12,622**	**(499)**	**(15,156)**	**(15,603)**	-	-	-
Interest	**474**	**338**	**203**	**68**	**0**	-	-	-	-	-
Income taxes	-	-	-	-	-	-	-	-	-	-
Profit after taxes	**61,688**	**49,244**	**25,644**	**12,554**	**(499)**	**(15,156)**	**(15,603)**	-	-	-
Principal payments	**1,353**	**1,353**	**1,353**	**1,353**	-	-	-	-	-	-
Up-front payment	-	-	-	-	-	-	-	-	-	-
Cash flow	**61,688**	**49,244**	**25,644**	**12,554**	**854**	**(13,802)**	**(14,250)**	-	-	-

Option 2- Unbundling

Isolated Systems

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Revenue	-	-	-	-	(6,422)	(6,751)	(7,100)	(7,469)	(7,903)
Expenses	-	-	-	-	(7,064)	(7,426)	(7,810)	(8,216)	(8,694)
Labor	-	-	-	-	120	120	120	120	120
Investment	-	-	-	-	-	-	-	-	-
Concession payment	-	-	-	-	(7,184)	(7,546)	(7,930)	(8,336)	(8,814)
Depreciation of up-front payment	-	-	-	-	-	-	-	-	-
Operating income	-	-	-	-	642	675	710	747	790
Interest	-	-	-	-	-	-	-	-	-
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	-	-	642	675	710	747	790
Principal payments	-	-	-	-	-	-	-	-	-
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	-	-	-	-	642	675	710	747	790

349

Option 2- Unbundling

Generation

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Revenue	-	-	-	-	**17,988**	**17,299**	**17,094**	**16,980**	**17,073**
Expenses	-	-	-	-	**7,151**	**4,120**	**4,120**	**4,120**	**4,120**
Labor	-	-	-	-	120	120	120	120	120
Investment	-	-	-	-	7,031	4,000	4,000	4,000	4,000
Concession payment	-	-	-	-	-	-	-	-	-
Depreciation of up-front payment	-	-	-	-	881	881	881	881	881
Operating income	-	-	-	-	**10,836**	**13,179**	**12,974**	**12,860**	**12,953**
Interest	-	-	-	-	**8,799**	**8,336**	**7,874**	**7,411**	**6,949**
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	-	-	**2,037**	**4,842**	**5,100**	**5,448**	**6,004**
Principal payments	-	-	-	-	**4,405**	**4,405**	**4,405**	**4,405**	**4,405**
Up-front payment	-	-	-	22,025	-	-	-	-	-
Cash flow	-	-	-	**(22,025)**	**(1,487)**	**1,318**	**1,577**	**1,924**	**2,480**

Internal rate of return **15%**

350

Option 2- Unbundling

Transmission

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Revenue	-	-	-	-	**29,166**	**29,795**	**24,782**	**24,041**	**24,203**
Expenses	-	-	-	-	**21,155**	**21,058**	**21,021**	**21,099**	**21,213**
Labor	-	-	-	-	120	120	120	120	120
Investment	-	-	-	-	6,000	6,000	6,000	6,000	6,000
Concession payment	-	-	-	-	15,035	14,938	14,901	14,979	15,093
Depreciation of up-front payment	-	-	-	-	268	268	268	268	268
Operating income	-	-	-	-	**8,011**	**8,737**	**3,760**	**2,943**	**2,990**
Interest	-	-	-	-	**2,680**	**2,539**	**2,398**	**2,257**	**2,117**
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	-	-	**5,331**	**6,198**	**1,362**	**685**	**873**
Principal payments	-	-	-	-	**1,342**	**1,342**	**1,342**	**1,342**	**1,342**
Up-front payment	-	-	-	**6,708**	-	-	-	-	-
Cash flow	-	-	-	**(6,708)**	**4,258**	**5,125**	**289**	**(388)**	**(200)**

Internal rate of return **26%**

357

Option 2- Unbundling

Wholesale Marketing

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Revenue	-	-	-	-	**10,871**	**14,532**	**14,885**	**14,840**	**12,931**
Expenses	-	-	-	-	**12,090**	**12,410**	**12,594**	**12,567**	**12,325**
Labor	-	-	-	-	240	240	240	240	240
Investment	-	-	-	-	-	-	-	-	-
Concession payment	-	-	-	-	11,850	12,170	12,354	12,327	12,085
Depreciation of up-front payment	-	-	-	-	80	80	80	80	80
Operating income	-	-	-	-	**(1,219)**	**2,121**	**2,291**	**2,273**	**606**
Interest	-	-	-	-	**796**	**754**	**713**	**671**	**629**
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	-	-	**(2,016)**	**1,367**	**1,579**	**1,603**	**(23)**
Principal payments	-	-	-	-	**399**	**399**	**399**	**399**	**399**
Up-front payment	-	-	-	**1,993**	-	-	-	-	-
Cash flow	-	-	-	**(1,993)**	**(2,335)**	**1,048**	**1,260**	**1,284**	**(342)**

Internal rate of return **24%**

352

Option 2- Unbundling

Distribution & Customer Service

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Revenue	-	-	-	-	32,988	45,747	52,413	60,581	63,945
Expenses	-	-	-	-	26,246	27,691	29,109	30,525	31,545
Labor	-	-	-	-	120	120	120	120	120
Investment	-	-	-	-	10,000	10,000	10,000	10,000	10,000
Concession payment	-	-	-	-	16,126	17,571	18,989	20,405	21,425
Depreciation of up-front payment	-	-	-	-	1,228	1,228	1,228	1,228	1,228
Operating income	-	-	-	-	6,742	18,056	23,304	30,056	32,400
Interest	-	-	-	-	7,156	6,780	6,404	6,028	5,652
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	-	-	(414)	11,276	16,900	24,028	26,748
Principal payments	-	-	-	-	3,583	3,583	3,583	3,583	3,583
Up-front payment	-	-	-	30,708	-	-	-	-	-
Cash flow	-	-	-	(30,708)	(2,768)	8,921	14,545	21,673	24,394

Internal rate of return 39%

353

Option 2- Unbundling

Isolated Systems

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Revenue	**(8,364)**	**(8,854)**	**(9,298)**	**(9,865)**	**(10,469)**	**(11,113)**	**(11,801)**	**(12,535)**	**(13,318)**
Expenses	**(9,201)**	**(9,740)**	**(10,228)**	**(10,851)**	**(11,516)**	**(12,224)**	**(12,981)**	**(13,788)**	**(14,650)**
Labor	120	120	120	120	120	120	120	120	120
Investment	-	-	-	-	-	-	-	-	-
Concession payment	(9,321)	(9,860)	(10,348)	(10,971)	(11,636)	(12,344)	(13,101)	(13,908)	(14,770)
Depreciation of up-front payment	-	-	-	-	-	-	-	-	-
Operating income	**836**	**885**	**930**	**986**	**1,047**	**1,111**	**1,180**	**1,253**	**1,332**
Interest	-	-	-	-	-	-	-	-	-
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	**836**	**885**	**930**	**986**	**1,047**	**1,111**	**1,180**	**1,253**	**1,332**
Principal payments	-	-	-	-	-	-	-	-	-
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	**836**	**885**	**930**	**986**	**1,047**	**1,111**	**1,180**	**1,253**	**1,332**

Option 2- Unbundling

Generation

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Revenue	**17,268**	**17,443**	**17,613**	**17,731**	**17,835**	**18,011**	**17,952**	**17,885**	**17,811**
Expenses	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**
Labor	120	120	120	120	120	120	120	120	120
Investment	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Concession payment	-	-	-	-	-	-	-	-	-
Depreciation of up-front payment	881	881	881	881	881	881	881	881	881
Operating income	**13,148**	**13,323**	**13,493**	**13,611**	**13,715**	**13,891**	**13,832**	**13,765**	**13,691**
Interest	**6,486**	**6,024**	**5,561**	**5,099**	**4,636**	**4,405**	**4,405**	**4,185**	**3,744**
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	**6,661**	**7,299**	**7,932**	**8,512**	**9,079**	**9,487**	**9,427**	**9,581**	**9,947**
Principal payments	**4,405**	**4,405**	**4,405**	**4,405**	**4,405**	-	-	**4,405**	**4,405**
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	**3,137**	**3,775**	**4,408**	**4,988**	**5,555**	**10,368**	**10,308**	**6,057**	**6,423**

Option 2- Unbundling

Transmission

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Revenue	**24,437**	**24,671**	**24,875**	**24,848**	**25,061**	**26,158**	**26,158**	**26,328**	**26,494**
Expenses	**21,331**	**21,451**	**21,576**	**21,705**	**21,837**	**33,084**	**22,381**	**22,523**	**22,670**
Labor	120	120	120	120	120	120	120	120	120
Investment	6,000	6,000	6,000	6,000	6,000	16,744	6,000	6,000	6,000
Concession payment	15,211	15,331	15,456	15,585	15,717	16,220	16,261	16,403	16,550
Depreciation of up-front payment	268	268	268	268	268	268	268	268	268
Operating income	**3,106**	**3,220**	**3,298**	**3,143**	**3,223**	**(6,926)**	**3,777**	**3,805**	**3,824**
Interest	**1,976**	**1,835**	**1,694**	**1,553**	**1,412**	**1,342**	**1,342**	**1,275**	**1,140**
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	**1,131**	**1,385**	**1,605**	**1,590**	**1,811**	**(8,268)**	**2,436**	**2,531**	**2,683**
Principal payments	**1,342**	**1,342**	**1,342**	**1,342**	**1,342**	-	-	**1,342**	**1,342**
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	**57**	**311**	**531**	**517**	**738**	**(8,000)**	**2,704**	**1,457**	**1,610**

356

Option 2- Unbundling

Wholesale Marketing

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Revenue	**13,890**	**13,867**	**12,585**	**12,149**	**10,482**	**9,491**	**7,859**	**4,923**	**3,263**
Expenses	**12,821**	**13,407**	**14,319**	**15,812**	**15,022**	**240**	**240**	**240**	**240**
Labor	240	240	240	240	240	240	240	240	240
Investment	-	-	-	-	-	-	-	-	-
Concession payment	12,581	13,167	14,079	15,572	14,782	-	-	-	-
Depreciation of up-front payment	80	80	80	80	80	80	80	80	80
Operating income	**1,069**	**460**	**(1,734)**	**(3,663)**	**(4,540)**	**9,251**	**7,619**	**4,683**	**3,023**
Interest	**587**	**545**	**503**	**461**	**420**	**399**	**399**	**379**	**339**
Income taxes	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Profit after taxes	**482**	**(85)**	**(2,237)**	**(4,124)**	**(4,960)**	**8,852**	**7,220**	**4,304**	**2,684**
Principal payments	**399**	**399**	**399**	**399**	**399**	**-**	**-**	**399**	**399**
Up-front payment	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cash flow	**163**	**(404)**	**(2,556)**	**(4,443)**	**(5,279)**	**8,932**	**7,300**	**3,985**	**2,366**

Option 2- Unbundling

Distribution & Customer Service

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Revenue	**64,588**	**63,948**	**68,141**	**61,086**	**65,277**	**67,345**	**70,000**	**70,890**	**72,132**
Expenses	**32,557**	**33,398**	**35,412**	**36,645**	**37,896**	**26,512**	**25,274**	**25,919**	**26,571**
Labor	120	120	120	120	120	120	120	120	120
Investment	10,000	10,000	10,000	10,000	10,000	11,875	10,000	10,000	10,000
Concession payment	22,437	23,278	25,292	26,525	27,776	14,517	15,154	15,799	16,451
Depreciation of up-front payment	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
Operating income	**32,032**	**30,549**	**32,729**	**24,441**	**27,380**	**40,833**	**44,726**	**44,971**	**45,560**
Interest	**5,275**	**4,899**	**4,523**	**4,147**	**3,771**	**3,583**	**3,583**	**3,404**	**3,045**
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	**26,756**	**25,650**	**28,206**	**20,294**	**23,610**	**37,251**	**41,143**	**41,567**	**42,515**
Principal payments	**3,583**	**3,583**	**3,583**	**3,583**	**3,583**	-	-	**3,583**	**3,583**
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	**24,402**	**23,296**	**25,851**	**17,940**	**21,255**	**38,479**	**42,372**	**39,213**	**40,160**

318

Option 2- Unbundling

Isolated Systems

	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Revenue	**(14,156)**	**(15,051)**	**(16,008)**	**(17,031)**	**(18,126)**	**(19,298)**	**(20,553)**	**(21,897)**	**(23,172)**
Expenses	**(15,571)**	**(16,556)**	**(17,608)**	**(18,734)**	**(19,939)**	**(21,228)**	**(22,608)**	**(24,087)**	**(25,489)**
Labor	120	120	120	120	120	120	120	120	120
Investment	-	-	-	-	-	-	-	-	-
Concession payment	(15,691)	(16,676)	(17,728)	(18,854)	(20,059)	(21,348)	(22,728)	(24,207)	(25,609)
Depreciation of up-front payment	-	-	-	-	-	-	-	-	-
Operating income	**1,416**	**1,505**	**1,601**	**1,703**	**1,813**	**1,930**	**2,055**	**2,190**	**2,317**
Interest	-	-	-	-	-	-	-	-	-
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	**1,416**	**1,505**	**1,601**	**1,703**	**1,813**	**1,930**	**2,055**	**2,190**	**2,317**
Principal payments	-	-	-	-	-	-	-	-	-
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	**1,416**	**1,505**	**1,601**	**1,703**	**1,813**	**1,930**	**2,055**	**2,190**	**2,317**

Option 2- Unbundling

Generation

	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Revenue	**17,729**	**17,709**	**17,502**	**17,289**	**17,072**	**16,849**	**16,620**	**16,387**	**16,148**
Expenses	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**
Labor	120	120	120	120	120	120	120	120	120
Investment	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Concession payment	-	-	-	-	-	-	-	-	-
Depreciation of up-front payment	881	881	881	881	881	881	881	881	881
Operating income	**13,609**	**13,589**	**13,382**	**13,169**	**12,952**	**12,729**	**12,500**	**12,267**	**12,028**
Interest	**3,304**	**2,863**	**2,423**	**1,982**	**1,542**	**1,101**	**661**	**220**	**-**
Income taxes	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Profit after taxes	**10,305**	**10,726**	**10,959**	**11,187**	**11,410**	**11,627**	**11,840**	**12,047**	**12,028**
Principal payments	**4,405**	**4,405**	**4,405**	**4,405**	**4,405**	**4,405**	**4,405**	**4,405**	**-**
Up-front payment	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cash flow	**6,781**	**7,202**	**7,435**	**7,663**	**7,886**	**8,103**	**8,316**	**8,523**	**12,909**

36b

Option 2- Unbundling

Transmission

	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Revenue	**26,691**	**26,716**	**26,735**	**26,749**	**26,756**	**26,848**	**26,713**	**26,571**	**26,425**
Expenses	**22,823**	**22,982**	**23,147**	**23,319**	**23,498**	**23,684**	**23,878**	**24,080**	**24,291**
Labor	120	120	120	120	120	120	120	120	120
Investment	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Concession payment	16,703	16,862	17,027	17,199	17,378	17,564	17,758	17,960	18,171
Depreciation of up-front payment	268	268	268	268	268	268	268	268	268
Operating income	**3,868**	**3,734**	**3,588**	**3,429**	**3,258**	**3,164**	**2,834**	**2,491**	**2,134**
Interest	**1,006**	**872**	**738**	**604**	**470**	**335**	**201**	**67**	**-**
Income taxes	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Profit after taxes	**2,861**	**2,862**	**2,850**	**2,826**	**2,789**	**2,828**	**2,633**	**2,424**	**2,134**
Principal payments	**1,342**	**1,342**	**1,342**	**1,342**	**1,342**	**1,342**	**1,342**	**1,342**	**-**
Up-front payment	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cash flow	**1,788**	**1,788**	**1,776**	**1,752**	**1,716**	**1,755**	**1,560**	**1,351**	**2,402**

Option 2- Unbundling

Wholesale Marketing

	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Revenue	**1,646**	**3,076**	**39,174**	**29,467**	**20,789**	**11,938**	**4,210**	**(6,004)**	**(9,399)**
Expenses	**240**	**240**	**240**	**240**	**240**	**240**	**240**	**240**	**240**
Labor	240	240	240	240	240	240	240	240	240
Investment	-	-	-	-	-	-	-	-	-
Concession payment	-	-	-	-	-	-	-	-	-
Depreciation of up-front payment	80	80	80	80	80	80	80	80	80
Operating income	**1,406**	**2,836**	**38,934**	**29,227**	**20,549**	**11,698**	**3,970**	**(6,244)**	**(9,639)**
Interest	**299**	**259**	**219**	**179**	**140**	**100**	**60**	**20**	**0**
Income taxes	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Profit after taxes	**1,107**	**2,577**	**38,714**	**29,048**	**20,409**	**11,599**	**3,910**	**(6,264)**	**(9,639)**
Principal payments	**399**	**399**	**399**	**399**	**399**	**399**	**399**	**399**	**-**
Up-front payment	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cash flow	**788**	**2,258**	**38,395**	**28,729**	**20,090**	**11,280**	**3,591**	**(6,583)**	**(9,559)**

Option 2- Unbundling

Distribution & Customer Service

	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Revenue	**72,521**	**70,522**	**55,930**	**53,950**	**39,843**	**36,390**	**32,206**	**26,936**	**32,718**
Expenses	**27,232**	**27,899**	**28,574**	**29,255**	**29,944**	**30,640**	**31,343**	**31,967**	**33,480**
Labor	120	120	120	120	120	120	120	120	120
Investment	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Concession payment	17,112	17,779	18,454	19,135	19,824	20,520	21,223	21,847	23,360
Depreciation of up-front payment	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
Operating income	**45,290**	**42,623**	**27,357**	**24,694**	**9,899**	**5,750**	**862**	**(5,031)**	**(763)**
Interest	**2,687**	**2,329**	**1,970**	**1,612**	**1,254**	**896**	**537**	**179**	**-**
Income taxes	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Profit after taxes	**42,603**	**40,295**	**25,386**	**23,082**	**8,645**	**4,854**	**325**	**(5,210)**	**(763)**
Principal payments	**3,583**	**3,583**	**3,583**	**3,583**	**3,583**	**3,583**	**3,583**	**3,583**	**-**
Up-front payment	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cash flow	**40,249**	**37,940**	**23,032**	**20,728**	**6,290**	**2,500**	**(2,029)**	**(7,564)**	**466**

Option 2- Unbundling

Isolated Systems

	2027/28	2028/29	2029/30
Revenue	**(24,534)**	**(25,990)**	-
Expenses	**(26,988)**	**(28,589)**	-
Labor	120	120	-
Investment	-	-	-
Concession payment	(27,108)	(28,709)	-
Depreciation of up-front payment	-	-	-
Operating income	**2,453**	**2,599**	-
Interest	-	-	-
Income taxes	-	-	-
Profit after taxes	**2,453**	**2,599**	-
Principal payments	-		
Up-front payment	-	-	-
Cash flow	**2,453**	**2,599**	-

Option 2- Unbundling

Generation

	2027/28	2028/29	2029/30
Revenue	**8,591**	**8,639**	-
Expenses	**4,120**	**4,120**	-
Labor	120	120	-
Investment	4,000	4,000	-
Concession payment	-	-	-
Depreciation of up-front payment	881	881	-
Operating income	**4,471**	**4,519**	-
Interest	-	-	-
Income taxes	-	-	-
Profit after taxes	**4,471**	**4,519**	-
Principal payments	-	-	-
Up-front payment	-	-	-
Cash flow	**5,352**	**5,400**	-

Option 2- Unbundling

Transmission

	2027/28	2028/29	2029/30
Revenue	**26,272**	**26,113**	-
Expenses	**24,511**	**24,740**	-
Labor	120	120	-
Investment	6,000	6,000	-
Concession payment	18,391	18,620	-
Depreciation of up-front payment	268	268	-
Operating income	**1,761**	**1,373**	-
Interest	-	-	-
Income taxes	-	-	-
Profit after taxes	**1,761**	**1,373**	-
Principal payments	-	-	-
Up-front payment	-	-	-
Cash flow	**2,029**	**1,641**	-

Option 2- Unbundling

Wholesale Marketing

	2027/28	2028/29	2029/30
Revenue	**(10,663)**	**(12,006)**	-
Expenses	**240**	**240**	-
Labor	240	240	-
Investment	-	-	-
Concession payment	-	-	-
Depreciation of up-front payment	80	80	-
Operating income	**(10,903)**	**(12,246)**	-
Interest	-	-	-
Income taxes	-	-	-
Profit after taxes	**(10,903)**	**(12,246)**	-
Principal payments	-	-	-
Up-front payment	-	-	-
Cash flow	**(10,823)**	**(12,166)**	-

Option 2- Unbundling

Distribution & Customer Service

	2027/28	2028/29	2029/30
Revenue	**41,708**	**45,332**	-
Expenses	**35,043**	**36,658**	-
Labor	120	120	-
Investment	10,000	10,000	-
Concession payment	24,923	26,538	-
Depreciation of up-front payment	1,228	1,228	-
Operating income	**6,665**	**8,674**	-
Interest	-	-	-
Income taxes	-	-	-
Profit after taxes	**6,665**	**8,674**	-
Principal payments	-	-	-
Up-front payment	-	-	-
Cash flow	**7,893**	**9,903**	-

368

Option 4- Master Concession- Stage 1

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Revenue	-	-	-	**83,292**	**92,149**	**99,877**	**97,518**	**101,890**	**104,918**	**108,863**
Expenses	-	-	-	**71,241**	**85,048**	**85,593**	**88,200**	**91,342**	**94,428**	**97,874**
Incremental labor	-	-	-	600	600	600	600	600	600	600
Investment	-	-	-	12,619	23,031	20,000	20,000	20,000	20,000	20,000
Concession payment	-	-	-	55,665	59,059	62,635	65,242	68,385	71,471	74,916
Depreciation of up-front payment	-	-	-	2,357	2,357	2,357	2,357	2,357	2,357	2,357
Operating income	-	-	-	**12,051**	**7,101**	**14,284**	**9,318**	**10,548**	**10,490**	**10,989**
Interest	-	-	-	**1,834**	**1,636**	**1,438**	**1,240**	**1,042**	**849**	**660**
Income taxes	-	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	-	**10,217**	**5,465**	**12,846**	**8,078**	**9,506**	**9,642**	**10,329**
Principal payments	-	-	-	**1,886**	**1,886**	**1,886**	**1,886**	**1,886**	**1,886**	**1,886**
Up-front payment	-	-	**23,574**	-	-	-	-	-	-	-
Cash flow	-	-	**(23,574)**	**10,689**	**5,937**	**13,318**	**8,550**	**9,977**	**10,113**	**10,801**

Internal rate of return **38%**

Option 4- Master Concession- Stage 1

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Revenue	**110,808**	**106,631**	**103,947**	-	-	-	-	-	-	-
Expenses	**101,217**	**105,098**	**109,012**	-	-	-	-	-	-	-
Incremental labor	600	600	600	-	-	-	-	-	-	-
Investment	20,000	20,000	20,000	-	-	-	-	-	-	-
Concession payment	78,259	82,141	86,055	-	-	-	-	-	-	-
Depreciation of up-front payment	2,357	2,357	2,357	-	-	-	-	-	-	-
Operating income	**9,592**	**1,532**	**(5,066)**	-	-	-	-	-	-	-
Interest	**471**	**283**	**94**	-	-	-	-	-	-	-
Income taxes	-	-	-	-	-	-	-	-	-	-
Profit after taxes	**9,120**	**1,249**	**(5,160)**	-	-	-	-	-	-	-
Principal payments	**1,886**	**1,886**	**1,886**	-	-	-	-	-	-	-
Up-front payment	-	-	-	-	-	-	-	-	-	-
Cash flow	**9,592**	**1,721**	**(4,688)**	-	-	-	-	-	-	-

Option 4- Master Concession- Stage 1

	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30
Revenue	-	-	-	-	-	-	-	-	-	-
Expenses	-	-	-	-	-	-	-	-	-	-
Incremental labor	-	-	-	-	-	-	-	-	-	-
Investment	-	-	-	-	-	-	-	-	-	-
Concession payment	-	-	-	-	-	-	-	-	-	-
Depreciation of up-front payment	-	-	-	-	-	-	-	-	-	-
Operating income	-	-	-	-	-	-	-	-	-	-
Interest	-	-	-	-	-	-	-	-	-	-
Income taxes	-	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	-	-	-	-	-	-	-	-
Principal payments	-	-	-	-	-	-	-	-	-	-
Up-front payment	-	-	-	-	-	-	-	-	-	-
Cash flow	-	-	-	-	-	-	-	-	-	-

Option 4- Master Concession- Stage 2

Isolated Systems

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Revenue	-	-	-	(10,469)	(11,113)	(11,801)	(12,535)	(13,318)	(14,156)
Expenses	-	-	-	(11,516)	(12,224)	(12,981)	(13,788)	(14,650)	(15,571)
Labor	-	-	-	120	120	120	120	120	120
Investment	-	-	-	-	-	-	-	-	-
Concession payment	-	-	-	(11,636)	(12,344)	(13,101)	(13,908)	(14,770)	(15,691)
Depreciation of up-front payment	-	-	-	-	-	-	-	-	-
Operating income	-	-	-	1,047	1,111	1,180	1,253	1,332	1,416
Interest	-	-	-	-	-	-	-	-	-
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	-	1,047	1,111	1,180	1,253	1,332	1,416
Principal payments	-	-	-	-	-	-	-	-	-
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	-	-	-	1,047	1,111	1,180	1,253	1,332	1,416

Internal rate of return **45%**

Option 4- Master Concession- Stage 2

Generation

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Revenue	-	-	-	**17,835**	**18,011**	**17,952**	**17,885**	**17,811**	**17,729**
Expenses	-	-	-	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**
Labor	-	-	-	120	120	120	120	120	120
Investment	-	-	-	4,000	4,000	4,000	4,000	4,000	4,000
Concession payment	-	-	-	-	-	-	-	-	-
Depreciation of up-front payment	-	-	-	2,044	2,044	2,044	2,044	2,044	2,044
Operating income	-	-	-	**13,715**	**13,891**	**13,832**	**13,765**	**13,691**	**13,609**
Interest	-	-	-	**8,165**	**7,736**	**7,306**	**6,877**	**6,448**	**6,019**
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	-	**5,550**	**6,156**	**6,526**	**6,888**	**7,243**	**7,590**
Principal payments	-	-	-	**4,088**	**4,088**	**4,088**	**4,088**	**4,088**	**4,088**
Up-front payment	-	-	**20,438**	-	-	-	-	-	-
Cash flow	-	-	**(20,438)**	**3,506**	**4,112**	**4,482**	**4,844**	**5,199**	**5,546**

Internal rate of return **23%**

373

Option 4- Master Concession- Stage 2

Transmission

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Revenue	-	-	-	**25,061**	**26,158**	**26,158**	**26,328**	**26,494**	**26,691**
Expenses	-	-	-	**13,979**	**24,974**	**14,250**	**14,321**	**14,395**	**14,472**
Labor	-	-	-	120	120	120	120	120	120
Investment	-	-	-	6,000	16,744	6,000	6,000	6,000	6,000
Concession payment	-	-	-	7,859	8,110	8,130	8,201	8,275	8,352
Depreciation of up-front payment	-	-	-	1,144	1,144	1,144	1,144	1,144	1,144
Operating income	-	-	-	**11,082**	**1,184**	**11,908**	**12,007**	**12,099**	**12,219**
Interest	-	-	-	**4,569**	**4,329**	**4,088**	**3,848**	**3,608**	**3,368**
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	-	**6,513**	**(3,145)**	**7,819**	**8,158**	**8,491**	**8,851**
Principal payments	-	-	-	**2,287**	**2,287**	**2,287**	**2,287**	**2,287**	**2,287**
Up-front payment	-	-	**11,436**	-	-	-	-	-	-
Cash flow	-	-	**(11,436)**	**5,370**	**(4,288)**	**6,676**	**7,015**	**7,347**	**7,707**

Internal rate of return **39%**

Option 4- Master Concession- Stage 2

Wholesale Marketing

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Revenue	-	-	-	**10,477**	**9,485**	**7,853**	**4,917**	**3,258**	**1,641**
Expenses	-	-	-	**240**	**240**	**240**	**240**	**240**	**240**
Labor	-	-	-	240	240	240	240	240	240
Investment	-	-	-	-	-	-	-	-	-
Concession payment	-	-	-	-	-	-	-	-	-
Depreciation of up-front payment	-	-	-	-	-	-	-	-	-
Operating income	-	-	-	**10,237**	**9,245**	**7,613**	**4,677**	**3,018**	**1,401**
Interest	-	-	-	-	-	-	-	-	-
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	-	**10,237**	**9,245**	**7,613**	**4,677**	**3,018**	**1,401**
Principal payments	-	-	-	-	-	-	-	-	-
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	-	-	-	**10,237**	**9,245**	**7,613**	**4,677**	**3,018**	**1,401**

Internal rate of return **-9%**

375

Option 4- Master Concession- Stage 2

Distribution & Customer Service

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Revenue	-	-	-	**64,666**	**66,708**	**69,354**	**70,235**	**71,469**	**71,850**
Expenses	-	-	-	**10,120**	**11,995**	**10,120**	**10,120**	**10,120**	**10,120**
Labor	-	-	-	120	120	120	120	120	120
Investment	-	-	-	10,000	11,875	10,000	10,000	10,000	10,000
Concession payment	-	-	-	-	-	-	-	-	-
Depreciation of up-front payment	-	-	-	9,593	9,593	9,593	9,593	9,593	9,593
Operating income	-	-	-	**54,546**	**54,713**	**59,234**	**60,115**	**61,349**	**61,730**
Interest	-	-	-	**22,356**	**21,181**	**20,006**	**18,830**	**17,655**	**16,480**
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	-	**32,190**	**33,532**	**39,228**	**41,285**	**43,693**	**45,250**
Principal payments	-	-	-	**11,192**	**11,192**	**11,192**	**11,192**	**11,192**	**11,192**
Up-front payment	-	-	**95,931**	-	-	-	-	-	-
Cash flow	-	-	**(95,931)**	**30,591**	**31,933**	**37,629**	**39,686**	**42,094**	**43,651**

Internal rate of return **35%**

376

Option 4- Master Concession- Stage 2

Isolated Systems

	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Revenue	**(15,051)**	**(16,008)**	**(17,031)**	**(18,126)**	**(19,298)**	**(20,553)**	**(21,897)**	**(23,172)**	**(24,534)**
Expenses	**(16,556)**	**(17,608)**	**(18,734)**	**(19,939)**	**(21,228)**	**(22,608)**	**(24,087)**	**(25,489)**	**(26,988)**
Labor	120	120	120	120	120	120	120	120	120
Investment	-	-	-	-	-	-	-	-	-
Concession payment	(16,676)	(17,728)	(18,854)	(20,059)	(21,348)	(22,728)	(24,207)	(25,609)	(27,108)
Depreciation of up-front payment	-	-	-	-	-	-	-	-	-
Operating income	**1,505**	**1,601**	**1,703**	**1,813**	**1,930**	**2,055**	**2,190**	**2,317**	**2,453**
Interest	-	-	-	-	-	-	-	-	-
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	**1,505**	**1,601**	**1,703**	**1,813**	**1,930**	**2,055**	**2,190**	**2,317**	**2,453**
Principal payments	-	-	-	-	-	-	-	-	-
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	**1,505**	**1,601**	**1,703**	**1,813**	**1,930**	**2,055**	**2,190**	**2,317**	**2,453**

Option 4- Master Concession- Stage 2

Generation

	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Revenue	**17,709**	**17,502**	**17,289**	**17,072**	**16,849**	**16,620**	**16,387**	**16,148**	**8,591**
Expenses	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**	**4,120**
Labor	120	120	120	120	120	120	120	120	120
Investment	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Concession payment	-	-	-	-	-	-	-	-	-
Depreciation of up-front payment	2,044	2,044	2,044	2,044	2,044	2,044	2,044	2,044	2,044
Operating income	**13,589**	**13,382**	**13,169**	**12,952**	**12,729**	**12,500**	**12,267**	**12,028**	**4,471**
Interest	**5,590**	**5,160**	**4,731**	**4,302**	**4,088**	**4,088**	**3,883**	**3,474**	**3,066**
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	**8,000**	**8,222**	**8,438**	**8,650**	**8,641**	**8,413**	**8,384**	**8,554**	**1,405**
Principal payments	**4,088**	**4,088**	**4,088**	**4,088**	-	-	**4,088**	**4,088**	**4,088**
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	**5,956**	**6,178**	**6,394**	**6,606**	**10,685**	**10,457**	**6,340**	**6,510**	**(638)**

328

Option 4- Master Concession- Stage 2

Transmission

	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Revenue	**26,716**	**26,735**	**26,749**	**26,756**	**26,848**	**26,713**	**26,571**	**26,425**	**26,272**
Expenses	**14,551**	**14,634**	**14,720**	**14,809**	**14,902**	**14,999**	**15,100**	**15,206**	**15,315**
Labor	120	120	120	120	120	120	120	120	120
Investment	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Concession payment	8,431	8,514	8,600	8,689	8,782	8,879	8,980	9,086	9,195
Depreciation of up-front payment	1,144	1,144	1,144	1,144	1,144	1,144	1,144	1,144	1,144
Operating income	**12,165**	**12,101**	**12,029**	**11,947**	**11,946**	**11,714**	**11,471**	**11,219**	**10,956**
Interest	**3,128**	**2,888**	**2,648**	**2,407**	**2,287**	**2,287**	**2,173**	**1,944**	**1,715**
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	**9,037**	**9,214**	**9,381**	**9,540**	**9,658**	**9,426**	**9,298**	**9,275**	**9,241**
Principal payments	**2,287**	**2,287**	**2,287**	**2,287**	-	-	**2,287**	**2,287**	**2,287**
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	**7,893**	**8,070**	**8,238**	**8,396**	**10,802**	**10,570**	**8,155**	**8,131**	**8,097**

Option 4- Master Concession- Stage 2

Wholesale Marketing

	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Revenue	**3,070**	**39,168**	**29,461**	**20,783**	**11,932**	**4,204**	**(6,013)**	**(9,408)**	**(10,673)**
Expenses	**240**	**240**	**240**	**240**	**240**	**240**	**240**	**240**	**240**
Labor	240	240	240	240	240	240	240	240	240
Investment	-	-	-	-	-	-	-	-	-
Concession payment	-	-	-	-	-	-	-	-	-
Depreciation of up-front payment	-	-	-	-	-	-	-	-	-
Operating income	**2,830**	**38,928**	**29,221**	**20,543**	**11,692**	**3,964**	**(6,253)**	**(9,648)**	**(10,913)**
Interest	-	-	-	-	-	-	-	-	-
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	**2,830**	**38,928**	**29,221**	**20,543**	**11,692**	**3,964**	**(6,253)**	**(9,648)**	**(10,913)**
Principal payments	-	-	-	-	-	-	-	-	-
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	**2,830**	**38,928**	**29,221**	**20,543**	**11,692**	**3,964**	**(6,253)**	**(9,648)**	**(10,913)**

Option 4- Master Concession- Stage 2

Distribution & Customer Service

	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Revenue	**69,842**	**55,241**	**53,252**	**39,136**	**35,673**	**31,480**	**26,201**	**31,973**	**40,954**
Expenses	**10,120**	**10,120**	**10,120**	**10,120**	**10,120**	**10,120**	**10,120**	**10,120**	**10,120**
Labor	120	120	120	120	120	120	120	120	120
Investment	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Concession payment	-	-	-	-	-	-	-	-	-
Depreciation of up-front payment	9,593	9,593	9,593	9,593	9,593	9,593	9,593	9,593	9,593
Operating income	**59,722**	**45,121**	**43,132**	**29,016**	**25,553**	**21,360**	**16,081**	**21,853**	**30,834**
Interest	**15,305**	**14,130**	**12,955**	**11,780**	**11,192**	**11,192**	**10,632**	**9,513**	**8,394**
Income taxes	-	-	-	-	-	-	-	-	-
Profit after taxes	**44,417**	**30,991**	**30,177**	**17,236**	**14,362**	**10,168**	**5,448**	**12,340**	**22,440**
Principal payments	**11,192**	**11,192**	**11,192**	**11,192**	-	-	**11,192**	**11,192**	**11,192**
Up-front payment	-	-	-	-	-	-	-	-	-
Cash flow	**42,818**	**29,392**	**28,578**	**15,637**	**23,955**	**19,761**	**3,849**	**10,741**	**20,841**

Option 4- Master Concession- Stage 2

Isolated Systems

	2028/29	2029/30	2030/31
Revenue	**(25,990)**	**(27,547)**	**(29,214)**
Expenses	**(28,589)**	**(30,302)**	**(32,135)**
Labor	120	120	120
Investment	-	-	-
Concession payment	(28,709)	(30,422)	(32,255)
Depreciation of up-front payment	-	-	-
Operating income	**2,599**	**2,755**	**2,921**
Interest	-	-	-
Income taxes	-	-	-
Profit after taxes	**2,599**	**2,755**	**2,921**
Principal payments	-	-	-
Up-front payment	-	-	-
Cash flow	**2,599**	**2,755**	**2,921**

Option 4- Master Concession- Stage 2

Generation

	2028/29	2029/30	2030/31
Revenue	**8,639**	**8,682**	**8,719**
Expenses	**4,120**	**4,120**	**4,120**
Labor	120	120	120
Investment	4,000	4,000	4,000
Concession payment	-	-	-
Depreciation of up-front payment	2,044	2,044	2,044
Operating income	**4,519**	**4,562**	**4,599**
Interest	**2,657**	**2,248**	**1,839**
Income taxes	**-**	**-**	**-**
Profit after taxes	**1,862**	**2,313**	**2,760**
Principal payments	**4,088**	**4,088**	**4,088**
Up-front payment	**-**	**-**	**-**
Cash flow	**(182)**	**270**	**716**

Option 4- Master Concession- Stage 2

Transmission

	2028/29	2029/30	2030/31
Revenue	**26,113**	**25,949**	**25,778**
Expenses	**15,430**	**15,550**	**15,675**
Labor	120	120	120
Investment	6,000	6,000	6,000
Concession payment	9,310	9,430	9,555
Depreciation of up-front payment	1,144	1,144	1,144
Operating income	**10,683**	**10,399**	**10,104**
Interest	**1,487**	**1,258**	**1,029**
Income taxes	-	-	-
Profit after taxes	**9,196**	**9,141**	**9,075**
Principal payments	**2,287**	**2,287**	**2,287**
Up-front payment	-	-	-
Cash flow	**8,053**	**7,997**	**7,931**

Option 4- Master Concession- Stage 2

Wholesale Marketing

	2028/29	2029/30	2030/31
Revenue	**(12,016)**	**(13,416)**	**(15,086)**
Expenses	**240**	**240**	**240**
Labor	240	240	240
Investment	-	-	-
Concession payment	-	-	-
Depreciation of up-front payment	-	-	-
Operating income	**(12,256)**	**(13,656)**	**(15,326)**
Interest	-	-	-
Income taxes	-	-	-
Profit after taxes	**(12,256)**	**(13,656)**	**(15,326)**
Principal payments	-	-	-
Up-front payment	-	-	-
Cash flow	**(12,256)**	**(13,656)**	**(15,326)**

Option 4- Master Concession- Stage 2

Distribution & Customer Service

	2028/29	2029/30	2030/31
Revenue	**44,568**	**47,981**	**50,590**
Expenses	**10,120**	**10,120**	**10,120**
Labor	120	120	120
Investment	10,000	10,000	10,000
Concession payment	-	-	-
Depreciation of up-front payment	9,593	9,593	9,593
Operating income	**34,448**	**37,861**	**40,470**
Interest	**7,275**	**6,156**	**5,036**
Income taxes	-	-	-
Profit after taxes	**27,173**	**31,706**	**35,434**
Principal payments	**11,192**	**11,192**	**11,192**
Up-front payment	-	-	-
Cash flow	**25,574**	**30,107**	**33,835**

Option 1- Concession
Whole Company

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Revenue	-	-	81,050	90,198	94,077	100,254	97,910	102,355	105,483	109,493
Expenses	-	-	75,252	71,723	84,847	84,667	87,279	90,448	93,448	96,893
Incremental labor	-	-	600	600	600	600	600	600	600	600
Investment	-	-	19,509	12,619	23,031	20,000	20,000	20,000	20,000	20,000
Concession payment	-	-	53,789	57,151	59,862	62,714	65,326	68,495	71,494	74,940
Depreciation of up-front payment	-	-	1,353	1,353	1,353	1,353	1,353	1,353	1,353	1,353
Operating income	-	-	5,798	18,474	9,230	15,587	10,631	11,907	12,035	12,600
Interest	-	-	2,703	2,561	2,419	2,277	2,135	1,993	1,851	1,709
Income taxes	-	-	-	-	-	-	-	-	-	-
Profit after taxes	-	-	3,095	15,913	6,811	13,310	8,496	9,914	10,184	10,891
Principal payments	-	-	1,353	1,353	1,353	1,353	1,353	1,353	1,353	1,353
Up-front payment	-	33,836	-	-	-	-	-	-	-	-
Cash flow	-	(33,836)	3,095	15,913	6,811	13,310	8,496	9,914	10,184	10,891

Internal rate of return 33%

Private Participation Options Study for the Zambia Electricity Supply Company

Task 3 Report- Legal and Regulatory Review

388

Table of Contents

List of Exhibits and Tables....iv

Acronyms....v

1 Introduction....1-1

1.1 Background....1-1

1.2 Organization Of This Report....1-1

2 Current Power Sector Legal and Regulatory Framework....2-1

2.1 Policy Making....2-1

2.1.1 Ministry of Energy & Water Development....2-1
2.1.2 Ministry of Finance and Economic Development....2-6
2.1.3 Ministry of Commerce, Trade, and Industry....2-6
2.1.4 Ministry of Environment....2-7
2.1.5 Ministry of Land....2-8
2.1.6 Summary....2-8

2.2 Operations....2-20

2.2.1 Generation....2-20
2.2.2 Transmission....2-21
2.2.3 Distribution....2-22
2.2.4 Southern Africa Power Pool....2-22

2.3 Regulation....2-23

2.3.1 Energy Regulatory Board....2-23
2.3.2 ZESCO Performance Contract....2-25
2.3.3 Zambia Competition Commission....2-24
2.3.4 Zambia Bureau of Standards....2-26

3 Analysis of Legal and Regulatory Framework....3-1

3.1 General Weaknesses in the Legal and Regulatory Framework....3-1

3.1.1 Coordinated Energy and Water Policies....3-1
3.1.2 Role of the GRZ....3-1
3.1.3 Lack of Institutional Independence of the ERB....3-2
3.1.4 Fragmentation of Roles....3-4
3.1.5 Lack of Specificity in ERB Guidelines/Procedures....3-8
3.1.6 Insufficient Institutional Capacity....3-10

3.2 Legal and Regulatory Framework Issues Specific to Nexant's Proposed Options....3-11

3.2.1 Competition and Monopoly Issues....3-11
3.2.2 Lack of Specificity and Consistency in Rights and Obligations in Regional Market....3-14
3.2.3 Provisions of SAPP Agreements....3-15
3.2.4 Provisions of Bulk Supply Agreements....3-18
3.2.5 Impact of Ownership Changes....3-16
3.2.6 Privatization Transaction Process and Documents....3-16
3.2.7 Gaps in the Existing Legal and Regulatory Framework....3-18

4 Recommendations....4-1

4.1 Recommendations to Address General Weaknesses in the Legal and Regulatory Framework....4-1

4.1.1 Develop More Detailed Water Policy Framework....4-1

389

4.1.2 Remove the Role of the GRZ in Regulation....4-4
4.1.3 Eliminate Institutional Overlaps....4-5
4.1.4 Establish Coordination Mechanisms....4-6
4.1.5 Establish Detailed Procedures for Various ERB Functions. 4-8
4.1.6 Develop an Institutional Strengthening Program for ERB and MEWD (DOE and OPPPI) 4-9

4.2 Recommendations to Address Deficiencies in Existing Legal and Regulatory Framework vis a vis Nexant's Proposed Options.... 4-10
4.2.1 Develop Market Rules for Open Access Regime....4-10
4.2.2 Extend the Privatization Trust Fund....4-11

390

List of Exhibits and Tables

Exhibits

2-1 Current Power Sector Structure and Institutional Relationships in Zambia..... 2-2

2-2 Summary Matrix of Legal and Regulatory Functions In the Electricity Sector..... 2-9

2-3 ZESCO's Main Functions..... 2-18

3-1 Legal and Regulatory Requirements to Implement Nexant's Proposed Options... 3-17

4-1 Summary of Recommendations for Legal and Regulatory Framework 4-2

4-2 Zambia Electricity Sector: Recommended Division of Responsibilities..... 4-4

4-3 Licensing Sequencing for Private Investors in Generation and Transmission..... 4-8

Tables

2-1 Generation Profile of ZESCO.....2-19

2-2 Transmission Network Profile of ZESCO..... 2-19

3-1 Role of GRZ in Regulation and Potential Overlap.....3-3

3-2 Summary of Rights and Permissions Required for Power Sector Investors..... 3-7

3-3 Summary of Nexant's Options..... 3-11

Acronyms

CFTA	Competition & Fair Trading Act
EA	Electricity Act
EPCA	Environmental and Pollution Control Act
EPPCR	Environmental Protection and Pollution Control Regulations
ERA	Energy Regulation Act
CFTA	Competition and Fair Trading Act
FPI	Framework Package of Incentives
IA	Investment Act
IC	Investment Centre
IPP	Independent Power Project
ITC	Independent Transmission Company
KNBC	Kariba North Bank Company
LA	Lands Act
MCTI	Ministry of Commerce, Trade & Industry
MEWD	Ministry of Energy & Water Development
MFED	Ministry of Finance & Economic Development
MOE	Ministry of Environment
MOL	Ministry of Lands
NEP	National Energy Policy
OPPPI	Office for Promotion of Private Power Promotion
PA	Privatization Act
PC	ZESCO Performance Contract
SAPP	Southern Africa Power Pool
WA	Water Act
ZBS	Zambia Bureau of Standards
ZBSA	Zambia Bureau of Standards Act
ZCC	Zambia Competition Commission
ZPA	Zambia Privatization Agency

392

Section 1 Introduction

1.1 *Project Background*

The Government of the Republic of Zambia (GRZ) has requested the Zambia Privatization Agency (ZPA) to study the Options for private sector participation in the Zambia Electricity Supply Corporation (ZESCO). The United States Agency for International Development (USAID) has agreed to support ZPA in this effort and has selected Bechtel/Nexant to provide assistance.

This is the Task 3 Report of the engagement, on the *Development of a Legal and Regulatory Framework* to support the privatization of ZESCO. The field work for this Task, consisting of data and document collection and review, as well as interviews with relevant local institutions, took place from November 3 – 19, 2000 in Lusaka, Zambia.

1.2 *Organization of the Report*

Nexant has organized this Report as follows:

- Section 2 presents an overview of the existing power sector framework;
- Section 3 contains an analysis of the current situation, highlighting the most important legal, regulatory and institutional issues and/or challenges which need to be considered in developing and implementing our proposed privatization strategy; and
- Section 4 comprises Nexant's specific recommendations to address these issues and challenges.

Section 2 Current Power Sector Legal and Regulatory Framework

In this Section, Nexant examines the current framework of the power sector around three major activities: policy making, operations, and regulation. The current power sector structure and institutional relationships in Zambia are depicted in Exhibit 2-1. This is not intended to capture all of the intricacies of the sector and how it currently operates, but rather to summarize the main inter-relationships. In addition, we have compiled Exhibit 2-2, a summary matrix of legal and regulatory functions—and the responsible agencies—in the electricity sector.

2.1 *Policy Making*

There are a number of GRZ Ministries and agencies with responsibilities in the power sector. Below we highlight the main entities and their responsibilities.

2.1.1 Ministry of Energy & Water Development

As illustrated in Exhibit 2-1, the MEWD is the line Ministry responsible for the electricity and water sectors. The MEWD sets sector policy (in conjunction with other Government agencies, described below) which in turn guides the operations of the key players in the sector.

The MEWD developed and published a *National Energy Policy* in 1994, which calls for reforms in the electricity sector, including:[1]

- Liberalizing the sector, so that other companies are introduced
- Commercializing ZESCO's operations in the short term
- Privatizing the distribution function of ZESCO.
- Improving access to electricity
- Developing the hydro potential of the country
- Implementing cost reflective pricing
- Placing energy sector investment in the hands of the private sector

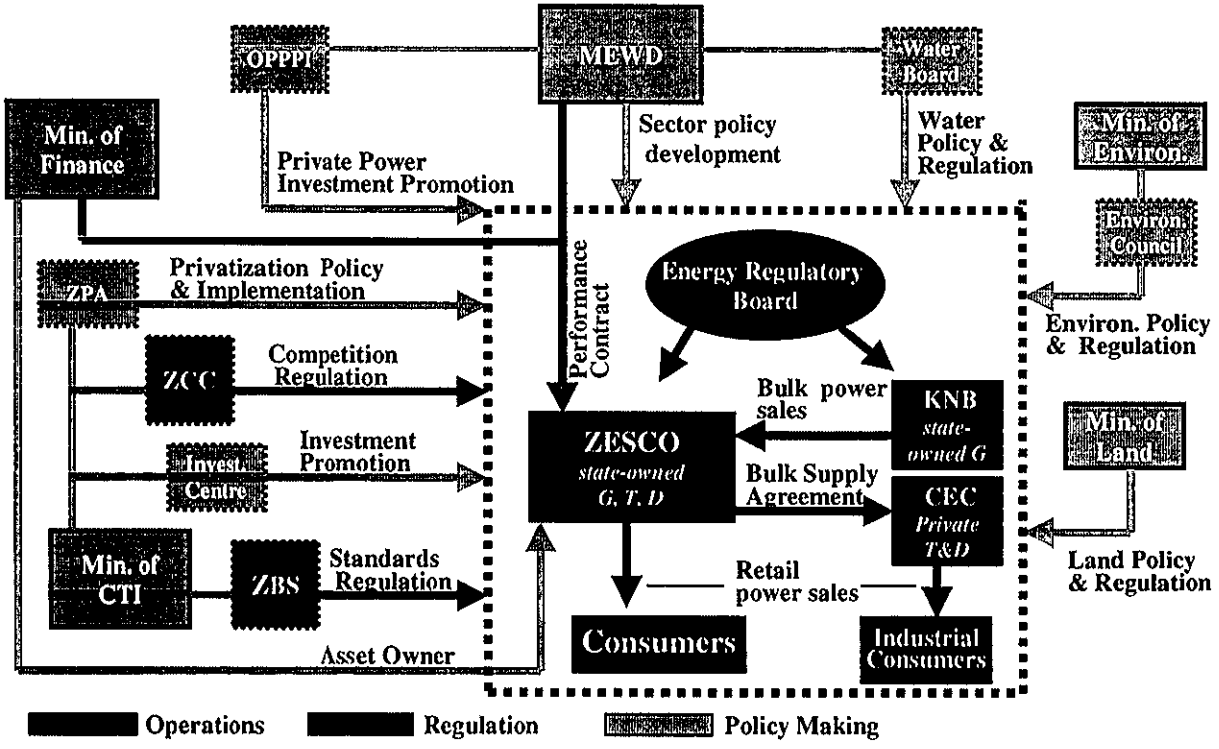
The role of the MEWD is also delineated in the *National Energy Policy* document, as follows:

- Provide and articulate policy guidelines to the energy sector
- Develop and implement Government energy policy
- Monitor developments in the energy sector
- Integrate the energy sector into national and regional development strategies
- Review on a periodic basis energy related legislation

[1] This list represents only a summary of the key policy parameters relevant to the electricity sector.

394

Exhibit 2-1:
Current Power Sector Structure and Institutional Relationships in Zambia



395

The MEWD developed and approved a National Water Policy (NWP) in 1994. Its general objective is to promote sustainable water resources development with a view to facilitate an equitable provision of adequate quantity and quality of water for all competing groups of users at acceptable costs, and ensuring security of supply under varying conditions. It notes the need for a well-defined institutional structure to ensure attaining the objectives. Although the NWP notes that energy is the life-blood of any economy, and that Zambia's electricity is almost all hydro power, most of the document addresses issues associated with non-hydro power water use. With respect to issues that might affect hydro power development, specific policy elements include:

- According high priority to the water sector in view of its paramount role to all social-economic activities.
- Vesting ownership of water resources in the country under the state control.
- Promoting water resources development through an integrated management approach.
- Undertaking environmental impact assessments prior to implementation of any developmental project.
- Defining clear institutional responsibilities of all stakeholders in the water sector for effective management and co-ordination.
- Developing an appropriate institutional and legal framework for effective management of the water resources.
- Recognizing water as an economic good.
- Ensuring that water tariffs take account of all the economic costs.

The MEWD is also a signatory in a Performance Contract between the GRZ and ZESCO (this is discussed in more detail in Section 2.3.2 below). The Minister of the MEWD is granted significant authority in several legislative acts. Below we provide a summary of these functions.

The Department of Energy (DOE) within the MWED is responsible for the electricity sector. The DOE currently has a staff of eight professionals addressing mainly issues of rural electrification, energy management, woodfuels, and renewable energy. There is a plan being developed to structure the DOE under two Assistant Directors. One will be responsible for the issues currently addressed by the DOE, with the exception of rural electrification. The other would supervise a Power Development Section responsible for rural electrification issues, and power system development.

Energy Regulation Act[1]

The Minister of the MEWD is granted a number of critical functions in the Energy Regulation Act of 28 April 1995. Perhaps the most significant component of the ERB Act with regard to the Minister is Section 27. This states that:

[1] Although the ERB Act and Electricity Act do not specify that "the Minister" is the Ministry of Energy and Water Development, we understand that for all practical purposes, "the Minister" discussed in these Acts is the MEWD.

396

"the Minister may, by statutory instrument, make regulations for or with respect to any matter that by this Act is required or permitted to be prescribed, or that is necessary to be prescribed for carrying out or giving effect to this Act."

This includes standards with regard to quality, safety and reliability of energy supply. It should be noted that regulations made under this Section of the ERB Act are subject to the provisions of the Electricity Act and any regulations made under that Act (see below).

Several other functions include:

- The Minister prescribes the form of license applications and fees payable for the application;
- The ERB must seek the consent of the Minister for revocation of a license, or the refusal to renew a license; and
- Any disputes with regard to the revocation, or refusal to renew or transfer a license may be appealed to the Minister

Water Act

This Act governs the ownership, control, and use of water in Zambia. It provides that the ownership of all water is vested in the President, and its diversion and apportionment shall be made in terms of the Act, except that a landowner has the right to take free of charge "private water" (primarily water bodies wholly within the boundaries of a property, and wells) occurring on this land.

The Act establishes a Water Board which grants in whole or in part (or denies) applications for the use of water, which may be made by any person for primary, secondary, or tertiary purposes. The Water Board may attach conditions to the grant, award compensation to affected registered owners of water rights, revoke, vary, or amend registered rights concerned in another application (but the applicant must compensate as the Water Board directs), and make such order as to costs as it deems just.

The Act includes various provisions governing the use of water, the procedures and composition of the Water Board, charges and fees, applications, record keeping, and others. With respect to hydro power development the key provisions include:

- Primary use is for domestic purposes and the support of animal life.
- Secondary use is for irrigation and pisciculture.
- Tertiary use is for mechanical and industrial purposes, and power generation.
- The "right of storage" is the right to occupy land belonging to another by submerging it by means of a dam or weir, and includes the right of passage.
- For an undertaking of public importance or general utility, the Water Board may authorize tertiary use if its public advantages outweigh its disadvantages, subject to payment of compensation of holders of existing secondary or tertiary rights.
- The Water Board may grant a right of passage or a right of abutment to a person having a water right, so that that right may be exercised in the use of the water.
- Water rights can be renewed, subject to application to and approval of the Water Board.

The Water Act provides a substantial role for the Minister of the MEWD. In addition to the power to appoint the Water Board, "the Minister may, by statutory instrument, make regulations for the effective administration of this Act" (Section 46). This includes "supervising and regulating the diversion, storage, distribution, and use of water in any public stream" (Section 46[e]).

Thus, any private power developer in Zambia must receive the approval of the Water Board to undertake a hydropower project.

Electricity Act

Similarly, in Section 30 of the Electricity Act (EA), the Minister is granted the broad authority to make regulations for carrying out the provisions of the Act, such as "the maintenance of security of supply of electricity"(Section 30[a]). The Electricity Act specifies other areas of authority for the Minister, such as:

- The Minister may declare a transmission line to be common carrier, and is this common carrier is subject to any regulations made by the Minister or the ERB (Section 4(2,3);
- Any electricity undertaking of over 100 KW shall comply with any requirement of the Minister or the ERB "for the purpose of coordination with existing or future undertakings" (Section 12)
- The Minister and/or the ERB may conduct or order inspections of electricity undertakings, as we all as request any information related to the operations of undertakings (Section 25).

The EA specifies that the President may authorize the acquisition of land for the purpose of electricity generation, transmission, or distribution. The Act also addresses land issues such as compulsory acquisition, land rights (way leaves), rights of entry, transmission lines over land and buildings, tree trimming, offenses and penalties, and other administrative items. In all cases regarding these matters, the Minister decides on disputes, makes final rulings, and determines compensation levels.

Office for the Promotion of Private Power Investment

The GRZ has decided that future hydro generation projects and transmission projects will be built by the private sector. As such, the MEWD has established a Framework and Package of Incentives for Private Sector Participation in Hydropower Generation and Transmission Development (FPI) to attract private investors. This FPI delineates financing arrangements, fiscal incentives, a Security Package of model legal agreements, procedures for application and processing of proposals, and tariff principles. In addition, the MEWD has created the OPPPI as a one-stop office for dealing with investors and providing assistance in the project bidding and approval process. The specific mandate of the OPPPI is to:

"articulate and promote the FPI and shall solicit and evaluate proposals, negotiate and process the award of contracts...and design, implement and manage the competitive process for procurement of private power. The OPPPI shall have the authority to represent the interests of Goverment and shall act as a focal point for coordinating with other agencies..."

The OPPPI is currently staffed with four professionals: the chief of the group is the Project Manager, permanently assigned to OPPPI (previously with 22 years at ZESCO); two are

398

seconded from ZESCO and have backgrounds in civil and electrical engineering, respectively; and one individual is seconded from the MEWD with an energy planning and economics background. The Project Manager has indicated that the OPPPI should add a legal and environmental specialist to the permanent staff.

2.1.2 Ministry of Finance and Economic Development

The Ministry of Finance and Economic Development (MFED) has a considerable role in the electricity sector. First and foremost, the MFED is the owner of ZESCO's assets. Second, the MFED is a signatory to the Performance Contract between the GRZ and ZESCO. This Contract is discussed in detail in Section 2.3.2.

2.1.3 Ministry of Commerce, Trade, and Industry

The MCTI is the GRZ Ministry responsible for several agencies with direct roles in the power sector. First, the Zambia Privatization Agency (ZPA)—although acting as autonomous entity—is attached to the MCTI and is responsible for developing and implementing Zambia's privatization policy. As this policy is clearly relevant to the ongoing restructuring and privatization process in the power sector, this agency's functions are described briefly below. The Zambia Investment Center (IC), with a broad mandate to promote investment in Zambia is also discussed in this Section. While the Zambia Competition Commission (ZCC) and the Zambia Bureau of Standards (ZBS) are agencies in the portfolio of the MCTI, their functions are described in Section 2.3 on regulation.

Zambia Privatization Agency

The ZPA is established by the Privatization Act of 1992. It's role is "to plan, manage, implement and control the privatization of state-owned enterprises in Zambia" (Section 8). Other provisions of the Privatization Act of important consideration for the reform of the electricity sector include the ZPA's mandate to:

- Ensure that monopolies are not created in the process of privatization.
- Prepare the necessary documentation to effect privatization.
- Maintain close liaison with all relevant institutions in the privatization process.
- Publicize the activities of the privatization program.

The ZPA may privatize in any method it sees fit, including public offering of shares, management or employee buyouts, and reorganization of the SOE prior to sale of the whole or part of the SOE (unbundling). The Minister of Finance may retain a "golden share" in a state owned enterprise, and shall establish a Privatization Trust Fund to hold shares in trust for the citizens of Zambia. Foreign investors are entitled to own shares in an SOE and to incentives under the Investment Act in some circumstances. ZPA may convert an enterprise scheduled for privatization which is not a public company into a public company.

Zambia Investment Center

The Investment Act of 1993 (IA) provides a comprehensive legal framework for all investment in Zambia. The Act establishes an Investment Center (IC) responsible for promoting investment in the country. All business enterprises in Zambia must apply to the

399

Center for an Investment Certificate and the Act details the procedures for securing such a Certificate. Specifically, the Center:

- Monitors the performance of enterprises approved by it and enforces compliance with the terms and conditions of investment certificates approved under the Act.
- Assists in securing from government agencies, etc., permission, licenses, land, etc., needed for establishing or operating a business enterprise.
- Collects and disseminate information on laws, regulations, etc..

The Act also makes provisions for general incentives. The most relevant for the electricity sector are an exemption from the 15 percent tax on the export of electricity (since it is defined as a traditional product), and for any business operating in a rural area, the enterprise is entitled to a tax reduction in the first five years of the enterprise's operation equal to one-seventh of the total tax which would otherwise be charged on its income.

The Act also grants the Investment Center the authority to offer selected services to investors. One such service of potential importance for investors in the power sector, especially in hydropower projects, is assistance in securing land. Section 32(2) states that where a business has made an application for land, and the land has been allocated for the purpose of the investment (and not to any others), then that land shall be allocated to the investor by the authority responsible.

The IC has 23 professional staff divided into five operating divisions: (a) Investment Promotion; (b) Research & Project Development; (c) Business & Investor Relations; (d) Accounting & Finance; and (e) Legal Counsel.

2.1.4 Ministry of Environment

The Environmental Protection and Pollution Control Act. No. 12 of 1990 establishes the Environmental Council, whose general functions are to do all things necessary to protect the environment and control pollution for the health and welfare of persons, animals, plants, and the environment. It is important to note that the Council comprises representatives from a number of other GRZ agencies. Among the Environmental Council's many more specific functions are to:

- Advise the GRZ on the formulation of policies relating to natural resources and the environment.
- Advise on any aspect of conservation.
- Identify projects for which environmental impact assessment (EIAs) are necessary.
- Consider and advise on all major development projects at an initial stage and request information on them.
- Carry out any other activities relating to the protection of the environment and the control of pollution which are necessary or conducive to the better performance of its functions under the Act.
- Administer and enforce measures for the protection of the environment and the prevention of pollution of the environment.

490

In 1997, Environmental Protection and Pollution Control Regulations were promulgated by the Ministry of Environment. These require all project developers to provide an EIA prior to the development of the undertaking.

2.1.5 Ministry of Land

Under the Lands Act, the President is the owner of land in Zambia. However, the Ministry of Lands (MOL) is the GRZ agency delegated authority to grant land rights, effectively through the Commissioner of Lands. The Commissioner handles all administrative procedures for those seeking access to land, including applications, fees, identification of plots, surveying, etc. The office of the Commissioner of Lands is responsible for coordinating with all other GRZ agencies in assessing the application for rights to use land, including the local authorities (Councils), the ECZ, Ministry of Agriculture, Presidential Housing Initiative, etc. It was stated that the Commissioner generally accepts the recommendation of local Councils. With regard to the use of land for electricity projects, it is the view of the MOL that the MEWD must coordinate with the MOL. This in effect is a standard internal administrative act (i.e., within GRZ Cabinet level Ministries).

In sum, it is clear that any project developer in the electricity sector must secure rights to access and/or own land related to the project, and that the office of the Commissioner of Lands in the MOL is the GRZ agency responsible for this step.

2.1.6 Summary

The responsibilities of various ministries and agencies are summarized in Exhibit 2-2 according to the following categories:

- Licensing
- Tariffs
- Standards
- Capital expenditure planning
- Complaints
- Enforcement
- Penalties
- Appeals dispute resolution
- Environmental regulation
- Land rights/ regulation
- Water rights/ regulation
- International electricity policy
- Competition policy
- Privatization policy
- Investment promotion

401

Issue/ Function	Ministry of Energy and Water Development	Minisry of Commerce, Trade and Industry	Ministry of Finance and Economic Development	Energy Regulation Board
Licensing	**Energy Regulation Act** Minister prescribes form of License application and fees; Minister must consent to revocation or refusal to renew a License; Minister must consent to ERB recommendation to revoke or refusal to renew a License	**Investment Act** Investment Center assists an investor in obtaining any License	No role	**Energy Regulation Act** Awards Licenses to all operators; Discretion to draft all terms & conditions; May vary or attach new conditions; Can revoke, or refuse to renew a License with consent of Minister; determines license duration **Electricity Act** May suspend License in certain circumstances
Tariffs	**Performance Contract** Broad principles specified, eg., cost recovery, LRMC, reducing level of cross subsidization, etc.; Automatic adjustment formula provided.	No role	**Performance Contract** Broad principles specified, eg., cost recovery, LRMC, reducing level of cross subsidization, etc.; Automatic adjustment formula provided.	**Energy Regulation Act** ERB specifies rates in License conditions **Licenses** Licensees' rates & methodologies approved by ERB **Electricity Act** Charges subject to Licenses; ERB with approval
Standards	**Energy Regulation Act** Minister may, by statutory instrument, make regulations for quality, safety, & reliability of supply **Electricity Act** Minister may, by statutory instrument, make regulations for maintenance of security of supply; Make standards for works required to generate & supply electricity	**Bureau of Standards Act** Prepares and promulgates standards; Standards are revised when necessary by the issue of either amendments or of revised editions; Minister can declare compulsory standards, or designate anyone to develop & implement; Minister can declare compulsory standards, or designate anyone to develop & implement	No role	**Energy Regulation Act** Designs & recommends to Minister standards for quality, safety, & reliability of supply in conjunction with ZSB; Appoints inspectors; Licenses; Designs & recommends to Minister standards for quality, safety, & reliability of supply in conjunction with ZSB; Appoints inspectors; **Licenses** Licensees must comply with standards approved by ERB and other GRZ agencies; must submit to ERB procedures for ensuring compliance with standards (initial and yearly).

Exhibit 2-2 Summary Matrix of Legal and Regulatory Functions in the Electricity Sector

402

403

Exhibit 2-2 Summary Matrix of Legal and Regulatory Functions in the Electricity Sector (continued)

Issue/ Function	Ministry of Energy and Water Development	Ministry of Commerce, Trade and Industry	Ministry of Finance and Economic Development	Energy Regulation Board
Capital Expenditure Planning	**Performance Contract** Broad capital expenditure projections and criteria for priority projects determined by ZESCO & limited to $25 million/yr; ZESCO to provide annual information: (a) Revenue & Expenditure Budget; (b) 5-year Corporate Business Plan; (c) Audited Accounts; also quarterly management Reviews & monitors performance against indicators	**Privatization Act** An SOE scheduled for privatization shall not undertake new capital investment programs, unless under certain conditions	**Performance Contract** Broad capital expenditure projections and criteria for priority projects determined by ZESCO & limited to $25 million/yr; ZESCO to provide annual information: (a) Revenue & Expenditure Budget; (b) 5-year Corporate Business Plan; (c) Audited Accounts; also quarterly management accounts; Reviews & monitors performance against indicators	**Energy Regulation Act** License conditions may include requiring licensee to consult with ERB on location & construction of common carriers, facilities, plant etc.; **ZESCO Licenses** Requirement to submit to ERB Annual Opportunity Statement identifying areas for development & augmentation; Requirement to submit to ERB Annual Opportunity Statement identifying areas for development & ZESCO Distribution. & Transmission Licenses require ERB written approval for location, construction, replacement, etc of facilities; **KNBC License** License requires ERB written approval for location, construction, extension of the generating stations, & connection with tranmission system
Complaints	No role	**Competition & Fair Trading Act** Competition Commission can carry out investigations on its own initiative or at the request of any person	No role	**Energy Regulation Act** Receives & investigates complaints; Appoints inspectors

404

Yoe

Exhibit 2-2 Summary Matrix of Legal and Regulatory Functions in the Electricity Sector (continued)

Issue/ Function	Ministry of Energy and Water Development	Ministry of Commerce, Trade and Industry	Ministry of Finance and Economic Development	Energy Regulation Board	Ministry of Environment
Enforcement	**Electricity Act** Minister can authorize investigation of premises, and can require operators to provide information **Performance Contract** ZESCO to provide annual information: (a) Revenue & Expenditure Budget; (b) 5-year Corporate Business Plan; (c) Audited Accounts; also quarterly management accounts; Reviews & monitors performance against indicators	**Competition & Fair Trading Act** Authority to enter premises, access to any documents;	**Performance Contract** ZESCO to provide annual information: (a) Revenue & Expenditure Budget; (b) 5-year Corporate Business Plan; (c) Audited Accounts; also quarterly management accounts; Reviews & monitors performance against indicators	**Energy Regulation Act** Monitors efficiency & performance of operators; Specifies information required from Licensees and penalties in License conditions; Inspectors with specified rights of investigation; **Electricity Act** ERB can authorize investigation of premises; and require operators to provide information **Licenses** Enforcement, compliance, & license revocation/suspension provisions	**Environmental Protection & Pollution Control Regulations** Administers & enforces measures for protection of environment
Penalties	**Energy Regulation Act** Fines and/or imprisonment can be levied (not specified by whom) for impeding functions of inspectors **Electricity Act** Fines and/or imprisonment can be levied for contravention of the EA or any order by Minister (not specified by whom) **Water Act** Provisions for offences & penalties, and some specific fines for specified offences	**Competition & Fair Trading Act** Failure to comply with CFTA or regulations made under it, or to produce information, is subject to specified fine and imprisonment.	No role	**Energy Regulation Act** Fines and/or imprisonment can be levied (not specified by whom) for impeding functions of inspectors. **Electricity Act** Fines and/or imprisonment can be levied for contravention of the EA of any order by ERB (not specified by whom) **Licenses** ERB levies penalties (not defined) for any breach of License conditions	No role

Exhibit 2-2 Summary Matrix of Legal and Regulatory Functions in the Electricity Sector (continued)

Issue/ Function	Ministry of Energy and Water Development	Minisry of Commerce, Trade and Industry	Ministry of Finance and Economic Development	Energy Regulation Board	Ministry of Environment
Enforcement	**Electricity Act** Minister can authorize investigation of premises, and can require operators to provide information **Performance Contract** ZESCO to provide annual information: (a) Revenue & Expenditure Budget; (b) 5-year Corporate Business Plan; (c) Audited Accounts; also quarterly management accounts; Reviews & monitors performance against indicators.	**Competition & Fair Trading Act** Authority to enter premises, access to any documents;	**Performance Contract** ZESCO to provide annual information: (a) Revenue & Expenditure Budget; (b) 5-year Corporate Business Plan; (c) Audited Accounts; also quarterly management accounts; Reviews & monitors performance against indicators	**Energy Regulation Act** Monitors efficiency & performance of operators; Specifies information required from Licensees and penalties in License conditions; Inspectors with specified rights of investigation; **Electricity Act** ERB can authorize investigation of premises; and require operators to provide information **Licenses** Enforcement, compliance, & license revocation/suspension provisions	**Environmental Protection & Pollution Control Regulations** Administers & enforces measures for protection of environment
Penalties	**Energy Regulation Act** Fines and/or imprisonment can be levied (not specified by whom) for impeding functions of inspectors **Electricity Act** Fines and/or imprisonment can be levied for contravention of the EA or any order by Minister (not specified by whom) **Water Act** Provisions for offences & penalties, and some specific fines for specified offences	**Competition & Fair Trading Act** Failure to comply with CFTA or regulations made under it, or to produce information, is subject to specified fine and imprisonment.	No role	**Energy Regulation Act** Fines and/or imprisonment can be levied (not specified by whom) for impeding functions of inspectors. **Electricity Act** Fines and/or imprisonment can be levied for contravention of the EA of any order by ERB (not specified by whom) **Licenses** ERB levies penalties (not defined) for any breach of License conditions	No role

Issue/ Function	Ministry of Energy and Water Development	Ministry of Commerce, Trade and Industry	Energy Regulation Board	Ministry of Environment	Ministry of Lands
Appeals Dispute Resolution	**Energy Regulation Act** Minister hears, and decides on, appeals to ERB's revocation or refusal to renew a License **Electricity Act** Minister's decision on an undertaking's desire to increase or decrease rated capacity, or contractual rights to purchase power from outside Zambia, can only be appealed to High Court on point of law. **Water Act** Any person aggrieved by a decision of the Water Board may appeal to High Court; Disputes over compensation between an applicant and owner of water rights, shall be submitted to arbitration."	**Competition & Fair Trading Act** Decisions of ZCC can be appealed to High Court	**Energy Regulation Act** Can include conditions in licenses for arbitration of disputes in connection with license **Licenses** Refers back to the appeals process established in the ERA with decision in the hands of the Minister **Electricity Act** Consumer may appeal to ERB when power is unduly delayed or not supplied with electricity	No role	**Lands Act** Minister hears appeals on Land issues
Environmental Regulation	No role	No role	**Energy Regulation Act** In conjunction with other GRZ agencies, formulate measures to minimize environmental impact of undertakings; Enforce such measures by attachment of appropriate conditions in licenses. **Licenses** General provisions to comply with all laws & standards of Zambia	**Environmental and Pollution Control Act** Environmental Council to do all things necessary to protect environment; consider & advise on all major development projects at initial stages and request information on them; **Environmental Protection & Pollution Control Regulations** Requires EIAs for all projects	No role

Exhibit 2-2 Summary Matrix of Legal and Regulatory Functions in the Electricity Sector (continued)

908

Exhibit 2-2 Summary Matrix of Legal and Regulatory Functions in the Electricity Sector (continued)

Issue/ Function	Ministry of Energy and Water Development	Minisry of Commerce, Trade and Industry	Ministry of Environment	Ministry of Lands
Land Rights / Regulation	**Electricity Act** President may authorize acquisition of land for electricity generation, transmission, or distribution.; Addresses land issues such as acquisition, land rights, rights of entry, way leaves; trans. lines over land and buildings, tree trimming, etc; Minister decides on disputes, makes final rulings, and determines compensation levels.	**Investment Act** The Investment Center to assist an investor in identifying land for the investment, and applying to responsible authorities; If an application is made, the land is not allocated to any other person or entity, the responsible authority shall allocate the land upon payment.	**Environmental Protection & Pollution Control Regulations** Requires EIAs for all projects	**Lands Act** Ownership of land is vested in President, but authority delegated to Commissioner of Lands under the MOL for receiving, reviewing, and approving applications granting of land rights (ownership, access)
Water Rights / Regulation	**Water Act** Minister may, by statutory instrument, make regulations for effective administration of the Act, including regulating diversion, storage, distribution, and use of water in any public stream **Water Board** Appointed by Minister; reviews, issues, and monitors water rights; may grants rights of storage, passage, abutment, etc.; Board authorizes tertiary use if project's public advantages outweigh disadvantages, subject to payment of compensation to holders of existing secondary or tertiary rights.	No role	**Environmental and Pollution Control Act** Monitors any project or investment with impact on destruction of river valleys, relocation of persons, flood plain damage, alteration of ecology, & damage to flora.	No role

Issue/ Function	Ministry of Energy and Water Development	Ministry of Finance and Economic Development	Energy Regulation Board
International Electricity Policy	**Performance Contract** GRZ & ZESCO policy is to facilitate optimal regional power system development through SAPP; capitalize on the N-S transmission grid; improve security of supply in event of drought conditions **National Energy Policy** Developing hydro potential to take advantage of strategic location of Zambia, through promoting interconnection **Electricity Act** Minister approves undertaking's desire to increase or decrease rated capacity, or contractual rights to purchase power from outside Zambia; Minister must consider any relevant international agreement **Southern Africa Power Pool** At inter-governmental level, Minister has input to broad policy issues; ZESCO, as state-owned entity, must liaise with MEWD **Framework Package of Incentives** Allows direct access regionally for generators	**Performance Contract** GRZ & ZESCO policy is to facilitate optimal regional power system development through SAPP; capitalize on the N-S transmission grid; improve security of supply in event of drought conditions	**ZESCO Supply License** Licensee must act in accordance with applicable Regional Power Pool Agreements to which it is a party, and as approved by ERB; **KNBC License** Licensee may sell to the export market subject to approval of ERB

Exhibit 2-2 Summary Matrix of Legal and Regulatory Functions in the Electricity Sector (continued)

Issue/ Function	Ministry of Energy and Water Development	Minisry of Commerce, Trade and Industry	Ministry of Finance and Economic Development	Energy Regulation Board
Competition Policy	**National Energy Policy** Calls for liberalization of power sector to encourage entry of other companies **Electricity Act** Minister has right to declare, by statutory instrument, any transmission line a common carrier	**Competition & Fair Trading Act** Competition Commission monitors, controls & prohibits acts or behavior likely to adversely affect competition & fair trading; Takes action to prevent or redress creation of a merger, or abuse of a dominant position by any enterprise. **ZPA (PA)** Shall ensure that monopolies are not created in the process of privatization	No role	**Energy Regulation Act** Monitors in conjunction with ZCC, levels and structures of competition, with a view to promoting competition & accessibility; By attachment to license conditions, can require licensee not to show undue preference, or exercise discrimination in the provision of electricity or other services. **Licenses** General Provisions section specifies anti-competitive behaviors, including open access, collusion, barriers to entry; also specifies adherence to CFTA.
Privatization Policy	**National Energy Policy** Supports immediate privatization of ZESCO distribution **Performance Contract** GRZ & ZESCO policy is to actively pursue involvement in private sector projects	**Privatization Act** Privatization Agency plans, manages, implements, & controls privatization of SOEs; prepares or causes to be prepared relevant documentation to effect privatization.	**Performance Contract** GRZ & ZESCO policy is to actively pursue involvement in private sector projects	No role

Exhibit 2-2 Summary Matrix of Legal and Regulatory Functions in the Electricity Sector (continued)

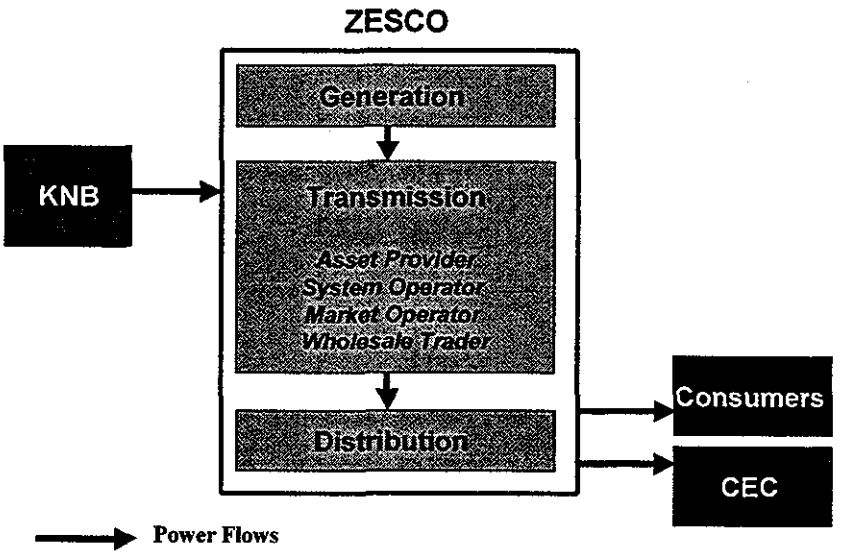
Exhibit 2-2 Summary Matrix of Legal and Regulatory Functions in the Electricity Sector (continued)

Issue/ Function	Ministry of Energy and Water Development	Minisry of Commerce, Trade and Industry
Investment Promotion	**Framework Package of Incentives** ***Office for Promotion of Private Power Investment*** Articulates and promotes FPI for private investment in hydro generation (IPPs) & ITCs: Solicits, evaluates and negotiates award of IPPs and ITCs ; Represents the interests of GRZ agencies, and serves as one-stop shop for investors	**Investment Act** Promotes investment in Zambia; For all business enterprises, requires application; issues certificate; Assists investors in securing all permissions, licenses, etc. from GRZ agencies: Provides incentives for investors

2.2 *Operations*[1]

ZESCO was formed in 1970 as a vertically integrated utility responsible for generation, transmission, and distribution (the functions of ZESCO are depicted in Exhibit 2-3). It is incorporated under the Companies Act, is 100 percent owned by the GRZ (MFED) and is under the portfolio of the MEWD. ZESCO's activities are licensed by the Energy Regulatory Board, and a Performance Contract with the MEWD and MFED has been established to improve efficiency (these regulatory tools are discussed below in Section 2.3).

Exhibit 2-3: ZESCO's Main Functions



2.2.1 Generation

Total installed capacity in ZESCO is 1031 MW and is based solely on hydropower. A Generation Profile of ZESCO is presented in Table 2-1.

ZESCO's Generation License specifies that the Licensee shall enter into contracts with the transmission system operator and the distribution entity, and pay charges as agreed in those contracts. In addition, ZESCO shall only sell electricity to retail customers (end users) subject to tariffs approved by the ERB, and provide the transmission system operator with information required for efficient dispatch. ZESCO must also design, implement, maintain, and operate billing and settlement procedures for electricity supply to customers.

[1] Source for data in this Section is ZESCO.

Table 2-1 Generation Profile Of Zesco

STATION	CAPACITY (MW)
Kafue Gorge	900
Victoria Falls	107
Lusiwasi	12
Musonda Falls	5
Chishimba Falls	6
Lunzua River	.75

ZESCO sells power under a 20-year Bulk Supply Agreement to the Copperbelt Energy Corporation (CEC), which in turn sells electricity under 20-year supply agreements to pre-defined mining companies in the Copperbelt region. CEC owns and operates a 220 kV and 66 kV grid serving these customers. ZESCO is committed to providing up to 700 MW though 2012 and declining amounts after that.

The Kariba North Bank Company (KNBC) is wholly-owned by the MFED and operates a 600 MW generation plant. It is licensed by the ERB and provides power to ZESCO under a bulk supply agreement. ZESCO also has short-term bilateral contracts with ZESA in Zimbabwe and ESKOM in South Africa for the export of power.

2.2.2 Transmission

ZESCO transmission currently handles four main functions as follows:

- *Asset Provider* – providing and maintaining the transmission system.
- *System Operator* -- operating the transmission system, including dispatch or meeting dispersed load from available generation and maintaining system frequency.
- *Market Operator* – managing electricity transactions, i.e. implementing a settlements system among buyers (end-use consumers), sellers (generators), and other users of the system.
- *Wholesale Trader* -- buying and selling wholesale energy, extending to the entire market's transactions.

Table 2-2 Transmission Network Profile of Zesco

LINE VOLTAGE (Kv)	KILOMETERS
330	1,941
220	348
132	77
88	717
66	2,791

ZESCO's Transmission License is for operation of lines and substations at 72.5 kV and above (see Table 2-2 for a profile of ZESCO's transmission network). The License specifies that it

414

is required to ensure open access, develop a Grid Code, enter into contracts with other transmission owners, prepare a Balanced Power Dispatch Schedule in collaboration with other licensed operators, and issue Dispatch Orders in accordance with this Schedule and the Grid Code. Other critical responsibilities of ZESCO transmission delineated in the License include:

- Ensuring system reliability
- Procuring and ensuring ancillary services
- Managing the real time market
- Managing transmission congestion and generation constraints
- Arranging the import of power in case of national emergency
- Designing, implementing, maintaining, and operating billing and settlement procedures for payment of wheeling charges to the Licensee, and transmission service charges paid by Licensee to transmission system owners

2.2.3 Distribution

ZESCO is responsible for distribution—it provides and maintains the low voltage system and is responsible for metering, billings, and collections.

ZESCO's Distribution License governs system operation at 72.5 kV and below. It has similar requirements as the Transmission License in obligating the Licensee to ensure open access and to contribute to the development of a Grid Code in collaboration with other operators. The Distribution Licensee must connect customers who have applied and met all payment requirements, ensure that meters are installed, and work with other operators to prepare the Balanced Power Dispatch Schedule. ZESCO must also design, implement, maintain, and operate billing and settlement procedures for payment of distribution and connection charges to the Licensee by consumers and electricity suppliers.

There are over 200,000 customers of ZESCO, with sales to mines contributing 50 percent to total revenue, and industrial consumers 30 percent. The exports of electricity accounts for approximately 5 percent of ZESCO's revenue.

2.2.4 Southern Africa Power Pool

Zambia, and ZESCO in particular, is a member of the Southern Africa Power Pool (SAPP), with the objective of providing reliable and economical electric supply to the consumers of each SAPP Member. ZESCO is a signatory to several SAPP agreements summarized below.

- *SAPP Power Pool Inter-Utility Memorandum of Understanding of 8 December 1995* - - The objective of this document is to facilitate the establishment of the SAPP by establishing the basic principles under which the SAPP will operate. A Member is a signatory which is also an Electricity Supply Enterprise, which in turn is an entity which operates a Control Center around the clock, owns or controls generation and operates these units to meet some or all of its load, and which owns a transmission system which is or may be interconnected with its neighbors. In summary the MOU delineates the management structure of the SAPP and some of the procedures to be

415

followed. The MOU has the following key provisions: (a) membership is open to all SADC utilities and other non-SADC utilities empowered by their respective governments; (b) each Member shall at its own cost build, operate, and maintain its own transmission facilities; (c) IPPs may participate in the Operating and Planning Sub-committees, but not in the Management of Executive Committees; and (d) an Operating Member is a Member which has its system interconnected internationally with at least one other Member and which is a signatory of the Agreement between Operating Members.

- *SAPP Agreement Between Operating Member of 8 December 1995* -- The purpose of this document is to establish the basic principles and rules under which the interconnected potion of the SAPP will operate, so that all Operating Members can co-ordinate and co-operate in the operation of their systems to minimize costs while maintaining reliability, fully recover their costs, and share equitably in the resulting benefits.
- *SAPP Operating Guidelines of 14 August 1996* -- The objective of this document is to provide a set of guidelines to ensure that all the Operating Members of SAPP operate the interconnected Southern African network efficiently and effectively, and that all Members participate equitable in the obligations and in the benefits resulting from the Pool. The emphasis is on operating each system in such a manner that it does not burden neighboring systems. The guidelines are divided into six sections, some with appendices: System Control, System Security, Emergency Operations, Operating Personnel, Operations Planning, and Telecommunications. The individual clauses involve many issues that would or might affect the operation of an independent power project, either directly or indirectly.

2.3 *Regulation*

There are several institutions with roles in regulating the electricity sector in Zambia. The Energy Regulatory Board (ERB), the Zambia Bureau of Standards (ZBS),and the ZCC all have specific functions designated by legislation. In addition, as discussed previously in Section 2-1, the MEWD (through the Minister), has a variety of regulatory responsibilities. Finally, the Zesco Performance Contract is a regulatory instrument between the GRZ and ZESCO designed to provide incentives for the utility to improve its performance.

2.3.1 Energy Regulatory Board

The electricity sector is regulated in part by the ERB, established by the Energy Regulation Act of 28 April 1995 (ERA). The ERB's major functions, as delineated in the ERA, include:

- Licensing any electricity undertaking in Zambia
- Enforcing license conditions, including appointing and using inspectors.
- Regulating price adjustments and services provided through attaching appropriate license conditions.

416

- In conjunction with the Zambia Competition Commission, monitoring the levels and structures of competition within the energy sector, with a view to promoting competition within the energy sector.
- In conjunction with the Zambia Standards Bureau, designing standards with regard to the quality, safety, and reliability of supply of energy and fuels.
- Monitoring the efficiency and performance of energy sector undertakings.
- Receiving and investigating complaints from consumers on price adjustments made or services provided.
- Regulating the location or construction of energy facilities through license conditions; receive and investigate complaints in this area.
- In conjunction with other GRZ agencies, formulating measures to minimize the environmental impact of energy production and supply.
- Making recommendations to the Minister as to measures to be taken through regulations to be made under this Act.

The ERB currently has a professional staff of 18 located in their own office space. It should be noted that the ERB also has a mandate to regulate the petroleum and thus some of this full-time staff is dedicated to this sector.

It is notable that the ERB has formed and chairs a *Reference Group for Electricity Market Restructuring*. This group has been formed to discuss, review, and develop recommendations for the structural reform of the electricity sector in Zambia. The *Reference Group* comprises representatives of about a dozen organizations with a role in the power sector.

Licenses

The ERB has issued licenses to ZESCO and KNBC: ZESCO is licensed for transmission, distribution, and supply of electricity, and KNNDC for generation (their respective functions and responsibilities under the Licenses are described in Section 2.2). The Licenses are structured in a very similar manner, with the following main sections:

1. General Provisions
2. Conditions for Carrying out the Licensed Activity
3. Enforcement and Compliance
4. License Suspension and Revocation
5. Appeals
6. Renewal
7. Amendment of Conditions

Although the Licenses differ in specifying the obligations of each particular activity, they contain several standard sections. The major components common to all four Licenses are summarized below:

- Licensees shall not engage in "anti-competitive practices" as defined in the Competition and Fair Trading Act

417

- The ERB shall confirm and approve the tariff methodologies
- The ERB has the authority to request and review all manner of financial, technical and operational information
- The ERB has established periodic reporting requirements on particular issues
- Licensees must comply with all laws of Zambia
- Licensees must comply with regulations, including quality, safety, reliability, functional performance standards, etc.
- The ERB has rights of inspection and investigation
- The ERB may assess a fine or penalty

In all regulations, the procedures delineated in the ERB Act are to be followed.

Electricity Act

There are also powers granted to the ERB delineated in the Electricity Act, as follows:

- *General Authority to Make Regulations* -- ERB has broad powers to make regulations governing the establishment and maintenance of undertakings, especially with the purpose of "facilitating coordination with existing or future undertakings" (see Sections 4 and 12).
- *Tariffs* – Charges made by an operator are subject to the conditions of a License; Operator may change tariffs, an affected consumer may contest, and ERB makes final decision. (see Sections 7 and 8).
- *Entry and Inspection / Information and Records* -- The ERB is authorized (along with the Minister) enter and inspect and undertakings' premises, and to require operators to provide information as the Board may require.

2.3.2 ZESCO Performance Contract

In order to ensure the financial and commercial viability of ZESCO, the GRZ and ZESCO entered into a three year Performance Contract (PC) in 1996.[1] Targets and performance indicators were established in areas such as governance of ZESCO, financial management, tariffs, supply and customer services, electrification, and human resources management. At the end of the term of this Contract in 1999, the GRZ determined that, in large measure, the targets were not met due to a variety of factors. Principal among these were the setting of ambitious targets and poor monitoring and enforcement. With regard to the latter, a Performance Contract Review Committee was to be created, but never implemented. The PC was revised to extend for another three year period through 2003 with the intention to address these and other problems.

The PC regulates the activities of ZESCO in several critical areas. It specifies a tariff formula, capital investment program, and specific financial and technical performance indicators and targets. However, the PC is subject to all laws of Zambia, including the Electricity Act and

[1] A major impetus for the implementation of the PC was the World Bank requirement that this be instituted as a conditionality in its power sector loan program.

418

the ERB Act. It specifically states that where a conflict exists between the PC and any existing law, the existing law prevails.

2.3.3 Zambia Competition Commission

The ZCC is a statutory body established by the Competition And Fair Trading Act. No. 18 of 1994 (CFTA). Broadly, it's mandate is to monitor, control, and prohibit acts or behavior which is likely to adversely affect competition and fair trading in Zambia, including (on its own initiative or at the request of any person) determining whether any enterprise is carrying on anti-competitive trade practices, including the abuse of a dominant position. The Act specifies the following areas the ZCC is empowered to address:

- Anti-competitive practices
- Mergers and takeovers
- Trade Agreements
- Anti-competitive trade practices by associations
- Criteria for controlling monopolies and concentrations of economic power
- Unfair trading/consumer welfare and protection

The CFTA makes no specific reference to the power sector. As mentioned, ERB Licenses issued to date contain provisions prohibiting operators from engaging in "anti-competitive trade practices" as defined in the CFTA, and the ERB Act requires the ERB to work with the ZCC on competition issues in the energy sector.

The ZCC has 15 professional staff, including one individual assigned to ZESCO and electricity sector issues. This person participates in the ERB-sponsored *Reference Group for Electricity Market Restructuring.*

2.3.4 Zambia Bureau of Standards

The ZBS is a statutory organization established by the Zambia Bureau of Standards Act of 1994 for the preparation and promulgation of Zambian standards. The Energy Regulation Act authorizes the ERB to design standards in collaboration with the ZBS. ERB and ZBS in fact established a committee consisting of numerous stakeholder institutions in the power sector, including those entities to be regulated. Using international models as a guideline, standards were formulated concerning:

- *Quality of Service* -- This includes processing requests for supply, revenue management, consumer complaints and inquiries, provision and maintenance of street lighting, an consumer education
- *Power Quality and Reliability* – Addresses such issues as voltage harmonics, flicker, unbalance, interruptions, regulation, and frequency.

According to the ERA, the ERB has forwarded these standards to the Minister for approval, and ultimately to be adopted as formal regulations.

419

Section 3 Analysis of Legal and Regulatory Framework

The review of the current legal and regulatory framework governing the electricity sector described in the previous Section illustrates a number of significant weaknesses. In this Section, we analyze these issues, organized around general weaknesses and those specific to Nexant's privatization Options. In Section 4 (Recommendations), we present proposals for resolving these deficiencies.

3.1 *General Weaknesses in the Legal and Regulatory Framework*

In this Section, Nexant provides an analysis of the major, general weaknesses we have identified, presented in several categories. These problems need to be addressed regardless of the restructuring and privatization Options recommended by Nexant. This is not to diminish the importance of these problems. Indeed, strengthening the legal and regulatory foundation is critical to attracting private investment.

3.1.1 Coordinated Energy and Water Policies

The GRZ has made great progress by establishing policies to guide the energy and water sectors. In the energy sector, many of the basic principles stated in the NEP have been given legal status through the Electricity and Energy Regulation Acts. In the water sector, the Water Act is currently being revised, and the Department of Water Affairs in the MEWD is spearheading a wide-ranging effort to develop a more comprehensive and coordinated water resources management program. In sum, the NEP makes mention of the importance of developing the country's vast hydropower potential, and the NWP acknowledges the importance of hydropower as a main use of water. However, the water policy is of a very general nature with regard to the power sector and does not offer specifics on how the two sectors should be linked.

3.1.2 Role of the GRZ

One of the fundamental tenets forming the basis of electricity sector reform throughout the world is the necessity of separating the functions of policy-making, operations, and regulation. Historically, governments have played all three roles and the inherent conflict in the objectives of each of these functions has produced disastrous results. While a government's main purpose is to serve and protect the interests of the general public—a social objective, an electric utility is a business enterprise seeking profit maximization—a commercial objective. When the pursuit of social needs dominates, i.e. through government ownership and regulation of operations, the result is often uneconomic tariffs and planning and investment driven by non-commercial criteria. This in turn leads to inadequate investment in system maintenance, rehabilitation, and expansion, and ultimately the provision of unreliable and poor quality of electricity service. In the end, the paradox emerges where a government, charged with providing the nation with a basic service, cannot adequately fulfill this responsibility because of its very involvement in the activity.

Thus, many governments have begun to relinquish control and/or ownership of public utilities, and invite the participation of the private sector to provide the expertise, management, and access to technology which is required to install a greater commercial orientation. However, this has highlighted the challenge that private investors require a transparent, stable, and clearly defined legal and regulatory framework to provide the level of comfort necessary for significant levels of investment. Typically, electricity industry operations have been regulated by a government ministry or department, or are simply self-regulated by the state-owned utility itself. Thus, there has emerged the need to establish a more independent regulatory regime to guarantee investors a fair return on investments and insulate operating decisions from short-term political machinations, while also ensuring that consumers are provided safe, reliable and cost-efficient services.

These emerging trends and attendant institutional changes have fueled the need to rigidly differentiate the roles of policy making, operations, and regulation in the electric utility sector.

The GRZ has already initiated reform steps which reflect this worldwide trend. As described in Section 2.1.1, the MEWD has a stated policy to liberalize the sector and introduce private participation, the ERB has been established as a separate body to regulate power industry operations, and the CEC has been privatized as a transmission and distribution company serving industrial and mining customers in the Copperbelt region. In addition, the KNBC has been unbundled from ZEWSCO and the GRZ has declared, through the FPI, that all new investment in generation and transmission will be undertaken by private developers.

Nevertheless, the GRZ maintains a strong role in each of the three main sector functions. First, the MEWD and various other Ministries develop policy for a variety of issues affecting the sector. Policy making is an appropriate role for governments. Indeed, the main purpose of respective Ministries and agencies is to develop policy approaches to key sector problems which realize the greatest good for the general population.

Second, the Government remains the sole owner of ZESCO's assets, as well as KNBC. Although this is not in-line with global trends, the GRZ has initiated the process of studying the options for removing Government ownership. Indeed this is the central purpose of Nexant's assignment—to develop an approach for removing, or vastly reducing, the level of GRZ ownership in ZESCO.

Finally, the GRZ—most directly through the Minister of the MEWD—has significant regulatory input as delineated in legislation and the ZESCO Performance Contract. It is the GRZ role in regulation which forms the critical weakness in the current power sector legal and regulatory framework. The most severe result of the GRZ's participation in regulation is the lack of institutional independence for the ERB.

3.1.3 Lack of Institutional Independence of the ERB

The relationship between the Minister and the ERB needs to re-visited. On paper, the Minister seems by most international standards to have too much of a regulatory role, potentially compromising independence. As presented in Table 3-1, the Minister is granted very broad powers in the regulatory regime in Zambia.

421

This participation by a policy making body in regulation is a disincentive to private investment because investors will insist that the commercial parameters surrounding their investment be sufficiently insulated from the shifting tides of politics. Government policy makers are charged, first and foremost, with acting in the public's best interests. Investors will seek a legal framework in which an independent and transparent regulatory regime protects their operations from short-term GRZ intervention in the day-to-day management of the enterprise. Even if it is not the intent of Government to intervene, the broad language of current legislation provides the opportunity for Ministerial participation in the regulatory process.

Table 3-1 Role of GRZ in Regulation and Potential Overlap

Energy Regulation Act	Electricity Act
"Minister may, by statutory instrument, make regulations for or with respect to any matter that by this Act is required or permitted to be prescribed, or that is necessary or expedient..." §27(1) **Role – Minister** "The Board shall have and may exercise and perform such other powers and functions as are conferred or imposed on it by or under this Act or any other written law." §6(2) **Role - ERB** A license is subject to such conditions as may be imposed by the Board and specified in the license when it is granted or...varied...The conditions of a license may include conditions...requiring the licensee to comply with directions given by the Board from time to time in relations to specified matters." §12(1) and 12(2h). **Role – ERB**	"Any person who wishes to erect and establish any generating station works—the plant of which will be rated ...at a capacity of 100 kw or more, for generating transmitting, transforming, converting, or distributing electricity...shall do so in accordance with regulations made under this Act, and shall comply with any requirement of the Minister or the Board for the purpose of facilitating coordination with existing or future undertakings." §4(1)(a) **Role – Minister and ERB** "The Minister may, by statutory instrument, make regulations for the better carrying out of the provisions of this Act." §30(1) **Role – Minister**

Note: the "Minister" refers to the Minister of MEWD; Board refers to the Energy Regulatory Board.

In addition to the broad authority of the Minister to participate in regulation illustrated in Table 3-1, there are several other areas where the Minister plays a critical role. The most prominent roles for the Minister are allocated in licensing, rates, standards, capital expenditure planning, enforcement, penalties, land rights and regulation, water rights and regulation. In addition, the Minister is granted a significant role in the determining the future of the sector with regard to

422

open access, as specified in Section 4 of the EA (this important issue is discussed in more detail in Section 3.2.7). The specific functions of the Minister in these and other areas are highlighted in Exhibit 2-2.

Policy making institutions also play a role in regulation through the ZESCO Performance Contract (PC). As described in Section 2, both the MEWD and MFED are signatories to the PC, which contains provisions addressing many typical regulatory functions, e.g., rates, capital investment programs, and a variety of performance standards and targets.

The PC not only poses the problem of GRZ participation in regulation, but also is a clear overlap with the functions of the ERB. This is discussed in Section 3.1.4.1 below.

3.1.4 Fragmentation of Roles

It is very apparent from Exhibit 2-1 that there are a large number of Ministries and agencies involved in policy making and regulation in the current legal and regulatory framework. This is not necessarily a situation unique to Zambia: most governments have many institutions which play a role in any given sector of the economy.

However, our analysis reveals that, in an effort to accommodate the needs of power sector reform, new institutions, or new roles for existing institutions, have emerged in the last several years. This situation has outpaced the development of suitable procedures, coordination mechanisms, and communication (including reporting) requirements among these institutions. In addition, in particular circumstances there are overlaps in the established mandates of several organizations.

As Zambia is in the process of developing and implementing restructuring and privatization reform in the electricity industry, it is imperative to realize as much rationalization and clarity as possible in the structure of the sector and inter-relationships among the principal players. This, in turn, will enhance the stability and predictability of the sector, and provide a more attractive investment opportunity for the private sector.

Below, Nexant highlights in greater detail the most significant issues resulting from institutional fragmentation in the power sector.

Institutional Overlaps

There are two main instances in the Zambia power sector where the stated function of an institution overlaps with that of another (these are described below). The major ramification of functional duplication is that the lack of clarity and potential delays in responding to the bureaucracy are a disincentive to investment.

MEWD and ERB

The role of the GRZ in regulation is a problem not only because of its very participation in regulatory functions, but also because it overlaps with the mandate of the ERB. This is manifested in several ways. First, the language of the Electricity Act and ERA is often very broad and could be interpreted to grant similar powers to the Minister and the ERB. For example, as shown in Table 3-1, the Minister is empowered to make regulations for any matter

423

falling under the jurisdiction of each piece of legislation, while the ERB is empowered to attach any conditions in the term of a license. The broadness of this language could leave the powers of each open to varied interpretation.

Second, there are at least two instances in which both the ERB and Minister appear to be authorized to conduct the same activity: enforcement powers and issuance of penalties. The EA allows both the Minister and ERB to authorize investigations and request information of undertakings. The ERA provides the ERB with broad powers to monitor the efficiency of undertakings, request all manner of information, and conduct investigations.

The EA and ERA identify several categories of offences and the procedures for arriving at a penalty stage, but do not identify who is the party determining and issuing the penalty. It should be noted also that the ZCC is empowered to levy fines or prison terms for violations under the CFTA. There will need to be some rationalization of penalty provisions in order to avoid a situation where several agencies are issuing penalties for one infraction.

Third, as indicated in Section 2.3.2, the ZESCO Performance Contract with the GRZ, represented by the MEWD and MFED, provides the Government with a role in regulation. Beyond this, however, the GRZ's role in regulating ZESCO through the PC is the intended domain of the ERB, as specified in the ERB's enabling legislation. The ERB Act establishes the ERB as the agency responsible for overseeing the electricity sector (and therefore ZESCO), to ensure it is operating efficiently, safely and in a cost-effective manner. This is precisely the objective of the PC. Specific areas of overlap are in tariffs and the setting of various performance targets and standards. Although the PC is very general in its language, and the enforcement/monitoring of it has been insufficient, it is intended to do what the ERB was created for. Nexant has learned that, at the ERB's urging, it is the intention of the GRZ to include the Board on the PC Review Committee.

In addition, the existence of the PC is redundant. An investor will certainly question the need for a PC when the ERB has been established and is building capabilities, Licenses will be issued, and bilateral contracts will be in place for some commercial arrangements. This is very likely to be viewed as overly intrusive regulation.

Two factors regarding the PC should be pointed out. First, the PC states that if it conflicts with any existing law, the existing law prevails. Second, the Contract was instituted in the first place in response to a World Bank loan conditionality. Nevertheless, Nexant believes that in light of private sector investment in ZESCO and the creation and ongoing strengthening of the ERB, the PC may not be necessary or, at least, should be transferred to the ERB for oversight and monitoring.

OPPPI and the IC

The functions of the OPPPI and the IC clearly overlap in several areas. First, both have a mandate to promote private investment: the IC in all investment in Zambia, and the OPPPI in both hydropower generation and electricity transmission. Second, both are intended to serve as a first, and/or, one-stop location to register investors and issue documents granting the right to invest: the IC issues an Investment Certificate, and the OPPPI issues Letters of Intent and

Support. Third, both agencies are authorized to provide assistance to investors in dealing with other GRZ institutions, including obtaining licenses, permissions, etc.

A private investor may not be clear on which agency should be consulted first or, in fact, if both need to be included in the investment process. This raises a related issue of what the sequence will be for an investor of securing various rights, permissions, licenses, and other contracts in the electricity sector. This is examined in the following Section.

Inadequate Coordination Mechanisms

One of the consequences of establishing new institutions, or new roles for existing entities, is the increase in the number of linkages among organizations. These can take the form of mandated, formal reporting requirements, or simply more informal information flows. In either case, clearly stated coordinating mechanisms and procedures are required in order to avoid duplication of effort and fulfill all requirements.

In the Zambia power sector, many of these coordination mechanisms and procedures among institutions are absent or ill-defined. The obvious result of this situation, if not addressed, is that the required functions comprising the regulatory framework will not be carried out.

Below we highlight several of most important linkages. In each of these cases, there isn't necessarily an overlap of responsibilities, but rather a lack of clarity and specificity in how each of these agencies are to coordinate in ensuring that the regulatory function is properly carried out.

Zambia Competition Commission and Energy Regulatory Board

The ERA specifies that the ERB shall monitor competition and fair trade practices in conjunction with the ZCC. The license issued to date by the ERB to ZESCO and KNBC contain specific provisions requiring the Licensees to adhere to the CFTA and to several specific principles of fair competition. What is currently lacking in this arrangement is a more defined and explicit statement of the role of each institution and mechanisms to establish regular and formal communication between the ERB and ZCC. For example, while it is clearly the intent of the CFTA that the ZCC will monitor and investigate any anti-competitive issue arising in any sector of the economy, it is also clearly the intent of the ERA that the ERB is to monitor the activities of the electricity sector operators. What is required then, is an explicit understanding and procedures which define the roles of each entity.

Environmental Council and Energy Regulatory Board

The ERA specifies that the ERB shall, in conjunction with other GRZ agencies, formulate measures to minimize environmental impact of undertakings, and enforce such measures by attachment of appropriate conditions in licenses. As in the case described above, what is currently lacking in this arrangement is a more defined and explicit statement of the role of each institution and mechanisms to establish regular and formal communication between the ERB and Environmental Council. For example, although the language in the ERA could be interpreted to grant the ERB the authority to actually draft environmental measures or standards to protect the environment with regard to electricity undertakings, this would clearly have to involve—or, in fact, be led by—the Environmental Council. In addition, the language appears to indicate that

both agencies could be involved in enforcing the environmental regulations governing the power sector.

There should be greater specificity with regard to the responsibilities of the ERB and Environmental Council, and coordination among each entity. Explicit procedures and sequence of roles and communication need to developed at the different levels of involvement: from the development of standards, to monitoring and enforcement.

Zambia Standards Bureau and Energy Regulatory Board

As described previously, the ERB and the ZSB have already established a coordination mechanism to effect the development of electricity sector standards: a committee was created with numerous power sector stakeholders to develop standards which were submitted to the Minister for approval as formal regulations. This is a commendable first step and will go a long way in establishing future, periodic communication. What remains is to specify an ongoing coordination mechanism to ensure a strong relationship and clear understanding of roles once standards are approved and incorporated as license conditions.

Licensing Sequencing

The analysis in Section 2 of each institution with a major role in the power sector reveals that there a number of permits, licenses, registrations, and rights which need to be secured in order for a project developer to invest in Zambia. These are summarized in Table 3-2 below.

In addition to the lack of specific coordination mechanisms among these organizations, the existing legal and regulatory framework is not clear on the sequence of obtaining these rights and permissions. Although in some instances there is mention of the need for coordination between entities (e.g., the ERA describes general collaboration between the ERB and the ECZ), these various requirements are in large measure independent of each other. For example, it is not specified in the ERA or in the FPI, that the ERB will have a role in approving IAs and/or PPAs for hydropower IPPs, although the ERB is of the view that this should be the case. It is also the understanding of the ERB that prior to the issuance of a license, an undertaking will have secured all other necessary rights and permissions, such as environmental approval from the ECZ, water rights from the Water Board, etc. However, this is not spelled out to this level of detail in the current legal and regulatory framework.

Table 3-2 Summary of Rights and Permissions Required for Power Sector Investors

RIGHTS / PERMISSIONS	RESPONSIBLE GRZ INSTITUTION
Access to / Ownership of Land	Ministry of Land (Commissioner of Lands)
Water Use Rights	MEWD (Water Board)
Environmental Impact Assessment	Environmental Council
License to Operate Undertaking	ERB / Local Authority
Letter of Intent / Letter of Support	Office for Promotion of Private Power Investment
Implementation Agreement / Power Purchase Agreement	Office for Promotion of Private Power Investment
Investment Certificate	Investment Center

3.1.5 Lack of Specificity in ERB Guidelines/Procedures

Our review of the ERA indicates that there are a number of areas where the procedures for conducting specific functions are not sufficiently detailed. Below we briefly highlight areas which need to be addressed in the current regulatory framework.

Tariff Methodologies

The ERB is clearly granted the mandate regulate tariffs, including the specification of methodologies (see Exhibit 2-2). However, it is our understanding that a rate regulation approach and detailed methodologies/formulas have not been developed. It will be critical to identify an approach and develop as much specificity as possible prior to embarking on the privatization process. Investors consider clear and pre-specified guidelines for tariffs (recovering costs) to be a critical ingredient in the privatization process.

Appeals / Dispute Resolution

There are a limited number of references in existing legislation which provide explicit guidelines on appeals and dispute resolution. These are:

- Minister hears, and decides on, appeals to ERB's revocation or refusal to renew a License; this decision can only be appealed to the High Court on a point of law (ERA)
- Minister's decision on an undertaking's desire to increase or decrease rated capacity, or contractual rights to purchase power from outside Zambia, can only be appealed to High Court on point of law (EA)
- In cases of a failure of parties to agree on compensation for damages suffered from an operator's execution of works, compensation is decided by Arbitration in accordance with the Arbitration Act (EA)
- The ERB may include conditions in Licenses providing for the arbitration of any disputes concerning Licenses (ERA)

Beyond these very specific instances, existing legislation, and in particular the ERA, is silent on an appeals process, including notification and filing procedures, public hearings, time periods for parties to respond, format of communications, etc. It is not clear, for example, if the ERB issues an order or decision concerning rates or an operating standard, what the operator's rights of appeal and dispute resolution would be.[1]

Capital Expenditure Planning

It is a common regulatory function for a public utility commission to request, review and approve an operator's capital expansion plans. This is critical since expansion plans have direct implications for rates, the environment and, in a small market, coordination with other players.

[1] It is interesting to note that in Sections 25 and 26 of the ZESCO-CEC Bulk Supply Agreement, there are detailed provisions for dispute resolution and arbitration, including the use of UNCITRAL Arbitration Rules. However, this represents an appeals and dispute resolution process agreed upon by two parties in a bilateral contract, and not a standardized set of rules for the whole sector. Nevertheless, it does indicate some precedent for defining more specified rules in the future.

427

Most importantly, a utility will seek to recover the costs of the investments through tariffs, and as such regulatory review of the need for tariff increases to cover capital expenditures is required.

In Zambia, there are a number of provisions in legislation and contracts which indirectly authorize the ERB to conduct this regulatory function. However, the law appears to be silent with regard to the explicit right of the ERB to review and approve capital investment plans.

The ERA requires a licensee to consult with ERB on the location and construction of common carriers, facilities, plant etc. ZESCO Licenses require the utility to submit to ERB an Annual Opportunity Statement identifying areas for development and augmentation. There are also License provisions requiring ERB written approval for location, construction, replacement, etc of facilities. In addition, the ERB is authorized to request any information, especially financial data, in carrying out its duties of monitoring sector operators. Thus, the cumulative effect of the above provisions could allow the ERB to request and capital expenditure plans.

Perhaps the ZESCO Performance Contract provides the most defined provisions with regard to this issue. The ZESCO PC does specify broad capital expenditure projections and criteria for priority projects determined by ZESCO, limited to $25 million per year.

ZESCO is also required to provide annual information to the GRZ such as: (a) Revenue & Expenditure Budget; (b) 5-year Corporate Business Plan; and (c) Audited Accounts. The PC also requires the submission of quarterly management accounts and the GRZ is charged with reviewing and monitoring ZESCO's performance against pre-specified indicators. However, the PC is not specific on whether the approval of ZESCO's capital expenditure plans is required or authorized.

In sum, it is our view that the existing provisions in the legal and regulatory framework do not specifically address the right of the ERB to review and approve capital expenditure plans. As this is a core regulatory function with a broad impact on the development of the electricity sector, this weakness should be addressed.

Enforcement / Penalties

The language in the EA and ERA regarding enforcement and the issuance of penalties is very broad. There are provisions stating general guidelines, but there are no procedures matching specific penalties for specific infractions. This has already surfaced as an issue for the ERB, where the Board has found itself with little recourse in the event of an operator not complying with a request for information.

Consumer Affairs and Public Accountability

Accountability refers to requirements placed on a regulatory body to make its proceedings and decisions as accessible to the public as possible. Typically this includes requirements for public observation and to explain decisions in writing (and make them available to the public). The legislation is silent on the matter of ERB's inter-action with the general public, and electricity consumers in particular. There are no pre-defined procedures for public hearings or responding to consumer inquiries. With regard to the latter written decisions, the ERA does not specify these requirements. The ERB is required by the ERA to produce an annual report for submission to the Minister, but this focuses on a financial synopsis of the Board's yearly activities.

428

The Licenses do mention the licensees requirement to "cooperate with any applicable Consumer Council as may be constituted" and to take part in public meetings.

Autonomous Decision-Making

One of the principal criteria for the establishment of an independent regulatory commission is that it remains free to the greatest degree possible from political interference so that it's decisions remain autonomous. Other government institutions must have no leverage over the individual or individuals who serve as the regulators. There are two main ways in which autonomy is provided for:

- *Appointments* - Commissioners are usually nominated by a government body, must meet some minimum, pre-specified qualification requirements, serve for fixed terms, and cannot be removed from office prior to the expiration of their terms unless under pre-defined circumstances such abuse of authority, are found guilty of malfeasance by a court of law, or become incapacitated and are unable to fulfil their duties over a sustained period. The salaries of the individual board members should be fixed in advance.
- *Funding and Financial Independence*. The budget and funding of a regulator should not be politically manipulated. The regulator should develop its own budget on an annual basis, which is usually submitted to a government body for approval, and then be able to utilize that money in any suitable way to conduct its business. In this way, the regulator is given significant control over its own budget, but remains accountable to other governmental institutions for its financial operations and management. Funding sources should be sufficient and from as diverse a number of sources as is possible. This can include the government, fees levied on regulated entities and other sources.

In Zambia, the ERA addresses most of these issues sufficiently, with the exception of a few gaps in the level of specificity. First, although the terms of Board members are fixed at three years, there are no provisions requiring the Minister, upon the expiration a member's term, to nominate a new member within a pre-specified period of time. In practice, this has resulted in extended vacancies on the Board with no replacements being nominated. Second, the terms are for fixed three years for all Board members. A greater degree of insulation from changing political environments, i.e., administrations, could be achieved through the institution of staggered terms. This would guarantee greater continuity of the Board as well. Third, at present there are provisions for three full-time, and four part-time Board members. There is some consideration that this mixture may not be the most efficient, and that all members should be either full- or part-time. Fourth, it is not clear how salaries are to be determined, only that it will be "by an agreement governing the terms of the member's appointment."

3.1.6 Insufficient Institutional Capacity

The regulatory framework will require strong technical capabilities among the professional staff of several institutions playing a role in the sector – the MEWD (OPPPI, and DOE), and the ERB. These agencies lack substantial financial resources to add staff professionals, or to offer remuneration sufficient to attract the qualified individuals with highly specialized niche areas of expertise. In addition, resources available for training are often very limited. As the electricity

sector becomes more complex, with an expanding number of institutions and increased commercial and contractual relationships, there will be an even greater demand for effective regulation carried out by highly qualified technical professionals.

3.2 *Legal and Regulatory Framework Issues Specific to Nexant's Proposed Options*

In Nexant's Task 2A Report (*Option Identification and Screening*), we identified three privatization options for ZESCO.[1] The main structural characteristics of these models are summarized below in Table 3-3. In this Section, we assess several critical issues in the context of the legal and regulatory framework's capacity to accommodate these Options.

3.2.1 Competition and Monopoly Issues

As illustrated in Exhibit 2-2, the ZPA is mandated to ensure that, in the process of privatizing SOEs, it shall ensure that monopolies are not created. In addition, the CFTA empowers the ZCC to monitor sector activities and take action to prevent or redress the abuse of a dominant position by any enterprise.

Option 1 could be interpreted to contain monopolistic and/or anti-competitive aspects, since ZESCO is maintained as a vertically integrated utility with private participation introduced through a *single* concession for all of ZESCO's activities, i.e., generation, transmission, and distribution. For this reason, Option 1 is the most problematic, especially with regard to Section 8(2j) of the Privatization Act, which clearly states that ZPA shall ensure that monopolies are not created in the privatization process. If Option 1 is pursued, the process may be subject to legal challenge based on existing legislation.

[1] These Options, their advantages and disadvantages and suitability for Zambia, were presented and discussed comprehensively in Nexant's Task 2A Report.

430

Table 3-3 Summary of Nexant's Options

OPTION	STRUCTURE*
1. **ZESCO vertically integrated with single concession**	ZESCO as generation, transmission and distribution company – private concessionaire All new generators (IPPs) built by private sector
2. **ZESCO Unbundled, then privatized through sale (Generation) and concession (Transnmission, and Distribution)**	Separate generation company (KGU and KGL) – trade sale Separate generation company (Victoria Falls) – trade sale Separate generation (smaller generation plants) – trade sale All new generators (IPPs) built by private sector Separate transmission company – private concessionaire Separate distribution company – private concessionaire
4. **ZESCO vertically integrated with Master Concession or Joint Venture**	ZESCO as generation, transmission and distribution company – private concessionaire or JV All new generators (IPPs) built by private sector
then unbundled and privatized through Sub-concession (Transmission and Distribution), JV or sale (Generation)	Separate generation company (KGU and KGL) – JV or trade sale Separate generation company (Victoria Falls) – JV or trade sale Separate generation (smaller generation plants) – JV or trade sale All new generators (IPPs) built by private sector Separate transmission company – private concessionaire Separate distribution company – private concessionaire or JV sale

* The elements below represent changes in the current sector; other existing entities are assumed to remain.

Options 2 and 4 have less monopolistic traits, and actually involve a process of diluting ZESCO's dominant market power through unbundling. It is notable that the current legal framework, through Section 22(1e) of the Privatization Act specifically empowers ZPA to privatize via "the reorganization of the SOE before the sale of the whole or any part of the SOE." Moreover, unbundling has already occurred with sale of ZCCM to CEC, and separation of KNBC from ZESCO.

Although Options 2 and 4 ultimately call for the unbundling of ZESCO into separate entities for each of these activities, we support a "whole river concept" for generation based on the Kafue River. In this structure, Kafue Gorge Upper and Kafue Gorge Lower are packaged together—i.e.,

431

the investor in KGU is offered the option of obtaining the rights to KGL. In addition, these Options envision a single concessionaire in transmission, and for a single concessionaire in distribution. Thus, in Options 2 and 4 there may be concerns that a single operator is being granted a monopolistic position in the generation market—given the overwhelming dominance of Kafue Gorge Upper at 900 MW, as well as in the distribution market.

However, in Nexant's view these aspects of Options 2 and 4 are justified by the nature of the Zambian power sector. Since KGU and KGL will be based on the same river system, water releases and dispatch will need to be closely coordinated, and thus much easier if these plants are under the same ownership. Moreover, maintaining separate ownership of these Kafue River-based plants may be a disincentive to potential investors in KGL given the size of KGU and its control of the river upstream.

The question of whether to disaggregate ZESCO's distribution activity into a single company or multiple entities has generated much debate. While there are certainly examples of countries with more than one distribution company, these are found more often in larger countries (both geographically and in terms of number of customers). In Zambia, Nexant believes that, on balance, the market is too small in Zambia for the creation of multiple distribution companies. There are several reasons supporting this judgment :

- *Customer Base*: There must be a critical mass in the load base to justify the creation of multiple companies. A typical rule of thumb is that a system of under about 400,000 customers is too small to break up, as the smaller loads would not provide a viable base to sustain the business.[1] ZESCO currently has about 200,000 customers.
- *Customer Mix*: Beyond the sheer number of customers, there is the issue of the type of customers for each distribution company. Multiple distribution companies should have a relatively balanced load among residential, commercial, and industrial customers. This is primarily to ensure that a dominant position for one company is not created by allowing it to serve the most lucrative load base (industrial customers). In Zambia, the load is predominantly in the corridor between Lusaka and the Copperbelt region. The exercise of establishing multiple, viable distribution companies which serve all of Zambia would be most challenging. Furthermore, and perhaps most importantly, there is not sufficient available industrial load in the country: the CEC currently serves about 60 percent of all industrial load in the country under a 20-year Bulk Supply Contract, and projections for future industrial load growth are modest at best.
- *Economies of Scale*: Consolidating distribution under one company can achieve economies of scale in management, staffing, maintenance, and operations
- *Consistency in Operating Practices and Standards*: In a nascent regulatory framework such as Zambia's, it is essential to institute consistent planning, operational and technical standards. This is likely to be more easily accomplished with one distribution company.

[1] This, of course, also depends on the customer profile of each proposed load (or franchise area), which is discussed below.

432

More broadly, there is justification for the market structure proposed in Options 2 and 4 based on the small size of the Zambian market and limited load growth potential.[1] Moreover, the hydro-based nature of the system places limits on the amount of competition which can be engendered among operators in the market. This is due to the fact that the facilities are must-run plants and variation in cost among the plants may not be that significant. The ability to compete on price is therefore limited and complicated by the potential impact of one plant over another since they are located on the same river (Kafue).

Thus, while our Options recognize these fundamental facts and may not result in the addition of many new, individual companies *in* the market competing directly against each other, the policy framework in place—or at least envisioned—establishes significant competition *for* the market. Indeed, it is envisioned by the GRZ, and in our Options, that private investors will compete for the right to enter the market through competitive bidding procedures for IPPs, ITCs, concessions or, possibly in generation, the sale of assets. In short, it is our view that our Options recognize the nature of the Zambia electricity system and the limits on the level of competition which can be introduced in the market, but build on the existing legal framework to incorporate significant competition *for* the market.

This approach is reflected in all of our Options: private investors are competing for the right to own assets – in the case of a trade sale or JV in generation, or to manage and operate assets – in the case of a concession for transmission and distribution entities.

Nexant does not believe that any of the Options necessarily pose problems under the provisions of the CFTA. First, the ZCC is authorized not to *prevent* the formation of monopolies, but rather to monitor the activities of enterprises and ensure that there is no abuse of a dominant position. Exploitation of a dominant market position could be manifested in several ways, such as implementing artificially high prices, preventing market entry of other players, etc.

In addition, the existing legal and regulatory framework has some mechanisms in place to monitor the market practices of electricity sector undertakings. The ZESCO and KNBC Licenses contain general conditions requiring electricity sector undertakings to adhere to the conditions of the CFTA, and specifically not to engage in anti-competitive behavior (several such practices are specifically defined in the Licenses). Furthermore, the ERA mandates that the ERB work in conjunction with the ZCC on matters pertaining to anti-competitive behavior. As described in the previous Section, what is lacking in this current framework are more developed and specific coordination mechanisms for the ZCC and ERB to work together effectively on these issues. (Other market rules not yet developed in the legal and regulatory framework required to govern operators' activities are discussed in Section 3.2.7).

3.2.2 Lack of Specificity and Consistency in Rights and Obligations for Participating in the Regional Electricity Market

In each of Nexant's Options, some form of direct access for all market players is assumed, including to markets and consumers outside Zambia's borders (open access is addressed in more

[1] Both the domestic and export market for electricity are constrained. Growth in the industrial sector (primarily mining) is likely to remain flat, and there is current surplus capacity in the regional market.

433

detail in Section xx bleow). However, in general, there appears to be a lack of clearly delineated and consistent guidelines governing the participation of electricity sector undertakings in the regional electricity market. The following is a summary of the specific references to this issue in the current legal and regulatory framework.

Under the EA, the Minister is granted the authority to approve an undertaking's desire to increase or decrease rated capacity, or contractual rights to purchase power from outside Zambia; in so doing, the Minister must take account of any relevant international agreement;

The ZESCO Supply License requires ZESCO to act in accordance with applicable Regional Power Pool Agreements to which it is a party, and as approved by the ERB; there are no provisions in this License which address the right or procedures for ZESCO to export power;

The KNBC License, on the other hand, has no similar requirement to act in accordance with Regional Power Pool Agreements, but does have specific reference requiring ERB approval to export power.

Based on these provisions and an analysis of the existing legislation and agreements, there does not appear to be a general, explicit provision granting direct, open access to export markets, or whether approval would be required (from either the Minister or the ERB). This right is indirectly implied by Section 4 of the EA, which states that the Minister may declare a transmission line to be a common carrier – but this is not specific to the export market. In addition, in practice KNBC has been exporting power recently to Zimbabwe (estimated to up to 50 MW) without the prior approval of the ERB as called for in its License.

3.2.3 Provisions of SAPP Agreements

As described in Section 2, a Member of SAPP is a signatory which is also an Electricity Supply Enterprise, which in turn is an entity which operates a Control Center around the clock, owns or controls generation and operates these units to meet some or all of its load, and which owns a transmission system which is or may be interconnected with its neighbors. If Option 1 were implemented, it is clear that the privatized ZESCO would retain these characteristics and thus could remain a signatory in SAPP.

However, the implications of Options 2 and 4 are less clear. Both Options ultimately involve the unbundling of ZESCO and it is not clear whether the individual functions of each disaggregated entity will automatically allow membership in SAPP. The question is which of the unbundled entities would become signatories to SAPP (or would each one)? Since the current Inter-Utility Memorandum of Understanding allows IPPs to become Operating Members, it is likely that ZESCO's unbundled generation companies would also be allowed to achieve this status, although this is not specifically provided for in the SAPP Agreements. However, an unbundled distribution company does not necessarily meet the criteria for SAPP signatories outlined above, e.g., operating a control center around the clock.

It is likely that all electricity undertakings will be allowed to participate in the regional power market, but this would have to be clearly stated. In sum, rules governing this participation are not clear at this point, such as: (a) who qualifies for membership in an unbundled sector? (b)

434

what are the rules for importing or exporting power? and (c) what approvals are required for what activity, and by whom (e.g., Minister or ERB)?

3.2.4 Provisions of Bulk Supply Agreements

The provisions of the Bulk Supply Agreement (BSA) between ZESCO and CEC do not appear to provide an obstacle to the privatization of ZESCO as envisioned in Nexant's Options.[1] Section 29 of the BSA states that the rights and obligations of either party shall not be assigned to any other party without the prior consent of both ZESCO and CEC. This consent is not to be unreasonably withheld, and specifically CEC shall not "unreasonably withhold or delay or impose conditions on its consent to ZESCO's assignment in whole or in part...to any successor of ZESCO which may acquire assets...as part of the restructuring of ZESCO in any future privatization program" [Section 29(a)(iii].

However, the provisions of the BSA which limit CEC to serving only certain mining customers in the Copperbelt Region [see Section 1(a)(ii)], may conflict with the direct access regime proposed by Nexant in our Options. Presumably direct access should apply to all market participants and as such, the ZESCO-CEC BSA may have to be amended to allow CEC this right.

Finally, in Section 24 of the BSA each party agrees to provide the ERB with a copy of the Agreement, liaise with the Board to explain any provisions, and to take proper account of any ERB directive it is authorized to make. It is not clear in this language, or that contained in the EA and ERA, whether the ERB has the authority to review and approve the terms of this, or any other, bilateral contract among parties in the electricity sector. Section 4 of the EA, specifying that the Minister or Board may make regulations "for the purpose of facilitating coordination with existing or future undertakings" could be interpreted to grant this review, approval, and monitoring authority, but it is by no means clear.[2]

3.2.5 Impact of Ownership Changes

Each of Nexant's Options calls for the introduction of private ownership of ZESCO's assets. There is nothing in the existing legal and regulatory framework which prohibits or hinders this. In fact, the NEP specifically promotes greater liberalization of the electricity market and privatization of distribution. In addition, the FPI outlines a specific policy for the introduction of the private sector in all future hydropower generation and transmission projects. The EA does not limit the participation of other entities in the generation, transmission and distribution of power, and privatization has already taken place in the electricity industry with CEC. Finally, there do not appear to be any prohibitions for private investors (including foreign parties) to owning land or acquiring water rights.

However, there are several specific questions which may have to be addressed in the legal and regulatory framework. First, the current ZESCO Licenses indicate that "if the Licensee changes

[1] Nexant had access only to the ZESCO-CEC BSA. We did not review the ZESCO-KNBC contractual arrangement.
[2] Nexant understands that the ERB has issued a license to CEC, but we did not have access to the license for this review.

435

its form of ownership, legal form, or name," then the License becomes null and void. The Licensee must receive the written consent of the ERB or, in the absence of such consent, reapply for a License. It is our view that this does not pose any significant hindrance to implementing any one of our Options, but may require more a more detailed legal opinion.

Second, does introducing private ownership in ZESCO (Option 1) or in its unbundled companies (Options 2 and 4) have ramifications for membership in SAPP? This is closely related to the issues outlined in Section 3.2.3, but more specific to the question of whether ZESCO's current commitments and obligations as a state-owned utility under SAPP automatically transfer to the new private owner(s). Nexant does not believe that this poses any problems, so long as the responsibilities required by SAPP membership are met and monitored. Currently, the Licenses implemented by the ERB contain broad provisions requiring the Licensees to adhere to any applicable regional agreements it is a party to, subject to approval of the ERB. Once again, however, this may require a more detailed legal opinion to confirm this assessment.

436

3.2.6 Privatization Transaction Process and Documents

Each of Nexant's proposed Options entail the privatization of ZESCO in some manner. This, in turn, will require the development of a transaction process and a variety of bidding documents. Since the GRZ has already privatized many SOEs, including large and complex transactions in the mining sector, we expect that the Government will be able to handle the privatization of ZESCO. However, it will still be necessary to designate the principal institutions responsible for the process, development of documents, negotiations, etc.

3.2.7 Gaps in the Existing Legal and Regulatory Framework

There are elements of the existing framework which can accommodate the proposed Options, but there are several gaps in regulatory instruments, contracts, rules etc. which will need to be filled. For the most part, the required changes are very similar across each Option. Exhibit 3-1 summarizes these requirements and the current framework's ability to accommodate them.

IPPs

Private investors in hydropower generation are encouraged, and the basic GRZ policy and institutional framework—through the FPI—is in place to promote and facilitate IPPs. Specifically, the FPI permits direct access: Section 2.2 states that "power produced by the hydropower generating station may be purchased by any entity, including ZESCO…the sponsor may also negotiate a direct Power Purchase Agreement with SAPP or any neighboring country with the approval of the ERB."

The OPPPI has developed model IAs and PPAs, and while there are no model licenses for potential IPPs, the ERB has developed generation licenses for ZESCO and KNBC. This should provide sufficient basis for further development of these contracts.

Licenses and Privatization Transaction Documents

ZESCO currently has licenses issued by the ERB for supply, transmission, and distribution. As discussed in Section 3.2.5, once ZESCO is privatized—whether as a vertically integrated utility in Option 1, or unbundled as in Options 2 and 4—the change in ownership and legal form will require written approval of ERB or the re-application for a new license(s). In our view, given the experience of ERB thus far in drafting and issuing licenses, this does not pose a significant challenge in the privatization Options developed by Nexant.

However, each of the Options will necessitate the development, drafting, issuance, monitoring, and enforcement of Concession Contracts. In the case of Options 2 and 4, trade sale and/or JV procedures and documentation such as an Information Memorandum, data room, bidding documents, evaluation criteria, etc. will need to be developed for generation assets. In addition, it will be necessary to identify which entity –or combination of entities – in the GRZ will be responsible for overseeing the various stages of the privatization process (contract development, negotiation, implementation, and monitoring).

Exhibit 3-1 Legal And Regulatory Requirements To Implement Proposed Options

REQUIREMENTS TO IMPLEMENT OPTIONS	ABILITY OF CURRENT FRAMEWORK TO ACCOMMODATE OPTIONS
Implementation Agreements	Model document in place at OPPPI.
Power Purchase Agreements	Model document in place at OPPPI.
IPP Licenses **Option 1** ZESCO License and Concession Contract **Options 2 and 4** ZESCO GENCO License, and sale document and/or Joint Venture Contracts ZESCO TRANSCO License, and Concession Contract ZESCO DISTCO License, and Concession Contract	1. Not in place, but ERB has developed other supply licenses for ZESCO and KNBC. 2. Existing Licenses issued by ERB for Supply, Transmission, and Distribution will have to re-issued 3. Concession and/or sale/Joint Venture process and documents to be developed, implemented, 4. Appropriate mechanism should be identified for selling residual GRZ ownership (shares) in the
Bulk Supply Agreements • ZESCO – CEC • ZESCO – KNBC • Suppliers and end-users	1. Right of direct access not currently explicitly stated; including right to export power. 2. In the case of ZESCO-CEC, there do not appear to be any provisions in the BSA hindering privatization of ZESCO. However, the BSA limits CEC to selling only to mining customers in the 3. Direct commercial arrangements between future suppliers and end-users will likely be developed by the parties concerned; however, review, approval, and monitoring provisions (i.e., the responsible
SAPP Inter-Utility Agreements	Further legal review may be required to ascertain verify/clarify whether: • Unbundled entities from ZESCO are eligible for membership; • ZESCO's current commitments and obligations as a state-owned utility under SAPP the new private owner(s);
Market Rules 1. Open Access 2. Functional Unbundling 3. Other Wholesale Market Rules • fair dispatch • access to ancillary services • accepted methodologies and principles for charges & procedures relating to: ➢ coordination of hydro generation ➢ wheeling services ➢ connection to the system ➢ use of system assets ➢ quality of service ➢ system expansion responsibilities	1. Right of direct access not currently explicitly stated; including right to export power. 2. Current legislation, several bilateral and trilateral agreements, and SAPP provide foundation for open 3. Performance Contract does require ZESCO to implement changes to improve management and 4. Detailed corporatization steps will be required as prelude to implementing Options. 5. ZESCO's current transmission License requires ZESCO to broadly adhere to these principles, but 6. SAPP Operating Guidelines provide broad guidelines for regional market participants.

438

Market Rules

The structural, commercial, and ownership changes commensurate with Nexant's proposed Options require the development and implementation of certain market rules. Below we highlight the primary rules which should be addressed.

Direct Access -- If new market participants have the opportunity to buy and sell electricity directly with one another, they will need to be guaranteed access to the transmission and distribution system. This is true for Options 2 and 4 when ZESCO unbundled.

The current legal and regulatory framework does provide some foundation for open access. Specifically, Section 4(2) of the EA states that the Minister may declare any transmission line to be a common carrier. The provisions go on to indicate that this regime is subject to regulations made by the Minister or the ERB, but does not elaborate on what those regulations would be. Furthermore, ZESCO's current Transmission License requires it to ensure open access, and the FPI specifically permits direct access both domestically and regionally (see Section 2.2 of the FPI).

It is also important to note that at the level of international electricity interchanges, a number of bilateral and trilateral agreements have been in effect for years which essentially provide the operational and commercial rules for the exchange of power. For example, there is a *Tripartite Agreement Between ZESCO-SNEL-ZESA Relating to the Payment for the Wheeling of Power From Zaire to Zimbabwe Through the Zambian Syste*m. The SAPP agreements contain provisions relating to membership rules and operating guidelines for regional exchanges of power. The Bulk Supply Agreement between ZESCO and CEC is also representative of existing agreements which deal with open access issues and the wheeling of power through third party systems. This BSA requires CEC to make transmission capacity available to ZESCO for international power exchange on the Luano-Karavia 220 kV line, as well as for ZESCO to supply power to its domestic customers using CEC's system. The CEC is entitled to compensation for these services, and this is spelled out in the BSA.

Nevertheless, these examples illustrate that there are no detailed, central guidelines for an open access regime pertaining specifically to the Zambian market. First, each Option presented envisions direct access between suppliers and end-users. This would apply to IPPs, ZESCO (Option 1), or unbundled generators from ZESCO (Options 2 and 4) selling to industrial customers, an unbundled distribution company, or a buyer beyond the borders of Zambia. In the current legal and regulatory framework, there is no stated, explicit right of direct access. Second, whatever rules are in place are contained in various bilateral agreements (and in the case of SAPP, a regional accord). What is lacking are unifying rules and principles for an open access regime in the Zambian electricity sector.

Functional Unbundling – If Option 1 is implemented, this will entail the rigid requirement that ZESCO functionally unbundle. ZESCO's Market Operator and System Operator roles (M&SO) become multiparty services charged to market participants. Market Rules will specify the functional separation required. Specifically, the M&SO functions must be properly organized and given enough independence from the rest the company to ensure market participants that its services are provided with complete transparency and according to the Market Rules. The M&SO functions are a completely regulated activity.

It should be noted that since Options 2 and 4 call for complete unbundling into separate companies (not just functions within the same entity), the same separation of roles is

undertaken. Indeed, the same kinds of market rules will apply in this case as well. The difference is that in Options 2 and 4, the potential for conflicts of interest is somewhat reduced, and regulatory oversight is relatively easier with the creation of entirely separate companies to carry out various activities.

Each of Nexant's Options envisages a corporatization/commercialization Phase as a prelude to, and an integral component of, the privatization process. While the current PC does require ZESCO to undertake a process of functionalization, involving the establishment of separate sets of accounts, this process will have to become far more rigorous and proceed apace in order to prepare the utility for the privatization process. There are also numerous legal steps involved in the corporatization process which need to be undertaken commensurate with the commercial unbundling process.

Other Wholesale Market Rules – The eventual creation of a wholesale market with direct access among parties requires rules directing the bilateral transactions between market participants. These include clearly specified rules for fair dispatch, access to ancillary services, and accepted methodologies and principles for charges relating to wheeling services, connection to the system, use of assets, quality of service, and system expansion responsibilities. Market Rules do not currently exist in the detail sufficient to accommodate such changes.

General Regulations

As discussed in Section 3.1, there are a number of weaknesses in the current legal and regulatory framework which need to be addressed regardless of the privatization option implemented. However, it is important to emphasize here that none of the three Options will succeed unless the basic, foundation of the framework is strengthened by addressing those weaknesses.

It is extremely important that the GRZ establish and implement an effective legal and regulatory foundation for ongoing industry activity in advance of (or in conjunction with) the privatization process. These "rules of the game" are the primary point of leverage for Government policy. They must be developed and specified in a manner that protects the interests of both consumers and investors. Since the ability of any set of physical assets to generate revenues and profit is highly dependent on the legal environment in which it operates, the rational development and clear specification of Government policy and regulation is vital in determining the attractiveness of privatization proposals to potential investors.

In this Section, Nexant provides recommendations for strengthening the legal and regulatory framework in Zambia. We have organized this Section in two parts: first, we present proposals to address those general weaknesses in the existing framework, and then we provide recommendations that address deficiencies related to our three privatization options. A summary of our recommendations is depicted in Exhibit 4-1.

4.1 *Recommendations to Address General Weaknesses in the Legal and Regulatory Framework*

4.1.1 Develop More Detailed Water Policy Framework with Respect to Hydropower Generation and Linkage to the Electricity Sector.

Nexant understands that a review of the Water Act a broader water policy framework is underway. We support this effort, but urge that it be completed in an expedient fashion in order to accommodate the rapid and pending changes in investment in the power sector which are likely to occur over the next several years. It is imperative that a more detailed water policy which addresses water for hydropower generation use is developed consistent with the GRZ's policy in the electricity sector.

One concept which has been considered by the GRZ in the past is the establishment of a Kafue River and/or Catchment Authority. An organization of this type could centralize in one place all of the agencies with a role in analyzing and determining the use of water on the Kafue River. There are several reasons arguing for such an institution: the catchment supplies most of the power in Zambia; it is the main water source for over 50 percent of Zambians; it is the most utilized river in Zambia; there are many competing water users (current and future); and the entire catchment will come under increasing pressure from agriculture and forestry in the future (due to its location near to the bulk of the urban population), which could have implications for dam siltation, nutrient loading, runoff etc. Moreover, the whole Kafue Flats issue needs serious consideration - the socio-economic environment and ecology have been seriously affected, and increases in mining activity could have a great effect on water quality and water use.

441

Exhibit 4-1 Summary of Recommendations for Legal and Regulatory Framework

GENERAL RECOMMENDATIONS	
Issue/Problem	***Legal / Regulatory / Institutional Change Required***
1. Lack of detailed water policy linked to, coordinated with, the electricity sector.	Develop more detailed water policy framework with respect to hydropower generation, and linkage to the electricity sector. Consider the formation of a Kafue River/Catchment Authority.
2. GRZ with role in regulation; lack of institutional independence of the ERB.	Remove the role of the Minister in regulation; amend Electricity Act and Energy Regulation Act.
3. Institutional overlaps.	Eliminate overlaps between MEWD and ERB by: (a) amending the Electricity Act and Energy Regulation Act to remove the role of the Minister; and (b) transferring responsibility for oversight and enforcement of the ZESCO Performance Contract to the ERB. Later, the PC should be eliminated altogether as an unnecessary regulatory instrument. Eliminate overlap between OPPPI and IC by establishing the OPPPI as a specialized unit within the IC; and having the IC report directly to the Office of the President. OPPPI to be one-stop shop for investors in new generation and transmission projects.
4. Inadequate coordination mechanisms.	Establish coordination mechanisms between the ERB and ECZ, ZCC, and ZBS consisting of: (a) developing an MOU clarifying respective roles; (b) utilizing stakeholder committees led by the ERB; (c) specifying the ERB as the lead regulatory agency in the power sector, with final authority to issue directives/rulings, penalties, etc.; and (d) specifying the requirement that ERB leverages the expertise of other agencies in monitoring & enforcement. Specify licensing sequencing process for investors in new generation and transmission
5. Lack of specificity in ERB guidelines / procedures.	Establish detailed procedures for tariff approach, appeals/dispute resolution, capital expenditure planning, enforcement/penalties, consumer affairs/accountability, and appointments and financial independence.
6. Insufficient institutional capacity.	Develop an institutional strengthening program for ERB, DOE, and OPPPI. Should comprise extensive training, as well as identification of required computer based equipment and software, and communications needs.

442

Exhibit 4-1 Summary of Recommendations for Legal and Regulatory Framework (continued)

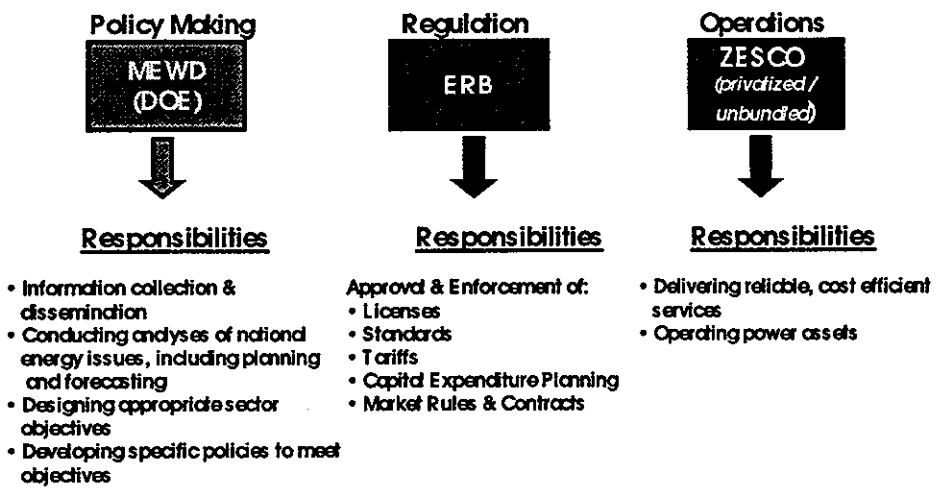
SPECIFIC RECOMMENDATIONS to ACCOMMODATE OPTIONS	
Issue/Problem	*Legal /Regulatory /Institutional Change Required*
1. Need to prepare ZESCO for privatization.	Implement corporatization steps, including legal, financial and technical. Designate the ZPA the lead institution responsible for developing and implementing privatization transaction. ZPA to lead in development of transaction documentation, such as public awareness, data room, concession contracts, sale documents, etc. ERB granted authority to review and approve concession and sale documents. Extend the mandate of the Privatization Trust Fund as a mechanism for selling residual GRZ ownership in privatized ZESCO to Zambians.
2. Gaps in existing legal and regulatory framework.	Specific policy required allowing direct access, including right to export; Develop market rules for open access; documents/contracts required include Grid Code, Ancillary Services Agreement, Connection and Use of System Agreement; ERB must be designated as responsible party for developing & approving rules and regulatory instruments; Further legal review required to assess impact of ZESCO privatization on SAPP membership.

443

4.1.2 Remove the Role of the GRZ in Regulation

There needs to be as much separation as is feasible in the Zambian context of three distinct functions: policy making, regulation, and operations. Nexant recommends that the GRZ amend the current framework or legislation to diminish or eliminate the role of the MEWD (Minister), and improve the independence of the ERB. The re-aligned framework should strictly identify the roles of the GRZ as policy maker for the energy and water sectors, the ERB as the regulator monitoring and ensuring the implementation of these policies, and the sector undertakings as the operators of utility services (see Exhibit 4-2).

Exhibit 4-2
Zambia Electricity Sector:
Recommended Division of Responsibilities



It is important to note that this recommendation does not diminish or eliminate the role of the GRZ in the electricity sector. On the contrary, it more clearly defines the role of the Government, and that role is critical to the smooth functioning of the sector. Governments have the vital role of determining policy direction. By having institutions such as the MEWD (DOE) establish policies in advance, and by preventing special interests from influencing the regulator's case-by-case application of those policies, Government promotes the nation's long-term interest in achieving an adequate supply of power at the lowest possible cost.

Specifically, the MEWD will be responsible for developing national power sector plans that will establish sectoral investment priorities. In particular, the MEWD will be responsible for developing plans and policies for rural electrification, as well as designing and implementing a

444

program for funding rural expansion programs. Given the low level of electrification in Zambia, this is a critical responsibility.

4.1.3 Eliminate Institutional Overlaps

There are two primary instances where this issue is a problem. Below we outline our proposals for addressing each.

Ministry of Energy and Water Development (MEWD) and the Energy Regulation Board (ERB)

As described in Section 3.1.4.1, the language of the EA and ERA is very broad, resulting a lack of clarity and/or conflict over the roles of the MEWD and ERB. In addition, there are instances, such as in the enforcement and penalty areas, where it appears the both entities have authority of action. It is our recommendation that, to the best of the GRZ's ability, this situation be addressed by clarifying the respective roles of the MEWD and ERB. In line with our comments on Recommendation 2 above, we strongly urge that this be accomplished by removing and/or significantly reducing the role of the Minister (MEWD).

In addition, there is a clear overlap in the regulatory role of the GRZ (MEWD and the MFED)—in its oversight of the ZESCO PC—with the general mandate of the ERB. In addition, performance contracts suffer from several disadvantages, and the ZESCO PC is no different. The use of a performance contract does not improve the transparency of regulation. Performance contracts are established through negotiations among a limited number of parties, rather than through rigorous regulatory proceedings in which all interested parties can participate. Unlike directives and regulations, the results of negotiating a performance contract do not have to be explained in writing and cannot be challenged as not satisfying defined legal standards. Given these characteristics, they can be very difficult to enforce and this has clearly been the case with the ZESCO PC. Even though the GRZ has asked the ERB to participate in the Performance Contract Review Committee, this does not necessarily enhance enforcement or eliminate the overlap.

Thus, it is our recommendation that the oversight and enforcement of the PC be transferred solely to the ERB. Over time, the PC should be eliminated altogether as a regulatory instrument.

Office for Promotion of Private Power Investment (OPPPI) and the Investment Center (IC)

There are essentially two paths available to eliminate the clear overlap in the respective mandates of the OPPPI and IC. First, since the role of the OPPPI is so focused on one sector, with a specialized mandate and high profile investment portfolio, it could be argued that the role for the IC is not needed and, in fact, simply provides another bureaucratic hurdle for an investor. The advantage to this is that the OPPPI truly becomes the one-stop focus for an investor. However, this approach has the major drawback that the IC has a legal mandate under the IA to receive, review, and approve all applications for investment in Zambia. Making an exception for investment in the power sector may entail a long legal process for amending the Investment Act.

A second approach recognizes that, although the IC does not necessarily possess the technical expertise required to assist in most of the technical aspects of private power investment, the Center does have an established infrastructure and professional staff with broad financial and transaction capabilities. Thus, in this approach we support moving the OPPPI under the

445

auspices of the IC, functioning as a specialized, technical unit within the Center, and leveraging its existing resources. This would mitigate the OPPPI's need to add large numbers of staff, and would reduce the current burden on the OPPPI to develop its physical infrastructure and resources (i.e., computer based, communications, furniture, etc).

The disadvantage to this approach is that the OPPPI is currently under the MEWD while the IC is within the portfolio of the MCTI. One way to avoid this problem is to move the IC (with the OPPPI unit) to report directly to the Office of the President. This administrative stroke has been utilized in several cases before for issues with major national prominence which require the imprimatur of the President's office (e.g., the Presidential Housing Initiative).

Nexant recommends that the GRZ strongly consider placing the OPPPI within the Investment Center, and that the Center itself report to the Office of the President.

4.1.4 Establish Coordination Mechanisms

As pointed out, with numerous institutions playing key roles in regulating the sector, there is a need for well-defined linkages, coordinating mechanisms, and procedures for interaction. In developing an overall approach to address this problem, we have been guided by several key principles. First, it is critical that information be shared among the various players. This is important in order to ensure that regulatory functions are being implemented efficiently and in a transparent manner. Over time, sharing and making information publicly available will engender trust in the system—both from investors and consumers. We strongly recommend the preparation of written documents wherever feasible, and the exchange of these documents. Written reviews, periodic reporting requirements, comments, approvals, requests for information and/or clarifications, and legal contracts and agreements should form a core, commonly-understood blueprint for information flows. Second, there are limited financial and human resources available in the power sector in Zambia to staff numerous organizations. By definition, then, it will be necessary to implement an approach which leverages existing resources and the expertise of each entity.

Coordination between the ERB and the ECZ, ZCC, and ZBS

The ERB and ZBS have implemented a commendable process for working together, elements of which Nexant recommends be instituted for collaboration with the ECZ and ZCC. As discussed, the ERB and ZBS formed a stakeholder committee to develop standards for quality of service, and power quality and reliability. The ERB utilized the specialized expertise of the ZBS in this process, and the ZBS has also assisted the ERB in monitoring efforts. The ZBS has stated that it views its role as assisting in the development of standards and in monitoring, but not in enforcement and issuance of penalties. If asked to assist in the ERB in an inspection capacity, it will render an opinion on its finding to the ERB – but from that point, the ERB is solely responsible for regulatory activities. The ZBS has proposed that a Memo of Understanding between the two institutions be signed formalizing this understanding of their respective roles.

The most significant need for coordination is between the ERB and the ECZ and ZCC since each of these institutions has a direct regulatory role assigned to it in legislation. Nexant recommends that, as in the case of the collaborative effort with the ZBS, the ERB formulate a joint stakeholder committee at the outset to develop operating procedures and, in the case of the ECZ, environmental standards. A clear understanding of the role of each entity in the regulatory process should be spelled out in a Memo of Understanding.

446

Nexant recommends that the founding principles of such an MOU should specify the following. Since the ERB is the principal institution charged with regulating the activities of power sector operators, it should be the first line of monitoring and enforcement in the power sector. In instances where an operator appears to engage in activities in violation of established environmental policies and standards or anti-competitive behavior (and therefore the conditions of a license) the ERB should consult with (or refer these cases to) the ECZ and ZCC, respectively. Further procedures and coordination mechanisms should be established to subsequently review and investigate the case and, if necessary, take action. The ERB should be the responsible party in establishing any joint committees reviewing such cases, but the intent is for the Board to utilize the respective skill base in each entity to review specific technical issues in environmental standards or competitive behavior. This could include the use of inspectors from these organizations to assist the ERB on the ground.

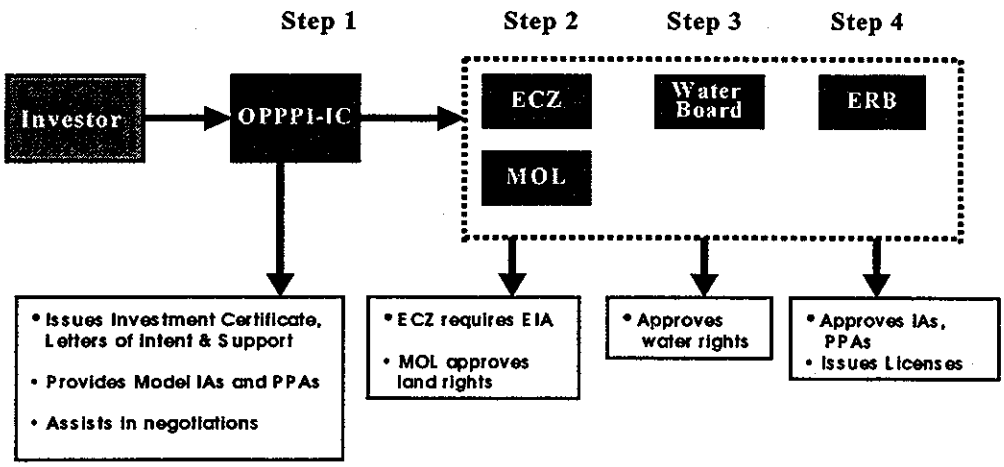
Once specific issues are reviewed, the decision should be rendered by the ERB. Any accompanying penalties should be determined by the ERB (in consultation with the other agencies), and issued by the ERB. Our recommendations center on the premise that the ERB is the main and sole point of contact with the operators (since the operator is in the power sector). This is to streamline the regulatory process, centralize communications, and reduce the intrusiveness of the regulatory process by limiting the number of agencies with direct monitoring, investigation, and enforcement powers over sector operators.

Licensing Sequencing.

The first point of contact for a private power investor (in hydropower generation or transmission) will be the OPPPI-IC, [1] where the developer will apply, register and receive an Investment Certificate and Letters of Intent and Support. The OPPPI-IC will then assist the investor with necessary approvals and permissions as depicted in Exhibit 4-3. As illustrated, Nexant supports the mandate of the OPPPI-IC as the main institution assisting the investor with securing the necessary approvals and licenses in the power sector. We also propose that the sequencing specify that, by the time an investor is applying for a License from the ERB, the approvals and rights outlined in Steps 1-3 have been obtained. In this fashion, the ERB can then utilize the License as an all-encompassing regulatory instrument, and include in the terms and conditions of the license the requirement that the licensee adhere to all of the conditions negotiated in Steps 1-3.

[1] Nexant distinguishes between private participation in new projects – for which the OPPPI is the main entity responsible for interacting with (and assisting, the investor), and the privatization of ZESCO's existing assets. The process for the latter is different (see Section 4.2, Recommendation #2).

Exhibit 4-3
Licensing Sequence for Private Investors in Generation and Transmission



4.1.5 Establish Detailed Procedures for Various ERB Functions.

The ERB needs to develop specific procedures and guidelines for various key regulatory functions it will be responsible for. Below we summarize the most critical issues and offer proposals to address them.[1]

- *Tariff Regulatory Approach / Methodologies.* There are essentially two basic models for tariff regulation: cost-of-service, as typified by US regulation, and indexation, as typified by UK regulation. The advantages and disadvantages of both are well-documented. The critical issue for Zambia is to specify the regulatory approach, and make provisions for how this approach will be implemented.
- *Appeals / Dispute Resolution.* Greater specificity in the appeals and dispute resolution process are required. Fr example, regulated companies should have the right to participate in any proceeding affecting their interests and to appeal the regulator's decisions to the courts. The Government should explore having appeals proceed to the highest court of appeal directly. The ERB should be responsible for resolving service disputes, although the courts should remain the primary forum for resolving contractual disputes between parties to those contracts. Nevertheless, given that the ERB will develop as the agency with the most centralized expertise in the power sector, it may also be advisable to allow power sector entities to bring contractual disputes to the regulator.

[1] We understand that the Swedish aid agency (SIDA) is working with the ERB on addressing these and a variety of other issues.

448

- *Capital Expenditure Planning.* Regulation must protect consumers from imprudent investments. This can be done by empowering the ERB to evaluate individual investment decisions as part of the process of determining tariffs, or to review and approve investment and resource acquisition programs. Nexant recommends that the regulatory framework specifically specify how investments and resource acquisition programs will be reviewed and approved by the ERB. The regulated companies can be made primarily responsible for planning new investments to satisfy the power sector's needs, and the procedures for this process could specified in the operators' license.
- *Enforcement / Penalties.* The ERB must be able to design enforcement action that reflects the severity of the violation or offense. Enforcement action may include monetary penalties, orders dictating certain action, divesture of assets, and, under extreme circumstances, revocation of Licenses (there are provisions for the latter in the ERA). This enforcement authority must be specified in the legislation and clearly identify who has the authority to: (a) determine whether there has been a violation of the regulator's decision, (b) determine the appropriate remedy in response to the violation and to issue an order imposing that remedy, and (c) carry out the remedial order, e.g. by sequestering funds or other assets for nonpayment of fines or taking other actions appropriate for willful disregard of the remedial order.
- *Consumer Affairs / Accountability.* Regulatory proceedings should be conducted with the opportunity for the public to observe those proceedings. The GRZ should also give consideration to the allowing the public access to voting by the Board members. The regulatory framework should specify the requirement for written decisions precisely stating the result and the bases for the decision. The written decision must then be made available for public review.[1]
- *Appointments and Financial Independence.* The ERA should specify a requirement for the Minister to nominate a new member within a pre-specified period of time upon the expiration a member's term. We recommend that all Board members be full-time since regulation of the electric power industry in Zambia will be a full time undertaking. A greater degree of insulation from changing political environments, i.e., administrations, could be achieved through the institution of staggered terms. Finally, the salaries of the individual board members should be fixed in advance, at levels appropriate to attract individuals with significant expertise and integrity.

4.1.6 Develop an Institutional Strengthening Program for ERB and MEWD (DOE and OPPPI)

It is absolutely critical that the institutions playing a role in the regulatory framework in Zambia have the institutional capacity to carry out their mandated roles. Nexant recommends that training of staff form the crux of a phased institutional strengthening program. This program should focus on the staff of the OPPPI, the DOE, and the ERB. Below, we highlight the principal topical areas for training.[2]

[1] Some matters may not be appropriate for written decisions. Those areas for which written decisions are usually not required are specified in the enabling legislation that creates the regulator.

[2] Staff at each of the agencies could benefit from the courses listed below, not simply the ERB.

- Customer service (customer service issues with emphasis on complaint investigation and resolution)
- Tariff setting methods, tariff economics, electric tariff design, cost of service, marginal costs
- Utility operations including specific courses in fuels management, operations forecasts, materials management, reliability measurement;
- Utility financial statements, depreciation, utility financing, cost of capital, long range financial forecasting
- Load forecasting, capacity planning, transmission planning, distribution planning, analysis of alternatives, decision analysis.

In addition, each institution will require support staff with adequate knowledge and expertise in a variety of areas, including:

- Accounting and software training
- Computer-based programs for office productivity software
- Specific application training, for example for document management systems and messaging systems

Provision of adequate computer, communications and office equipment is critical to effective institutional operation, particularly in light of the new regulatory regime being implemented in Zambia. Telephone communications infrastructure may need to be improved in all three agencies to assure that all staff members have direct access to telephone sets and that adequate conferencing facilities are in place. An infrastructure comprising desktops, local area network, servers access to email and a variety of software packages is essential to enhance capabilities beyond the now mainly paper-based workload in a more expedient manner. In addition, the intercommunications paths will permit each agency to pass and share documents electronically. The use of email and scheduling software will further streamline the work effort and will aid in tracking assignments and delegated work.

4.2 *Recommendations to Address Deficiencies in Existing Legal and Regulatory Framework vis a vis Nexant's Proposed Options*

4.2.1 Develop Market Rules for Open Access Regime

The open access regime must specify who is eligible for transmission service, identify the obligations of participants (especially for transmission capacity expansion), pricing (wheeling charges), and regulatory oversight. The regime should also explicitly state the right of market participants to sell to customers outside of Zambia. The rules governing the market should be developed, monitored and enforced by the ERB. The market rules need to address the following areas:

- Information handling requirements (technical and commercial information);
- Open access to the M&SO databases, reports to the market participants, etc.;

- Rules for the technical operation (including ancillary services) of the system according to the quality of service criteria enforced by regulation (for normal and emergency system situations);
- Commercial operation (dispatch rules, spot prices, ancillary services transactions, etc.; and
- Market administration (metering requirements, settlement, guarantees, payments, etc).

Specific documents required to effect Market Rules include:

- *Grid Code* -- A grid code organizes all pertinent rule and procedures systematically in a single, consistent document. Compliance is mandatory for the System Operator and all users of the grid. Procedures and regulations support a fair, non-discriminatory and transparent system of grid dispatch. The grid code contains rules and principles governing the relationships between all grid participants, to which all participants are committed. It specifies the responsibilities, day-to-day procedures and technical requirements for both planning and operations, and covers both normal and exceptional circumstances.
- *Ancillary Services Agreement* – Whether an vertically-integrated, private ZESCO or an unbundled segment of ZESCO (perhaps ZESCO Transmission) has responsibility for dispatching the system and simultaneously maintaining system frequency, there will be a need to source and call on various ancillary services. These include, at a minimum, operating reserves, load /frequency control, regulation, reactive power, black start. The Agreement will assign responsibility for calling on services and assignment of responsibility for providing the called-for service.
- *Transmission regulation* -- Under the multiparty model, the use of the transmission network is shared by all market participants. Since the Asset Owner is providing the network to other parties, the relationship between the parties must be clearly defined, including: specifying technical requirements for new comers to comply with for using the transmission capacity; identifying the quality of service the Asset Owner is obliged to provide; and establishing the methodology for the regulated charges (tariffs) the users must pay for use of the system. Moreover, the need for the functional separation of the asset ownership role is clearly evident since the open access service provided is a regulated activity

  A specific document required to effect transmission regulation is *Connection and Use of System Agreement*. Power is allowed onto the transmission system under this Agreement between the generators and the asset provider. The Connection and Use of System Agreement specifies the charges payable by users for use of the grid. Charges are set according to principles established by the ERB (and could be added to the conditions of a license. Any disputes about the right to be connected to and use the system or the charges to do so are resolved by the ERB.

4.2.2 Extend the Privatization Trust Fund.

Section 29(1) of the Privatization Act states that the "Minister responsible for finance shall establish a Privatization Trust Fund (PTF) in which the Government shall hold shares in trust for citizens of Zambia for divestiture after a state-owned enterprise has been privatized."

451

This purpose of the PTF has primarily been to establish a warehouse, or central repository, of those shares the GRZ holds in privatized companies. The Fund provides a mechanism by which the shares cannot be sold or transferred by, or for the purposes of, the Government. Rather, the PTF is managed by an independent Board. Shares may be offered to citizens of Zambia, and this can include sub-categories such as management and employees of the privatized SOE.

The advantage of the PTF is that it provides a mechanism that is insulated from Government use. The drawbacks are that its use has been limited and relatively conservative in the past two years, and that the PTF is expected to expire in March of 2001. At that time a decision will need to be made by the MFED on the merits of extending its mandate.

Nexant supports the use of the PTF as a valuable component in the privatization of ZESCO. This will require extending its mandate beyond the current date. Options 2 and 4 foresee that the Government will initially maintain some ownership in the privatized entities, and then eventually this level of GRZ ownership will be reduced through the sale of shares to local investors. The PTF compliments this strategy and provides an existing mechanism to carry it out.

Private Participation Options Study for the Zambia Electricity Supply Company

Task 4A Report- Market Valuation

453

Table of Contents

1 Introduction.....1-1

2 Summary of Results.....2-1

2.1 Approach..... *2-1*

2.2 Generation..... *2-2*

2.3 Transmission..... *2-4*

2.4 Wholesale Marketing..... *2-5*

2.5 Distribution and Customer Services..... *2-5*

2.6 Summary..... *2-7*

454

Section 1 Introduction

The purpose of this report is to present the results of the market valuation analysis. This analysis utilized the financial model developed in Task 1 and the detailed analysis of option in Task 2B to project the discounted cash flow for the various components of the power system under a range of circumstances.

The results of this analysis are summarized in Section 2.

455

This section summarizes the results of the market valuation.

2.1 *Approach*

The market value estimates made in this report are based on the value of the cash flow generated by a given asset with an upper limit placed at its replacement value. This is discussed in more detail in the following paragraphs.

The value of an asset to an investor is a function of the cash flow that is generated by that asset as shown by the following formula:

$$\mathbf{V = SUM\ over\ remaining\ life\ of\ asset\ [\ (P_k + D_k - T_k - I_k)/(1+i)^k]}$$

where:

V = value of future cash flow

P_k = profit before taxes in year k

D_k = depreciation in year k

T_k = taxes in year k

I_k = investment requirements in year k

i = discount rate taken to be the weighted cost of capital for the investor

In words, the cash flow in any given year is made up of the profit before taxes plus depreciation minus any taxes and investment. The discounted value of the projected cash flow generated by a given asset represents its value to a potential investor.

Higher investor risk is reflected in a higher weighted cost of capital. The assumptions concerning cost of capital for the base case analysis in this section are presented in Table 2-1. We have conducted sensitivity analysis over a range of real weighted cost of capital values from 8% to 15%.

The replacement value of an asset is generally the upper limit of its market value. For example, if a given asset can generate a cash flow worth $100 to an investor, but can be replaced for $50, an investor would be unwilling to invest $100 in the asset. An informed investor would replace it rather than pay this value.

456

Table 2-1. Weighted Cost of Capital

	Generation, Transmission, Wholesale Marketing	Distribution & Customer Service
Equity[1]	20%	30%
Senior debt[2]	40%	35%
Subordinate debt[3]	40%	35%
Weighted cost of capital	14.20%	16.18%
General inflation rate	3.00%	3.00%
Real weighted cost of capital[4]	10.87%	12.79%

1. Equity return = 30%
2. Cost of senior debt = 10.5%
3. Cost of subordinate debt = 10% (from IFC)
4. Real weighted cost of capital = (1+ weighed cost of capital)/ (1+general inflation rate) -1

2.2 *Generation*

Generation assets are sold under Option 2 in 2003/04 and Option 4, Stage 2 in 20012/13. Table 2-2 shows the results of the market valuation estimates for these two times of sale for two different generation pricing assumptions.

The first pricing approach is cost-based with profit based on a 6 percent real return on revalued assets. Assets were revalued to depreciated replacement cost under this approach for estimating profit and depreciation levels.

The second generation pricing approach is based on the projected marginal generating cost for the region. This is projected to increase over the next decade, as discussed in the Task 1 Report- Situation Assessment. Profit levels are projected to be much higher under a market pricing approach with the value of the asset increased according. However, the value of the future cash flow exceeds the replacement value of the generation assets in this case. Therefore, the replacement value is a reasonable proxy for the market value.

Market pricing of generation would either result in a significant increase in retail prices, or a further deterioration of the financial health of the distribution and customer service function. Market pricing would also adversely impact the profitability of the contract with CEC. For these reasons, we judge that continue cost-based regulation of generation will be required. This is discussed in detail in the business case analysis of the Task 2B Report- Detailed Options Assessment.

457

Table 2-2. Market Value of Generation Assets

	Sale at end of 2003/04 (Option 2)		Sale in 2012/13 (Option 4)	
	Regulated generation prices[1]	Market generation prices[2]	Regulated generation prices	Market generation prices
(thousands (US$)				
Present worth of cash flow	110,125	947,746	102,188	1,581,688
Replacement cost[3]		842,625		
Estimated market value	110,125	842,625	102,188	842,625

1. Regulated price is cost-based reflecting a revaluation based on depreciated replacement cost.

2. Market price is based on projected marginal regional generation price for medium growth. See Task 2B Report for more detailed description of assumptions.

3. Replacement cost of Kafue Gorge hydroelectric plant, Itezhi-tezhi dam, and Victoria Falls hydroelectric plant is based on survey by American Appraisal Associates (Task 4B). The depreciated replacement value of small hydro was assumed to be $3000/kW.

A higher weighed cost of capital reduces the perceived value of a given asset. This is illustrated in Figure 2-1 for ZESCO's generation assets. In increase of the weighted cost of capital from the approximately 11% of the base case analysis to 15% reduces the market value for a near-term sale (Option 2) from $110 million by nearly 25%. Higher perceived risk and lack of concessionary financing for subordinate debt would increase the investor's weighted cost of capital.

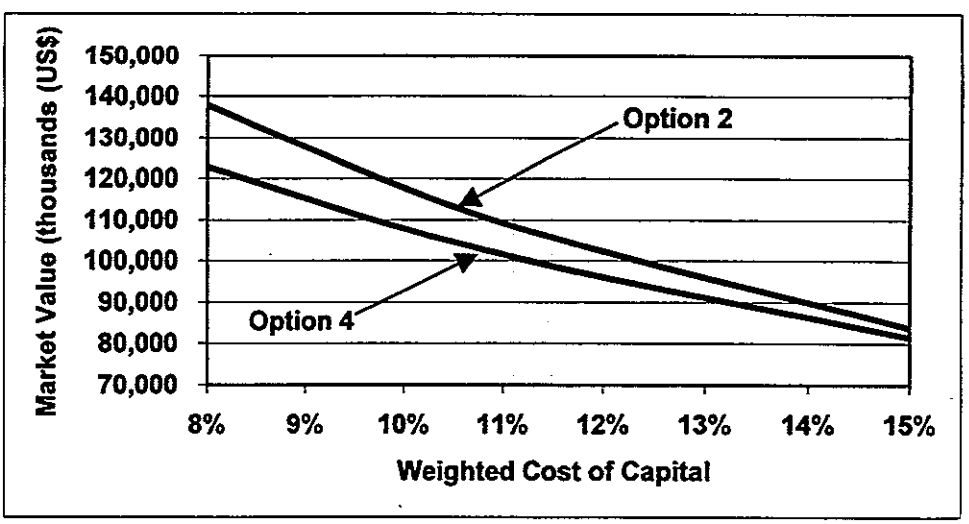


Figure 2-1. Weighted Cost of Capital Versus Generation Market Value (Cost-Based Pricing)

458

2.3 *Transmission*

The transmission system is to be concessioned separately under Option 2 and Option 4, Stage 2. None of the options considered contemplate sale of the transmission system. The value of the transmission system will affect the terms of the concession agreement. Table 2-2 shows the results of the market valuation analysis for transmission. The time of concession has little impact on its value to a potential concessionaire and this value a substantially less than its replacement cost.

Table 2-3. Market Value of Transmission Assets

	Market value at end of 2003/04	Market value in 2012/13
(thousands (US$)		
Present worth of cash flow	167,710	169,263
Replacement cost[1]	773,143	
Estimated market value	167,710	169,263
1. Replacement cost is from the Task 4B Report.		

Figure 2-2 illustrates the impact of the value of the weighted cost of capital on transmission system value.

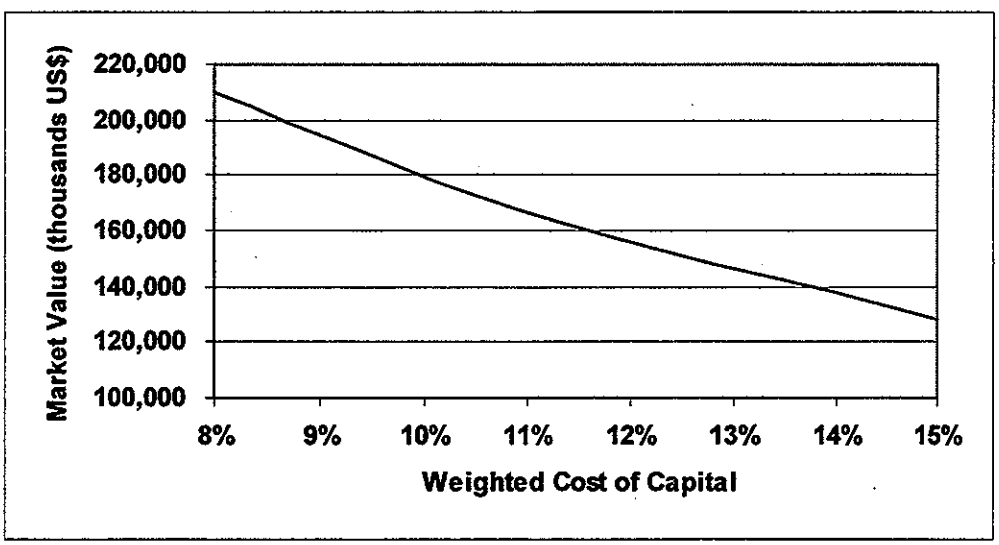


Figure 2-2. Weighted Cost of Capital Versus Transmission Market Value

459

2.4 *Wholesale Marketing*

ZESCO's contract with CEC has a value. We estimate this value to be about $100 million today assuming that the price of generation and transmission services continues to be regulated at approximately the levels estimated as transfer prices in Task 1. This will decline over time as the time remaining in the contract declines.

2.5 *Distribution and Customer Services*

The distribution and customer service function is to be concessioned separately in Option 2 and sold under Option 4, Stage 1. The value of this function is highly dependent upon retail tariffs and the cost of supply, primarily generation and transmission cost. Figure 2-3 shows the retail pricing scenarios considered in valuing the distribution and customer service function

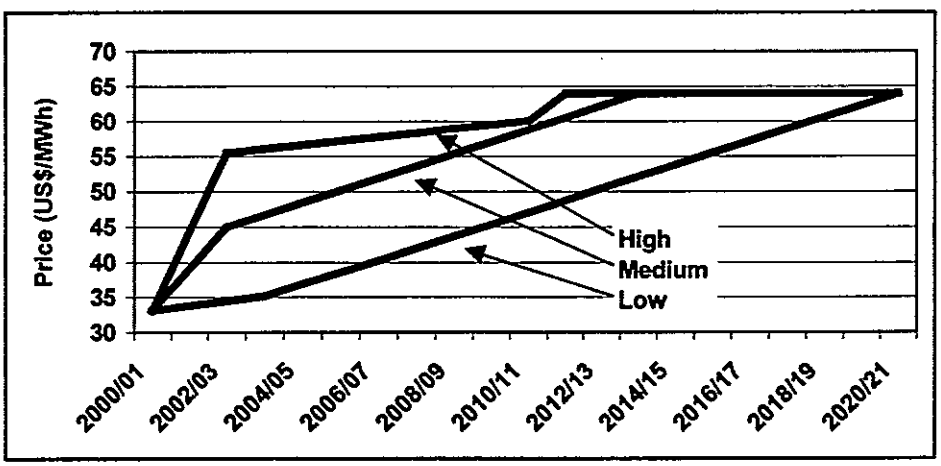


Figure 2-3. Pricing Scenarios for Options 1 and 4

Table 2-4 summarizes the market valuation analysis of this function for the three levels of retail tariff. The value of the projected cash flows is substantially lower than the replacement value of the distribution system. We projected an upward trend in retail pricing under all scenarios so that market value tends to increase over time, if only slightly. However, it should be recognized that there is currently public resistance to an Automatic Tariff Adjustment Formula intended to keep prices level in real terms. The distribution and customer service function would have a large negative market value if retail tariffs continue at the current level in real terms.

The value of future cash flow generated is substantially less that the replacement cost of distribution and customer service assets for all cases considered.

460

Table 2-4. Market Value of Distribution and Customer Service Assets

	Market value at end of 2003/04			Sale in 2012/13 (Option 4)		
Retail Tariff	Low	Medium	High	Low	Medium	High
(thousands (US$)						
Present worth of cash flow	31,096	341,204	363,973	159,788	360,026	371,188
Replacement cost[1]			1,190,623			
Estimated market value	31,096	341,204	363,973	159,788	360,026	371,188
1. Replacement cost is from the Task 4B Report.						

Figure 2-3 shows the impact of the weighted cost of capital on the projected market value of distribution and customer service assets.

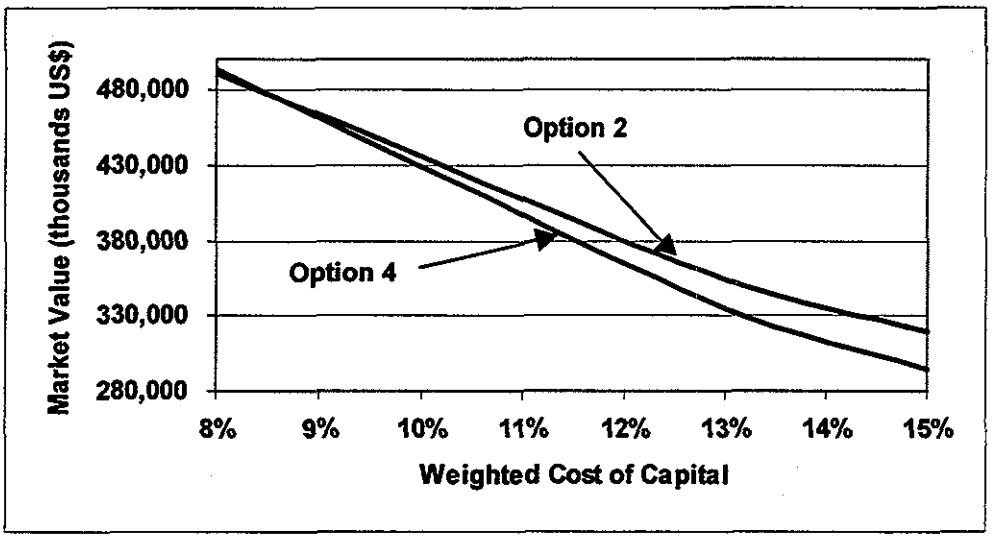


Figure 2-4. Weighted Cost of Capital Versus Distribution and Customer Service Market Value

461

2.6 *Summary*

Table 2-5 summarizes the market valuation results for all functions. The cost of operating isolated systems has been added to this table in order to get an approximate market valuation of all power related assets. Generation prices are cost-based. Wholesale marketing has been included with Transmission.

The estimated market values are well under replacement cost. They are also under the estimated depreciated replacement cost. For generation and transmission, this is because tariffs have been set based on a 6% return on revalued assets, while the investor/concessionaire's cost of capital is considerable higher than this level (i.e., the 6% return does not fully reflect investor cost). In the case of distribution and customer service, current retail tariffs do not cover full cost, reducing market value.

Table 2-5. Summary of Market Valuation, Replacement Cost and Depreciated Replacement Cost

	Market value at end of 2003/04	Replacement Cost[1]	Current Depreciated Replacement Cost[2]
Isolated Systems	(30,774)		
Generation	110,125	773,625	337,009
Transmission & Wholesale Marketing	267,362	773,143	385,898
Distribution & Customer Service	341,204	1,190,623	594,449
Total	687,916	2,737,391	1,317,355

1. Replacement cost based on results of asset survey summarized in Task 4B Report.
2. Depreciated replacement cost as of December 2000 (Task 4B Report).

462

ZESCO LIMITED
REPUBLIC OF ZAMBIA, AFRICA

Cost of Replacement and
Cost of Replacement Less Physical Depreciation

As of December 1, 2000

Prepared for

Nexant, Inc.
San Francisco, California

American Appraisal Associates®

CONFIDENTIAL BUSINESS INFORMATION

463

Private Participation Options Study for the Zambia Electricity Supply Company

Task 4B Report- Asset Survey

464

CONTENTS

	Page
APPRAISAL SUMMARY LETTER	1
INTRODUCTION	6
HISTORY/BACKGROUND OF ZESCO LIMITED	8
AREA DESCRIPTION	9
THE PROPERTY STUDIED	11
Kafue Gorge Hydroelectric Plant	11
Victoria Falls Hydroelectric Plant	11
Itezhi-Tezhi Dam	11
Transmission Lines	12
Transmission Substations	12
Distribution Lines	12
Distribution Substations	13
Line Transformers	13
Services	13
Meters	14
General Plant - Structures and Improvements	14
General Plant - Water and Wastewater System	14
General Plant - Contents	15
Construction Work in Progress	15
VALUATION INTRODUCTION	16
COST APPROACH	18
Introduction	18
Cost of Replacement	18
Cost of Replacement Less Physical Depreciation	20
CONCLUSION	22
APPENDICES	
A - Property Location Map	
B - Land-Based Photographs	
C - Assumptions and Limiting Conditions	
D - Certificates of Appraisers	
E - Qualifications of Appraisers	
GENERAL SERVICE CONDITIONS	

United States

Atlanta
Boston
Buffalo
Charlotte
Chicago
Cincinnati
Dallas
Denver
Detroit
Houston
Irvine
Jacksonville
Los Angeles
Milwaukee
Minneapolis
New Orleans
New York
Oak Lawn
Philadelphia
Pittsburgh
Princeton
St. Louis
San Francisco
Schaumburg
Seattle

American Appraisal Associates®
411 East Wisconsin Avenue
Suite 1900
P.O. Box 664
Milwaukee, Wisconsin 53201-0664

Telephone (414) 271-7240

International

Brazil
Canada
China
Croatia
Czech Republic
England
Germany
Greece
Hong Kong
Hungary
Italy
Japan
Mexico
Morocco
Philippines
Portugal
Russia
Spain
Taiwan
Thailand
Turkey
Venezuela

January 26, 2001

Nexant, Inc.
San Francisco, California

In accordance with your authorization, we have made a cost study of certain property of

ZESCO LIMITED

located in the **Republic of Zambia, Africa**, and submit our findings in this summary report.

This report is intended to comply with the purpose and reporting requirements set forth by the Uniform Standards of Professional Appraisal Practice ("USPAP") for a summary report. As such, it presents only summary discussions of the data, reasoning, and analyses. Supporting documentation concerning these matters has been retained in our work papers. The depth of discussion contained in this report is specific to your needs as the client and for the intended use stated. American Appraisal Associates, Inc., is not responsible for the unauthorized use of this report.

Based on the project requirements, this cost study was performed to express an opinion, as of December 1, 2000, of the cost of replacement and the cost of replacement less physical depreciation. Functional and economic obsolescence were not investigated or quantified. Our opinion of the cost of replacement and the cost of replacement less physical depreciation will not be considered an opinion of fair market value. It is understood this opinion will be utilized to assist Nexant in providing advice to ZESCO Limited ("ZESCO") regarding a possible privatization of assets and services, including the subject property.

Cost of replacement is defined as the estimated amount required to reproduce all of the subject property at one time with a modem new unit using the most current technology and materials that will duplicate the production capacity and utility of the existing subject property at current market prices for materials, labor and manufactured equipment, contractor's overhead and profit and fees, but without provision for overtime or bonuses for labor and premiums for materials or equipment.

Cost of replacement less physical depreciation is defined as the cost of replacement as defined above, less a loss in value resulting from wear and tear in operation and exposure to the elements.

The investigation included certain assets of ZESCO. ZESCO is a wholly government-owned electrical utility company in the Republic of Zambia, Africa. Formed in 1970 after the Zambia Electric Supply Act of 1969, ZESCO is responsible for the generation, transmission, and distribution of electricity in the Republic of Zambia. The subject property assets include two hydroelectric plants; a dam; and transmission, distribution, and other assets primarily along the north-south Kitwe-Lusaka-Livingstone corridor. Specifically, these assets include primarily two major hydroelectric plants at Kafue Gorge and Victoria Falls, a dam at Itezhi-Tezhi, transmission and distribution lines and substations, land improvements, buildings and structures, water and sanitary sewer systems at Kafue Gorge and Itezhi-Tezhi Dam, management housing, and vehicles; personal property comprising general property such as office furniture and equipment and computers; and certain construction work in progress as of March 31, 2000, associated with ZESCO. Excluded from the investigation were land, minor hydroelectric plants, minor diesel generation plants, idle thermal generation plants, certain transmission property accompanying the diesel and thermal generation plants, PCB storage facilities, street lighting, guest housing, permanent employee housing, non-ZESCO employee housing, training centers and their contents, inventories, supplies, receivables, and any intangible assets that exist. Also, based on discussions with Nexant and ZESCO, the generation and certain transmission assets of Kariba North Bank Corporation ("KNBC") and certain transmission assets of Copperbelt Energy Corporation ("CEC") are excluded.

Our report consists of

This letter, which identifies the property included in the study, describes the nature and extent of the investigation, and presents the conclusions

A summary report, which sets forth the purpose and scope of the cost study, a description of the property, a presentation of the techniques employed, and the conclusions

Appendices, comprising
Appendix A - Property Location Map

B - Land-Based Photographs

Appendix C - Assumptions and Limiting Conditions

D - Certificates of Appraisers

E - Qualifications of Appraisers

A statement of general service conditions

Before arriving at our opinions of the cost of replacement and the cost of replacement less physical depreciation, we personally inspected the subject property and considered the following factors:

Continued use of the property in its present location

Extent, character, and utility of the property

Highest and best use of the property

History and nature of the business and its industry

The estimated cost of replacement, where applicable, less an allowance for depreciation arising from condition, age, and wear and tear.

Capacity of the property as originally constructed and modified in subsequent years

Based on our investigation and analysis, it is our opinion, as of December 1, 2000, that the cost of replacement and cost of replacement less physical depreciation are reasonably represented as follows:

Description	Cost of Replacement ($000s)	Cost of Replacement Less Physical Depreciation ($000s)
ZESCO Assets		
Kafue Gorge Hydroelectric Plant	404,278	250,652
Victoria Falls Hydroelectric Plant	138,459	69,230
Itezhi-Tezhi Dam	214,087	107,044
Transmission Lines	513,575	256,787
Transmission Substations	254,729	127,364
Distribution Lines	838,588	419,294
Distribution Substations	41,252	21,451
Line Transformers	75,910	37,955
Services	141,856	70,928
Meters	57,219	28,610
General Plant - Structures and Improvements	43,455	22,597
General Plant - Water and Wastewater Systems	5,900	2,950
General Plant - Contents	8,083	5,173
Total ZESCO Assets	2,737,391	1,420,035
Construction Work in Progress as of March 31, 2000	14,254	14,254
Grand Total	2,751,645	1,434,289

Our opinions of the cost of replacement and the cost of replacement less physical depreciation are not to be considered opinions of fair market value. Earnings of the business, economic obsolescence, or going concern value were not considered in the study.

We have not investigated the title to or any liabilities against the property analyzed.

Respectfully submitted,
AMERICAN APPRAISAL ASSOCIATES, INC.

Michael J. Remsha, P.E., ASA, CMI
Vice President and Principal

January 26, 2001
044916

Investigation and Report by
Richard J. Palchak, P.E., ASA
Gregory W. Kort

INTRODUCTION

The study described in this report was made of certain property exhibited as that of ZESCO Limited ("ZESCO") located in the Republic of Zambia, Africa ("Zambia"). Based on the project requirements, this cost study was performed to express an opinion, as of December 1, 2000, of the cost of replacement and the cost of replacement less physical depreciation. Functional and economic obsolescence were not investigated or quantified. This opinion of the cost of replacement and the cost of replacement less physical depreciation will not be considered an opinion of fair market value. It is understood this opinion will be utilized to assist Nexant, Inc. ("Nexant"), in providing advice to ZESCO regarding a possible privatization of assets and services, including the subject property.

Cost of replacement is defined as the estimated amount required to reproduce all of the subject property at one time with a modem new unit using the most current technology and materials that will duplicate the production capacity and utility of the existing subject property at current market prices for materials, labor and manufactured equipment, contractor's overhead and profit and fees, but without provision for overtime or bonuses for labor and premiums for materials or equipment.

Cost of replacement less physical depreciation is defined as the cost of replacement as defined above, less a loss in value resulting from wear and tear in operation and exposure to the elements.

The investigation included certain assets of ZESCO. ZESCO is a wholly government-owned electrical utility company in the Republic of Zambia, Africa. Formed in 1970 after the Zambia Electric Supply Act of 1969, ZESCO is responsible for the generation, transmission, and distribution of electricity in the Republic of Zambia. The subject property assets include two hydroelectric plants; a dam; and transmission, distribution, and other assets primarily along the north-south Kitwe-Lusaka-Livingstone corridor. Specifically, these assets include primarily two major hydroelectric plants at Kafue Gorge and Victoria Falls, a dam at Itezhi-Tezhi, transmission and distribution lines and substations, land improvements, buildings and structures, water and sanitary sewer systems at Kafue Gorge and Itezhi-Tezhi Dam, management housing, and vehicles; personal property comprising general property such as office furniture and equipment and computers; and certain construction work in progress as of March 31, 2000, associated with ZESCO. Excluded from the investigation were land, minor hydroelectric plants, minor diesel generation plants, idle thermal generation plants,

certain transmission property accompanying the diesel and thermal generation plants, PCB storage facilities, street lighting, guest housing, permanent employee housing, non-ZESCO employee housing, training centers and their contents, inventories, supplies, receivables, and any intangible assets that exist. Also, based on discussions with Nexant and ZESCO, the generation and certain transmission assets of Kariba North Bank Corporation ("KNBC") and certain transmission assets of Copperbelt Energy Corporation ("CEC") are excluded.

HISTORY/BACKGROUND OF ZESCO LIMITED

ZESCO, a wholly government-owned electrical utility company in Zambia, Africa, was formed in 1970 after the Zambia Electric Supply Act of 1969. Formerly Zambia Electric Supply Corporation, ZESCO is responsible for the generation, transmission, and distribution of electricity in Zambia.

ZESCO provides over 70% of the generation and nearly 100% of the distribution of electricity in Zambia. The power system in Lusaka, Zambia, was originally installed in the 1950s and 1960s by British Engineering. In the northern copper mining area, Copperbelt Energy Corporation ("CEC"), a consortium including CINERGY from the United States and National Grid from the United Kingdom, owns and operates the subtransmission grid and a segment of the interconnection to the Democratic Republic of the Congo ("DRC"). Along the Zambia/Zimbabwe border, Kariba North Bank Corporation ("KNBC") owns and operates the 600-megawatt ("MW") Kariba Hydroelectric Generation Plant.

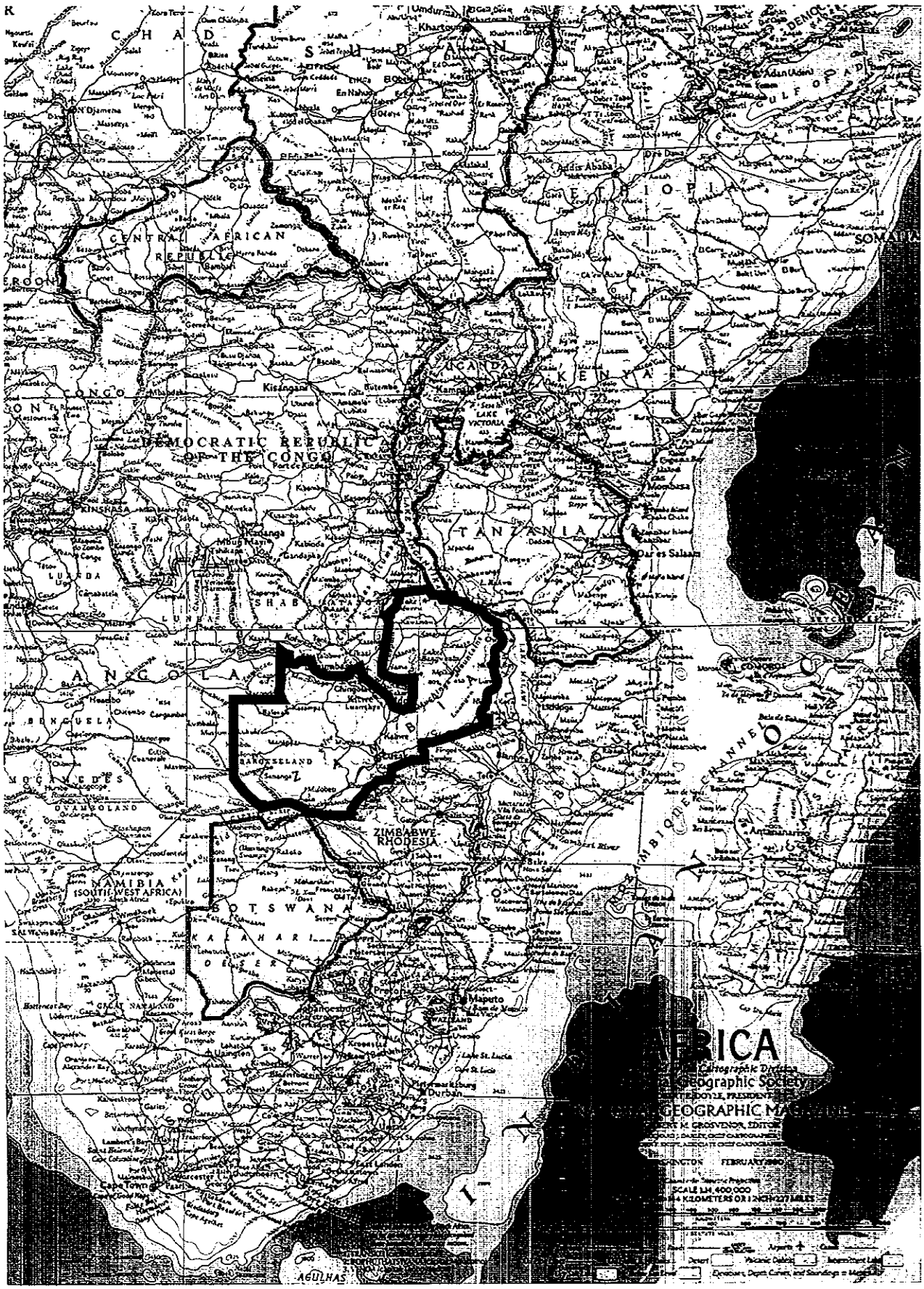
The Zambian economy as a whole and the power sector in particular are currently being reformed. The Zambia Privatization Agency's ("ZPA") goal is to sell off 280 government-owned enterprises, including the largest entities in the economy.

AREA DESCRIPTION

The subject property is located throughout Zambia in the South/Central region of Africa. Zambia is landlocked from the Atlantic and Indian Oceans by the bordering countries of Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, DRC (formerly Zaire), and Zimbabwe. Zambia covers approximately 752,614 square kilometers and has a combined population of over 9.6 million persons. Zambia comprises nine provinces consisting of Central, Copperbelt, Eastern, Luapula, Lusaka, Northern, North-Western, Southern, and Western. Major cities in Zambia include Lusaka, the nation's capital; Ndola; Kitwe; and Livingstone. The Copperbelt region comprises Kitwe, Ndola, and other cities in the Northern and Copperbelt provinces.

The economic base of Zambia is primarily based on the mining and processing of copper in the Copperbelt Region. Zambia also exports cobalt, tobacco, gemstones, timber, electricity, cement, and textiles. Copper is Zambia's principal export and major foreign exchange earner. The potential exists for agriculture and tourism. Despite progress in privatization and budgetary reform, Zambia's economy is still depressed. The recent privatization of the government-owned Zambia Consolidated Copper Mines should improve Zambia's future prospects. Inflation, at 27.4% and the unemployment rate, at 25%, remain high.

A map showing the location of the subject property in Africa is provided on the following page.



AREA MAP OF AFRICA

THE PROPERTY STUDIED

The property included in this study comprises assets of ZESCO; primarily two hydroelectric plants, a dam, transmission and distribution lines and substations, structures and improvements, and other assets as of December 1, 2000. A ZESCO property location map and land-based photographs of the subject property comprise Appendices A and B, respectively.

Kafue Gorge Hydroelectric Plant

The Kafue Gorge Hydroelectric Plant, situated on the Kafue River, has a total installed capacity of 900 MW. Originally constructed in 1972, the Kafue Gorge Hydroelectric Plant consists of four 150-MW generation units which were installed in 1972; two additional150-MW generation units were installed in 1977. In addition to the generating units, a dam, intake structures, tunnels, structures including management housing, and improvements make up the assets included with this location. The Kafue Gorge Hydroelectric Plant is in good condition overall.

Victoria Falls Hydroelectric Plant

The Victoria Falls Hydroelectric Plant, situated on the north bank of the Zambezi River, has a total installed capacity of 108 MW. Originally constructed in 1938, the Victoria Falls Hydroelectric Plant consists of 14 generation units installed from 1938 through 1972, intake structures, tunnels, structures including management housing, and improvements. The Victoria Falls Hydroelectric Plant is in fair condition overall.

Itezhi-Tezhi Dam

The Itezhi-Tezhi dam, a conventional rockfill dam located on the Kafue River, is 143 miles upstream from the Kafue Gorge Hydroelectric Plant. The dam was originally constructed in 1978 to provide storage and regulation of water for the Kafue Gorge Hydroelectric Plant. The dam is in fair physical condition overall.

Transmission Lines

Transmission lines consists of 330-, 220-, 132-, 88-, 66-kilovolt ("kV") high-voltage lines. The majority of these lines transfer electric power from Kafue Gorge Hydroelectric Plant north to the Copperbelt region of the country. According to government statistics, approximately 6,100 kilometers of transmission lines exist. The transmission lines are generally constructed using steel towers and aluminum core steel reinforced conductor. The physical condition of the transmission lines is considered fair to good overall.

Transmission Substations

The transmission substations are located at 45 sites primarily along the north-south Kitwe-Lusaka-Livingstone corridor. Six major substations step down the 330-kV transmission lines to 220 kV; the remainder of the substations step down the high-voltage electricity down to a lower voltage for ultimate distribution to customers. Assets included with the transmission substations include transformers, transformer bays, line bays, structures, and improvements. The physical condition of the transmission substations is considered to be good to fair overall.

Distribution Lines

The distribution lines consist mainly of 33-kV, 11-kV, 400-volt, and 230-volt voltages. In addition there are a small quantity of 3.3-kV distribution lines generally in the Copperbelt region. According to government statistics, approximately 19,000 kilometers of distribution lines serve customers situated throughout the country. The majority of these lines are overhead type construction; the remainder of the lines are installed underground. The underground line construction uses different insulation than the overhead lines. One type of insulation, paper, has been used in older underground cables and more recently has presented problems with faults, mainly in the rainy season of the year. In addition, in the process of constructing buildings and their associated water and wastewater piping and surrounding roads, underground cables have been cut, requiring repair. These splices or joints contribute to the increased faults that cause power outages. Distribution lines are generally constructed using indigenous wood poles with wood and steel crossarms. Alumunim Core Steel Reinforced ("ACSR") is the major type of conductor used in the construction of lines. Protective devices such as isolators, D-links, and auto-reclosers are used to protect the line

equipment during lightning strikes and other mishaps. The physical condition of the majority of the distribution line system is fair, while the 3.3-kV system located mainly in the northern portion of the country is in fair to poor condition. The 3.3-kV system is in the process of being upgraded to 11 kV.

Distribution Substations

Distribution substations at the 33-kV/11-kV voltage level are generally constructed of steel lattice component support structure, circuit breakers, main power transformers, and substation protective devices. These main units are connected by the use of underground cables to a control building on site. The 11-kV/0.4-kV and the 11-kV/0.23-kV voltage level transformer locations are either pole or ground mounted along with corresponding unit protection equipment. Ground-mounted transformer locations are either protected by a fence or a small building. Even with this protection, vandalism, particularly regarding the removal of insulating oil from the transformers, has continued to an accelerated degree in the last few years. The physical condition of the distribution substations is good to fair.

Line Transformers

Generally, the line transformers are in the 11-kV/0.4-kV and the 11-kV/0.23-kV voltage levels. The line transformers are located either on a pole or are ground mounted along with corresponding unit protection equipment. Ground-mounted transformer locations are either protected by a fence or a small building. Like the distribution substations, vandalism, in the form of removing insulating oil from the transformers, has continued to an accelerated degree in the last few years. The low oil level or lack of oil causes the transformer to overheat, and burn out of the windings occurs. The physical condition of the line transformers is fair.

Services

Services are considered that portion of the electrical line which starts at a pole or a ground-mounted transformer and ends at a customer's home, business, or factory. The majority of the services are residential. A majority of the residential services are constructed on overhead lines, including urban and rural/farming areas. The remaining residential services, the bulk of the commercial services, and almost all of the industrial or maximum-demand services utilize underground lines. Overhead residential services are generally four-wire

48

ACSR, and the underground commercial and industrial services are constructed of four conductor copper cables. The physical condition of the services is fair.

Meters

The single-phase meters used along with residential and some commercial services are rated at 20- to 80-ampere kilowatt hour. The commercial customers are metered using three-phase whole current kilowatt hour meters. Maximum demand customers are metered using 110- or 400-current transformer ("CT") operated meters. Some state-of-the-art CT-operated static meters have been installed that are able to capture and store technical data. In recent years, ZESCO has instituted a program to meter all of its customers. Currently, approximately over 80% of the residential customers are metered as compared with the overall customer metering of over 75%. The addition of more meters into the system has made the overall physical condition of the meters good to fair.

General Plant - Structures and Improvements

As of December 1, 2000, the subject property has over 75 freestanding buildings that were built as required from the 1950s to the present. The buildings are constructed of masonry, steel, wood, or various combinations of these materials. Major buildings include the main headquarters, regional headquarters, district offices, administration, general offices, vehicle garages, pump houses, medical clinics, machine shops, warehouses, and guardhouses. The majority of the buildings are of fair quality construction and have been adequately maintained over the years. Overall, the buildings' physical condition is considered to be fair.

Land improvements include concrete, asphalt, and gravel roads and paving; parking lots; landscaping; outdoor lighting; security walls; flagpoles; and underground utility piping. Overall, the land improvements are in fair condition.

General Plant - Water and Wastewater System

The water and wastewater system includes the assets at Kafue Gorge and Itezhi-Tezhi Dam. The water treatment system consists of filters, pumps, storage equipment, chlorination system, and piping. The wastewater treatment system consists of piping and primary treatment tanks. The water systems are in generally fair condition; however, the wastewater

systems have numerous underground pipe section separations that cause the system to either be totally inoperative or function below accepted levels. Therefore, the wastewater systems are in poor condition.

General Plant - Contents

The contents of ZESCO assets includes general property such as office furniture and equipment, computers, radio equipment, tools and other equipment, boats, and vehicles.

Construction Work in Progress

Construction work in progress is primarily associated with the electrification programs in Zambia and the power reliability project. The amounts obtained from the trail balances as provided by ZESCO and as of March 31, 2000, total $14,254,000. The March 31, 2000, construction work in progress date, while eight months prior to the study date, is the most current data available.

VALUATION INTRODUCTION

As stated in a prior report section, this study was made to express an opinion of the cost of replacement and cost of replacement less physical depreciation as of December 1, 2000. Functional and economic obsolescence were not investigated or quantified.

The premise considered in this study assumes that the operating assets will remain in place and in use as part of a continuing and operating business. The opinion expressed herein does not represent the amount that might be realized from piecemeal disposition of the operating property through immediate sale of all or part of the property.

In formulating an opinion of the cost of replacement and the cost of replacement less physical depreciation of the designated property, discussions were held with management concerning the history and nature of the business including an analysis of recent operations and economic prospects of the business. Furnished were certain operating data, equipment lists, drawings, and other records, estimates, and documents pertaining to the operation of the distribution, transmission, generation, and general plant property. These government-supplied data were analyzed and reviewed with ZESCO management and accepted, without further independent investigation, as properly reflecting current operating statistics results of the electrical system property.

In addition, as part of the investigation, the subject property was inspected, and the following factors were considered:

Continued use of the property in its present location

Extent, character, and utility of the property

History and nature of the business and its industry

The estimated cost of replacement, where applicable, less an allowance for depreciation or loss of value arising from condition, utility, age, and wear and tear

Our opinions of the cost of replacement and the cost of replacement less physical depreciation are not to be considered opinions of fair market value. Earnings of the business, economic obsolescence, or going concern value were not considered in the study.

The cost approach was the only approach used to determine the subject costs.

COST APPROACH

Introduction

In the cost approach, the maximum value of a property to a knowledgeable buyer is that amount currently required to erect or construct a similar property of equal utility. As the subject property is not new, the current cost new must be reduced to reflect physical deterioration attributable to the property at December 1, 2000.

Cost of Replacement

The first step in the cost approach is to determine the proper level of current cost by using the cost of replacement method. The *cost of replacement* ("COR") is defined as the estimated amount required to replace the entire property at one time with a modern new unit using the most current technology and construction materials that will duplicate the production capacity and utility of an existing unit at current market prices for materials, labor, and manufactured equipment; contractors' overhead and profit; and fees, but without provision for overtime, bonuses for labor, or premiums for material or equipment.

The normal cost elements included in the replacement cost estimates are direct labor and materials, general contractors' overhead and profit, architectural and engineering fees, indirect field costs, interest during construction, and other indirect or soft costs.

In order to determine the cost of replacement, a combination of techniques were used. The hydroelectric generation plants located at Kafue Gorge and Victoria Falls and the water storage dam at Itezhi-Tezhi were developed using the trended cost approach. This technique uses the original cost as base and, coupled with time-cost escalators, bridges the time from the original construction to current day and the associated changes in costs to construct during the time period. The result was the cost of replacement of the generation and water storage facilities.

The cost of replacement for the transmission lines and transmission substations was developed by obtaining from ZESCO Transmission Department detailed line and substation information that consisted of line location, voltage, length, year of construction, conductor type, and number of circuits, and substation location, voltage, number and size of

transformers, and year of construction. The replacement costs obtained from ZESCO Transmission Department were based on past construction estimates. These costs were escalated, as described previously in the hydroelectric generation plant cost section, to arrive at the cost of replacement for the transmission lines and transmission substations.

The costs of replacement for the distribution lines and substations, line transformers, services, and meters were developed from quantity information provided by ZESCO Distribution Department. Distribution substation information included a list of locations with size and quantity of transformers by voltage class and year of construction. The distribution line information consisted of the total lines by 33-kV and 11-kV voltage class. The 400-volt system line information was developed by ZESCO distribution personnel; an estimate was made for the entire country based on their knowledge of the system. Because the Distribution Department routinely makes estimates, a manual for costs of typical substations and typical line configurations was developed; this manual was used to develop the cost of replacement. ZESCO maintains a system where statistics on line transformers are available. This system provided the quantity of line transformers in the Lusaka area. Data for the remainder of the country were obtained from the respective regions. The line transformer information showed the voltage, size, and year of construction. The cost estimating manual was used to develop the cost of replacement for the line transformers. Quantities for the services and meters was obtained from the Customer Services Department. Typical service and meter models were determined by the ZESCO Distribution Department. This information, along with the cost estimating manual, was used to determine the cost of information for the services and meters.

The cost of replacement also was determined for the general plant categories which included structures and improvements, water and wastewater systems, furniture and fixtures, computers, vehicles, and garage and warehouse equipment. The cost of replacement for the structures and buildings was determined by developing current cost models and applying them to the existing list of buildings. The list of buildings was developed with the aid of the Civil Engineering Department as well as data gathered from on-site inspections. The improvements were gathered based on data shown on site drawings and in on-site inspections and modeling of like sites. Current costs were then applied to the improvement data to arrive at the cost of replacement. The cost of replacement for the water and wastewater systems was developed from discussions with ZESCO site personnel at Kafue Gorge Hydroelectric Generating Station and the information was extrapolated to encompass the systems at Itezhi-

Tezhi Dam. Recent work costs at Kafue Gorge assisted in the replacement cost determination.

Furniture and fixtures, computers, vehicles, and garage and warehouse equipment detail was obtained from the ZESCO asset register. This dated information was used as a basis for the cost of replacement. The furniture and fixtures, computers, vehicles, and garage and warehouse equipment were escalated to the current date by using the same time-cost technique described in the hydroelectric generation plant cost section to obtain the cost of replacement.

The cost of replacement is the upper limit of value or what the property would be worth under today's economic and technological conditions to the prudent investor in new and unused condition and is the proper current cost basis for developing the cost approach.

Based on the preceding analysis, the cost of replacement was concluded to be $2,751,645,000 by the cost approach.

Cost of Replacement Less Physical Depreciation

The cost of replacement less physical depreciation is defined as the cost of replacement as defined above, less a loss in value resulting from wear and tear in operation and exposure to the elements.

Once current cost or the cost of replacement has been established, a deduction must be made for physical deterioration. *Physical deterioration* is defined as the loss in value resulting from wear and tear in operation and exposure to the elements.

Physical deterioration is a result of past service experience and maintenance practice, exposure to the natural elements or the production area atmosphere, the less obvious internal defects due to vibration and operating stress, and the effects of prolonged shutdowns, accidents, and disasters. Excessive physical deterioration is often manifested in declines in effective capacity, lower levels of reliability, and generally poorer performance. Other indications are continual demands for maintenance with repair costs at much above the average or below the average costs for similar property, indicating the possibility of deferred maintenance and increased deterioration.

For the subject property, estimates of physical deterioration have been developed by analysis of the facility including direct comparisons with modern facilities, personal inspection of existing facilities, analysis of maintenance expenditures, and consideration of age and life expectancies. Physical deterioration is usually expressed as a percentage of replacement cost and can be calculated using an effective age/average service life relationship when effective age is calculated and the average service life can be reasonably estimated.

Effective age is the composite age considering original construction, expansions, replacements, maintenance, and modifications. It is measured by the age-weighted dollar investment of the property being analyzed. When the historical investment is not available, estimates of effective age can be made as in this case where ZESCO management personnel assisted in the average age determination. Average service life is the physical life reasonably expected for a new asset, based on average experience and allowing for normal wear and tear; in effect, this is a measurement of the percentage of life expired to the expected life when new. This technique provides a reasonable indication of physical deterioration which must be verified and adjusted based on a personal inspection or other known data. The other known data was provided in the form of a series of studies commissioned by ZESCO in which various consultants studied certain aspects of the electrical system. Such studies included the *Lusaka Power Distribution System Rehabilitation, Upgrade, and Condition Surveys*, March, October 1997; the *Copperbelt Distribution Rehabilitation Project*, May 1997; the *Study on Electricity Distribution System in Ndola and Luanshya Towns*, June 1997; and the *Customer Management Project in Lusaka Within ZESCO Limited*, April 2000. These studies, in conjunction with the inspections conducted in the Lusaka, Copperbelt, and Livingstone regions and ZESCO personnel interviews, provided insight to the current condition of the electric system.

Based on the preceding analysis, the cost of replacement less physical depreciation is concluded to be $1,434,289,000 by the cost approach.

CONCLUSION

Based on the preceding investigation and analysis, it is concluded as of December 1, 2000, that the cost of replacement and the cost of replacement less physical depreciation are reasonably represented as follows:

Description	Cost of Replacement ($000s)	Cost of Replacement Less Physical Depreciation ($000s)
ZESCO Assets		
Kafue Gorge Hydroelectric Plant	404,278	250,652
Victoria Falls Hydroelectric Plant	138,459	69,230
Itezhi-Tezhi Dam	214,087	107,044
Transmission Lines	513,575	256,787
Transmission Substations	254,729	127,364
Distribution Lines	838,588	419,294
Distribution Substations	41,252	21,451
Line Transformers	75,910	37,955
Services	141,856	70,928
Meters	57,219	28,610
General Plant - Structures and Improvements	43,455	22,597
General Plant - Water and Wastewater Systems	5,900	2,950
General Plant - Contents	8,083	5,173
Total ZESCO Assets	2,737,391	1,420,035
Construction Work in Progress as of March 31, 2000	14,254	14,254
Grand Total	2,751,645	1,434,289

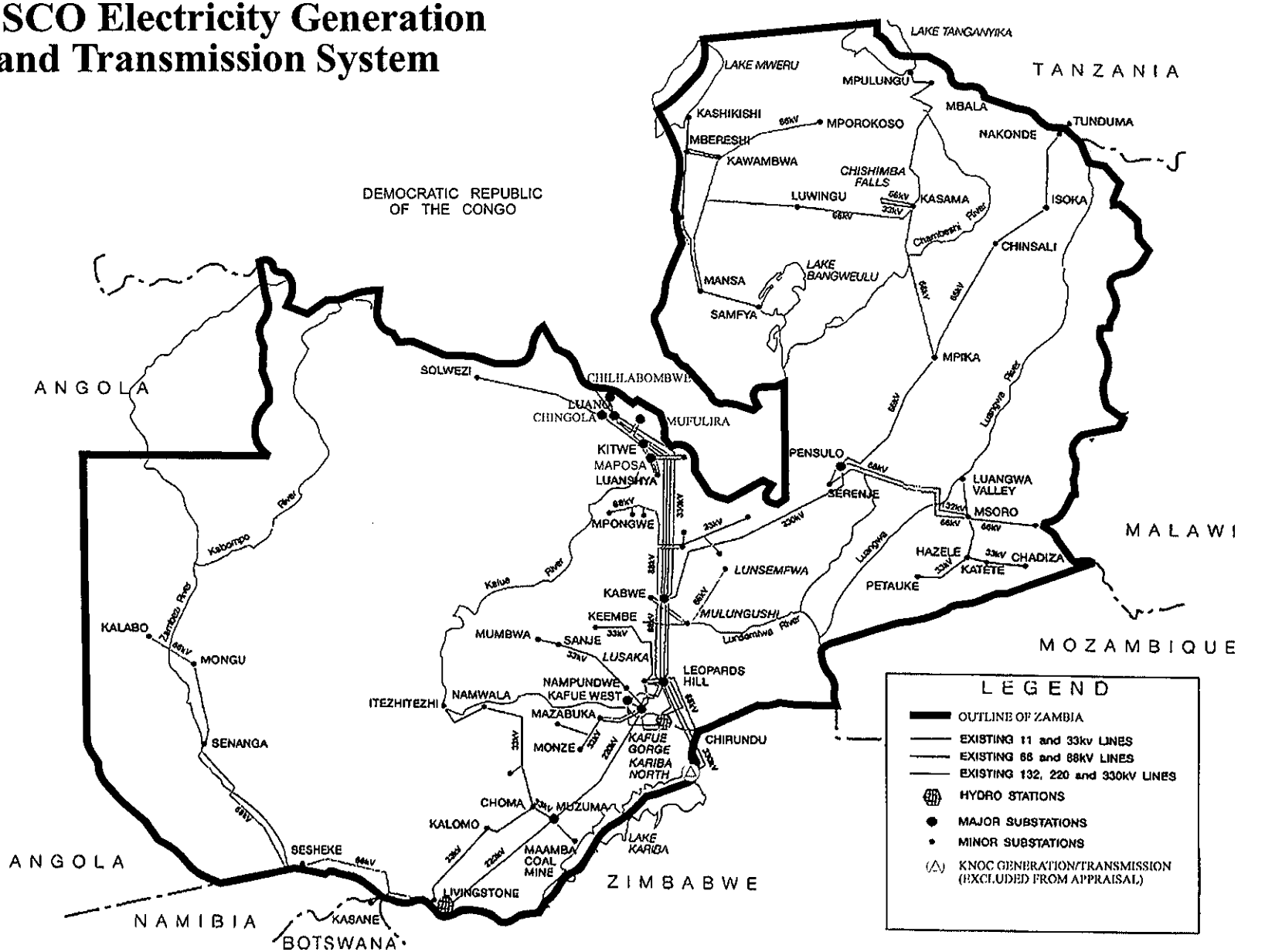
Our opinions of the cost of replacement and the cost of replacement less physical depreciation are not to be considered opinions of fair market value. Earnings of the business, economic obsolescence, or going concern value were not considered in the study.

No investigation was made of the title to or any liabilities against the property analyzed.

APPENDIX A
Property Location Map

(1 page)

ZESCO Electricity Generation and Transmission System



(NAME) INDICATES JOINTLY OWNED SUBSTATION BETWEEN CEC & ZESCO

(NAME) INDICATES COPPERBELT ENERGY CORPORATION (CEC) TRANSMISSION SUBSTATION

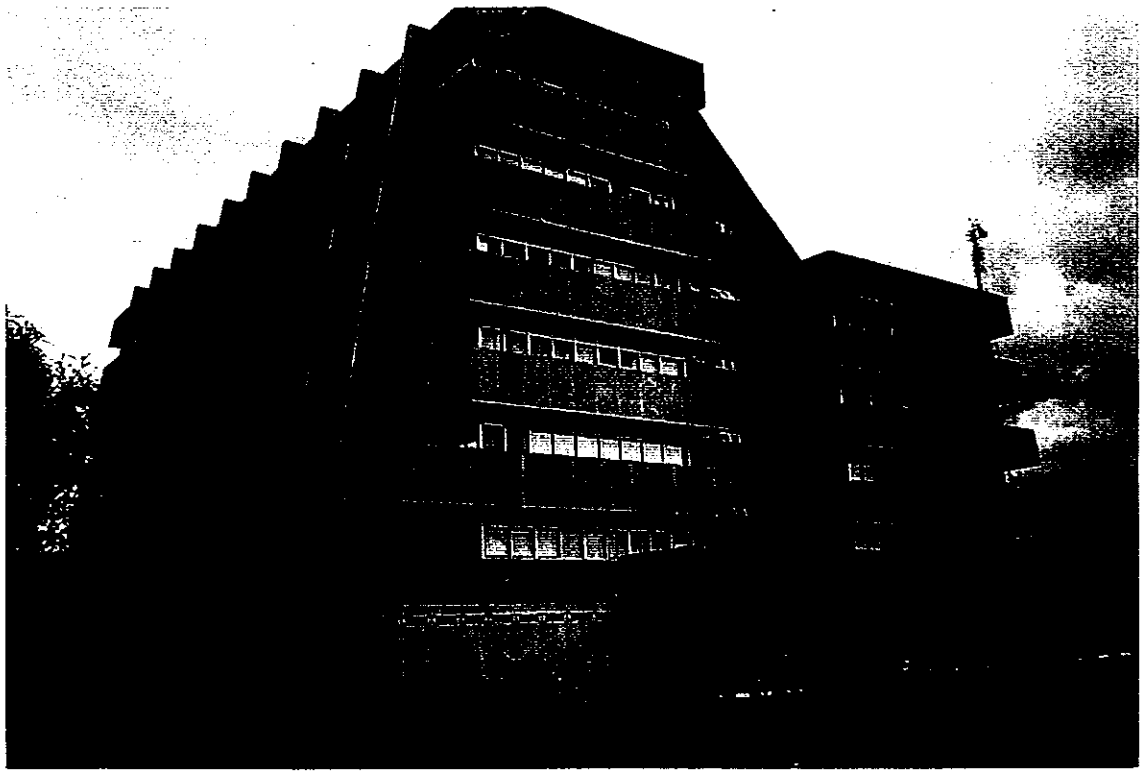
PROPERTY LOCATION MAP

CONFIDENTIAL BUSINESS INFORMATION

APPENDIX B
Land-Based Photographs

(11 pages)

ZESCO LIMITED
REPUBLIC OF ZAMBIA, AFRICA

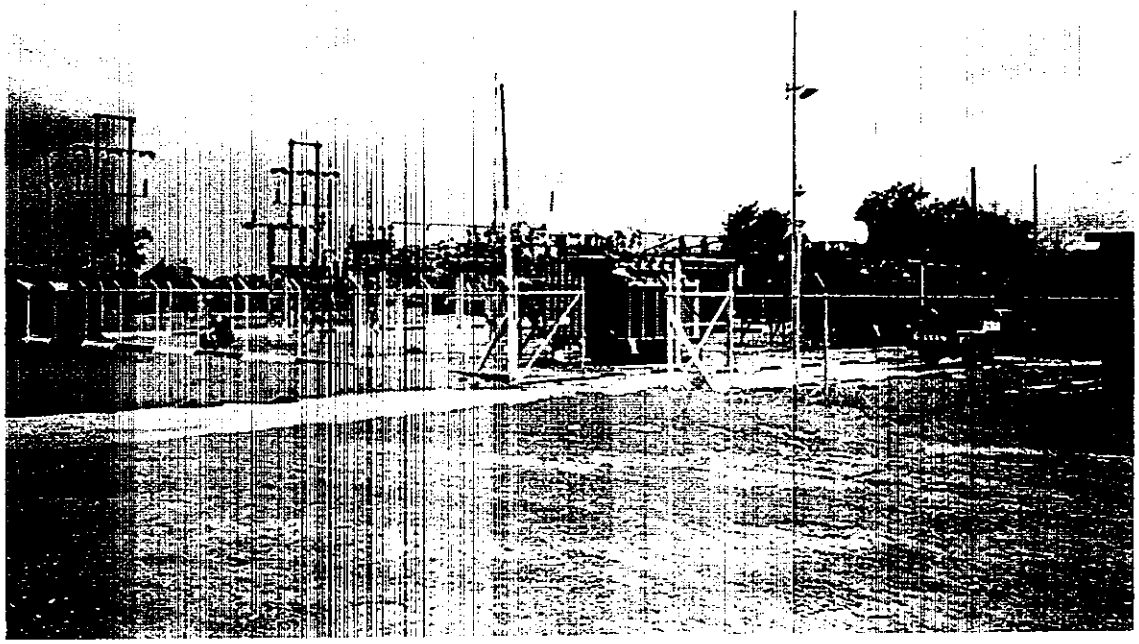


Lusaka - Main Headquarters Building

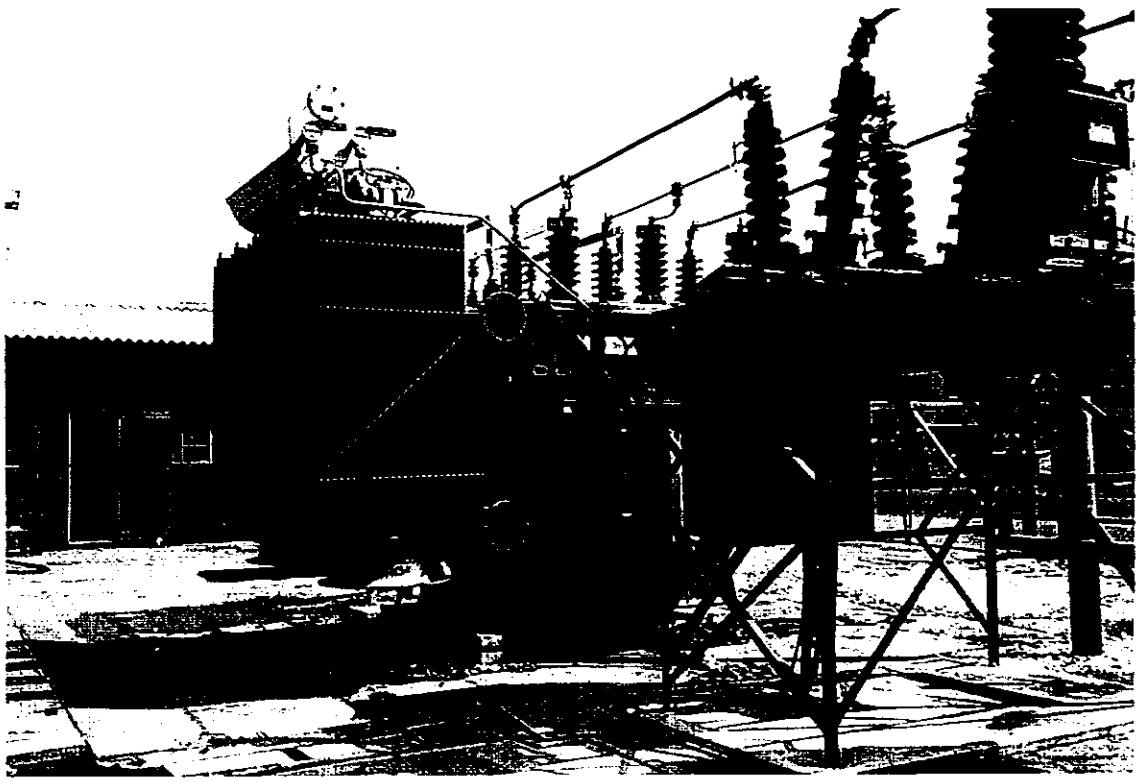
Lusaka - Customer Services Building

491

ZESCO LIMITED
REPUBLIC OF ZAMBIA, AFRICA



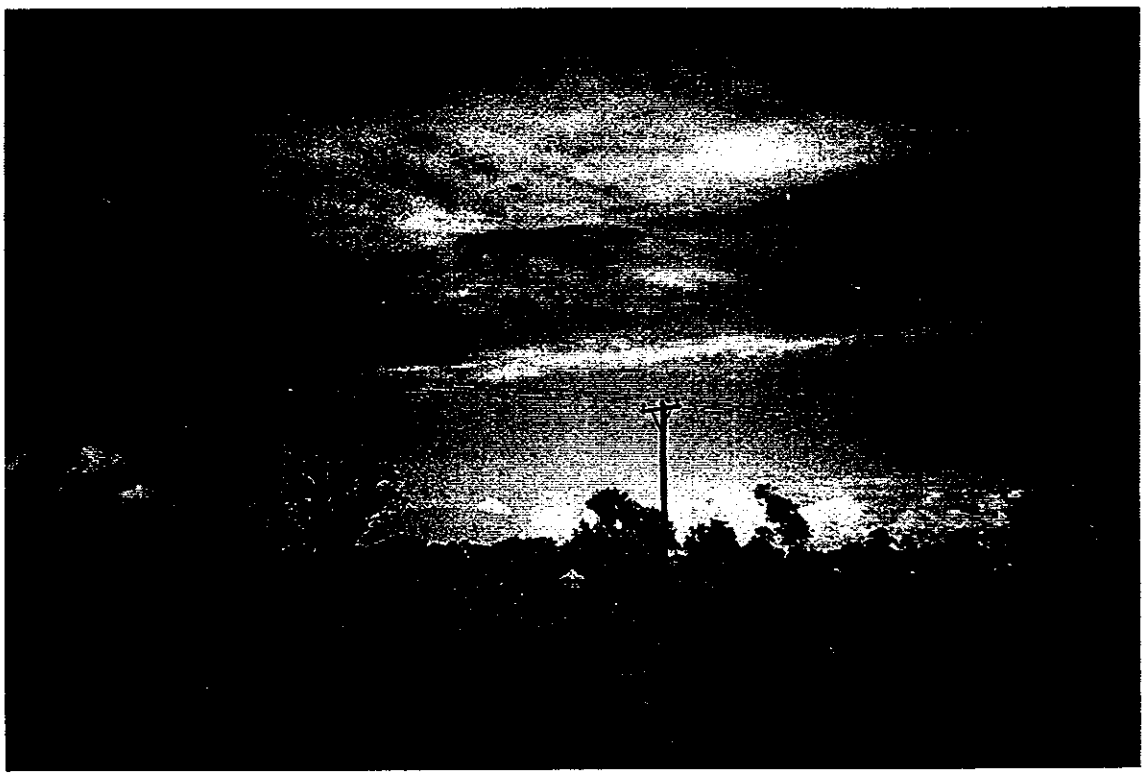
Lusaka Area - Woodlands Substation, 33/11 Kilovolts



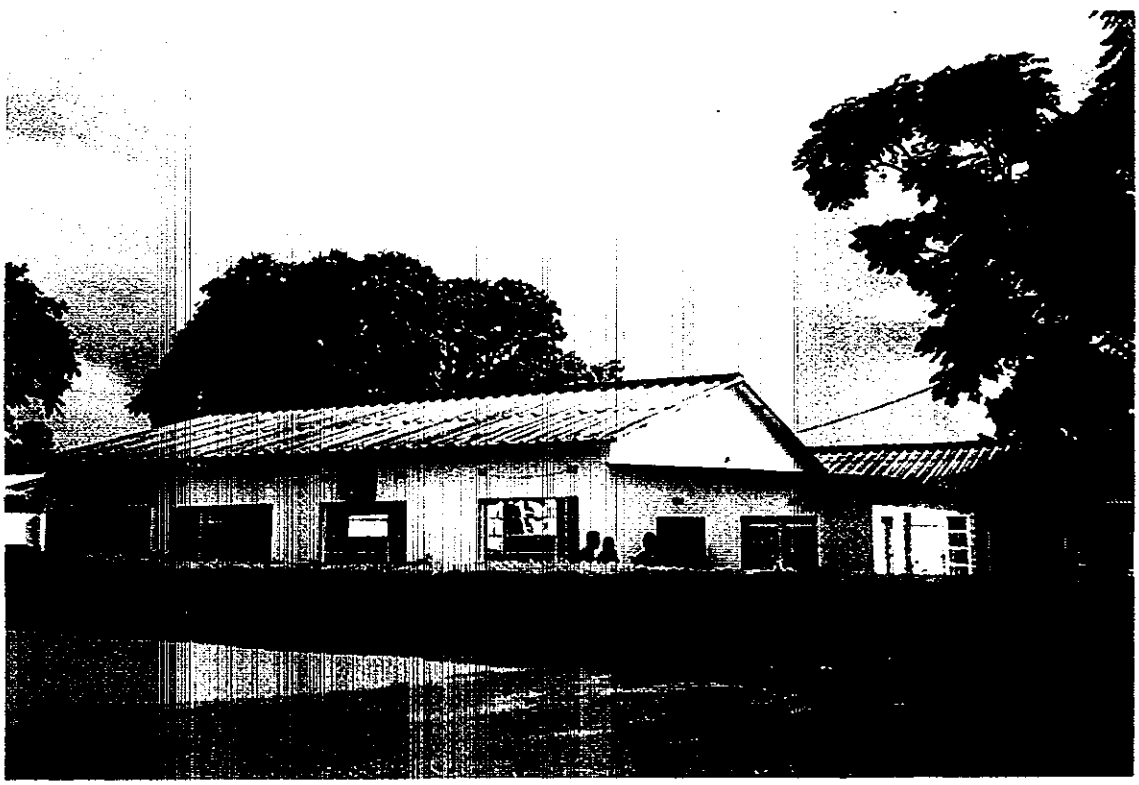
Lusaka Area - Woodlands Substation

492

ZESCO LIMITED
REPUBLIC OF ZAMBIA, AFRICA

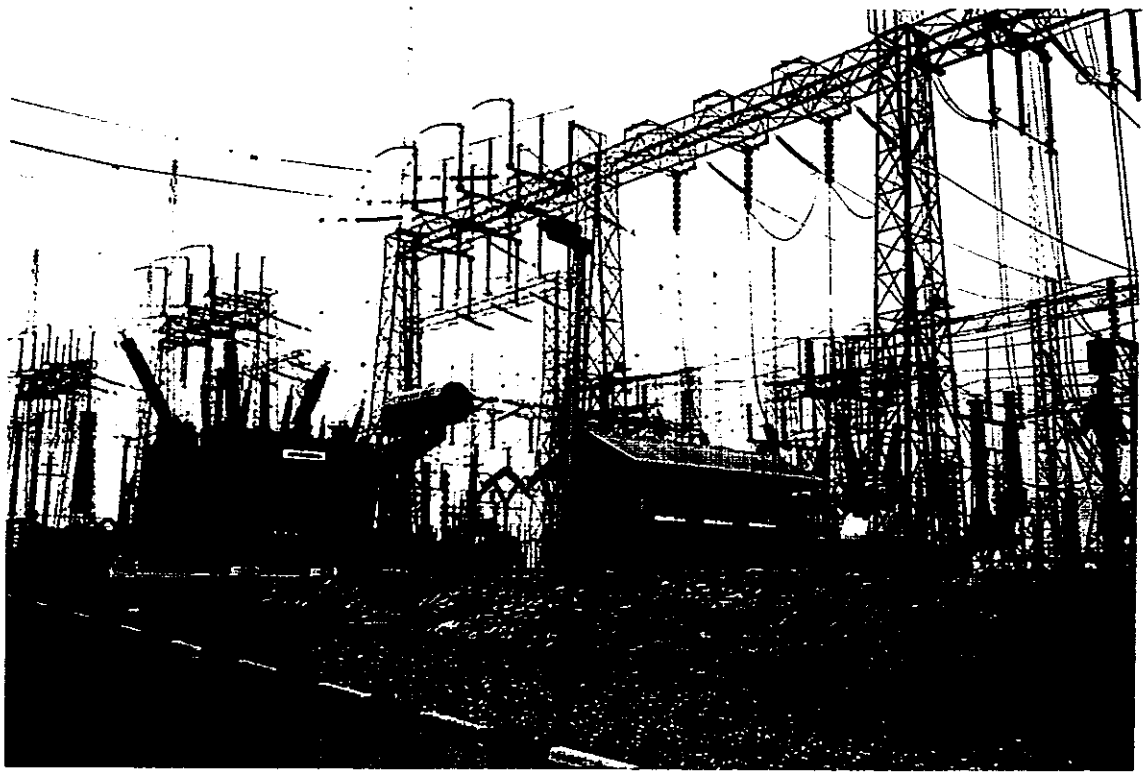


Mfume - Typical Three-Phase, 33-Kilovolt Construction

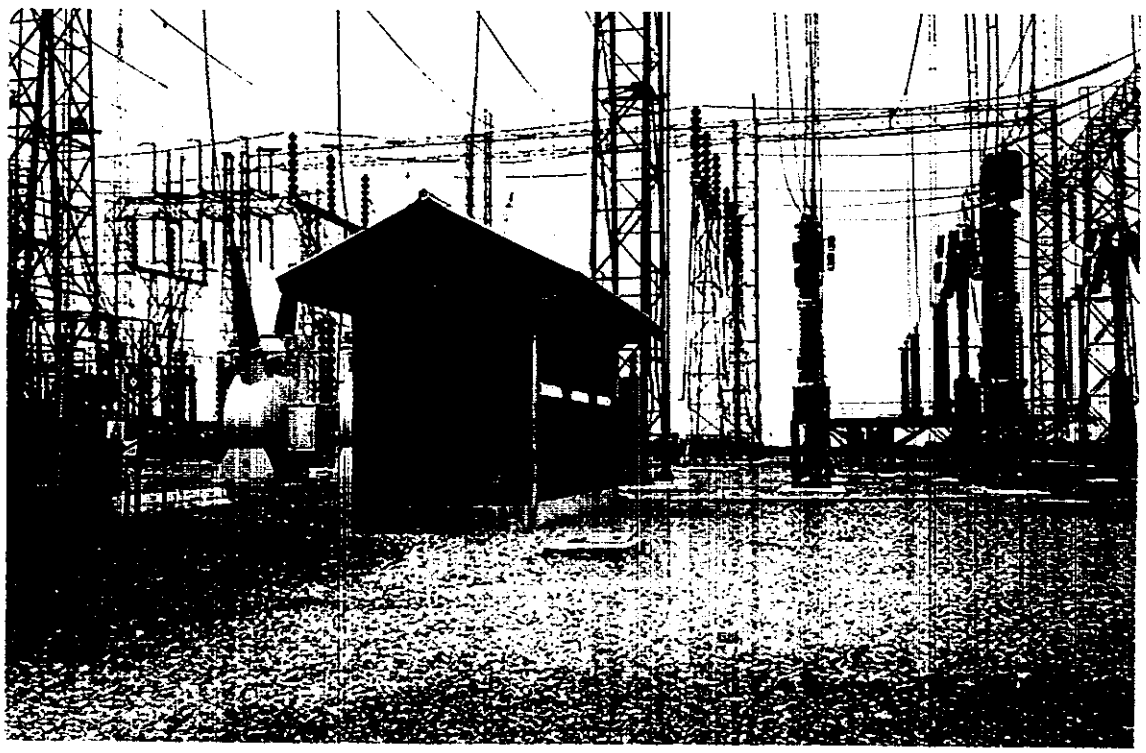


Lusaka Area - Kabwata Fault Center

ZESCO LIMITED
REPUBLIC OF ZAMBIA, AFRICA

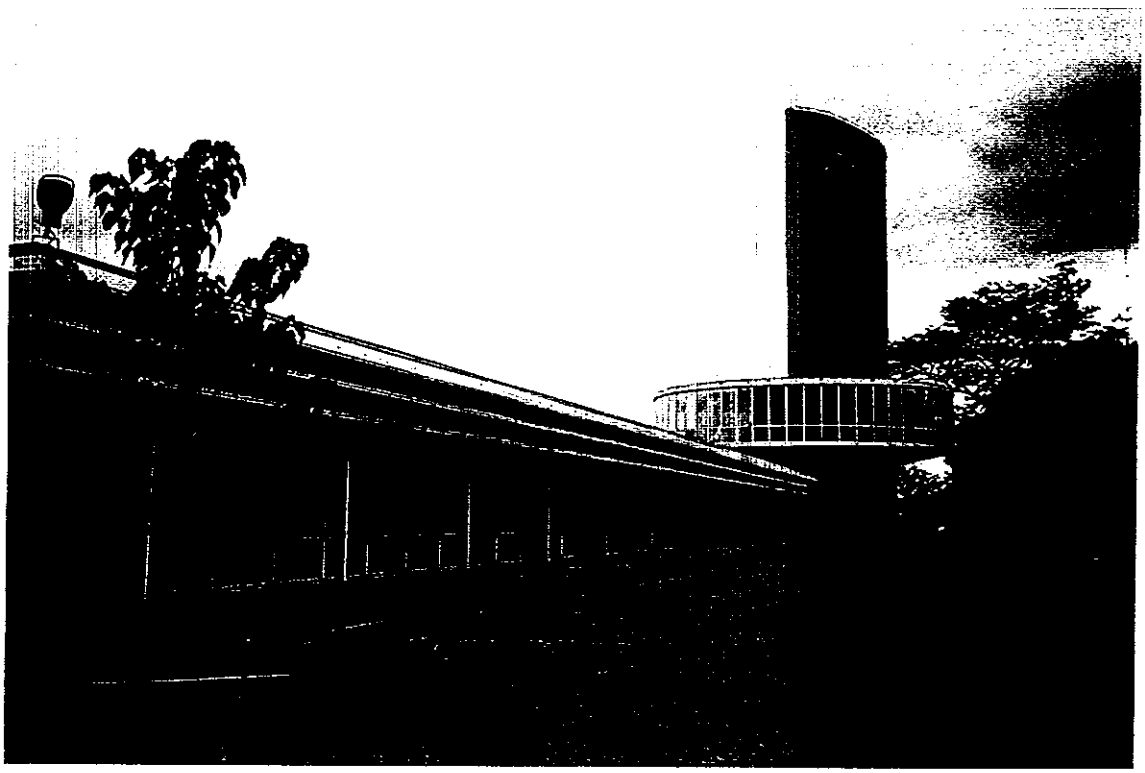


Lusaka Area - Leopards Hill Substation,
330/132 Kilovolts, 330/88 Kilovolts, and 88/11 Kilovolts

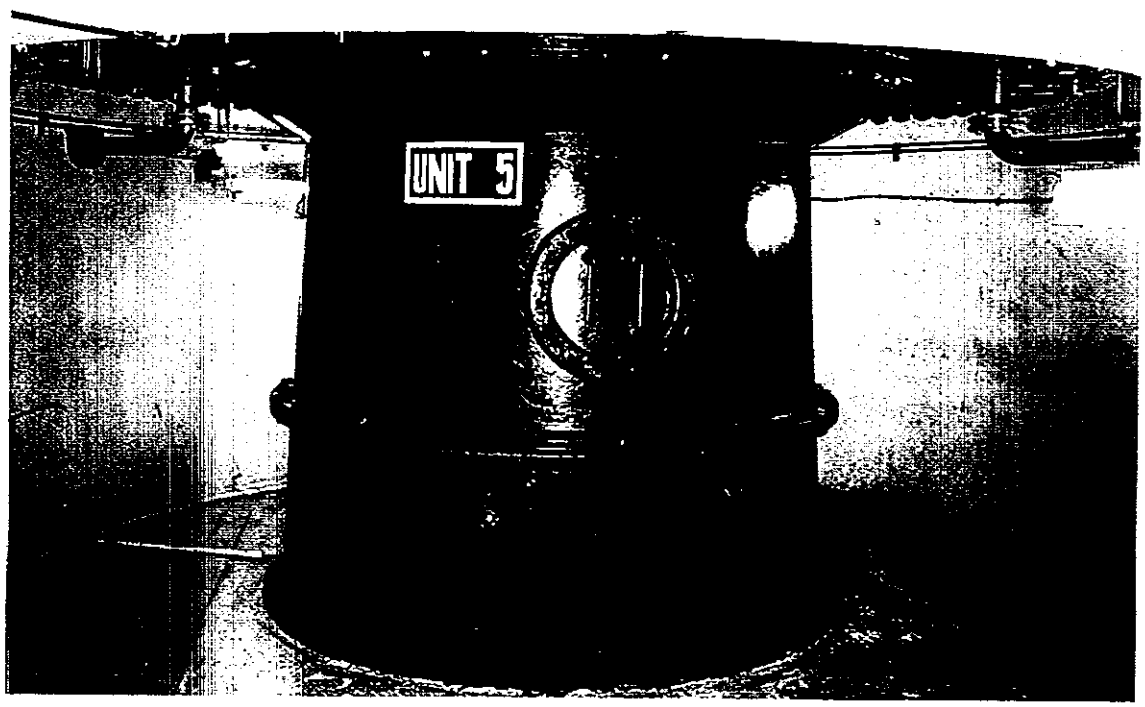


Lusaka Area - Leopards Hill Substation,
330/132 Kilovolts, 330/88 Kilovolts, and 88/11 Kilovolts

ZESCO LIMITED
REPUBLIC OF ZAMBIA, AFRICA



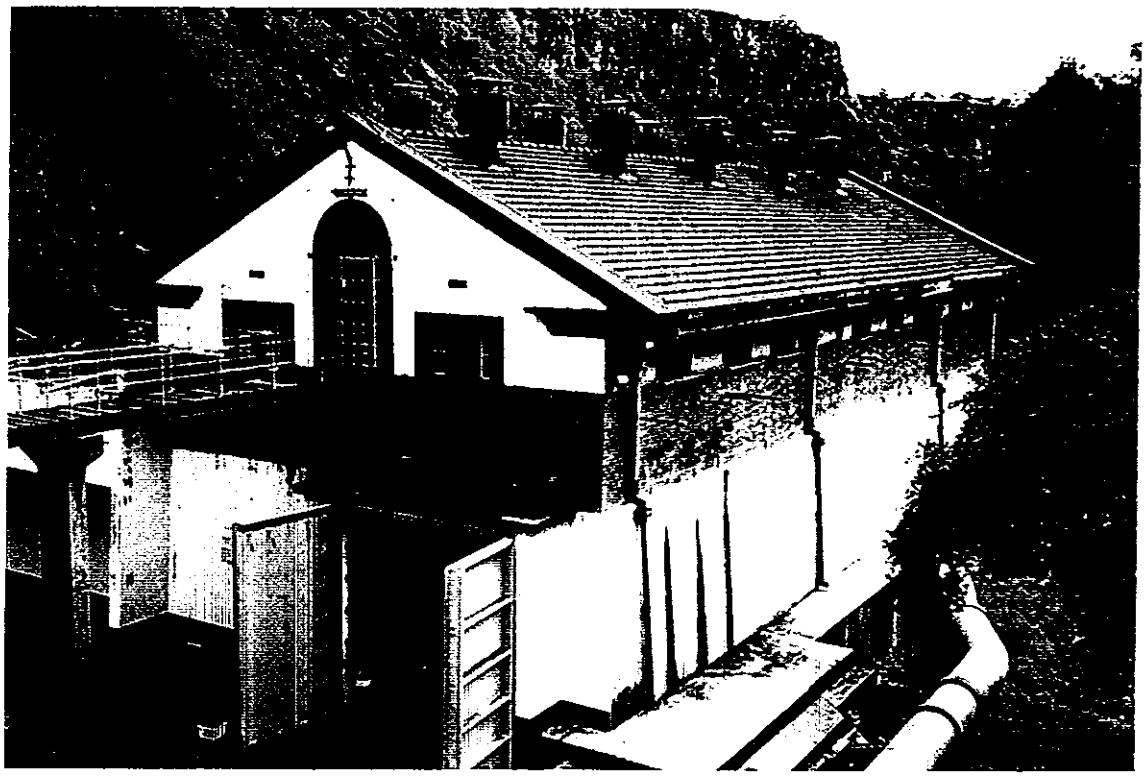
Kafue Gorge Administration Building and Elevator to Underground Generating Station



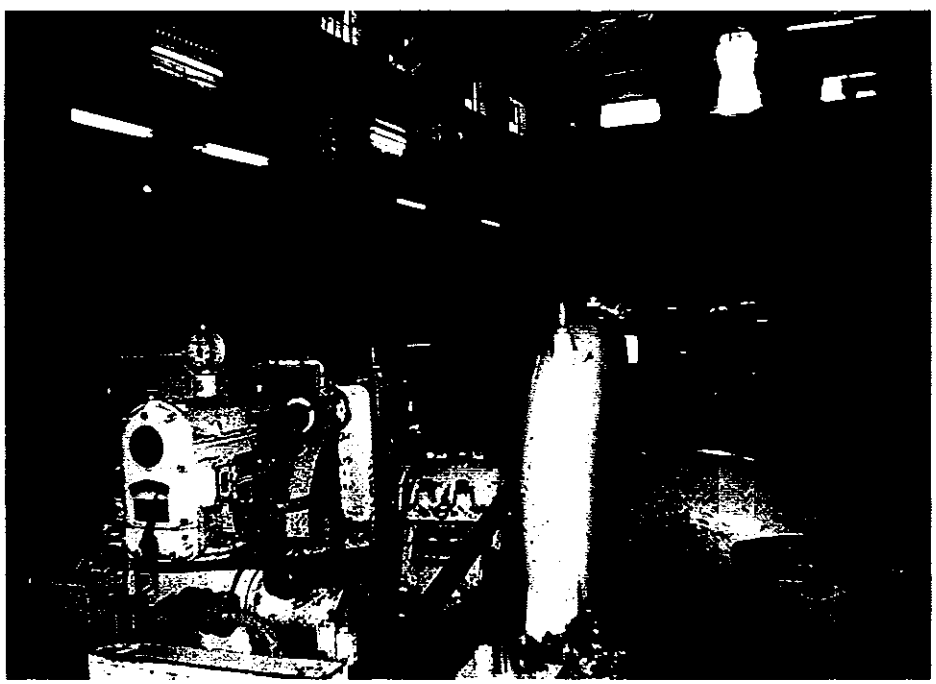
Kafue Gorge Turbine Unit 5 of Six Total Units

495

ZESCO LIMITED
REPUBLIC OF ZAMBIA, AFRICA



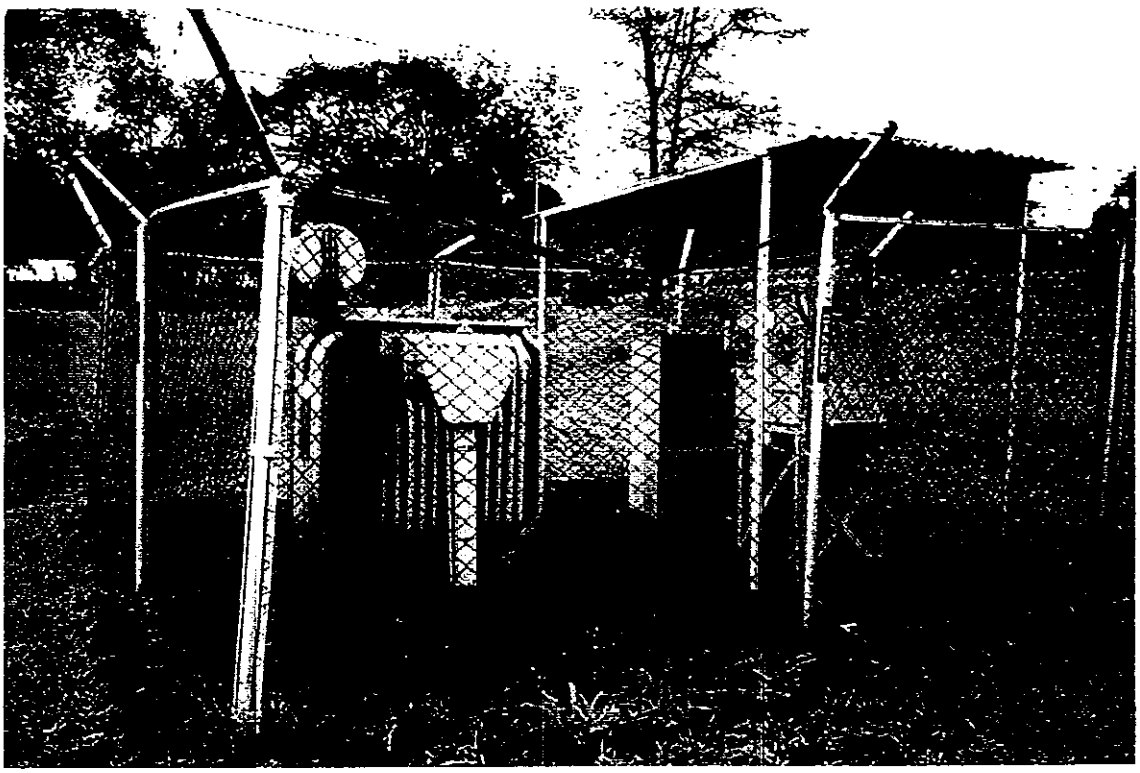
Victoria Falls Generating Station - Station A Powerhouse



Victoria Falls Generating Station - Generating Units A1, A2, A3, and A4;
Installed in 1938, 1954, and 1959; 8 Megawatts Total

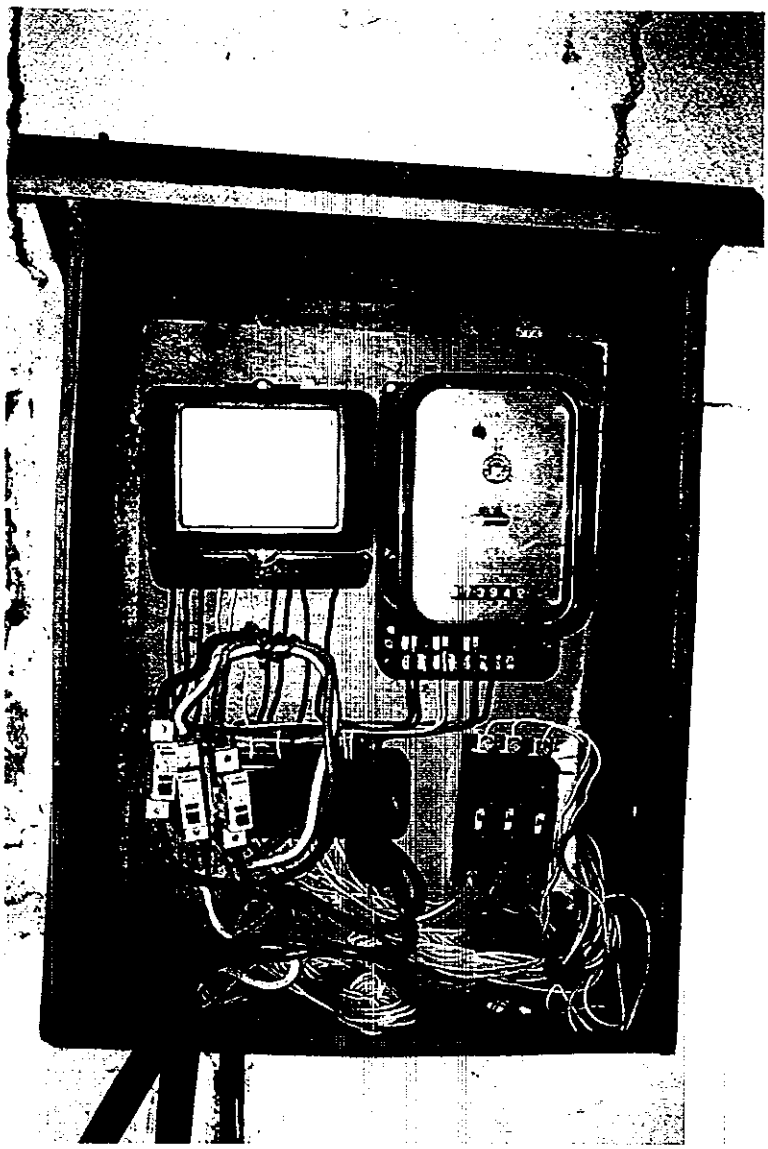
496

ZESCO LIMITED
REPUBLIC OF ZAMBIA, AFRICA



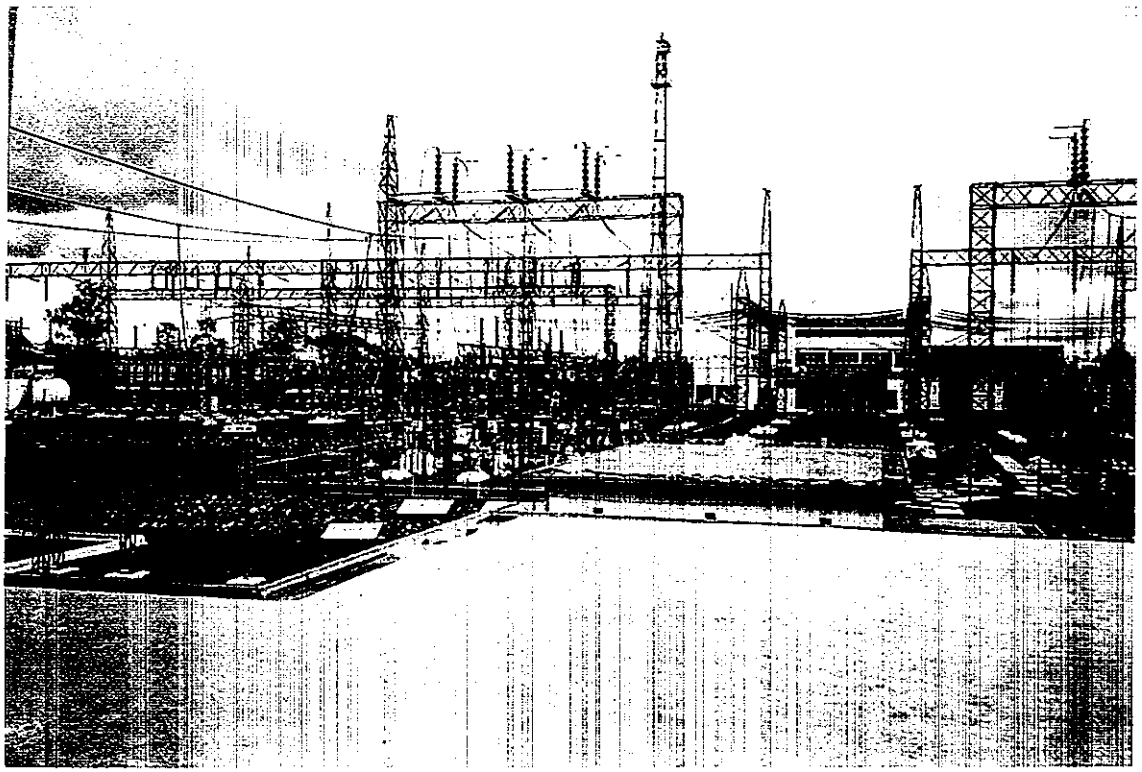
Victoria Falls Area - Typical Ground-Mounted Transformer

ZESCO LIMITED
REPUBLIC OF ZAMBIA, AFRICA

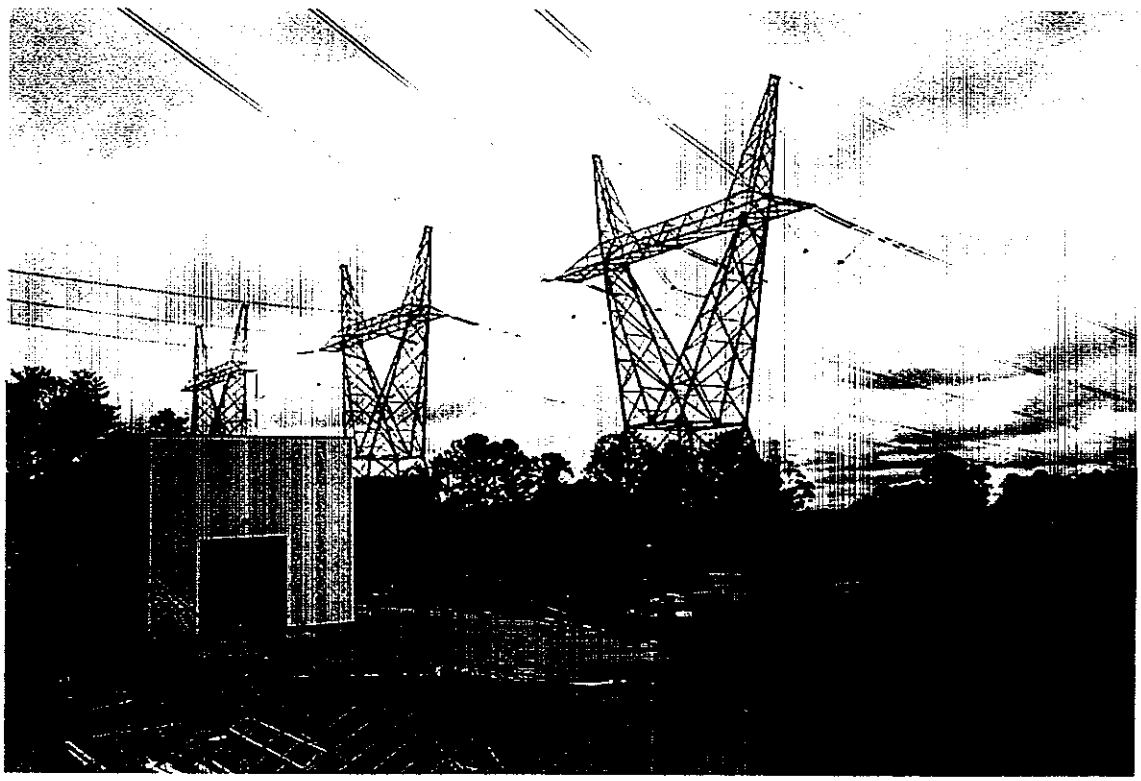


Victoria Falls Area - Typical Metering Configuration

ZESCO LIMITED
REPUBLIC OF ZAMBIA, AFRICA

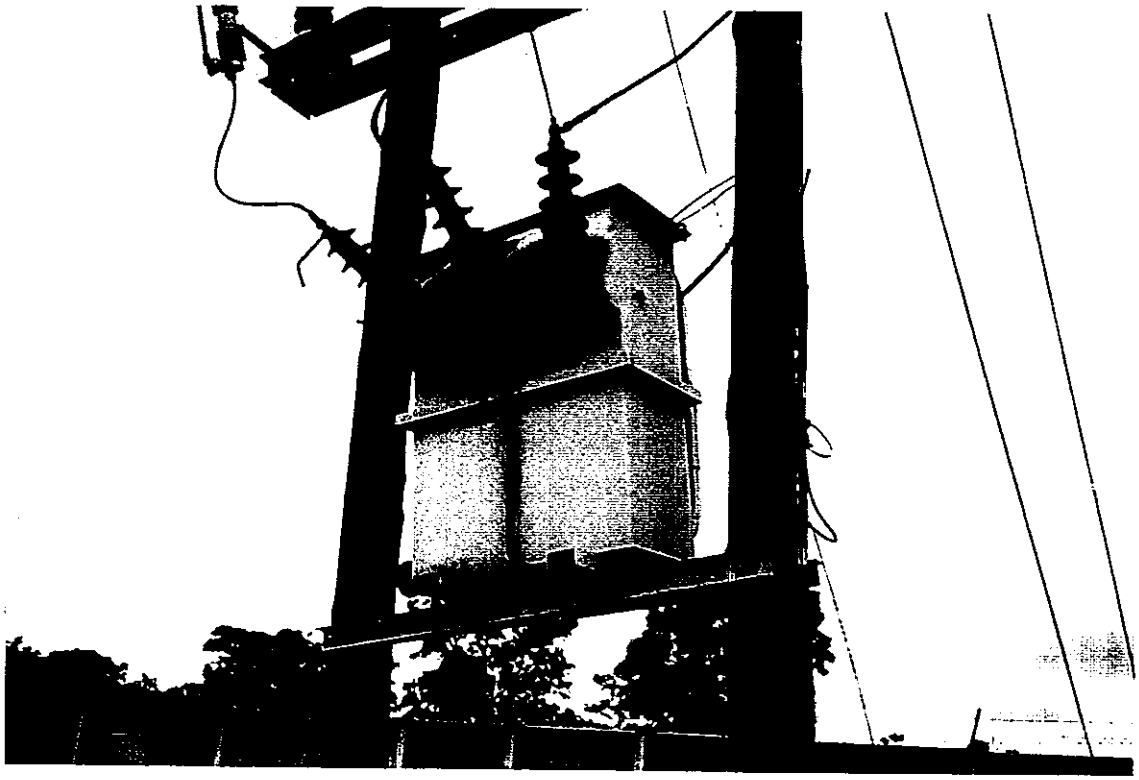


Kitwe Central 330-Kilovolt Substation

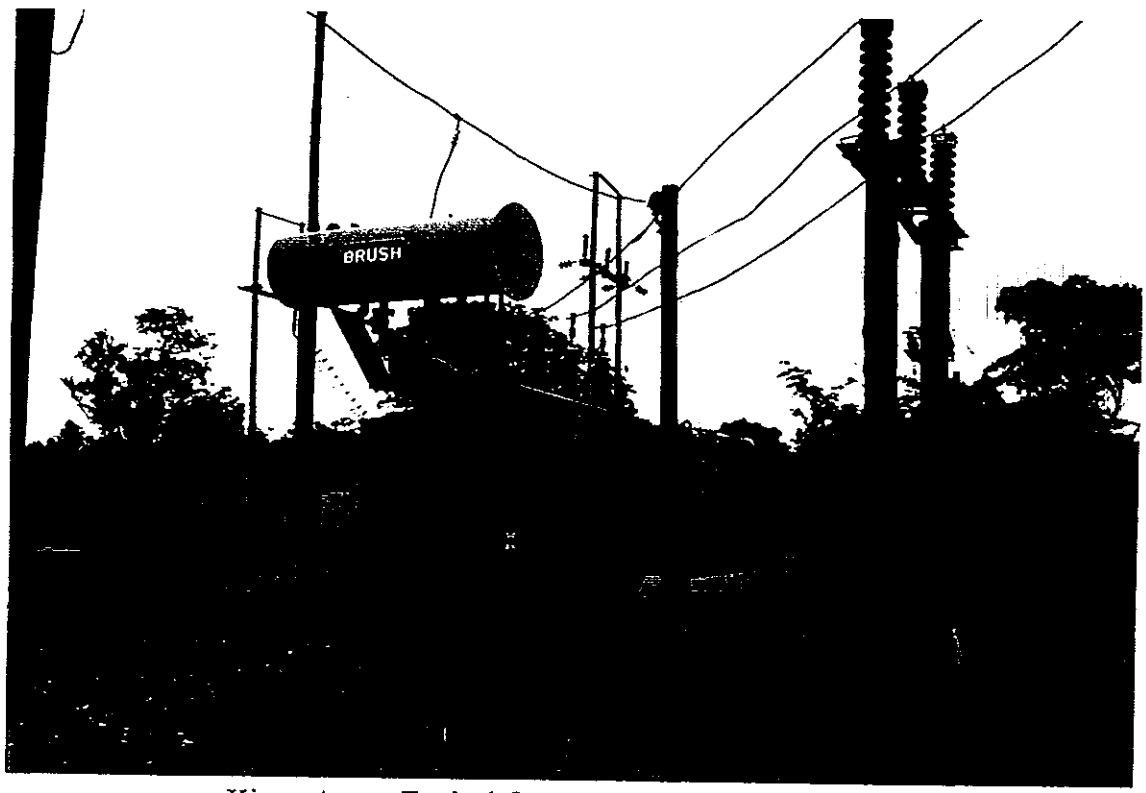


Kitwe Central 330-Kilovolt Substation

ZESCO LIMITED
REPUBLIC OF ZAMBIA, AFRICA



Kitwe Area - Typical Pole-Mounted Transformer

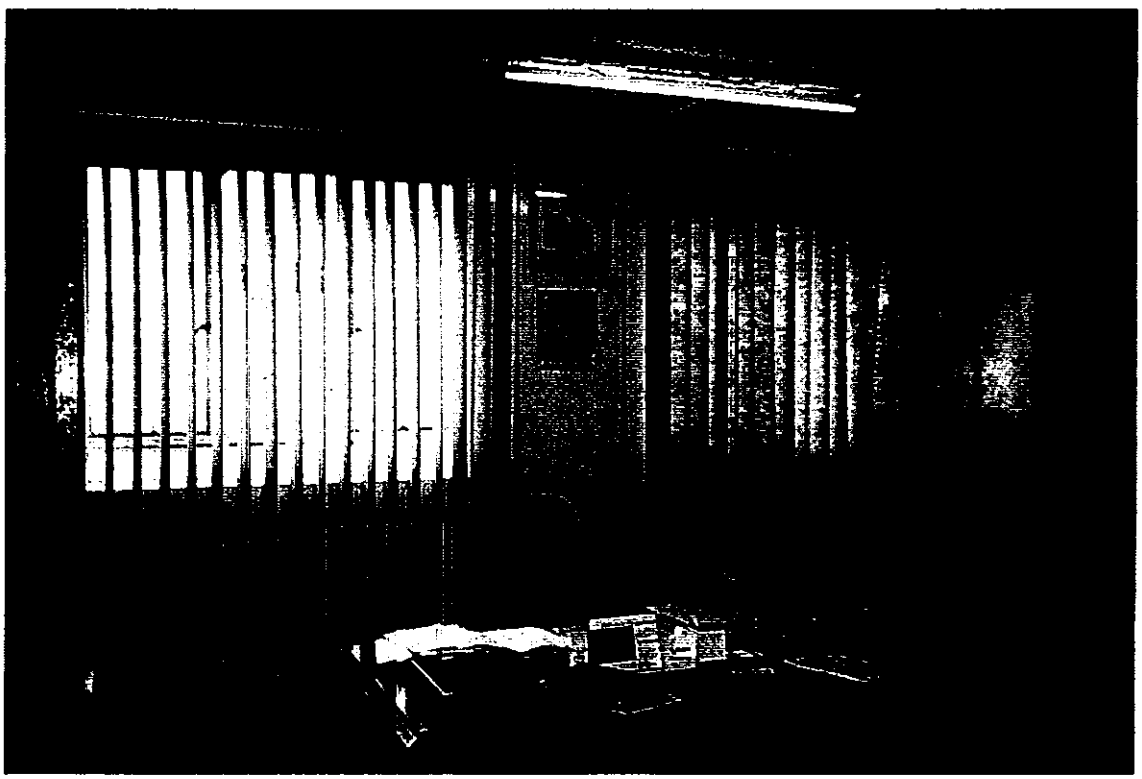


Kitwe Area - Typical Ground-Mounted Transformer

500

ZESCO LIMITED
REPUBLIC OF ZAMBIA, AFRICA

Ndola Area - Main Office



Ndola Area - Typical Main Office

501

APPENDIX C
Assumptions and Limiting Conditions

(2 pages)

ASSUMPTIONS AND LIMITING CONDITIONS

No responsibility is assumed for matters legal in nature. No investigation has been made of the title to or any liabilities against the property studied. In this cost study, it is presumed that, unless otherwise noted, the owner's claim is valid, the property rights are good and marketable, and there are no encumbrances which cannot be cleared through normal processes.

To the best of our knowledge, all data set forth in this report are true and accurate. Although gathered from reliable sources, no guarantee is made nor liability assumed for the accuracy of any data, opinions, or estimates identified as being furnished by others which have been used in formulating this analysis.

Substances such as asbestos, urea-formaldehyde foam insulation, other chemicals, toxic wastes, or other potentially hazardous materials could, if present, adversely affect the value of the property. Unless otherwise stated in this report, the existence of hazardous substance, which may or may not be present on or in the property, was not considered by the appraiser in the development of the conclusion of value. The stated value estimate is predicated on the assumption that there is no material on or in the property that would cause such a loss in value. No responsibility is assumed for any such conditions, and the client has been advised that the appraiser is not qualified to detect such substances, quantify the impact on values, or develop the remedial cost.

No environmental impact study has been ordered or made. Full compliance with applicable national (the government of Zambia, as we understand it) and local environmental regulations and laws is assumed unless otherwise stated, defined, and considered in the report. It is also assumed that all required licenses, consents, or other legislative or administrative authority from any local or national government or private entity organization either have been or can be obtained or renewed for any use which the report covers.

Maps are presented only as aids in visualizing the property and its environment. Although the material was prepared using the best available data, it should not be considered as a survey or scaled for size.

We have made a physical inspection of a sampling of the property and noted visible physical defects, if any, in our report. This inspection was made by individuals generally familiar

with real estate and building construction. However, these individuals are not architectural or structural engineers who would have detailed knowledge of building design and structural integrity. Accordingly, we do not opine on, nor are we responsible for, the structural integrity of the property including its conformity to specific governmental code requirements, such as fire, building and safety, earthquake, and occupancy, or any physical defects which were not readily apparent to the appraisers during their inspection.

The costs presented in this report are based upon the premises outlined herein and are valid only for the purpose or purposes stated.

The date to which the conclusions and opinions expressed apply is set forth in this report. The opinion herein rendered is based on the status of the national business economy and the purchasing power of the U.S. dollar as of that date.

At the request of the client, the content of this cost study report has been limited to those data presented herein. As such, it represents something less than a full and complete report. However, the substance of the investigation meets all of the requirements of a full and complete assignment and a complete record of all analyses and conclusions leading to the opinion of value stated herein has been retained in our files.

Possession of this report or any copy thereof does not carry with it the right of publication. No portion of this report (especially any conclusion to use, the identity of the appraiser or the firm with which the appraiser is connected, or any reference to the American Society of Appraisers or the designations awarded by this organization) shall be disseminated to the public through prospectus, advertising, public relations, news, or any other means of communication without the written consent and approval of American Appraisal Associates, Inc.

APPENDIX D
Certificates of Appraisers

(3 pages)

CERTIFICATE OF APPRAISER

I certify that, to the best of my knowledge and belief

The statements of fact contained in this report are true and correct.

The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and represent the unbiased professional analyses, opinions, and conclusions of American Appraisal Associates, Inc.

American Appraisal Associates, Inc., and I personally have no present or prospective interest in the property that is the subject of this report and have no personal interest or bias with respect to the parties involved.

Compensation for American Appraisal Associates, Inc., is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.

The analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the requirements of the Uniform Standards of Professional Appraisal Practice and the Principles of Appraisal Practice and Code of Ethics of the American Society of Appraisers.

Members of my appraisal staff have made an inspection of a majority of the property that is the subject of this report; I have not made an inspection of the property.

Anyone providing significant professional assistance is identified on the signature page of this report.

The American Society of Appraisers has a mandatory recertification program for all of its senior members. I am in compliance with the requirements of that program.

Michael J. Remsha, P.E., ASA

CERTIFICATE OF APPRAISER

I certify that, to the best of my knowledge and belief

The statements of fact contained in this report are true and correct.

The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and represent the unbiased professional analyses, opinions, and conclusions of American Appraisal Associates, Inc.

American Appraisal Associates, Inc., and I personally have no present or prospective interest in the property that is the subject of this report and have no personal interest or bias with respect to the parties involved.

Compensation for American Appraisal Associates, Inc., is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.

The analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the requirements of the Uniform Standards of Professional Appraisal Practice and the Principles of Appraisal Practice and Code of Ethics of the American Society of Appraisers.

I have made an inspection of a majority of the property that is the subject of this report; the remainder of the property was not inspected.

Anyone providing significant professional assistance is identified on the signature page of this report.

The American Society of Appraisers has a mandatory recertification program for all of its senior members. I am in compliance with the requirements of that program.

Richard J. Palchak

Richard J. Palchak, P.E., ASA

CERTIFICATE OF APPRAISER

I certify that, to the best of my knowledge and belief

The statements of fact contained in this report are true and correct.

The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and represent the unbiased professional analyses, opinions, and conclusions of American Appraisal Associates, Inc.

American Appraisal Associates, Inc., and I personally have no present or prospective interest in the property that is the subject of this report and have no personal interest or bias with respect to the parties involved.

Compensation for American Appraisal Associates, Inc., is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.

The analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the requirements of the Uniform Standards of Professional Appraisal Practice and the Principles of Appraisal Practice and Code of Ethics of the American Society of Appraisers.

I have made an inspection of a majority of the property that is the subject of this report; the remainder of the property was not inspected.

Anyone providing significant professional assistance is identified on the signature page of this report.

Gregory W. Kort

Gregory W. Kort

APPENDIX E
Qualifications of Appraisers

(11 pages)

Michael J. Remsha, P.E., ASA, CMI

Vice President and Principal, Corporate Valuation Group

Position

Michael J. Remsha serves as a Vice President and Principal for the Milwaukee Corporate Valuation Group of American Appraisal Associates, Inc. ("AAA"). In this capacity, Mr. Remsha provides direction and technical support on special-purpose and large multiproperty/multidiscipline valuations.

Experience

Business

Mr. Remsha joined AAA in 1977. He has specialized in various valuation disciplines including ad valorem, real estate, and regulated industries. Before joining AAA, Mr. Remsha was an engineer for Ladish Company.

Valuation

Mr. Remsha has extensive valuation experience in ad valorem tax, allocation of purchase/sales price, fair market value studies in use or in exchange, and financing. Industries served include chemical, high-technology, oil and gas, paper, public utilities, railroad, and trucking. Properties appraised include computer manufacturing facilities, dams, electric generation and transmission property, hydroelectric plants, nuclear power plants, oil refineries, petrochemical plants, pipelines, railcars, tire manufacturers, and wineries.

Court

He has testified as an expert witness before various county and state tax boards and courts in California, Colorado, Connecticut, Illinois, Kansas, Michigan, Missouri, New York, North Carolina, North Dakota, Tennessee, Texas, Wisconsin, and Wyoming.

Education

University of Wisconsin - Milwaukee
Graduate-Level Courses in Engineering
Bachelor of Science - Applied Science and Engineering

State Certifications

Certified General Real Estate Appraiser, State of California, #AG018213
Certified General Real Estate Appraiser, State of Michigan, #1201003611
Certified General Real Estate Appraiser, State of New Jersey, #RG01446
Certified General Real Estate Appraiser, State of Wisconsin, #286

Professional Affiliations

American Society of Appraisers, Accredited Senior Appraiser
ASA Designation - Machinery and Technical Specialties ("M&TS")/Public Utilities
Treasurer of the Technical Valuation Committee 1991-1993
Editor - *Machinery & Technical Specialties Journal* 1995-1997
Secretary of the M&TS Committee 1997-1999
Institute of Electrical and Electronic Engineers
Institute for Professionals in Taxation, Certified Member of the Institute ("CMI")
International Association of Assessing Officers
Registered Professional Engineer ("P.E."), State of Wisconsin
Wisconsin/National Society of Professional Engineers

Valuation and Special Courses

American Society of Appraisers
Advanced Business Valuation
Business Valuation I
Uniform Standards of Professional Appraisal Practice
Appraisal Institute
Appraisal Principles
Standards of Professional Practice
Center for Business Intelligence
Profit with Nuclear Power
Institute of Property Taxation ("IPT")
Property Tax School
Public Utilities Reports, Inc./The Management Exchange, Inc.
Determining the Cost of Capital
Western Michigan University
Depreciation Program II
Wichita State University/NTA-TIA
Appraisal of Utility/Railroad Property for Ad Valorem Taxation

Speeches

Mr. Remsha has spoken to numerous groups on the valuation of unique and special-purpose properties, ad valorem taxes, and the oil refining industry. Groups addressed include the American Bar Association ("ABA"), The Institute of Property Taxation, the Tax Executives Institute ("TEI"), the Tax Information, Management and Education Society ("TIMES"), the American Petroleum Institute ("API"), Texas Society of Certified Public Accountants ("TSCPA"), Western States Petroleum Association ("WSPA"), Real Estate Center of Texas A&M University, and the ASA. He is also an instructor at various AAA education forums.

CLIENTS SERVED BY MARKET

Oil Refineries	American Refining Group American Ultramar ARM Refining Ashland Petroleum Company Atlantic Richfield Company Chevron USA Coastal Corporation ExxonMobil Corporation Golden West Refinery Hill Petroleum Mapco Petroleum Marathon Ashland Petroleum Mobil Oil Corporation Pennzoil Products Company Shell Oil Company Sun Refining & Marketing Co. Texaco Refining and Marketing Tosco Corporation Total Petroleum Unocal Corporation Ultramar Corporation Ultramar Diamond Shamrock
Personal Property	ABB Vetco Gray Bridgestone/Firestone, Inc. CNG Producing Company Cooper Industries Digicon, Inc. General Electric Company General Tire Company Grant Tensor Geophysical Jack Eckerd Corporation Kelly-Springfield Tire Kimberly-Clark Corporation Memorex Mobil Chemical Corporation Northern Telecom Walgreen Company

Process Plants	Alumax Mill Products American Hoechst Beaumont Methanol Company Coastal Chem, Inc. Condea Vista Fort Howard Paper Company Hercules Inc. HIMONT Jefferson Smurfit Corporation Mobil Chemical Corporation National Sun Industries Occidental Chemicals Shell Chemical Company Texas Lehigh Cement Unocal Corporation

Unique Property

ACF Industries (Private Railcars)
Alpena Power Co. (Hydroplant)
Alternative Energy (Wood-Fired Power Plant)
Bangor Hydro Company (Oil Terminal)
Bell Atlantic Mobile (Telecom)
Bridgeport Hydraulic (Dam)
Burlington Industries (Nitrogen Allocation)
Coastal Corporation (Tank Farms)
Declaration Services (Semiconductor Fixtures)
Detroit Edison (Steam Generation System)
EG&G/Perkin Elmer (DOE Properties)
First Air Products, L.P. (Advanced Flue Gas Desulfurization Facility)
General American Transportation Corporation (Private Railcars)
Heublein, Inc. (Winery and Vineyards)
Humana, Inc. (Hospital)
Indian River Company (Dam)
Lakehead Pipeline Co. (Pipeline)
Niagara Mohawk Power (Hydroplants and Transmission Property)
Northern Border Pipeline Company (Pipeline)
Piedmont Natural Gas Company (Propane Distribution Company)
PPL Electric Utilities Corporation (Nuclear Power Plant)
Railway Progress Institute (Private Railcars)
Shippingport Nuclear Power Plant (Inventory of DOE Assets)
South Central Connecticut Regional Water Authority (Dam)
Sunflower Racing Inc. (Pari-Mutuel Track)
Texaco Refining and Marketing (Intangibles)
Ultramar Diamond Shamrock (Intangibles)
Union Carbide (Department of Energy Properties)
Union Tank Car Company (Private Railcars)
Unocal Corporation (Intangibles)
Vodafone (Telecom)
Wisconsin Electric Power Co. (Hydroplants)
Wisconsin Public Service Company (Power Plants)
Wisconsin River Power Co. (Hydroplants)
Wolverine Power Company (Gas, Diesel, and Coal Power Plants)

CLIENTS SERVED BY SERVICE

Ad Valorem

Alumax Mill Products, Inc.
Ashland Petroleum Company
Atlantic Energy Inc.
Atlantic Richfield Company
Bangor Hydro Company
Chevron U.S.A., Inc.
Coastal Chem, Inc.
Coastal Corporation
Digicon, Inc.
ExxonMobil Corporation
General Electric Company
Golden West Refinery
Herman Miller, Inc.
Huffy Corporation
Humana, Inc.
Jack Eckerd Corporation
Kimberly-Clark Corporation
Lakehead Pipeline Co.
Longview Fibre Company
Mapco Petroleum
McDermott, Inc.
Mobil Oil Corporation
National Sun Industries
PPL Electric Utilities Corporation
Railway Progress Institute
Shell Oil Company
Springs Industries, Inc.
South Central Connecticut Regional Water Authority
Tosco Corporation
Total Petroleum
Ultramar Corporation
Unocal Corporation
Wolverine Power Company
Xerox Corporation

Financing	American Refining Group Amoco Corporation AT&T Bankers Trust Company Chemical Bank Citibank, N.A. Cooper Tire and Rubber First Air Partners, L.P. HIMONT Hill Petroleum Pennzoil Products Company Watkins Associated Industries
Purchase/Sale	American Ultramar ARM Refining Bell Atlantic Mobile Humana, Inc. Northern Telecom, Inc. Shell Chemical Company Shell Oil Company Tosco Corporation Vodafone Wisconsin Public Service Company

Richard J. Palchak, P.E., ASA

Engagement Director, Corporate Valuation Group

Position

Richard J. Palchak is an engagement director for the Milwaukee Corporate Valuation Group of American Appraisal Associates, Inc. ("AAA").

Experience

Business

Mr. Palchak joined AAA in 1971 as an assistant appraiser, advancing to staff appraiser in 1972, senior appraiser in 1976, engagement manager in 1985, and his present position in 1994.

Valuation

Mr. Palchak has extensive valuation experience in allocation of purchase/sales price, depreciation, fair market value studies in use, insurance, property records, and sale or sale/leaseback. Industries served include communications, oil and gas (exploration and refineries and chemical plants), product pipelines, and public utilities. Properties appraised include cable television, cellular telephone, and satellite earth stations; electric, gas, telephone, water, wastewater, and cogeneration facilities; oil and gas production and distribution facilities; and product pipelines.

Court

Mr. Palchak has presented expert testimony before the California Board of Equalization, the British Columbia Utilities Commission, and the Indiana Utility Regulatory Commission.

Education

Milwaukee School of Engineering
Master of Business Administration, Graduate Candidate
Bachelor of Science - Electrical Engineering Technology

Professional Affiliations

American Society of Appraisers, Accredited Senior Appraiser
ASA Designation - Machinery and Technical Specialties/Public Utilities
Institute of Property Taxation
National Society of Professional Engineers
Registered Professional Engineer, Wisconsin and Indiana

Valuation and Special Courses	American Society of Appraisers Uniform Standards of Professional Appraisal Practice Appraisal Institute Advanced Income Capitalization Appraisal Principles Appraisal Procedures Basic Income Capitalization Institute of Property Taxation Property Tax School Public Utilities Reports, Inc./The Management Exchange, Inc., Determining the Cost of Capital Western Michigan University Depreciation Programs I, II, and III Wichita State University/NTA-TIA Appraisal of Utility and Railroad Property for Ad Valorem Taxation
Publications	"Appraisal of a Cable Television Business," E.H. Boeckh, *Real Estate Valuation Guide*
Speeches	Mr. Palchak has spoken before a municipal property accounting group relating to property record development and at an Institute for Professionals in Taxation annual conference relating to the sales comparison approach for complex properties.

Gregory W. Kort

Valuation Consultant, Corporate Valuation Group

Position

Gregory W. Kort is a valuation consultant for the Milwaukee Corporate Valuation Group of American Appraisal Associates, Inc. ("AAA").

Experience

Business

Mr. Kort joined AAA in 1998. Prior to joining AAA, Mr. Kort was a project engineer at Water Services Corporation (U.S. Filter) and Rust Environment & Infrastructure (Earth Tech).

Valuation

Mr. Kort has valuation experience in ad valorem tax, allocation of purchase price, and studies for fair market value in continued use and in exchange. Properties he has appraised include oil refineries, chemical plants, electric generation facilities, pipelines, railcars, and general manufacturing facilities.

Engineering/Project Management

Mr. Kort gained process engineering experience in water and wastewater treatment equipment while at U.S. Filter/Water Services Corporation. Also, at Rust Environment & Infrastructure, he engineered hazardous waste facilities in the Pacific Rim for Waste Management International. Mr. Kort has knowledge of piping and instrument diagrams, process equipment specifications, general arrangements, electrical design, and instrument specifications.

Education

Michigan Technological University - Houghton, Michigan
- Bachelor of Science - Chemical Engineering

Keller Graduate School of Management
- Course work in Masters of Business Administration

Valuation and Special Courses

American Society of Appraisers
- Ethics Exam
- Introduction to Machinery & Equipment Valuation
- Uniform Standards of Professional Appraisal Practice

Appraisal Institute
- Advanced Income Capitalization
- Appraisal Principles
- Appraisal Procedures
- Basic Income Capitalization

Engineer in Training Exam Passed in July 1994

Wichita State University
- Appraisal for Ad Valorem Taxation of Communications, Energy, and Transportation Properties

Professional Affiliations	American Institute of Chemical Engineers American Society of Appraisers, Candidate

GENERAL SERVICE CONDITIONS

(1 page)

GENERAL SERVICE CONDITIONS

The service(s) provided by American Appraisal Associates, Inc., have been performed in accordance with professional appraisal standards. Our compensation was not contingent in any way upon our conclusions of value. We assumed, without independent verification, the accuracy of all data provided to us. We have acted as an independent contractor and reserved the right to use subcontractors. All files, work papers, or documents developed by us during the course of the engagement are our property. We will retain this data for at least five years.

Our report is to be used only for the specific purpose(s) stated herein and any other use is invalid. No reliance may be made by any third party without our prior written consent. You may show our report in its entirety to those third parties who need to review the information contained herein. No one should rely on our report as a substitute for their own due diligence. No reference to our name or our report, in whole or in part, in any document you prepare and/or distribute to third parties may be made without our prior written consent.

The parties agree to indemnify and hold us harmless against and from any and all losses, claims, actions, damages, expenses, or liabilities, including reasonable attorneys' fees, to which the indemnified party may become subject in connection with this engagement. Each party will not be liable for the other party's negligence. The indemnifying party's obligation for indemnification and reimbursement shall extend to any controlling person of the indemnified party, including any director, officer, employee, subcontractor, affiliate, or agent.

We reserve the right to include your company/firm name in our client list, but we will maintain the confidentiality of all conversations, documents provided to us, and the contents of our reports, subject to legal or administrative process or proceedings. These conditions can only be modified by written documents executed by both parties.

American Appraisal Associates, Inc., is an equal opportunity employer.

Private Participation Options Study for the Zambia Electricity Supply Company

Task 5 Report- Social Impact

S23

Table of Contents

List of Tables and Figures.....iii

Executive Summary.....ES-1

1 Introduction.....1-1

1.1 Background.....1-1

1.2 Organization Of This Report.....1-1

2 Pre-Retrenchment Issues.....2-1

2.1 Selection of Employees.....2-1

2.2 Basic Pay.....2-1

2.3 Timing Issues.....2-1

2.4 Implementation.....2-2

2.5 Copperbelt Division.....2-3

2.6 Cost Issues.....2-3

3 Post-Retrenchment Issues.....3-1

3.1 Labor Market.....3-1

3.2 Training and Entrepreneurial Programs.....3-1

3.3 Counseling.....3-2

3.4 Infrastructure.....3-2

4 Social Impact of Private Participation Options.....4-1

4.1 Option Specific Recommendations for Retrenchment.....4-1

4.2 Profile of Retrenched Workers.....4-3

5 Benefits Framework and Cost of Retrenchment.....5-1

5.1 Background.....5-1

5.2 Retrenchment Package for Represented Employees.....5-2

5.3 Retrenchment Package for Non-Represented Staff:.....5-4

5.4 Estimated Cost of Retrenchment.....5-6

6 Recommendations and Conclusions.....6-1

6.1 Recommendations.....6-1

6.1.1 Mitigating the Impact of Retrenchment.....6-1

6.1.2 Programs to Support Retrenched Workers.....6-2

6.1.3 Training and Support Services Cost.....6-5

6.2 Conclusions.....6-5

7 References.....7-1

Appendix A- Persons Interviewed..... A-1

524

Table of Contents

Appendix B- Collective Agreement.....B-1
Appendix C- Conditions of Service for Non-Represented Workers.....C-1

525

List of Tables and Figures

Tables

5-1 Cost of Retrenchment Packages- Basic Pay Without Service Allowance (Kwacha).....5-1

5-2 Cost of Retrenchment Package- Basic Pay With Service Allowance (Kwacha).....5-2

Figures

5-1 Distribution of ZESCO Employee According to Grade.....5-2

5-2 Breakdown of Retrenchment Costs.....5-10

Executive Summary

The Government of the Republic of Zambia (GRZ) has requested the Zambia Privatization Agency (ZPA) to study the options for Private Sector Participation in the Zambia Electricity Supply Company Limited (ZESCO). The United States Agency for International Development (USAID) is supporting the study for ZPA. This section of the report, Task 5, covers the "Social Impact" of the options presented in the study.

Interviews to gather information for the Social Impact Report were conducted with ZPA, ZESCO, USAID, the World Bank, the Ministry of Labor, the National Energy Sector and Allied Workers Union, local government and non-governmental organizations.

There are three options being presented for consideration for private sector participation in ZESCO. In the case of all three options and as a result of productivity analysis benchmarked with world class utilities, a need for a retrenchment of workers is indicated. This report outlines the issues related to the proposed retrenchment and offers suggestions for minimizing the impacts of the proposed retrenchment of 1000 workers.

Since retrenchment is inevitable, ZESCO needs to plan as early as possible for managing a retrenchment program. A transition team with a project manager would be the ideal solution to address key issues such as selection of retrenched workers, balancing the skill mix of the remaining work force for productivity and efficiency, complying with employment legislation for privatization and transferring of employee contracts to new divisions or companies.

ZESCO is currently considering outsourcing non-core functions through the Power Rehabilitation Project (PRP) involving approximately 700 employees. Any plans for outsourcing a significant number of employees should be dovetailed with retrenchment.

During discussions with the Union, the primary request was for a retrenchment package and payment of pension plan monies. Negotiating and structuring a retrenchment package is costly and complex. For structuring packages, ZESCO will follow the Collective Agreement with the Union and Conditions of Service for Non-Represented Employees.

This report outlines retrenchment packages in detail and estimates a cost with and without Service Allowances added to the basic salary figure. The components of "basic salary" have become an issue in the Zambia Courts as a result of retrenchments of other parastatals. Benefits are computed based on basic salary therefore if there is an increase in basic pay through the addition of Service Allowance; this will result in a corresponding increase in the total package. The total cost of a retrenchment package with Service Allowance included in basic pay and with pension payments is $24,128,164; without Service Allowance included, the total is $17,730,497.

Employees join the Local Authorities Superannuation Fund (LASF), which is a defined benefit pension scheme separate from ZESCO operations. From various interviews, it appears that LASF does not have funds available for pension payments. Donor organizations will probably be requested to provide assistance with pension payments.

ZESCO management and the Union discussed the possibility of offering a voluntary retrenchment package. Both parties feel that many employees would opt for a retrenchment package and would be satisfied as long as payment was made in full and in a timely fashion. ZESCO management feels that retrenchment is being considered not necessarily by their choice

and therefore funding the program should not be considered their financial obligation. A retrenchment package should be offered and paid in a timely fashion. The issue becomes one of who will bear the cost of the retrenchment program. The World Bank Representative interviewed was encouraging and recommended approaching the Bank for financial support of the retrenchment package.

The labor market in Zambia is tight, inflation high, access to credit is extremely limited and families are barely keeping up with the cost of living. Studies show that many retrenched workers shift to the informal sector or agriculture. This change represents a loss in health benefits and pensions but it is not the primary reason for poverty. Unemployment is the main cause of poverty. Workers need to be reemployed as expeditiously as possible.

To lessen the impact of retrenchment, a support services program should be designed to expedite the return of workers to the labor force. ZESCO employees are mainly skilled workers and therefore, have an advantage over other parastatal workers in finding employment. Early intervention is essential with counseling and training programs to match employee needs. An individual should be selected to design a support services program utilizing the very excellent government and non-governmental organizations operating in Zambia. Many of the programs are mentioned in this report. Donor organizations and the World Bank should be approached for funding support services.

Finally, communication and inclusion of all stakeholders in the process is fundamental to building trust and minimizing the negative aspects of retrenchment. Keeping the Union well informed and involved from the beginning helps control rumors and minimizes potential disruptions to business. The union can keep members informed and advise management and the transition team of employees concerns. Once decisions are made, it is best to act in an expeditious manner while allowing the employees enough time to psychologically adjust to the decision. It is a balancing act and the transition team can decide the timing of events.

With an integrated strategy, collaborative planning and effective communication, retrenchment becomes a manageable and measurable transition.

528

1.1 *Background*

The Social Impact of the Private Participation Options Study for the Zambia Electricity Supply Company" (ZESCO), Task 5, Social Impact, is being conducted for the Zambia Privatization Agency (ZPA). Bechtel/Nexant is conducting the study for the United States Agency for International Development (USAID) to study the options for private sector participation in ZESCO.

The objective of this report is to identify the social impact of restructuring, hiving off of non-core activities and/or concessioning ZESCO and to identify ways of mitigating negative social effects. The report estimates the cost of retrenchment, recommends programs beneficial to employees and offers suggestions for an efficient and effective management of the retrenchment process.

Electric utilities around the world are facing new and unfamiliar challenges as they face deregulation, restructuring and reengineering. Aligning human resources to meet changing business needs is a key element of the process along with mitigating negative social impacts.

In this changing environment, ZESCO is no exception. The utility has been proactive in analyzing ways to streamline operations and moving towards commercialization. The utility's Power Rehabilitation Project (PRP) is an example of an ongoing effort to focus on customers and to supply quality electricity through an efficient and competitive system. Through the PRP, ZESCO is planning to outsource non-core activities in these areas: construction, fabrication, transport, security services, canteens, I/T communication, property maintenance, clinics and the Ndola training center. This process should result in the reduction of approximately 700 positions. There has been conflicting information about the process and if and when the outsourcing will occur. In principle, the outsourcing appears to be a sound strategy to improve productivity.

In 1993, ZESCO had 5,168 staff. From 1994 to 1996, through a retrenchment program and attrition, the utility was able to reduce staff by 400. Wastage analysis shows that from 1995 through August 2000, there was a total decrease of 1,266 employees due to deaths, retirement, resignations, and dismissals. The staffing level at August 31, 2000 was 4009. A study conducted in June 1993 sponsored by the Swedish International Development Agency (SIDA) recommended the optimum ZESCO staff size for commercialization of 3000. The number appears to be reasonable considering benchmarks for the industry and the figure is in line with the recommendations of this private participation options study.

1.2 *Organization Of This Report*

The remainder of this report is organized as follows:

- Section 2 addresses pre-retrenchment issues.
- Section 3 address post-retrenchment issues.

529

- Section 4 provides a summary of the social impact of the private participation options under consideration.
- Section 5 provides a framework for employment and retrenchment benefits and provides and estimate of the their cost.
- Section 6 summarizes recommendations and conclusion of the analysis
- Section 7 provides the references used as sources of data and information for this report.

The following appendices are included with the report

- Appendix A- list of persons interviewed for this assignment.
- Appendix B- Collective Agreement between ZESCO and National Energy Sector and Allied Workers Union
- Appendix C- Conditions of Service for Non-Represented Employees

Responding to an increasingly competitive environment is necessary for survival and initiating change can bring benefits to a corporation. However, when retrenchment of employees becomes essential, it is critical that the organization develops a planned approach to managing the process. Identification of relevant issues is important to the ultimate success of the program for ZESCO management and the future of retrenched workers. The following recommendations should be given careful consideration prior to implementation of retrenchment to empower the organization to move forward in an effective and coordinated manner.

2.1 *Selection of Employees*

Management makes the ultimate selection of who is retrenched. ZESCO follows the "Last In First Out" principle and the Union may pressure ZESCO to follow this approach. Management needs to analyze the work force and select the proper mix of skills, knowledge and abilities to meet business requirements.

In a previous retrenchment, ZESCO lost several skilled staff that were necessary for efficient operations. Consequently, the utility found themselves in a position to have to rehire some retrenchees on a contractual basis. There are currently fifteen contract employees in this situation. The World Bank, who may be offering lending support for the retrenchment program, has a guideline of not rehiring retrenchees for three years following the process. Management should review carefully, the existing resources and determine the required skill base to avoid a similar situation in the future.

Recently, Customer Service hired some of the "best and brightest" to improve the meter reading operation and customer service. It would be detrimental to the organization to lose these relatively new employees under the "Last In, First Out" policy.

2.2 *Basic Pay*

Currently, there are court cases in Zambia regarding which benefits constitute the components of the "basic pay" figure. To avoid problems with the formula for basic pay, it is recommended that the Conditions of Service for Non-Represented Employees, the Collective Agreement for Union and guidelines from the Government be followed.

Since the retrenchment package is based on formulas utilizing "basic pay", it is important that there are not any unscheduled increases to 'basic pay." A pay increase would result in a corresponding increase in the cost of the total package.

2.3 *Timing Issues*

ZESCO and the Union negotiated a new Collective Agreement in August 2000. There is a feeling that employees would prefer to be retrenched sooner rather than later with the new agreement in force. If the process is delayed, ZESCO can expect that negotiations for better benefits would be required due to increases in the cost of living and general inflation. The Collective Agreement is renegotiated every two years.

The sentiment expressed by both management and Union in interviews is that given an opportunity to volunteer, many employees would likely choose a retrenchment package. ZESCO has transferred most of their previously owned homes, except at power stations, to employees. The vast majority is settled and would be content with a package if it included the allowances along with basic salary and payment was delivered in a timely fashion. This mind set is directly related to life expectancy.

In many interviews, concern was expressed over life expectancies which in Zambia have dropped for both women and men to age 37. Population statistics take into account the excess mortality effects of AIDS, which can lower life expectancy, increase death rates, and change the distribution of population by age and sex. The age structure of the general population as described in "Living Conditions in Zambia" is: 0-14 years: 45%, 15-24 years: 24%, 25-64 years: 31% and 65 years and over 2%. ZESCO is currently losing 3% of its workforce a year due to early deaths, which is an additional cost of doing business.

The timing of employee transfers in light of various private participation options being considered in Section 5 of this report, is an important element of potential retrenchment costs. Timing will affect the number of employees receiving retrenchment benefits and consequently, the cost of the program. Section 35 of the Employment Act, states that "a contract of one employer cannot be transferred to another." The test for transfers is "Does the employer change?" If parts of ZESCO were privatized and sold, employees would have to be paid End-of-Service Benefits and rehired by the new employer. This could be very costly. To avoid hiring employees by a "new" employer, employees could be legally transferred to subsidiaries prior to any sales if the action was explained to the employee and the employee signs a "Transfer of Contract Consent Form."

Employees are reluctant to agree to consent forms as other companies have folded after going through privatization. Employees have then been left without any income or benefits. Due to the nature of the electric utility industry, it is highly unlikely that this would happen to ZESCO. However, this needs to be explained thoroughly to staff and management in order to facilitate transfer of contracts to the new employer.

To ensure a smooth retrenchment process and lessen the risk of court cases, retrenchment packages should be paid when promised. This has not been always the practice in earlier retrenchments. The Government has since introduced laws to protect workers and the law now requires that employees continue to be paid salaries until redundancy benefits are received.

2.4 *Implementation*

ZESCO should promptly establish management responsibility for the retrenchment process. It would be advantageous to establish a transition team led by a project manager for the duration of the retrenchment program.

Adequate time should be allotted for pre-retrenchment training for the employees prior to receiving money in hand. Most employees are unaccustomed to having so much money in their possessions and training/counseling is needed on money management to avoid squandering the package.

S32

2.5 *Copperbelt Division*

ZESCO has acquired an estimated 40,000 to 60,000 new customers in the Copperbelt Region as a result of the privatization of Zambia Consolidated Cooper Mines Limited (ZCCM) and the formation of the Copperbelt Energy Corporation (CEC). ZESCO anticipates needing 300 employees to staff the region. This presents an opportunity in view of a possible retrenchment to redeploy staff as opposed to bringing on new hires. ZESCO is planning on running the operation "lean and mean" and is currently advertising the positions internally requesting workers to transfer to the Copperbelt.

2.6 *Cost Issues*

The ZESCO Pension Fund is a defined benefit scheme named the Local Authorities Superannuation Fund (LASF). Both the employee and employer contribute to the plan. The last actuarial analysis was conducted in December 31, 1992. The latest available figures dated March 1999 show a negative balance of K-2.9 Billion with minimum funding and K-7.6 Billion with normal funding. These figures are computed for all companies that participate in the plan and ZESCO's figures are not segregated.

Pensions could become a contentious issue as employees have contributed to the fund and are entitled to their funds with interest. From various interviews, it appears that LASF does not have funds available for pension payments. Donor organization support needs to be requested for pension payments.

ZESCO management expressed the feeling that retrenchment is not being considered necessarily by their choice and therefore funding the program should not be considered their financial obligation. The issue becomes one of who will bear the cost of the retrenchment program. If any of the private participation options are implemented that involve a sale, an investor should be aware that the Privatization Act states that redundancy benefits must be paid through privatization profits if the company does not cover the expense.

3.1 *Labor Market*

An earlier study for ZPA by GY Associates with funding from GTZ, "The Social Impact of Privatization in Zambia" shows that few new formal sector jobs are likely to be created in the very near future. Until the positive results of privatization take hold, most retrenched workers are likely to find employment in the informal sector and in agriculture. The downside of working in the informal sector is the absence of a pension, a social security system, and medical insurance or paid leave. This is an additional economic burden for the worker and the extended family. The GY study shows the principal cause of poverty in Zambia is unemployment rather than a move into the informal sector.

The ZESCO retrenchees may fare better than those from other parastatals, as many are skilled and should have an easier time finding gainful employment. Unskilled workers have had the most difficulties in finding alternative employment. Chris Sealy, resident Director of the Private Sector Development Programme, a European Development Fund Project, stated there is new private sector investment in Zambia and jobs are being created. This presents a less than totally bleak outlook for employment.

Despite progress on privatization and reforms, inflation and unemployment remain high. The unemployment rate (1998) is 25% and the 1999 estimated inflation rate (consumer prices) is 27.4%. The Zambian currency, the Kwacha, has dropped from K per US$1 in 1995 from K864 to K3500 in November 2000. A normal commercial loan rate is 40% interest and one person interviewed said loans could cost as much as 60% interest. Access to credit is difficult.

Counseling and training for the retrenchees is essential to assist them in learning what opportunities are available in the market place. Matching their qualifications and interests to the labor market helps to create realistic employment expectations.

In researching this report, a meeting was held with the ZESCO Union. The position of the Union was very predictably anti-privatization. One of the chief reasons for the Union stance is that as citizens of Zambia they have not yet seen the positive effects of privatization. Even though their expressed concerns were lack of jobs and benefits, the Union President felt that if a ZESCO retrenchment package were offered on a voluntary basis, many members would take advantage of the offer.

3.2 *Training and Entrepreneurial Programs*

Retrenched workers from privatized companies have historically found employment in the informal sector in Zambia. Many form their own businesses, start trading or move into agriculture. Training in many areas is required: job search skills, small business ownership and management, skills training, accounting, communication, computer technology, and farming.

Since access to credit is very limited and interest rates are high, training needs to be combined with access to credit at affordable rates for those interested in business start-ups. The cost of training needs to be covered either by ZESCO or funded by a donor organization. Sources of

534

credit need to be identified and the information communicated to retrenched workers. The opportunity for establishing micro-credit schemes for individuals and small groups should be examined by the donor community, as money for new business start-ups is virtually nonexistent at the present time.

3.3 *Counseling*

Counseling plays an important role in helping the retrenched workers find a source of income. The National Social Safety Net (NSSN) coordinates many programs to assist retrenched employees. NSSN works with these agencies: the Public Welfare Assistance Scheme, Future Search, the Land Resettlement Programme, Small and Micro Enterprises Promotion Unit, Vocational Education, Vocational and Entrepreneurship Training (TEVET), and various Non-Government Organizations (NGOs).

NSSN is a government organization with a goal of capacity building for employment creation. NSSN can provide the necessary assistance but lacks an adequate budget to provide the services it aims to coordinate. A funding source is necessary to utilize NSSN's professional capabilities.

In the past, retrenched workers have not been tracked to monitor what they are doing post-retrenchment. NSSN has the capability of monitoring and evaluating the progress of former employees. This is a project that would need funding but could be invaluable in tracking success stories and learning from the experiences of these workers.

3.4 *Infrastructure*

Retrenched workers have an option of repatriation, which includes resettlement to their home villages and offers of land through a Government Land Resettlement Program. It is felt that many would opt for this choice if living conditions were better in the rural areas. Existing conditions in the rural areas would represent a dramatic decline in the standard of living for urban dwellers choosing to relocate. Capital needs to be raised and allocated for rural electrification, water systems, medical clinics and better roads. This is a macro issue much larger than a potential ZESCO retrenchment but the existing conditions in rural Zambia affect the choices and economic viability of retrenched workers.

535

Section 4 Social Impact of Private Participation Options

4.1 *Option Specific Recommendations for Retrenchment*

Section 35 of the Employment Act, states "a contract of one employer cannot be transferred to another." The test is "Does the employer change?" in a transfer situation. This becomes a significant issue in relationship to the cost of privatization. If parts or all of ZESCO were to be sold outright to a new owner, theoretically, all employees would have to be given End-of-Service Benefits (ESB) and hired as new employees. This could be quite costly for a new owner since there are over 4000 employees.

The timing of transferring employees in light of various options and new ownership is also an important element of the cost issue. Timing affects the number of employees receiving retrenchment benefits and consequently, the cost of the program. Employees could be transferred to new divisions if ZESCO remained the owner and opted for a management contract or concession. Without the concern of being hired by a new owner, employees could be transferred to subsidiaries prior to any sales. This would save the cost of paying ESB. The law requires that the transfer action is thoroughly explained to the employee and the employee must sign a "Transfer of Contract Consent Form." Employees would transfer with years of service in tact.

Employees are reluctant to agree to sign consent forms as other companies have folded after going through privatization. Many employees have then been left without any benefits. Due to the nature of the electric utility industry and the strategic importance to Zambia, it is highly unlikely that this would happen to ZESCO. However, this would need to be explained in a convincing manner to staff and management in order to facilitate transfer of contracts to the new employer.

There are three options being presented for consideration for private sector participation in ZESCO. These options have implications for how the retrenchment process should be managed and are analyzed in this section.

Option 1 proposes concessioning ZESCO to a single concessionaire for a period ranging from 10 to 25 years. The concessionaire would most probably unbundle ZESCO into separate divisions for Generation, Transmission and Distribution. Centralized functions would be controlled from a Corporate Center for administrative functions.

This option could be completed very quickly and most probably within one year's time. In this case, ownership does not change and employees could be transferred to the new divisions and continue to work for ZESCO through the Concessionaire without paying ESB.

Option 2 is a two-step plan, which could take from two to three years to implement. In the first phase, ZESCO would be unbundled into business units of Generation, Transmission and Distribution and Supply. The owner would remain ZESCO at stage one and ESB would not be required.

Phase two would involve the concession, joint venture or sale of the three business units. In the likely event of a sale and new ownership, the "new employer test" would come into play and costly benefit packages required from the profits of privatization may have to be paid.

536

It is recommended that a major reengineering take place during phase one of Option 2. Employees would be transferred to the new business units under ZESCO ownership. A Human Resource plan should be developed and implemented to include a freeze on hiring, monitoring staff numbers through attrition and natural wastage and planning any downsizing/retrenchment prior to the sale of the business units. At the time of sale, joint venture or concession, staffing should be at appropriate levels enhancing the attractiveness to investors.

Option 4 is very similar to Option 2 except that a master concession or joint venture is used in phase two. From a Human Resources perspective, the situation is the same as Option 2. Downsizing should be completed in phase one which could take two to three years, with an aggressive approach by Human Resources to manage any new hiring and monitor natural wastage and attrition. Phase two could take up to eight years but staffing levels should be appropriate prior to the master concession being put in place.

The Task One report on Private Participation Options reports that ZESCO measures productivity levels in customers or sales per employee. According to benchmark data, the analysis shows the need for productivity improvements at ZESCO through anticipated growth in sales and a reduction in staff.

Distribution is the function that employs the greatest number of people at ZESCO. The functional areas of Distribution include: maintenance of low voltage wires and transformers, new customer connects, meter reading, billing and payment collection. Most would assess that Distribution falls short in executing its functional responsibilities and it is projected that Distribution will remain unprofitable throughout the decade.

In the case of all three private participation options described above, the number of employees to be reduced for productivity gains is the same and totals approximately 1000. The bulk of the 1000 would come from Distribution with a smaller number, around 200 of the 1000 coming from Human Resources and Corporate Development and Accounting (CD&A) staff, which supports the Distribution function.

The current ratio of employees at ZESCO is one/third in core areas to two/thirds in non-core areas. ZESCO is cognizant of this and through the Power Rehabilitation Project is reviewing non-core areas for improvements in the ratio. ZESCO has a plan to outsource these units: Construction, Fabrication and Motor Vehicles in Engineering Development and Security, Cleaners, Building Maintenance, Clinics, Property and IT in CD&A. Canteens have already been outsourced. There are plans to make the training center in Ndola a world-class regional center which could be revenue producing. If ZESCO executes this plan, there would be a potential decrease of 700 employees and an improvement in overall productivity numbers. The 700 outsourced could offset the projected 1000 retrenched workers.

There are situations where ZESCO may have to continue to hire new employees such as in the meter reading division. Talented people with appropriate skills are filling the void there and improving the effectiveness of operations. The new Copperbelt Division may require new hires if the needed staff estimated at 300 cannot be redeployed from other areas of ZESCO.

Management needs to balance these factors and plan for a reduction of approximately 1000 staff.

4.2 *Profile of Retrenched Workers*

There are many factors that would affect the profile of the retrenched worker. This study did not go into detailed analysis of whom should be retrenched and which specific locations would be affected. This type of analysis would require a separate detailed organizational development study. Management has the ultimate decision making authority to select retrenchees. The selections would have to consider the viability of maintaining operations with the requisite skill level of employees. The Union would be involved with the selection process. Factors to consider are age, gender, department, length of service, and skill requirements.

Both Union representatives and management stated that if a voluntary retrenchment program were offered, many employees would be satisfied to take the package. This could create an imbalance in the organization and caution should be used to ensure that the right skill mix of employees is retrenched.

The majority of staff is Union numbering 3223 and management totals 786. Therefore, the bulk of retrenchees would be Union members who fall in the categories of six to seventeen years of service and are 32 to 43 years of age. Males out number females and there should not be a disproportionate number of females retrenched. See Appendix C for employee statistical data.

Attention should be given to gender in the selection process as the Social Impact Study of Zambia Railways shows that women are increasingly taking over as the breadwinners of the family.

It may be assumed that retrenchees will come from communities located all over Zambia. It is difficult to predict at this stage if one area will be adversely impacted until a detailed study is completed. It is very important when designing a support services program of training and counseling that all geographic areas of retrenchment are included.

538

Section 5 Benefits Framework and Cost of Retrenchment

5.1 *Background*

The Employment Act, Chapter 512 of the Laws of Zambia, which covers employment in the parastatal and public service sectors, governs ZESCO. The Employment Act and its amendments represent the minimum requirements for employers to be in compliance with Zambian Law.

ZESCO has conditions of service that exceed the requirements of the Employment Act. Union employees are represented by a collective bargaining agreement between ZESCO and the National Energy Sector and Allied Workers Union. A new agreement was ratified recently between the Union and ZESCO management to run from August 2000 to July 31, 2002. The Agreement covers the conditions of service for union employees. This Agreement is attached in Appendix B.

Non-represented staff is covered under ZESCO's Conditions of Service based on the former Zambian Industrial and Mining Corporation Limited (ZIMCO) Corporate Terms and Conditions of Service which were used to cover all aspects of employment for parastatals. The ZIMCO Terms and Conditions were legally binding until 1993 when it was dismantled. ZESCO modified the ZIMCO conditions of service for Non-Represented staff to exceed the normal statutory requirements in Zambia. The ZESCO Conditions of Service are attached in Appendix C.

Redundancy benefits are defined in the Conditions of Service and are offered to employees if it is necessary to downsize/retrench due to privatization. Management negotiates with the Union the terms of redundancies considering these factors: capacity or position, efficiency, length of service, diligence, health, and disciplinary record. The general policy followed is that redundancies are based on the principle of "Last in, First out." However, management should analyze the workforce to ensure that the requisite skills remain in the labor pool for effective and efficient operations before final selection for retrenchment.

Redundancy pay is in addition to notice pay and any additional contractual terminal benefits. According to Zambian law, an employee placed on retrenchment must continue to receive compensation until benefits are actually paid.

The components of the ZESCO remuneration package are complex and contain numerous allowances but the key component is the basic salary figure. Due to retrenchments previously completed in other industries, there is a controversy over which allowances are included in "basic salary" and some court cases are pending in Zambia regarding this issue. ZIMCO issued a policy statement on "Incorporation of Allowances into Basic Salary" dated January 25, 1995 stating that "...with immediate effect that allowances currently being paid separately monthly should be incorporated into the basic salaries." ZIMCO stated in a letter dated, November 1994, that "...all calculations to unionized workers are made in accordance with the existing Collective Agreement with the Union." "...Allowances paid in cash to the employees may be incorporated with the basic salary. " In the case of the Union, these benefits are defined as transport, housing and lunch.

Since the retrenchment package is based on formulas utilizing the number of basic pay months, it is important that there are not increases to basic salaries prior to implementing the retrenchment

process. An increase in basic pay will result in a corresponding increase in the total package. In some cases, Boards of Directors have approved salary increases prior to privatizations.

The ZESCO Human Resources Director reviewed the benefits, which need to be included in calculating the cost of retrenchment packages. The basic packages are defined below with notations on the assumptions made for calculations. The figures used for employment and salary levels are based on ZESCO statistics dated August 31, 2000. Total number of employees is 4009. Represented employees are classified in salary grades referred to as RS1 through RS9. Non-represented or management salary grades are M4 through M12.

Figure 5-1 shows the distribution of ZESCO employees according to grade level.

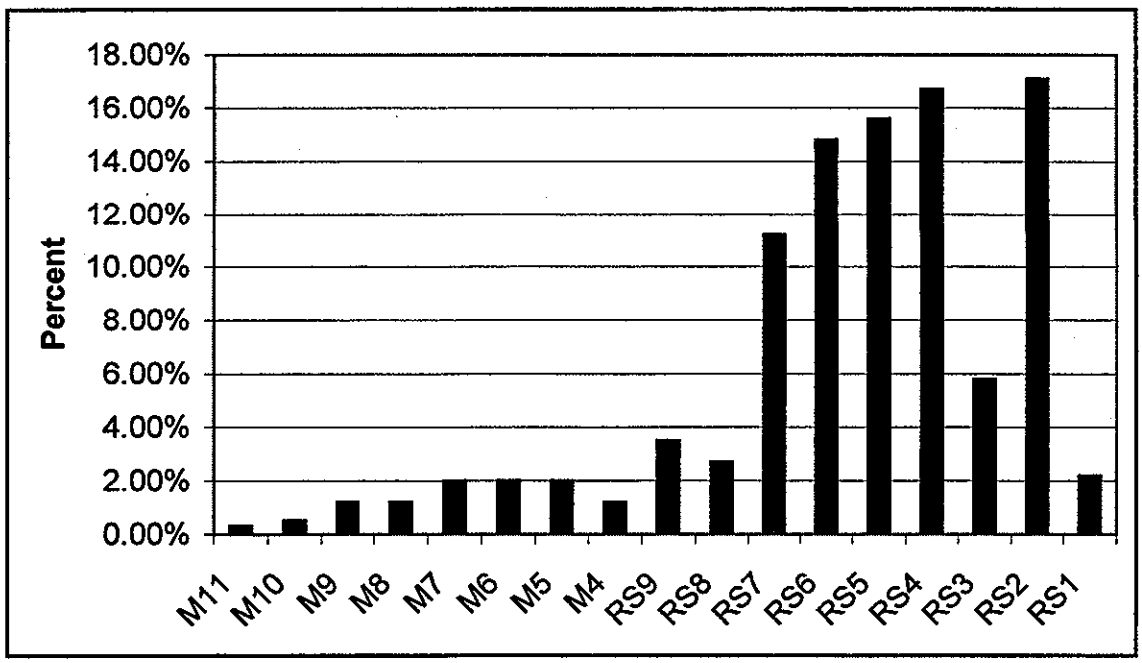


Figure 5-1 Distribution of ZESCO Employee According to Grade

5.2 *Retrenchment Package for Represented Employees*

Retrenchment compensation for the **Union-represented employees** includes the following components for estimating total package cost:

1. **Redundancy Benefits** - These benefits are usually measured in terms of months of basic pay per year of service. The ZESCO schedule of payments is as follows:

Continuous Service	**Redundancy Pay**
Below 5 years	10 months
5 years - below 10 years	17 months
10 years - below 15 years	22 months
15 years - below 20 years	28 months
20 years - below 25 years	34 months

540

25 years - below 30 years	40 months
30 years - below 36 years	46 months

Since the majority of employees falls within the 10 years and below 15 years of continuous service, this category will be used for estimating the cost of the retrenchment packages.

2. **Retirement/Long Service Gratuity** - In addition to benefits accruing from the Pension scheme, any employee who is retired and has worked not less than 10 years, receives the following for each year of completed service:

First 10 years of service - 2 months pay
Next 10 years (11-20) - 3 months pay
Next 10 years (21-30) - 4 months pay

The Long Service Gratuity is a liability which must be paid to all employees that meet the 10 year-criteria of employment. It is generally, a liability, which is calculated each year and should be shown on the balance sheet. When these benefits are paid, the company in fact makes an early payment of a liability.

3. **Pension** - Employees join the Local Authorities Superannuation Fund (LASF), which is a defined benefit pension scheme separate from ZESCO operations. Employees contribute 10 % of basic pay and the employer pays 23%. Employees are entitled to pension payouts with 8% interest. The formula for monthly retirement benefits is annual salary x length of service (in months) divided by pension age (in months). Members receive a lump sum payment of two thirds of the gross annuity at retirement and receive the remaining one third of the gross annuity as the net annuity, which is paid as a pension for life. To retire, an employee has to be either age 55 or have 30 years of service. In the case of retrenchment, Section 28 of the LASF plan document stipulates that workers are deemed to be age 55. They receive a pension computed on the above-listed formula using age 55. An assumed life expectancy is used to estimate payments of the remaining one third of the annuity until death.

For estimating pension liability, the formula used for represented employees uses average basic annual salary times ten years of service in months (120) divided by age 55 in months (660) times 20 years of life expectancy. Basic salary does not include the Service Allowance percentage.

Pensions are a cost of retrenchment but are not necessarily ZESCO's liability as contributions have been made to LASF.

It is important to note that effective February 1, 2000, ZESCO introduced a second pension fund, the National Pension Scheme Authority (NAPSA), as required by Zambia legislation. All members of the formal sector have to participate in NAPSA, which requires matching contributions to the new pension fund by both the employer and employee at a rate of five percent of basic pay. ZESCO hired 250 employees between February and November 2000 whom are now covered under NAPSA. Costs of the NAPSA pension plan are not covered in this report.

4. **Service Allowance** - Employees are entitled to service allowances according to the following schedule:

Salary Grades	**Allowance**

For Represented

RS 1	85% of basic salary
RS2	80% of basic salary
RS3-RS9	75% of basic salary

As will be discussed later, there have disputes as to whether the Service Allowance should be considered as part of basic pay in the calculation of other benefits. The definition of what comprises basic pay is a fundamental issue that greatly affects the overall cost of the retrenchment package.

5. **Long Service Award** - Employees receive recognition for length of service.
   10 years - a wrist watch or K300,000
   20 years - radio or K 500,000
   30 years - plough, planter, ridger or K750,000.

The category utilized for calculations is 10 years and K300,000.

6. **Notice Pay** - A termination notice of 30 days is required. Payment of all wages and benefits for 3 months of basic pay in lieu of notice is standard practice. Notice Pay formula is based on 3 months of basic pay at the appropriate salary grade and at the average monthly basic pay of the range.

7. **Repatriation** - ZESCO pays a Subsistence Allowance as repatriation benefits to the employee, his/her children and registered dependents. An employee is entitled to be reimbursed for a maximum of seven days.

The rates payable under the Collective Agreement are:
   RS1-RS5 – K55,000 per night
   RS6-RS9 – K75,000 per night

Calculations assume a family of 5 and seven nights.

8. **Leave Days** - Upon separation of employment, employees are entitled to convert all accrued leave for cash upon separation from ZESCO. Based on conversations with the ZESCO HR Director, it is common practice to convert leave days. Since this amount would be paid in any case of departure and is such a variable, the cost is not included in the calculations of the cost of the retrenchment package.

9. **Housing** - An employee who has not been provided with Company housing is entitled to a housing allowance of 40% of monthly basic pay.

5.3 *Retrenchment Package for Non-Represented Staff:*

1. **Redundancy package** - The ZIMCO guidelines dated July 26, 1993 are followed for calculating terminal benefits. The Redundancy benefit is calculated as 24 months pay plus one month's salary inclusive for each year of service.

The majority of non-represented employees are in the category of 6-11 years of service. 10 years of service and 34 months of basic pay have been used for calculations.

542

2. **Retirement/Long-Service Gratuity** - Paid as follows for each completed year of service.
   10 years of service - one month
   11-20 years - 1.25 months
   21- 30 years - 1.5 months

The Long Service Gratuity is a liability which must be paid to all employees that meet the 10 year-criteria of employment. It is generally, a liability, which is calculated each year and should be shown on the balance sheet. When these benefits are paid, the company in fact makes an early payment of a liability.

3. **Pension** - Employees join the Local Authorities Superannuation Fund (LASF), which is a defined benefit pension scheme separate from ZESCO operations. Employees contribute 10 % of basic pay and the employer pays 23%. Employees are entitled to pension payouts with 8% interest. The formula for monthly retirement benefits is annual salary x length of service (in months) divided by pension age (in months). Members receive a lump sum payment of two thirds of the gross annuity at retirement and receive the remaining one third of the gross annuity as the net annuity, which is paid as a pension for life. To retire, an employee has to be either age 55 or have 30 years of service. In the case of retrenchment, Section 28 of the LASF plan document stipulates that workers are deemed to be age 55. Employees receive a pension computed on the above-listed formula using age 55. An assumed life expectancy is used to estimate payments of the remaining one third of the annuity until death.

For estimating pension liability, the formula used for non-represented employees uses average basic annual salary X ten years of service in months (120) divided by age 55 in months (660) X 20 years of life expectancy. Basic salary does not include the Service Allowance percentage.

Pensions are a cost of retrenchment but are not necessarily ZESCO's liability as contributions have been made to LASF.

It is important to note that effective February 1, 2000, ZESCO introduced a second pension fund, NAPSA, as required by Zambia legislation. All members of the formal sector have to participate in NAPSA, which requires matching contributions to the new pension fund by both the employer and employee at a rate of five percent of basic pay. ZESCO hired 250 employees between February and November 2000 whom are now covered under NAPSA. Costs of the NAPSA pension plan are not covered in this report.

4. **Service Allowance** - The following are allowances for pay grades expressed as percentages of basic salary.
   M4 - M8- 60% with tax to be split 50:50 by ZESCO and employee
   M9 - M12- 75% with tax to be split 50:50 by ZESCO and employee

5. **Long Service Award** - Employees receive recognition for length of service.
   10 years - a wrist watch or K300,000
   20 years - radio or K500,000
   30 years - plough, planter, ridger or K750,000.

The category utilized for calculations is 10 years and K300,000.

6. **Notice Pay** - A termination notice of 30 days is required. Payment of all wages and benefits for 3 months of basic pay in lieu of notice is standard practice. The Notice Pay formula is based on 3 months of basic pay at the appropriate salary grade and at the average monthly basic pay of the range.

7. **Repatriation** - ZESCO pays a Subsistence Allowance as repatriation benefits to the employee, his/her children and registered dependents.

M4-M8 K120,000 per night per person
M9-M12 K150,000 per night per person.

Calculations assume a family of 5 and seven nights.

8. **Leave Days** - Upon separation of employment, employees are entitled to convert all accrued leave for cash upon separation from ZESCO. Based on conversations with the ZESCO HR Director, it is common practice to convert leave days. Since this amount would be paid in any case of departure and is such a variable, the cost is not included in the calculations of the cost of the retrenchment package.

9. **Housing** - Salary grades M 4-M12 are entitled to receive 35% of monthly basic pay.

5.4 *Estimated Cost of Retrenchment*

Calculations for the cost of the retrenchment packages are based on average basic pay and components as described in sections 6.1 and 6.2. These are summarized in Tables 5-1 and 5-2. Total retrenchment is based on 1000 employees evenly distributed among the represented and management salary grades.

Table 5-1 Assumptions for Calculations of Retrenchment Cost

	Service Allowance (% of basic pay)	Redundancy Benefits (months)	Long Service Gratuity (months)	Repatriation				Housing (% of basic pay)	Notice (months)	Long Service Award (Kwacha)
				Number of family members	Number of days	Payment family member per day (Kwacha)	Total per employee (Kwacha)			
	A	B	C	D	E	F	G=DxExF	H	I	J
M12	75%	34	10	5	7	150,000	5,250,000	35%	3	300,000
M11	75%	34	10	5	7	150,000	5,250,000	35%	3	300,000
M10	75%	34	10	5	7	150,000	5,250,000	35%	3	300,000
M9	75%	34	10	5	7	150,000	5,250,000	35%	3	300,000
M8	75%	34	10	5	7	120,000	4,200,000	35%	3	300,000
M7	75%	34	10	5	7	120,000	4,200,000	35%	3	300,000
M6	75%	34	10	5	7	120,000	4,200,000	35%	3	300,000
M5	75%	34	10	5	7	120,000	4,200,000	35%	3	300,000
M4	75%	34	10	5	7	120,000	4,200,000	35%	3	300,000
RS9	75%	22	20	5	7	75,000	2,625,000	40%	3	300,000
RS8	75%	22	20	5	7	75,000	2,625,000	40%	3	300,000
RS7	75%	22	20	5	7	75,000	2,625,000	40%	3	300,000
RS6	75%	22	20	5	7	75,000	2,625,000	40%	3	300,000
RS5	75%	22	20	5	7	55,000	1,925,000	40%	3	300,000
RS4	75%	22	20	5	7	55,000	1,925,000	40%	3	300,000
RS3	75%	22	20	5	7	55,000	1,925,000	40%	3	300,000
RS2	80%	22	20	5	7	55,000	1,925,000	40%	3	300,000
RS1	85%	22	20	5	7	55,000	1,925,000	40%	3	300,000

544

Table 5-2 Assumptions for Calculating Pension Liabilities

Many of the benefits are functions of the size of basic pay. There has been some dispute in previous retrenchments on what is to be included in basis pay. It is our understanding that this issue is under litigation and has yet to be settled. We have considered two cases that bound this dispute. At the low end, basic pay includes no allowances. At the high end, the basic pay used to calculate benefits includes to Service Allowance.

Table 5-3 shows the calculation of retrenchment benefits for basic pay without allowances. Table 5-4 considers the same calculation with basic pay that includes the Service Allowance. These calculations define a range of benefits from US$ 17.8 million to US$ 24.3 million.

Average Length of Service (years)	Average Life Expectancy (years)	Average Age (years)
K	L	M
10	20	55

Table 5-3 Cost of Retrenchment Packages- Basic Pay Without Service Allowance (Kwacha)

Employee Category	Average Monthly Basic Pay	Total Retrenchment	Service Allowance	Redundancy	Long Service Gratuity	Repatriations	Housing	Notice	Long Service Award	Pension Obligation	Total
	AA	BB	CC= AAxBBxA	DD = AAxBBxB	EE = AAxBBxC	FF = BBxG	GG =AAxBBxH	HH = AAxBBxI	II =BBxJ	JJ = AAxBBx12* (K*L/M)	
M12	4,326,500	0	0	0	0	0	0	0	0	0	0
M11	3,393,500	3	7,635,375	346,137,000	101,805,000	15,750,000	3,563,175	30,541,500	900,000	444,240,000	950,572,050
M10	2,714,500	5	10,179,375	461,465,000	135,725,000	26,250,000	4,750,375	40,717,500	1,500,000	592,254,545	1,272,841,795
M9	2,171,500	12	19,543,500	885,972,000	260,580,000	63,000,000	9,120,300	78,174,000	3,600,000	1,137,076,364	2,457,066,164
M8	1,773,000	12	15,957,000	723,384,000	212,760,000	50,400,000	7,446,600	63,828,000	3,600,000	928,407,273	2,005,782,873
M7	1,447,000	20	21,705,000	983,960,000	289,400,000	84,000,000	10,129,000	86,820,000	6,000,000	1,262,836,364	2,744,850,364
M6	1,181,500	20	17,722,500	803,420,000	236,300,000	84,000,000	8,270,500	70,890,000	6,000,000	1,031,127,273	2,257,730,273
M5	984,500	20	14,767,500	669,460,000	196,900,000	84,000,000	6,891,500	59,070,000	6,000,000	859,200,000	1,896,289,000
M4	820,500	12	7,384,500	334,764,000	98,460,000	50,400,000	3,446,100	29,538,000	3,600,000	429,643,636	957,236,236
RS9	956,902	35	25,118,678	736,814,540	669,831,400	91,875,000	13,396,628	100,474,710	10,500,000	1,461,450,327	3,109,461,283
RS8	839,379	27	16,997,425	498,591,126	453,264,660	70,875,000	9,065,293	67,989,699	8,100,000	988,941,076	2,113,824,279
RS7	736,302	112	61,849,368	1,814,248,128	1,649,316,480	294,000,000	32,986,330	247,397,472	33,600,000	3,598,508,684	7,731,906,461
RS6	645,875	148	71,692,125	2,102,969,000	1,911,790,000	388,500,000	38,235,800	286,768,500	44,400,000	4,171,178,182	9,015,533,607
RS5	566,565	156	66,288,105	1,944,451,080	1,767,682,800	300,300,000	35,353,656	265,152,420	46,800,000	3,856,762,473	8,282,790,534
RS4	503,606	167	63,076,652	1,850,248,444	1,682,044,040	321,475,000	33,640,881	252,306,606	50,100,000	3,669,914,269	7,922,805,891
RS3	447,654	58	19,472,949	571,206,504	519,278,640	111,650,000	10,385,573	77,891,796	17,400,000	1,132,971,578	2,460,257,040
RS2	397,913	171	54,434,498	1,496,948,706	1,360,862,460	329,175,000	27,217,249	204,129,369	51,300,000	2,969,154,458	6,493,221,741
RS1	353,700	22	6,614,190	171,190,800	155,628,000	42,350,000	3,112,560	23,344,200	6,600,000	339,552,000	748,391,750
TOTALS		1000	500,438,739	16,395,230,328	11,701,628,480	2,408,000,000	257,011,520	1,985,033,772	300,000,000	28,873,218,502	62,420,561,341

Table 5-4 Cost of Retrenchment Package- Basic Pay With Service Allowance (Kwacha)

Employee Category	Average Monthly Basic Pay Plus Service Allowance	Total Retrenchment	Redundancy	Long Service Gratuity	Repatriations	Housing	Notice	Long Service Award	Pension Obligation	Total
	AAA=AA x (1+A)	BBB = BB	DDD =AAA x BBB x B	EEE =AAA x BBB x C	FFF =BBB x G	GGG =AAA x BBB x H	HHH =AAA x BB x I	III =BBB x J	JJJ = JJ	
M12	7,571,375	0	0	0	0	0	0	0	0	0
M11	5,938,625	3	605,739,750	178,158,750	15,750,000	6,235,556	53,447,625	900,000	444,240,000	1,304,471,681
M10	4,750,375	5	807,563,750	237,518,750	26,250,000	8,313,156	71,255,625	1,500,000	592,254,545	1,744,655,827
M9	3,800,125	12	1,550,451,000	456,015,000	63,000,000	15,960,525	136,804,500	3,600,000	1,137,076,364	3,362,907,389
M8	3,102,750	12	1,265,922,000	372,330,000	50,400,000	13,031,550	111,699,000	3,600,000	928,407,273	2,745,389,823
M7	2,532,250	20	1,721,930,000	506,450,000	84,000,000	17,725,750	151,935,000	6,000,000	1,262,836,364	3,750,877,114
M6	2,067,625	20	1,405,985,000	413,525,000	84,000,000	14,473,375	124,057,500	6,000,000	1,031,127,273	3,079,168,148
M5	1,722,875	20	1,171,555,000	344,575,000	84,000,000	12,060,125	103,372,500	6,000,000	859,200,000	2,580,762,625
M4	1,435,875	12	585,837,000	172,305,000	50,400,000	6,030,675	51,691,500	3,600,000	429,643,636	1,299,507,811
RS9	1,674,579	35	1,289,425,445	1,172,204,950	91,875,000	23,444,099	175,830,743	10,500,000	1,461,450,327	4,224,730,564
RS8	1,468,913	27	872,534,471	793,213,155	70,875,000	15,864,263	118,981,973	8,100,000	988,941,076	2,868,509,938
RS7	1,288,529	112	3,174,934,224	2,886,303,840	294,000,000	57,726,077	432,945,576	33,600,000	3,598,508,684	10,478,018,400
RS6	1,130,281	148	3,680,195,750	3,345,632,500	388,500,000	66,912,650	501,844,875	44,400,000	4,171,178,182	12,198,663,957
RS5	991,489	156	3,402,789,390	3,093,444,900	300,300,000	61,868,898	464,016,735	46,800,000	3,856,762,473	11,225,982,396
RS4	881,311	167	3,237,934,777	2,943,577,070	321,475,000	58,871,541	441,536,561	50,100,000	3,669,914,269	10,723,409,218
RS3	783,395	58	999,611,382	908,737,620	111,650,000	18,174,752	136,310,643	17,400,000	1,132,971,578	3,324,855,976
RS2	716,243	171	2,694,507,671	2,449,552,428	329,175,000	48,991,049	367,432,864	51,300,000	2,969,154,458	8,910,113,470
RS1	654,345	22	316,702,980	287,911,800	42,350,000	5,758,236	43,186,770	6,600,000	339,552,000	1,042,061,786
TOTALS		1000	28,783,619,589	20,561,455,763	2,408,000,000	451,442,278	3,486,349,989	300,000,000	28,873,218,502	84,864,086,121

Note: Items B, C, G, H, I, and J are from Table 5-1, Item JJ is from Table 5-3

547

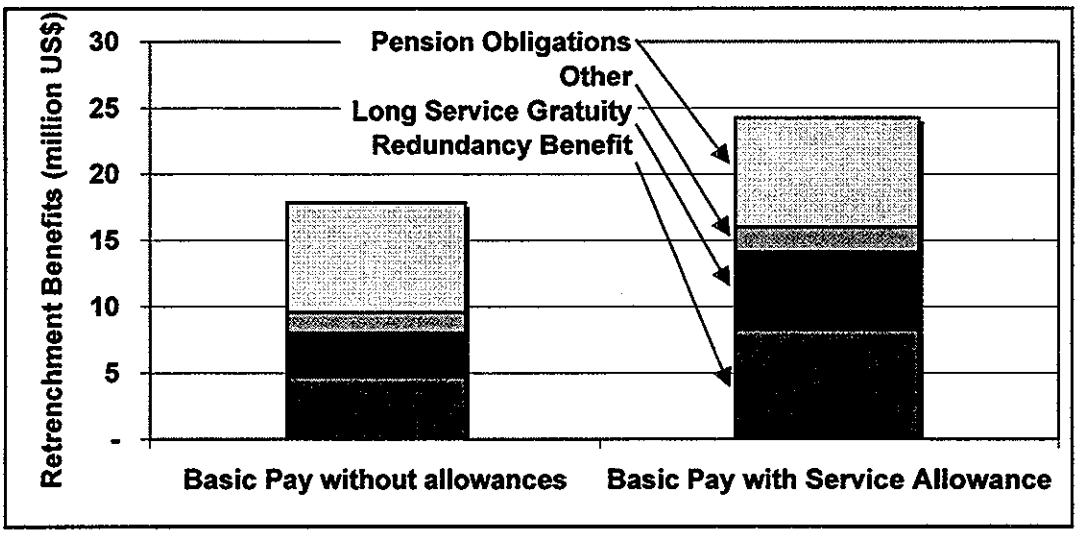


Figure 5-2 Breakdown of Retrenchment Costs

548

Section 6 Recommendations and Conclusions

6.1 *Recommendations*

6.1.1 Mitigating the Impact of Retrenchment

Retrenchment or downsizing is a purposive undertaking by management that involves reducing staff to improve efficiency and productivity. To minimize the negative effects on retrenched workers and also those continuing with ZESCO, a planned program should be developed and implemented to manage the retrenchment process.

ZESCO should start advanced planning well before it has to implement retrenchment by forming a transition team. The team should have a project manager as the lead who involves all stakeholders including key managers from Human Resources, Generation, Transmission, Distribution and Customer Service, Corporate Development and Accounting, Engineering Development, the Power Rehabilitation Project and the Union. The team should develop the organization required to take ZESCO into the future and plans for retrenchment of redundant personnel.

Communication is an integral part of a successful retrenchment and a communications program must be designed. The project manger and transition team should create a transparent and open atmosphere where workers feel they have the facts about what is happening. Keeping the Union well informed and involved from the beginning will help control rumors and minimizes potential disruptions to business. The union can keep members informed and advise management and the transition team of employee concerns.

The timing of when to announce the retrenchment and actually dismiss employees is critical. Once decisions are made, it is best to act in an expeditious manner allowing the employees enough time to psychologically adjust to the decision. It is a balancing act and the transition team should establish the timing. Too much lead-time can result in thefts, vandalism, and disruption to business, and low morale.

There are a number of services that should be provided to ZESCO retrenched workers that will enable employees to find their next jobs more expeditiously. Part of the challenge is to identify what the services are and which ones fit the needs of the employees. An individual, who will advise the transition team, needs to develop and deliver a needs-assessment, design a support services program, and identify appropriate service providers for delivery of services and training. A listing of some of the service providers is available in section 7.2. The mix of services needs to be determined that will best meet the retrenched workers needs.

Many ZESCO employees are skilled workers, which is an advantage in finding new employment. However, some workers may need to acquire new skills, be psychologically prepared for the downsizing and learn what their realistic options are in the market place. Several people interviewed mentioned that some workers have taken their retrenchment packages, checked into 5-star hotels, spent the money, had a good time and returned home broke. In fact, most Zambians have never had this much money at one time and need guidance in money management prior to receiving the retrenchment package.

It is recommended that support services be provided to retrenchees in these areas: career counseling, psychological support, resume writing, interviewing skills, workshops on market opportunities, business management, money management, skills training, computer training, basic farming, advice on forming groups/cooperatives, knowledge of existing credit and access to credit, and office assistance (use of telephones, typewriter, computers) for a specified period of time.

Service providers and appropriate training and counseling are readily available in Zambia. Sources of funding are not so readily available and donor organizations should be approached for monetary support. The World Bank needs to be approached for financial support of the retrenchment package and support services for retrenchees.

6.1.2 Programs to Support Retrenched Workers

There are many quality programs based in Lusaka operating to support retrenched workers in identifying new employment, planning a career change, acquiring new skills and learning how to effectively use retrenchment packages. The Government of Zambia and numerous international organizations sponsor effective programs. The World Bank, the British (DFID), the Germans (GTZ), the Irish Embassy, the European Union, the Dutch and the YWCA offer various programs that ZESCO retrenchees could tap into for help. Of course, the employees need to be informed of which available resources they could avail themselves. A program needs to be designed, with one person as the lead, to leverage all relevant resources, Government and Non-government, to support ZESCO rentrenched workers. The program would delineate which organizations have the best resources to match the needs of retrenchees. The following is a list of many but not all of the agencies and programs that could be utilized to minimize the negative impact of retrenchment on families and communities.

The National Social Safety Net (NSSN)

Contact: Ngosa Chisupa, Director

NSSN is the apex body for the Ministry of Labor and Social Security responsible for coordinating various governmental social safety net programs for displaced workers in Zambia. Additionally, NSSN works closely with NGOs and consulting firms involved with retrenched workers. Mrs. Elizabeth Jere, ZPA, is on the Board of NSSN and is well versed in the organization's efforts in capacity building for employment creation.

The National Social Safety Net (NSSN) coordinates many programs to assist retrenched workers. NSSN works with these agencies: the Public Welfare Assistance Scheme, Future Search, the Land Education, Resettlement Programme, Small and Micro Enterprises Promotion Unit, Vocational and Entrepreneurship Training (TEVET), and various Non-Government Organizations (NGOs).

The combination of services provided by this group of agencies is very comprehensive. Everything from basic skills training to resettlement through land for agricultural

ventures and training on starting a micro enterprise can be arranged through NSSN. NSSN has the capacity to follow up with retrenched workers after training and counseling to develop statistics and report on post retrenchment soci-economic levels and success stories.

KPMG

Contact: Andrew Shikopa, Consultant

KPMG offers a counseling and retraining program for retrenched workers. The objectives of the program are to equip retrenched workers with knowledge and skills to adapt to retrenchment, learn job search skills, start a business and be retrained for gainful employment. Skills training covers many areas of practical training: market vending, retail trading, driving, farming, carpentry, bricklaying, plumbing, welding, catering, tailoring and designing, motor mechanics, electronics and computers.

KPMG has unique retrenchee experience having trained over 6000 retrenched workers from ZCCM, Kafironda PLPc, Chambisi Metals PLc., BP Zambia, and Copperbelt Energy Corporation. KPMG has the capabilities of providing practical training that can be utilized in the market place and could make the difference for the worker in finding employment or not. A marketable skill appears to be the critical factor for reemployment and avoiding falling into poverty.

Mr. Shikopa could not provide an estimate of the cost of training. A cost could be negotiated for group training at the time of retrenchment.

Human Resource Development Project (HRDP), a U.S. Agency for International Development (USAID) Project

Contact: Maxwell Sichula, Project Manager

The HRDP project is run through the Zambia Chambers of Small and Medium Business Associations with funding from USAID. Project outreach is extensive as HRDP operates in nine provinces and 42 out of 72 districts in Zambia. Training and counseling is offered in business planning and basic finance, leadership development, marketing and costing, accounting and finance, debt management and taxation. Training can be conducted where needed in virtually any location in Zambia. This agency could be a key provider of training for ZESCO retrenched workers living outside Lusaka.

HRDP utilizes volunteers from the International Executive Service Corp (IESC) in the United States. These retired executives provide practical information from first hand experience on how to develop a business plan and operate a successful business. This would be particularly helpful for workers wanting to start their own businesses or even groups wanting to form cooperatives.

Training courses are offered for thirty people for an entire week (nonresidential) at a cost of $4,000 to 5,000 including all materials and lunch. A source of funding would be required.

Future Search

Contact: Mary Kakumbi, Director

551

Future Search counsels and trains retrenchees/retirees outplaced due to privatization of state-owned enterprises, government ministries and departments. Counseling is provided on coping with the loss of jobs, how to search for a job and writing a resume. Training is provided on fundamentals of staring a small business, entepreneurship/business development and training of trainers.

Future Search has an impressive list of clients and vast experience with ZCCM, Bank of Zambia, Standard Bank, Zambia National Commercial Bank, Chilanga Cement Plc, Maamba Colliers, Zambia Airways, BP Zambia Ltd, National Airports, Zambia Air Services Training Institute, Cadbury Schweepps, and Zambia Electricity Supply Corporation. The track record is good with overall employment creation of 32% for full time and 36% of part time employment.

The Private Sector Development Programme (PSDP), a European Development Fund Project

Contact: Chris Sealy, Programme Manager

PSDP is a European Development Fund Project aimed at stimulating private sector development through loan services, direct technical support, a trade and enterprise support facility and promotion of foreign investment. The trade and enterprise facility provides support to individual businesses for feasibility studies and loan guarantees.

The primary assistance is non-financial support to micro enterprises. Technical training is available on product development, marketing assistance and feasibility studies. PSPD works with established small and medium sized businesses rather than start-ups. Their classification of micro-enterprise is at least nine employees and revenues of K50 million a year. Sector focus is agro-processing, manufacturing and tourism. The service sector is not a focus.

An example was discussed with Mr. Sealy, regarding a ZESCO manager wanting to start a business for cleaners as a result of the cleaners being hived off as a non-core area. PSDP said they would possibly be able to assist someone in this type of situation with funding for a feasibility study. The conversation turned to how many people would really be willing to risk their retrenchment package on starting a business. The opinion was that very few would be willing to risk their retrenchment package on a business. The majority of people put money into their homes adding additional rooms. At best, 10 per cent or 100 of the estimated 1000 retrenched workers may go into business.

It was noted that there is a very strong need for business management skills. Many new, small business owners particularly in trade do not segregate their personal funds from business revenues. Any money earned is spent on household expenses and the extended family resulting in a lack of money for continuation of the business.

An interesting point raised in conversation was to use the word "cooperative" with caution. Some Zambians may interpret the inherent meaning of "cooperative" to imply that the total assets of the cooperative would be turned over to the retrenched workers forming the cooperative.

Pulse

Contact: Michael Mbulo, Director

Pulse is a CARE International project sponsored by the British/DFID and is currently planning to operate as a separate entity. Pulse is a financial services institution, providing small, working capital loans to small and micro-enterprise groups or individuals that have a proven track record of success. Pulse operates in Lusaka and has eight offices in the surrounding areas of Lusaka. Pulse provides loans with competitive interest rates and convenient repayment schedules and has a 90 percent rate of repayment of loans.

Pulse holds the bank account and disburses loans to self-employed entrepreneurial groups who are running micro and small businesses. Focus sectors are retailing, trading and manufactured goods.

Pulse will not provide loans for start-ups and they prefer to loan to self-selected groups. Support of ZESCO retrenched workers would be minimal at the time of retrenchment. However, it could be important to be aware of Pulse's capital resources for future use if cooperatives or businesses are formed.

6.1.3 Training and Support Services Cost

It is difficult to assess the cost of a comprehensive program at this time. Until the profile of retrenched workers is better defined and the needs known, a total cost cannot be estimated. Interviews revealed that training costs are minimal especially considering the trade off for employees and society.

A week of business skills training can cost as low as K30,000. Training courses by HRDP are offered for thirty people for an entire week (nonresidential) at a cost of $4,000 to $5,000 including all materials and lunch.

A source of funding for a comprehensive support services program including training would be required. In meeting with a representative from the World Bank, there was an understanding that the Bank supports these types of programs for retrenched workers and should be approached for funding at the appropriate time.

A follow-up study is required for developing and costing training, counseling and support services.

6.2 *Conclusions*

Alvin Toffler wrote, "Our moral responsibility is not to stop the future, but to shape it...to channel our destiny in humane direction and to ease the trauma of transition."

Retrenchment is inevitable for ZESCO under the private participation options. Union representatives have expressed their anti-privatization sentiments and fears for retrenched workers. As Zambians, they are living in a changing world and waiting for the effects of Government privatization policies to impact their lives in a positive way. They are confronted with living with the AIDS virus and have seen their life expectancy drop dramatically to an average age of 37. Inflation is high, access to credit is very difficult and salaries barely keep pace with the increasing cost of living. Times are tough.

553

ZESCO management is reviewing outsourcing options and balancing wastage and attrition with improving productivity. Management is aggressively working towards commercialization and has made progress in many areas. ZESCO is a key employer in the Zambia economy and cognizant of its responsibilities to employees.

Retrenchment will require a great deal of the retrenched workers and the survivors. It is critical that a creative support system is designed and implemented, which will expedite the process of workers identifying new employment opportunities. Reemployment is the key factor to reduce the impact of retrenchment for families and communities. The vast majority of ZESCO employees have skills and this can be viewed as a positive whether they choose to pursue the formal or informal sector for gainful employment.

In many interviews, the same notion was repeated that if a retrenchment package is offered and paid in a timely fashion, the workers would be satisfied and volunteer for the program. If this is seen as the just and fair approach, it is highly recommended that management follow this approach. A retrenchment package should be paid in a timely manner.

554

Section 7 References

1. Frost-Hansen, Claus, Larsen Jesper, and Antonides, Robert. 1993. "Retrenchment Strategy Study - Draft Report." Study prepared by Deloitte & Touche for the Government of the Republic of Zambia and supported by the Swedish International Development Agency (SIDA).

2. Mwinga, Mwene (Dr.). 1994. " Study to Assess the Impact of Privatization." Study prepared by Luba Consultancy and Development Limited for the Government of the Republic of Zambia and supported by the International Development Association (IDA).

3. GY Associates. 1997. "The Social Impact of Privatization in Zambia." Undertaken for the Zambia Privatization Agency with funding from GTZ.

4. SwedPower International. 2000. "Project Document on Institutional Capacity Building of ZESCO." A project document prepared at the request of the Republic of Zambia and supported by SIDA.

5. Kane Consult. 2000. "Social Impact Study of the Reorganization and Concessioning of Zambia Railways Limited." This study was commissioned by the Zambia Privatization Agency (ZPA).

6. Republic of Zambia. "Employment Chapter 512 Of The Laws of Zambia."

7. ZESCO. 2000. "Collective Agreement between ZESCO and National Energy Sector and Allied Workers Union to Run from August 2000 to 31 July 2002."

8. LASF. "The Local Authorities Superannuation Fund - Member's Guide." LASF is a benefit scheme responsible for pensions covering the employees of ZESCO.

9. Project Office, National Social Safety Net. 1999. "Profile on the National Social Safety Net Coordinating Committee (NSSNCC)."

10. Theibert, Philip R. ed. 1994. "Lessons in Cultural Change, the Utility Industry Experience."

11. Central Statistics Office, Republic of Zambia. 1998. "Living Conditions in Zambia."

Appendix A Persons Interviewed

1. Elizabeth Jere - Manager Social Impact, Zambia Privatization Agency (ZPA)
2. Kenneth Konga - Director Corporate Development & Administration, ZESCO Limited
3. Mwiche C. Ngulube - Director Human Resources, ZESCO Limited
4. Alex M. Matale - Senior Manager Change, ZESCO Limited
5. Ngosa Chisupa - Director National Social Safety Net (NSSN)
6. Godfrey Chileshe - Secretary, (NSSN)
7. Alec Chirwa - Permanent Secretary, Ministry of Labor
8. Sue Gale - Program Manager USAID
9. Morecome Mumba - Manager Human Resources, ZESCO Copperbelt Division
10. Mr. Saya - Manager Human Resources, ZESCO Power Rehabilitation Project
11. Andrew Shikopa, Consultant KPMG
12. Maxwell D. Sichula - Project Manager, Human Resources Development Project (USAID Project)
13. Mehrnaz Teymourian - Sr. Technical Specialist, The World Bank
14. Peter B. Chupa - President, National Energy Sector and Allied Workers Union (ZESCO Union)
15. Y. Mtayachalo - General Secretary, ZESCO Union
16. Mr. Kabwa - Senior Manager, Industrial Relations ZESCO
17. Chris Sealy - Programme Manager, Private Sector Development Programme, a European Development Fund Project
18. Henry Sakala - Team Leader Business Ananlysis (ZPA)

Appendix B Collective Agreement

The following is the current collective agreement between ZESCO and the National Energy Sector and Allied Workers Union.

557

rcvd
10/31/00

ZESCO

COLLECTIVE AGREEMENT BETWEEN ZESCO AND NATIONAL ENERGY SECTOR AND ALLIED WORKERS UNION TO RUN FROM AUGUST 2000 TO 31 JULY 2002

558

THIS COLLECTIVE AGREEMENT made on the day of Month of July..2000. BETWEEN ZESCO, a corporation in Zambia and having its registered office at Lusaka Zambia (hereinafter called "the corporation") of the one part and the National Energy Sector and Allied Workers Union whose principal office of business is at Ndola, Zambia (hereinafter called "the Union") of the other part. WHEREAS the Corporation and the Union were parties to a Collective Agreement which has entered into and WHEREAS the corporation and the Union have agreed to conclude a Collective Agreement for a period of two years from the .1st day of August. 2000 now it is HEREBY AGREED as follows:

INTERPRETATION

In this Agreement the following expression shall (except where the context otherwise requires) have the meanings respectively ascribed to them namely:-

"Employee" shall mean any person employed by the Corporation on Conditions and Terms as are agreed by the parties in this Agreement.

"Employer" shall mean ZESCO Ltd and Corporation shall be construed accordingly.

"Employment year" shall mean a period of twelve consecutive months terminating on 31st July each year.

"Management" shall mean the Management of the Corporation

"Month" shall mean a calendar month

"Week" shall mean a period of seven successive days.

"Union" shall mean the National Energy Sector and Allied Workers' Union (NESAWU)

"Dependant" means a person under the age of 21 who is wholly dependent on the employee and registered with the Corporation

"Normal Pension Date" means the pension date as defined in the corporation pension scheme.

"Agreement" means this Collective Agreement.

"Contract" means a contract of employment entered into between the employee and the corporation.

"Working Week" means forty working hours.

559

"Probation" means the period from the commencement date to the date when the corporation confirms the appointment for employment in writing to the employee

2 OBJECTIVES

It is hereby realised and agreed that the advancement of employees and indeed their lively hood depends on the success of the Corporation. The employees are expected to be hard working, loyal, devoted, and to maintain a high standard of performance. Both the Corporation and the Union have obligations which may be summarised as follows:

(i) Determination of an equitable pay structure
(ii) Improvement of morale, industrial relations harmony and productivity
(iii) Training – the Union and the Corporation fully realise the important of training local personnel in the Corporation as a whole, in view of this, the Corporation undertakes to do all in its power to train Zambians for high responsibilities.

3 RECRUITMENT

Recruitment of personnel shall remain the prerogative of the management. It is the Corporation's policy to give priority to the employment of Zambians. However, where a suitable qualified Zambian is not available to fill a particular posit, a non-Zambian may be offered the job.

4. CONDITIONS OF SERIVCE

The Conditions of Service shall be as per attached Appendix 1 for permanent employees.

5. SALARIES/SALARIES STRUCTURE

(a) Salaries and Salary structure shall be as per attached Appendix II

(b) One Automatic Notch shall be paid to employees annually effective from 1st August each year accept for employees who have reached the ceiling in their respective grades.

(c) Salaries and allowances shall be negotiated for every year as the inflation may dictate.

6. DISCIPLINARY POLICY

560

The Union acknowledges and accepts that it is the function of the Management to enforce order and discipline and to suspend, demote, discharge or dismiss employees for proper cause in accordance with the disciplinary code. Both the Corporation and the Union mutually agreed that no external forces of any designation should dictate disciplinary action outside the provisions of the Industrial Relations Act or any other written law.

6.1. If the union and Management agree to disagree (reaches a deadlock) on disciplinary action to be taken, other Chairman shall be appointed by Management to replace the chairman of the disciplinary panel

6.2 DISCIPLINARY ACTION

The Corporation shall take disciplinary action against offending employees having regard to the seriousness of the offence and the prevailing circumstances. Notwithstanding the foregoing, the following measures shall be taken for the specified breaches:-

6.2.1 **Verbal Warning**
Persistent Lateness

6.2.2 Written warning

(i) Repetition of 6.2.1
(ii) Absence from place of work without any satisfactory explanation
(iii) Sleeping on duty as witnessed by two persons
(iv) Changing shift with another worker without prior permission of the Supervisor.

6.2.3 **One day's Suspension without pay plus warning**

One day's suspension without pay for failure to wear appropriate protective clothing at work.

6.2.4 **Fourteen Days Suspension without pay plus warning**

(i) Repetition of any of the offences listed in 6.2.2 and 6.2.3 within six months
(ii) Abandoning one's place of work
(iii) Absence of not more than three (3) days within one calendar Month
(iv) Insurbodination
(v) Immoral or indecent behavior at place of work
(vi) Neglect of duty

6.2.5 ONE MONTH'S SUSPENSION WITHOUT PAY PLUS FINAL WARNING

(i) Repetition of any offences listed in 6.2.4 above within six months
(ii) Divulging information of the Corporation's activities to the press and other mass media unauthorised person (s) organisation.
(iii) Taking stupefying drug during working hours.
(iv) Selling or willfully damaging protective clothing
(v) Absence for four (04) days within one calendar months
(vi) Refusal to take lawfully given orders

6.2.6 **DISMISSAL**

(i) Committing any offence after a final warning letter had been issued in respect of any offence whatsoever within a period of 12 months.
(ii) Committing any offence after three warning letters for any cause whatsoever within a period of twenty-four (24) months.
(iii) Insobriety.
(iv) Breach of peace at place of work
(v) Being convicted of any offence involving fraud, dishonesty or be sentenced to imprisonment without any option of paying a fine for any offence whatsoever.
(vi) Causing damage to Corporation property or injury to personnel where such damage or injury arises from negligence or failure to obey regulations or lawful instructions.
(vii) Absence from duty for five (5) consecutive days within a period of thirty (30) days.
(viii) Drinking intoxicating liquor during working hours
(ix) Assault or fighting while on duty.
(x) Neglect of Safety Rules or Regulations.
(xi) Disobey, neglect or refuse to perform or comply with any lawful directions given to him/her under these Conditions of Service.
(xii) The Managing Director or an Officer of the Corporation duly exercising the Managing Director's authority may dismiss, discharge or suspend without pay the employee from employment provided that the grievance procedure has been followed.
(xiii) When an employee is dismissed under this Section, the employment shall immediately terminated and employee shall be entitled to the payment of basic salary up to the date of dismissal and to any payment in lieu of leave to which he/she may be entitled by statute but not other benefits payments or dues whatsoever.

6.2.7

An employee suspected of serious misconduct or against whom criminal

MTC

NCW

Proceedings are being instituted, may be suspended from duty on half pay and such suspension shall remain in force until it is cancelled through a letter from an authorised officer of the corporation.

7. GRIVANCE PROCEDURE

7.1 STAGES OF COMMUNICATION

7.1.1. Stage One

An employee who has a grievance shall in the first instance present the grievance to the Shop Steward/Union branch official who will try to settle the matter.

7.1.2. Stage Two

The Shop Steward/Union branch official will refer the grievance to the supervisor at the station or place of work that will try to settle the grievance.

7.1.3. Stage Three

Failing satisfactory settlement at stage two, the Shop Steward/Branch Secretary will meet with the Head of department/Regional Manager in the presence of a representative from the Human Resources department.

7.1.4 Stage Four

If a grievance is still unresolved, the Branch Secretary will take it up with the Divisional Manager in the presence of the Human Resource Manager.

7.1.5 Stage Five

If the grievance is still unresolved, at he respective Divisional Management level, the union Headquarters will take up the grievance with the Director of Human Resources who shall hear the appeal on behalf of the Managing Director.

Grievance at every stage up to Managing Director level within a period of (60) days.

8.0 DISCIPINARY CASES

The company and the Union recognise that in any organisation, disciplined behaviour , within the framework of rules and regulations is essential for the well

563

being of the individual and success of the corporation, However, all the disciplinary cases shall be dealt with in accordance with the rules and procedures laid down in the Collective Agreement.

9.0 APPEAL PROCEDURES

An employee aggrieved of any disciplinary decision taken against him/her, may appear by himself or through the union against such disciplinary action in the order described hereunder.

9.1.1. Stage one

Appeals against disciplinary action taken against an employee at Region/Department level shall be made to the Divisional Manager through the Human Resources Manager setting out the grounds of appeal within fourteen days of such action.

9.1.2 Stage two

Appeals against disciplinary action taken against an employee at Divisional Management level shall be made to the Director of Human Resources through the Senior Manager Industrial Relations and Man Power Planning within fourteen days of such action.

9.1.3 Stage three

Appeals against disciplinary action taken against an employee at Directorate level shall be made to the Managing Director through the Director of Human Resources.

9.1.4 Stage four

Provided that any appeal referred to the Managing Director for consideration, the appeals committee shall be as follows:

-Management representatives – Three (3)
-Union representatives - Three (3)

Subject to the paragraph 9.1.4 of this agreement, the Managing Director shall preside over the appeals committee. In accordance with the rules of natural justice the appeals committee shall not comprise of any person (s) who took part in the hearing process at stages one, two and three above for the purpose of achieving impartial decisions.

Upon hearing the grounds of appeal, the committee shall endeavour to arrive at consensus building during the hearing session whose decision there on shall be communicated to the appellant within a period of not more than twenty –one (21) days.

9.1.5 In order to facilitate the speedy conclusion of an appeal case lodged at the level of Management Director for hearing, the appeals committee shall meet at intervals of not more than three (3) months provided however that nothing under this paragraph shall hinder any person (s) from testifying against or for the appellant.

In the consideration of constituting the appeals or disciplinary committees, the charging officer, witness or arresting officer (thereof shall not constitute the composition of the appeals or disciplinary committee at all stages except testifying for or against the appellant.)

9.1.6 Subject to the provisions of stage one an appeals committee (at Directorate, Divisional and Regional levels) shall be constituted whose composition shall be as follows:

(i) Management representatives – Three (3)
(ii) Union representatives – Three (3)

9.1.7 In the event that the employee/appellant is not satisfied of the decision of the Managing Director, he/she shall have the right to appeal to a court of competent jurisdiction.

10.0 CERTIFICATE OF SERVICE

An employee leaving the corporation's service shall be given a certificate of service stating:-

i) Name of employee
ii) Name of employer
iii) Date of engagement
iv) Nature of employment
v) Last salary/Wage and grade
vi) Date of termination
vii) National Registration Card Number
viii) Employee's Social Security Number
ix) Employer's National Pension (NAPSA) or Local Authorities Superannuation Fund (LASF) account Number.
x) Total contributions paid to the fund during the employment period.

MTC

NCW

11.0 LEAVE FOR UNION MATTERS

11.1.1 Any employee engaged in direct negotiation between the two parties shall be granted paid leave for the period he/she shall be away from duties.

11.1.2 The Corporation shall grant leave of absence to a union official or member of the Union for the purpose of attending any meeting called under the provisions of the Constitution of the Union.

11.1.3 The Corporation shall not penalise any employee on account of his or her Union membership or his/her union official duties as provided for under the Industrial and Labour Relations Act.

12.0 VARIATIONS

12.1.1 Neither party may vary or rescind any part of this agreement unless such variation, addition is accepted in writing by the other party. Failure to reach an agreement will not invalidate the Collective Agreement.

12.1.2 Meetings to review, amend, replace or terminate the collective agreement shall be called at the request of either party at the mutually agreed venue and date by giving seven (7) days notice. The agenda of the meeting shall be given to either party except in cases of an emergence meeting for which a short notice shall be given.

In witness whereof, the parties have set their respective hands and seals at Lusaka on the Day and year first above written.

The subscribing witnesses:-

FOR AND ON BEHALF OF THE CORPORATION

SIGNED: Miss. M C S Ngulube
DIRECTOR OF HUMAN RESOURCES

SIGNED: Mrs. P H Chimwala
COMPANY SECRETARY

566

Mte

FOR AND ON BEHALF OF THE UNION

SIGNED: Mr. P. Chupa
(INTERIM PRESIDENT)

SIGNED: Mr. Y. Mtayachalo
(INTERIM GENERAL SECRETARY)

Day and year first above written.

ZESCO LIMITED

REPRESENTED PERMANENT SALARIED STAFF

CONDITIONS OF SERVICE

These Conditions of Service, which are effective from 1st August 2000 shall apply to all represented employees who have: -

(a) been appointed to the permanent staff of the Corporation, and

(b) Not signed an Agreement for Employment on a limited contract basis

1. APPOINTMENTS

(a) The employment shall be deemed to have commenced on the date which the employee first reports for duty following receipt of a letter of appointment signed by an authorised Officer of the Corporation.

(b) The Managing Director or an Officer of the Corporation duly exercising the authority of the Managing Director shall make all appointments.

(c) The engagement of personnel is subject to the passing of medical examination which the Corporation shall require workers to take prior to entering Corporation Service.

(d) All appointments shall begin with six (6) months probation after which the employee may be confirmed in the permanent and pensionable service of the Corporation, such confirmation being at the Managing Director's discretion or that of an Officer of the Corporation exercising the authority of the Managing Director.

(e) If an employee is not confirmed at the end of the probationary period the employment shall cease forthwith and the employee shall be informed in writing, except that the probationary period may be extended by three months or reduced at the discretion of the Managing Director or that of an Officer of the Corporation duly exercising the authority of the Managing Director.

568

NKC

NKC

2. **BASIC WORKING HOURS**

(a) Basic working time shall be forty hours per week corresponding to eight hours per day from Monday to Friday inclusive.

(b) In the case of employees on shift work, the basic working time shall be as an average of forty hours per week a cycle, irrespective of the days worked, whether Saturday, Sunday or Public Holidays.

3. **DUTIES AND OBLIGATIONS OF AN EMPLOYEE**

(a) An employee shall devote the whole of his/her time and attention to their employment during normal working hours per week and may be liable for duty at any time in accordance with clause 32.

(b) An employee shall work and reside at any place within Zambia to which in the best interest of the Corporation, he/she may be directed.

(c) An employee shall obey and act upon all lawful instructions given by the Corporation, the Managing Director or such other persons as the Managing Director may place over him/her and shall faithfully observe all rules laid down for the efficient management of the Corporation and the good conduct and discipline of its employees, he/she shall serve the Corporation diligently and endeavour to promote its interest at all times.

(d) An employee shall not object to the control of the article or materials entrusted to him/her nor shall he/she object to a personal search at the time he/she leaves the place of work.

(e) An employee shall refrain from any action which might endanger his/her safety and the safety of others or equipment of the Corporation and shall observe all rules and safety regulations.

(f) An employee shall not remove from the Corporation premises any property of the Corporation without prior permission.

(g) An employee shall not make any statement to the public, press, radio, and television or news services on any matters relating to the Corporation's affairs.

4. **SALARY**

(a) An employee shall on engagement, be informed of his/her starting salary which shall be subject to the approval of the Managing Director or any officer of the Corporation duly exercising the Managing Director's authority. Subsequent increments shall also be subject to the approval of the Managing Director or an officer of the Corporation duly exercising the Managing Director's authority as and when such increments fall due.

569

MJC

Mk

(b) Employees shall be entitled to an automatic increment of one incremental notch of 5% of employees basic salary in their respective grades on 1st August of each year. This is only applicable to employees who have not reached the ceiling in their respective grades.

(c) Salaries shall be paid monthly in arrears about the 26th day of each month but not later than the 27th day of the same month.

5. PENSION

An eligible employee shall join the Local Authorities superannuation Fund or any other approved pension scheme. The employee and the Corporation shall each pay the approved contribution to the fund.

6. LEAVE

(a) An employee shall be entitled to leave on full pay. Leave shall accrue at a rate per completed month of service depending on the employees grade as follows:-

RS6-RS9	-	3.5days per month
RS1-RS5	-	3.0 days per month

(b) No leave shall be taken during the first six months of service.

(c) Application for leave shall be made on the appropriate form to the head of department and in the case of annual leave at least thirty days notice prior to commencement of leave shall be given.

(d) Statutory public holidays ,Saturdays, and Sundays occuring during leave shall be added thereto.

(e) Leave taken shall form part of the service period of an employee.

(f) Leave that has accrued to the credit of an employee shall not be considered as part of the period of service until that leave has been taken.

(g) Only leave which is commuted for cash shall be referred to as " leave pay" and shall exclude remuneration drawn during leave, which shall form part of the salary.

(h) An officer who goes on not less than thirty days leave may commute for cash not less than thirty days but not more than eighty days of his/her remaining accumulated leave days, provided that he/she had not previously commuted leave for cash during the twelve months preceding the first day of his/her leave days and that the amount of leave taken plus the number of days commuted does not exceed the maximum period of leave which can be taken at any time, thus:-

570

MTC

Salary Grade RS6-RS9 -120
Salary Grade GS1-RS5 -110

(i) When an employee commutes leave for cash other than when proceeding on leave, the commutation payment must be calculated at the full rate of his substantive salary as at the first day of his leave.

(j) In arriving at the leave pay (cash for leave commutation) the average annual working days of an employee shall be taken as 260.

(k) Commutation payments shall be paid upon commencement of leave.

(l) An employee shall be allowed to commute once every year.

(m) Commutation payments may be paid in advance at the discretion of management

(n) Leave days commuted for cash must not be converted again into leave at a later date.

(o) Upon separation of employment with the Corporation an employee shall commute all his accrued leave for cash.

7. **SICK LEAVE/ RETIREMENT ON MEDICAL GROUNDS**

(a) (i) When sickness or injury incapacitates an employee he/she shall be granted sick leave on full pay up to six months paid leave and three months unpaid leave subjected to the production of a valid medical certificate.

(ii) If the employee does not recover after nine months he/she shall be retired on medical grounds. In the case of an employee who is retired on medical grounds and has served less than seven years with the Corporation he/she shall be entitled to one half of a month's salary or wage for every twelve months of continuous service or in proportion thereof. An employee who shall have served seven years or more shall be entitled to the benefits accruing under the local Authority Superannuation Fund Scheme.

(b) (i) If an employee is continuously ill, he/she shall be granted sick leave on full pay for a maximum period of six months within any twelve month's period on production of medical certificate.

(ii) If the employee's illness does not improve after the twelve month's period he/she shall be retired on medical grounds and the benefits shall be in accordance with Section 7(a) (ii).

571

MTC

M

(d) Where an employee sustains injury while on Corporation business he/she shall, subject to a medical certificate, be granted leave of absence and be paid in accordance with the provisions of the Worker's Compensation Act, and if as a result of such injury, he/she is unable to follow his/her normal occupation, his/her further employment or discharge shall be considered with the recommendations of the Worker's Compensation Commissioner.

(e) In case of illness which arises out of pregnancy and results in a female employee becoming temporarily incapable of performing her official duties, such employee shall be entitled to sick leave as per provision of this section.

8. MATERNITY LEAVE

(a) Female employees who have been in continuous service for twelve months or longer shall be granted three month's paid maternity leave.

(b) An employee shall qualify for paid maternity leave only once in two years.

9. COMPASSIONATE LEAVE

Paid leave shall be granted up to a maximum of seven days over a period of twelve months upon receipt of a written application and supported by documentary evidence under the following circumstances: -

(a) Death of

(i) Spouse, child, mother, father

(ii) Registered dependant

(b) Serious illness of:

Spouse, child, mother and father

(c) Other request for leave on strong compassionate grounds may be considered up to a maximum of three days over a period of twelve months.

10. SPECIAL LEAVE

A female employee shall be entitled to one day of absence from duty in every calendar month without any explanation whatsoever.

11. VALIDITY OF DISCIPLINARY RECORDS

(a) Disciplinary action taken against an employee shall cease to be valid reference one (1) year after the pronouncement and application of such disciplinary action.

572

MTC

12. NOTICE OF TERMINATION OF EMPLOYMENT

(a) Except where an employee is dismissed under Section 6.2.6 of the Collective Agreement, thirty (30) days notice to terminate employment shall apply to the case of an employee giving notice to the Corporation or vice versa.

(b) All notices must be given in writing

(c) Either party may at any time terminate the employment by a shorter period of notice than that mentioned in Section 12 (a) by payment to the other of such sum in lieu as the employee would have received as salary if the employment had terminated after notice given in terms of Section 12 (a).

(d) An employee may not, except with the consent of the Managing Director or an officer of the Corporation duly exercising the authority of the Managing Director, be granted leave after he/she has submitted the notice.

13. REDUNDANCY/RETIREMENT

Where through force of circumstance it is necessary to reduce labour, Management shall negotiate with the Union the terms of redundancies taking into account the following factors;

(a) Capacity or position

(b) Efficiency

(c) Length of service

(d) Diligence

(e) Health

(f) Disciplinary record

Payments shall be made as follows: -

Continuous Service	Redundancy Pay
Below 5 years	10 months
5 years – below 10 years	17 months
10 years – below 15 years	22 months
15 years – below 20 years	28 months

573

20 years – below 25 years	34 months
25 years – below 30 years	40 months
30 years – below 36 years	46 months

The redundancy pay shall be in addition to the applicable salary in lieu of notice and in addition to any other contractual terminal benefits. An employee who has been put on redundancy/retrenchment shall continue being on the payroll until his/her; benefits are paid in full.

The last drawn "Basic Salary" shall be the basis for calculation of redundancy pay.

14. RETIREMENT

(a) Age

The normal retirement age shall be 55 years

(b) **Service**

An employee may retire after 30 years continuous service

(c) Medical grounds – As per Clause 7

(d) **Notice**

An employee due for retirement shall be notified in writing at least six months in advance.

(e) **Extended Service**

An employee may apply for extension for a further period not exceeding five years.

15. **EARLY RETIREMENT**

An employee who has done less than thirty years continuous service may with the consent of the Corporation on giving due notice, retire at any time before the employee attains retirement age/service.

16. **RETIREMENT BENEFITS**

In addition to the benefits accruing from the Pension Scheme, an employee who is retired as stipulated in Section 16 and 17 and has served not less than ten years, shall be granted retirement benefits as follows:

MTC

(a) For the first (10) years of service; two (2) month's pay for each complete year of service

(b) For the next 10 years (11-20) years of service; three (3) month's salary for each complete year of service.

(c) For the next 10 years (21-30) years of service, four (4) months salary for each complete year of service in excess of 20 years.

17. **DISCHARGE**

An employee discharged shall entitled to gratuity as stipulated under retirement benefits, Clause 16 of the Conditions of Service.

18. **DECEASED'S BENEFITS**

In addition to the benefits accruing from the pension scheme, Group Life Assurance, etc. deceased's benefits of one year basic salary shall be payable to nominated representatives of deceased employee who has been in continuos service for more than two years, and six months' salary in respect of a deceased employee who has been confirmed in service but has served for a period of less than two years.

19 **FUNERAL ASSISTANCE**

Following the death of: -

an employee, spouse, child, mother or father or registered dependants the Corporation shall give the following assistance:

(i) Coffin

(ii) Transport to and from the Local Cemetery

(iii) Firewood

(iv) A funeral grant of K200,000.00

(v) Three 3 x 25Kg bags of Mealie Meal

(vi) 2.5 litres of cooking oil

575

MTC

20. REPATRIATION BENEFITS

(a) Only employees retiring, being medically discharged and families of deceased employees will be provided with a Corporation vehicle to repartriate them to a place of their choice within Zambia. In addition the Corporation shall pay applicable Subsistence Allowance to the employee, his/her children and registered dependants. In the event of the Corporation failing to repartriate an employee on the date of his/her choice, he/she and the registered dependants shall be entitled to subsistence allowance applicable to employee's grade until he/she and registered dependants are repartriated.

21. MARRIAGE, DIVORCE AND BIRTH

These shall be notified at once to the Human Resources Department for the purpose of changing privilege entitlement.

22. HOUSING

(a) The Corporation may endeavour to provide the employee with accommodation with an electric cooker where facilities exist.

The rent payable for such unfurnished accommodation will be as follows: -

(i) **Flats and High Cost Housing**
Of K250.00 per month

(ii) **Medium Cost Housing**
Of K150.00 per month

(iii) **Low Cost Housing**
Of K75.00 per month

(iv) **Temporary Housing**

Rent Free and shall be entitled to receive housing allowance.

Temporary Housing	-	Houses which are not constructed of permanent material, e.g. pole and mud or grass, caravans and tents and hotels.

(b) **HOUSING ALLOWANCE (OWN ARRANGEMENT)**

An employee who has not been provided with a Corporation house shall be entitled to housing allowance of 40% of his/her monthly basic salary.

576

MTC

(c) **VACANT POSSESSION**

Where an employee resigns he/she shall vacate the Corporation's home within fourteen days from his last day of duty. If the employee is dismissed he/she shall be required to vacate the house within thirty days. Where an employee is retired or discharged he/she shall occupy the Corporation house until his/her terminal benefits are paid in full.

23. SERVICE ALLOWANCE

An employee shall be entitled to service allowance as stipulated below:

(i) RS 1	85% of basic salary
(ii) RS2	80% of basic salary
(iii) RS3 – RS9	75% of basic salary

24. SUBSISTENCE ALLOWANCE

An employee shall be entitled to be reimbursed for expenditure incurred on his/her subsistence while travelling on the Corporation's duties away from his/her base station for a maximum of seven (7) days. The rates payable will be as follows: -

RS1-RS5	-	K55, 000.00 per night
RS6-RS9	-	K75, 000.00 per night

25. CAMPING ALLOWANCE

An employee who has been paid subsistence allowance for seven (7) days may claim a camping allowance after seven days at the following rates:-

RS1 – RS5	-	K20,000.00 per night
RS6 – RS9	-	K25,000.00 per night

26. LUNCH ALLOWANCE

Where the employee is travelling locally outside a radius of 25Km on Company business and is not claiming the subsistence, he/she shall be entitled to lunch allowance amounting to K10, 000.00 per meal.

27. REMOVAL OR UPSET ALLOWANCE

Where the Corporation requires the employee to work permanently at a place, which he cannot reasonably attend to from his existing residence, the Corporation shall pay: -

MJC

(a) the reasonable costs or removal of the employee's ordinary household effects subject to prior acceptance by the Corporation of a quotation for the cost and

(b) An upset allowance of 10% of the basic annual salary. The employee may claim for damaged personal effects while in transit if proven beyond reasonable doubts.

The rates shall be subject to review from time to time.

28. ACTING ALLOWANCE

Acting allowance shall be payable when an employee is asked to act in a grade higher than his/her substantive grade, and has the basic qualifications prescribed for the higher grade. In this case the acting allowance shall be the difference between the employee's entry point in the grade immediately above the acting employee's grade.

29. RESPONSIBILITY ALLOWANCE

Where an employee is appointed to act for another in the same grade such employee shall receive a responsibility allowance. The allowance shall be two incremental notches in the employee's present grade. At no time should a responsibility allowance exceed an acting allowance in the same given circumstances.

30. TOOLS ALLOWANCE

The Corporation shall provide tools to employees. In the event that the Corporation fails to provide tools, employees shall continue to receive K20,000.00 per month as tools allowance until the Corporation provides them with appropriate tools.

31. OVERTIME

(a) When the Company requests an employee to work outside his/her own normal working hours such an employee shall be paid overtime at the following rates:-

Week days and Saturdays	-	One and half (1.5) times the hourly Rate
Sundays and Public Holidays	-	double or (2) times the hourly rate.

(b) Basic hourly rate shall be calculated at annual basic salary divided by 24000 (300 working days x 8 hours per day).

(c) The public holidays are those gazetted by the Government in this regard.

578

MTC

32 HOUSING LOAN (HOME OWNERSHIP SCHEME)

(a) In order to encourage employees to have their own houses, the Corporation shall grant loans to build or purchase a house as per Corporation Housing policy.

33. VEHICLES LOAN

(a) The Corporation may, for the purpose of purchasing a motor car or motor cycle, grant to a confirmed employee, who is in possession of a valid driving licence, a loan on the following terms.

(i) The maximum amount of any loan shall be full purchase price of vehicle. Repayment period shall be 96 months.

(ii) for a motor cycle, full purchase price repayment period shall be 60 months

(iii) An employee shall be eligible for a second or subsequent advance at any time after the previous advance has been re-paid in full.

(b) The Managing Director or his duly authorised representative reserves the right to alter the conditions of any loan or to decline to grant a loan as may be necessary. Vehicles to be purchased with the assistance of a Corporation loan shall be subjected to an agreement with the Corporation. Regarding security, vehicles must be registered in the absolute Ownership of the Corporation until such time as the loan is fully repaid.

34. FURNITURE LOAN

(a) For the purpose of buying furniture, a loan of up to a full purchase price or 100% of employee's annual salary, whichever is less, may be granted to a confirmed employee. In the case of a refridgerator loan or cooker loan full purchase price shall be paid. Interest rate shall be 10% per annum.

(b) Furniture and refridgerator loans shall be repaid over a period of 72 months.

(c) The employees must produce quotations supporting the purchase of furniture or refridgerator to the Management.

(d) In the case of second hand furniture or refridgerator, the Management shall use its discretion.

579

MCI

MTC

35. EDUCATION LOAN

(a) The Corporation may assist any employee who wishes to undertake studies relevant to his/her work with an educational loan not exceeding the full cost of tuition, relevant textbooks and materials.

(b) Employees who pass these examinations shall be refunded in full the amount of loan obtained from the Corporation at the current bank rate.

(c) Repayment period shall be a minimum of 12 months and a maximum of 18 months.

(d) An employee taking examinations and wanting to take study leave prior to the commencement of the examinations shall apply for paid leave or unpaid leave if no accrued leave is available. The Corporation shall avail such an employee ten (10) days without deducting the accrued leave days.

Education loans shall be Interest free.

35. BICYCLE LOAN

Employees shall be eligible for bicycle loans at 100% of the actual cost of the bicycle. The loan shall be recovered over a period of 24 months. The bicycle loan shall be at a concessionary interest rate of 9% per annum on reducing balances.

36. COMPASSIONATE LOAN

An employee who applies for a loan shall be granted the same on compassionate grounds. Repayment period shall be 12 months.

37. SALARY ADVANCE

An employee shall be entitled to salary advance recoverable in three installments.

38. MEDICAL REGULATIONS

The employee shall submit to any medical examination, which the employer shall require from time to time.

39. GROUP LIFE ASSURANCE

In addition to the benefits accruing from the pension scheme, a group life assurance shall apply to all employees. Under this benefit an amount of five times an employee's annual basic salary shall be payable to nominated representatives of the deceased or an employee declared unfit to work by a medical board. A family representative shall be identified by way of an Order of Appointment of an Administrator.

NCN

40. UNIFORMS AND PROTECTIVE CLOTHING

(a) Certain classes of employees shall be eligible to free issue of uniforms or protective clothing annually

(b) When an employee refuses to wear prescribed uniforms or protective clothing, he/she shall be guilty of misconduct and shall be liable to disciplinary action.

(c) Where an employee is issued with uniform or protective clothing and willfully damages, loses or sells the clothing or serves the Corporation for a period of less than six (6) months he/she shall refund to the Corporation the equivalent value of protective clothing issued to him/her in addition to the disciplinary action.

41. TRAINING

(a) An employee who wishes to be trained in a field relevant to the technique of administration of the electricity industry may be sponsored by the Corporation for such training subject to the employee being bonded to serve the Corporation for a period thereafter equal to the length of the course or four years, whichever is less.

(b) An employee who qualifies to membership of a professional institute (by examination) will have membership fees paid for by the Corporation to one professional body.

(c) An employee who is on training and is sponsored by the Company shall be paid an out of pocket allowance whose rates shall be reviewed from time to time.

42. MEMBERSHIP OF THE UNION

All employees shall have the right to membership of the Union and to assume any office of the union.

43. GRIEVANCE PROCEDURE

Any aggrieved employee who is a member of the Union shall follow the procedures laid down in the Recognition Agreement and Collective Agreement.

44. SHIFT ALLOWANCE

Shift workers shall be entitled to shift allowance as follows:-

RS9	-	K75,000.00 per Month
RS8	-	K70,000.00 per Month

581

MTC

RS7	-	K65,000.00 per Month
RS6	-	K60,000.00 per Month
RS5	-	K55,000.00 per Month
RS4	-	K50,000.00 per Month
RS3	-	K45,000.00 per Month
RS2	-	K40,000.00 per Month
RS1	-	K35,000.00 per Month

A shift worker shall also be paid converted over time at the applicable rate if they work extra hours after the shift.

45. LONG SERVICE AWARD

In appreciation and recognition of the service rendered by long serving employees, the following long service award shall apply: -

(a) An employee who completes ten (10) years of continuous service shall be entitled to a long service award of a wrist watch or opt for K300,000 cash in lieu.

(b) An employee who completes twenty (20) years of continuous service shall be entitled to a long service award of a Radio or opt for K500, 000.00 cash in lieu.

(c) An employee who completes thirty (30) years of continuous service shall be entitled to a long service award of a Plough, planter, ridger or opt for K750 000.00 cash in lieu.

46. ANNUAL CHRISTMAS BONUS

Christmas Bonus shall be 100% of employee's monthly basic salary (tax free) subject to company's ability to pay.

47. DEROGATION

Nothing in these conditions shall be construed as being in derogation of the provisions of the Worker's Compensation Act, the Employment Act, the Industrial and Labour Relations Act or any other relevant statute.

Appendix C

Conditions of Services for Non-Represented Workers

The following are the conditions of service for ZESCO workers not represented by union agreements.

Appendix C

Conditions of Services for Non-Represented Workers

The following are the conditions of service for ZESCO workers not represented by union agreements.

File - conditions of service

ZAMBIA ELECTRICITY SUPPLY CORPORATION LIMITED

TELEPHONE: (01) 228084/9
TELEFAX: (01) 222753
TELEX: ZA 40150

TELEGRAMS: "GENERATOR"
P O BOX 33304
LUSAKA

MEMORANDUM

To: All Chief Accountants
All Human Resources Managers

From: Senior Manager - IR/MPL

Ref: Memo/HR 99/99

Date: 26th January, 1998

Re: Revised Conditions of Service For Non-Represented Staff

Please find herewith new conditions of service for non-represented staff which we request you to implement immediately with the following observations:

i). Services allowance for staff in M4 - M8 - 60% with effect from 1st October, 1998.

ii) House rent 10% of basic salary including those in rental houses with effect from 1st February, 1999.

iii) Standby allowance and availability allowance with effect from 1st January, 1999.

If you need any clarification on specific clauses of the conditions of service please contact the undersigned.

A/C Kabwe

ACK/pm

585

APPENDIX I

ZESCO LIMITED
EXECUTIVE SUMMARY OF CONDITIONS OF SERVICE FOR NON-REPRESENTED EMPLOYEES

N0.	Element	Old Conditions			New Conditions	Comments
1	LEAVE RATES	M4 to M5	36 days p.a.		No change	
		M6 to M8	42 days p.a.		"	
		M9 to M10	42 days p.a.		"	
		M11 to M13	48 days p.a		"	
2	MAXIMUM LEAVE ACCRUALS	M4 to M5	108 days		No change	Any excess over maximum will be written off at the end of the financial year.
		M6 to M8	126 days		"	
		M9 to M10	126 days		"	
		M11 to M13	144 days		"	
3	LEAVE COMMUTATION	M4 to M5	Min. 30 days	Max 60 days	No change	Leave commuted shall not be converted to leave days
		M6 to M8	Min. 30 days	Max 60 days	"	
		M9 to M10	Min. 30 days	Max 80 days	"	
		M11 toM13	Min. 30 days	Max 100 days	"	
4	TRAVEL & SUBSISTENCE	Travel and subsistence Allowance is payable to employees where accommodation is not provided.			Travel and subsistence Allowance is payable to employees where not accommodated by the corporation.	
4.1	SUBSISTENCE	LOCAL				
		M4 to M5	K10,000.00 per night		K25,000.00 per night	
		M6 to M8	K10,000.00 per night		K40,000.00 per night	
		M9 to M10	K10,000.00 per night		K40,000.00 per night	
		M11 to M13	K10,000.00 per night		K45,000.00 per night	

586

4.2	NON-SPONSORED	**FOREIGN** **Eastern & Southern Africa** M13 Group A $220.00 M12 and below Group A $190.00 **The rest of the world** Group B $190.00 Group B $170.00	**FOREIGN** Eastern & Southern Africa / The Rest of the world M13: $255 / $270 M12 & below: $225 / $240
4.3	SPONSORED	**FOREIGN** M11 to M13 Group A $88.00 Group B $76.00 M10 and below Group A $76.00 Group B $68.00	
4.4	BUSINESS TRAVEL BY AIR	**International Travel** The chief executive shall travel in business class and all other staff economy class **Local Travel** Only M12 and M13	No change No change
5	HOUSING ALLOWANCE	Housing Allowance is paid to employees who are not accommodated by the corporation M4 to M13: 25% of basic salary	Housing Allowance is paid to employees who are not accommodated by the corporation No change
6	HOUSE RENT	House rent is paid by employees who are accommodated by the corporation **Flats & High Cost housing** 10% of basic salary ceiling of K750.00 per month **Medium cost housing** 8% of basic salary ceiling of K500.00 per month **Low cost housing** 6% of basic salary ceiling of K250.00 per month **Rented house** 10% of basic salary ceiling of K750.00 per month	No change 10% of monthly basic salary 10% of monthly basic salary 10% of monthly basic salary **Rented house** 10% of monthly basic salary

Guided by cabinet circulars on foreign travel.

Guided by cabinet circulars on foreign travel.

587

7	**FUEL LIMITS**	Fuel limits applies to employees who use personal to holder vehicles	Fuel limits applies to employees who use personal to holder vehicles	
		Personal to holder cars		
		M6 to M8 300 litres pm	Nil	
		M9 360 litres pm	240 litres pm	
		M10 360 litres pm	No change	
		M11 360 litres pm	No change	
		M12 360 litres pm	No change	
		M13 420 litres pm	No change	
8	**KILOMETER ALLOWANCE**	Kilometer Allowance is payable to employees when they use their own vehicles for official business. The vehicles must be registered with the corporation.	Kilometer Allowance is payable to employees when they use their own vehicles for official business. The vehicles must be registered with the corporation.	
		Own cars		
		Class A K9.00 per km	K100.00 per km	
		Class B K12.00 per km	K150.00 per km	
		Class C K15.00 per km	K200.00 per km	
		Class D K18.00 per km	K250.00 per km	
		Maximum Distance 2000 km	No Change	
9	***SERVICES ALLOWANCE***	*M4 to M8 50% of basic salary. Tax borne by the employee*	M4 to M8 60% of basic salary. 50% of the tax to be borne by the Corporation	Tax to be split 50:50
		M9 to M13 75% of basic salary. Tax borne by the employee	M9 to M13 75% of basic salary. 50% of the tax to be borne by the Corporation	Tax to be split 50:50
10	**LOCAL REMOVAL & DISTURBANCE ALLOWANCE**	10% of annual basic pay for married employees	No Change	
		5% of annual basic pay for single employees	10% of annual basic salary	

588

11 LOANS & GUARANTEES		
11.1 ADMINISTRATION OF STAFF LOANS		All loans will be administered on revolving fund basis
11.2 *DEDUCTIONS ON ALL LOANS	Monthly total deductions of all loans shall not exceed 50% of monthly basic salary after tax. Scrutiny sheets to be used for all loan application included and the system centralised payments.	No change
12.1 CAR LOANS	**LOAN LIMITS**	
	For new car or mechanically sound 2nd hand cars not older than 24months- Full purchase price or 4yrs basic salary whichever is less.	For new cars or mechanically sound 2nd hand cars not older than 12mths Full purchase price or 150% of annual salary whichever is less. With a maximum of K30m.
	For vehicles which are older than 24 months but not older than 96 months Full purchase price or 200% of annual basic salary whichever is less	For vehicles which are older than 12 mths but not older than 48 months Full purchase price or 100% of annual salary whichever is less. With a maximum of K20m.
	The employer shall not issue loans for purchase of vehicles older than 96 months	The corporation shall not issue loans for purchase of vehicles older than 48 months but encourage employees to buy new cars.
	Repayment Period New vehicles and second hand vehicles which are not older than 24 months, the maximum repayment period shall be 96 months	New vehicles and second hand vehicles which are not older than 12 the maximum repayment period shall be 60 months
	For all the vehicles repayment period shall be for a period not exceeding 60 months	For all second hand vehicles older than 12 months the repayment period shall not exceed 48 months
	Interest rates 10% p.a. on reducing balances	No Change **Approval** Management Board

589

	<u>Ownership</u> Absolute ownership in the name of the employer. Blue book and insurance cover note should be suitably endorsed in this regard.	No Change	
12.2 HOUSING LOANS			
	<u>LASF Loan conditions</u> The corporation provides bridging loans pending LASF funding.	Aplications to be approved by the Board of Directors. The corporation will not provide Bridging loans.	Approval by board of directors
	<u>Zesco Housing scheme</u> The maximum loan entitlement is 10 times of the annual basic salary. The interest rate shall be 7.5% on reducing balances.	The maximum loan entitlement is 2 times of the annual basic salary. Other conditions remain unchanged. Approval by Board of Directors	
12.3 MATERIAL LOANS			
	Material Loans (incl. Furniture, Fridge,TV & Video,Cooker) Full purchase price or 100% of annual basic salary whichever is less.	**Material Loans (incl. Building Materials, Basic Furniture and Cooker)** Full purchase price or 30% of annual basic salary with a maximum of K6m. In case of building material loans, any amount above K6m will require title deeds as security.	
	The interest rate shall be 6.5% p.a.on reducing basis.	No change	
	The repayment period shall be 36 months	No change	
13 SALARY ADVANCES	Salary advance is a very temporal loan with a maximum of one month's basic salary and it is recoverable in not more than three instalments from the payroll immediately following the salary advance. It is interest free.	Salary advance is a very temporal loan with a maximum of 50% of one month's basic salary and it is recoverable in one instalment from the payroll immediately following the salary advance. It is interest free.	
14 COMPASSIONATE LOAN	An employee can have one compassionate loan at one time and is recoverable in 12 months intalments. It is interest free.	An employee can have one compassionate loan at one time of not more than one month's basic salary and is recoverable in 12 months intalments. It is interest free.	

15 PASSAGES		
15.1	**For contract non-Zambians:** Between place of recruitment & work Passage paid for by the company for employee & dependants @ the beginning & end of contract.	No change
15.2	**For Zambians:**	
	the company shall bear the cost of repat- riation to his home on retirement but not on separtion on disciplinary grounds	No change
15.3	**<u>Employees sent abroad on duty.</u>**	
	The employee & dependants shall be entitled to terminal economy class air passage The employee & dependants shall be entitled to leave passage (economy class air) home only after two years.	No change
15.4	**CNZ - (Contract Non-Zambians)** Economy class from recruitment place: air passage using the shortest route possible.	No change
15.4.1	**Employees on 3 year contract.**	
	Employees on 3 year contract & employed on normal inducement will be entitled to mid contract passage after working for 18 months or air tickets of equivalent value for employee and dependants.	No change

15.4.2	**Employees on 2 year contract**	
	After 12 months an employee shall be entitled to the equivalent value of air tickets	No change
	Should an employee terminate his services he shall be entitled to a return passage after 2 years of the 3 year contract.	No change
	On termination of contract @ 18 mths for a 3 year contract & at 15 months for two year contract the employee shall reimburse the company:	No change
	a) Initial air ticket b) Initial baggage allowance c) Settling allowance at the rate of 1/18 or 1/15 respectively	
	upon the extention of a 3 year contract the employee shall be entitled to an economy air class ticket.	No change
	cost of mid term contract to be deducted from the cost of the terminal passage.	No change
16 **BAGGAGE ALLOWANCE**	Permanent and Pensionable Staff	
16.1	**OUTWARD JOURNEY**	No change
	Unaccompanied Baggage Employee and Wife 100kg each **Excess bagage** Accompanied 10Kg **Each dependant** (up to 6 children) 50Kg **Excess bagage** 5Kg	

592

16.2	**INWARD JOURNEY** same as outward & 300Kg to be carried by sea **CNZ**	No change
	<u>On joining the company & repatriation</u> Employee & wife 100Kg each	No change
	Unaccompanied Employee and Wife 100kg each	No change
	Excess bagage Accompanied 10Kg	No change
	Each dependant (up to 6 children) 50Kg	No change
	Excess bagage 5Kg	No change
	On contract other than going or repatriation **Unaccompanied** Employee and Wife Nil	No change
	Excess bagage Accompanied 10Kg	No change
	Each dependant Nil	No change
	Excess bagage 5Kg	No change
17	**LOCAL SETTLING IN ALLOWANCE**	
	Married employee -20% of annual basic salary	Married employee -10% of annual basic salary
	Singles -15% of annual basic salary **CNZ**	Singles -10% of annual basic salary
	Kwacha equivalent of USD 500.00	No change

18	SALE OF PERSONAL TO HOLDER CARS	
	ELIGIBILITY	
	SERVING EMPLOYEES The employee to whom the vehicle is sold should have worked for @ least 10 yrs *Member of staff should be in grade M9 & above. *Member of staff should have been using the vehicle for a period of 3 years *The employer should have secured a replacement vehicle. *10 years should elapse before the same facility is availed to the same employee. *The selling price shall be 15% of original value or 25% of market value	No change
	RETIRING EMPLOYEES * employee should have worked 5 yrs *employee should have been using the vehicle as a personal to holder *staff member should be in M9 & above *The selling price shall be the book value or 15% of the original cost whichever is higher.	No change
	CNZ Not eligible	No change

19	**HOUSE HOLDERS INSURANCE**	Employees will be reimbursed the cost of householder's insurance as shown below (ie insurance of personal effects as shown below Below M6: Nil M6 to M8: on actual insured value subject to a ceiling of K75,000.00 M9 to M10: on actual insured value subject to a ceiling of K800,000.00 M11 to M13: on actual insured value subject to a ceiling of K1,200,000.00	To be discontinued
20	**ACTING ALLOWANCE**	M4 to M5 Three notches M6 to M8 Three notches M9 to M10 Three notches M11 to M13 Three notches	Two incremental steps in the higher grade
21	**RESPONSIBILITY ALLOWANCE**	For all members	One incremental step in substantive grade
22	**OVERTIME**	No over time is paid to employees in M4 and above	Overtime will be payable to employees in M4 to M7 only. The applicable hourly rates will be 1.25 times on week days, 1.5 times on Saturdays and 2 times on sundays and public holidays not exceeding 25 actual hours worked per month. Restricted to work related to Operations and maintenance of generation, Transmission and Distribution plants.
23	**STANDBY ALLOWANCE**	Standby allowance is payable to employees in operations in grades M4 to M7 who perform standby duties for the purpose of operations and maintenance of generation, transmission and distribution plants. M7 and above = K12,000.00 per week M6 = K10,000.00 per week M5 = K 7,500.00 per week M4 nil	M7 = K20,000.00 per week M6 = K15,000.00 per week M5 = K 10,000.00 per week M4 = nil

24	SHIFT ALLOWANCE	Shift allowance is payable to employees in grades M4 to M7 who perform shift duties. M7 = K 35,000.00 per month M6 = K25,000.00 per month M5 = K15,000.00 per month M4 = K 14,000.00 per month	10% of monthly basic salary. 10% of monthly basic salary. 10% of monthly basic salary. 10% of monthly basic salary.
25	AVAILABILITY ALLOWANCE	Availability allowance is payable to employees in grades M5 to M12 who are required to be available for the purposes of operations and maintenance of the power system. M8 and above K35,000.00 per month M7 K30,000.00 per month M6 K25,000.00 per month M5 K20,000.00 per month	Availability allowance is payable to employees in grades M8 to M12 who are required to be available for the purposes of operations and maintenance of the power system. Eligibility to be determined by the Management Board. M8 and above 10% of the monthly basic salary Nil Nil Nil
26	GROUP LIFE AND ACCIDENT INSURANCE	5 Times annual basic salary for all	3 times annual basic salary for all
27	GRATUITY / LONG SERVICE	10 years of service = 1 month pay for each completed year of service 11 - 20 years = 1.5 months pay for each completed year of service 21 - 30 years = 2 months pay for each completed year of service	10 years of service = 1 month pay for each completed year of service 11 - 20 years = 1.25 months pay for each completed year of service 21 - 30 years = 1.5 months pay for each completed year of service
28	PRODUCTIVITY BONUS	Perfomance Bonus	No change
29	CONTRACT GRATUITY	25% last drawn salary and leave commutation if any(tax free)	35% of the last drawn salary and leave commutation if any (tax free)
30	FUNERAL	Employee, Spouse, Own Child father, Mother, Sister and Brother. K100,000.00 plus 3 X 25kg Mealie Meal Coffin plus local transportation	Employee, spouse, own child or registered dependants up to a maximum of 6.(Including own children). K200,000.00 Coffin plus local transportation

596

Private Participation Options Study for the Zambia Electricity Supply Company

Task 6 Report- Environmental Assessment

591

Table of Contents

List of Tables and Figures.....v
List of Plates.....vi
Acronyms.....viii

1 Introduction.....1-1
1.1 Background.....1-1
1.2 Organization of this Report.....1-2
2 Methodololgy.....2-1
3 Existing Facilities.....3-1
3.1 Itezhi Tezhi Dam.....3-1
3.1.1 Brief Description.....3-1
3.1.2 Environmental Liabilities.....3-4
3.1.3 Recommended Actions.....3-5
3.2 Kafue Gorge Upper Hydroelectric Scheme.....3-6
3.2.1 Brief Description.....3-6
3.2.2 Environmental Liabilities.....3-9
3.2.3 Recommended Actions.....3-10
3.3 PCB Storage Facilities.....3-11
3.3.1 Brief Description.....3-11
3.3.2 Environmental Liabilities.....3-12
3.3.3 Recommended Actions.....3-13
3.4 Victoria Falls Power Station.....3-14
3.4.1 Brief Description.....3-14
3.4.2 Environmental Liabilities.....3-16
3.4.3 Recommended Actions.....3-18
3.5 Small Hydroelectric Schemes.....3-20
3.5.1 Brief Description.....3-20
3.5.2 Environmental Liabilities.....3-21
3.5.3 Recommended Actions.....3-21
3.6 Diesel Power Schemes.....3-22
3.6.1 Brief Description.....3-22
3.6.2 Environmental Liabilities.....3-23
3.6.3 Recommended Actions.....3-23
3.7 Lusaka Workshop and Stores.....3-24

598

Table of Contents

3.7.1 Brief Description ... 3-24

3.7.2 Environmental Liabilities ... 3-25

3.7.3 Recommended Actions ... 3-26

3.8 Ndola Workshop and Stores ... 3-27

3.8.1 Brief Description ... 3-27

3.8.2 Environmental Liabilities ... 3-27

3.8.3 Recommended Actions ... 3-28

3.9 Substations ... 3-29

3.9.1 Brief Description ... 3-29

3.9.2 Environmental Liabilities ... 3-30

3.9.3 Recommended Actions ... 3-31

3.10 Transmission System ... 3-32

3.10.1 Brief Description ... 3-32

3.10.2 Environmental Liabilities ... 3-33

3.10.3 Recommended Actions ... 3-33

3.11 Distribution System and Alternative Energy Sources ... 3-33

3.11.1 Brief Description ... 3-33

3.11.2 Environmental Liabilities ... 3-34

3.11.3 Recommended Actions ... 3-34

4 Abandoned Facilities ... 4-1

4.1 Lusaka Thermal Power Plant ... 4-1

4.1.1 Brief Description ... 4-1

4.1.2 Environmental Liabilities ... 4-1

4.1.3 Recommended Actions ... 4-1

4.2 Ndola Thermal Power Station ... 4-2

4.2.1 Brief Description ... 4-2

4.2.2 Environmental Liabilities ... 4-2

5 Potential Future Facilities ... 5-1

5.1 Itezhi Tezhi Power House ... 5-2

5.2 Kafue Gorge Lower Hydroelectric Project ... 5-3

5.3 Batoka Gorge ... 5-4

5.4 Other Large-Scale Hydroelectric Schemes ... 5-5

5.5 New Small Hydro Schemes ... 5-7

5.6 Future Extensions to the Transmission Network ... 5-7

5.7 Reinforcement of Distribution Lines ... 5-8

Table of Contents

6 Gwembe-Tonga Development Project.....6-1

7 Environmental and Social Affairs Unit.....7-1

7.1 Option 1- Concessioning the Whole Company.....7-3

7.2 Option 2- Separating the Company Into Business Units.....7-3

7.3 Option 3- Master Concession.....7-4

8 Conclusions.....8-1

8.1 Introduction.....8-1

8.2 The Future of the Environmental and Social Affairs Unit.....8-1

8.3 Current Environmental Liabilities.....8-2

8.4 Future Environmental Constraints.....8-3

8.5 Recommendations.....8-4

9 List of References.....9-1

Appendix A- List of Persons Interviewed..... A-1

Appendix B- Plates..... B-1

600

List of Tables and Figures

Tables

3-1 Summary of Environmental Liabilities at Itezhi Tezhi Dam 3-5

3-2 Summary of Environmental Liabilities at Kafue Gorge Upper 3-10

3-3 Summary of Environmental Liabilities of PCBs 3-13

3-4 Summary of Environmental Liabilities at the Victoria Falls Power Station 3-18

3-5 Summary of Environmental Liabilities at the Small Hydo Schemes 3-21

3-6 Summary of Environmental Liabilities at Diesel Power Stations 3-23

3-7 Summary of Environmental Liabilities at the Lusaka Workshops 3-26

3-8 Summary of Environmental Liabilities at the Ndola Workshops 3-28

3-9 Summary of Environmental Liabilities at the Kitwe and Luano Substations 3-31

Figures

3-1 Zambia Electricity Generation and Transmission System 1990-91 3-2

7-1 Position of the Environmental and Social Affairs Unit at ZESCO

List of Plates

1 The Itezhi Tezhi dam. Note dam monitoring installations at toe of dam.

2 Rapid sand filters at Itezhi Tezhi water treatment plant.

3 The upper sewage stabilisation pond at Itezhi Tezhi.

4 Unsterilised sewage sludge available for collection by the local community.

5 The Itezhi Tezhi workshops. Note oil spillage on the ground.

6 Dam releases can have serious environmental and social consequences for the Kafue Flats.

7 The Kafue Gorge Upper Hydroelectric dam. Note booms to protect the power station intakes from water hyacinth, which is evident along the edge of the dam and outer boom.

8 View of the Kafue Gorge Upper Hydroelectric Power Station. The power station is situated underground and is accessed via the yellow shaft. Note effects of deforestation.

9 Part of the workshop site at Kafue Gorge. Note oil spills.

10 View of the ZESCO Training Centre at Kafue Gorge and part of the village.

11 The Kafue Gorge waste disposal site.

12 Under-cover storage site for PCB-contaminated transformer carcasses at KNBC, Siavonga.

13 Storage area for PCB oils and capacitors in sea containers.

14 Aerial view of the intake structures on the north bank. Note the flow in the Eastern Falls (April 1997) and the relationship between the East Gorge, Knife Edge walk and Palm Grove (far right).

15 The 48 MW intake structure at Victoria Falls.

16 Dry Eastern Cataract (November 2000) at the end of the dry season when river flows are at their lowest. Compare with Plate 14.

17 Boom to protect intake structures from water hyacinth. Note presence of weed on left side of photograph.

18 Scour siphon discharge at the eastern end of the Falls. Note dry condition of vegetation along the Knife Edge and compare with Plate 14.

19 Palm Grove Gorge.

20 Aerial view of the Victoria Falls Power Station at the end of the Third Gorge. The Victoria Falls are just off the picture to the right. Palm Grove Gorge is bottom right of photo. The power stations are (from left to right): Station B (underground, tailrace visible), Station A and Station C. Note town of Victoria Falls in the distance.

21 The service trolley to the Power Station. Note pipes bringing power cables up from Station B, and Station C on right of photo.

22 Waste disposal site at Victoria Falls Power Station.

23 The staff compound at Victoria Falls. The Senior staff housing block is on the left and part of the Junior staff housing area is on the right foreground. The PS offices are located at centre right of the photo.

24 View of Third and Fourth Gorges from the proposed tea room.

25 Diesel storage tanks at Kabompo inside a bunded area. Note spillages on the ground outside the bunded area.

26 Old power plant at Lukulu, showing extensive soil contamination.

27 Air pollution at the Zambezi Diesel Power Plant.

28 Oil ditch at the Zambezi Diesel Power Plant.

29 Earthworks in preparation for the installation of oil interceptors at the Luangwa Power House.

30 Oil transformer carcasses at the Lusaka Workshop. Note leaking oil.

31 Oil transformer carcasses at the Ndola Workshop. Note oil puddles and old cooling tower in the background.

32 Oil storage site at Ndola Workshop. Note oil spillage.

33 Unbunded oil recycling tanks at Kitwe Substation. Note spillage.

34 PCB-filled capacitors at Kitwe Substation.

35 Dump area at Kitwe Substation showing drums filled with capacitors and concrete, capacitors, scrap pylon components, old transformers etc.

36 Luano Substation showing the building which is reported to contain PCBs from CEC and housing construction in the background.

37 View of old Lusaka Power Station from the ZESCO stores area. Note old conveyor and chimney. A thin layer of coal covers the old coal stockpile site (foreground).

38 Location of possible future underground power house at Itezhi Tezhi.

39 Sahel-like conditions near Lusito.

40 Massive gully erosion in the Lusito area.

Acronyms

AST	Above-ground storage tank
CAPCO	Central African Power Company
CEC	Copperbelt Electricity Corporation
CFC	Chloro-fluoro carbons
CIDA	Canadian International Development Agency
ECZ	Environmental Council of Zambia
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESU	Environmental and Social Affairs Unit
FSL	Full Supply Level
GIS	Geographic Information System
GTDP	Gwembe – Tonga Development Project
GWh	Giga Watt hours
IPP	Independent Power Producer
KCMA	Kafue Catchment Management Authority
KNBC	Kariba North Bank Corporation
kV	Kilo volt
KW	KiloWatt
KWh	KiloWatt hours
MEWD	Ministry of Energy and Water Development
MW	Mega Watt
NCC	National Control Centre
OPPPI	Office for the Promotion of Private Power Investment
PCB	Poly-chlorinated biphenyl
PRP	Power Rehabilitation Project
UN	United Nations
USAID	The United States Agency for International Development
UST	Underground storage tank
WCD	World Commission on Dams
ZESCO	Zambia Electricity Supply Company Ltd
ZPA	Zambian Privatization Agency
ZRA	Zambezi River Authority

604

1.1 Background

The Government of the Republic of Zambia (GRZ) has requested the Zambia Privatization Agency (ZPA) to study the options for Private Sector participation in the Zambia Electricity Supply Corporation Limited (ZESCO). The United States Agency for International Development (USAID) has agreed to support ZPA in this effort and has selected Bechtel/Nexant to assist ZPA in developing a report on this subject. Bechtel/Nexant staff have met with ZPA, ZESCO, the Ministry of Finance, the Ministry of Energy and Water Development, the Energy Regulation Board and other stakeholders and has developed a work plan for conducting this work. We have assembled a team of experts to study various aspects of this problem.

The tasks associated with this study are as follows:

- Task 1- Situation Assessment and Need for Private Participation
- Task 2- Options Development and Evaluation
- Task 3- Legal, Institutional and Regulatory Framework
- Task 4- Asset Survey and Market Valuation
- Task 5- Social Impact
- Task 6- Environmental Review
- Task 7- Action Plan
- Task 8- Communications with Stakeholders

This is the Task 6 Report. Its objective is to assess the current environmental liabilities of ZESCO's operations and to identify possible future environmental constraints and liabilities. The environmental liabilities are considered in terms of the following:

- public health;
- public safety;
- environmental health;
- public relations risks;
- financial costs (risks) of mitigation;
- compliance with international standards of best practice.

The Task 1 report provides an understanding of ZESCO's current situation, presents a projection of how it will operate if no private participation is involved, provide a Best Case scenario for its operation based on operation at benchmark levels, and illustrate how private participation can move ZESCO closer to the Best Case scenario. The Task 2 report provides a description of a variety of private participation options for ZESCO. These options will be reduced to two or three through a screening process which will make a more detailed evaluation of the options. Task 3 addresses the legal, institutional and regulatory requirements for implementing the chosen private participation options. Task 4 consists of a physical asset survey to develop an estimate of the depreciated replacement cost for ZESCO's technical assets and a market value for ZESCO's

605

commercial assets based on a financial analysis. Task 5 is directed at the potential social impact of private participation in ZESCO on potential retrenchments and recommends ways of mitigating this impact. Task 7 is an Action Plan for implementing the recommended two to three privatization options. As part of Task 8 we will keep stakeholders informed on a continuing basis of our intermediate results.

1.2 Organization Of This Report

The remainder of this report is organized as follows:

Section 2 describes the methodology employed. The current liabilities of existing and abandoned facilities are described in Sections 3 and 4 respectively, while a discussion of possible future constraints and impacts associated with those potential future facilities which have already been subject to full feasibility studies, are described in Section 5. The Gwembe-Tonga Project is discussed in Section 6 and the role of the Environmental and Social Affairs Unit of ZESCO under the possible privatization options being considered in the study, is discussed in Section 7. The conclusions of the study are contained in Section 8. Section 9 provides a list of persons interviewed in the course of conducting this work.

Appendix A presents a list of people interviewed in the course of conducting this task and Appendix B contains the plates that are referenced throughout the report.

606

The methodology employed was a combination of meetings, site visits and an extensive review of relevant literature. The detailed trip report is provided in Appendix A and the list of references is found at the end of this report, but a summary of meetings and site visits is provided below.

During the course of the study, 18 meetings were held with:

ZESCO Head Office staff;
ZESCO site staff;
Government departments:
- Department of Fisheries, Ministry of Agriculture, Food and Fisheries;
- Department of Energy, Ministry of Energy and Water Development;
- Department of Physical Planning and Housing, Ministry of Local Government and Housing;
- Environmental Council of Zambia;
- Zambia Wildlife Authority, Ministry of Tourism.

Other stakeholders:
- PriceWaterhouseCoopers;
- Safaris Par Excellence
- Shearwater Safaris

Members of the Project Team.

The following sites were visited:

- The Power Stations at Kafue Gorge, Kariba North Bank and Victoria Falls;
- The sub-stations at Kitwe and Luano;
- The PCB temporary disposal sites at Kariba and Luano;
- The workshops at Lusaka and Ndola;
- The villages and associated infrastructure at Kafue, Itezhi Tezhi and Victoria Falls;
- The Itezhi Tezhi dam and future power station site;
- The Gwembe-Tonga Project;
- The Kantolomba Township compensation scheme;
- The abandoned thermal power stations at Lusaka and Ndola.

Photographs were taken of each site, some of which are reproduced at the end of this report. In addition, photographs of the remote diesel power plants were given to the study team by ZESCO.

In this section on the existing facilities, each facility is first described and then discussed in terms of the current liabilities. A summary table has been provided showing the type, magnitude and probability of occurrence of each risk. A list of recommended actions is then provided regarding the mitigation of the environmental liabilities.

3.1 Itezhi Tezhi Dam

3.1.1 Brief Description

The Itezhi Tezhi dam is located on the Kafue River, about 295km upstream of the confluence of the Kafue River with the Zambezi, and 230km upstream from the Kafue Gorge Upper Hydro Project (Figure 1). The Itezhi Tezhi dam was developed as a storage and regulation facility for the Kafue Gorge Upper Hydro Project, because the original Kafue Gorge dam was not large enough and the scheme suffered from severe water shortages. The dam was completed in 1978 and has a total storage of 5 640 million cubic metres. The dam is a conventional rockfill dam with a central impervious core. It has a maximum height of 51m and a crest length of 1 400m (Plate 1) (Harza, 1999). The dam wall was raised by 1m in 1993.

At present, the dam is not infested with water hyacinth (*Eichhornia crassipes*), which is a major benefit, nor is the dam affected by bilharzia snails. Of the typical tropical water borne vectors, only malaria is a problem at Itezhi Tezhi.

The dam is located in the Kafue National Park and 370 km^2 of the park was inundated by dam construction. No Environmental Impact Assessment was conducted at the time of building and so the impacts of the dam on the Park are unknown. However, the dam has a profound effect on the Kafue Flats wetland system downstream, significantly altering land use patterns and fisheries, but the magnitude and significance of such effects are still not fully understood (Komex, 1995). This has prompted the call for an Integrated Kafue River Basin EIA. The Terms of Reference were drawn up by the ESU in June 1999, but the Request for Proposals has not yet been released.

The average long-term flow in the Kafue River upstream of the Itezhi Tezhi dam is 280m^3/s. The water entitlement at Kafue Gorge power station is 265m^3/s, which leaves 15m^3/s for other consumptive users. However, the minimum flow in the river downstream of Itezhi Tezhi, must not go lower than 25m^3/s and the Kafue Flats must be flooded for 4 weeks in March each year. The annual range of drawdown within the dam is about 7m, but the allowable maximum drawdown is 20-25m. This has never occurred. The maximum daily drawdown has been set at 0.5m in order to reduce pore pressures in the banks of the dam, but according to the Resident Engineer, the daily fluctuation rarely exceeds a few centimetres. High water levels are more of a problem for the Kafue National Park than lower levels within the 7m operating range, because this inundates valuable grazing land along the dam margins and floods several of the roads.

608

Zambia Electricity Generation and Transmission 1990-91

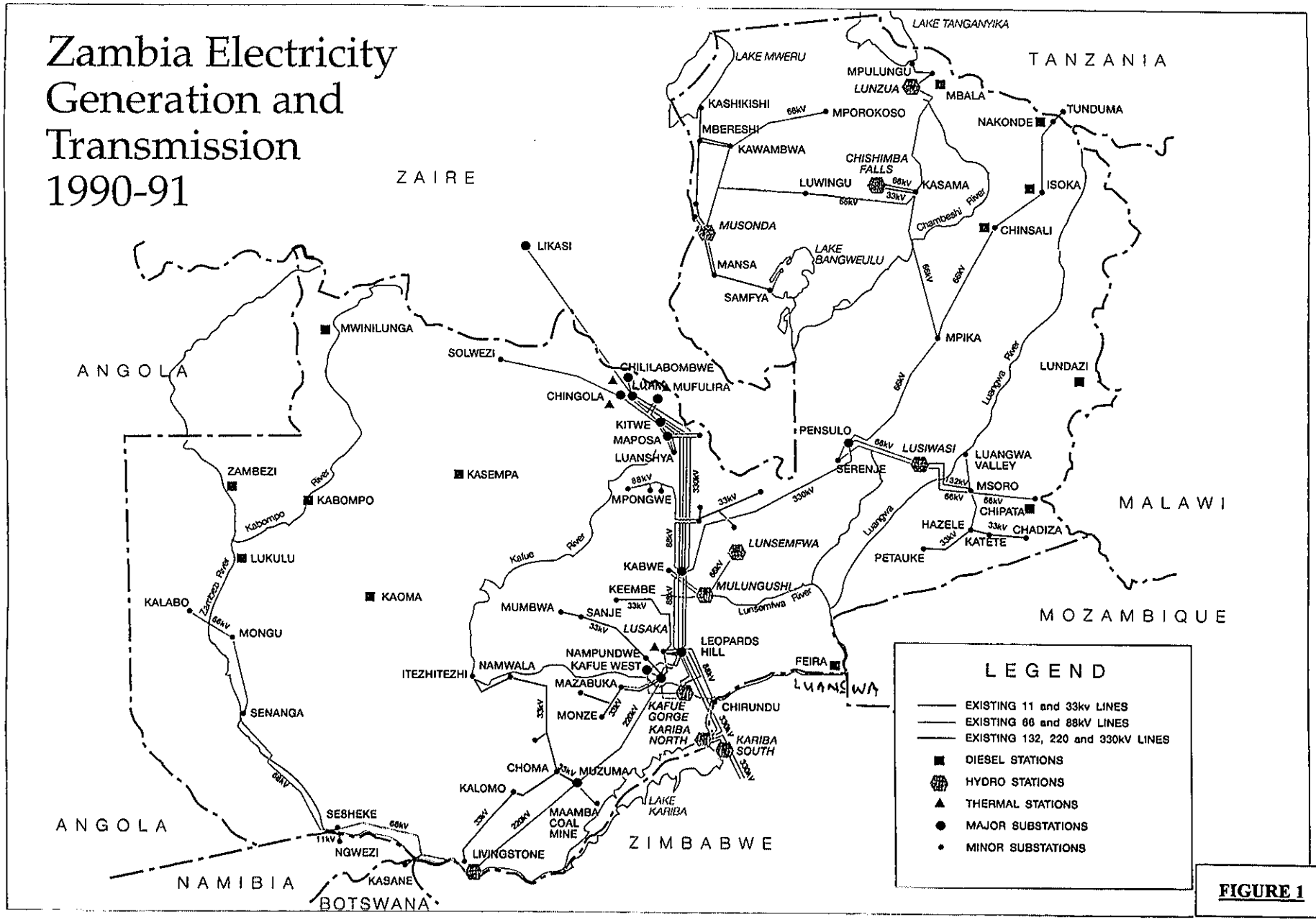


FIGURE 1

609

The safety and integrity of the dam is monitored regularly through a system of peizometers and other instrumentation to monitor pore pressures, ground water levels, leakages, structural integrity and seismicity (Plate 1).

The ZESCO operations at Itezhi Tezhi comprise:

- village of about 5000 people;
- water treatment plant and reticulation;
- sewerage system and treatment plant;
- workshop and stores;
- an old quarry used for construction of the rockfill dam.

Although only 71 people are employed at Itezhi Tezhi by ZESCO, the village has a population of 5000. Many of the houses being used were originally temporary structures built for construction workers during the building of the dam. Some of the older buildings have asbestos roofs, but newer houses have corrugated iron sheeting. ZESCO is responsible for house and road maintenance. The population has increased recently due to the proclamation of Itezhi Tezhi as a District. This has meant that key Government services must now be provided, with the corresponding assignment of government personnel to the area. A local council has recently been formed, but there have been no plans to expand the water and sanitation systems.

ZESCO, however, is still responsible for the supply of potable water. Water is abstracted from the dam at two places and pumped to a reservoir and then to a water treatment plant. The plant comprises a rapid sand filter system and a slow sand filter (Plate 2). The rapidly increasing population at Itezhi Tezhi is putting pressure on this water treatment plant. The water is chlorinated prior to reticulation to the houses. ZESCO used to monitor the water quality on a regular basis, but this was stopped 2 years ago. A new test kit has recently been acquired, but it does not allow for microbiological monitoring.

The sewage treatment plant comprises three large, concrete-lined stabilisation ponds, but 2 of these ponds never get filled and it is suspected that sewage seeps into the ground from broken pipes and blocked systems (Plate 3). The sludge is removed from the one active pond on an annual basis and is left on the side to dry and for collection by the local community to use as manure (Plate 4). The sewerage system is also the responsibility of ZESCO.

The village is electrified and ZESCO employees receive free electricity, but other residents have to pay.

The workshop comprises two large under-cover areas and a large open yard. The workshop floors are concreted, but badly cracked in places. There is no provision for oil collection in drip trays or drums and no recycling takes place. Waste oil is poured onto the open ground outside the workshop (Plate 5). The yard contained small amounts of scrap metal and a dozen or so wrecked vehicles and broken-down heavy equipment. ZESCO experiences difficulties in selling scrap metal and disposing of oil to recycling merchants due to the remote location and poor access roads to Itezhi Tezhi. No PCB-contaminated oils or transformers occur at Itezhi Tezhi.

3.1.2 Environmental Liabilities

The current environmental liabilities of the Itezhi Tezhi dam site and associated ZESCO structures and services are as follows:

1. *Soil contamination* from the disposal of all oils, lubricants and other hydrocarbons onto the ground. The area affected is quite small, but the persistent disposal of oils in this way over a long period of time, will have resulted in a considerable build up of contamination in the soil. The workshops lie on a slope, less than 500m from the lake shore and the potential exists therefore for water pollution at some future date.

2. *Sewage sludge*. There is a health risk from using un-sterilised sewage sludge on domestic vegetable gardens.

3. *Dam safety*. There are currently problems with the dam monitoring equipment, as well as a lack of resources to run the equipment e.g. paper, spares etc. This compromises the safety of the dam. Furthermore, at the time of the visit, the telephones were out of operation (which is the norm) and the engineers at Itezhi Tezhi can only communicate by short-wave radio.

4. *Dam releases*. There appears to be a lack of communication between ZESCO and other government departments e.g. Fisheries and Water Board regarding the release of water from the Itezhi Tezhi dam. At issue is the timing and volume of the releases in relation to fish life cycles. Untimely releases can seriously affect the seasonal catch, thereby affecting the dependent human population, which then has to find other more costly sources of food or face starvation (Plate 6). Similarly, seasonal grazing can also be adversely affected by the dam release strategy, which has repercussions on existing grazing resources and stock condition.

5. *Water supply and sanitation*. The overloaded sewerage system constitutes a health hazard and can cause faecal pollution in the lake and ground water resources if left unchecked. There are also risks associated with the provision of water to the community, when it is not being sampled and analysed for at least, microbiological organisms. The dam lies downstream of the Copperbelt, which contributes a heavy pollution load to the Kafue River in the form of sulphates and heavy metals (copper, cobalt). Although it is thought that most of this pollution load settles out in the river sediments upstream of Itezhi Tezhi, there is a risk of contaminated sediments being swept into the dam under flood conditions.

6. *Asbestos roofs*. Asbestos comprises a health hazard, which increases with age and deterioration of the material. The asbestos roofing materials in the village are a health risk to the inhabitants.

Table 3-1: Summary of Environmental Liabilities at Itezhi Tezhi Dam

Issue	Health risk[a]			Safety risk[b]			Environ-mental risk[c]			Public Relations risk[d]			Financial risk[e]	Compliance[f]
	M	S	P	M	S	P	M	S	P	M	S	P	M	Yes/No/?
Oil disposal	1	1	1	0	0	0	1	2	3	1	1	1	Low	No
Sewage sludge	1	3	3	0	0	0	1	2	3	1	3	1	Low	No
Inadequate sewerage	1	3	3	0	0	0	1	2	3	1	3	1	Low	No
Lack of water quality monitoring	1	3	1	0	0	0	1	1	1	1	1	1	Low	No
Dam safety	3	3	1	3	3	1	3	3	1	3	3	3	Very high	?
Lack of communications re dam releases	2	2	3	2	3	3	2	3	3	2	1	1	Medium	No
Asbestos	1	1	1	0	0	0	0	0	0	0	0	0	Low	No

Notes

a Risk to the health of the general public.
b Risk to the safety of downstream residents.
c Risk of pollution, a loss of biodiversity, a fundamental change in ecosystem functioning beyond the threshold limits of normal occurrence.
d Risk of damage to the corporate name through adverse publicity.
e Risk of significant future capital expenditure to rectify one of the listed liabilities if left unchecked.
f Compliance with local legislation or where this does not exist, with internationally recognised norms and standards of best environmental practice.

Scoring

M Magnitude of the liability: 1 = local; 2 = regional; 3 = national
S Significance of the liability: 1 = low; 2 = medium; 3 = high
P Probability of occurrence: 1 = low; 2 = medium; 3 = high
? Insufficient information available

3.1.3 Recommended Actions

1. *Oil disposal.* All oil-contaminated soil should be excavated and placed into a mini bioreactor, which can be constructed simply and cheaply on site. The bioreactor should comprise either a concrete or plastic-lined cell with a drainage layer and outlet to a sump, equipped with a pump. The cell should be filled with sand and the contaminated material, which should be ploughed or dug in to a depth of 200-300 mm. The material should then be irrigated with water and a nutrient e.g. fertiliser, or compost, to promote bacterial growth. The leachate should be pumped back to the bioreactor pad until such time as all oil has disappeared.

2. *Sewage sludge.* The most cost-effective way to sterilise sewage sludge is to heat it. This can be done by heaping it up in layers with garden waste up to a height of 1-1.5m and then covering the heap with soil. This should be left for approximately 6 months, turned over and then re-covered for another 6 months. The heat build up in the heap is sufficient to kill off all harmful bacteria.

3. *General domestic waste.* An excavation should be dug, with the base well above the high water table level. Waste should be collected at least once per week and deposited in layers in the excavation, nominally compacted and then

612

covered with a thin layer of topsoil. The area should be fenced to prevent the egress of blowing litter. This type of site is not suitable for any kind of hazardous wastes, e.g. PCB oils, waste oil, transformer carcasses, lead-acid batteries etc.

4. *Dam safety and emergency communications.* The monitoring and communication system needs to be upgraded to a system appropriate to Zambian conditions e.g. use of satellite telephones, less dependence on outdated spares and analogue systems. A flood warning system to reach all down stream users should be devised in conjunction with all stakeholders to ensure effective communication of potential floods.

5. *Dam releases.* A cross-sectoral forum should be set up to develop mutually acceptable operating standards regarding the timing and volume of dam releases. This should be initiated by ZESCO. In the case of the Kafue River, it is suggested that a Kafue Catchment Management Agency (KCMA) should be set up following the Kafue Pilot Programme to ensure effective management of land and water resources in the catchment, which plays such a vital role in Zambia's economy. The KCMA would be responsible for allocation of water rights, water quality, dam release strategies, weed control, fisheries and irrigation agriculture.

6. *Asbestos roofs.* It is strongly recommended that a survey should be undertaken to establish the condition of the asbestos roofs in all the houses, and those that are dangerous in terms of exposure to asbestos fibre, should be replaced with IRB sheeting. The old asbestos sheets must be properly disposed of i.e. buried in a site well above the water table to prevent dispersion of fibres.

3.2 Kafue Gorge Upper Hydroelectric Scheme

3.2.1 Brief Description

The Kafue Gorge Upper Hydroelectric Scheme comprises the following elements which are under ZESCO's control:

- the dam and intake structures;
- the power station;
- tailrace;
- workshop and stores;
- village;
- water and sanitation systems;
- waste disposal site;
- offices;
- surrounding environment.

The Kafue Dam is located on the Kafue River some 25km downstream from the road bridge near Kafue Town and some 65km upstream from the confluence of the Kafue with the Zambezi River (Figure 1). The site lies some 230 km downstream from the

613

Itezhi Tezhi dam, separated by the extensive wetlands of the Kafue Flats. The rockfill dam was constructed in the late 1960s in the narrow Kafue gorge, which was soon found to have inadequate storage capacity during the dry season. The dam cannot be raised any further because it would cause unacceptable flooding of the Kafue Flats. The spillway is being upgraded as part of the PRP and investigations are underway regarding the abutment which may be moving.

The biggest problem besetting the dam (as well as power station operation) is the proliferation of water hyacinth (*Eichhornia crassipes*) (Plate 7). This plant is a native of South America and is highly invasive; under optimal conditions, a colony may double every 11-18 days. The weed problem has persisted for over 3 decades, but has worsened in recent years (ECZ, 2000). Dense mats of weed disrupt fishing and recreational activities, and increase water losses through evapo-transpiration. It poses a serious threat to hydroelectric installations through the build up of organic material in the intake system and heat exchangers, which in turn affects the efficiency and availability of the power station. The annual cost of lost generating capacity at Kafue due to the weed problem amounts to over US$850 000 (K3 billion). Thick mats of plant also affect the aquatic environment by reducing light penetration and oxygen levels and by increasing the acidity of the water. It also creates more favourable breeding habitats for mosquitoes (Stirton, 1987).

The removal of weed from the dam and river system used to be the responsibility of a government department, but now ZESCO removes the weed from the dam, at a cost of US$28 570 per annum. One method of removal has been to flush the surface water carrying the weed over the spillway, depositing the weed in the dry river bed below the dam wall. Although there is no flow in this section of the river, except after heavy rains (due to the fact that the tailrace exits further down), this practice is not sound environmentally, as there is a strong risk that the weed will start to infest the relatively weed-free downstream sections of the Kafue and Zambezi Rivers.

The weed thrives on nutrient enriched water and a Nutrient Loading Study was completed by the ECZ in 2000 to quantify the problem and to make recommendations regarding nutrient reduction. The conclusions of this study were:

- the commercial farms in the Mazabuka area contribute large quantities of nutrients to the river;
- the concentrations of nutrients in the discharges from various point sources and in the ground water resources of the area are several orders of magnitude higher than ambient river water levels;
- the nutrient levels are a direct cause of the weed problem, but the weed does perform a water purifying function through the uptake of nutrients from the water;
- the water quality at several of the point source discharge points exceeded the threshold for phosphates, which is considered to be the main growth limiting factor for the weed.

The dam is used for some artisanal fishing and occasional boating. The water supply for the Kafue Dam village is taken from near the headrace.

No comprehensive studies have been conducted on the downstream effects of the Kafue Upper dam on the river ecology. There is an 8km section of dry river bed

614

between the dam wall and the tailrace outlet, which has obviously suffered complete habitat alteration. The effects of a constant stream of water in the river below the tailrace, which does not reflect natural seasonal fluctuations, must be having some negative effects on the ecology, but these have not been quantified.

The power station is located underground, some distance from the dam wall (Plate 8). It comprises 4 x 150MW units which were commissioned in 1972 and 2 x 150MW units added in 1977, giving a total installed capacity of 900MW, utilising the 400m of head in the upper part of the gorge. This power station generates between 50% and 60% of Zambia's power. The station provides both base load and peaking power. At present, ZESCO owns 15% of the water rights of the Kafue River and the water for the power station is free. The chillers in the power station contain CFCs, but these will be replaced as part of the PRP.

The workshops for the power station are located on an area of fill measuring about 200m by 80m, which is located at the top of a hill, far from the dam and presumably the water table. The area includes stores, vehicle workshops, fabrication shops, carpentry shops and electrical workshops. A considerable amount of waste and scrap metal has been dumped within the fenced area, as well as around the perimeter, comprising old oil drums, cables and cable drums, vehicle wrecks, batteries, tyres, scrap metal and packaging materials. An area measuring about 50x50m contains numerous drums of dielectric oil, some of which are leaking (Plate 9). This whole section has been affected by oil spills. Spent oils are stored in drums and are recycled in this area, or else the oil is sent to Distribution for them to use. Waste oil from the vehicle workshop is stored in drums and given to the local community. There are no PCBs at Kafue.

The village has a population of some 5000 people, of which only about 130 are employed in the power station. The rest of the population comprises employees of the hospital, schools, security company, police force, post office, taverns, small shops and a para-military unit which has its base here. The land belongs to ZESCO, except for a small plot owned by the Roman Catholic Church. Most of the buildings and all the services are also ZESCO property. Many of the houses were built as temporary accommodation for the construction workers and thus many are over 30 years old. Most of the houses have asbestos roofs. All residents of the village receive free water, sanitation, maintenance and refuse removal services, while ZESCO employees receive free electricity and a free bus service to Kafue town (Plate 10).

The water supply and sanitation system was also designed and built to cater for the construction camp. While the water treatment plant appeared to be operating effectively, with water samples being taken every 3 months, the state of the reticulation system is poor and leaks are common. The sewerage system is completely inadequate for the current loads and an inspection of the 3 x 2m diameter settling ponds showed minimal inflows, indicating that there must be extensive pipe failures. Raw sewage therefore flows down the natural drainage channels, ultimately reaching the river course. The annual cost of maintenance of the township is estimated to be US$85 714.

615

The rubbish dump is located in a remote area, near the workshops. Some effort has been made to excavate hollows for the waste and some covering with soil has taken place, but there is much wind-blown litter strewn throughout the environment.

The Kafue Power Station is situated in the Zambezi Escarpment zone and the terrain is rugged with deeply incised valleys e.g. the Kafue Gorge. The slopes are steep and therefore the landscape is very vulnerable to erosion. This has been exacerbated by illegal tree felling for firewood and charcoal production (Plate 8). Accelerated erosion can have a serious impact on the future storage capacity of the dam and is therefore of great concern to ZESCO. In order to try and rectify the situation, ZESCO planted 300 trees in August 2000 and future tree planting programmes are planned. The power station management actively tries to prevent deforestation within the ZESCO property, including a prohibition on land clearance for agriculture, except with special permission.

3.2.2 Environmental Liabilities

The main environmental liabilities at Kafue Gorge are:

1. *Water hyacinth.* The high nutrient load in the Kafue River, caused by non-ZESCO activities results in the proliferation of this weed, which in turn, has a major effect on the efficient operation of the power station, incurs high maintenance costs and has potentially significant risks for the downstream ecology.

2. *Soil contamination* from the disposal of all oils, lubricants and other hydrocarbons onto the ground. The area affected measures some 2500m^2, and the persistent disposal of oils in this way over a long period of time, will have resulted in a considerable build up of contamination in the soil. Although this area of contamination is far from the dam and the ground water table, it represents an persistent source of pollution of infiltrating rain water.

3. *CFCs.* The chillers containing CFCs will be replaced as part of the PRP, and will therefore cease to be a liability.

4. *Water supply and sanitation.* The overloaded and broken sewerage system constitutes a health hazard and is causing faecal pollution in the streams and ground water resources. There are also risks associated with the provision of water to the community.

5. *Asbestos roofs.* Asbestos comprises a health hazard, which increases with age and deterioration of the material. The asbestos roofing materials in the village are old and are in poor condition and it is suspected that there is a health risk to the inhabitants.

6. *Deforestation.* The proximity of Kafue Gorge to the urban centres of Kafue and Lusaka, where woodfuel comprises some 84% of household energy needs, means that there is increasing pressure on the forest resources of this area. The steep slopes of the catchment area of the dam are highly susceptible to

616

erosion and therefore there is a potential risk to both the environment in general and the storage capacity of the Kafue dam in particular.

7. *Waste and scrap metal disposal.* The current methods of disposal of domestic and industrial wastes are poor and these wastes constitute a health risk and are causing environmental pollution at a local level.

Table 3-2: Summary of Environmental Liabilities at Kafue Gorge Upper Hydroelectric Scheme

Issue	Health risk[a]			Safety risk[b]			Environ-mental risk[c]			Public Relations risk[d]			Financial risk[e]	Compliance[f]
	M	S	P	M	S	P	M	S	P	M	S	P	M	Yes/No/?
Water hyacinth	0	0	0	0	0	0	3	3	3	3	1	2	High	?
Soil contamination	1	1	1	0	0	0	1	1	1	0	0	0	Low	No
CFCs	0	0	0	0	0	0	1	1	1	0	0	0	Medium	Yes
Water supply and sanitation	1	3	3	0	0	0	1	3	3	2	2	1	Medium	No
Asbestos	1	3	3	0	0	0	0	0	0	1	1	1	Low	No
Deforestation	0	0	0	0	0	0	1	2	2	0	0	0	Med -high	?
Waste disposal	1	1	1	0	0	0	1	1	1	0	0	0	Low	No

Notes

a Risk to the health of the general public.
b Risk to the safety of downstream residents.
c Risk of pollution, a loss of biodiversity, a fundamental change in ecosystem functioning beyond the threshold limits of normal occurrence.
d Risk of damage to the corporate name through adverse publicity.
e Risk of significant future capital expenditure to rectify one of the listed liabilities if left unchecked.
f Compliance with local legislation or where this does not exist, with internationally recognised norms and standards of best environmental practice.

Scoring

M Magnitude of the liability: 1 = local; 2 = regional; 3 = national
S Significance of the liability: 1 = low; 2 = medium; 3 = high
P Probability of occurrence: 1 = low; 2 = medium; 3 = high
? Insufficient information available

3.2.3 Recommended Actions

In order to mitigate some of the risks and impacts described above, the following actions are recommended

1. *Water hyacinth.* The Nutrient Loading Study report recommended that the nutrient loading reduction programme should be given priority by the ECZ. Furthermore, it is suggested that a Kafue Catchment Management Agency (KCMA) should be set up to ensure effective management of land and water resources in the catchment, which plays such a vital role in Zambia's economy. The KCMA would be responsible for *inter alia* weed control, water quality management, allocation of water rights, dam release strategies, fisheries and irrigation agriculture.

2. *Oil disposal.* All oil-contaminated soil should be excavated and placed into a mini bioreactor, which can be constructed simply and cheaply on site. The bioreactor should comprise either a concrete or plastic-lined cell with a

617

drainage layer and outlet to a sump, equipped with a pump. The cell should be filled with sand and the contaminated material, which should be ploughed or dug in to a depth of 200-300 mm. The material should then be irrigated with water and a nutrient e.g. fertiliser or compost, to promote bacterial growth. The leachate should be pumped back to the bioreactor pad until such time as all oil has disappeared.

3. *CFCs.* These will be replaced as part of the PRP.

4. *Village services.* There is a high risk to ZESCO in providing these services and they are costly non-core functions. Given the size of the village and the number of non-ZESCO residents, it is recommended that the houses and land should be sold to the current residents and that a local council should be established, which will administer the running of the village on a more commercial footing, with payment for rates and services. The Council would then take responsibility for providing clean water, a safe sewerage system and a better controlled waste management system.

5. *General domestic waste.* An excavation should be dug, with the base well above the high water table level. Waste should be collected at least once per week and deposited in layers in the excavation, nominally compacted and then covered with a thin layer of topsoil. The area should be fenced to prevent the egress of blowing litter. This type of site is not suitable for any kind of hazardous wastes, e.g. PCB oils, waste oil, transformer carcasses, lead-acid batteries etc.

6. *Asbestos roofs.* It is strongly recommended that a survey should be undertaken to establish the condition of the asbestos roofs in all the houses, and those that are dangerous in terms of exposure to asbestos fibre, should be replaced with corrugated iron sheeting. The old asbestos sheets must be properly disposed of i.e. buried in a site well above the water table to prevent dispersion of fibres.

7. *Deforestation.* There is a Government Forestry office in the village, which is responsible for the issuing of permits for charcoal burning. There needs to be a high degree of co-operation between this office and the power station managers to ensure that government policy is properly enforced in the dam catchment.

3.3 PCB Storage Facilities

3.3.1 Brief Description

The Kariba North Bank power station does not belong to ZESCO, but it was included in the PRP, which is being managed by ZESCO. In the course of the investigations into the scope of work for the PRP at KNBC, a number of transformers containing PCB oils were identified, as well as drums containing PCB oils. However, there is no funding available under the PRP for the ultimate safe disposal of these contaminated materials. Therefore a safe site was required to temporarily store these wastes until

such time as funding became available for disposal. ZESCO agreed to participate in a site selection study, funded by CIDA, and to take responsibility for the construction and operation of the storage facility.

A multi-disciplinary team identified a site on KNBC land, which best complied with the site selection criteria that were set, based on engineering, environmental and socio-economic grounds. The site lies 400m away from the nearest settlement and 50m from the lake shore, on a high, well-drained piece of ground, with easy access to roads, water supply and electricity.

Site construction is nearing completion and has been hailed as 'the first of its kind in Africa' (Watts On, 2000). It has been built according to international standards and has all the required security measures such as fire fighting equipment, guardhouse, 24 hour phone connection, security fence, warning signs and specially constructed storage areas. The drained transformer carcasses will be stored under cover on a concrete slab, which has been coated with a PCB-resistant epoxy coating (Plate 12). The slab is bunded and has an associated internal drainage system. Drums and capacitors containing PCBs will be stored in sea containers, which will be specially adapted to ensure that they are leak-proof. The containers will stand on concrete plinths (Plate 13). The site measures 70 x 50m and has sufficient room to store the 30 contaminated transformer carcasses and the 16 drums which will be removed from the KNBC power station, as well as other PCBs from the southern part of the country.

A similar facility is planned for the Copperbelt, to cater for the PCBs from that region. A suitable site adjacent to the Luano sub-station has been identified and plans drawn up, but construction has not yet commenced.

A quotation has been obtained (in 1998) for out-of-country disposal of the KNBC PCBs at a special incineration facility in Finland. The total cost was estimated to be US$292 300, but apparently there are other companies and incinerators in Europe which are less costly.

3.3.2 Environmental Liabilities

Poly-chlorinated biphenyl compounds (PCBs) are synthetic organic compounds, that were added for many years to dielectric oils as a coolant, due to their special properties such as stability, lack of corrosiveness, limited volatilisation and solubility. However, PCBs have since been found to be highly hazardous to humans and wildlife and are responsible for reproductive failure, disruption of normal biological functioning and are a suspected carcinogen. Because they do not degrade, they persist in tissues and organs and are passed up the food chain. PCBs can escape into the environment either through leakages from drums and transformers, or in very poor economies, such as in Zambia, the oil is drained from the transformers and used as cooking oil, a skin lightening substance and hair oil.

The uncontrolled storage and disposal of PCB oils, contaminated transformer carcasses and capacitors therefore presents a major health and environmental risk. By assuming responsibility for the management of the storage facilities and ongoing monitoring, ZESCO becomes responsible for any liabilities relating to these sites.

Table 3-3: Summary of Environmental Liabilities of PCBs

Issue	Health risk[a]			Safety risk[b]			Environ-mental risk[c]			Public Relations risk[d]			Financial risk[e]	Compliance[f]
	M	S	P	M	S	P	M	S	P	M	S	P	M	Yes/No/?
Random dumping in unlicensed sites	3	3	3	0	0	0	3	3	3	3	3	3	High	No
Controlled storage in licensed sites	1	3	1	0	0	0	1	3	1	1	1	1	Medium	Yes
Vandalism (lack of policing)	3	3	3	0	0	0	3	3	3	3	3	3	High	No

Notes

a Risk to the health of the general public.
b Risk to the safety of downstream residents.
c Risk of pollution, a loss of biodiversity, a fundamental change in ecosystem functioning beyond the threshold limits of normal occurrence.
d Risk of damage to the corporate name through adverse publicity.
e Risk of significant future capital expenditure to rectify one of the listed liabilities if left unchecked.
f Compliance with local legislation or where this does not exist, with internationally recognised norms and standards of best environmental practice.

Scoring

M Magnitude of the liability: 1 = local; 2 = regional; 3 = national
S Significance of the liability: 1 = low; 2 = medium; 3 = high
P Probability of occurrence: 1 = low; 2 = medium; 3 = high

3.3.3 Recommended Actions

An impressive start has been made by ZESCO and the ECZ in doing a country-wide inventory of all PCBs and in the construction of the KNBC temporary storage facility. The Luano site needs to be constructed as a matter of urgency and all PCBs in the country need to be stored at one of these sites until funding can be found for disposal.

ZESCO has a policy in place to only use PCB-free dielectric oils and all new oil consignments are tested for PCBs.

ZESCO produced a Project Brief for the KNBC storage facility, according to the Environmental Regulations and the company has committed to a monitoring programme at the site. This involves weekly inspections for leaks for the first three months after receiving PCBs, and then monthly for the next 12 months and thereafter on a quarterly basis.

There are ongoing discussions between Eskom of South Africa and PCB disposal technology companies. The southern African market is not big enough to economically justify a dedicated incinerator, but a feasibility study is underway looking at plasma arc technology. A regional disposal site may become a reality in 2-3 years time, which would reduce the cost of disposal (pers.comm. H van Tonder, Eskom). There therefore needs to be close liaison with Eskom on this matter.

620

3.4 Victoria Falls Power Station

3.4.1 Brief Description

The Victoria Falls Power Station is situated on the north bank of the Zambezi River, approximately 6km from Livingstone and 1km from the town of Victoria Falls (Figure 1). The facility comprises three power stations situated in the gorge, downstream of the falls.

There are 2 inlet structures located on a side channel on the north bank of the river, immediately upstream of the falls (Plate 14). One feeds the 60MW Station B and the other supplies Stations A and C (Plate 15). Each intake has 2 radial gates and screen rakes to remove debris. The power station is entitled to a maximum of 170 m^3/s of water or 50% of flows, whichever is greater, free of charge, but the historical maximum utilisation, with the power station running at full capacity, is $117m^3/s$. During low flow periods i.e. less than $200m^3/s$, the power station only diverts $40m^3/s$. The excavation of the diversion channel and the power station consumption of water has been blamed for the drying up of the eastern (Zambian) falls during the dry season (Plate 16). Historical evidence suggests that the power station abstraction does have a negative effect on the eastern cataract when flows are between $200\text{-}400m^3/s$ (a period of some 60 days per year), but below $200m^3/s$, the eastern cataract dries up anyway. This is due to the fact that the river bed tilts towards Zimbabwe and that the crest of the Devil's Cataract (at the western end) is lower than the rest of the falls (Komex, 1997).

ZESCO are experiencing increasing problems with water hyacinth, which clogs the water inlets and causes a build up of organic matter in the heat exchangers of the power station. The source of the problem is an uncontrolled discharge of sewage into the Maramba stream, which has its confluence with the Zambezi just upstream of the intakes. The weed infestations usually only occurred immediately after the first rains, but the problem is becoming more persistent throughout the year. At present, a rudimentary boom of drums has been placed above the intakes to direct the weed away, but it is not too efficient and some weed gets through (Plate 17). One of the components of the PRP is to install a better boom and provide a small raft for hand removal of the weed.

The weed and any other debris and sediment which gets into the intake is removed via the scour siphon, which is a 30" pipe discharging to a manhole and then through an excavated tunnel to the eastern end of the falls. The siphon discharge ranges from $1.5 - 4m^3/s$ depending on the intake. The discharge point was originally supposed to have been carried back to the face of the falls, but during construction a decision was made to route the siphon discharge down a gully at the eastern end of the falls, destroying a stairway in the process (Plates 14 & 18). The noise from this 'man-made' waterfall adds to the aesthetics of the walk along the knife-edge, especially when the eastern cataract is otherwise dry. During the refurbishment design, the scour siphon will be redesigned to discharge water into the Palm Grove gully at the end of Second Gorge (Plates 14 & 19). At present, this gully is used extensively by rafters to gain access to the Boiling Pot launching spot and it contains a number of large specimens of palms and other sub-tropical trees. Discharging the siphon to this gully

621

will require significant civil works along the path to provide bridges and re-alignment of footpaths. It would probably render the Boiling Pot area unsuitable for raft launching, and it would reduce the sound of falling water currently experienced along the knife edge trail, thus diminishing the tourist experience. The decision to move this siphon should be re-considered.

From the intakes, water is channelled in canals to the headrace tunnels and penstocks above the power station. The stations utilise a head of 107m. The three stations are located at Silent Pool at the end of Third Gorge (Plate 20). Station details are as follows:

Name	Date commissioned	No and size of turbines	Total capacity	Discharge volumes m^3/s	Historical availability	Availability after PRP
Station A	1938, 1954, 1959	2 x 1MW 2 x 3MW	8MW	10.95	65%	90%
Station B	1968	6 x 10MW	60MW	63.9	75%	90%
Station C	1972	4 x 10MW	40MW	42.6	80%	90%

Stations A and C are above-ground structures and Station B is underground. The total generating capacity is 108MW, with an expected power output after PRP, of 750GWh. The power station land is owned by the local council and ZESCO has a 99 year lease, but no records could be found during the visit to indicate the date of expiry of this lease. No CFCs are used in the power station. The tailraces discharge immediately below the power houses into the river (Plate 20). The sewage from the power station is discharged directly into the river. Access to the power stations is by a service trolley for all personnel, materials and equipment; waste is hauled out (Plate 21).

Power is transmitted from the power station via overhead cables and cables in pipes (Plate 21) to a switchyard on surface, from where power is sent to:

- Livingstone and Choma (33kV)
- Sesheke, Western Province and Katima Mulilo in Namibia (currently 66kV, but to be augmented by a 132kV transmission line)
- the national grid (220kV) (Figure 1).

Power exports comprise 1.5-2MW to Botswana at Kazangula and 6MW to Namibia at Katima Mulilo. There are no exports to Zimbabwe, but the station is on standby to provide power in the event of transmission failures in Zimbabwe.

The switch yard appeared clean with no visible oil spills. The transformers are PCB-free, but old and will be replaced, together with the circuit breakers, as part of PRP.

The workshops include a vehicle workshop, machining/welding shop, carpentry shop and electrical workshop, all in a single closed building. The floor of the building is concreted and there is a concrete-lined storm water drainage system around the perimeter. The oil is stored in a separate, locked building on a concrete slab. There is no bunding and no drip trays were evident to collect spills during oil transfer, but sawdust was available for soaking up spilt oil. There was a strong smell of oil and it

622

is suspected that the entire area around the oil store has been heavily contaminated by oil.

There is no proper demarcated area for scrap and waste disposal, with this material being dumped alongside a small rough track leading from the workshops to the filling station. The waste includes: old transformers (some of which were leaking badly), old asbestos roofing material, cables, rubble, glass and oil drums (Plate 22). The filling station is serviced by BP. There are 2 underground storage tanks, one for diesel and one for petrol. Both are single sheet metal tanks, but recent investigations showed that no leakage is occurring. However, some spills have occurred during vehicle filling.

The staff compound comprises three sections: senior staff housing with 19 units, which was built in 1972; two sections of junior staff housing, one with 30 blocks and one with 33 blocks of slightly larger dwellings, built in the late 1960s/early 1970s (Plate 23). All the buildings have asbestos roofs. The compound contains a primary school, club, clinic, church and a small market. The compound houses all the generation and transmission employees, numbering 119, and their families, as well as National Parks and Wildlife staff, immigration staff, and teachers at the local school. The total population is estimated to be 1300, with an average household size of 7 persons. All residents are supplied with water, sewerage, refuse removal, building maintenance, bus service to Livingstone and electricity free of charge. The water and sanitation system is adequate for the compound. Water is abstracted from the feeder canal, passed through rapid sand filters and chlorinated prior to reticulation. The sewage reports to septic tanks, which are pumped out by the Council on a regular basis. The rubbish is mostly removed by ZESCO to the municipal dump once per week, but there was a lot of litter lying around and some gets burnt within the compound.

3.4.2 Environmental Liabilities

There are a number of environmental liabilities at Victoria Falls Power Station, some of which relate to its position a) in relation to the World Heritage Site of Victoria Falls and b) its position within the Mosi-oa-Tunya National Park.

1. *World Heritage Site*. Zambia is a signatory to the World Heritage Convention, and the Zambian and Zimbabwean Governments jointly listed the Victoria Falls as a World Heritage Site for the following reasons:

   - an outstanding example of a major stage in the Earth's evolutionary history;
   - an outstanding example of significant ongoing geological processes; and
   - an area of natural beauty.

   The Victoria Falls is considered to be one of the seven natural wonders of the world, and it attracts world-wide tourism. There is however, as strong perception amongst the tourists and tour operators that the power station is 'stealing all the water from the Eastern cataract' and several letters to this effect have been received by ZESCO and the Minister.

623

2. *Mosi-oa-Tunya National Park.* The ecological importance of the habitats surrounding the Falls is acknowledged through the presence of the Zambezi National Park and the Victoria Falls National Park in Zimbabwe and the Mosi-oa-Tunya National Park in Zambia. The power station, staff compound and offices all lie within the Mosi-oa-Tunya Park, which was gazetted in 1972, after the power station had been built. The management objectives of the Park are to keep the immediate surroundings of the Falls free from further inappropriate development, but there is increasing pressure to develop the ZESCO site for tourism. Conversion of some of the old buildings to tourist accommodation, with the non-essential ZESCO employees moving to Livingstone would open up this area for tourism. It would also have the benefit of:

   - lower human occupation on the edge of the Falls;
   - protection and maintenance of the surrounding areas in a natural state through access and activity controls;
   - movement of the economically-active population to Livingstone.

3. *Land degradation.* The power station has been operating since 1938, which has resulted in land degradation and deforestation over a wide area. This has caused significant erosion in places. The entire site has a negative environmental impact from the road and from the air.

4. *Waste management.* Part of the visual impact of the ZESCO site is caused by the lack of waste management. Litter is strewn over the area and industrial wastes have been dumped randomly in the area behind the workshop. Some of these wastes are potentially harmful to health and the environment, such as asbestos waste and transformer oils.

5. *Contaminated soil.* Soil contaminated with hydrocarbons is limited to the areas immediately around the oil store, the filling station and the workshops.

6. *Water hyacinth.* The nutrient loads in the Maramba stream are clearly increasing, causing an infestation of water hyacinth. This is posing an increasing risk to efficient power station functioning, due to clogging of the heat exchangers, and the annual cost of maintenance is also rising.

7. *Asbestos.* Almost all the houses in the compound have asbestos roofs. Asbestos fibres are extremely fine and can be inhaled. A build-up of fibre in the lungs can lead to asbestosis, which is a degenerative lung disease which can be fatal.

624

Table 3-4: Summary of Environmental Liabilities at the Victoria Falls Power Station

Issue	Health risk[a]			Safety risk[b]			Environ-mental risk[c]			Public Relations risk[d]			Financial risk[e]	Compliance[f]
	M	S	P	M	S	P	M	S	P	M	S	P	M	Yes/No/?
World Heritage Site	0	0	0	0	0	0	0	0	0	3	3	2	High	No
National Park	0	0	0	0	0	0	0	0	0	3	3	2	Medium	No
Land degradation	0	0	0	0	0	0	1	2	2	1	3	2	Medium	No
Waste management	1	1	1	0	0	0	1	1	1	0	0	0	Low	No
Contaminated soil	0	0	0	0	0	0	1	1	1	0	0	0	Low	No
Water hyacinth	0	0	0	0	0	0	0	0	0	0	0	0	High	?
Asbestos	1	1	1	0	0	0	0	0	0	1	1	1	Low	No

Notes

a Risk to the health of the general public.
b Risk to the safety of downstream residents.
c Risk of pollution, a loss of biodiversity, a fundamental change in ecosystem functioning beyond the threshold limits of normal occurrence.
d Risk of damage to the corporate name through adverse publicity.
e Risk of significant future capital expenditure to rectify one of the listed liabilities if left unchecked.
f Compliance with local legislation or where this does not exist, with internationally recognised norms and standards of best environmental practice.

Scoring

M Magnitude of the liability: 1 = local; 2 = regional; 3 = national
S Significance of the liability: 1 = low; 2 = medium; 3 = high
P Probability of occurrence: 1 = low; 2 = medium; 3 = high
? Insufficient information available

3.4.3 Recommended Actions

There are a number of proposed mitigation measures that have either been suggested in the Victoria Falls Environmental Assessment (Komex, 1997), or as a result of this Task 6 assignment.

1. *The Environmental Protection Plan.* This plan, devised by Komex (1997), comprises several initiatives, which are described in detail in the 1997 report and summarised as follows:

   - development and implementation of a waste management and site restoration programme to mitigate ZESCO's historical effects on the National Park;
   - relocation of the majority of staff houses to Livingstone, with conversion of some units to medium class tourist accommodation;
   - relocation of the 48MW intake scour siphon discharge and reconstruction of the original steps to the base of the Falls (although this author believes that this Plan should be reconsidered);
   - development of the 1938 8MW power station (Station B) into a museum and interpretative centre showing the history of power generation at Victoria Falls. There is an ideal place for a tea room next to Station B with spectacular views of the gorges (Plate 24). This would be accessed by a reconstructed service trolley or tram (Plate 21);

625

- establishment of a Foundation for the Enhancement of the Mosi-oa-Tunya National Park; and
- initiation of a monitoring and auditing programme by the ESU to track project progress and implementation of environmental and socio-economic initiatives.

2. *Water management plan.* The Victoria Falls Power Station has an effect on water flows over the Eastern Cataract when flows are between 200-400m^3/s. In order to mitigate this, there have been suggestions to limit power generation during the low flow periods. However, an economic analysis of this operational scenario shows that the loss for shutting the plant down for an 8 week period for 10 hours per day, would be US$1.95 million. To offset this revenue, it was calculated that an additional 12 290 tourists per year would be required to visit Zambia, spending $159 per day. It would also mean that the whole of the Western Province, Livingstone and all towns up to the Muzuma Substation would be without power for parts of the day or night. It is therefore necessary to conduct a detailed hydrological study to provide the basic data to assess stream flows pre- and post canal development. Furthermore, water management has become a problem for ZESCO due to repair and maintenance problems associated with the headwork and canal systems. In many cases, water is spilled during maintenance and repairs, which could have been diverted to the Eastern Cataract to enhance the value of the Falls for visitors. The refurbishment programme will include repair of these structures, allowing station operators to minimise spillway use during river flow levels between 200-400m^3/s, and maximise flow over the Falls.

3. *Waste management.* The Komex report (1997) and the recommendations from this Task 6 report identify the following actions:

   - all waste materials including household and industrial wastes to be cleaned up and dumped at the municipal dump;
   - the municipal dump requires better management or the existing dump should be closed and a new, better located facility should be found;
   - oil-contaminated soil should be picked up and removed from site. The soil should be treated in a mini bioreactor, as described in section 3.1.1 above;
   - all existing waste disposal sites within the National Park must be closed and rehabilitated to a natural state;
   - development of an environmental awareness programme for those staff who will continue to remain in the National Park and those who will work there, pertaining to their responsibilities in a National Park in general, and waste management in particular.

4. *Land rehabilitation.* The areas which have been damaged by past activities, including those housing areas which will be knocked down, need to be contoured, with field drains installed where necessary and rehabilitated with indigenous grass, shrub and tree species.

5. *Water hyacinth.* ZESCO needs to initiate discussions with the Livingstone City Council to conduct a study into nutrient loading in the Maramba stream and other upstream point sources of nutrients, to determine the sources of

626

pollution. Once this has been done, it will be possible to try and eliminate the nutrients at source, but this will need the co-operation of the Council. As a parallel measure, the PRP will include the construction of a more effective boom and a raft for manual removal of the weed.

6. *Asbestos roofs.* A survey should be conducted of the staff houses that will remain to check the state of the asbestos roofs. All old and damaged roofs should be replaced with corrugated iron sheeting or other roofing material. The houses that will be refurbished for tourists should have their roofs replaced. The asbestos roof material on the structures that will be knocked down must be dumped in a properly controlled site and buried under a thick layer of soil to prevent the egress of fibres.

3.5 Small Hydroelectric Schemes

3.5.1 Brief Description

ZESCO owns four small hydroelectric schemes, all of which are located in the Northern Province (Figure 1).

Name	Catchment	Installed capacity (MW)	Available capacity (MW)	Year of commission
Lusiwasi	Luangwa	12	12	1970-75
Chishimba Falls	Chambishi	6	6	1969
Lunzua River	Lunzua	0.75	0.75	1960
Musonda Falls	Luapula	5	5	1960

These stations used to be isolated from the national grid, but this was rectified in 1994, when they were integrated into the grid via Serenje Substation. Together these small hydros only contribute 23.75MW or 1.4% of the total power generation, but all four stations are being considered for future expansion (see section 5.5) (Komex, 1995).

None of the sites could be visited in the time available for this study, due to their remote location and poor infrastructure. The following discussion is therefore based on discussions with relevant personnel and a review of the available literature.

Musonda Falls. This dam provides an important source of income and protein from the artisanal fisheries that it supports, with little impact on the downstream fish resources of the Luapula River. However, the dam is small and is rapidly silting up due to the amount of settlement that has occurred in the catchment and the concomitant deforestation.

Lusiwasi. This scheme has a large dam on one of the tributaries of the Luangwa River and its supports commercial fishing ventures.

Chishimba Falls. This dam suffers from leakages and is also silting up due to poor catchment management. It does not have an impact on downstream fisheries potential.

627

3.5.2 Environmental Liabilities

There were contradicting reports regarding the presence of bilharzia in the dams of the small hydro schemes.

Table 3.5: Summary of Environmental Liabilities at the Small Hydro Schemes

Issue	Health risk[a]			Safety risk[b]			Environ-mental risk[c]			Public Relations risk[d]			Financial risk[e]	Compliance[f]
	M	S	P	M	S	P	M	S	P	M	S	P	M	Yes/No/?
Bilharzia	1	2	3	0	0	0	0	0	0	0	0	0	Low	?
Leakage in dam walls	0	0	0	2	3	1	2	3	1	3	3	1	High	?
Erosion	0	0	0	0	0	0	1	2	2	0	0	0	Low	?
Siltation of dams	0	0	0	1	1	1	0	0	0	0	0	0	High	?

Notes

a Risk to the health of the general public.
b Risk to the safety of downstream residents.
c Risk of pollution, a loss of biodiversity, a fundamental change in ecosystem functioning beyond the threshold limits of normal occurrence.
d Risk of damage to the corporate name through adverse publicity.
e Risk of significant future capital expenditure to rectify one of the listed liabilities if left unchecked.
f Compliance with local legislation or where this does not exist, with internationally recognised norms and standards of best environmental practice.

Scoring

M Magnitude of the liability: 1 = local; 2 = regional; 3 = national
S Significance of the liability: 1 = low; 2 = medium; 3 = high
P Probability of occurrence: 1 = low; 2 = medium; 3 = high
? Insufficient information available

3.5.3 Recommended Actions

1. *Lack of knowledge of environmental impacts.* In view of the fact that all of these schemes are being considered for future expansion, it will be necessary to conduct EIAs on each scheme, in order to determine the impact that they have had on the immediate catchment area of the dam basin, downstream ecology and social impacts. This information will be useful for developing mitigation measures and for guiding future development.

2. *Sedimentation.* This is a difficult problem to reverse in the short-term and requires a concerted effort by all relevant government departments and local authorities to implement an integrated catchment management programme. This should address issues such as afforestation, a moratorium on land clearance, contour farming practices, mandatory fallow periods, a limit on stock numbers grazing in the catchment, a moratorium on settlement in the immediate catchment area and even the construction of small silt catch dams above the dam.

3. *Promotion of multiple uses.* The dams should be considered for multiple uses to maximise the use of the water, e.g. for fishing, irrigated agriculture downstream and water supply.

628

3.6 *Diesel Power Schemes*

3.6.1 Brief Description

There are several small power plants fuelled by diesel in the rural areas. These are primarily located in the North-west and Northern provinces, with isolated stations in the Southern and Eastern provinces (Figure 1). The diesel is imported into the country from Tanzania and is distributed to the small diesel plants via road tanker from the Indeni refinery at Ndola. Most of these small plants are old and have passed their normal service life. Together they only produce 0.2% of the power generated in the country. They have very high operating costs with a very low income and are therefore operating at a loss.

All of the sites have been visited by the ESU and this report is based on discussions with ESU staff and an examination of available photographs. This discussion, therefore is not inclusive of all diesel power plants.

Kabompo. The inside of the power house appears quite clean, but some soil contamination is evident around the outside of the building. There are 3 ASTs which are bunded with concrete, but spillage has occurred on the ground outside of the bunded area (Plate 25).

Kaoma. The inside looks very clean, but according to the Dept of Fisheries, diesel is spilling into nearby fish ponds and into the Luena River, where is it having a negative impact on fish stock.

Kasempa. Although the interior of the power house appears quite clean and the building appears structurally sound, the soil around the plant is contaminated with oil and there is oil flowing freely in the unlined ditch.

Lukulu. The building appears to be old and is in very poor condition (Plate 26). Oil has soaked into the walls and most of the ground outside the building is contaminated with oil. There is an unlined ditch containing flowing oil. The power plant also causes air pollution. There are 4 ASTs on concrete plinths, but the area is unbunded.

Mufumbwe. The interior looks reasonably new and is in a clean condition. There is one AST on concrete plinths which may be bunded.

Zambezi. This older plant appears to be causing serious air pollution and the ground is extensively contaminated (Plates 27 & 28). There are 3 ASTs, all inside a concrete bund wall, but some spillage has occurred outside the bunded area. There is a small scrap yard containing drums, tyres, cables and scrap metal.

Mwinilunga. The interior and exterior of the building appears to be in reasonable condition, but the oil ditch shows that soil contamination has occurred. This power plant also has a scrap yard containing old machine parts and equipment.

Luangwa. The power house is old and soil contamination is extensive. The ESU has embarked on a rehabilitation programme for the diesel plants, starting here at Luangwa, with the construction of oil interceptors (Plate 29). There are 3 ASTs, but the photographs do not show if they are bunded or not.

3.6.2 Environmental Liabilities

1. *Oil pollution.* It is clear from the above descriptions that oil pollution is a major liability at these sites and several water courses have been contaminated as a result of uncontrolled discharges. Hydrocarbon pollution affects fish life expectancy and reproductive cycles. It also is one of the main consumers of oxygen in the water, reducing its availability for aquatic life.

2. *Soil contamination.* Even if the source of oil is stopped, the soil surrounding most of these power plants is so contaminated that rainfall runoff will continue to be affected for many years, washing oil continuously into the nearest water course.

3. *Air emissions.* The magnitude of this problem is not known, but it is likely that there are local effects on vegetation and human health.

Table 3.6: Summary of Environmental Liabilities at most of the Diesel Power Stations

Issue	Health risk[a]			Safety risk[b]			Environ-mental risk[c]			PR risk[d]			Financial risk[e]	Compliance[f]
	M	S	P	M	S	P	M	S	P	M	S	P	M	Yes/No/?
Oil pollution	1	1	2	0	0	0	1	3	3	0	0	0	Medium	No
Oil-contaminated soil	1	3	3	0	0	0	1	3	3	0	0	0	Medium	No
Air emissions	1	1	2	0	0	0	1	1	1	0	0	0	?	?

Notes
- a Risk to the health of the general public.
- b Risk to the safety of downstream residents.
- c Risk of pollution, a loss of biodiversity, a fundamental change in ecosystem functioning beyond the threshold limits of normal occurrence.
- d Risk of damage to the corporate name through adverse publicity.
- e Risk of significant future capital expenditure to rectify one of the listed liabilities if left unchecked.
- f Compliance with local legislation or where this does not exist, with internationally recognised norms and standards of best environmental practice.

Scoring
- M Magnitude of the liability: 1 = local; 2 = regional; 3 = national
- S Significance of the liability: 1 = low; 2 = medium; 3 = high
- P Probability of occurrence: 1 = low; 2 = medium; 3 = high
- ? Insufficient information available

3.6.3 Recommended Actions

1. *Oil pollution.* The rehabilitation programme initiated by the ESU to construct oil interceptors at all the diesel plants should be continued as a matter of priority to prevent any further pollution.

630

2. *Oil-contaminated soil.* All oil-contaminated soil should be excavated and placed into a mini bioreactor, which can be constructed simply and cheaply on site. The bioreactor should comprise either a concrete or plastic-lined cell with a drainage layer and outlet to a sump, equipped with a pump. The cell should be filled with sand and the contaminated material, which should be ploughed or dug in to a depth of 200-300 mm. The material should then be irrigated with water and a nutrient e.g. fertiliser to promote bacterial growth. The leachate should be pumped back to the bioreactor pad until such time as all oil has disappeared.

3. *Air emissions.* It is not sure what is causing air pollution, but most probably, it can be attributed to old equipment and lack of money to properly maintain the generators. Replacement of old equipment and routine maintenance would probably solve this problem, as well as making the power plants more efficient.

4. *Waste disposal.* All non-toxic waste should either be removed by scrap metal dealers, or it should be dumped into the local dump.

3.7 Lusaka Workshop and Stores

3.7.1 Brief Description

The Lusaka Workshop and Stores is located next to the old thermal power station and adjacent to ZESCO's Head Office in central Lusaka. The area comprises:

- the transformer workshop and transformer scrap yard;
- the fabrication workshop;
- the vehicle workshop;
- filling station;
- stores;
- storm water drainage system.

This workshop and stores provides supplies and services to the Western, Southern, Lusaka, Central and Eastern Provinces.

Approximately 90% of all transformers in Zambia come to this workshop for repair. Those that are irreparable are dumped in the yard. Several hundred transformer carcasses are located here, covering a large area (Plate 30). Most of these have burnt out after having been vandalised by people draining out the oil. Many of the older transformers contain, or used to contain PCBs. In the workshop, new transformers are tested before being put into operation and checked for PCBs. Old transformers in for repair are drained in the workshop and the oil is recycled via an unbunded tank, filtered and re-used. The general waste from this workshop, which comprises oily rags, filters, sawdust, office waste etc, is either sent to the municipal dump, or it is burnt in the yard. The workshop floor was very oily and many oil spills had occurred on the ground outside.

Several oil spillages were evident in and around the vehicle workshop, as well as many wrecked vehicles. Waste fuel oil is collected in drums and given to ZESCO employees.

The filling station is owned by BP, who check the integrity of the underground storage tanks (USTs) twice per year (this was later verified by a BP auditor). There are 2 petrol USTs and 2 diesel USTs, which are single walled tanks, but no leaks have ever been detected.

The stores area is divided into an outdoor and closed section. The outside stores area is situated on the old coal stockpile site (of the old thermal power station). A layer of coal is still evident, but its thickness and potential for pollution is unknown. New sealed transformers, insulators, parts, mineral oil, lubricants, cables and creosoted wooden poles are stored in this area. Small parts, office supplies, equipment and furniture are stored undercover.

The entire site drains into a concrete lined storm water drain, which ultimately drains into the natural water course. A thin film of oil was evident on the water in the drain, but it could come from any number of sources upstream, as well as from the workshop area. The drains were completely blocked, but drain maintenance is the responsibility of the city council.

3.7.2 Environmental Liabilities

1. *PCB-contaminated oils and transformer carcasses.* These are a major hazard to human health and the environment (see section 3.3.2). The inventory conducted by the ESU and ECZ has identified all PCBs on this site, but urgent action is required to remove them to safe storage. Soils impregnated with PCB oils will constitute an ongoing source of pollution.

2. *Oil-contaminated soil.* In addition to the soils contaminated with PCBs, large sections of the site have been contaminated with various types of hydrocarbons. In view of the shallow water table underlying Lusaka, the tendency for flooding during the rainy season and the fact that storm water runoff is discharged into a natural water course, means that this soil will continue to be a source of pollution until it is removed. Furthermore, Lusaka obtains its water supply from a combination of groundwater and surface water sources which lie downstream of the pollution sources, of which this site is but one of many.

3. *PCB-free transformer carcasses, vehicle wrecks and scrap.* There are several hundred old transformer carcasses, wrecked vehicles and mounds of scrap on this site. This waste does not cause an immediate risk to health and safety, but if the National Heritage Conservation Commission wants to turn the old power station into a museum (see section 4.1), this extensive area of scrap poses a major visual impact, with possible PR repercussions.

4. *Waste disposal.* The practice of burning oily wastes and other industrial waste is not acceptable since it poses a risk to health and contributes to the poor air quality in Lusaka, especially in winter.

632

Table 3.7: Summary of Environmental Liabilities at the Lusaka Workshops

Issue	Health risk[a]			Safety risk[b]			Environ-mental risk[c]			PR risk[d]			Financial risk[e]	Compliance[f]
	M	S	P	M	S	P	M	S	P	M	S	P	M	Yes/No/?
PCB-contaminated material	1	3	3	0	0	0	1	3	3	3	3	3	High	No
Contaminated soil	1	1	1	0	0	0	1	2	3	1	1	1	Medium	No
Transformer carcasses etc	0	0	0	0	0	0	1	1	1	1	2	3	Medium	?
Waste disposal	1	1	2	0	0	0	1	1	2	0	0	0	Low	No

Notes

a Risk to the health of the general public.
b Risk to the safety of downstream residents.
c Risk of pollution, a loss of biodiversity, a fundamental change in ecosystem functioning beyond the threshold limits of normal occurrence.
d Risk of damage to the corporate name through adverse publicity.
e Risk of significant future capital expenditure to rectify one of the listed liabilities if left unchecked.
f Compliance with local legislation or where this does not exist, with internationally recognised norms and standards of best environmental practice.

Scoring

M Magnitude of the liability: 1 = local; 2 = regional; 3 = national
S Significance of the liability: 1 = low; 2 = medium; 3 = high
P Probability of occurrence: 1 = low; 2 = medium; 3 = high
? Insufficient information available

3.7.3 Recommended Actions

1. *PCBs.* Urgent funding should be sought to effect the safe removal of all PCB-contaminated material to either the KNBC or, when built, the Luano PCB storage facilities. All soil that is suspected of being contaminated should be tested and if it does contain PCBs, is should be picked up and transported to a hazardous waste disposal site. At present, there is no such site in Lusaka, although construction of such a site has been recommended in the recently completed Lusaka Integrated Development Plan (V3 Consulting Engineers, 2000). However, a shortage of funding may delay the construction of such a site for some time. Alternatively, this soil could be placed in a temporary lined cell on site and sealed, or transported to a suitable hazardous disposal site e.g. in South Africa.

2. *Oil-contaminated soil.* An investigation should be carried out to determine the extent of the soil contamination. All oil-contaminated soil should be excavated and placed into a bioreactor, which can be constructed simply and cheaply on site. The bioreactor should comprise either a concrete or plastic-lined cell with a drainage layer and outlet to a sump, equipped with a pump. The cell should be filled with sand and the contaminated material, which should be ploughed or dug in to a depth of 200-300 mm. The material should then be irrigated with water and a nutrient e.g. fertiliser to promote bacterial growth. The leachate should be pumped back to the bioreactor pad until such time as all oil has disappeared. 'Clean' fill should be used to replace the contaminated material.

3. *Oil management.* Workshop staff need to be trained in better oil management practices e.g. the use of drip trays at oil transfer points, maintenance of

633

equipment, use of sawdust, separation and separate disposal of oily waste and sludge (not burnt) and correct disposal of old oils.

4. *Transformer carcasses, vehicle wrecks, scrap etc.* The best option would be to sell off the scrap metal, thus removing it from the site, otherwise, this waste needs to be picked up, compacted and disposed of in a landfill.

5. *Waste disposal.* The practice of burning waste on site should be stopped immediately. The waste should be transported to an official dump.

3.8 Ndola Workshop and Stores

3.8.1 Brief Description

The Ndola Workshop serves the Copperbelt, North-west, Northern and Luapula Provinces. It is situated in the grounds of the old thermal power station in Ndola. The main workshop function is the maintenance of transformers and switchgear. Transformer oil is filtered and recycled, but the old oil and oily waste is thrown onto the ground. The workshop floor was extremely oily and very slippery. Drainage from the site is into the Kafue River, discharging immediately upstream of the intake of the water treatment plant for Ndola. Oil pollution has been detected in the drainage from the site.

Several dozen old transformers have been dumped on the site; these were sold for their copper wire, but the purchaser took out the wire and left the carcasses. Vandalism (drainage of the transformer oil for cooking and other purposes) and old age are responsible for most of the irreparable transformers, which are being dumped at a rate of 10-12 per month (Plate 31).

There is a small vehicle workshop here. The old oil is stored in drums and given to employees.

Old concrete bunkers, previously used by the power station, are now being used as storage areas by the workshop. There was a considerable amount of oil spillage around the drum storage section (Plate 32).

3.8.2 Environmental Liabilities

1. *PCB-contaminated oils and transformer carcasses.* These are a major hazard to human health and the environment (see section 3.3.2). The inventory conducted by the ESU and ECZ has identified all PCBs on this site, but urgent action is required to remove them to safe storage. Soils impregnated with PCB oils will constitute an ongoing source of pollution.

2. *Oil-contaminated soil.* In addition to the soils contaminated with PCBs, large sections of the site have been contaminated with various types of hydrocarbons. In view of the position of the site in relation to the town's water intake and the pollution that is occurring, this situation poses an unacceptable health risk to the population.

634

3. *PCB-free transformer carcasses, vehicle wrecks and scrap.* There are several dozen old transformer carcasses, wrecked vehicles and mounds of scrap on this site. This waste does not cause an immediate risk to health and safety, but if the National Heritage Conservation Commission wants to turn the old power station into a museum (see section 4.2), this extensive area of scrap poses a major visual impact, with possible PR repercussions.

Table 3.8: Summary of Environmental Liabilities at the Ndola Workshops

Issue	Health risk[a]			Safety risk[b]			Environ-mental risk[c]			PR risk[d]			Financial risk[e]	Compliance[f]
	M	S	P	M	S	P	M	S	P	M	S	P	M	Yes/No/?
PCB-contaminated material	1	3	3	0	0	0	1	3	3	3	3	3	High	No
Contaminated soil	1	2	3	0	0	0	1	2	3	1	1	1	High	No
Transformer carcasses etc	0	0	0	0	0	0	1	1	1	1	2	3	Medium	?
Waste disposal	1	1	2	0	0	0	1	1	2	0	0	0	Low	No

Notes

a Risk to the health of the general public.
b Risk to the safety of downstream residents.
c Risk of pollution, a loss of biodiversity, a fundamental change in ecosystem functioning beyond the threshold limits of normal occurrence.
d Risk of damage to the corporate name through adverse publicity.
e Risk of significant future capital expenditure to rectify one of the listed liabilities if left unchecked.
f Compliance with local legislation or where this does not exist, with internationally recognised norms and standards of best environmental practice.

Scoring

M Magnitude of the liability: 1 = local; 2 = regional; 3 = national
S Significance of the liability: 1 = low; 2 = medium; 3 = high
P Probability of occurrence: 1 = low; 2 = medium; 3 = high
? Insufficient information available

3.8.3 Recommended Actions

1. *PCBs.* Urgent funding should be sought to effect the safe removal of all PCB-contaminated material to the Luano PCB storage facility, when built. All soil that is suspected of being contaminated should be tested and if it does contain PCBs, it should be picked up and transported to a hazardous waste disposal site. At present, there is no such site on the Copperbelt, although there probably is a demand for such a site in this mining area. However, a shortage of funding may delay the development of such a site for some time. Alternatively, this soil could be placed in a temporary lined cell on site and sealed, or transported to a suitable site e.g. in South Africa.

2. *Oil-contaminated soil.* An investigation should be carried out to determine the extent of the soil contamination. All oil-contaminated soil should be excavated and placed into a bioreactor, which can be constructed simply and cheaply on site. The bioreactor should comprise either a concrete or plastic-lined cell with a drainage layer and outlet to a sump, equipped with a pump. The cell should be filled with sand and the contaminated material, which should be ploughed or dug in to a depth of 200-300 mm. The material should then be irrigated with water and a nutrient e.g. fertiliser to promote bacterial growth. The leachate should be

635

pumped back to the bioreactor pad until such time as all oil has disappeared. 'Clean' fill should be used to replace the contaminated material.

3. *Oil management.* Workshop staff need to be trained in better oil management practices e.g. the use of drip trays at oil transfer points, maintenance of equipment, use of sawdust, separation and separate disposal of oily waste and sludge (not burnt) and correct disposal of old oils.

4. *Transformer carcasses, vehicle wrecks, scrap etc.* The best option would be to sell off the scrap metal, thus removing it from the site, otherwise, this waste needs to be picked up, compacted and disposed of in a landfill.

3.9 Substations

3.9.1 Brief Description

There are at least 12 major substations and numerous small substations in Zambia. Only two substations, Kitwe and Luano, were investigated during the course of the study and it is assumed that similar conditions and environmental liabilities exist at the other major substations.

Kitwe Substation

This large substation receives two 330kV lines from Kabwe substation, stepping down to 88kV and 66kV lines to the Copperbelt mines (Figure 1).

All the existing transformers on site are PCB-free. The dielectric oil is recycled, but there has been a considerable amount of spillage at the transfer point (Plate 33). Furthermore, there is no bunding around the ASTs. The areas which have been seriously contaminated with oil cover 10 x 5m and 5 x 3m. The subsurface drainage system underlying the substation, which collects oil and storm water, discharges directly to the veld.

There is a programme to replace the SF6s used in the circuit breakers, which is part of the PRP.

All capacitor banks are being replaced with PCB-free components, leaving over 100 old capacitors containing PCBs awaiting disposal. Some of these have been stacked on a grassy bank, others dumped in the grass and some were put into drums which were then filled with concrete (Plates 34 & 35). The intention is to put these capacitors into a specially adapted sea container and transport them to the proposed Luano PCB storage facility.

There is a considerable amount of scrap metal on site, comprising: 15 x 3200 gallon old oil tanks, old bushings, scrap pylon steel, drums, transformer carcasses etc. Most of this is very bulky and difficult to dispose of (Plate 35).

The substation control building has an asbestos roof.

636

Luano Substation

This substation is about two thirds the size of Kitwe Substation. It receives two 330kV lines from Kabwe and one from Kitwe. The site is situated near Chambishi Mine, midway between Kitwe and Chingola on the Copperbelt (Figure 1).

All the transformers on site are PCB-free, but there are some 400 PCB capacitors requiring safe disposal. The site is very clean and no oil spills were evident, but the substation suffers from corrosion from sulphur dioxide emissions from the nearby mine and there is a strong small of oil from the adjacent CEC substation, which probably indicates some soil contamination.

There is a small building located on the outside of the substation fence, within the CEC wayleave, but on ZESCO property, which is reported to contain PCBs from the CEC substation (Plate 36). This needs to be checked out.

The land around the substation used to be zoned as forestry land and as such, there was very little human habitation in the area. It was for this reason, as well as the proximity to the substation, that the temporary PCB storage facility was sited here (see section 3.3). However, the government has recently re-zoned the area surrounding the substation for human settlement and houses are already being built (Plate 36). This comprises a major security and safety hazard for the substation in the form of fire, theft and vandalism. The community on the other hand, will be exposed to electro-magnetic fields from the substation and PCBs in the future storage facility.

3.9.2 Environmental Liabilities

Although only two substations were investigated in this study, some of the following liabilities probably pertain to the other major substations in the country. The full liability can therefore only be assessed following further investigations.

Kitwe Substation

1. *Soil contamination.* Much of the oil spillage has occurred on the compacted stone fill which underlies the substation, but it is assumed that some of the underlying soil will also have been contaminated. Furthermore, any rain falling on these contaminated areas will become polluted and the storm water runoff drains discharge to the natural environment.

2. *Capacitors.* The current method of storing the PCB-filled capacitors is unacceptable due to the high risk of fire and the high health risks associated with PCBs.

3. *Scrap metal.* Although the large amounts of scrap being stored on the site poses a visual impact, it does not pose a health, safety or environmental risk.

4. *Asbestos roof.* Asbestos fibres are extremely fine and can be inhaled. A build-up of fibre in the lungs can lead to asbestosis, which is a degenerative lung disease which can be fatal.

637

Luano Substation

1. *Capacitors.* The capacitors at Luano are still in use, thus posing a small health risk.

2. *PCBs.* If CEC is dumping PCBs in the small building next to the substation, this could pose a liability to ZESCO, even though the building is located within the CEC wayleave, but on ZESCO property.

3. *Human settlement.* This poses a major safety and security risk to ZESCO.

4. *Electro-magnetic fields.* The presence of a high voltage substation in close proximity to human settlement could be a health risk for the residents, especially those who live within 100m of the substation and reside at home all day i.e. women, young children and the elderly.

Table 3.9: Summary of Environmental Liabilities at the Kitwe and Luano Substations

Issue	Health risk[a]			Safety risk[b]			Environ-mental risk[c]			PR risk[d]			Financial risk[e]	Compliance[f]
	M	S	P	M	S	P	M	S	P	M	S	P	M	Yes/No/?
Soil contamination	0	0	0	0	0	0	1	1	2	0	0	0	Medium	No
Capacitors	1	3	1	0	0	0	1	3	3	1	1	1	High	No
Scrap metal	0	0	0	0	0	0	1	1	1	0	0	0	Low	?
Asbestos	1	2	1	0	0	0	0	0	0	0	0	0	Low	No
PCBs of CEC	1	?	?	0	0	0	1	?	?	?	?	?	?	?
Human settlement	0	0	0	1	3	3	0	0	0	0	0	0	High	?
Electro-magnetic fields	1	3	3	0	0	0	0	0	0	0	0	0	Low	?

Notes

a Risk to the health of the general public.
b Risk to the safety of downstream residents.
c Risk of pollution, a loss of biodiversity, a fundamental change in ecosystem functioning beyond the threshold limits of normal occurrence.
d Risk of damage to the corporate name through adverse publicity.
e Risk of significant future capital expenditure to rectify one of the listed liabilities if left unchecked.
f Compliance with local legislation or where this does not exist, with internationally recognised norms and standards of best environmental practice.

Scoring

M Magnitude of the liability: 1 = local; 2 = regional; 3 = national
S Significance of the liability: 1 = low; 2 = medium; 3 = high
P Probability of occurrence: 1 = low; 2 = medium; 3 = high
? Insufficient information available

3.9.3 Recommended Actions

1. *Oil-contaminated soil.* An investigation should be carried out to determine the extent of the soil contamination. All oil-contaminated soil should be excavated and placed into a bioreactor, which can be constructed simply and cheaply on site. The bioreactor should comprise either a concrete or plastic-lined cell with a drainage layer and outlet to a sump, equipped with a pump. The cell should be

638

filled with sand and the contaminated material, which should be ploughed or dug in to a depth of 200-300 mm. The material should then be irrigated with water and a nutrient e.g. fertiliser to promote bacterial growth. The leachate should be pumped back to the bioreactor pad until such time as all oil has disappeared. 'Clean' fill should be used to replace the contaminated material.

2. *Oil management.* Substation staff need to be trained in better oil management practices e.g. the use of drip trays at oil transfer points, maintenance of equipment, use of sawdust, and the correct disposal of old oils.

3. *Capacitors.* These need to be stored in a safer environment e.g. a sea container, until the Luano PCB storage facility has been built. Thereafter they should be transported to Luano for storage before exporting for final destruction.

4. *Transformer carcasses, vehicle wrecks, scrap etc.* The best option would be to sell off the scrap metal, thus removing it from the site, otherwise, this waste needs to be picked up, compacted and disposed of in a landfill.

5. *PCBs.* The rumour that CEC is dumping PCBs in the small building adjacent to the Luano substation should be investigated immediately.

6. *Asbestos roof.* The state of the asbestos roof over the control building at Kitwe should be assessed and replaced if necessary.

7. *Human settlement.* Urgent discussions are required between ZESCO and the Department of Physical Planning and Housing to stop the resettlement of the area around the Luano substation in the interests of human health and substation protection.

3.10 Transmission System

3.10.1 Brief Description

The transmission system originates from the three main generation centres of Kafue Gorge, Kariba North Bank and Victoria Falls power stations (Figure 1). Seven voltage levels are used in Zambia: 330kV, 220kV, 132kV, 88kV, 66kV, 33kV and 11kV. The total length of the 330kV and 220kV network is about 2 500km and the 132kV, 88kV and 66kV network covers 3 500km. The transmission network comprises the following:

1. Kariba North Bank and Kafue Gorge power stations are both connected to Leopards Hill Substation by two 330kV lines and Kafue Gorge additionally by one 330kV line via Kafue West substation to Leopards Hill.
2. Three 330kV lines from Leopards Hill to Kabwe. Four 330kV lines go from Kabwe to the Copperbelt, two of which go straight to Luano, one goes via Kitwe to Luano and the fourth terminates at Kitwe.
3. Two 330kV lines lead from the Kariba North to the Kariba South stations.

4. One 330kV line goes from Kabwe to the Serenje Substation, which connects the Lusiwasi small hydro and the Northern System to the interconnected network.
5. Victoria Falls is connected to Kafue by a 220kV line.
6. One 330kV line goes from the Copperbelt to the DRC.

The transmission system is generally in good condition, although corrosion does occur within the Copperbelt due to the high levels of sulphur dioxide in the air. The other problem relates to vandalism of the pylons near to urban areas. Vandals steal the bolts from the pylon, which then collapse with the next strong wind.

Wildlife interactions are limited to the Livingstone area, where baboons and monkeys climb up the towers and get electrocuted. Bird collisions are thought to be minimal, but there is limited data in this regard.

At present, ZESCO does not have to pay for its transmission line wayleaves, but a private investor may have to, although he could fall back on the provisions of the Land Acquisition Act, which allows wayleaves to be granted free of charge, if it is in the public interest. There do not appear to be any legal impediments in the way of transferring the ownership of wayleaves between companies. ZESCO subcontracts out the maintenance of wayleaves. No settlement is allowed to occur within the wayleaves.

3.10.2 Environmental Liabilities

Apart from the problem with monkeys and baboons, which is more of an operational problem than environmental, there are no real environmental liabilities associated with the existing transmission system.

3.10.3 Recommended Actions

The pylons in the Livingstone area need to be protected from monkeys and baboons with an electrified wire around the base of the pylon.

3.11 Distribution System and Alternative Energy Sources

3.11.1 Brief Description

A distinction needs to be drawn between rural electrification and urban electrification systems. Over 40% of the eight million people of Zambia live in urban areas. The remaining 4.8 million people, are scattered across a country measuring 752 600 km^2, a density of over 6 people per square kilometre. Most of the electricity is generated in the southern and central parts of the country and therefore the costs of transmission and distribution to rural settlements are very high. Some of the remote towns are powered from isolated small hydro schemes or diesel power plants, with distribution limited to the town areas. Most of the rural population (78-80%) therefore relies on woodfuel in the form of dead wood or charcoal for cooking and heating.

The situation in the urban areas is not much better, where woodfuel provides 84% of household energy needs, compared to only 7% provided by electricity. This is due to the fact that only 42% of urban households are electrified, the rest, mainly in the low cost, poor areas do not have access to grid power.

A programme of peri-urban electrification began around Lusaka in 1987, with the goal of supplying 260 000 households with power, but this project is only progressing at a rate of 3000 households per year, which is less than one quarter of the requirement to keep pace with the present rate of urban population growth of 5.2% per year. Insecure land tenure has been cited as one of the main obstacles in achieving the programme objectives. A householder cannot get electricity if he does not have land tenure, but a householder cannot get tenure if he is not in a formal township. This leaves the vast shanty towns surrounding Lusaka dependent on fuelwood for their energy requirements. Ironically, electricity once installed is more convenient and less expensive than charcoal by 1.5 to 3 times, but the costs for connection and wiring are formidable for the low-income households.

The demand for woodfuel, therefore, is steadily rising and deforestation in the country is occurring more rapidly than re-forestation programmes. Woodlands used to cover an estimated 81% of the land area, but this had decreased by 1998 to 55-70%. It has been estimated that 4 700ha of forest per year are cleared for firewood and 19 400ha are cleared for annual charcoal production.

At present, ZESCO is responsible for electricity distribution throughout the country. They do not have to pay for poles or wayleaves in the urban areas. It is generally thought that none of the city councils in the country have the capacity to run an electrical distribution system.

Recently, there has been an increase in the number of solar systems in the country, from 6 in 1993, to more than 350 systems in 1997. ZESCO utilised Rural Electrification Fund money, augmented by funds from CIDA, to implement solar power systems for lighting and fridge operation (not cooking) in three districts: at Kasempa, Chishi on Lake Bangweulu and south-east of Lusaka.

3.11.2 Environmental Liabilities

It could be argued that the slow progress in electrifying urban areas is contributing to deforestation, which leads to a number of other environmental problems such as soil erosion, sedimentation of river beds and dams, loss of productive land, loss of a valuable carbon sink, increased runoff and reduction in water tables, etc.

3.11.3 Recommended Actions

An innovative approach is required to solve the problem of urban and rural electrification. In rural areas the major drawback is that power distribution systems have to be considerably oversized simply to meet cooking needs. A second problem is that rural populations generally do not have sufficient disposable income to pay for the high electricity consumption required for cooking, or the wherewithal to purchase basic stoves. The answer lies in a separation of energy needs.

641

The energy needs for lighting, radio, refrigeration, water pumps, grain mills and clinics could be most effectively met with electricity, while energy for cooking and space heating is most easily and cheaply met by fuelwood. Therefore, a pre-condition for introducing electricity into a community would be the ongoing involvement of each household receiving electricity in a community woodlot (Inversin).

This scenario would increase the financial justification for rural electrification by reducing its costs and increasing the benefits to the consumers and electrical utility. This is achieved by:

- avoiding the cooking load which considerably reduces the required capacity and cost of distribution systems;
- making energy available for productive activities e.g. sawmills, grain mills, water pumps for small-scale agricultural production etc;
- once the woodlots have matured, the wood can be used, not only for cooking, but for craft production, construction timber etc.
- less time and energy will be spent by women in searching for, and carrying fuelwood and this time and energy can be channelled into more productive activities (Inversin).

The recommended actions to increase electrical distribution in urban areas is much more complex and is described in detail in Ragsdale and Associates (1995). Some of the actions required include:

- land tenure reform;
- a detailed socio-economic assessment of the urban areas;
- updated urban development plans;
- urban and national government capacity building;
- urban policy reform;
- electricity tariff reforms; and
- development of an integrated energy programme, combining grid electricity with solar and energy-efficient wood stoves.

642

ZESCO still owns two abandoned thermal power plants, one in Lusaka and the other at Ndola. The environmental liabilities associated with these two abandoned sites are discussed below.

4.1 Lusaka Thermal Power Plant

4.1.1 Brief Description

Little is known about this power station, except that it used to be run by the Lusaka City Council before being transferred to ZESCO when ZESCO was formed. It must have closed down in the late 1960s or early 1970s. Coal feedstock was transported from the Maamba Colliery in the Southern Province and stockpiled near the coal conveyor. Evidence of the former stockpile site is visible as a thin layer of coal on the ground (Plate 37). The power station had an installed capacity of 15MW. Extensive enquiries were made as to the final destination of the power station ash, but no one knew where this might have been dumped. It is most likely that the ash has subsequently been used in brick making activities and cement.

The old power station building is currently being used by the line maintenance and substation maintenance divisions of ZESCO, the Regional Control Centre and for transformer repairs. However when ZESCO wanted to pull down the power station, cooling tower and associated structures, they were prevented by the National Heritage Conservation Commission who wanted it to remain as a national monument and possible museum. All the old machinery is still in place, but it would be of limited interest to the general public. The water tanks on the roof of the building are leaking badly and water is pouring through the structure.

4.1.2 Environmental Liabilities

1. *Coal stockpile site.* It is not known how deep the coal layer is at the old coal stockpile site, or its contribution to pollution, but it is thought to be negligible.

2. *Visual impact.* The buildings are not of real aesthetic value or historical interest and are generally thought to be an eyesore and possibly a safety hazard. The land is located near to the city centre and would probably have greater value for ZESCO with the old power station removed. Some of the old components could be removed and placed in the National Museum if desired.

4.1.3 Recommended Actions

It is recommended that further negotiations take place between ZESCO and the National Heritage Conservation Commission with regard to the future of the power station buildings.

4.2 *Ndola Thermal Power Station*

4.2.1 Brief Description

As with the Lusaka Power Station, very little is known about the Ndola power plant. It is thought to have closed down over 20 years ago, but part of the old building is still used by ZESCO as offices for the diesel power station maintenance team, protection services, the metering division and telecommunications. The old concrete bunkers are used by the workshop as storage areas (Plate 32). There are no signs of either the coal stockpile or ash disposal sites. Again it is likely that the ash has been used for making bricks or cement.

The National Heritage Conservation Commission has prevented the destruction of this building for the same reasons as for Lusaka, although the motivation is difficult to understand.

4.2.2 Environmental Liabilities

There are no known liabilities associated with this site.

Compared to other power sources, hydroelectric power can be considered to be less harmful to the environment. Nevertheless, there are some negative impacts, such as:

- inundation of land previously used for settlement, agriculture, forestry, recreation etc;
- need for resettlement and the socio-economic consequences of this;
- loss of alluvial soils in the dam basin and impacts on downstream agriculture;
- effects on wildlife;
- geological changes, including increases in seismicity;
- changes in micro-climate;
- high evaporation losses;
- spread of water-borne diseases;
- effects on aquatic vegetation and riverine vegetation downstream;
- effects on the downstream ecology;
- some dams release high levels of methane, rivalling the 'greenhouse gas' emissions of thermal power stations.

The most beneficial aspects are commonly stated as being:

- locally generated power supply;
- development of irrigation agriculture and fisheries;
- opportunities for tourism;
- improved infrastructure;

But the recently released report by the World Commission on Dams (WCD) (November, 2000) revealed that many large dams do not achieve the pre-development objectives in terms of delivering the benefits, particularly those built for hydroelectric power, irrigation, water supply and multiple purposes. Indeed, the WCD report found that the social and environmental costs of large dams were far in excess of the perceived benefits for the local people; most of the benefits being derived in urban centres far from the dam.

Zambia has the advantage of plentiful water and suitable dam sites for hydroelectric plants, but the future development and funding of dams will be contingent on meeting a number of criteria set out in the WCD report "Dams and Development: A New Framework for Decision-Making" (2000). The most advantageous schemes (from an environmental and social perspective) will be those that are extensions of existing schemes or small run-of river installations. The schemes with the greatest impacts will be those requiring large areas of land to be flooded to provide sufficient storage.

All new schemes for power generation, transmission and related infrastructure will be required to submit an EIA report according to the EIA Regulations (1997), made in terms of the Environmental Protection and Pollution Control Act (No 12 of 1997). Furthermore, Zambia is a signatory to, *inter alia,* the Convention on Biological Diversity, the Kyoto Convention, Basel Convention and Persistent Organic Pollutants Convention and it has been recommended that the Government should sign the Montreal Protocol on CFCs. The Environmental Council of Zambia (ECZ), will be mindful of these international obligations when reviewing all proposed new schemes, as well as the WCD New Framework for Decision-Making. The proponent must also

645

be aware of the cost of the Review Fees required by the ECZ. These can range from less than US$10 000 for small projects to over US$100 000 for large projects, such as a hydroelectric power scheme.

The ECZ has also indicated that they will look more favourably upon those schemes which promote multiple use of the dam and water e.g. for recession and irrigation agriculture, fisheries, water supply, tourism and recreation. All future dams will also be required to have fish ladders. Future water rights will be allocated at a catchment management level and the Water Act is in the process of being revised to this effect. It is also likely that future hydroelectric projects will have to pay for their water.

Several new projects have been proposed, both large and small. The most economically viable large schemes are:

- the construction of a power house at Itezhi Tezhi Dam;
- The Kafue Gorge Lower Hydroelectric Project;
- Batoka Gorge.

The environmental impacts that have been identified by the studies so far are listed below, together with further comments in light of the WCD report. In all cases, a considerable amount of further primary research is required to fully quantify and understand the environmental and social impacts of the projects.

5.1 Itezhi Tezhi Power House

The proposal is to construct an underground power house in the southern bank abutment of the dam, with an installed capacity of 55MW and an energy output of 510GWh per annum (Plate 38). It would provide backup power to Lusaka via Mumbwa in the event of breakdowns in the main transmission system. Three alternatives were initially considered: raise the existing dam and build a power house, build the power house without raising the dam and do nothing.

The pre-feasibility study showed that raising the dam would result in unacceptable impacts on the local population and Kafue National Park. A 5m rise in dam level would affect: 1241 houses, 2 tourist lodges, 2 primary schools, government offices, 9 churches, existing roads and nearly 4000 people would be displaced. It would also flood a very large additional part of the Kafue National Park. On the basis of these findings, it was decided not to raise the dam.

The negative impacts associated with the construction of a power house and utilising the head and storage provided by the existing dam were mostly related to the construction phase and included:

- social diseases;
- influx of job seekers;
- illegal poaching in the Park;
- a small amount of bush clearing;
- waste from the construction site;
- waste oils and lubricants;

646

- sewage and litter from the construction camp.

Once the power house is in operation, the ongoing impacts will be the visual impact of the outgoing power lines and the continuing impacts on the socio-ecology of the Kafue Flats. It is possible, however, to mitigate most of these negative impacts through the strict implementation of an environmental management plan (EMP) for both construction and operation. The water management plan for operation will have to be drawn up with the full co-operation of the Water Board or proposed Kafue Catchment Management Authority, Dept of Fisheries, Dept of Agriculture and all interested and affected parties.

The main benefits of the project will include:

- employment opportunities for the local communities for the 4 year construction period, with a limited number of jobs in the power station once operational;
- strengthening of power development in the country with increased potential for export revenues;
- it will help to meet the growing demand for electricity;
- the construction of the power house at Itezhi Tezhi has the highest Financial and Economic Internal Rates of Return, making it the most economically viable of the large-scale hydro projects being considered;
- the Itezhi Tezhi project as proposed, and given a comprehensive EIA and EMP, will have a much lower environmental impact than Batoka Gorge and slightly less than the Kafue Gorge Lower project.

The full EIA should include **as a minimum**, the following studies:

- baseline environmental and socio-economic survey of the reservoir area, shoreline and Kafue Flats;
- detailed hydrological and water quality monitoring within the dam basin, as well as upstream and downstream;
- a full assessment of current impacts in the Kafue Flats, with an assessment of costs;
- an investigation into the presence of hot springs under the dam;
- a full assessment of the socio-economic impacts of the construction period, including the effects (positive and negative) of housing construction, provision of better infrastructure, increased spending power, influx of job seekers, social conflicts and social diseases;
- an assessment of cumulative effects;
- a detailed options analysis.

5.2 *Kafue Gorge Lower Hydroelectric Project*

This proposed project is located in the Kafue Gorge, about 60km upstream of the confluence of the Kafue and Zambezi Rivers, about 28km downstream of the Kafue Road Bridge and about 2.5km downstream from the existing Kafue Gorge Upper Hydroelectric Project. This new dam and power station would utilise the remaining 200m of head in the gorge and it would have an installed capacity of 450MW, with an output of 2 500GWh. The small dam would only provide diurnal storage for peaking

647

power production, but the Itezhi Tezhi dam and Upper Kafue dam would provide sufficient storage and river regulation upstream.

The benefits of the dam lie in its central location in the country, the availability of regulated flow, its relatively low investment costs and the fact that environmental impacts will be less, given the existing impacts caused by the presence of the Kafue Upper dam.

A feasibility study was done by Harza in 1995, which included a hydrological study, a geological investigation, a construction materials study and an initial EIA. However, all these studies were at a reconnaissance level for the three proposed dam sites and none are in sufficient detail for a bankable document on the preferred site.

The environmental study looked at general environmental conditions and identified broad level impacts and mitigation measures, with no primary research. The report concluded that only limited environmental impacts would be incurred. In view of current trends in dam evaluation, as exemplified by the new Framework for Decision Making (WCD, 2000) this type of conclusion would have to be substantiated with real data based on primary research. At a minimum, the following studies would be required:

- vegetation and soil survey in the dam basin and downstream;
- wildlife survey, in the basin and downstream;
- water quality and limnology of the reservoir;
- fish and fisheries potential in the dam and downstream;
- land use planning;
- social and cultural issues (including a census, GIS mapping, socio-economic study, resettlement plan and a future development plan);
- a cost-benefit analysis, including environmental and social impact mitigation costs.

5.3 Batoka Gorge

The proposed dam site in the Batoka Gorge is about 50km downstream of Victoria Falls on the Zambezi River, straddling the international boundary between Zambia and Zimbabwe. A feasibility study was undertaken by Lahrmeyer in 1992, which considered two scenarios: one with a regulating dam at Katombora upstream of the Falls and one without this regulating dam. The first option was dropped because the dam at Katombora would flood large parts of Botswana and Namibia. The scheme without the Katombora dam would have an installed capacity of 1600MW, of which Zambia will have 800MW as its half share. Although several Full Supply Levels (FSLs) were considered, the Batoka dam by itself would only have sufficient capacity for daily and weekly regulation. The dam site is also very remote from the national Zambian grid and there are no planned developments in Southern Province that would need an additional source of power in the long-term.

All the FSLs considered would have a negative effect on the operation of the Victoria Falls Power Station, since the tailraces of Stations A and C would both be inundated

648

and even the operating floors of these two stations would be flooded at least once per year.

The feasibility study contained very limited information on socio-economics and land use on the Zambian side or indeed on the value of the river for tourism, judging by its conclusions. It concluded that the visual impact would be most marked at the lower end of the Zimbabwe National Park, where the river will rise 50m above normal levels and the velocities would be reduced considerably at all commonly occurring discharges. There would be 'minimal effects' of an increased water level and velocity reduction at Silent Pool (at the end of Third Gorge) with a FSL of below 767m, but any of the proposed FSLs above this would have effects that would be 'significant and noticeable'.

In view of its status as a World Heritage Site, the presence of three National Parks around the Falls and its world-wide importance as a tourist attraction, the Victoria Falls should be immune from suggested 'developments' of this nature. Any proposal in the vicinity of the Falls which would have such a devastating effect on the tourism industry, would attract world-wide condemnation. The most affected sector would be adventure tourism, with white-water rafting being the main attraction, because all but three rapids would be drowned (Plate 20). The average annual income from rafting fees alone over the last 3 years has been almost US$3.5 million. If these rafters spend a minimum of 2 nights in the area, the additional financial benefits of tourist spending, averages at over US$15 million per year for rafters alone, if they do not participate in any of the other activities at the Falls.

Furthermore, the report states that 'no serious impacts for wildlife are expected to arise'. This fails to take into account the fact that the Batoka Gorge system, extending 60km downstream of the Falls, supports the highest density of Taita Falcons in Africa, with 8-10 breeding pairs. This rare and secretive bird is only found at a few other remote locations in mountainous Africa from Zimbabwe to Ethiopia. The Batoka Gorge population comprises half the entire Zimbabwe population of Taita Falcons (Harrison *et al*, 1997). Clearly any developments of this nature in the Batoka Gorge would seriously affect the world population of these birds.

Against these negative impacts the benefits are loosely stated as: very little resettlement would be required, and, only a small portion of land would be inundated due to the confined nature of the gorge.

While the Batoka Gorge may be the third most economic large-scale hydro scheme (after Itezhi Tezhi and Kafue Gorge Lower) on purely engineering terms, full accounting of the environmental and social costs may change this assessment. Furthermore, it is unlikely that such a scheme would obtain investment funding given the probable world-wide condemnation it would attract.

5.4 Other Large-Scale Hydroelectric Schemes

The following discussion is taken from the Twenty Year Power System Development Plan for Zambia, (Ekono, 1998).

649

Mpata Gorge. Two alternative developments have been considered: the High Level Scheme and the Low Level Scheme. Regulated river flows from both Kariba and Kafue are available at this site. In order to create a sufficient head, an extensive dam would be required. Development of the High Level Scheme would result in the total flooding of large areas south of the river including game reserves, among them the Mana Pools Game Reserve, and controlled hunting areas.

Because of the environmental problems of the High Level Scheme, development of the Low Level Scheme has been introduced. In this alternative, the annual flooding of the Mana Pools area would correspond to the historic regime of the Zambezi River, reportedly creating ideal conditions for wildlife and flora. Other benefits of the Mpata development would be the improvement of road connections and the possibility of establishing a commercial fishery. The social problems on both banks would not be very serious because the area itself is rather sparsely populated. The savings in investment costs of the Low Level Scheme, compared to the full development are, however, relatively small, making the Mpata Gorge Scheme less attractive in economic terms than some other Zambezi developments.

Devil's Gorge. The area inundated by the water storage of the Devil's Gorge Dam would be rather large resulting in significant evaporation losses. Also some thousand people would need to be resettled, whereas for wildlife no severe problems are expected to arise.

Victoria Falls Extension. The extension of the existing Victoria Falls Power Station would require upstream water regulation, which has been discussed in connection to the Batoka Gorge development (Section 5.3). In addition to the environmental problems caused by the reservoir, the regulation would also affect the river regime over the Victoria Falls. Because of the unique value of the Victoria Falls as one of the world's most famous natural monuments, this scheme is not recommended to be developed.

Luapula Power Schemes. In order to avoid the inundation of large areas in Zaire near Mukuku, a limited development was considered. In this alternative the main storage would be located within Zambia at the Bangweulu Lake and the nearby swamp. A vast area would be inundated. Several thousand people would need to be resettled and extensive operations would be needed to translocate groups of antelopes, such as the black lechwe, and other wild animals.

The creation of such a big lake would no doubt be beneficial to fishery, tourism, transport and communications. For economic reasons this development was not considered further.

Kalungwishi River Schemes. The Kalungwishi River is practically unaffected by modern development. Thus, harnessing the river for power generation would mean changes in the ecology of the river system. The diurnal storage upstream would inundate the large dambo area. Resettlement of some villages would be necessary. On the other hand, pre-requisites for fishery and tourism would be created.

Lusiwasi Extension. A new dam is proposed to be constructed to regulate the river flow. Due to the small size of the river system and the existing infrastructure the environmental impacts are expected to be small.

During the next twenty years only 1-2 new power generation installations are needed. As can be seen, the most economic developments are also the most advantageous in terms of environmental impacts. The Itezhi Tezhi Power Plant would cause practically no additional environmental impacts and the Kafue Gorge Lower Plant is thought to cause only minor environmental problems. None of the large Zambezi schemes, (Batoka Gorge, Devil's Gorge and Mpata Gorge) are environmentally or socially acceptable.

The environmental problems can be reduced by taking into account the environmental aspects in project planning. In the same regard, activities such as power generation, agriculture, fisheries, recreation and tourism should be integrated to maximize the benefits of the development.

5.5 New Small Hydro Schemes

Several small hydro schemes are being reviewed to replace the old diesel generation plants e.g. at Mwinilunga (400kW) and Kabompo (2000-3000kW). Studies have also been carried out to expand the capacity at existing facilities e.g. Musonda Falls, Chishimba Falls, Lunzua and Lusiwasi.

All future schemes will require at least a Project Brief to be prepared and submitted to the ECZ for approval. Aspects which will be considered will be the amount of resettlement required, the impacts on downstream ecology, impacts on fish stocks and fish movements, and secondary impacts resulting from increased settlement, agriculture and deforestation in the dam basin.

5.6 Future Extensions to the Transmission Network

Several transmission lines are currently being planned:

Zambia to Namibia. A 132kV line is about to be constructed (2001) from the Victoria Falls Power Station to Sesheke substation and then to Katima Mulilo in Namibia. A route selection study and Project Brief was submitted for this line, to ensure the minimum amount of environmental impact on the forest reserves, the tourist areas around Livingstone and Katima Mulilo and with the minimum amount of resettlement.

Zambia to Tanzania. An EIA and EMP have been undertaken for this 330kV line to Tanzania. Some resettlement and compensation will have to be paid.

Zambia to Malawi. This line will connect the Pensulo substation in Zambia with Lilongwe in Malawi.

Zambia to DRC. This 220kV interconnector will connect Luano substation with Likasi in the DRC. An EIA and EMP will be carried out to try and minimise the amount of resettlement required and compensation to be paid.

Each of these lines has had, or will have an EIA and EMP conducted to minimise the impacts, most notably on local people and houses, forest reserves, river and stream crossings, wetland systems and sensitive landscapes.

5.7 Reinforcement of Distribution Lines

Measures are being taken to reinforce the existing urban distribution systems. The current priorities for system reinforcement are at Lusaka, Siavonga, Ndola-Kitwe, Kabwe and Chipata. All new projects will require a Project Brief to be prepared and submitted to the ECZ for approval. Resettlement and compensation proposals will have to be adequately addressed in the Project Brief.

652

When the Kariba Dam was constructed in the 1950s and the Zambezi valley was flooded, little consideration was given to resettlement of the Tonga people. The residents of the north bank were given a paltry amount of compensation and were relocated to an upland area with poor soils and little water. This has resulted in massive social and environmental impacts, as too many people try to eke out a living on soils with little fertility and a low carrying capacity, in a remote land, notable for its droughts, high temperatures and wild animals. The actual and perceived benefits are few in number, namely: tsetse fly control, more schools and clinics than prior to resettlement, greater access to the national infrastructure, Kariba fisheries (although this is limited for the artisanal fishermen) and some rural electrification.

The negative impacts are numerous:

- limited land suitable for arable agriculture;
- increasing pressure on the land thus reducing length of fallow periods, which in turn reduces the fertility of the soil and reduces yields;
- deforestation for land clearance and fuelwood has led to 'Sahelian-like' conditions, with wind, sheet and gully erosion having removed the topsoil over extensive areas (Plates 39 & 40);
- grazing and browse for stock has become increasingly sparse leading to starvation in dry years;
- lack of communication about the Kariba dam water levels has prevented effective farming in the water recession zone;
- high mortality rates;
- lack of food security;
- low quality and restricted water supplies, many of the original wells having collapsed or dried up;
- prevalence of disease such as an outbreak of cholera in 1993;
- drop in living standards;
- access to natural resources has diminished and women spend longer, and travel further in search of thatching grass, firewood, berries, fruits etc;
- social disintegration and out-migration;
- loss of culture and traditional spiritual sites (graves were not moved from the valley);
- conflict and violence as society unravels.

Funding of the Gwembe-Tonga Development Project (GTDP) is being provided by the World Bank through the PRP, the Development Bank of Southern Africa, the Rural Electrification Fund, run by the MEWD, and ZESCO.

The need for the Gwembe-Tonga Development Project (GTDP) is a direct result of the construction of the Kariba Dam. Although ZESCO did not exist at the time of the 1950s resettlement, as the principal income-earning agency taking power from the Kariba North Bank Power Station, ZESCO has assumed some responsibility for the rehabilitation of the Gwembe-Tonga people displaced by Kariba. Kariba North Bank has been operated at times as a virtual ZESCO facility. However, it is owned and operated by the Kariba North Bank Corporation (KNBC) and efforts are underway to

653

separate ZESCO and KNBC assets and delineate responsibilities of the two organisations. ZESCO currently pays a leasing fee for Kariba generation and is to negotiate a power purchase agreement in the near future.

KNBC has not assumed responsibility for the GTDP. Rather, ZESCO is the executing agency under the PRP, reporting directly to the Minister of Energy and Water Development (MEWD). It is responsible for providing resources for project management (i.e. salaries, fuel, office supplies etc). This represents a liability under future private participation options, unless roles are re-defined. The ESU could continue administering the project, either as part of a privatised body, or as a separate entity, depending on the privatization option selected (see Section 7). However, resources for project management could no longer come from the privatized company, unless the costs were carefully delineated and factored into any bidding process.

The main aims of the GTDP are to mitigate some of the negative impacts of the construction of Kariba dam on the resettled people, their hosts and the physical environment, by providing socio-economic and physical infrastructure and to encourage voluntary out-migration from the resettlement areas in order to reduce pressure on the land and the general environment.

The GTDP includes:

- the rehabilitation of roads;
- rural electrification;
- the installation of 30 new boreholes;
- the construction of 6 small dams and 4 weirs to improve water supply;
- construction of new, and rehabilitation of existing, clinics and a school;
- rehabilitation of 2 water works and reticulation systems;
- agricultural support for rain-fed and recession agricultural projects;
- HIV/AIDS awareness and support;
- flood control and land conservation.

The project is currently moving from the planning stage to the detailed design phase and implementation, with project funding from investment agencies now mostly in place. However, the entire project has been on hold for over a year due to the presence of land mines on the north shores of the lake, up to the road. It is estimated that it will take a minimum of 40 weeks using motorised equipment to remove the land mines, at an estimated cost of more than US$2 million. Up until June 2000, Zambia was not a signatory of the Geneva Convention on Land Mines, but now that has been rectified, Zambia can access funding for de-mining from the UN.

The 1995 Sectoral Environmental Assessment undertaken by Komex, as part of the PRP, identified the fact that ZESCO did not have a department dedicated to environmental and socio-economic issues, even though it operated hydroelectric plants which have a major impact on the environment and affected populations. Furthermore, at the time of the report, environmental regulations were in the process of being promulgated, which would require all new projects relating to power generation, transmission and distribution to submit a Project Brief and/or an EIA depending on the project size, to the newly formed Environmental Council of Zambia.

It was therefore recommended in the Sectoral Report that an Environmental and Social Affairs Unit (ESU) should be established in ZESCO, and that it should fall under the Director, Engineering Development (see Figure 2). The Komex report outlined four components of the ESU development programme:

- technical assistance;
- description of roles and responsibilities;
- staffing requirements;
- job descriptions.

These are set out in detail in the Komex report, but the current staff structure and the roles and responsibilities of the ESU are set below.

The ESU is headed by an experienced manager, supported by five specialists, comprising:

- an Environmental Scientist;
- a Hydrologist;
- a Soil Scientist;
- a Social Scientist;
- an Information Specialist.

The ESU is responsible for all environmental and social planning and implementation for ZESCO operations, with the following specific functions:

- liaison with all appropriate regulators, including but not limited to those responsible for water resources management, environment, land management and community affairs;
- development of baseline environmental and socio-economic data for all existing hydro power projects;
- assessment of problems and mitigation requirements for existing projects to ensure operations meet environmental regulations;
- development of baseline environmental and socio-economic data for proposed projects;
- screening of proposed sites and projects to determine the issues and constraints relating to their development;
- advising the engineering group and other ZESCO departments on environmental and social issues;

655

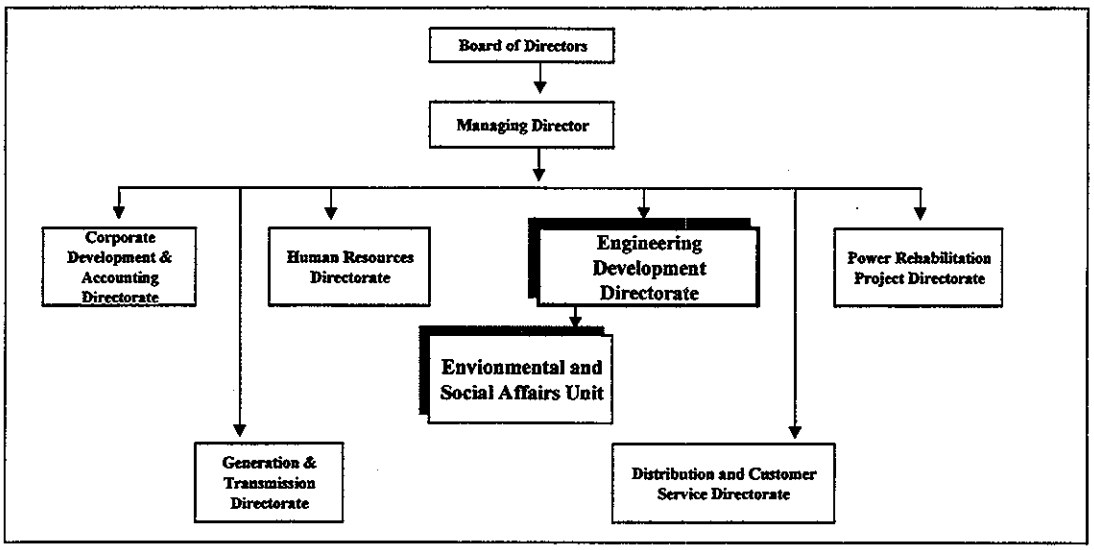


Figure 7-1. Position of the Environmental and Social Affairs Unit at ZESCO

656

- conducting community affairs programme and communications programmes to ensure that government agencies, non-governments organisations and the public understand the operations and projects being managed by ZESCO;
- managing programmes and consultants for environmental and socio-economic aspects of power generation, transmission and distribution;
- training ZESCO engineering and operations staff in environmental and social issues;
- managing land acquisition and resettlement programmes; and
- assessing overall electrification conservation and alternative energy strategies.

The most notable projects initiated by the ESU to date, include:

- the PCB inventory and construction of a temporary disposal facility at Siavonga;
- EIAs of all new projects;
- development of a Terms of Reference for an Integrated Kafue River Basin EIA;
- remediation plans for the oil spills at the diesel power plants;
- management of the Gwembe-Tonga Development Project;
- resettlement and compensation studies;
- Project Briefs for a number of projects, such as the PCB storage facility and the Copperbelt Rehabiliation Project to strengthen distribution.

Against this background, the following discussion revolves around the future options for the ESU, under the three privatisation options under detailed consideration in this study.[1]

7.1 Option 1- Concessioning the Whole Company

This option involves awarding the whole power company to one concessionaire for a period ranging from 10-25 years. Under this scenario, there is no need for any changes to be made to the position of the ESU within the organisation, or its roles and responsibilities.

7.2 Option 2- Separating the Company Into Business Units

Under Option 2, it is proposed to unbundled ZESCO into separate Business Units eg Generation, Transmission, Distribution etc, which would then be available for sale, joint venture partnerships or concessions. Under this scenario, there are several possibilities for the ESU:

1. the unit could be placed in one of the Business Units e.g. Generation, with agreements to work with the other Business Units on specific tasks when required;

[1] Six options were originally considered in our study. These were reduced to three for more detailed analysis. The screening process used in the selection of the three options is presented in the Task 2A Report. The numbering of the options is based on the original six that were considered.

657

2. the unit could amalgamate with a government body, such as the ECZ and serve all the Business Units;

3. the unit could be sold as a separate independent Business Unit on its own, which would then consult to anyone, including the power sector;

4. split up the ESU and place personnel in each of the main operational Business Units e.g. Generation, Transmission, Distribution.

If the focus of privatization Option 2 is to pursue core business only, and to hive off all non-core activities, scenario 3 would be the most attractive. The unit would continue to function as at present, but with a much greater degree of autonomy, independence and freedom to conduct other work. The unit would also have greater scope to grow the business and improve financial efficiency and productivity.

It is unlikely that scenarios 1, 2 and 4 would work in practice.

7.3 Option 4- Master Concession for the Whole Company

The third privatisation option being considered (known as Option 4) is to award a Master Concession responsible for the power sector, with different business or functional units being managed through separate sub-contracts to concessionaires, Joint Ventures or private ownership. Under this option, the ESU could either continue working 'as is' for the master Concessionaire, serving all the sub-units, or it could be sold off as in Option 2 above.

658

8.1 Introduction

The objective of the Task 6 Report was to assess the current environmental liabilities of ZESCO's operations and to identify possible future environmental constraints and liabilities. The environmental liabilities were considered in terms of the following:

- public health;
- public safety;
- environmental health;
- public relations risks;
- financial costs (risks) of mitigation;
- compliance with international standards of best practice.

This Task 6 report is complimented by the Task 3 report, which addresses the legal, institutional and regulatory requirements for implementing the chosen private participation options.

The methodology employed was a combination of meetings, site visits and an extensive review of relevant literature. The following sites were visited:

- The Power Stations at Kafue Gorge, Kariba North Bank and Victoria Falls;
- The sub-stations at Kitwe and Luano;
- The PCB temporary disposal sites at Kariba and Luano;
- The workshops at Lusaka and Ndola;
- The villages and associated infrastructure at Kafue, Itezhi Tezhi and Victoria Falls;
- The Itezhi Tezhi dam and future power station site;
- The Gwembe-Tonga Project;
- The Kantolomba Township compensation scheme;
- The abandoned thermal power stations at Lusaka and Ndola.

The environmental study would have benefited from a longer time frame to allow visits to be made to the remote diesel plants and small hydro schemes, but the size of the country and the very poor state of the transport infrastructure militated against this. The conclusions in the report regarding these schemes have therefore been based on hearsay and photographic evidence.

8.2 The Future of the Environmental and Social Affairs Unit

The 1995 Sectoral Environmental Assessment undertaken by Komex, as part of the PRP, identified the fact that ZESCO did not have a department dedicated to environmental and socio-economic issues, even though it operated hydroelectric plants which have a major impact on the environment and affected populations. Furthermore, at the time of the Sectoral report, the EIA regulations were in the process of being promulgated, which required all new projects relating to power generation, transmission and distribution, to submit a Project Brief and/or an EIA depending on the project size, to the newly formed Environmental Council of Zambia.

It was therefore recommended in the Sectoral Report that an Environmental and Social Affairs Unit (ESU) should be established in ZESCO, and that it should fall under the Director, Engineering Development.

Up until ZESCO formed the Environmental and Social Affairs Unit in 1996, very little attention had been paid to environmental matters, but since then, several important initiatives have been taken, based on the findings and recommendations of the Komex report.

The most notable projects initiated by the ESU to date, include:

- the PCB inventory and construction of a temporary disposal facility at Siavonga;
- EIAs of all new projects;
- development of a Terms of Reference for an Integrated Kafue River Basin EIA;
- remediation plans for the oil spills at the diesel power plants;
- management of the Gwembe-Tonga Development Project;
- resettlement and compensation studies;
- Project Briefs for a number of projects, such as the PCB storage facility and the Copperbelt Rehabilitation Project to strengthen distribution.

The future role of the ESU was examined according to three options for privatisation. The first option involves awarding the whole power company to one concessionaire for a period ranging from 10-25 years. Under this scenario, there is no need for any changes to be made to the position of the ESU within the organisation, or its roles and responsibilities.

Under Option 2, it is proposed to unbundled ZESCO into separate Business Units e.g. Generation, Transmission, Distribution etc, which would then be available for sale, joint venture partnerships or concessions. Under this scenario, the most suitable scenario for the ESU is to sell the Unit as a separate independent Business Unit, which would then consult to anyone, including the power sector.

The third privatization option being considered (known as Option 4) is to award a Master Concession, which would be responsible for the power sector, with different business or functional units being managed through separate sub-contracts to concessionaires, Joint Ventures or private ownership. Under this option, the ESU could either continue working 'as is' for the master Concessionaire, serving all the sub-units, or it could be sold off as proposed in Option 2 above.

8.3 Current Environmental Liabilities

The lack of funding and resources within ZESCO in the past, together with the lack of a legal framework for EIAs, has resulted in a number of direct and indirect environmental liabilities, which pose a risk to the environment in its widest context. The major environmental liabilities include:

- complete removal of PCBs and ultimate out-of-country disposal;
- waste oil disposal and clean-up of contaminated soil;
- scrap metal and transformer carcass disposal;
- lack of detailed studies on downstream river systems and the socio-ecology thereof;

- lack of communication with downstream users and stakeholders regarding water releases;
- inadequate water supply and sanitation in the compounds at Itezhi Tezhi, Kafue Gorge and Victoria Falls;
- replacement of asbestos building materials in the compound houses at Itezhi Tezhi, Kafue Gorge and Victoria Falls;
- vandalism of transformers and steel towers.

Furthermore, ZESCO has become involved in the Gwembe-Tonga Development Project, which is a significant social issue, with severe environmental consequences. ZESCO is also involved in a number of other non-core activities which have some degree of risk, e.g. the provision of water, sanitation and maintenance services to ZESCO and non-ZESCO employees in the compounds associated with some of their facilities.

8.4 Future Environmental Constraints

All new schemes for power generation, transmission and related infrastructure will be required to submit an EIA report according to the EIA Regulations (1997), made in terms of the Environmental Protection and Pollution Control Act (No 12 of 1997). Furthermore, Zambia is a signatory to a number of international environmental conventions. The Environmental Council of Zambia (ECZ), will be mindful of these international obligations when reviewing all proposed new schemes, as well as the WCD's 'New Framework for Decision-Making'.

The ECZ has also indicated that they will look more favourably upon those schemes which promote multiple use of the dam and water e.g. for recession and irrigation agriculture, fisheries, water supply, tourism and recreation. All future dams will also be required to have fish ladders. Future water rights will be allocated at a catchment management level and the Water Act is in the process of being revised to this effect. It is also possible that future hydroelectric projects will have to pay for their water.

Several new projects have been proposed, both large and small. The most economically viable large schemes are:

- the construction of a power house at Itezhi Tezhi Dam;
- The Kafue Gorge Lower Hydroelectric Project;
- Batoka Gorge.

The environmental impacts of the Itezhi Tezhi and Kafue Gorge Lower projects are relatively low due to the fact that significant environmental alteration has already occurred as a result of previous schemes. The proposed Batoka Gorge project will have unacceptable impacts on the ecology of the gorge, on river-based tourist activities in the gorge, and on the aesthetics of the gorge for visitors to the Victoria Falls and the adjacent National Parks, both in Zambia and Zimbabwe. Given that the Victoria Falls is a Natural Heritage Site, is one of the seven natural wonders of the world and attracts tourists from around the world, any such scheme would receive global condemnation. The current cost estimates for this project have not sufficiently taken into account the environmental, social and public relations costs that would be involved. If these were to be taken into account, the economic viability of the scheme would be compromised.

661

8.5 Recommendations

On the basis of the findings of this study, the following recommendations can be grouped into three categories: current liabilities; possible future issues; and Gwembe-Tonga issues.

Current Liabilities

- all PCBs should be removed to the temporary storage sites as soon as possible. The construction of the Luano site is critical in this regard;
- the diesel power plants are old, and expensive to maintain and run, with limited financial returns. They are causing significant, local pollution of water courses, soil and air. It is recommended that these plants should be phased out and replaced with cleaner and cheaper forms of energy e.g. solar systems, connection to grid power, development of woodlots etc.
- there needs to be a concerted clean-up of oil-contaminated soil country-wide using mini bioreactors as simple and relatively cheap means of remediation.
- a comprehensive waste management plan needs to be developed to deal with the waste being generated at each of ZESCO's facilities;
- a future investor needs to work with the authorities to solve the weed problems at the various affected facilities;
- a future investor needs to work with the authorities regarding the setting up of a Kafue Catchment Management Authority, or similar body, in order to resolve issues relating to dam releases, communication systems, deforestation and so on;
- a study needs to be carried out to investigate the state of the asbestos roofing material used in most of the company houses, and a replacement programme should probably be implemented;
- a new investor needs to continue with some of the current environmental programmes e.g. the Victoria Falls rehabilitation programme, the installation of oil interceptors at the diesel plants etc;
- an innovative and integrated approach is required to address the provision of cheap and clean energy to urban and rural populations.

Future Issues

- Cognisance needs to be given to the recommendations of the World Commission on Dams report regarding future environmental, social and consultative responsibilities. Future funding agencies will probably adopt the proposed WCD guidelines when evaluating future projects.

662

Gwembe-Tonga Issues

- Clear delineation of the roles, responsibilities and functions of ZESCO, the ESU, and the MEWD needs to be undertaken in order to clarify the magnitude and extent of the environmental liabilities that a new investor might inherit;

- funding for the removal of land mines in the Gwembe-Tonga area needs to be secured as a matter of urgency to prevent any more needless deaths and to speed up service delivery to the affected communities.

Bechtel National, Inc. (November 2000): "Private Participation Options Study for the Zambia Electricity Supply Company". Task 1 Draft Report – Situation Assessment and Need for Private Participation. Submitted to the Zambian Privatisation Agency.

Chipungu, PM and Kunda, DM (eds): "State of Environment Report for Zambia 1994".

Department of Energy (in press): Summary of the Energy Statistcs Bulletin.

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH (July 2000): "Measures to Implement the UN FCCC, Zambia Country Study on Climate Change – Inventories and Mitigation Analysis".

EKONO (1998): "Twenty Year Power System Development Plan for Zambia".

Environmental Council of Zambia (June 2000): "Kafue River Nutrient Loading Study, Main Report – Final version, Volume II".

Gwembe-Tonga Development Project (undated): "Fund Requirements for Landmine Clearance". Zambia: Power Rehabilitation Project Credit No. Cr.3042.ZM.

Harrison, J.A. *et al.* (Eds) (1997): "The Atlas of Southern African Birds: Volume 1: Non-passerines". BirdLife South Africa, Johannesburg.

Harza Engineering Company International (April 1999): "Itezhi Tezhi Hydroelectric Project: Environmental Impact Assessment".

Inversin, A.R. "Harnessing Complementary Strengths for Development: Linking Rural Electrification and Forestry". In Komex, 1995, Appendices.

Komex International Limited (March 1997): "Environmental Assessment and Management Plan for the Victoria Falls Power Station Rehabilitation and Refurbishment Program" prepared for Zambia Electricity Supply Corporation Limited. Reference No: K196-4367.

Komex International Limited (September 1995): "Sectoral Environment Assessment Scoping and Reconnaissance" prepared for Zambia: Power Sector Rehabilitation Program. Reference No. K195-4165. Report and Appendices.

Ministry of Environment and Natural Resources (1994): "The National Environmental Action Plan".

PCB Sub Project Working Team, ZESCO (undated): "Environmental Project Brief - Kariba North Bank Power Station, PCB Storage Facility".

Ragsdale Associates (1995): "Back to Office Report for Zambia: Power Rehabilitation Project Sectoral Environmental Assessment". Unpublished Report for World Bank, Washington.

Ragsdale Associates (1995): "Zambia: Issues of Urban Electrification and Land Tenure Insecurity". Unpublished Report for World Bank, Washington.

Republic of Zambia, "The Environmental Protection and Pollution Control Act (Act No. 12 of 1990), Chapter 204 of the Laws of Zambia".

Sirton, C.H. (Ed) (1987): "Plant Invaders: Beautiful but Dangerous". Botanical Research Institute, Department of Agricultural Technical Services, Cape Town.

The Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, 1997, made in terms of The Environmental Protection and Pollution Control Act (Act No. 12 of 1990)".

V3 Consulting Engineers (June 2000): "Lusaka Integrated Development Plan".

Wagner UK, and Sabathy, D (October, 1998): Letter from Environmental Technology International Ltd (ETI) to C Chitundu of ZESCO regarding "Kariba Power Station, Removal and Disposal of Hazardous PCB Equipment, ETI Quotation No. 98-10-981".

Walmsley Environmental Consultants (1998): "Project Brief for a Route Selection Study and Environmental Assesment of a 132 kV Power Line from Livingstone to Katima Mulilo". Unpublished Report to ZESCO and NamPower.

Watts On (2000): "SADC Countries to Fight Poison in Obsolete Transformers". Volume 22, October 2000. Newsletter of NamPower, Namibia.

World Commission on Dams (2000). "Dams and Development: A New Framework for Decision-Making".

ZESCO (June 1999), "Integrated Kafue River Basin Environmental Impact Assessment, Draft Terms of Reference".

ZESCO ESU (undated): "Kariba North Bank Rehabilitation Project, Project Brief".

ZESCO, Environmental and Social Affairs Unit (October 2000): "Copperbelt Rehabilitation Project: Project Brief".

Appendix A List of People Interviewed

ZESCO

- Dr Akim Tembo, Head of Environmental and Social Affairs Unit (ESU)
- Elenestina Mwelwa, Environmental and Social Affairs Unit (ESU)
- Mellon Chinjila, Environmental and Social Affairs Unit (ESU)
- Zondwayo Ndhlovu, Environmental and Social Affairs Unit (ESU)
- Kenneth Konga, Director of Corporate Development and Administration
- Mr Nyirenda, Senior Manager, Generation and Transmission Development
- Cyprian Chitundu, Project Manager, Generation for the Power Rehabilitation Project
- Matthew Phiri, Manager, Kafue Gorge Power Station
- Bornwell Sinkala, Civil Engineer, Kafue Gorge Power Station
- Wesley Lwiindi, Site Manager for Kariba North PS Power Rehabilitation Project (PRP), Kariba North Bank Power Station
- Claire Limbwambwa, Project Manager, Gwembe-Tonga Development Project
- Romas Kamanga, Resident Engineer, Itezhi Tezhi Dam
- Eddie Kawesha, Manager of Power Rehabilitation Project in Copperbelt
- George Chavula, Assistant to the Manager, Luano Sub-station
- John Chisango, Sub-station Manager, Kitwe 330 kV Sub-station
- Mr Chanda, ZESCO Line Maintenance Engineer
- Justine Loonga, Principal Electrical Engineer, Victoria Falls Power Station
- Abraham Sashi, Principal Operations Engineer, Victoria Falls Power Station

Authorities

- Edward Zulu, Director, Environmental Council of Zambia (ECZ)
- Nelson Manda, Project Manager of the PCB programme, ECZ
- Dr Glynn Khonje, Director of the Department of Physical Planning and Housing, Ministry of Local Government and Housing
- Mr Magusu, Director of the Department of Fisheries, Department of Fisheries, Chilanga
- Mr Maluti, Chief Fisheries Development Officer, Department of Fisheries, Chilanga
- Mr Chilimunda, Chief Fisheries Training Instructor, Department of Fisheries, Chilanga
- T Zulu, Chief Fisheries Training Officer, Department of Fisheries, Chilanga
- Wilfred Serenje, Director of the Department of Energy, Department of Energy
- Francis Muwowo, Acting Town Clerk, Lusaka City Council

Other

- Jim Duncan, PriceWaterhouseCoopers
- Sree Kumar, PriceWaterhouseCoopers
- Norman Mbazima, Deloitte and Touche, Project Manager, Formation of the Zambian Wildlife Authority (ZAWA)
- Manager, Safaris par Excellence, Livingstone
- Trevor Volker, Shearwater Safaris, Victoria Falls

Appendix B Plates

The following plates are included in this section:

1 The Itezhi Tezhi dam. Note dam monitoring installations at toe of dam.

2 Rapid sand filters at Itezhi Tezhi water treatment plant.

3 The upper sewage stabilisation pond at Itezhi Tezhi.

4 Unsterilised sewage sludge available for collection by the local community.

5 The Itezhi Tezhi workshops. Note oil spillage on the ground.

6 Dam releases can have serious environmental and social consequences for the Kafue Flats.

7 The Kafue Gorge Upper Hydroelectric dam. Note booms to protect the power station intakes from water hyacinth, which is evident along the edge of the dam and outer boom.

8 View of the Kafue Gorge Upper Hydroelectric Power Station. The power station is situated underground and is accessed via the yellow shaft. Note effects of deforestation.

9 Part of the workshop site at Kafue Gorge. Note oil spills.

10 View of the ZESCO Training Centre at Kafue Gorge and part of the village.

11 The Kafue Gorge waste disposal site.

12 Under-cover storage site for PCB-contaminated transformer carcasses at KNBC, Siavonga.

13 Storage area for PCB oils and capacitors in sea containers.

14 Aerial view of the intake structures on the north bank. Note the flow in the Eastern Falls (April 1997) and the relationship between the East Gorge, Knife Edge walk and Palm Grove (far right).

15 The 48 MW intake structure at Victoria Falls.

16 Dry Eastern Cataract (November 2000) at the end of the dry season when river flows are at their lowest. Compare with Plate 14.

17 Boom to protect intake structures from water hyacinth. Note presence of weed on left side of photograph.

18 Scour siphon discharge at the eastern end of the Falls. Note dry condition of vegetation along the Knife Edge and compare with Plate 14.

19 Palm Grove Gorge.

20 Aerial view of the Victoria Falls Power Station at the end of the Third Gorge. The Victoria Falls are just off the picture to the right. Palm Grove Gorge is bottom right of photo. The power stations are (from left to right): Station B (underground, tailrace visible), Station A and Station C. Note town of Victoria Falls in the distance.

21 The service trolley to the Power Station. Note pipes bringing power cables up from Station B, and Station C on right of photo.

22 Waste disposal site at Victoria Falls Power Station.

23 The staff compound at Victoria Falls. The Senior staff housing block is on the left and part of the Junior staff housing area is on the right foreground. The PS offices are located at centre right of the photo.

24 View of Third and Fourth Gorges from the proposed tea room.

25 Diesel storage tanks at Kabompo inside a bunded area. Note spillages on the ground outside the bunded area.

26 Old power plant at Lukulu, showing extensive soil contamination.

27 Air pollution at the Zambezi Diesel Power Plant.

28 Oil ditch at the Zambezi Diesel Power Plant.

29 Earthworks in preparation for the installation of oil interceptors at the Luangwa Power House.

30 Oil transformer carcasses at the Lusaka Workshop. Note leaking oil.

31 Oil transformer carcasses at the Ndola Workshop. Note oil puddles and old cooling tower in the background.

32 Oil storage site at Ndola Workshop. Note oil spillage.

33 Unbunded oil recycling tanks at Kitwe Substation. Note spillage.

34 PCB-filled capacitors at Kitwe Substation.

35 Dump area at Kitwe Substation showing drums filled with capacitors and concrete, capacitors, scrap pylon components, old transformers etc.

36 Luano Substation showing the building which is reported to contain PCBs from CEC and housing construction in the background.

37 View of old Lusaka Power Station from the ZESCO stores area. Note old conveyor and chimney. A thin layer of coal covers the old coal stockpile site (foreground).

38 Location of possible future underground power house at Itezhi Tezhi.

39 Sahel-like conditions near Lusito.

40 Massive gully erosion in the Lusito area.

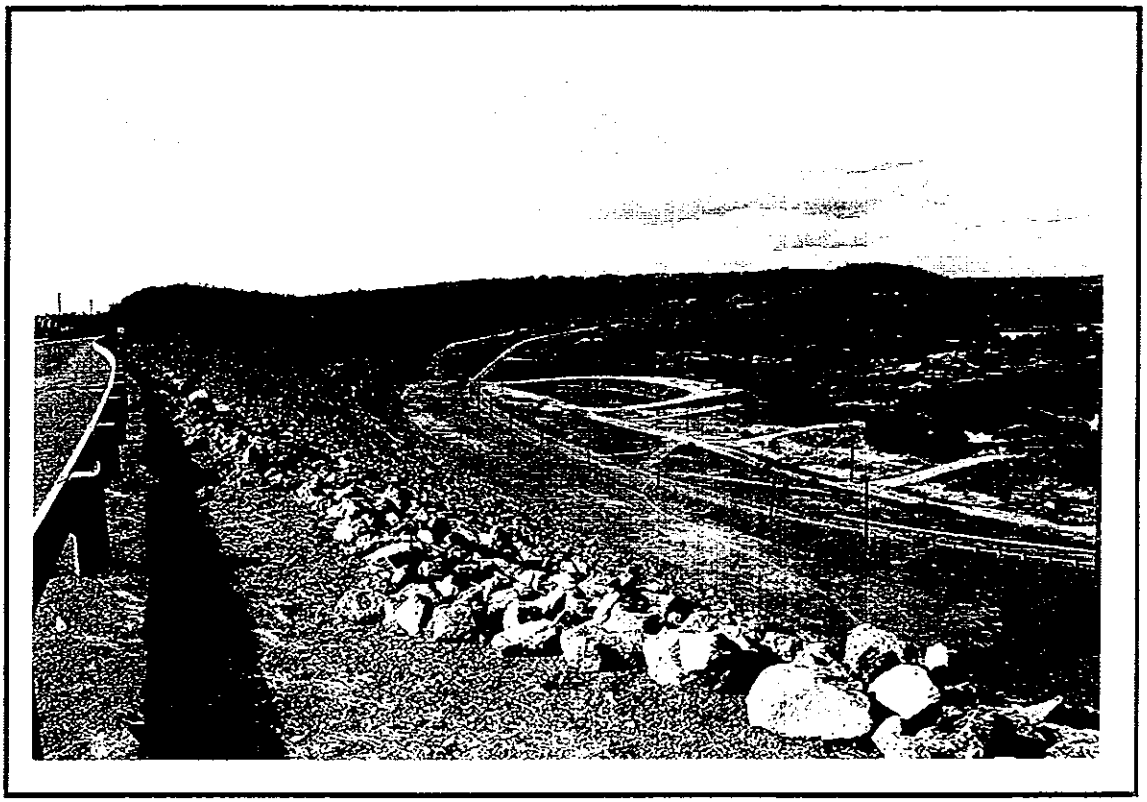


Plate 1: The Itezhi Tezhi dam. Note dam monitoring installations at toe of dam.

Plate 2: Rapid sand filters at Itezhi Tezhi water treatment plant.

Plate 3: The upper sewage stabilisation pond at Itezhi Tezhi.

Plate 4: Unsterilised sewage sludge available for collection by the local community.

Plate 5: The Itezhi Tezhi workshops. Note oil spillage on the ground.

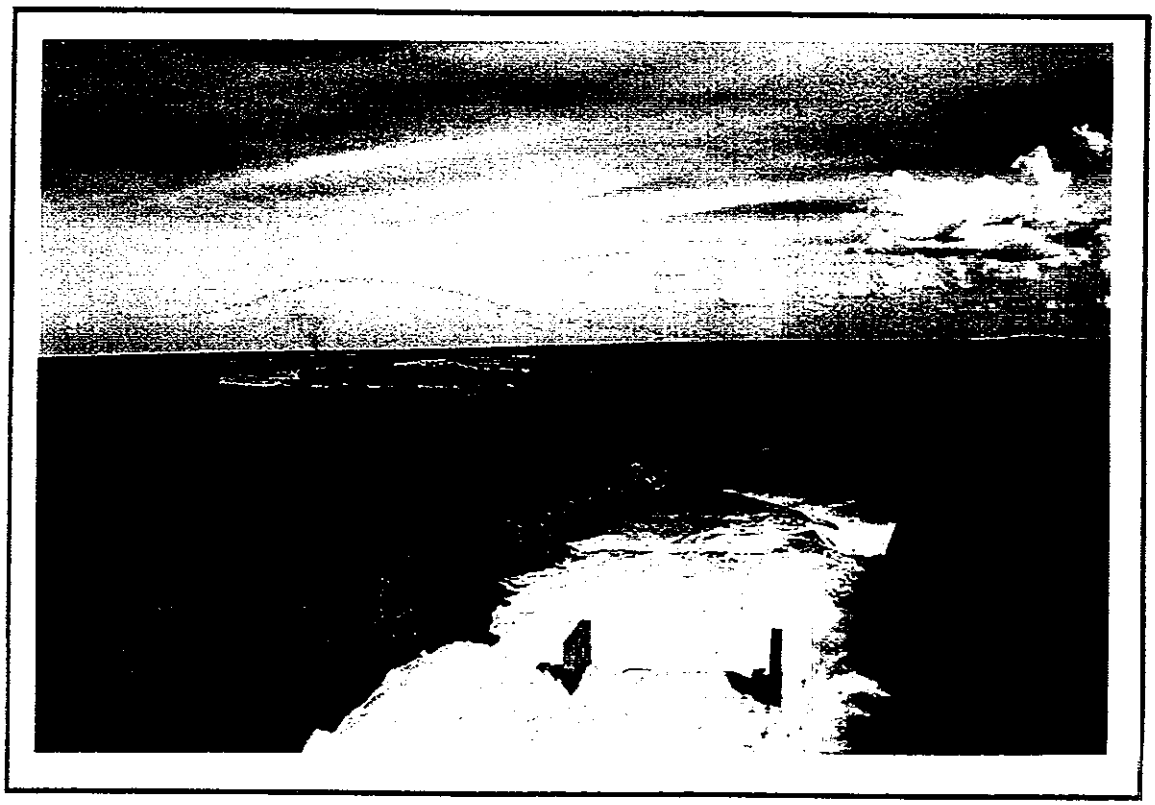


Plate 6: Dam releases can have serious environmental and social consequences for the Kafue Flats.

Plate 7: The Kafue Gorge Upper Hydroelectric dam. Note booms to protect the power station intakes from water hyacinth, which is evident along the edge of the dam and outer boom.

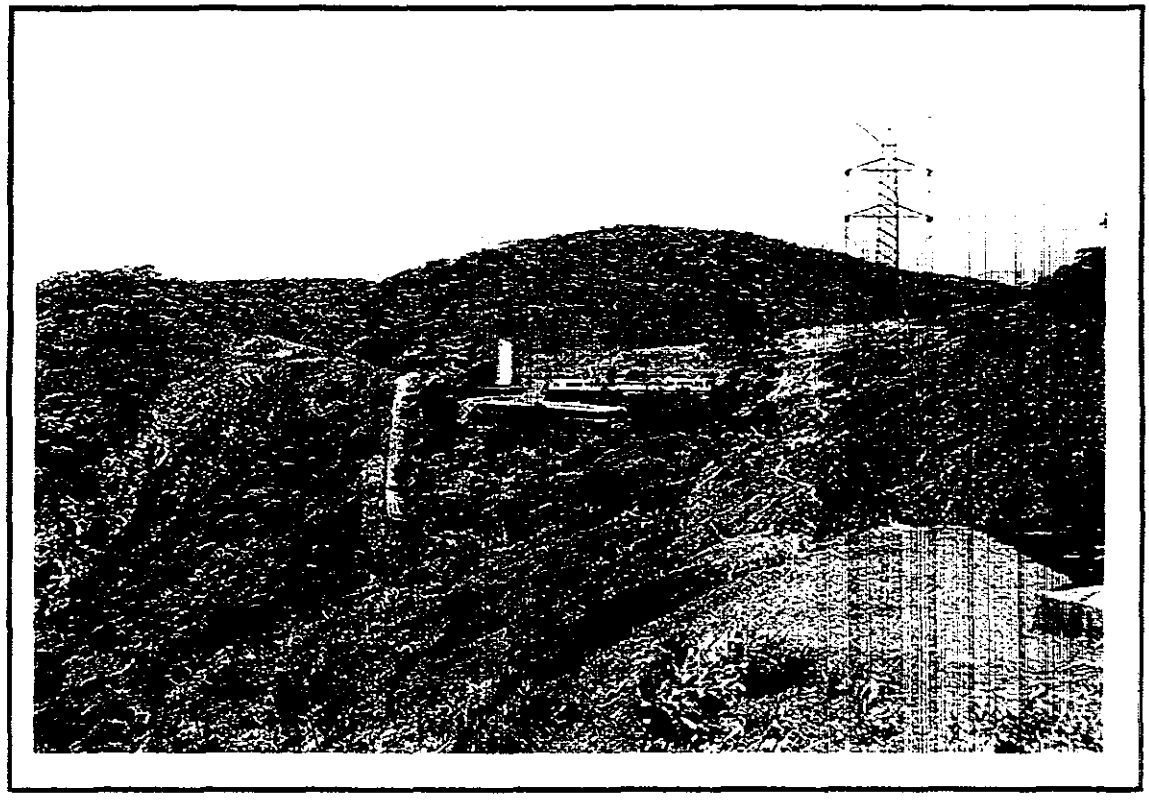


Plate 8: View of the Kafue Gorge Upper Hydroelectric Power Station. The power station is situated underground and is accessed via the yellow shaft. Note effects of deforestation.

Plate 9: Part of the workshop site at Kafue Gorge. Note oil spills.

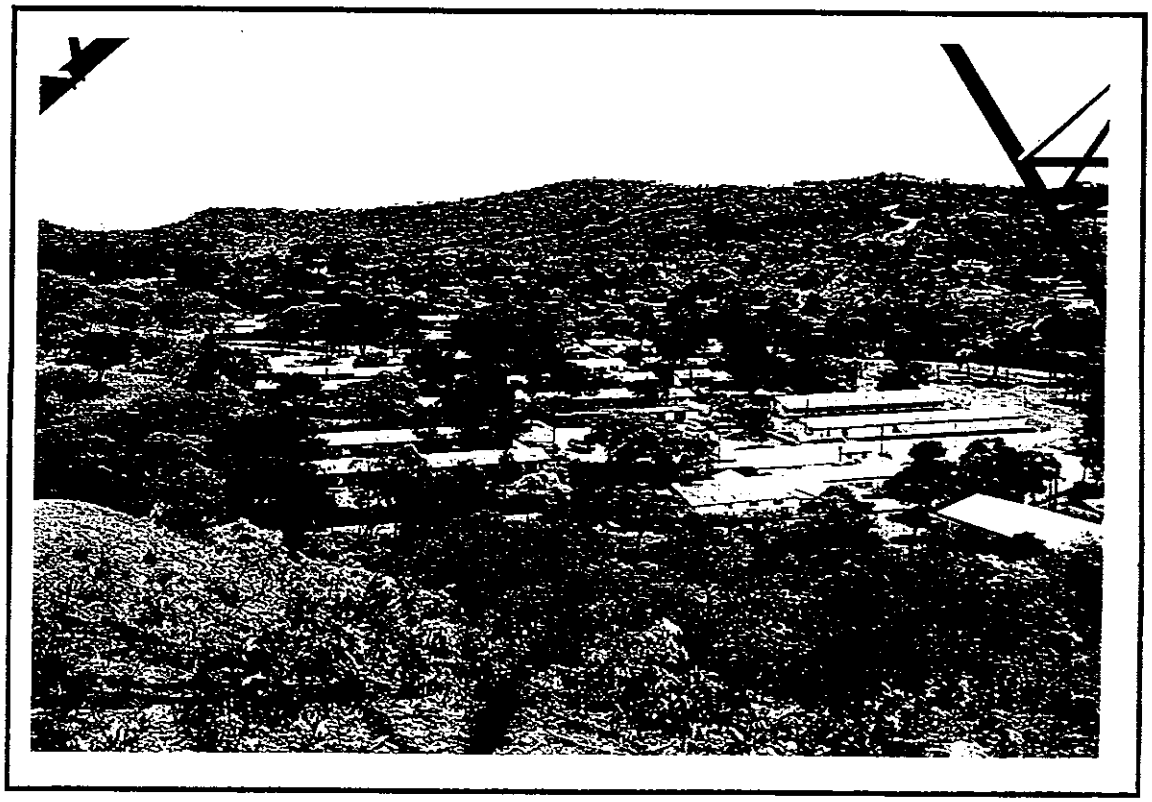


Plate 10: View of the ZESCO Training Centre at Kafue Gorge and part of the village.

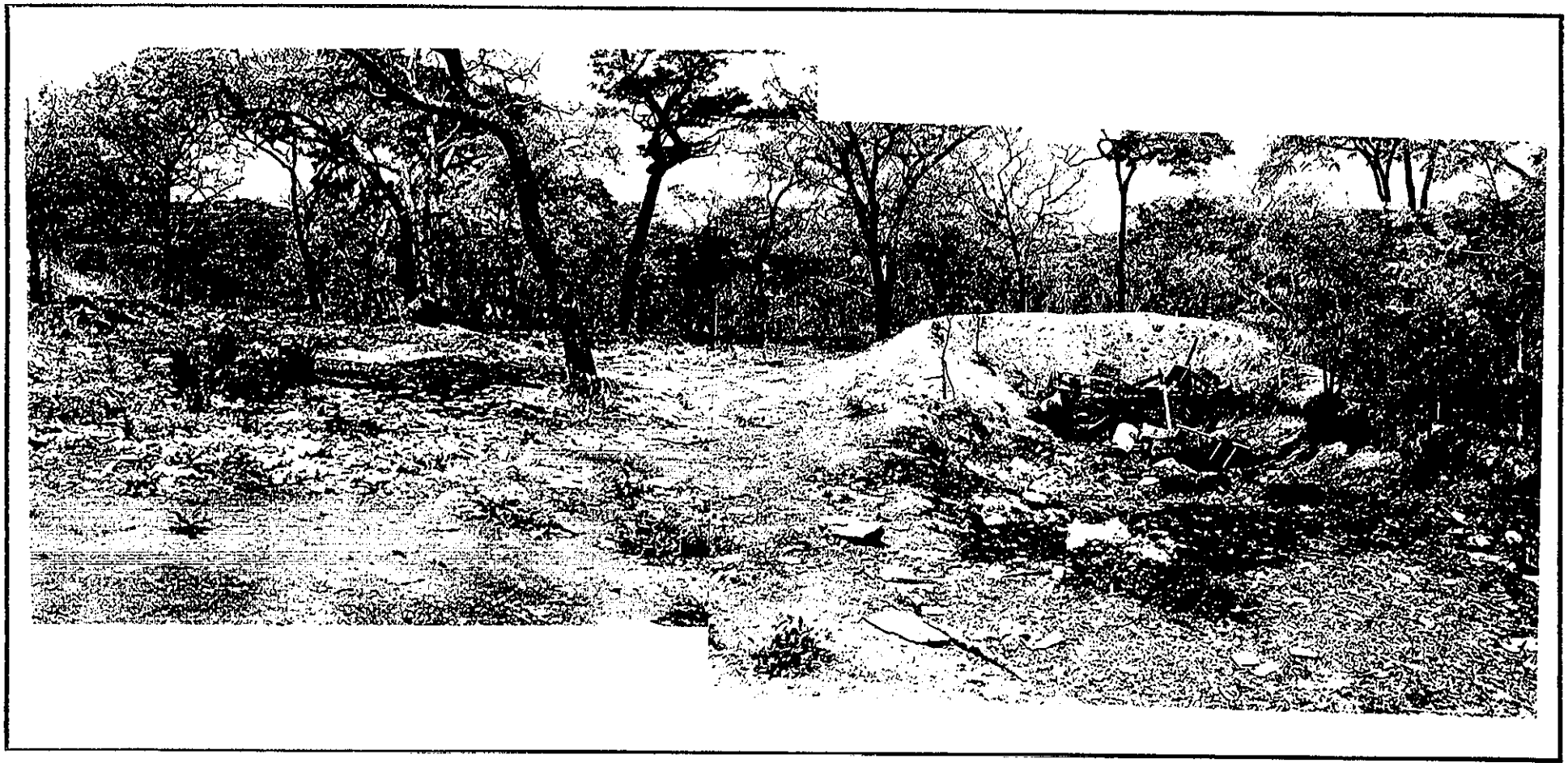


Plate 11: The Kafue Gorge waste disposal site.

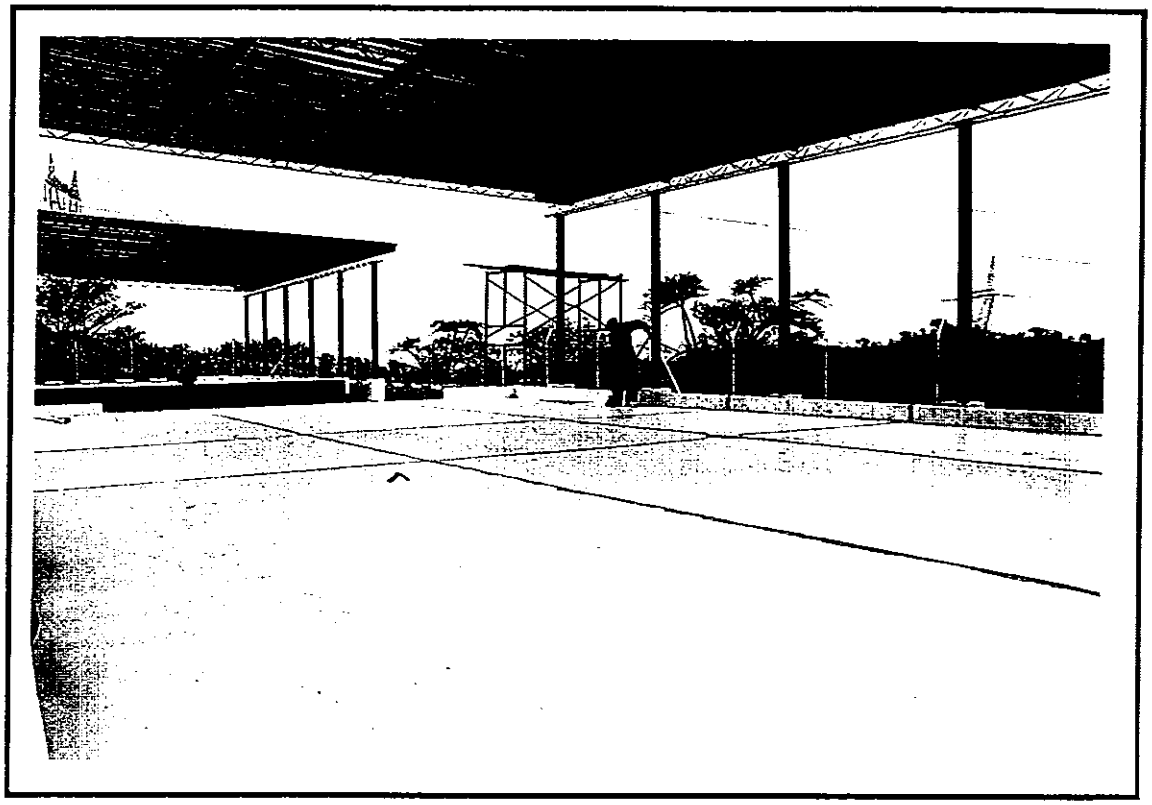


Plate 12: Under-cover storage site for PCB-contaminated transformer carcasses at KNBC, Siavonga.

Plate 13: Storage area for PCB oils and capacitors in sea containers.

Plate 14: Aerial view of the intake structures for the Victoria Falls Power Station on the north bank. Note the flow in the Eastern Falls (April 1997) and the relationship between the East Gorge, Knife Edge walk and Palm Grove (far right).

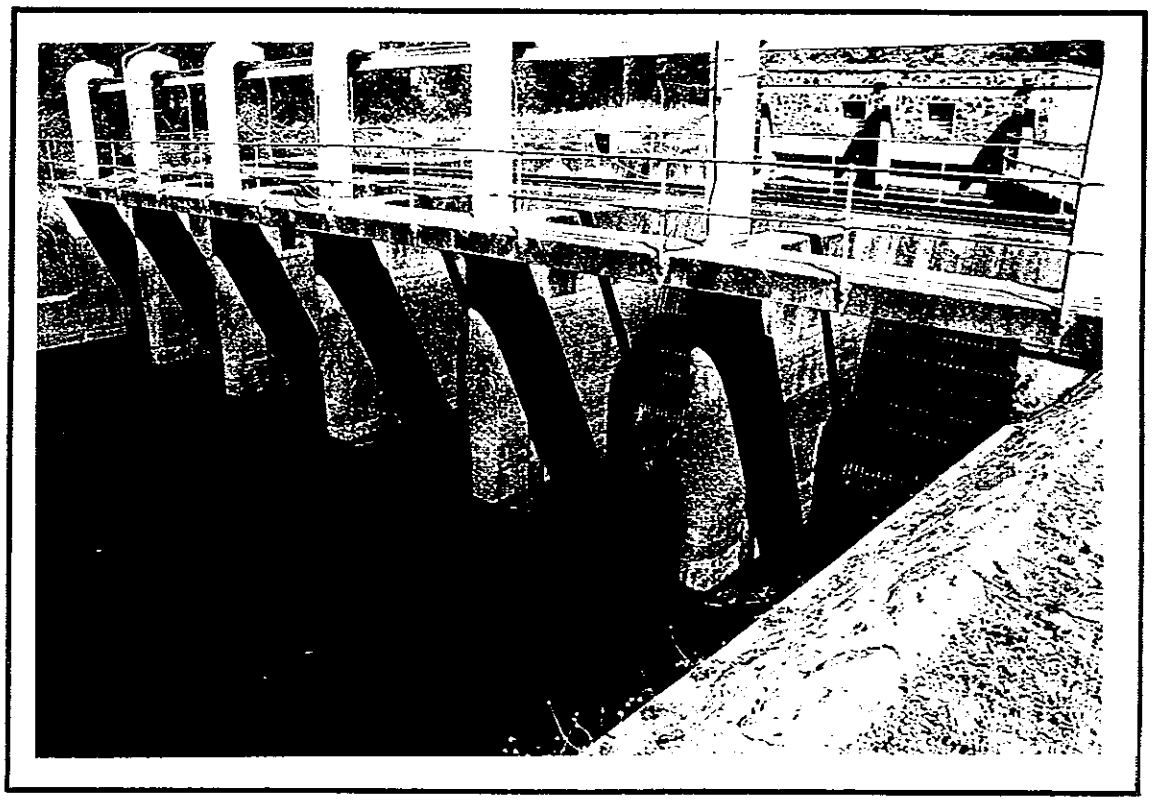


Plate 15: The 48 MW intake structure at Victoria Falls.

Plate 16: Dry Eastern Cataract (November 2000) at the end of the dry season when river flows are at their lowest. Compare with Plate 14.

Plate 17: Boom to protect intake structures from water hyacinth. Note presence of weed on left side of photograph.

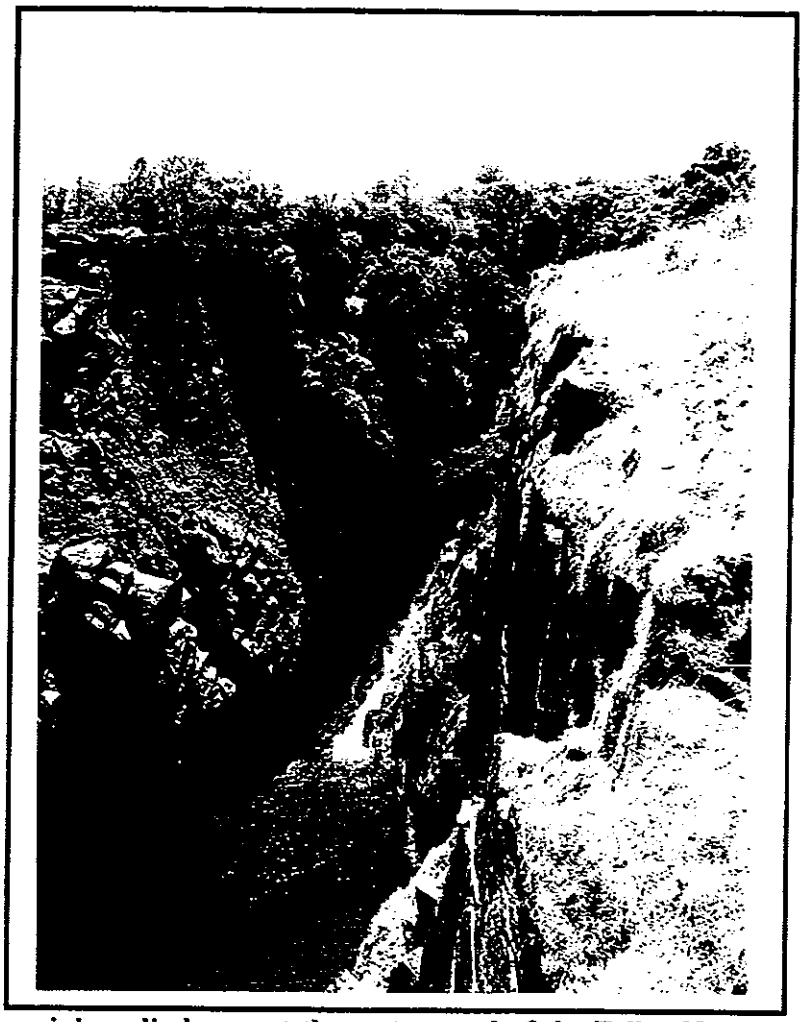


Plate 18: Scour siphon discharge at the eastern end of the Falls. Note dry condition of vegetation along the knife Edge and compare with Plate 14.

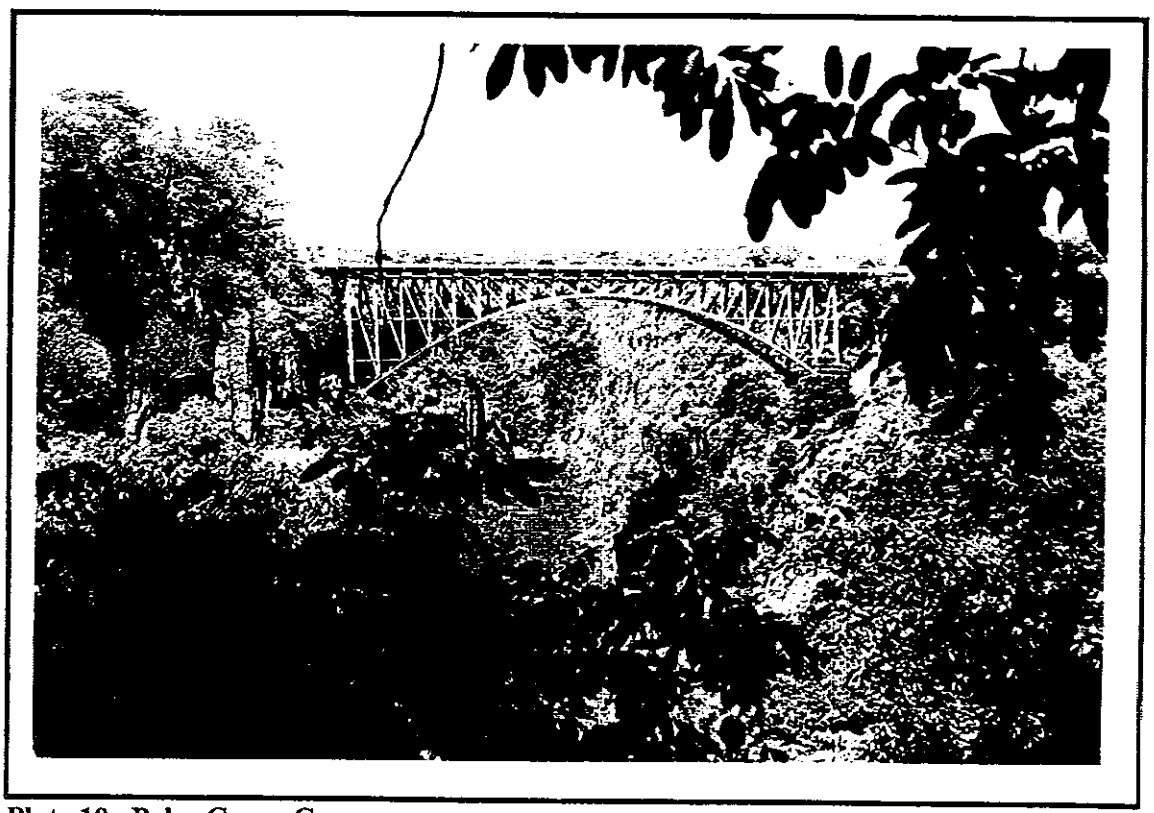


Plate 19: Palm Grove Gorge.

Plate 20: Aerial view of the Victoria Falls Power Station at the end of the Third Gorge. The Victoria Falls are just off the picture to the right. Palm Grove Gorge is bottom right of photo. The power stations are (from left to right): Station B (underground, tailrace visible), Station A and Station C. Note town of Victoria Falls in the distance.

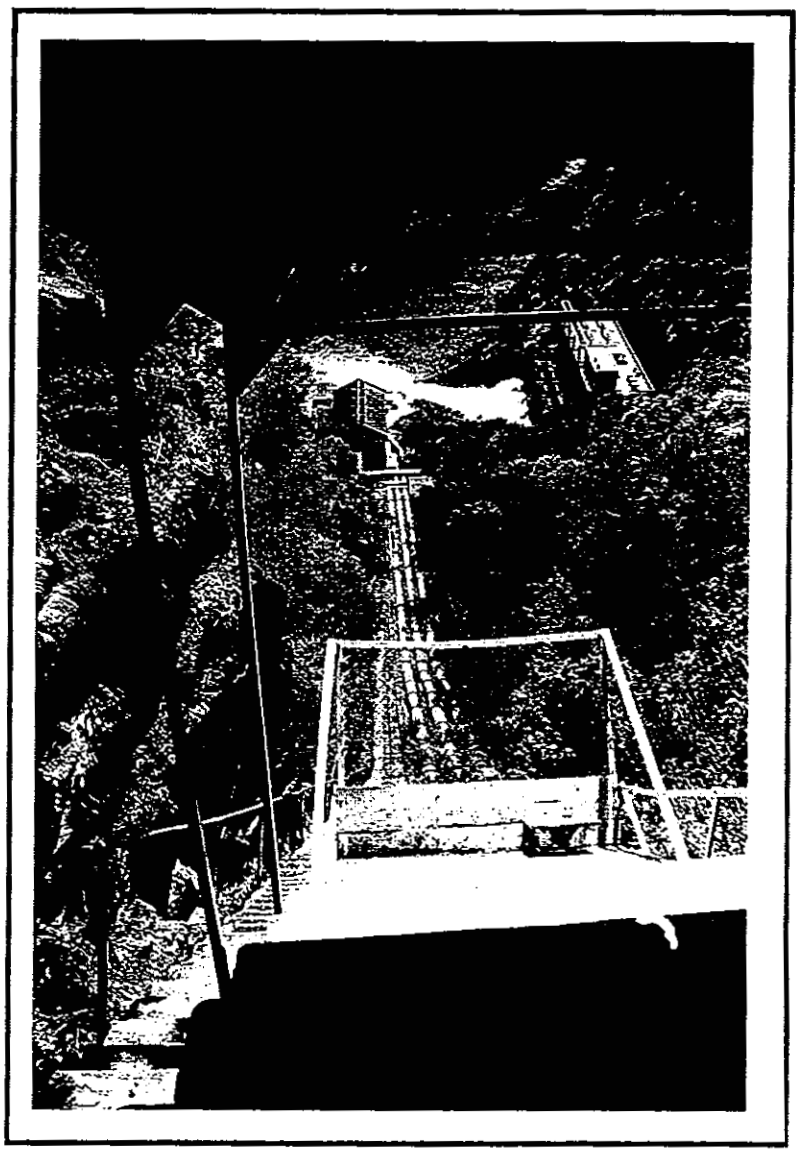


Plate 21: The service trolley to the Power Station. Note pipes bringing power cables up from Station B, and Station C on right of photo.

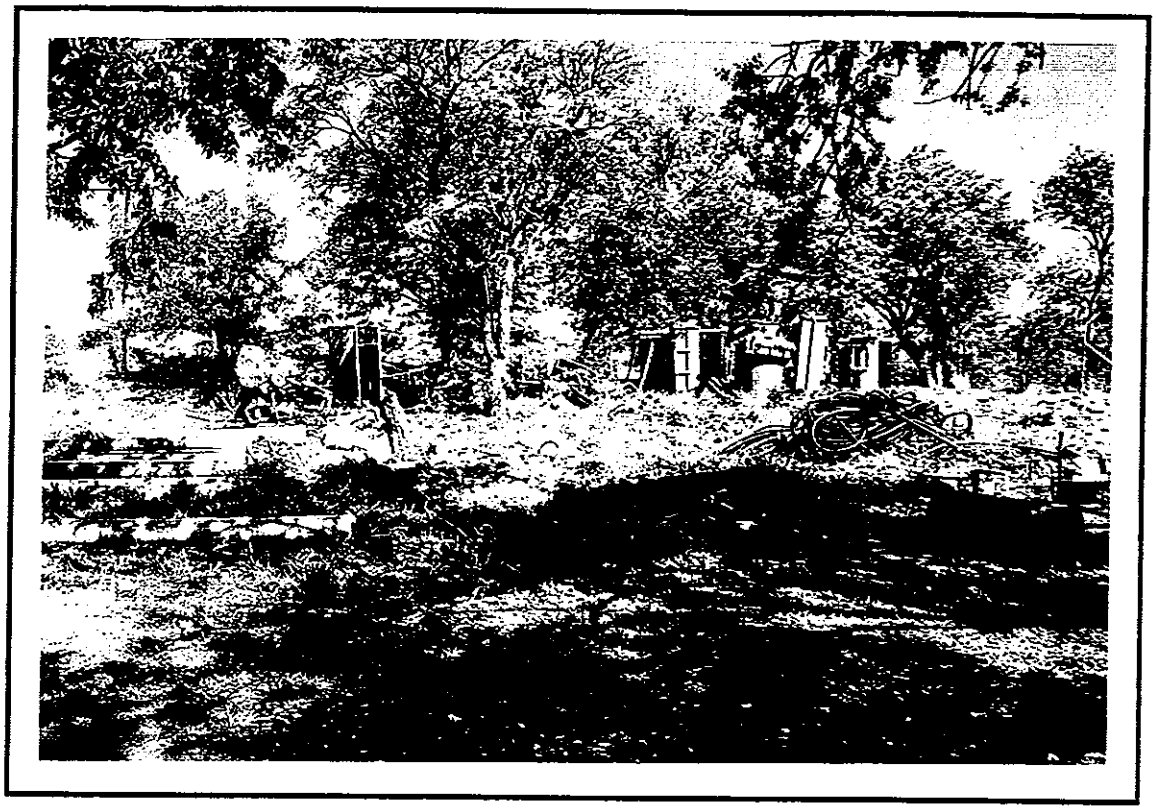


Plate 22: Waste disposal site at Victoria Falls Power Station.

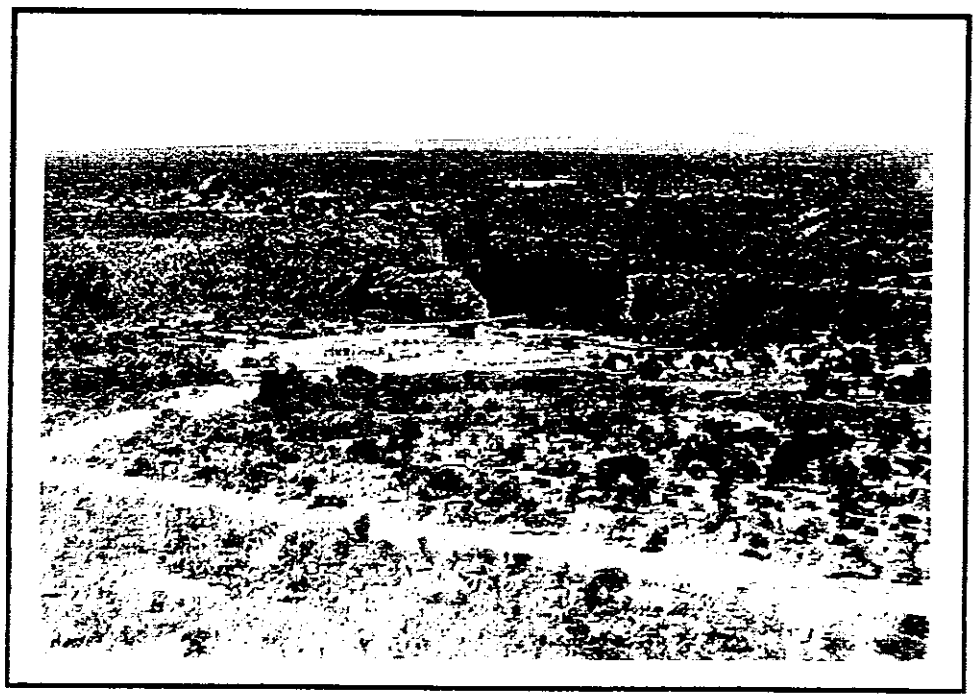


Plate 23: The staff compound at Victoria Falls. The Senior staff housing block is on the left and part of the Junior staff housing area is on the right foreground. The PS offices are located at centre right of the photo.

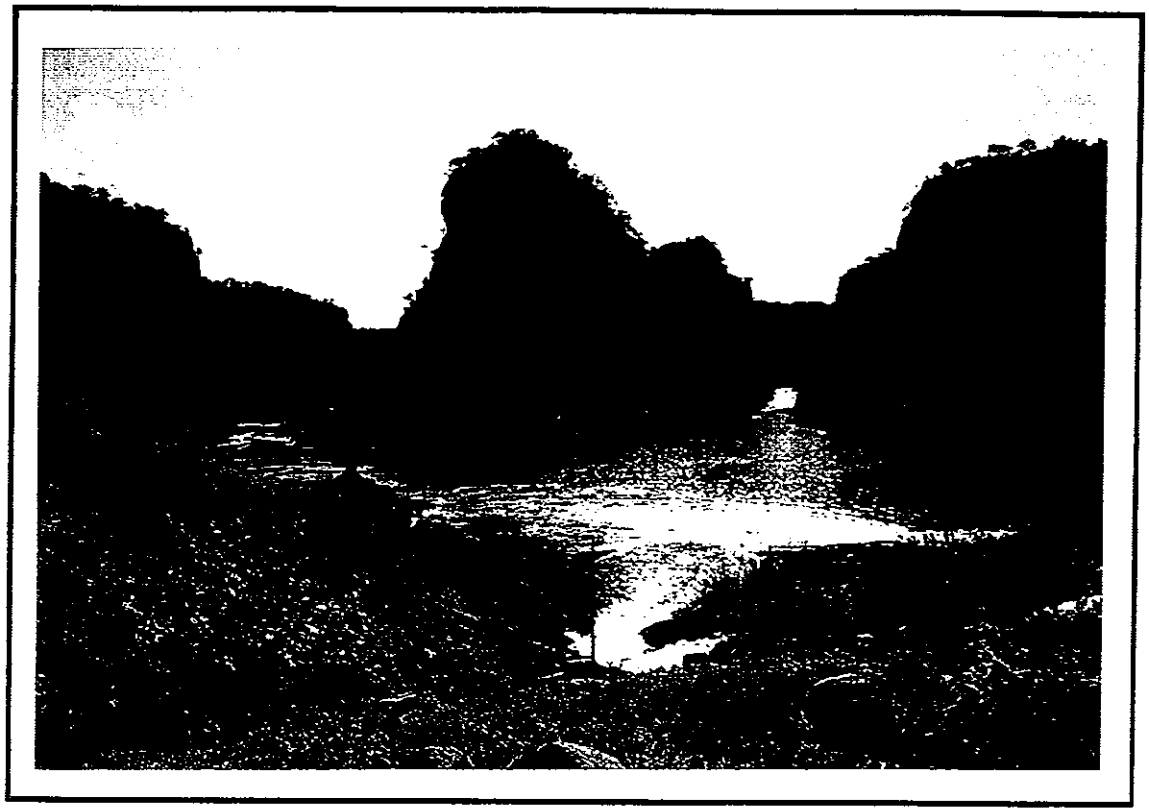


Plate 24: View of third and fourth Gorges from the proposed tea room.

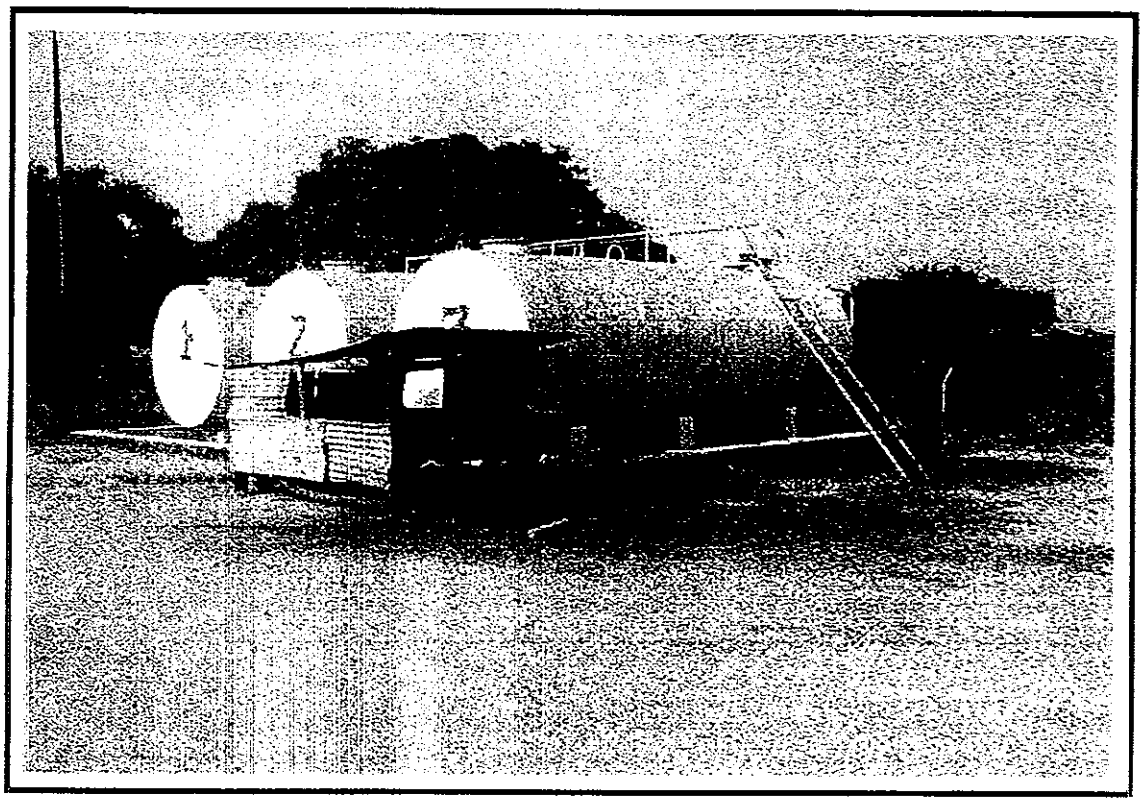


Plate 25: Diesel storage tanks at Kabompo inside a bunded area. Note spillages on the ground outside the bunded area.

Plate 26: Old power plant at Lukulu, showing extensive soil contamination.

Plate 27: Air pollution at the Zambezi Diesel Power Plant.

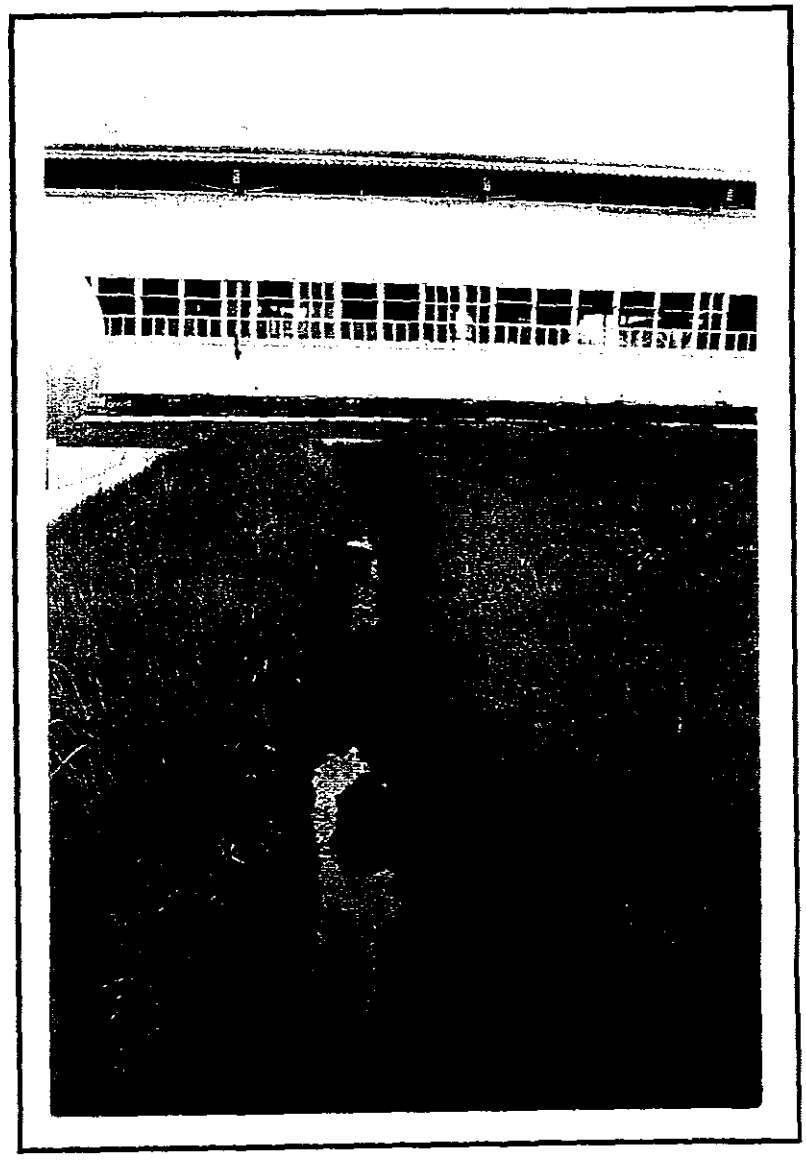


Plate 28: Oil ditch at the Zambezi Diesel Power Plant.

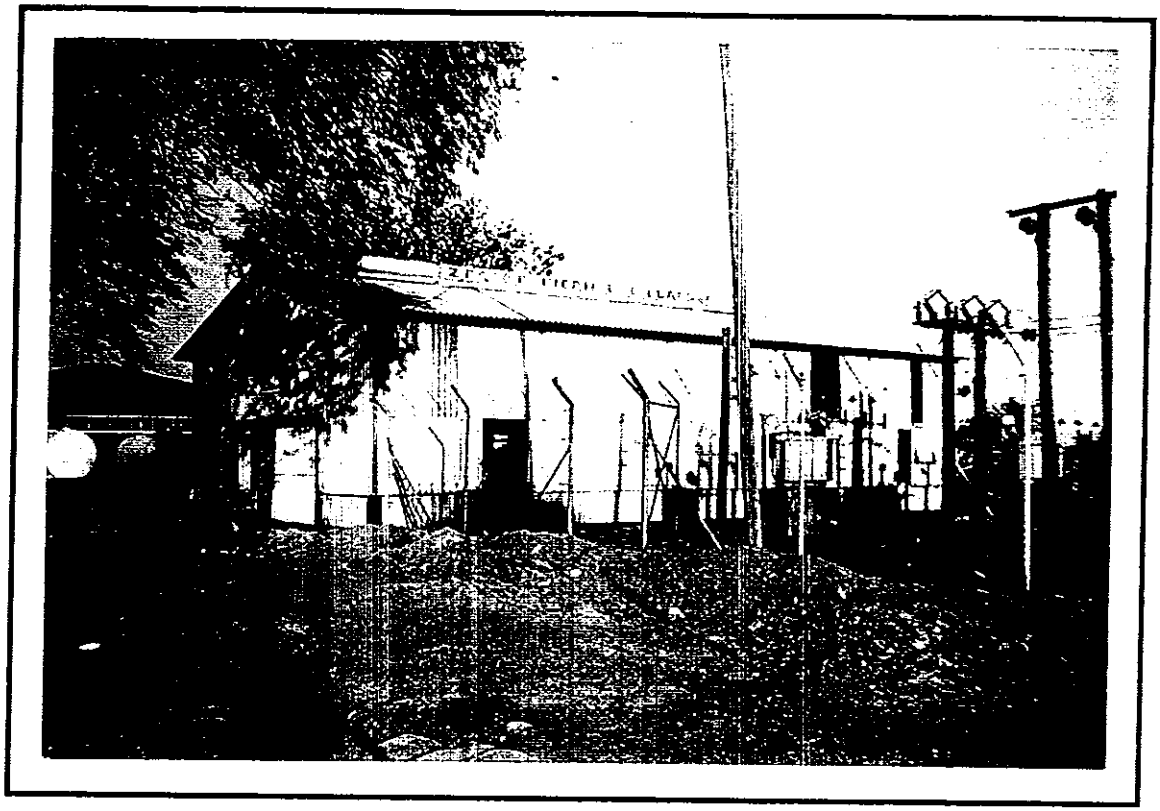


Plate 29: Earthworks in preparation for the installation of oil interceptors at the Luangwa Power House.

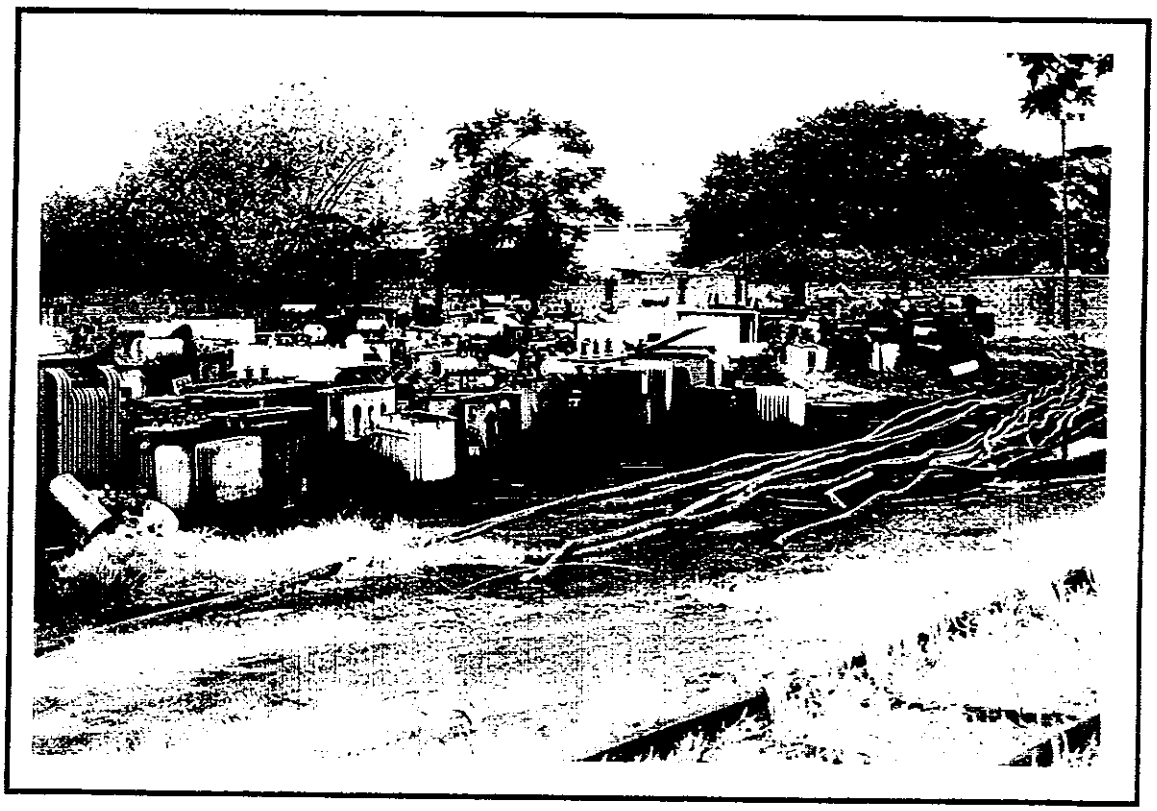


Plate 30: Oil transformer carcasses at the Lusaka Workshop. Note leaking oil.

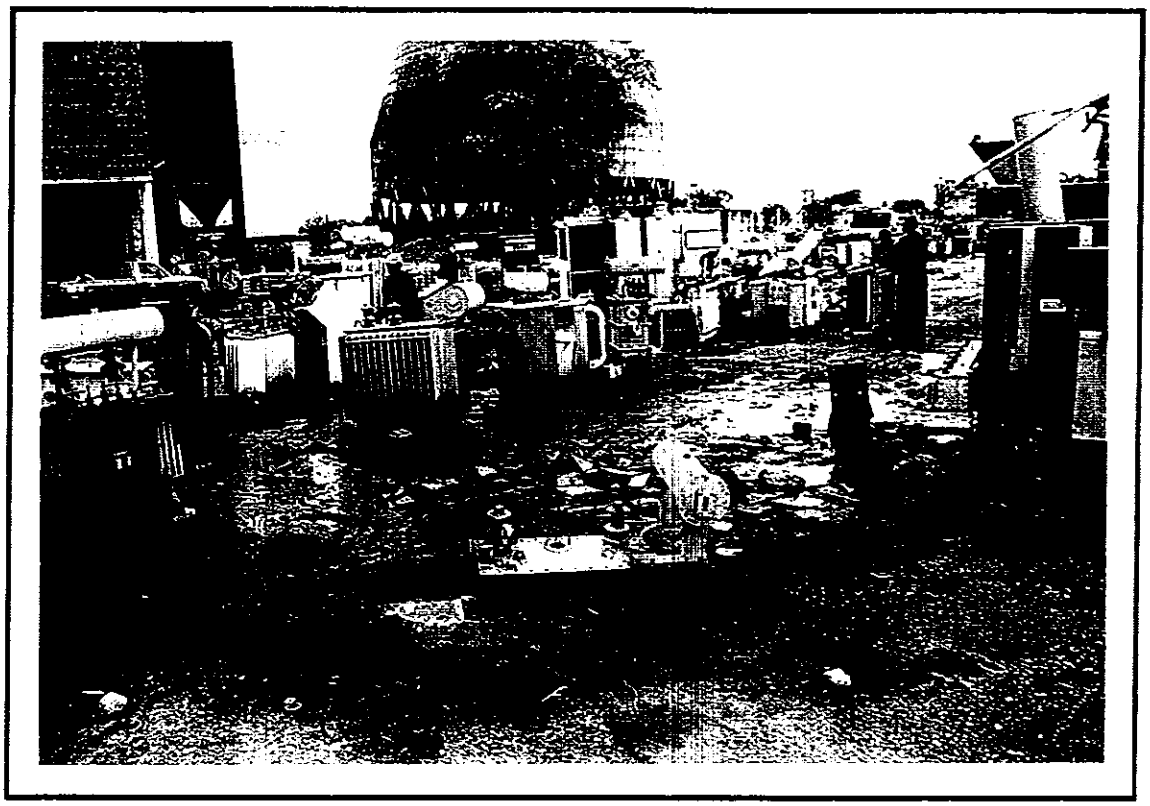


Plate 31: Oil transformer carcasses at the Ndola Workshop. Note oil puddles and old cooling tower in the background.

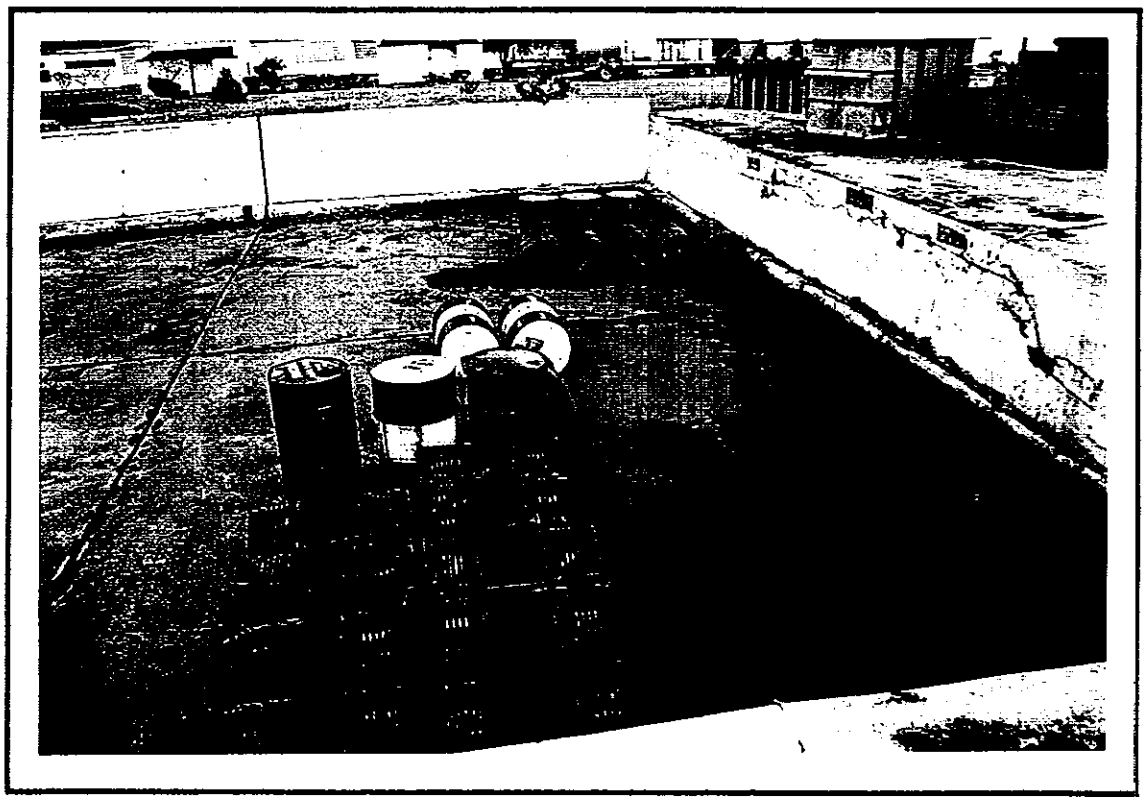


Plate 32: Oil storage site at Ndola Workshop. Note oil spillage.

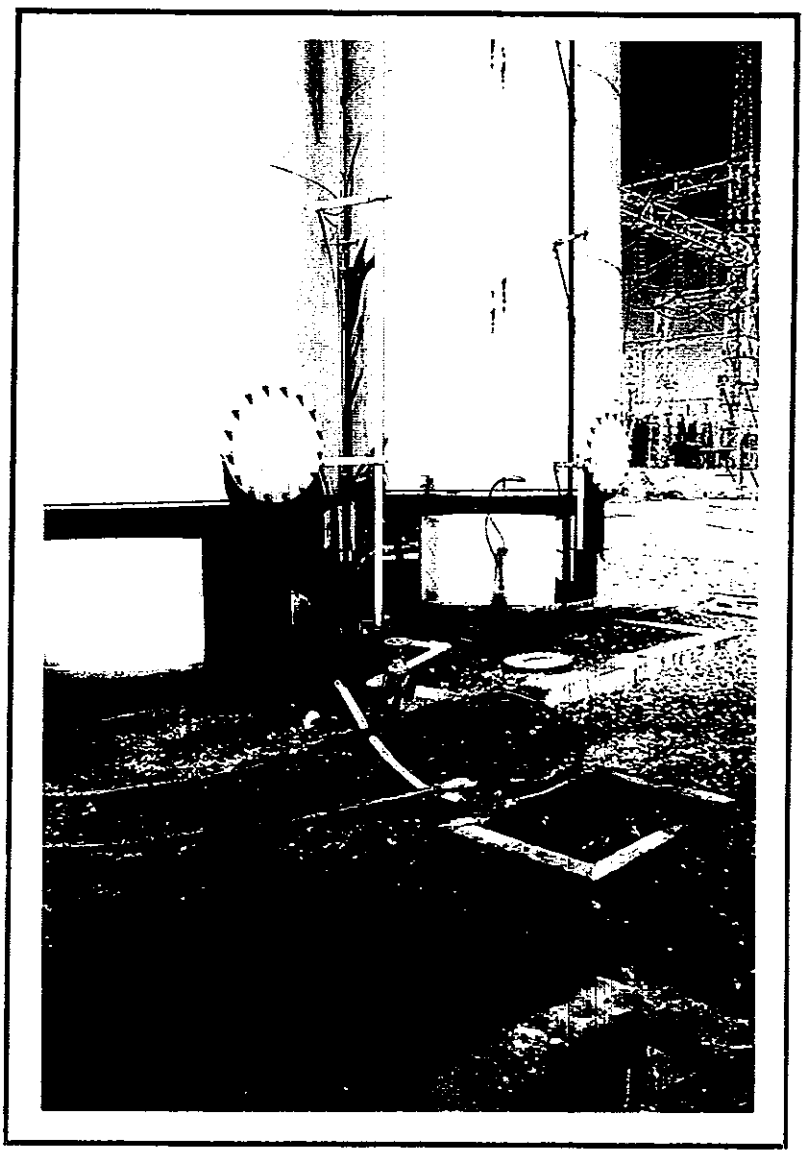


Plate 33: Unbunded oil recycling tanks at Kitwe Substation. Note spillage.

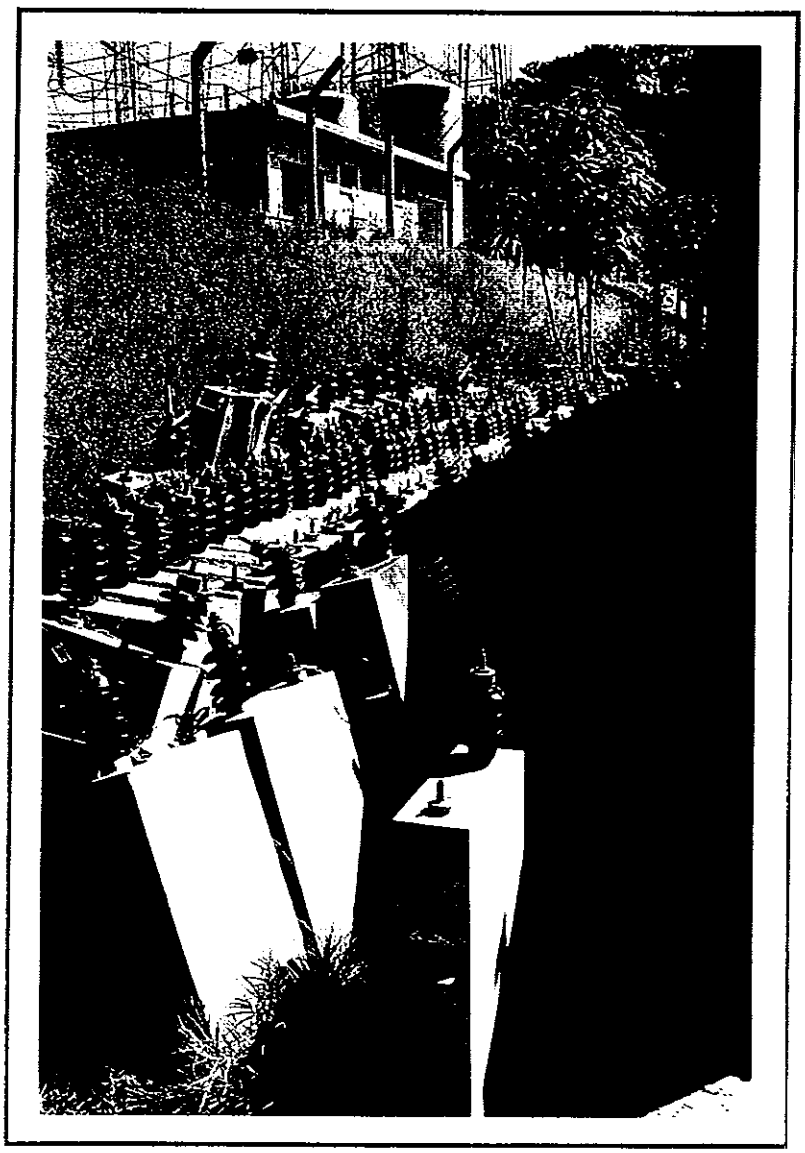


Plate 34: PCB-filled capacitors at Kitwe Substation.

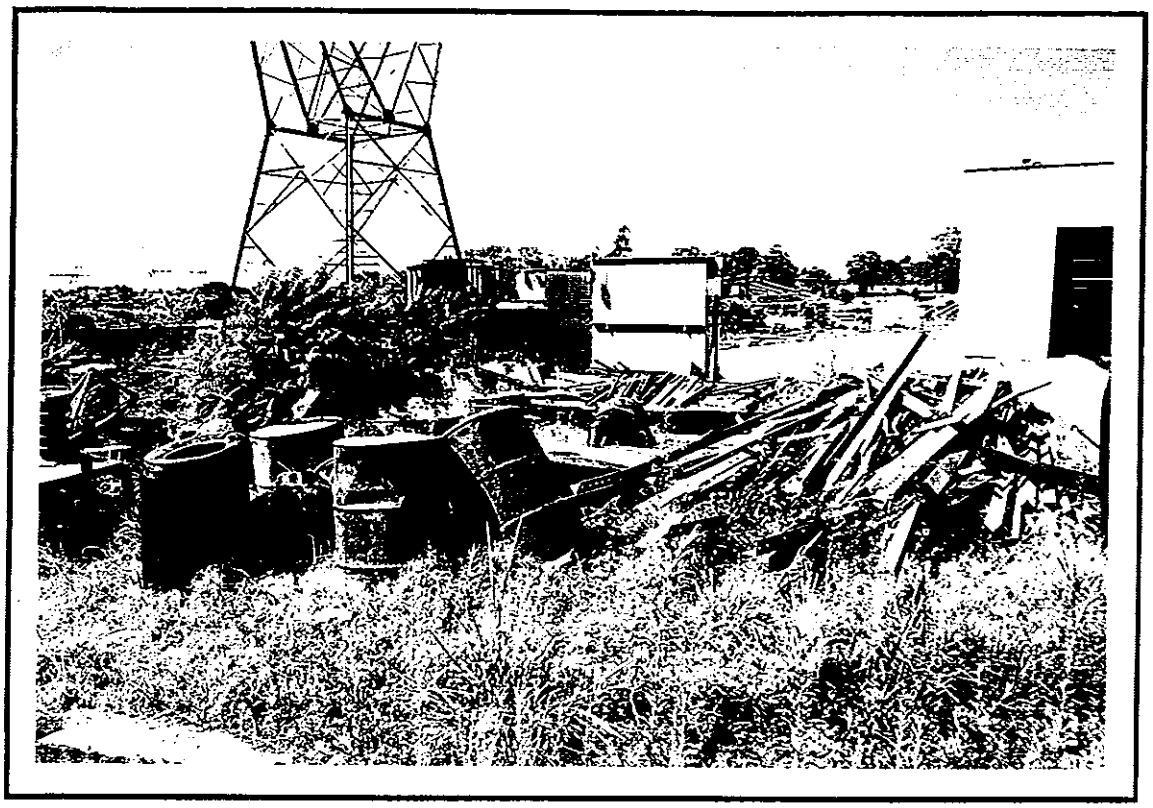


Plate 35: Dump area at Kitwe Substation showing drums filled with capacitors and concrete, capacitors, scrap pylon components, old transformers etc.

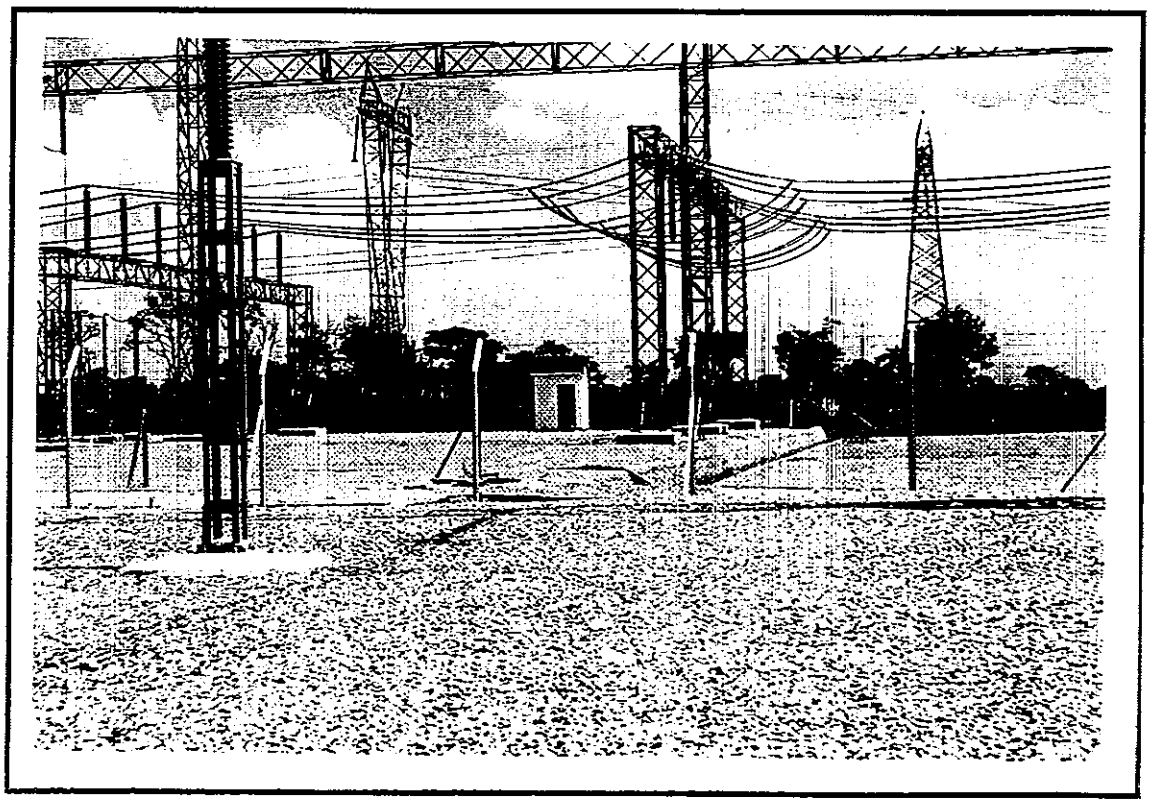


Plate 36: Luano Substation showing the building which is reported to contain PCBs from CEC and housing construction in the background.

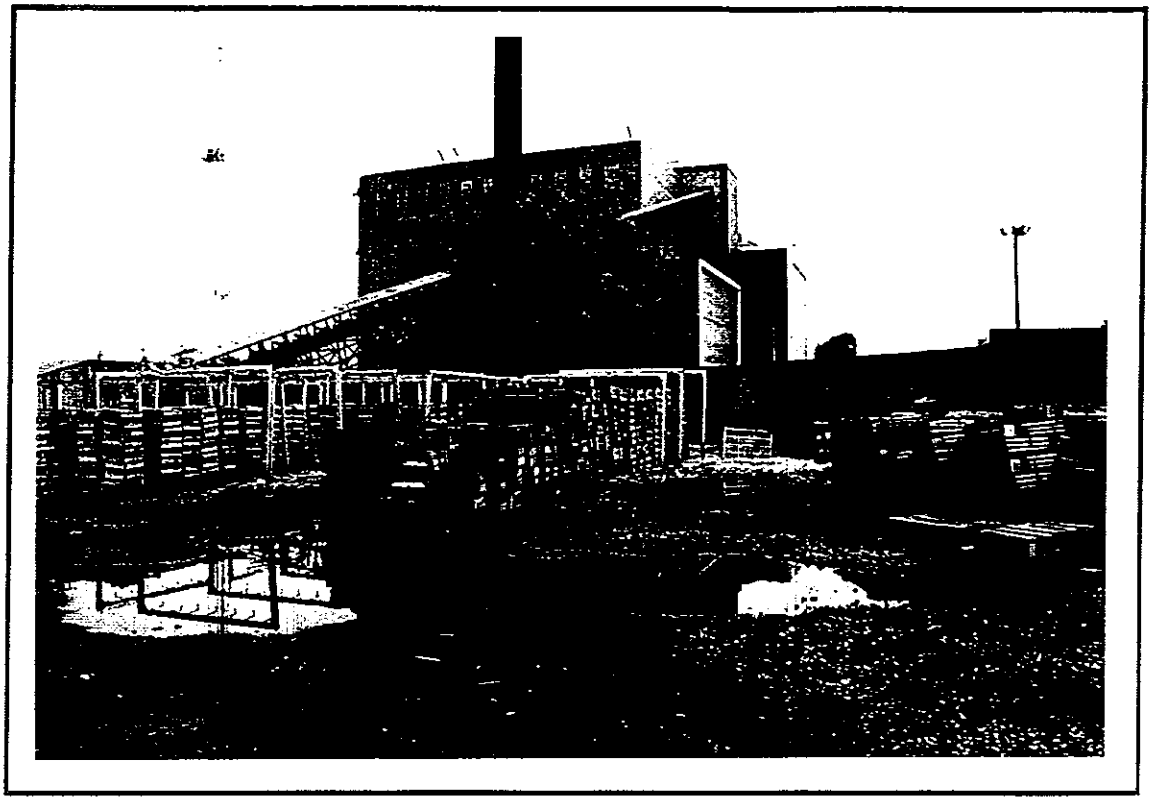


Plate 37: View of old Lusaka Power Station from the ZESCO stores area. Note old conveyor and chimney. A thin layer of coal covers the old coal stockpile site (foreground).

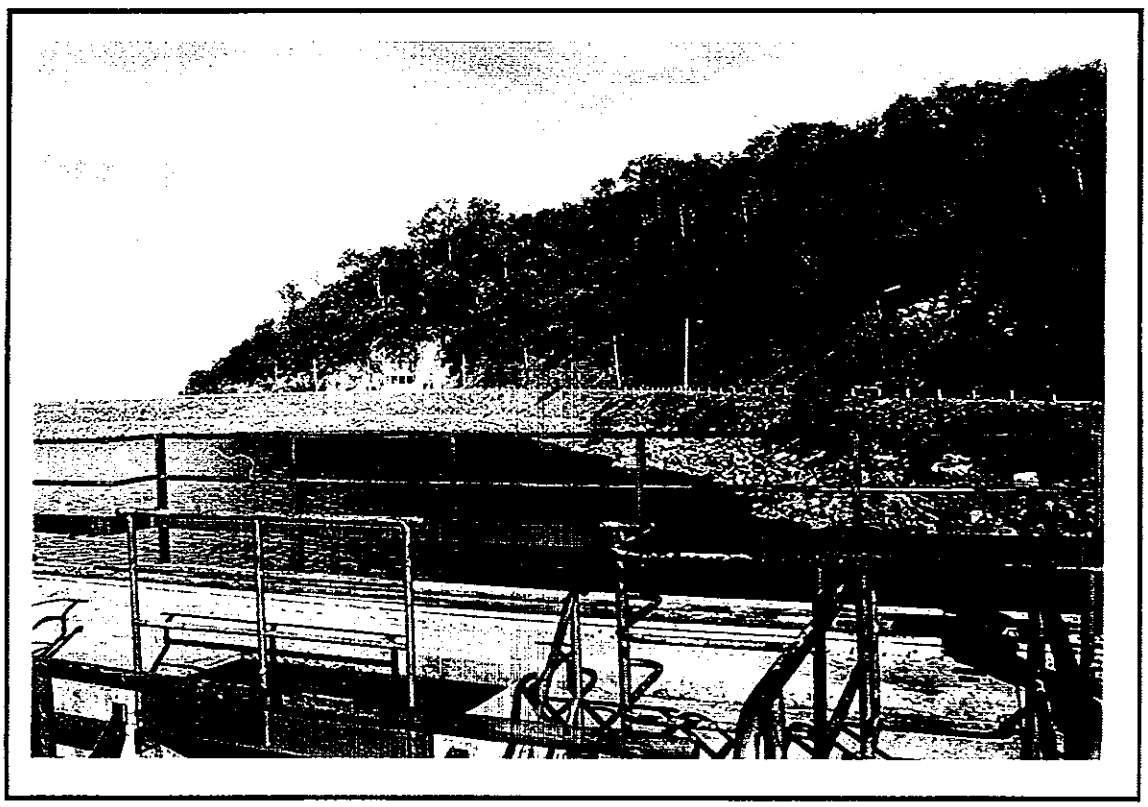


Plate 38: Location of possible future underground power house at Itezhi Tezhi.

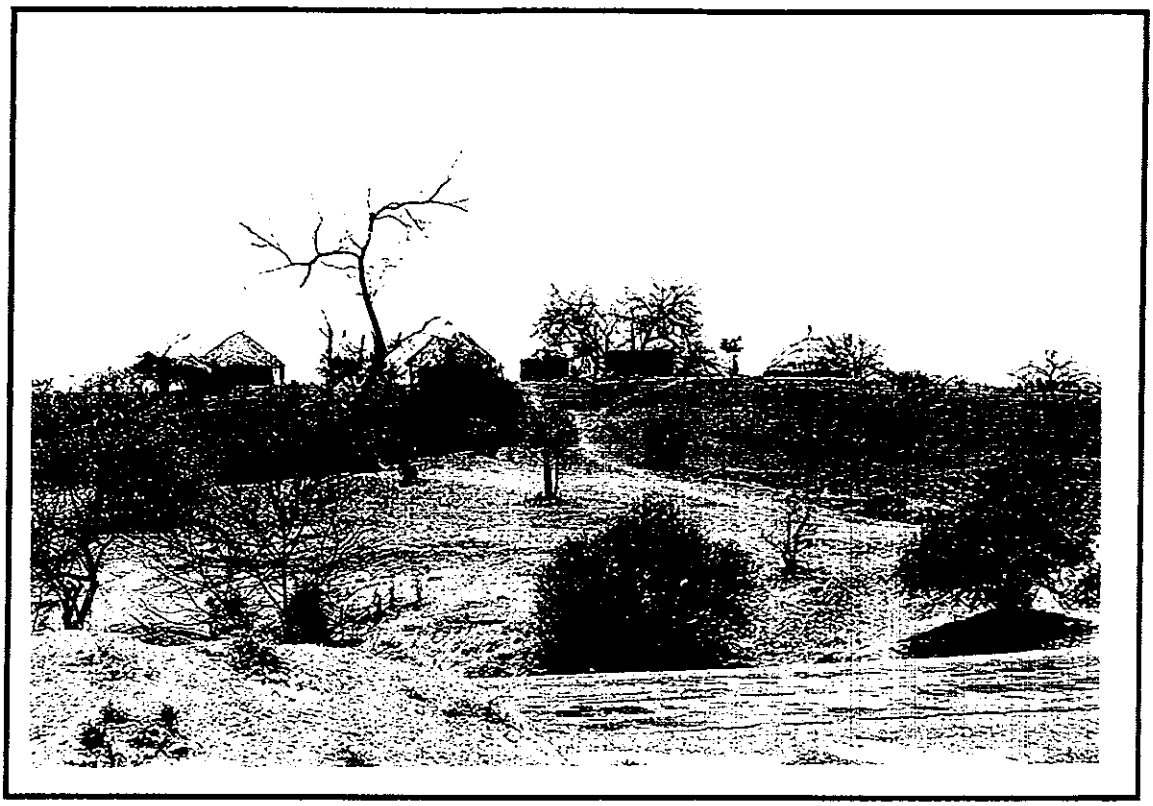


Plate 39: Sahel-like conditions near Lusito.

Plate 40: Massive gully erosion in the Lusito area.

Private Participation Options Study for the Zambia Electricity Supply Company

Task 7 Report- Action Plan

692

Table of Contents

1 Introduction.....1-1

1.1 Background.....1-1

1.2 Organization Of This Report.....1-1

2 Stage 1 Actions.....2-1

2.1 Pre-Transaction Actions.....2-1

2.2 Transaction-Related Actions.....2-3

2.3 Post-Transaction Actions.....2-4

3 Indicative Stage 2 Actions.....3-1

4 Action Plan Schedule.....4-1

5 Implementation Recommendations.....5-1

Figures

4-1 Action Plan Schedule- Year 1.....4-2

4-2 Action Plan Schedule- Years 2-10.....4-3

693

1.1 *Background*

The Government of the Republic of Zambia (GRZ) has requested the Zambia Privatization Agency (ZPA) to study the options for Private Sector participation in the Zambia Electricity Supply Corporation Limited (ZESCO). The United States Agency for International Development (USAID) has agreed to support ZPA in this effort and has selected Bechtel/Nexant to assist ZPA in developing a series of reports on this subject. The tasks associated with this study are as follows:

- Task 1- Situation Assessment and Need for Private Participation
- Task 2A- Options Development and Screening
- Task 2B- Options Evaluation
- Task 3- Legal, Institutional and Regulatory Framework
- Task 4- Asset Survey and Market Valuation
- Task 5- Social Impact
- Task 6- Environmental Review
- Task 7- Action Plan
- Task 8- Communications with Stakeholders

This is the Task 7 Report. The purpose of this action plan is to identify the principal actions needed to implement the preferred option once cabinet approval is attained. In addition to the specific actions required, the plan also identifies the institution responsible for implementing the action item. Lastly, the approximate timeframe for accomplishing the action plan up to the point where the transaction is completed is set out.

Of the six options assessed in the Task 2B Report, Option 4 Master Concession has been identified as the preferred option. Option 4 has a two stage implementation process. Stage 1 comprises the award of a master concession, while Stage 2 comprises the formation of a holding company and subsequent hiving off of the separate business units. The first stage envisions a limited term concession of up to ten years. Accordingly because of the significant period of time between Stage 1 and Stage 2, our focus will be on the Stage 1 actions. Stage 2 actions are also indicated but are less definitive in terms of the time for implementation.

1.2 *Organization Of This Report*

The remainder of this report is organized as follows:

- Section 2 provides a summary of the actions required to implement the initial master concession.
- Section 3 presents the indicative actions required to implement the unbundling, sale and concessioning of parts of ZESCO.
- Section 4 provides a schedule for these actions.
- Section 5 summarizes our implementation recommendations.

694

The actions required to implement the Stage 1 master concession are classified in three principal categories: Pre-Transaction, Transaction , and Post Transaction. Each is discussed below.

2.1 *Pre-Transaction Actions*

These actions would be those required to insure the necessary groundwork is in place to achieve successful private sector participation for the master concession. There are a wide range of actions which must be completed before the completion of the transaction. Total time for completing these actions is approximately one year. The needed actions are as follows:

- Establish ZESCO Privatization Task Force
- Commercialization/Organizational Changes
- Finalize concession terms
- Legal and Regulatory Changes
- Environmental

Action Item 1-1 Establish ZESCO Privatization Task Force – This action would be the responsibility of ZPA which would have lead responsibility for the privatization of ZESCO. Significant coordination will be required to insure the successful privatization of ZESCO. Accordingly, a task force would be established to clarify roles and responsibilities of all parties having a direct role in the process and to insure all actions are achieved in a timely manner. The task force would be given the mandate to implement the action plan. It would cease to exist with the execution of the master concession. The Task force would consist of representatives from ZPA, who would chair the task force, MEWD, ERB, Ministry of Finance, Water Board, Ministry of Environment, and ZESCO.

Responsible Institutions : ZPA

Time required : 1 month

Action Items 1-2 Commercialization/Organizational Changes – There are several actions required here:

1-2.1 – Complete financial unbundling and establish divisional structure – ZESCO has been in the process of financial unbundling. This process should be completed in a timely manner with the assistance of outside advisors who would also be charged with creating the divisional structure and associated organizational changes proposed for the preferred option.

Responsible Institutions: ZPA/ZESCO

Time required: 6 months

1-2.2 – Redeploy staff and complete retrenchment – Once the divisional structure has been established the existing ZESCO staff would be transferred to the newly established divisions. In conjunction with this activity it would be necessary to determine the those staff who are redundant. During this period the retrenchment packages would be finalized.

Responsible Institutiions: ZESCO/Union

695

Time required: 4 months

1-2.3 Determine core/non-core assets – Before the concession is implemented it will be necessary to specify which assets are surplus to ZESCO's operations and which will be part of the concession.

Responsible Institutions: ZPA/ZESCO

Time required: 2 months

Action Item 1–3 Finalize Concession Terms – The complete specification of the master concession will be critical to the successful implementation of this option. As indicated in the Task 2A Report a wide range of issues will need to be addressed and finalized. A model master concession agreement would result from this activity.

Time required: 6 months

Responsible Institutions: ZPA/ERB/ZESCO

Action 1-4 Legal and Regulatory Changes – There are several specific areas which will need to be addressed:

1-4.1 – Legislative actions – The following actions will be necessary:

- Review and modify existing electricity law to insure that the use of concessions is permissible
- Review and revise if necessary ZESCO corporate charter and articles of association
- Review and modify legal ownership with respect to non-core assets
- Review and amend the Energy Regulatory Act to :
    - establish complete independence of ERB
    - provide legal basis for third party access to the grid
    - provide basis for administering and monitoring concession
    - any implications for changes to existing licensing arrangements

1-4.2 – Regulatory actions – Under the preferred option the ERB will have a significant role to play in terms of

- Administering and monitoring performance of the concession,
- Setting tariff policy and methodlogy
- Reviewing and approving capital expansion plans
- Developing appropriate procedures for the determination of obligation to serve

Accordingly specific procedures will need to be developed for each of the above to more effectively regulate the power sector. In addition it will be necessary to insure that the institutional capacity of the ERB is strengthened to handle its expanded role.

Time required: 6 months

Responsible institutions: ERB/MEWD

Action Item 1-5 Environmental – It is important that any environmental issues be resolved in terms of potential liabilities and parties responsible, environmental compliance and reporting requirements.

Time required: 1 month

Responsible institution: Ministry of Environment/ZESCO/Ministry of Finance

2.2 *Transaction-Related Actions*

The required actions are as follows:

- Pre-qualification
- Preparation of bidding documents
- Bidding and award

Action Item 1-6 Pre-qualification Actions – There is likely to be a range of possible bidders for the master concession. Pre-qualification provides GRZ with ability to reduce potential risk exposure and target those bidders which best meet the requirements to operate and invest in the ZESCO system. The principal actions here would be to:

- Develop pre-qualification criteria
- Prepare and request Expressions of Interest
- Evaluate, screen and select short list of potential bidders

Time required: 3 months

Responsible institutions: ZPA, ERB

Action Item 1-7 Preparation of Bidding Documents- Definitive bidding documents must be prepared based on the terms of the model concession agreement. As indicated in the Task 2A Report a two envelope system is envisioned which will require the submission of separate technical and financial bids. The technical bidding documents should at a minimum address the following:

- Operating strategy and structure of the concession operating company
- Investment plan and sources of financing
- Proposed business plan
- Plan for dealing with rural electrification
- Tariff strategy
- The financial bidding documents should address the fixed fee the GRZ is willing to accept and the annual concession fee to be paid by the concessionaire.

Also in preparation for the bidding arrangements for provision for bidders conference, data room, and additional due diligence requests and site visits must be developed.

Time required: 3 months

Responsible institution: ZPA, ERB, ZESCO, MEWD

Action Item 1-8 Bidding and Award Actions – We are proposing a two stage bidding process which would first encompass the submission of technical proposals followed after evaluation by a separate financial bidding process. The following actions would be required:

- Request for technical bids
- Evaluation of bids, clarification of technical issues, and selection of preferred candidates based on technical bids
- Request for financial bids
- Evaluation and selection of preferred candidate
- Final negotiation and award

Time required: 8 months

Responsible Institutions: ZPA, ERB, Ministry of Finance, MEWD

2.3 *Post-Transaction Actions*

After the completion of the master concession agreement, there are number of actions that will be required in preparation for Stage 2. The timing of these actions is somewhat flexible in that Stage 2 would be implemented approximately ten years after the master concession is executed. Accordingly, we do not indicate a date certain for these actions. However, the creation of a transition task force and associated implementation of the suggested actions should probably commence in the fifth year of the master concession to insure the unbundled power market will be fully operational when the master concession ends and Stage 2 commences. The principal actions to be implemented during this period are as follows:

Action Item 1-9 – Establish power sector transition task force – The purpose of the task force would be to implement the necessary changes required to transition to an unbundled power sector. The principal members would be the Concessionaire, ERB, MEWD, Ministry of Finance, and the Water Board

Action Item 1-10 – Change ZESCO corporate structure- In order to facilitate the hiving off process a holding company would be created as discussed in the TASK 2A report. We assume this could be completed while the concession was still in place. This action involves a number of activities including legal, technical, financial and human resources.

Action Item 1-11 – Regulatory changes – there would be a number of regulatory changes which would be required as the system is unbundled. The rule governing the power market should be developed, monitored and enforced by the ERB. These include:

- Creation of market rules in terms of information requirements, rules for technical operation, commercial operation and market administration
- Modification to open access policy
- Methodology and procedures for pricing transmission, distribution and ancillary services
- Oversight for development of grid code and use of system agreements

698

Action Item 1-12 – Development of commercial instruments – transitional bi-lateral contracts will need to be developed, as well as bulk supply agreements

Action Item 1-13 – Sub-concession rural electrification – one of the responsibilities of the concessionaire will be to work with the MEWD to develop an electrification plan, and determine the funding levels required and to sub- concession out the program as negative concession.

699

Section 3 Indicative Stage 2 Actions

In Stage 2 the master concession ends and the business units are spun off and privatized through various means as described previously. Given the timeframe for reaching Stage 2 (10 years), the actions shown are indicative of what will be required. No time element is indicated given the proposed time of implementation. The focus of Stage 2 actions would be principally on the transactional aspects of hiving off the business units as most, if not all of the work, of establishing the associated market structure will be accomplished during the term of the master concession.

Action Item 2-1 – **Concession the transmission subsidiary**

Action Item 2-2 –**Sell generation subsidiary assets through combination of outright sale for small hydro and joint venture sale for large hydro units**

Action Item 2-3 – **Joint venture sale of the distribution and supply subsidiary**

Each of the above actions are significant transactions in their own right and will require time to prepare, evaluate and close on each transaction. At this time we believe that the transmission subsidiary would be the least complex transaction and should be executed first. In addition the transmission company will be at the center of managing the power market. So it would be important to establish this entity as soon as possible. The generation and distribution assets would then follow. It may be useful to sell the distribution assets first as this would then add clarity and certainty to the potential investors in the generation assets as to who would ultimately be the final buyer of energy.

Section 4 Action Plan Schedule

Figures 4-1 and 4-1 shows the overall implementation schedule for the preferred option broken down by individual activities. The overall time required to implement the preferred option from the time of cabinet approval until the close of the Stage 1 transaction is estimated to be approximately two years. The remaining post transaction and Stage 2 actions would commence in year 5 of the master concession.

-101

Action Plan Schedule

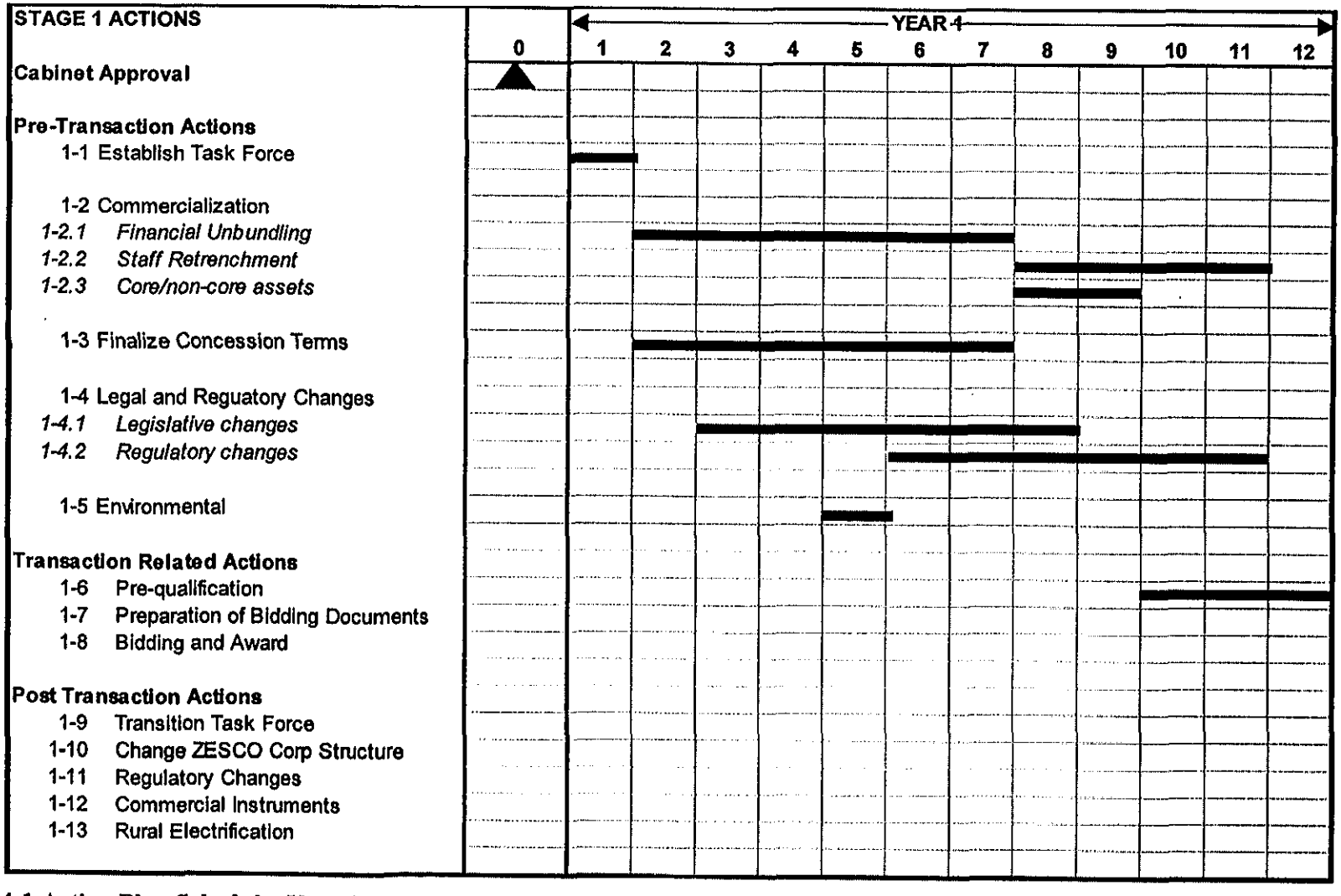


Figure 4-1 Action Plan Schedule- Year 1

702

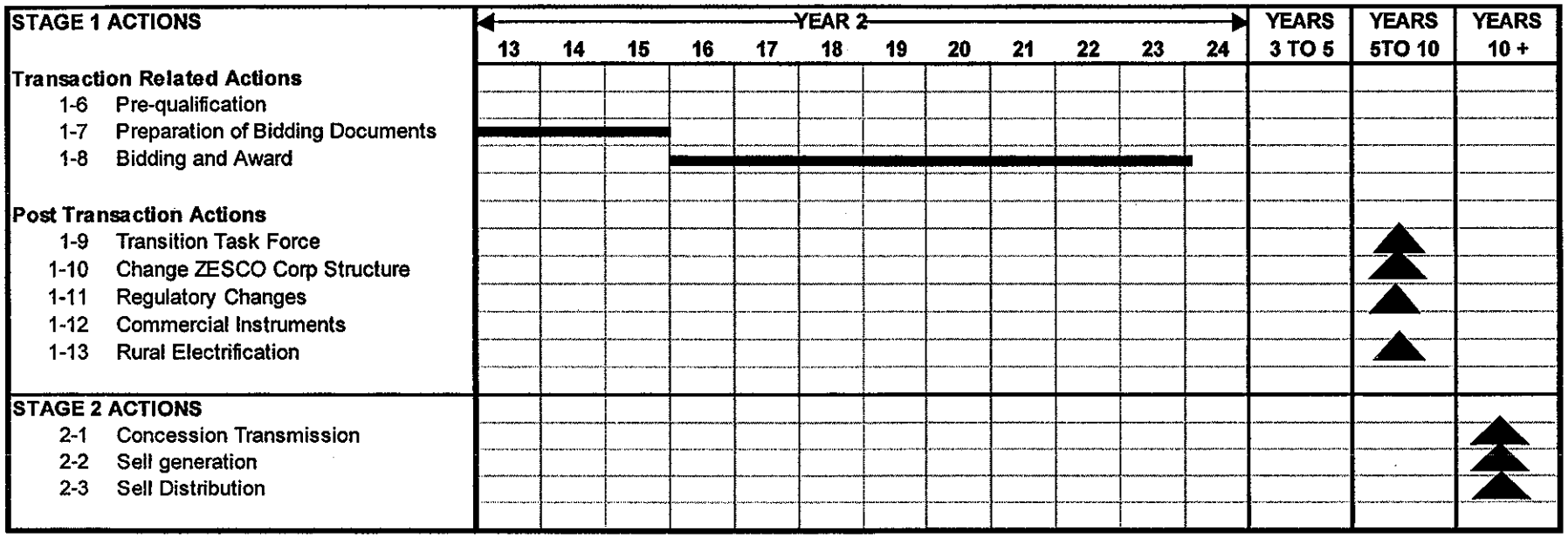


Figure 4-2 Action Plan Schedule- Years 2-10

703

Section 5 Implementation Recommendations

We recommend the following to prepare ZESCO to be concessioned under a master concession agreement:

1) Move quickly to manage the downsizing of ZESCO – The retrenchment of staff should be handled in a an equitable and humane manner. A special unit should be established within the human resources department to mange this situation so as everyone is clearly informed about what is happening and that any disputes can be managed as soon as they arise;

2) Finalize the retrenchment package and disburse it in a timely manner – The size and extent of the retrenchment packages needs to be determined precisely and in a timely manner. Once this has been accomplished the retrenchment program can commence and benefits paid in a timely manner;

3) Complete the hiving off of non-core activities and surplus assets – ZESCO is currently in the process of disposing of non-core activities. This process should continue and be completed before the concession commences. A survey should be carried out to determine what other assets are surplus to ZESCO's existing operation and quickly develop a plan for disposing of these assets;

4) Assess which of ZESCO's liabilities can be discharged – ZESCO has approximately $28 million dollars in longer term debt, not including the $150 million dollar Power Rehabilitation Project Loan from the World Bank. These existing loans are with the GRZ and consist of donor based funding. It is doubtful the concessionaire will want to service theses loans or whether they could even be transferred. Accordingly, it should quickly be determined which of these liabilities can be discharged;

5) Enhance the capacity of the ERB – Under the master concession, ERB will have an increasingly important role to play in the power sector. Moreover, a strong and capable ERB will be a key criterion by which outside investors gauge the attractiveness of investing in the power sector in Zambia. Accordingly, it is critical that assistance be provided ERB to enhance the technical capabilities of the staff, provide the latest information and regulatory techniques, and strengthen the rules and procedures necessary to regulate the sector.