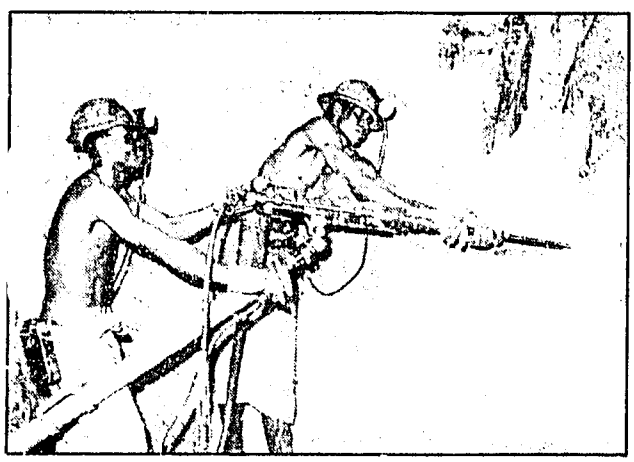
ENERGY

SOUTHERN AFRICAN DEVELOPMENT COORDINATION CONFERENCE



SADCC

Lusaka, Republic of Zambia
31st January — 2nd February, 1990

C O N T E N T S

NOTE ON PROJECT NUMBERING

The projects have been numbered according to a system based on three digits. The first digit indicates the sector as follows:

0 - Overall Coordination/Multimodal
1 - Oil
2 - Coal
3 - Electricity
4 - New and Renewable Sources of Energy
5 - Woodfuel
6 - Conservation

The second digit indicates the country as follows:

0 - Regional	5 - Mozambique
1 - Angola	6 - Swaziland
2 - Botswana	7 - Tanzania
3 - Lesotho	8 - Zambia
4 - Malawi	9 - Zimbabwe

The third digit is a serial number, to differentiate between several projects in the same sector and country.

L E G E N D

ADB = African Development Bank
AGIP Spa= AGIP Spa
AIDAB = Australian International Development Aid Bureau
ANG = Angola
AUS = Australia
AUST = Austria
BADEA = Arab Bank for Economic Development in Africa
BEL = Belgium
BOT = Botswana
BRA = Brazil
CAN = Canada
CBI = Confederation of British Industries
CFTC = Commonwealth Fund for Technical Cooperation
CHI = Peoples Republic of China (China)
CITES = Convention on International Trade in Endangered Species
DEN = Denmark
EEC = Commission of the European Communities
FAO = Food and Agriculture Organisation of the United Nations
FIN = Finland
FRA = France
FRG = Federal Republic of Germany
GDR = German Democratic Republic
ICAO = International Civil Aviation Organisation
IBRD = International Bank for Reconstruction and Development
IDA = International Development Agency
IDRC = International Development Research Centre
IDU = Industrial Development Unit of the Commonwealth Secretariat
IFAD = International Fund for Agricultural Development
ILO = International Labour Organisation
IMPOD = Import Promotion Office for Products from Developing Countries
IRE = Ireland
ICE = Iceland
ISNAR = International Service for National Agricultural Research
ITA = Italy
ITU = International Telecommunications Union
JAP = Japan
KUW = Kuwait Fund
LES = Lesotho
MAL = Malawi
MOZ = Mozambique
NET = Netherlands
NOR = Norway
NORDICs = Nordic Countries
OPEC = Organisation of Petroleum Exporting Countries
POR = Portugal
SADCC = Southern African Development Coordination Conference
SAREC = Swedish Agency for Research Cooperation with Developing Countries
SATEP = ILO Southern African Team for Employment Promotion
SPA = Spain
SWA = Swaziland
SWE = Sweden
SWI = Switzerland
TAN = Tanzania
TAZARA = Tanzania Zambia Railway Authority
UK = United Kingdom
UNDP = United Nations Development Programme
UNIDO = United Nations Industrial Development Organisation
UNSPEC'd= Unspecified
USA = United States of America
USSR = Union of the Soviet Socialist Republics
WB = World Bank
ZAM = Zambia
ZIM = Zimbabwe

1. EXECUTIVE SUMMARY

1.1 The Energy Sector continued to record progress in the implementation of the sectoral programme of action during the last year. The current portfolio contains 80 projects, including 13 new projects approved by Energy Ministers in June, 1989. US$125 million has been secured for 23 projects, while US$257 million is sought for 33 projects. The funding gap is thus 67 per cent. The bulk of the unfunded projects are in the electricity sub-sector, accounting for US$233 million or 88 per cent of the funding gap; including, one large project approved in June, 1989, the "Muela Hydropower Plant in Lesotho" US$137 million. 24 projects are being reviewed.

1.2 NORAD and the World Bank performed independent evaluations of the Technical and Administrative Unit (TAU) in August and September 1988. The reports confirmed that the TAU is playing an important role in the development of energy in the region. In general the performance of the TAU was reported as satisfactory by the two evaluation missions. The recommendations they gave are highly appreciated, and the government of Angola is in the process of implementing some of these. A restructuring of the Unit took place at the beginning of 1989, in order to achieve a more decentralised and dynamic organisation.

2. REVIEW OF THE REGIONAL SITUATION

SADCC Energy Balance 1987

The main characteristics of the regional energy balance are:

- The region is a net importer of coal, imports are almost twice exports.

- The region is both an exporter (Angola) and an importer of oil and oil products. For crude oil, export is more than ten times import. For oil products, however, import is more than twice the export. Export is mainly fuel oil (more than 80 percent), while import consists of lighter products.

- Import of electricity is almost 20 per cent of regional demand.

- Woodfuel, charcoal and biomass account for about 75 percent of total energy consumption (if losses in the

conversion process from wood to charcoal are included, the percentage increases to around 80).

- Oil products account for around half of the total consumption of commercial energy products, and coal and electricity each for around half of the rest. About half of the consumption of oil products is in the transport sector.

- Households account for 70 percent of the total energy consumption, mainly in the form of woodfuel.

It should be noted, however, that the dominance of woodfuel described above would have been considerably less if end-use efficiencies had been taken into account (energy consumption expressed in terms of useful energy).

Annex 1 shows the energy balance for the SADCC region for 1987, comprising the production, supply, conversion and consumption of coal and coke; crude oil and oil products, natural gas, ethanol, electricity, woodfuel, biomass and solar energy (last one only for Botswana). The charcoal figures reflect consumption only for some countries, for other countries charcoal is included in the woodfuel figures. Biomass is specified only for some countries. The conversion factors used in the energy balance are shown in Annex I.

Most of the figures are provisional or based on estimates made by the TAU, and will be adjusted when new data is available. In general, data is more readily available for supply than for consumption, and also for commercial products than for wood and biomass. However, the energy balance features the main characteristics of the SADCC energy situation.

3. PROGRAMME REVIEW

3.1 The objectives of the SADCC Energy Sector programme are to:

* reduce the drain on foreign exchange reserves caused by import of petroleum and petroleum products;

* reduce the depletion of woodfuel resources;

* develop expertise in energy technologies, and promote technology transfer to the region;

* establish detailed knowledge of the energy situation and its inter-relation with economic development in the region;

* strengthen regional cooperation in the various energy sub-sectors;

* establish emergency supply and distribution mechanisms;

* promote better knowledge of the capital and energy related technology requirements of the region; and,

* rehabilitate and expand, where necessary, energy production facilities.

To achieve these objectives, the Sector has developed strategies for each of the sub-sectors: coal, electricity, energy conservation, new and renewable sources of energy, petroleum and woodfuel. In addition, programmes and projects relating to energy planning and manpower development.

The Sectoral programme comprises 80 projects, with a total funding requirement of US$383.19 million, of which US$366.79 million is in foreign currency. US$124.98 million has already been secured, or is being negotiated, for 23 projects. Funding for 33 projects, estimated at US$257.61 million is still being sought. 5 projects have been completed, 19 projects have been suspended, withdrawn or transferred to other sectors. (See Table 2 below)

TABLE 2

SUB-SECTOR	NO	TOTAL COST US$ M	FOREIGN US$ M	LOCAL US$ M	FUNDING SECURED	%	FUNDING UNDER NEGOTIATION		%	FUNDING GAP	
OVERALL	6	18.76	14.77	3.99	16.76	89.33	-	-		2.00	0.66
PETROLEUM	1	48.96	46.55	2.41	16.41	33.52	29.20	59.65		3.35	6.84
COAL	4	11.89	11.49	0.40	1.89	15.90	-	-		10.00	84.10
ELECTRICITY	39	319.34	310.77	8.57	83.67	26.62	0.74	0.23		234.94	73.57
N.R.S.E.	3	1.45	1.45	-	1.45	100.00	-	-		-	-
WOODFUEL	15	21.35	18.39	2.96	4.86	22.76	-	-		16.49	77.24
CONSERVATION	2	5.24	5.09	0.15	3.76	71.76	-			1.48	28.24
	80	426.99	408.51	18.48	128.80	30.17	29.94	7.01		268.26	62.83

3.2 Petroleum

Despite the low oil prices registered in the first half of 1988, hydrocarbon exploration activities increased in the region; notably in Angola, Botswana, Mozambique, Tanzania and Zambia. Malawi signed an exploration and production agreement with oil companies, and Zimbabwe commenced exploration aimed at assessing its hydrocarbon potential, especially in the Zambezi Valley.

Since the last quarter of 1988, a major recovery in oil prices was registered, especially following recent events in the North Sea,namely the series of accidents that have tended to cut down on production and the diminishing US oil reserves. This recovery is also due to efforts by both OPEC and non-OPEC countries to reduce production by 5 percent, with a view to stabilizing oil market prices at US$18.0 per barrel.

The situation downstream has not changed. The region's consumption levels are very low compared to last year's figures (3 - 4 million tons a year), representing slow economic recovery rather than conservation and/or substitution of petroleum products.

In order to increase regional petroleum exploration and exploitation, the following measures will be undertaken:

- strengthening regional petroleum institutions;
- assessment of the need for a common legal, contractual and economic framework;
- promotion of joint technical and administrative activities in areas such as basin evaluation, exchange of exploration data and human resources development.

Programmes and projects will be developed to:

- assess the feasibility of a joint petroleum products procurement agency;
- establish maintenance and/or rehabilitation plans for refineries in the region; and
- evaluate the feasibility of refining Angolan crude oil in the other refineries the SADCC region.

A regional workshop on petroleum exploration will be organised for senior managers and professionals from government departments and national oil companies, to define projects in key areas of regional cooperation and discuss, practical administrative mechanisms.

Being a capital intensive sector, the petroleum sector in the region will continue to be constrained by shortages of technical and financial resources.

3.3 Coal

The SADCC region is endowed with enormous reserves of good quality coal, which can be utilised to meet most requirements for power generation, substitution of expensive oil and coal imports, woodfuel substitution, and the metallurgical and industrial purposes. All SADCC countries with the exception of Angola and Lesotho have significant coal deposits.

Large quantities of this high quality coal are exportable to other SADCC countries and beyond. Zambia and Zimbabwe on a small scale, export coal and coke to neighbouring countries. However, currently Swaziland is the only SADCC country exporting anthracitic coal to Kenya and South Korea. Mozambique is exporting cooking and steam coal.

There are enormous possibilities in the medium to long term future, for large scale coal production. Steam and cooking

coal could be produced for local consumption and/or export to international markets, including the countries of North and West Africa, which are increasing their coal imports. However, significant overseas exports from the region will have to wait until well into the next century, when rising coal prices on the international markets should justify the high transportation costs to the ports.

The long-term objective for the coal sub-sector is to facilitate increased use of coal and coal products within the region, mostly by the domestic and industrial sectors. The energy sector, intends to review the strategy in this important sub-sector with a view to giving it both, focus and impetus towards a viable regional coal development programme. One seminar on coal, held in Botswana in November 1988, recommended the appointment of a consultant to prepare a draft strategy on coal.

Coal development involves both the Energy and Mining Sectors. In order to avoid overlapping actions, it has been agreed that the Mining Sector will be concerned with coal exploration and mining activities, while the Energy Sector will deal with coal processing and utilisation.

3.4 Electricity

New interconnections between SADCC member States are regarded as the main area of focus within the electricity subsector, and at the Energy Ministers meeting in Arusha (September, 1988) two new projects were presented and accepted: 132 kV tieline Zambia - Malawi and 220/330 kV tieline Zambia - Tanzania. Implementation of the 220 kV inter-connection between Botswana and Zimbabwe started late 1988, and is proceeding well.

During the Annual Consultative Conference, in Luanda in February 1989, some cooperating partners indicated interest in a number of electricity projects. Hence the prospects for further development of this subsector seem good.

An electricity workshop, attended by three officials from each member State and donors was held in March, 1989, in Mbabane, Swaziland, with four major topics on the agenda: SADCC Interconnector Study; Maintenance in the Power Sector; Power Sector Training Needs; and Rural Electrification National Surveys. The recommendations of the workshop will form the basis for the future development of the SADCC electricity subsector.

One of the recommendations was to initiate a project called "Regional Generation", which will look into the possibilities of better utilisation of the generation

capacity in the region. The project was approved during the Energy Ministers meeting in June, 1989. A regional maintenance programme was also discussed at the Swaziland workshop, and project ideas from the discussions, are being analysed.

Following the seminar on Rural Electrification held in Malawi in November 1983, national surveys were launched in June 1989 and are expected to be through by the end of the year.

3.5 New and Renewable Sources of Energy

A series of national surveys of NRSE activities in each SADCC member State was commissioned in November, 1988, using national consultants. Each survey reviewed the status of solar, wind, biogas, crop waste, ethanol, and draught animal power. The surveys assessed the availability of data, the activities of government, private companies, and non-government organisations.

The NRSE surveys indicate that, while the use of NRSE technologies is increasing, and limited NRSE technologies are manufactured in the Region, most SADCC countries do not have a concerted NRSE development programme. Potential users are not familiar with NRSE. Many NRSE technologies or components are imported, and there is a lack of adequate financing mechanisms to take account of the high up-stream costs and low operating costs of these, technologies. Country reports will be published in 1989. The results of the surveys will be used to develop a regional NRSE strategy and a series of programmes designed to increase use of NRSE in the SADCC region.

These programmes and projects will address four main areas: Information dissemination; Training; Technology diffusion; and Institutional strengthening. A regional seminar will be held in late 1989, to obtain national input to the strategy and to finalize project details.

3.6 Woodfuel

Woodfuel continues to be the major source of energy in the region, accounting for about 70 percent of the total energy consumption. Its major contribution is in the household sector, where it accounts for around 90 percent of the energy used, mainly for heating and lighting. Woodfuel also continues to be the major source of energy for rural industries like tobacco curing, tea drying, fish smoking brick burning, pottery, salt production, ceramics, etc.

Woodfuel scarcity has increased, affecting more people and causing environmental degradation. Awareness of woodfuel problems, both by the general public and decision-makers, is satisfactory. However, ongoing efforts to solve the problem are far behind the desired level in all member States, with one exception. Malawi has attained satisfactory tree-growing efforts, both by the people on a participatory basis around their farms, and by the Government, through the establishment of large-scale fuelwood plantations.

Upward fuelswitch from woodfuel to other commercial energy sources like kerosine, coal, gas, electricity, etc. has been rather insignificant, due to financial constraints on the majority of the low-income group, and unavailability of appliances. Backward fuelswitch from woodfuel to other lower-quality biomass such as farm residues and cow dung, is increasing. The trend towards the greater use of these fuels is indicative of the increasing unavailability of fuel wood and deterioration in the incomes and standard of living of most rural people.

Implementation of the regional woodfuel five-year strategy, which was developed in 1987, is the main area of focus for the subsector for some time to come. Intensification of tree growing efforts through people's participation and strengthening of manpower capability for extension services are key areas of high priority.

3.7 Energy Conservation

Rational use of energy is of great importance for all types of economies. Energy resources can be used more efficiently by implementing energy saving measures which are technically, economically and financially feasible. SADCC's industrial sector shows great potential for reducing energy consumption by relatively simple, low-cost measures.

Energy conservation projects are relatively new to the region. At present, only one truly regional project is under way; project no. 6.0.2 "Energy Saving in Industry Data Base Development and Conservation Activities". However, there have been several national energy conservation projects carried out during the period 1984-88 in Malawi, Tanzania, Zambia, and Zimbabwe. In addition to these specific projects, Botswana and Lesotho have each completed national Energy Management Plans, which include preliminary evaluations of energy conservation potential in each country.

Because all other projects to date have had a national rather than regional focus, the role of energy conservation as a factor in regional energy planning has not been clearly

defined. Preliminary results from the "Energy Saving in Industry" project indicate that savings of 15-20 percent of annual energy costs are economically possible for firms using relatively low-cost energy sources such as coal or electricity. For those industries which are more dependent on electricity and petroleum fuels, e.g. smelting and chemicals, savings of 50 - 75 percent of annual costs are possible through equipment upgrading and use of more modern processing technologies.

The Sector is carrying out pilot activities to develop appropriate conservation methods, particularly in selected key industries. The results of these pilot projects will make it possible to propose an overall regional strategy for energy conservation.

An Energy Conservation Office was established in Harare, Zimbabwe, in November 1987. The activities to be undertaken by the office include:

- energy audits in selected firms;

- demonstration projects on energy conservation;

- organization of seminars on energy conservation;
- training of personnel in key sectors, e.g. manufacturing, mining, agricultural processing, etc. in energy conservation; and

- compilation of an industrial energy data base for the region, to be used in formulating a regional strategy for energy conservation.

Project coordination is assured by a Project Steering Committee made up of representatives of all SADCC member States.

Because energy conservation goes hand in hand with improved production efficiency, future energy conservation programs should be closely tied to industrial rehabilitation and investment programs. An effort should also be made to investigate the opportunities for energy saving in the transport sector, which presently accounts for 40% of the region's petroleum consumption.

3.8 New Projects

At their meeting at the Victoria Falls, Zimbabwe, in June 1989, SADCC Energy Ministers approved the following 11 new projects:

1.0.4 Specialist Training for the SADCC Petroleum Sector, valued at US$2.34 million.

1.0.5 Joint Petroleum Exploration Programme, valued at US$0.1 million.

1.0.6 Potential Petroleum Cost Savings, valued at US$0.18 million.

1.7.3 Establishment of a Biostratigraphic Reference Collection for the SADCC Region, valued at US$0.10 million.

3.0.8 Coordinated Utilisation of Regional Generation and Transmission capacities - Prefeasibility Study, valued at US$0.25 million.

3.0.9 Power Station Maintenance Programme, valued at US$0.05 million.

3.2.4 Second 220 Kv Line from Morupule to Gaborone, valued at US$18.00 million.

3.3.6 Muela Hydropower Project, Lesotho, valued at US$137 million.

3.5.11 Mozambique, Central Region Transmission and Distribution Network Study, valued at US$0.25 million.

3.5.12 Cahora Bassa Power for SADCC Prefeasibility Study, valued at US$0.09 million.

3.9.3 Expansion of National Control Centre in Harare, valued at US$4.08 million.

4. CURRENT STATUS OF PROJECTS

4.1 Overall coordination

Project 0.0.3: General Support to the Energy Sector/Technical and Administrative Unit (TAU)

The objective of this project is to provide technical and material support to facilitate the work of the TAU. This support involves procurement of materials, financial and technical assistance. The TAU has signed memoranda of understanding with Belgium, Brazil, Canada, EEC, France, Norway, Portugal, Sweden and UK. Altogether eight external experts; including one from the region are working in the

Unit. It is anticipated that the need for such external support will gradually decline as the TAU develops its internal capacity.

Project 0.0.4: Energy Bulletin

The objective of this project is to increase knowledge about the energy situation in the member States and improve the flow of energy-related information between member States, with a view to facilitating regional cooperation.

This is an ongoing project since September 1982. It receives financial and material support from Angola, the EEC, Canada and Portugal. Starting from issue no.17 (April/May 1988), printing has been done entirely in Angola, and photocomposition is done by the Bulletin's own staff, thanks to the equipment acquired through Canadian assistance (one high resolution printer, no-break equipment, one large monitor, one dot matrix printer and two small monitors).

The Bulletin's editorial staff has been strengthened through the addition of an experienced Angolan journalist. The financial situation of the Bulletin has improved slightly. An officer is being trained in accounting by a local company. Over the period under review, three issues in English and Portuguese have been produced.

Project 0.0.5: Information Coordination System

The project seeks to provide the Energy Sector Coordinating Unit with an effective planning and analytical tool for analysing the various energy policy options.

Priority is being given to economic studies. The data base will continue to be used as a tool to organize and store all information being collected, which serves as a basis for development of economic analysis.

To date two SADCC students have completed the training course in Boston in the LEAP/REAP Model.

Project 0.0.7: Documentation Centre for the Energy Sector

The objective of the project is to establish a professional filing system and an energy reference library at the TAU offices, to ensure proper handling of the large flow of documents within the Energy Sector, turning the documents into useful tools for sector planning and operations.

The implementation of the project started on 1st of July, 1987, and ended on 30th June, 1989.

The Angolan counterpart Librarian attended an English language course (Norwich in England, September-December 1988) and a basic course in librarianship, archives and documentation (Lisbon, Portugal January-April 1989).

The Documentation Centre will still depend on external backstopping services and advice, and an evaluation will be made later in 1989 to assess the needs for further technical assistance.

Project 0.0.8: Establishment of the Regional Energy Planning Network in SADCC

The objective of this project is to facilitate the coordination of information and data handling between the TAU and member States. An assessment of the needs of the TAU and member States for computer hardware and soft ware will be made, and efforts are directed at securing the most compatible equipment. Terms of reference for a broadened project were approved by Ministers of Energy in May 1988.

A new proposal for financing the implementation of the project has been received from Energy Systems Research Group/Norconsult. This proposal is now being assessed by the TAU.

Project 0.0.9: Development of Manpower Assessment and Planning Capacity in the SADCC Energy Sector

The project aims to assess available expertise and capacity in the member States for implementing projects and programmes in the Energy Sector and to establish within the TAU, technical capacity for manpower assessment and planning. The project is being reviewed in consultation with the RTC Secretariat.

4.2 Petroleum

Project: 1.0.2 Regional Petroleum Training Centre

The project aims at utilizing the Petroleum Training Centre at Sumbe, Angola, for training technicians in the petroleum sector. In order to foster maximum utilisation of the centre by member States, a Training Coordination Committee has been created to direct and support the school's management in the implementation of training programmes, including curriculum development, standardisation of entry qualifications, etc. A Training Needs Survey has been conducted in all SADCC member States, and the findings will be used in the development of a new syllabus and training programme.

UNDP is supporting an extension of the first phase to allow ongoing courses to be finalised. US$300 000 is available for this extension period. Currently 40 students from Angola, Mozambique, and Tanzania are enrolled at the PTC.

TAU has also asked UNDP to fund the updating of ongoing courses, and to formulate new ccurses as identified by the Training Needs survey. These activities are estimated to cost US$288 000.

Based on this work the terms of reference for phase two will be formulated and the cost estimated.

Project: 1.0.4: Specialist Training for the SADCC Petroleum Sector

The main objective of this new project is to produce a core of professional management staff for the National Oil Companies and Energy Ministries of the SADCC countries,in order to improve policy making on oil exploration, supply, refining, gas utilization and petrochemical projects.

The project will also enhance regional cooperation through standardization of exploration agreements, safety procedures, oil supply contracts, product handling procedures and product specifications within the region; and enhance cooperation with non-SADCC oil companies, to reduce costs and losses. Project activity will involve training of SADCC citizens on downstream and upstream investment management.

The project is estimated to cost US$2.34 million. Funding is being sought.

Project: 1.0.5: Joint Petroleum Exploration Programme

The programme aims to improve the geological database and allow individual SADCC countries to evaluate their petroleum potential. This will place the countries in a better position to formulate petroleum exploration strategies, and be better prepared for negotiations with international oil companies.

Phase I (US$0.1 million) will be to establish a Task Force to define the terms of reference for the data collection programme, and to establish a Project Steering Committee. Phase II is estimated to cost US$0.06 million, and Phase III, the three basin studies (the Karoo Rift, Rovuma and the East African Rift Valley), are estimated to cost US$0.29 million. New Project.

Project 1.0.6: Potential Petroleum Cost Savings

The study is split in two sub-projects:

a) **Potential Petroleum Cost Savings in the SADCC Transport Sector.**

The Transport Sector is the largest user of petroleum in the SADCC region. The objective of this project is to identify the potential for petroleum savings in the transport sector in SADCC member States through conservation measures and fuel substitution.

b) **Joint Organisation of Petroleum Market Information.**

The objective of this sub-project is to investigate the feasibility of establishing a regional organisation, and to define the structure, organisation, functions, responsibilities, costs and benefits of the organisation needed to handle the above activities. Total cost is estimated at US$0.18 million.

Funding is sought.

Project 1.1.1: Oil Supply from Lobito to the SADCC Region

The project is being reformulated.

Project 1.3.1/1.6.1: Strategic Fuel Storage in Lesotho and Swaziland - Feasibility Study

The objective of this study is to design a project, including costings, to establish in Lesotho and Swaziland, fuel storage capacity equivalent to at least four months consumption.

Tenders have been received from prospective consultants, but evaluation of the tenders and selection of contractor has been delayed until the procedure on how to organize the study is agreed upon by the TAU, Lesotho and Swaziland.

Project 1.4.1: Hydrocarbon Exploration in the Malawi Rift Valley

The project is under evaluation.

Project 1.5.3: Use of CNG as a Transport Fuel - Pilot Study

The objective of the project is to assess the technical and economic feasibility of using CNG as a transport fuel in Mozambique. The project comprises: a compression and

refuelling station in Pande; CNG Transportation fleet; refuelling station; and an engine conversion facility at Inhambane (estimated cost US$1.0 million). The project also seeks to establish the technical and economic feasibility of a broad CNG conversion programme for power generation, industrial and commercial sectors in southern Mozambique and the Beira region (estimated cost US$0.5 million).

This project has been funded by Italy.

Project 1.7.1: Rehabilitation of the Tazama Pipeline

The objective of the project is to rehabilitate the entire pipeline system and improve/repair supporting facilities such as corrosion protection, mechanical, electrical, telecommunication and the tank farm.

Emergency repairs are underway with Italian funding (US$12m), and negotiations are underway with the European Investment Bank (US$15.0m) and the World Bank (US$14.2m) for the financing of the next phase of major repair and rehabilitation work.

Project 1.7.2: SADCC Seismic Interpretation Centre in Dar-Es-Salaam

The implementation phase of the project, especially the training of operators of computers is under evaluation.

Project 1.7.3: Biostratigraphic Reference Collection for the SADCC Region

This new project aims at greater utilization of existing biostratigraphical and geological data from the SADCC countries together with additional studies of geological samples to achieve a general biozonation and correlation for the entire region.

The project is estimated to cost US$0.1 million. Funding is sought.

3.3 Coal

Project 2.2.1: Investigation into Possible Low Temperature and Other Carbonisation Processes of Coal in the SADCC Region - Prefeasibility Study

The project is being reviewed.

Project 2.2.2: Coal Distribution Yard and Coal Information, Botswana

The main objective of the project is to promote the use of coal by community services and households, and to gain experience in distribution and marketing of coal. It is hoped that the experience gained during implementation, can be applied in other member States.

The project has been funded bilaterally as part of the German (FRG) Technical Assistance to Botswana.

Project 2.8.1: Investigation of Coal Briquetting (Zambia)

The objective of this project is to investigate the technical and economic feasibility of setting up and operating a coal briquetting plant fed with washed fine coal. The coal briquets so produced would be used as an alternative to woodfuel and charcoal. Studies by both Japan and FRG have been completed. US$10m is being sought for setting up a pilot plant.

Project 2.9.1: Coal Stoves for use in Rural and Urban Areas

The project is under evaluation, to confirm its regionality.

4.4 Electricity

Project 3.0.1: Regional Rural Electrification Programme-Phase I

The objective of Phase I (financed by Canada US$0.18 million) of the project is to identify the institutional and socio-economic setting and framework for Rural Electrification in SADCC member States including energy resources and electricity systems; current technical experiences in rural electrification; training facilities; expert personnel and case studies of specific projects.

As recommended by the first feasibility study, national consultants have been appointed by SADCC countries to conduct one month surveys, starting on June 25th. A workshop for Energy officials and experts from the member States is planned to take place early 1990, to discuss the reports on the national surveys, in order to prepare the strategy.

Project 3.0.2: Specialised Training in the Field of Electric Power

The objective of the project is to identify training needs for electricity utilities personnel; and formulate a

training programme taking into account the existing facilities in the region. The original report carried out by Lah Meyer International was poor and the EEC refused to pay for it. CIDA has indicated willingness to finance another national survey to be carried out by Lah Meyer International.

Project 3.0.3: Maintenance of Mechanical Equipment in SADCC Power Stations - Prefeasibility Study

This study aimed at assessing the present maintenance costs of mechanical equipment at power stations in all SADCC member States, and will propose measures to reduce the related foreign exchange expenditure. Nearly all public power stations above 1 MW and some industrial establishments were visited by the consultants. The final report was issued in January 1988, and the maintenance programme developed (See 3.0.9).

Project 3.0.4: Regional Hydroelectric Hydrological Assistance Programme

The objective of the project is to improve availability, accessibility and quality of hydrological data within the SADCC region, for hydroelectric, agricultural, fisheries forestry and environmental development, etc.
First phase: Zambezi basin.

The Zambia Electricity Supply Corporation (ZESCO), the implementing agency, has made arrangements for office facilities and assistance staff for the group of consultants. Memoranda of Understanding with Brazil, Canada, and Portugal were signed in September 1988. The Project Steering Committee is not yet fully constituted, and reminders on nominations have been sent to Brazil and Lesotho. The first coordination meeting between ZESCO and the cooperating partners was held in Montreal, in January, 1989. Field work began in late February, 1989. A meeting of the Project Steering Committee to discuss and approve the inception report was held on 30 - 31 May, 1989 in Lusaka. At the meeting it was agreed that each country should consider sending two people to be trained at the project office in Zambia.

The project is estimated to cost US$2.84 million, which has been secured from Brazil, Canada and Portugal.

Project 3.0.5: Plan for Integrated Utilization of the Cunene River Basin

The objective of the project is to develop a master plan to utilize the Cunene River Basin's water resources fully.

The total cost of the project is estimated at US$0.62 million.

Project 3.0.6: Power Systems Control and Operation Technical Support and Training

The objective of the project is to train personnel who work with computerised control equipment; establish a permanent store of spare parts for quick replacement of faulty equipment; and establish regular maintenance routines for communication equipment.

Training is expected to take place in both Zambia and Zimbabwe using existing facilities in these countries. The spare parts will be held by each electricity utility (Zambia/Zimbabwe). The project will start as soon as funding (US$0.4 million) is secured.

Project 3.0.7: Computer Model for Analysis and Planning of SADCC Transmission Systems

Extensions and interconnections of the transmission system in the region is a continuous process. This calls for advanced tools (models) of system planning and operation. The objective of this project is to develop such a model, at regional level, in three separate stages: preliminary study; development of a computer model for analysing the grid; and implementation of the model.

Funding (US$0.1 million) is being sought.

Project 3.0.8: Coordinated Utilisation of Regional Generation and Transmission Capacities - Prefeasibility Study

The aim of this new project is to assess the scope for coordinated utilisation of the total regional power generation capacity, taking into account the need for reserve capacity, reliability, etc. The study will ascertain current installed capacity against demand, project both into the future; examine power tariff and pricing policies and structures, and their possible impact on regional trade in electricity, and recommend accordingly.

Funding (US$0.25 million) is being sought.

Project 3.0.9: Power Station Maintenance Programme

The project, which is a follow up to 3.0.3, seeks to increase the reliability of power plants in the SADCC countries. Three pilot power plants will be selected and

investigated. The project is estimated to cost US$0.15 million.

Funding is being sought.

Project 3.1.2: Interconnection of the Northern, Central and Southern Grids in Angola and Possible Extension to Namibia

The aim of the project is to study the technical and economic feasibility of interconnecting the three main electricity grids in Angola, as well as consider possible interconnection with Namibia.

The feasibility study was carried out by THEMAG. A 220 kV line from Gabela to Quileva to link the North and Central systems, and a 150 kV line from Lomaum to Lubango to make the Central to South connection was recommended. The extension to Namibia will be a 150 kV line from Matala. The Namibian part of the project was included in the terms of reference.

A seminar took place in Luanda from 8 to 11 March, 1988, where THEMAG consultants and senior Angolan technicians discussed the major findings and recommendations of the study. In the May 1988 meeting held in Maputo, Ministers recommended the Angolan Government to follow up the recommendations given in the study.

The project is completed. Angola is seeking funding for the implementation phase.

Project 3.1.3: Completion of the Gove Hydroelectric Development - Feasibility Study

First phase is a study on the generation and transmission facilities in the central system with emphasis on Gove. Second phase comprises engineering, tendering and work supervision.

Lavalin International is carrying out revision and upgrading of THEMAG's report and a consultant team has been collecting and verifying data on the systems, examining "on site" the state of existing facilities and checking overall conditions of the central grid. Hydrology and Energy Studies have already been completed as well as Load Forecasting and Geological Investigation. Planning Studies, Geotechnical Review and Transmission Studies are in progress. The responsibility for the follow-up of the project lies with the Empresa Nacional de Electricidade (ENE), Angola. Some information requested by Lavalin International from ENE is still missing so completion is likely to be delayed further.

Project 3.1.4: Provision of a Communication and Information System for the Angolan National Power Grid - 1st Phase-Evaluation Study

The project seeks to improve communications in the Angolan power system. First phase comprises a comprehensive study, while the second phase proposes projects for implementation.

Funding (US$0.12 million) is being sought.

Project 3.1.5: Reorganization of the Angolan National Electricity Utility - an Evaluation Study

The project is withdrawn from the SADCC programme.

Project 3.2.1: Interconnection of the Botswana and Zimbabwe Grids

The objective of the project is to promote the rational utilisation of regional electricity resources in order to reduce dependence on imports from outside the region.

This project involves the construction of an HV transmission line from Bulawayo in Zimbabwe to Morupule in Botswana. The last Project Steering Committee (PSC) meetings took place in late January, and late May, 1989. On transmission line contracts progress is being maintained. Design approval work is almost complete. Testing of self-supporting angle tower has been done in Spain. Due to wayleave problems, and delays on steel supply, the contractor in Botswana is about 7 weeks behind schedule. Foundation work is well under way. Survey and bush clearing in Zimbabwe are complete.

Verification of the suitability of equipment is continuing in Canada and SADCC region, and large amounts of equipment have arrived in Botswana. Civil works at Morupule are well under way, but started some three months late in Bulawayo. Both contractors are about six to eight weeks behind their schedules. Power-on date at Francistown and Morupule are expected to be on schedule, in December 1989, and Bulawayo substation is expected to be completed by March 1990, on schedule. The contractor for the transmission line has been requested to reschedule his activities to ensure that the March 1990 date is met for the Francistown - Bulawayo section of the line.

Project 3.2.2: Power Supply to Northern Botswana

The objective of the project is to promote the rational utilization of regional energy resources in order to reduce

dependence on imported electricity from outside SADCC countries.

The project has been completed and was commissioned in January 1988. Additional works involving the expansion of the 60KV transmission line on the Zambian side have been identified, and work is under way.

Project 3.2.4: Second 220 KV Line from Morupule to Gaborone

The objective of this new project is to reduce Botswana's dependence on power supply from South Africa by improving reliability of supply to the southern part of the country by providing a second line, which in turn will raise the transmission capacity to the expected levels by 1991.

The project is estimated to cost US$18 million.
Funding sought.

Project 3.3.1: Development of Small Hydropower Facilities (SHP) at Mantsonyane and Semonkgong - Lesotho (Phase II)

The implementation of this project will lessen the dependence of Lesotho on the country's consumption of South African electric energy, and also reduce diesel fuel.
Phase I of both Mantsonyane and Semonkong were commissioned by the end of 1988. Phase II of the Semonkong minihydropower plant comprises installation of a second turbine, and design and construction of a storage reservoir upstream of the Phase I project. The cost of phase I was US$7.4 million. The estimated cost of Phase II is US$3.5 million (in 1988). Funding sought.

Project 3.3.2: Transmission Network Development in Lesotho Phase III -

The objective of the project is ensure a reliable power supply to the rural areas of Lesotho, and hence contribute towards lessening dependence on fossile fuels, and imports from South Africa.

Phases I and II were completed late 1987. The project was reformulated in 1989. Phase III, which includes rehabilitation of the existing transmission and distribution network, will start as soon as funding is secured (US$6.3 million).

Project 3.3.4: Oxbow Multipurpose Scheme - Implementation

The project is withdrawn from the programme.

Project 3.3.5: Quthing Small Hydropower Project - Lesotho

The project seeks to reduce dependence on external power supplies; promote economic development in the southern parts of the country by providing reliable power for small industries and irrigation; and improve the reliability and availability of electricity throughout the country, through interconnection with main Grid from Maseru.

The project activity involves the construction of a rockfill dam, a 1.4 km canal, switch yard and a power house consisting of two units each 9400KVA as well as a 125km transmission line to Mohales Hoek.

The project is estimated to cost US$15.4 million. Funding is being sought.

Project 3.3.6: Muela Hydropower Project - Lesotho

The objectives of this project are to reduce Lesotho's dependence on South Africa for energy; and to improve the reliability and availability of electricity supply.

The project entails the construction of the hydropower complex, with a power output of 72 MW.

This project, which is part of the Lesotho Highlands Water Project, will promote general development of the remote Highlands region, by providing electricity, potable water and water for irrigation. Economic analyses have shown that this project can generate the highest internal rate of return among possible electricity generation projects in Lesotho.

Funding sought (US$137.0 million).

Project 3.4.1: Malawi/Mozambique Electricity Supply in the Eastern and Western Border Regions

The objective of the project is to supply three villages in Mozambique, located near the eastern and western border with Malawi, and far from the national grid in Mozambique, with electricity from the Malawi grid.

Tenders have been awarded for the supply of equipment, and the Electricity Supply Commission of Malawi (ESCOM) is executing this work (Phase I), which is proceeding well. Phase II of the project comprises rehabilitation of Caia substation, 153 km of 66 kV lines, three 66/33 kV substations, 50 distribution substations and 50 km low voltage lines, in western Mozambique. Phase I (US$2.26m) is financed by Norway, and funding (US$16.00) is sought for

Phase II. During Phase II, work to rehabilitate Caia substation will commence, and this will be followed by the construction of 50 small substations connecting all the villages.

Project 3.4.2: Small Hydropower Plants in Malawi

The project has been withdrawn from the Sectoral programme.

Project 3.4.3: Rehabilitation and Expansion of Power Network Communication

The project aims to improve the power network operation by providing reliable transmission circuits for speech, data collection and control; to enable fast restoration of power supply during disturbed conditions; increase switching capacity of subscriber circuits and isolate faulty lines rapidly to enhance safety for power plants and personnel. This is hoped to improve efficiency on the grid interconnection work between Malawi and Mozambique.

Funding (US$2.28 million) is being sought.

Project 3.4.4: Limbe Reinforcement

The project is withdrawn from the Sectoral programme.

Project 3.4.5: Supply to Chitipa and Karonga in Malawi from Mbeya in Tanzania

The project seeks to provide a cheaper source of electricity to consumers in Karonga and Chitipa; reduce Malawi foreign exchange drain due to imports of diesel fuel; and provide a more reliable source of electricity.

Project activities include the construction of 267km 33kV overhead lines, one substation at Ibada, two substations at Chitipa and Karonga and two distribution substations at Kuela and Chilumba.

Funding (US$3.98 million) is being sought.

Project 3.5.1: Zimbabwe - Mozambique Cooperation in Electricity Supply

This project seeks to increase cooperation in the electricity sector between the Mutare region in Zimbabwe, and Manica province in Mozambique; by up-grading existing transmission lines and substations. Phase I of the project will increase the capacity of the Mutare substation from 15 MW to 40 MW. Phase 2 comprises a feasibility study on a new transmission line (100 MW) between the two countries, which

has been completed, and the report issued in April, 1987. An agreement between the governments of Mozambique, Zimbabwe and Norway for actual project implementation was signed in May, 1987. Negotiations between EDM and ZESA are underway to implement the project.

Funding for phase I was secured from Norway, and funding (US$14.9 million) for Phase II is being sought.

Project 3.5.2: Master Plan for Swaziland and Southern Mozambique - Feasibility Study

The project has been withdrawn at the request of Swaziland.

Project 3.5.3: Corumana Hydropower Scheme

The project's objective is to reduce the dependence of the southern part of Mozambique on South Africa for electricity supply. In addition, the reserve generation capacity will improve the system's security.

Contracts were awarded to the following companies, COBOCO, Italy, to build the power station; HAFSLUND, Norway, to furnish the hydromechanical equipment (turbines, etc); and ASEA, Sweden, to deliver control and electric equipment.

Construction works are proceeding well, in spite of some security problems. The project, which is funded by Norway (US$7.4 million) and Sweden (US$13.09 million) is expected to be completed during 1989.

Project 3.5.4: Mavuzi Hydropower Plant - Evaluation Study

This is a study on possible future exports of electrical power from Mavuzi hydropower plant, in the Manica province of Mozambique, to Zimbabwe. Existing production facilities and their possible extension, the potential market, and likely power costs will be evaluated. An agreement between the Governments of Norway, Zimbabwe and Mozambique was signed in late 1987.

The consultant (Norconsult) has visited the site, and a preliminary report is due to be submitted.

Project 3.5.5: Mozambique - Malawi Interconnection of Electricity Supplies

This project consists of a study of the feasibility of constructing a transmission line which would carry power generated at Cahora Bassa to Malawi, and to the northern part of Mozambique.

The feasibility report was issued in 1987, and has been evaluated by the two countries. They have agreed to postpone the project until after 1997.

Project 3.5.7: Reconstruction of Mavuzi Hydropower Station-Implementation

This project involves the reconstruction and rehabilitation of the Mavuzi Power Station which was damaged during the Zimbabwe liberation struggle. The power station is an important energy source for projects in the Beira Corridor, including the port of Beira itself. The project also offers opportunity for increased cooperation in the power sector, between Zimbabwe and Mozambique.

Caisse Centrale and Indo-Suez Bank (France), and Banco de Mozambique agreed to finance the project, and construction started at the beginning of 1989. The project is estimated to cost US$8 million of which US$6 million is from France, and US$2 million from Mozambique.

Project 3.5.8: Completion of Chibata Substation in Manica Province

The project seeks to complete the construction of Chibata substation, and thereby interconnect the HCB system with the central system in Mozambique, and with the system in Zimbabwe.

CIDA allocated C$144 521 to finance a study of the project, and also to review other regional studies already completed or currently underway, which may be related to project's objectives. The final report was submitted in May 1989, and it recommends a full feasibility study, since the findings of the prefeasibility phase were promising in terms of benefits for both countries. Funding (US$0.13m) is being sought for carrying out of the feasibility study (phase II).

Project 3.5.9: Power Supply to Beira Corridor

The objective of the project is to re-route the present transmission system from Lamego to Manica Province along the main road, the railway and the pipeline, all of which are, at present, in well-protected areas, to facilitate access and shortened repair times in case of faults. The project also covers the installation of a stand-by power plant in Beira to guarantee continuous power supply. An Italian company has carried out the work with equipment supplied from Canada, which is funding the whole project, and the work is complete.

Project 3.5.10: Power Cooperation in Zimbabwe/Mozambique Border Areas

The objectives are to supply the following border region areas with electricity; Cashel in Zimbabwe, and Catandica in Mozambique. Both areas are at present depending on expensive diesel electricity generation.

The project involves the construction of 42km of 35kV overhead line from Mavita to Cashel, and the local distribution network, and 76km of 33kV overhead line from Ruwangwe to Catandica and local distribution network development.

Funding (US$3.1 million) is being sought.

Project 3.5.11: Mozambique Central Region Transmission and Distribution Network Study

The objective of the project is to prepare an investment programme for rehabilitation of the existing distribution network in the Beira Corridor, as well as further expansion beyond the Corridor.

Funding (US$0.25 million) is being sought.

Project 3.5.12: Cahora Bassa Power for SADCC-Prefeasibility Study

The objective of this new project is to investigate the feasibility of interconnecting the Cahora Bassa power station to the main transmission grid in Zimbabwe, thus allowing export to Zimbabwe, Zambia and Botswana.

Funding (US$0.09 million) is being sought.

Project 3.7.4 (Reconnaissance Study): Songwe River Hydropower Development

The project seeks to investigate the potential for hydropower development of the Songwe River, in order to provide the basis for future power systems planning in Malawi and Tanzania.

Funding (US$0.17 million) is being sought.

Project 3.8.1(1): Power Supply to Tunduma and Mbozi in Tanzania from Nakonde in Zambia

The objective of the project is to improve power supplies to Tunduma and Mbozi in Southwest Tanzania, by constructing

some 45km 11/33kV overhead line to transmit power from Nakonde, in Zambia.

Funding (US$2.19 million) is being sought.

Project 3.8.1(2): Supply of Sumbawanga in Tanzania

The project seeks to determine the preferred least cost scheme to supply Sumbawanga in Tanzania, with power.

The first phase is a load flow and cost estimate study, to decide on the best of the following alternatives:

a) small hydropower development;

b) extension of the Tanzanian grid from Mbeya; and,

c) supply from the Zambian grid in Mbala.

Funding (US$0.15 million) is being sought.

Project 3.8.1(3): 132KV Tieline Zambia - Malawi Feasibility Study

This project involves load flow and stability analysis; assessment of up-grading the Pensulo-Lusiwasi line, along with basic design and cost estimates; evaluation various benefits of inter-connection; assessment of impact on operation in both systems; development of principles for agreement and tariffs; and analysis of reserve connection Chama-Mzuzu.

Funding (US$0.4 million) is being sought.

Project 3.8.1(4): 330/220KV Tieline Zambia - Tanzania

The project seeks to carry out a study on the economic and technical feasibility of an interconnection between the two countries.

Funding (US$0.25 million) is being sought.

Project 3.8.2: Upgrading of Kafue Gorge Power Plant

The objectives of the project are to maintain the equipment; give key personnel at Kafue Gorge Power Station the opportunity to acquire knowledge and skills relevant to the requirements and problems they face in their jobs; and continue safe delivery of energy to other SADCC member States.

Funding has been secured for phases I and II - turbine and generator rehabilitation. Phase I is complete, and Phase II is due to be completed soon. The rehabilitation of the Kafue Gorge Training Centre (approved by the Energy Ministers in Maputo, May 1988) is an extension of Phase II of the ongoing rehabilitation of the Kafue Gorge Power Plant. Norway and Sweden have agreed to fund (US$3.1 million) the rehabilitation of the Training Centre. Funding for Phase III (spare parts) has not been secured (US$0.96 million).

The project may have to be revised in the light of the May 1989 accident at the power station.

Project 3.8.3: Rehabilitation of the National Control Centre (Phase II)

The project seeks to provide the national power company with modern equipment which will enable more efficient and economic operation of the electric system; and to maintain stable conditions on the 330 kV system in Zambia and consequently assist in maintaining stable conditions in Zimbabwe and Zaire.

Phase I comprises an evaluation of existing equipment and software, and preparation of tender documents plus tender evaluation. Phase II covers the purchase of necessary hardware and software. Zambia will finance Phase I, Sweden has advised that they would finance a feasibility study before deciding to fund Phase II, and has selected a consultant for that feasibility study.

Project 3.8.4: Provision of a New P.A.X for the 330 KV Transmission System

The project seeks to provide ZESCO with a modern communication system.

NOK 7.0 million was secured from NORAD. Elektrisk Bureau A/S is the contractor. Implementation started in April, 1988, and, apart from some additional works, the project is completed.

Project 3.8.5: PLC Communications on the Northern Transmission System

The project is being reviewed to confirm its regional relevance.

Project 3.8.6: Rehabilitation of Victoria Falls Power Station

The project seeks to rehabilitate the station's machines, and consequently to improve reliability and security of the local 66 kV feeder.

Funding (US$0.25 million) is being sought.

Project 3.9.3: Expansion of the National Control Centre in Harare

The objective of this new project is to monitor and control the power exchange in the interconnected grids of Botswana, Mozambique, Zambia and Zimbabwe, by the installation of computer based supervisory, monitoring and control equipment at the National Control Centre in Harare.

Funding is being sought (US$4.08 million).

4.5 **New and Renewable Sources of Energy**

Project 4.0.6: Solar and Wind Power Pilot Programme

The objective of this programme is to introduce proven NRSE technologies into rural or peri-urban areas to meet identified energy needs throughout the SADCC region. The approach will be to establish all the elements necessary for diffusion of different technologies in selected pilot areas, including production and distribution of equipment; servicing and financing, using existing local extension services, artisan and industrial capability as much as possible.

The investigation phase is underway. In July 1989, the TAU and the consultants sent a technical mission to the member States for discussion, evaluation and identifying the places where the possible pilot projects will be implemented. The mission is still underway.

Project 4.3.1: Renewable Energy Development - Lesotho

The project is to be reviewed to confirm its regionality, and to assess whether it can be developed as part of project 4.0.6.

Project 4.6.1: Investigation into the Acceptability of New Technology in Rural Communities

The project is to be reviewed to confirm its regional relevance, and to assess whether it can be developed as part of project 4.0.6.

4.6 Woodfuel

Project 5.0.6: Strengthening of Planning Capacity for Implementation of Woodfuel Programmes in SADCC Countries

The aim of the project is to increase capability of national energy planners in designing and implementing woodfuel programmes through dissemination of the findings of the woodfuel study (project 5.0.1) and formulation of national policies on this issue.

The project is funded by EEC (US$0.85m) and is under implementation.

Project 5.0.7: Support to TAU Woodfuel Section

Incorporated into 0.0.3.

Project 5.0.8: Development of National Woodfuel Strategies and Plans

The objectives of the project are to:

- develop comprehensive woodfuel strategies and implementation plans for each member States;
- develop projects for energy production integrated with other sectors dealing with biomass management and rural development;
- provide data to assess national capabilities for the implementation of woodfuel programmes, and means of increasing such capabilities through institutional strengthening.

Project activities include the review of experiences gained by member States and the formulation of a regional strategy.

Funding (US$1.1 million) is being sought.

Project 5.0.9: Identification and Support of Non-Governmental Organizations and Women's Groups Dealing with Woodfuel

The objectives of the project are to:

- identify active NGOs and women's groups dealing with woodfuel programmes in the region;
- analyse NGOs and women's groups experiences in implementing woodfuel projects, in particular those based on people's participation at grassroots level;

- explore possibilities of intensify NGOs and women's groups involvement in woodfuel programmes, by providing them with catalytic support like training, project planning, provision of equipment and funds, etc.

Project activity involves the compilation of a list of active NGOs, and the formulation of strategies in support of women groups.

The World Bank (ESMAP) is assisting in securing funds (US$0.4 million) for implementing the project.

Project 5.0.10: Identification of Suitable Tree Species for Energy Production in the SADCC Region

The objectives of the project are to:

- provide comprehensive data on suitable multipurpose tree species for energy production for the different climatic and edaphic zones of the region;

- provide data on how to obtain seeds of the recommended species;

- facilitate exchange of research findings and knowledge of suitable species for energy production.

A steering committee on woodfuel will be formed, surveys on suitable species conducted and a workshop organised to assess results of national surveys.

Funding (US$0.9 million) is being sought.

Project 5.0.11: Assessment of Environmental and Socio-Economic Impact of Woodfuel Scarcity

The objectives of the project are to provide:

- comprehensive site-specific data on environmental and socio-economic problems created by woodfuel scarcity in the SADCC region;

- information to be used for increase of public awareness of woodfuel aspects;

- data for planning future woodfuel projects.

A steering committee of environmental experts will be formed; experiences of member States will be reviewed, and data collected.

Funding (US$2.3 million) is being sought.

Project 5.0.12: Household Woodfuel Consumption Surveys in the SADCC Region

The objectives of the project are to:

- provide site-specific data on household woodfuel consumption rates within the SADCC region;

- analyse factors which influence rates of woodfuel consumption at household level.

Funding secured from the World Bank (ESMAP) (US$0.5 million).

Project 5.0.13: Development of Fuel Switch Opportunities

The main objectives of the project are to:

- examine critically opportunities for fuel switch from woodfuel to other sources of energy by the majority of the population in urban and a few rural areas in the SADCC region;

- examine factors which hinder fuel switch, and give recommendations on how to overcome them, on a short-and long-term basis;

- establish a few pilot projects on fuel switch, to test the validity of hypotheses advocated by the study.

A few pilot projects will be established to test the validity of the hypothesis.

Funding (US$0.6 million) secured by the World Bank (ESMAP).

Project 5.0.14: Increase of Public Awareness on Woodfuel Issues

The objectives of the project are to intensify:

- people's participation in the production of woodfuel, and adoption of improved techniques of utilising woodfuel;

- the awareness of decision-makers on socio-economic and environmental problems created by woodfuel scarcity, and the need to increase resources for the implementation of woodfuel programmes.

Nine country reports will be produced on ways of raising mass awareness of woodfuel issues, and guidelines indicating future strategies will also be produced.

TAU and RTC have agreed to develop the project with the other sectors involved. viz Forestry and Soil and Water Conservation and Land Utilisation. A meeting of all four parties is scheduled for late 1989.

Funding (US$1.5 million) is being sought.

Project 5.0.15: Improvement of Woodfuel End-use Efficiency in Rural Industries of the SADCC Region

The main objectives of the project are to:

- contribute to sustained supply of woodfuel for rural industries by improving their woodfuel use efficiency;
- minimise environmental degradation being caused by deforestation through clearing of trees and forests to supply woodfuel to rural industries;
- increase public awareness of the socio-economic importance of rural industries, and the need to sustain their energy supply through improvement of woodfuel end-use efficiency;
- produce country reports, indicating the main rural industries using woodfuel, and possibilities of improving their end-use efficiencies.

Phase one involves conducting national surveys and technical missions to member States as part of project development. Phase two involves project implementation.

Funding (US$0.5 million) is being sought.

Project 5.0.16: Development of Improved Charcoal Production Techniques

The main objectives of the project are to:

- minimise the wasteful use of wood in charcoal production in the region;
- minimise environmental degradation arising from poor charcoal production techniques;
- increase the income of charcoal producers through adoption of improved production techniques which will increase recovery rates;
- facilitate exchange of experiences in the improvement of charcoal production techniques in the region.

A steering committee of experts in this area will be formed in order to review experiences of member States, on charcoal production as part of the preparation of a regional programme.

Funding (US$0.45 million) is being sought.

Project 5.1.1: Evaluation of the Use of Woodfuel in Angola

The project is to be re-evaluated.

Project 5.1.2: Harnessing the Seasonal Flow Rates of the Curoca, Giraul, Bero and Bentiaba Rivers to Reforest the River Banks for Energy Purposes

The project is being reformulated.

Project 5.1.3: Luanda Woodfuel Project (Angola)

The main objectives of the project are to:

- establish a woodfuel plantation of about 55,000 ha in Luanda Province;
- increase food and fodder production for Luanda through agro-forestry;
- improve people's standard of living, especially by creating new jobs for women;
- minimise on-going environmental degradation around Luanda city, mainly soil erosion due to loss of vegetation cover.

The planning phase will evaluate the technical feasibility and economic viability of the project, leading to the establishment of plantations.

Funding (US$6.34 million) is being sought.

Project 5.3.1: Wood/Charcoal Stoves Development and Dissemination - Lesotho

The project is being reformulated.

Project 5.5.1: Urban Fuelwood Agro-forestry Project for Maputo - Mozambique

The main objectives of the project are to:

- rehabilitate the existing equipment in project FO.2;

- establish an additional area of 2 500 ha of eucalyptus plantation;

- manage the existing plantations (3 200 ha);

- improve the agro-forestry schemes;

- create forestry extension network;

- develop research and training, especially in agro-forestry, in liaison with other relevant sectors.

About 2500ha of woodfuel plantations will be established, and training and research activities will be conducted.

Funding (US$3.0 million) is being sought.

Project 5.6.1: Reaffforestation in the Eastern Part of Swaziland and Southern Mozambique

The project has been suspended until conclusion of the World Bank's ESMAP survey.

Project 5.6.2: Fuelwood Strategies in Swaziland

The project has been suspended until conclusion of the World Bank's ESMAP survey.

4.7 Energy Conservation

Project 6.0.2: Energy Saving in Industry

The main objectives of the project are to:

- carry out industrial energy consumption audits in selected firms in the member States;

- organise training workshops and data collection on energy conservation;

- develop a regional energy conservation strategy

The Energy Conservation Office established in Harare in November 1987 is now fully operational.

Five Project Steering Committee meetings have so far been held between November 1987 and June 1989, attended mostly by Botswana, Malawi, Zambia and Zimbabwe. The project coordinating team has, however, visited all the nine countries of SADCC to develop detailed programmes for training and pilot audits.

By the end of May 1989 eight audits had been carried out in Zimbabwe, and more are planned. In Malawi eleven audits had been carried out by April 1989, and twelve are underway. The Zambia programme involves the training audit at Mufulira Copper Mine, which was due to be completed by June 1989. The Botswana Programme is due to begin in October 1989.

A training workshop on energy conservation in the manufacturing sector, attended by 24 participants from 8 SADCC member States, was held in Harare in March 1989; and another one in June 1989, in Blantyre.

A mid-term review of the project will be carried out in September 1989, with Canadian financial assistance, to evaluate the project's performance.

Of the Project's total cost of US$4.29 million, about US$3.61 million has, so far, been secured from Canada.

Project 6.8.1: Energy Conservation, Indeni Petroleum Refinery - Zambia

The main objective of the project is to save energy in the existing refinery streams by the installation of waste-heat recovery equipment and the preflash tower in the atmospheric distillation unit. The project has been reviewed, and the terms of reference have been changed.

Funding (US$0.8 million) is being sought.

0.0.8 ESTABLISHMENT OF A REGIONAL ENERGY PLANNING NETWORK IN SADCC

Estimated cost (US$ Million)

Total: US$2.00
Foreign: US$2.00
Local:

Financing gap US$2.0m

Executing Agency: TAU

Funding Secured:

Foreign:
Local:

Start:

Duration:

Objectives: The project shall serve to:

- strengthen the processing and planning capability of the TAU and national energy units;
- facilitate exchange of data and information between regional and national planners; and
- facilitate technical cooperation between the TAU and the national energy authorities in the formulation of regional and national development programmes.

Description: The TAU has acquired what is considered adequate capacity and capability to process SADCC energy data and information, in the form of a series of micro-computers and a range of software packages. It has been decided to strengthen the capacity of national energy administrations with a view to providing technical and administrative facilities compatible with those in the TAU. This will be facilitated by the procurement and harmonisation of computer facilities.

The project will develop in three phases:

- assessment of member countries requirements;
- procurement of computer hardware and software; and
- training of personnel

Status: A new proposal for financing and implementation of the project has been received from ESRG Norconsult. This proposal is now being assessed.

1.0.4 SPECIALIST TRAINING FOR THE SADCC PETROLEUM SECTOR

Estimated Cost: (US$ Million)

Total: 2.34
Foreign: 2.34
Local:

Financing Gap: US$2.34m

Executing Agency:

TAU/RTC

Funding Secured:

Foreign:
Local:

Start:

Duration: 2 years

Objectives:

1. To produce for the SADCC Oil Companies and Government Ministries through an integrated Regional Energy Programme, a core of professional and management staff
2. Enhance regional cooperation through standardisation of exploration agreements, safety procedures, oil supply contracts, product handling and product specification procedures.
3. Enhance cooperation with non-SADCC oil companies, and to reduce costs and losses.

Description: The project will be implemented by the TAU in collaboration with the EEC. It will consist of two phases, thus:

Phase I: Training programme in the SADCC countries.

a) upstream
b) downstream
c: special workshops

Phase II: Award of scholarships to a few staff members for overseas specialised training.

Status: Funding sought.

1.0.5 JOINT SADCC PETROLEUM EXPLORATION PROGRAMME

Estimated cost: (US$ Million)

Total: 0.45
Foreign: 0.44
Local: 0.01

Financing gap: US$0.44m

Executing Agency:

SADCC Project Steering Committee

Funding Secured:

Foreign:
Local: 0.01 (MOZ)

Start:

Duration: 2-3 years

Objectives: The project will improve the geological database and allow the individual SADCC countries to evaluate the petroleum potential of their basins. By merging the national projects in a SADCC exploration programme, the short-term objectives are:

- To help financing from aid organisations.
- To mobilise the contributions from oil companies interested in getting new data to evaluate the prospectivity of the region.
- To save money as a certain crew can execute different projects in the same region.

Description: The joint programme will

- Collect new information/data
- Get a better understanding of the geology, and improved knowledge about the petroleum potential.
- Make the area/basin more prospective for commercial exploration by national and/or international oil companies.

This will place the countries in a better position to formulate petroleum exploration strategies, and to be better able to negotiate with international oil companies.

Phase I will involve the recruitment of a Task Force which will define the terms of references

for the data collection programme, and to establish a Project Steering Committee, (Phase II). Phase III involves the actual study of the Karoo Rift, Rovuma, and the East African Rift Valley, and the assessment of results and production of reports. Phase IV will involve data collection and analysis.

Status: New Project. Funding is being sought.

1.0.6 POTENTIAL PETROLEUM COST SAVINGS

Estimated cost: (US$ Million)		Financing gap:	US$0.18m
Total:	0.18		
Foreign:	0.18	Executing Agency:	
Local:			
Funding Secured:		Start:	
Foreign:			
Local:		Duration:	

Objectives: The Transportation Sector is the largest user of petroleum in the SADCC region. The objectives of this project are:

- to identify the potential for petroleum savings in the transportation sector in SADCC member States through conservation measures and fuel substitution; and
- investigate the feasibility of establishing of a regional organisation to handle joint petroleum information collection.

Description: The following activities will be carried out to meet the objectives:

i) Estimate the breakdown of petroleum use in the SADCC transportation sector by mode (air, rail, truck, bus, etc.) and fuel type (gasoline, diesel), using regional knowledge and international estimating procedures. A workshop will be held to train regional personnel on estimating procedures.

ii) Review transport policies in the SADCC member States as they affect petroleum use - for example, fuel pricing for different modes, vehicles, taxation, performance requirements, etc.

iii) Determine opportunities for improving fuel efficiency i the region through conservation measures, including improved maintenance, locally manufactured spare parts, driver training programmes, fleet management, mode switching, wind spoilers, etc.

iv) Determine opportunities for fuel substitution in the region, including electrification of railways, and increased use of alcohols and coal liquids.

v) Prepare a report documenting fuel use, opportunities, economics, and recommendations for policy changes.

This sub-project involves the establishment of a joint organisation responsible for the collection and dissemination of Petroleum Market Information.

Status: Funding sought.

1.7.1 TAZAMA PIPELINE REHABILITATION

Estimated Cost: (US$ Million)

Total: 43.6
Foreign: 41.2
Local: 2.4

Funding Secured:

Foreign: 12.0 (ITA)
Local: 2.4 (TAN/ZAM)

Financing Gap: US$39.2m

Executing Agency: Tazama Pipelines Ltd.

Start: July 1988

Duration: Subject to complete sourcing of funds

Objective: The main objective is to rehabilitate the pipeline as the least-cost and most reliable means of transporting oil to Zambia and other SADCC countries.

Description: The pipeline system which consists of 1705 km of eight inch pipeline and 769 km of twelve inch loop-lines has deteriorated resulting in increasing leakage. Core rehabilitation of the pipeline associated facilities is, therefore, necessary.

Status: A project implementation unit has been set up at Tazama Pipeline Ltd. for implementation. Part of the foreign component (US$12.0 million) has been secured from the Italian Government to cover emergency pipeline repairs, which is underway. Funding is required for the rest of the project.

1.7.3 ESTABLISHMENT OF A BIOSTRATIGRAPHIC REFERENCE COLLECTION FOR THE SADCC REGION

Estimated cost: (US$ Million)

Total 0.10
Foreign 0.10
Local

Financing gap: US$0.10m

Executing Agency: Tanzania Petroleum Development Corporation

Funding secured:

Foreign -
Local

Start:

Duration: 36 months

Objectives: Utilisation of existing biostratigraphical and geological data from the SADCC countries together with additional studies of geological samples to achieve a general biozonation and correlations for the entire region.

Description: The project is split up into three phases

Phase I: Includes biostratigraphicall studies of Tanzania sediments and the planning of the studies to be performed in the other SADCC countries.

Phase II: Includes biostratigraphical studies of sediments from the SADCC countries.

Phase III: The results obtained in phase I and II shallbe compiled and correlation charts prepared based on palynology, micropaleontology and source rock potential.

Final report includes an "Atlas of Microfossils" for the SADCC region.

Status: Implementation of phase I can begin once funding is secured.

3.0.5 PLAN FOR INTEGRATED UTILIZATION OF CUNENE HYDROLOGICAL BASIN WATER RESOURCES

Estimated Cost: (US$ Million)

Total : 0.62
Foreign : 0.60
Local: 0.02

Financing Gap: US$0.60n

Executing Agency:

Government of Angola

Funding Secured:

Foreign:
Local: US$0.020 (ANG)

Start:

Duration:

Objectives : The main objective is to devise a plan for the integrated development of the Cunene river basin's water resources.

Description: The project will entail:

- collection and organisation of data:
- characterizing the region; and
- formulating different investment projects for using water.

Status: Funding sought.

3.0.6. POWER SYSTEMS CONTROL AND OPERATION TECHNICAL SUPPORT AND TRAINING

Estimated cost: (US$ Million)

Total 0.40
Foreign 0.40
Local -

Financing gap: US$ 0.40m

Executing Agency: ZESA/ZESCO

Funding secured

Foreign -
Local -

Start:

Duration: at least 5 years

Objectives: Main objective of the project is to meet the need for training of personnel and provide technical support (both hardware and professional skills) to power utilities in the SADCC region have invested in computer-based equipment for power systems control and operation.

Description: Two times a year, a hardware engineer will spend 6 weeks in the countries involved providing technical support, and training local personnel responsible for the running and performance of the equipment.

Each half year, a software specialist will provide 6 weeks training in software maintenance and Energy Management Systems. Once a year an engineer will carry out on-site training on PLC and telephone equipment, and offer other technical support for a period of 5 weeks. A certain allowance will be included for replacement of faulty equipment.

Training is expected to take place in both Zabia and Zimbabwe using existing facilities in these countries. The spare parts will be held by each electricity utility (Zambia/Zimbabwe).

Status: Funding sought.

3.0.7 COMPUTER MODEL FOR ANALYSIS AND PLANNING OF SADCC TRANSMISSION SYSTEMS - PHASE I

Estimated costs: (US$ Million)

Total: 0.10
Foreign: 0.10
Local: -

Financing gap: US$0.10m

Executing Agency: TAU

Funding secured

Foreign -
Local -

Start:

Duration: 1 year (Phase I)

Objective: The aim of the project is to establish a computer model both for operation and planning of transmission systems.

Description: The project is divided into three stages:

I. Preliminary Study.
II. Development of a computer model for SADCC Grid
III. Model Implementation.

The Preliminary Study will provide the information needed to decide whether it is worthwhile to continue into stages II and III. All SADCC utilities interested in the problem will be offered the opportunity to participate from the initial stage.

Status: Funding sought.

3.0.8 COORDINATED UTILISATION OF REGIONAL GENERATION AND TRANSMISSION CAPACITIES - PREFEASIBILITY STUDY

Estimated cost: (US$ Million)

Total 0.25
Foreign 0.25
Local -

Financing gap: US$0.25m

Executing Agency:

Funding secured:

Foreign -
Local -

Start:

Duration: Approximately 16 months

Objectives: The aim of this project is to assess the scope for coordinated utilisation of the total regional power generation capacity, taking into account the need for reserve capacity, reliability, etc.

Description: Among other things, the following items must be done:

- Ascertain current installed capacity against demand and project both into the future.
- Review load forecasts and revise them were necessary.
- Examine power tariff and pricing policies and structures and their impact on regional trade in electricity.
- Develop least cost regional power development plan.
- Compare regional plan with national plans.
- Consider system stability of regional network.
- Maximum use of existing available reports and information.

Status: Funding sought.

3.0.9 MAINTENANCE DEVELOPING PROGRAMME

Estimated cost: (US$ Million)

Total 0.15
Foreign 0.15
Local -

Financing gap: US$0.15m

Executing Agency: TAU

Funding secured:

Foreign -
Local -

Start:

Duration:

Objectives: Increase the reliability of power plants in member States.

Description: Phase I: Selection of 3 pilot plants in the region on the basis of their technical status, potential for improvements, size and human resources.

Phase II: Inspection at site before final inclusion in the programme.

Phase III: Implementation.

Status: Funding sought.

3.1.4 PROVISION OF A COMMUNICATION AND INFORMATION SYSTEM FOR THE ANGOLAN NATIONAL POWER GRID - 1ST PHASE STUDY

Estimated cost: (US$ Million)

Total 0.12
Foreign 0.12
Local -

Financing gap: US$0.12m

Executing Agency: Government of Angola - ENE

Funding secured:

Foreign -
Local -

Start:

Duration: 6 months (phase I)

Objectives: The objective of the project is to improve communi-cations in the Angolan power system in order to:

- enable efficient and economic daily operation of the power generation, transmission and distribution systems;

- provide the national electricity authorities with data and information which will enable them to make the right decisions during operations; and

- provide a basis for cooperation with other SADCC and neighbouring countries.

Description: The project is to be executed in two phases.

In the first phase the consultant will carry out a comprehensive study which will assess:

a) the status of the existing communications system;

b) the need for efficient communication at local, regional and national levels to ensure efficient and economic daily operation of the national power system;

c) the need for back-up communications systems in the light of the security problems in some areas; and

d) the need for a national control centre, and the associated control systems.

The second phase comprises procurement, erection, commissioning and testing of equipment and manpower training, in line with the recommendations of Phase I. The implementation programme should preferably start with the rehabilitation of existing equipment and later proceed to installation of new equipment.

Status: Funding sought.

3.2.4 SECOND 220 KV LINE FROM MORUPULE TO GABORONE

Estimated cost: (US$ Million)		Financing gap: US$15.5m	
Total	18.0		
Foreign	15.5	Executing Agency: Botswana Power Corporation	
Local	2.5		
Funding secured:		Start: 1990	
Foreign	-		
Local	2.5 (BOT)	Duration: 2 years	

Objectives:

- Improve reliability of power supply to the Southern part of the country by providing a second line.
- Reduce dependence on power supply from South Africa.
- Allow for a full utilization of the future interconnection with Zambia and Zimbabwe.

Description: Build a 220KV line between Morupule Power Station and Gaborone to reinforce the existing 220 kV line.

Status: Funding sought.

3.3.1 DEVELOPMENT OF SMALL HYDROPOWER FACILITIES - LESOTHO (PHASE II)

Estimated cost: (US$ Million)

Total: 3.50
Foreign: 3.50
Local -

Financing gap US$3.50m

Executing agency:

Lesotho Electricity Corporation

Funding secured

Foreign -
Local -

Start:

Duration:

Objectives:

- Reduce the dependence of Lesotho on external power supplies, thus enhancing the supply security of the country.
- Provide cheaper electricity as the area is isolated.

Description: The project involves the installation of a second turbine and the construction of a water reservoir of about 8-10 million cubic metres up-stream of the Semonkong hydropower station.

Status: Funding sought.

3.3.2 TRANSMISSION NETWORK DEVELOPMENT - LESOTHO (PHASE II)

Estimated cost: (US$ Million)

Total : 6.30
Foreign: 6.30
Local:

Financing gap: US$10.69m

Executing Agency: Lesotho Electricity Corporation

Funding secured:

Foreign:
Local:

Start:

Duration:

Objectives: The objective of this project is to improve the 33 KV trans-mission system in Lesotho, as a

precondition for further electrification in the country.

Description: The project comprises construction of seven new substations, approximately 180 km of 33 KV transmission lines and one regional control centre. This work has been completed. Phase II requires a further 140 km of 33 KV overhead lines. However, as the demand for reliable energy has increased in the central part of the country (Thaba - Tseka area) and other villages lying between there and Maseru, it has become imperative to upgrade the line and erect more substations. This has resulted in the decision to extend phase II of the 33 kv project, to allow for the rehabilitation of the existing network.

Status: Funding sought.

3.3.5 QUTHING SMALL HYDROPOWER PROJECT - LESOTHO

Estimated cost: (US$ Million)

Total: 15.4
Foreign: 15.4
Local -

Financing gap: US$15.4m

Executing agency: Lesotho Electricity Corporation

Funding secured

Foreign -
Local -

Start:

Duration: 5 years

Objectives: The objectives of the project are to:

- reduce Lesotho's dependency on external power supplies thus enhancing the security of the country.
- promote economic development in the Southern parts of the country, by providing reliable power for small industries and irrigation.
- improve the reliability and availability of electricity supply throughout the country, through inter-connection with the main grid (from Maseru) and possibly the isolated grid of Qacha's Nek in the east.

Description: The following are the project components:

- construction of a rockfill dam;
- construction of a 1,34 km water transfer steel conduit;
- powerhouse consisting of two units with 9400 kVA capacity each;
- switchyard including transformers; and
- 125 km transmission line from power station to Mohale's Hoek.

Status: Funding sought.

3.3.6 MUELA HYDROPOWER PROJECT

Estimated cost: (US$ Million)

Total 137.0
Foreign 137.0
Local -

Financing gap: US$137.0m

Executing Agency: Lesotho Highlands Development Authority (LHDA)

Funding secured:

Foreign -
Local -

Start: 1990

Duration: 6 years

Objectives: The objectives of the project are to:

- Reduce the dependency from the RSA.
- Improve the reliability and availability of electricity supply.
- Promote general development of the remote and underdeveloped highlands region.
- Provide the opportunity to undertake auxilliary development.

Description: It will be a 3 x 24 MW plant and its major components will be as follows:

- A multistoried underground powerhouse containing generators, turbines, mechanical and electrical equipment.

- A 55 meter high curved, concrete, gravity dam.

- An outdoor gas insulated, double busban, 132 kV switchyard.

- A permanent village for the staff that will operate and maintain the plant.

The water will be sold as part of the effort to recover the project costs.

Status: Funding sought.

3.4.1 MALAWI/MOZAMBIQUE ELECTRICITY SUPPLY IN THE EASTERN AND WESTERN BORDER REGIONS - PHASE II

Estimated cost: (US$ Million)

Total	16.0
Foreign	16.0
Local	-

Financing gap: US$16.0m

Executing agency: ESCOM/EDM

Funding secured:

Foreign	-
Local	-

Start:

Duration:

Objectives: Saving foreign exchange for Mozambique through the replacement of diesel generated power with comparatively less expensive hydro-power from Malawi.

Promote energy cooperation between two SADCC member States.

Description: The main parts of the project are:

- rehabilitation of Caia sub-station in Mozambique;

- 153 km 66 kV over-head lines;

- three 66/33 kV sub-stations;
- 50 distribution sub-stations;
- 50 km low voltage network.

Status: Funding sought.

3.4.3 REHABILITATION AND EXPANSION OF POWER NETWORK COMMUNICATION - MALAWI

Estimated cost: (US$ Million)

Total: 2.28
Foreign: 2.22
Local: 0.06

Financing gap: US$2.22m

Executing Agency: ESCOM

Funding secured:

Foreign: -
Local: 0.06 (MAL)

Start:

Duration: 10 weeks

Objectives: The objective of the project is to rehabilitate existing equipment and expand the communication system in order to enable efficient and economic daily operation and fast restoration of power supplies during faults on the interconnected system.

Description: The project comprises eleven links to major substations, replacement of outdated equipment, six new digital and five analogue automatic exchange and subscriber circuits.

Up-grading single-phase line couplings to phase-to-phase couplings. Provision of protection signalling equipment in conjunction with distance relays.

Status: Funding sought.

3.4.5 SUPPLY TO CHITIPA AND KARONGA IN MALAWI FROM MBEYA IN TANZANIA

Estimated cost: (US$ Million)

Total: 3.980
Foreign: 3.050
Local: 0.930

Finding secured:

Foreign: -
Local: 0.930(Mal/Tan)

Financing gap: US$3.050m

Executing Agency:
ESCOM/TANESCO

Start:

Mid 1989

Duration:
2 years

Objectives: To provide a cheaper source of electricity to consumers in Karonga and Chitipa.

Reduce Malawi's foreign exchange drain due to importation of diesel fuel for diesel-power generators.

Provide a more reliable source of electricity.

Description: Electricity supply to Karonga was established in 1979, while Chitipa will be electrified by the end of 1988, by diesel generators under the present Rural Electrification Programme.

Reliability of supply in Karonga is poor due to frequent machinery breakdowns.

By connecting the two towns in Malawi to the Tanzanian national grid, considerable improvements will be achieved. The project involves construction of:

- 267 km 33kV overhead lines
- 1 sub-station for voltage regulation at Ibanda
- 2 sub-stations at Chitipa and Karonga
- 2 distribution sub-stations at Kyela and Chilumba

Status: Funding sought.

3.5.1. ZIMBABWE-MOZAMBIQUE COOPERATION IN ELECTRICITY SUPPLY (PHASE II)

Estimated cost: (US$ Million)

Total: 14.9
Foreign: 14.9
Local: -

Financing gap: US$14.9m

Executing Agency:
EDM/ZESA

Funding secured:

Foreign: -
Local: -

Start:

Duration:

Objectives: This project seeks to increase cooperation in the electricity sector between the Mutare region in Zimbabwe and Manica province in Mozambique, by upgrading existing transmission lines and substations.

Description: Phase I of the project will increase the capacity of the Mutare substation from 15 MW to 40 MW network analysis study has indicated that a 220kV transmission line between Chibata in Mozambique, and Orange Grove in Zimbabwe is feasible, given the load forecast for Zimbabwe. The project entails the construction of:

- 87 km 220 kV overhead line Chibata - Orange Grove;
- 120 MVA transformer at Orange Grove;
- 220 kV and 132 kV bays at Orange Grove;
- 220 kV bay and busbar extension in Chigodora.

Status: An agreement between the governments of Mozambique, Zimbabwe and Norway for actual project implementation was signed in May, 1987. Negotiations between EDM and ZESA are underway to implement the project.

Funding sought.

3.5.8 COMPLETION OF CHIBATA SUBSTATION IN MANICA PROVINCE - MOZAMBIQUE

Estimated cost: (US$ Million)

Total: 3.50
Foreign: 2.50
Local: -

Financing gap: US$2.50m

Executing Agency: EDM

Funding secured:

Foreign:
Local: 1.00 (MOZ)

Start:

Duration:

Objective: The objectives of the project are to complete the construction of Chibata Substation and thereby interconnect the HCB system with the central system in Mozambique, and consequently with the system in Zimbabwe; this will:

- ensure reliability of power supplies in the central electric power system in Mozambique, including the Beira port and Beira-Zimbabwe oil pipeline facilities;
- enable Mozambique to fulfil its commitments on supply of power to the Mutare area in an emergency situation; and,
- enable supply of electricity to Mutare area on a firm basis.

Description: All the electrical and mechanical equipment is already in Mozambique. The remaining works to be done on site comprise:

- site clearing, excavation, blasting, levelling and site surfacing of an area of 1 ha.
- building of foundations for 220/110 kV transformers and electrical equipment
- construction of control building

A tentative implementation period of 8 - 9 months is envisaged.

Status: Implementation awaiting funding, and the outcome of a feasibility assessment which is underway.

3.5.10 POWER COOPERATION IN ZIMBABWE/MOZAMBIQUE BORDER AREAS

Estimated cost: (US$ Million)		Financing gap: US$2.2m	
Total	3.09		
Foreign	2.20	Executing Agency:	
Local	0.89	EDM/ZESA	
Funding secured		Start:	
Foreign:			
Local	0.89 (MOZ/ZIM)	Duration:	

Objective: The objectives are to supply the following border region areas with electricity: Cashel in Zimbabwe, and Catandica in Mozambique. Both areas are at present dependent on expensive diesel electricity generation.

Description: The supply to Cashel involves:

- Construction of 42 km of 33 overhead line from Mavita to Cashel.
- Installation of necessary transformers and switching equipment.
- Local distribution network.

The supply to Catandica involves:

- Construction of 76 km of 33 kV overhead line from Rwange to Catandica.
- Installation of necessary transformers and switching equipment.
- Local distribution network.

Status: Funding sought.

3.5.11 MOZAMBIQUE CENTRAL REGION TRANSMISSION AND DISTRIBUTION NETWORK STUDY

Estimated cost: (US$ Million)

Total 0.25
Foreign 0.25
Local -

Financing gap: US$0.25m

Executing Agency: EDM

Funding secured:

Foreign -
Local -

Start:

Duration: 12 months

Objectives: The project aims at preparing an investment programme regarding:

- rehabilitation of existing networks along the Beira Corridor;
- expansion of networks;
- connection of new consumers;
- training of EDM staff; and
- identification of required technical assistance.

Description: Mozambique's Central Region constitutes an isolated network supplied from 2 hydropower stations rated to 84 MW. A programme has already been initiated for rehabilitating and expanding the production sources, and strengthening the transmission network. This study is aiming at the preparation of a comprehensive investment programme for a reliable power distribution network in the Beira Corridor.

Status: Funding sought.

3.7.4. SONGWE RIVER HYDROPOWER DEVELOPMENT

Estimated cost: (US$ Million)		Financing gap: US$0.15m	
Total:	0.15		
Foreign:	0.15	Executing Agency: TANESCO	
Local:	-		
Funding secured:		Start:	
Foreign:	-		
Local:	-	Duration: 6 months	

Objectives: To investigate the hydro-power potential of the Songwe River in order to provide the basis for future power systems planning and cooperation in Malawi and Tanzania.

Description: A preliminary study was made in 1976. At that time only 1:250 000 maps were available. Today 1:150 000 maps with 20 m contour intervals are available and hence facilitate the job considerably. A reconnaissance study is proposed. For both Tanzania and Malawi more accurate investigations would add one more potential project to the power systems planning in the two countries.

Status: Funding is sought.

3.8.1(1) **POWER SUPPLY TO TUNDUMA AND MBOZI IN TANZANIA FROM NAKONDE IN ZAMBIA**

Estimated costs (US$ Million)		Financing gap US$1.80m
Total	2.19	
Foreign	1.80	Executing agency:
Local	0.39	ZESCO/TANESCO
Funding secured:		Start
Foreign	-	Early 1989
Local	0.385 (Zam)	
		Duration
		2 months in Zambia
		9 months in Tanzania

Objectives: To replace expensive diesel powered generation in Mbozi district in the South West of Tanzania with cheaper hydro-electricity from the Zambia grid in Nakonde.

Description: The project is derived from project 3.8.1.

Public power supply in Tunduma was established in 1980, and the load has grown to 250 kW in 1987. The potential for further growth of consumption is considerable.

Tunduma is located about 5 km from the Zambian grid in Nakonde, and this makes inter-connection feasible.

Status: Funding sought.

3.8.1(2) SUPPLY OF SUMBAWANGA IN TANZANIA

Estimated cost: (US$ Million)	Financing gap: US$0.14m
Total 0.14 (Phase I) Foreign 0.14 Local -	Executing agency: TANESCO
Funding secured	Start
Foreign - Local -	Duration: 6 months.

Objectives: To carry out a load flow and cost estimate study to determine the least cost scheme to supply Sumbawanga in Tanzania with cheap power, in place of expensive diesel generated power, and to promote further electrification.

Description: This project is derived from project 3.8.1.

Power for Sumbawanga is currently supplied by diesel generation. The demand in 1986 was 470 kW/1,112 MWh, and is expected to reach 4,000-5,800 MWh in 10 years.

Three options are to be investigated:

- small hydropower development;
- extension of the Tanzanian grid from Mbeya; and
- supply from Zambian grid in Mbala.

Status: Funding sought for phase I.

3.8.1(3) 132 KV TIELINE ZAMBIA - MALAWI FEASIBILITY STUDY

Estimated cost: (US$ Million)

Total: 0.40
Foreign: 0.40
Local: -

Financing gap: US$0.40m

Executing Agency:

Funding secured:

Foreign: -
Local: -

Start:

Duration:
1 year

Objectives: To study the feasibility of constructing a tieline between Zambia and Malawi.

Description: The study project 3.8.1 demonstrated that a 132 kV interconnection between Malawi and Zambia is a potentially beneficial project. The possibility to inter-change power for reserve and supply reliability purposes would be important, and needs to be studied more carefully, to establish its feasibility.

Status: Funding sought.

3.8.1(4) 330/220 KV TIELINE ZAMBIA - TANZANIA, FEASIBILITY STUDY

Estimated cost: (US$ Million)

Total: 0.25
Foreign: 0.25
Local: -

Financing gap: US$0.25m

Executing Agency:

Funding secured:

Foreign: -
Local: -

Start:

Duration:
6 months

Objectives: To carry out a study to demonstrate if an interconnection between Zambia and Tanzania may be economically and technically feasible.

Description: The study project 3.8.1 indicated that an inter-connection between the power systems in Zambia and Tanzania might be viable. Load flow and cost estimates need to be carried out, and the impact of an inter-connection on future generation and transmission development in the two countries also needs to be investigated.

Status: Funding sought.

3.8.2 REHABILITATION OF KAFUE GORGE POWER STATION - PHASE III

Estimated cost: (US$ Million)		Financing gap: US$0.96m	
Total:	0.96		
Foreign :	0.96	Executing Agency:	
Local:	-	ZESCO	
Funding secured:		Start:	
Foreign:	-		
Local:	-	Duration:	
		2 years	

Objectives: The objective of the project is to upgrade the turbines and other major components in the Kafue Gorge power plant and to provide ZESCO with key personnel.

Description: The project entails:

- supply of spare parts for air compressor;
- major overhaul of 330 kv switchgear;
- modification to power house;
- provision of trash rack system and boat;
- modification of cooling water system;
- improvement of workshop facilities; and
- spare parts for generator and 330 kv transformer.

Phase III represents the finalisation of the rehabilitation of the power station.

Status: Funding Sought

3.8.3 REHABILITATION OF THE NATIONAL CONTROL CENTRE - ZAMBIA (PHASE II)

Estimated cost: (US$ Million)

Total: 8.06
Foreign: 8.00
Local: 0.06

Financing gap: US$8.00m

Executing Agency:
ZESCO

Funding secured:

Foreign: -
Local: 0.06 (ZAM)

Start:

Duration:

Objective: The objectives of this project are:

- to provide the national power company with modern equipment which will enable more efficient and economic operation of the electric system; and
- to maintain stable conditions on the inter-connected 330 kv system in Zambia and Zimbabwe, and assist Zaire in maintaining stable conditions.

Description: A draft project specification has been prepared, giving two options:

- to replace the computer system in the NCC with more powerful computers of the latest design, but to retain the telemetry system. This would entail inter-facing with the telemetry system, the mimic board, chart recorders and plotting table and incorporating EMS into the present software; and
- to replace the whole NCC system with a modern scheme of the latest technology in hardware and software of an EMS. The mimic board would be the only item to be inter-faced with the new system.

Both options retain the existing power supply scheme and control centre building.

The project will be carried out in two phases:

1. an appraisal study of the present system, taking into account ZESCO's specified requirements; and

2. implementation of the scheme proposed in Phase I.

Status: A consultant has been selected to carry out the feasibility study. Funding sought for phase II.

3.8.6 REHABILITATION OF VICTORIA FALLS POWER STATION - ZAMBIA STUDY

Estimated Cost: (US$ Million) Financing Gap: US$0.25m

Total: 0.25
Foreign: 0.25 Executing Agency: ZESCO
Local: -

Funding Secured: Start

Foreign:
Local: Duration:

Objective: It is necessary to rehabilitate this power station and improve the reliability of supply to the local 66 kv feeder which is to provide he inter-connection with Botswana.

Description: There are 3 stations; A, B and C:

* "A" station is fifty years old and is operating satisfactorily, but the 3.3 kv switchgear and cables associated with the machines are in a poor state of repair and are subject to high failure probability.

* The problems in "B" and "C" stations are mainly related to turbine crown seal wear, which causes bearing failure, excitation problems due to lack of spare parts, and the water cooling system. There are also problems with drop gatte seals and control gear, etc.

* This project will survey the stations to identify and specify detailed rehabilitation requirements.

Status: Seeking funding.

5.0.8 DEVELOPMENT OF NATIONAL WOODFUEL STRATEGIES AND PLANS

Estimated Cost: (US$ Million)		Financing Gap: US$1.10m	
Total:	1.20		
Foreign:	1.10	Executing Agency:	TAU
Local:	0.10		
Funding Secured:		Start:	
Foreign:			
Local:	0.10 (SADCC)	Duration:	3 years

Objectives: The main objectives of the project are to:

- develop comprehensive woodfuel strategies and implementation plans for each member State;
- projects for energy production integrated with other sectors dealing with biomass management and rural development; and
- provide data to assess national capabilities for the implementation of woodfuel programmes, and means of increasing such capabilities through institutional strengthening.

Description: The following activities will be undertaken:

- review of experiences, and formulation of detailed strategies and plans for implementing the project;
- strategies and plans will be compiled to form a regional woodfuel strategy and implementation plans which will be published for distribution in the member States.

Status: Implementation can commence once funding is secured.

5.0.9 IDENTIFICATION AND SUPPORT OF NON-GOVERNMENTAL ORGANISATIONS AND WOMEN'S GROUPS DEALING WITH WOODFUEL

Estimated Cost: (US$ Million)

Total: 0.46
Foreign: 0.40
Local: 0.06

Financing Gap: US$0.40m

Executing Agency: TAU

Funding Secured:

Foreign:
Local: 0.06 (SADCC)

Start:

Duration: 3 years

Objectives: The main objectives of the project are to:

- identify active NGOs and women's groups dealing with woodfuel programmes in the region;
- analyse NGOs and women's groups' experiences in implementing woodfuel projects, in particular those based on people's participation at grassroot level;
- explore possibilities of intensifying NGOs and women's groups' involvement in woodfuel programmes, by providing them with catalytic support like training, project planning, provision of equipment and funds, etc.

Project Activities:

The following activities will be undertaken in order to achieve the above objectives:

- compilation of a comprehensive list of active NGOs and women's groups dealing with woodfuel in each member State will be made;
- formulation of strategies and projects to support NGOs and women's groups on short and long-term basis.

Status: Implementation can commence once funding is secured.

5.0.10 IDENTIFICATION OF SUITABLE TREE SPECIES FOR ENERGY PRODUCTION IN THE SADCC REGION

Estimated Cost: (US$ Million)

Total: 0.99
Foreign: 0.90
Local: 0.09

Financing Gap: US$0.90m

Executing Agency: TAU

Funding Secured:

Foreign:
Local: 0.09 (SADCC)

Start:

Duration: 3 years

Objectives: The main objectives of the project are to:

- provide comprehensive data on suitable multi-purpose tree species for energy production for the different climatic and edaphic zones of the SADCC region;
- provide data on how to obtain seeds of the recommended species; and
- facilitate exchange of research findings and knowledge on suitable species for energy production.

Project Activities:

- A steering committee of woodfuel species specialist will be formed to plan and implement the project;
- Surveys on suitable species will be conducted in each member State;
- A regional workshop will be organised to scrutinise results of the national surveys, whose report will be published for general information.

Status: Implementation can commence once funding is secured.

5.0.11 ASSESSMENT OF ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACT OF WOODFUEL SCARCITY

Estimated Cost: (US$ Million)

Total: 2.53
Foreign: 2.30

Financing Gap: US$2.30m

Executing Agency: TAU

Funding Secured:

Foreign:
Local: 0.23 (SADCC)

Start:

Duration: 3 years

Objectives: The main objectives of the project are to provide:

- comprehensive site-specific data on environmental and socio-economic problems being created by woodfuel scarcity in the SADCC region;
- information to be used for increase of public awareness on woodfuel aspects; and
- data for planning future woodfuel projects.

Project Activities:

- A steering committee of environmental experts will be formed, to provide a detailed plan on how to implement the project.
- Review of experiences in member States will be undertaken by short-term consultants.
- Priority areas to be studied in the main project will be defined, based on the seriousness of the problem in member States.
- Obtained data will be analysed and a final report prepared. Demonstration materials like photographs, slides, video cassettes and films will be included as part of the study.

Status: Implementation can commence once funding is secured.

5.0.12 HOUSEHOLD WOODFUEL CONSUMPTION SURVEYS IN THE SADCC REGION

Estimated Cost: (US$ Million)

Total: 0.50
Foreign: 0.50
Local: 0.05

Financing Gap: US$0.45m

Executing Agency: TAU

Funding Secured:

Foreign:
Local: 0.05 (SADCC)

Start:

Duration: 3 years

Objectives: The main objectives of the project are to:

- provide site-specific data on household woodfuel consumption rates within the SADCC region; and
- analyse factors which influence rates of woodfuel consumption at household level.

Project Activities:

- In-depth house-hold woodfuel consumption surveys for specific climatic zones within the SADCC region will be undertaken.
- Factors which influence house-hold woodfuel consumption rates will be examined, and their impact on future woodfuel consumption trends.
- A regional workshop on how to conduct house-hold woodfuel consumption surveys will be conducted to examine findings and experiences gained.

Status: Implementation can commence once funding is secured.

5.0.13 DEVELOPMENT OF FUEL SWITCH OPPORTUNITIES

Estimated Cost: (US$ Million)

Total: 0.69
Foreign: 0.60
Local: 0.09

Financing Gap: US$0.60m

Executing Agency: TAU

Funding Secured:

Foreign:
Local 0.09 (SADCC)

Start:

Duration:

Objectives: The main objectives of the project are to:

- examine critically, opportunities of fuel switch from woodfuel to other sources of energy by the majority of the population in urban and a few rural areas in the SADCC region;
- examine factors which hinder fuel switch, and give recommendations on how to overcome them, on a short and long-term basis; and
- establish a few pilot projects on fuel switch, to test the validity of hypotheses advocated by the study.

Project Activities:

- A steering committee consisting of energy experts and economists will be established to plan how to conduct the survey and evaluate its results.
- Preliminary surveys on fuel switch opportunities will be conducted in all member States. The surveys will indicate main areas with high fuel switch opportunities which will be studied in detail.

Status: Implementation can commence once funding is secured.

5.0.14 INCREASE OF PUBLIC AWARENESS ON WOODFUEL ISSUES

Estimated Cost: (US$ Million)		Financing Gap: US$1.50m	
Total:	1.80		
Foreign:	1.50		
Local:	0.30	Executing Agency: TAU	
Funding Secured:		Start:	
Foreign:			
Local:	0.30 (SADCC)	Duration: 5 years	

Objectives: The main objectives of the project are to:

- intensify people's participation in production of woodfuel, and adoption of improved techniques of utilising woodfuel; and
- intensify the awareness of decision makers on socio-economic and environmental problems being created by woodfuel scarcity, and the need to increase resources for the implementation of woodfuel programmes.

Project Activities:

- The project will be divided into two major phases, mainly formulation of effective ways of increasing awareness and actual implementation of mass awareness programmes.
- Nine country reports indicating existing ways of raising mass awareness on woodfuel and environmental issues, as well as their effectiveness with regard to specific areas and target groups will be produced.
- A guideline indicating future strategies and specific programmes at regional and national levels will be produced in a book form, along with illustrative materials like photographs, slides, video cassettes and a film.

Status: Implementation can commence once funding is secured.

5.0.15 IMPROVEMENT OF WOODFUEL END-USE EFFICIENCY IN RURAL INDUSTRIES OF THE SADCC REGION

Estimated Cost: (US$ Million)

Total: 0.56
Foreign: 0.50
Local: 0.06

Financing Gap: US$0.50m

Executing Agency: TAU

Funding Secured:

Foreign:
Local: 0.06 (SADCC)

Start:

Duration: 3 years

Objectives: The main objectives of the project are to:

- contribute to a sustained supply of woodfuel to rural industries by improving their woodfuel use efficiency;
- minimise environmental degradation being caused by deforestation through clearing of trees and forests for supply of woodfuel to rural industries;
- increase public awareness on the socio-economic importance of rural industries, and the need to sustain their energy supply through improvement of woodfuel end-use efficiency; and
- country reports indicating the main rural industries using woodfuel, and possibilities of improving their end-use efficiencies will be produced.

The project will be implemented in two phases. Phase one will cover the conduction of preliminary surveys, technical missions to member States and development of concrete project proposals, including printing of reports. Phase two will implement the developed projects.

Status: Implementation can commence once funding is secured.

5.0.16 DEVELOPMENT OF IMPROVED CHARCOAL PRODUCTION TECHNIQUES

Estimated Cost: (US$ Million)	Financing Gap: US$0.45m
Total: 0.50	
Foreign: 0.45	Executing Agency: TAU
Local: 0.05	
Funding Secured:	Start:
Foreign:	
Local: 0.05 (SADCC)	Duration:

Objectives: The main objectives of the project are to:

- minimise the wasteful use of wood in charcoal production in the region;
- minimise environmental degradation arising from poor charcoal production techniques;
- increase the income of charcoal producers through adoption of improved production techniques which will increase recovery rates; and
- facilitate exchange of experiences in the improvement of charcoal production techniques in the region.

Project Activities:

The following main activities will be undertaken:

- A steering committee of experts will be formed to provide detailed plans on how to implement and evaluate the project.
- Review of experiences in member States on charcoal production will be made and country reports prepared.

Status: Implementation can commence once funding is secured.

5.1.3 LUANDA WOODFUEL PROJECT (ANGOLA)

Estimated Cost: (US$ Million)

Total: 6.67
Foreign: 6.34

Financing Gap: US$6.34m

Executing Agency: Government of Angola

Funding Secured:

Foreign:
Local: 0.33 (ANG)

Start:

Duration:

Objectives: The main objectives of the project are to:

- establish a woodfuel plantation of about 55,000 ha in Luanda Province;
- improve people's standards of living, especially by creating new jobs for women; and
- minimise on-going environmental degradation around Luanda city, mainly soil erosion due to loss of vegetation cover.

Project Activities:

The initial planning phase will determine the technical feasibility and economic viability of the project. The implementation phase will deal with growing, tending and harvesting operations.

Status: Funding sought.

5.5.1 URBAN FUELWOOD AGRO-FORESTRY PROJECT FOR MAPUTO

Estimated Cost: (US$ Million)

Total: 4.60
Foreign: 3.00
Local: 1.60

Financing Gap: US$3.00m

Executing Agency: Government of Mozambique

Funding Secured:

Foreign:
Local: 1.60 (MOZ)

Start:

Duration: 5 years.

Objectives: The main objectives of the project are:

- rehabilitation of the existing equipment in the project area;
- to establish an additional area of 2.500 ha of eucalyptus plantation;
- to manage the existing plantations (3.200 ha);
- to improve the agro-forestry schemes;
- to create forestry extension network; and
- to develop research and training, specially in the agro-forestry subject.

Project Activities:

- A total of 2.500 ha of woodfuel plantation, will be established on agro-forestry basis. In addition, a total of 3.200 ha of existing woodfuel plantation will be managed.
- Training and research activities will be conducted in order to strengthen local implementation capacity.

Status: Funding sought.

SADCC ENERGY BALANCE 1987. PETA-JOULE

	COAL	NATURAL GAS	CRUDE OIL	LPG	GASO-LINE	JET FUEL	KERO-SENE	DIESEL	FUEL OIL	ETHA-NOL	ELEC-TRICITY	CHAR-COAL	COMMER-CIAL ENERGY	TOTAL WOOD-FUEL	BIO-MASS	SOLAR	TOTAL
PRIMARY PRODUCTION	175.7	8.9	765.5	.	.	.	.	.	.	.	48.9	.	999.1	823.8	34.1	0.0	1,857.0
IMPORTS SADCC	0.7	-	-	0.0	0.4	0.0	-	0.1	-	-	3.4	-	4.7	-	-	-	4.7
NO SADCC	13.7	-	48.9	1.5	17.6	10.8	4.6	42.7	1.2	-	3.1	-	144.0	0.6	-	-	144.7
EXPORT SADCC	2.2	-	-	0.2	1.5	-	-	0.8	27.6	-	4.7	-	37.1	-	-	-	37.1
NO SADCC	6.9	8.9	680.1	-	-	1.4	-	1.6	4.4	-	-	-	703.3	-	-	-	703.3
PRIMARY SUPPLY	181.2	-	134.4	1.3	16.4	9.4	4.6	40.3	-30.8	-	50.7	-	407.5	824.4	34.1	0.0	1,266.0
TRANSFORMATION																	
OIL REFINERIES	-	-	-118.6	1.4	13.8	11.0	4.1	34.2	42.4	-	-	-	-11.8	-	-	-	-11.8
ELECTRICITY GENERATION	-86.6	-	-	-	-	-0.0	-	-3.4	-0.2	-	24.0	-	-66.2	-1.5	-5.8	-	-73.5
COKE OVENS	-0.8	-	-	-	-	-	-	-	-	-	-	11.3	10.5	-	-	-	10.5
KILNS	0.3	-	-	-	-	-	-	-	-	-	-	31.6	31.8	-127.7	-	-	-95.8
ETHANOL	-	-	-	-	-	-	-	-	-	1.6	-0.0	-	1.6	-	-	-	1.6
LOSSES	0.3	-	6.0	0.0	0.2	-	0.0	1.1	0.6	-	6.0	-	14.2	-	-	-	14.2
STOCK CHANGE/ STATISTICAL ERRORS	-4.5	-	-9.7	-0.1	1.7	1.1	1.0	3.9	4.1	-	-1.0	-	-3.2	-46.7	-0.1	-0.0	-50.1
FINAL CONSUMPTION	89.3	-	-	2.6	31.7	21.5	9.7	73.9	14.9	1.6	67.8	42.8	355.9	648.6	28.2	0.0	1,032.6
	8.0	-	-	0.0	0.4	-	0.1	6.8	1.5	-	4.4	0.3	21.5	17.7	-	-	39.2
MINING	12.0	-	-	0.0	0.1	-	0.4	3.9	2.9	-	23.8	-	43.1	-	-	-	43.1
MANUFACTURING	52.4	-	-	0.3	0.9	-	0.3	19.5	8.4	-	21.4	4.8	108.1	22.1	15.9	0.0	146.2
TRANSPORT	6.5	-	-	0.0	28.9	21.5	0.1	30.4	1.9	1.6	0.2	6.8	98.0	-	-	-	98.0
OTHER SERVICES	7.1	-	-	0.4	1.3	-	0.2	11.1	0.2	-	8.0	-	28.4	29.A	0.0	58.1	
HOUSEHOLDS	3.2	-	-	1.8	0.0	-	8.6	2.2	0.0	-	9.9	30.9	56.7	579.0	12.3	0.0	648.1

Because of rounding there may be small differences between a sum and the items constituting the sum.

ANNEX 1(a)

ENERGY BALANCE CONVERSION FACTORS

Coal	29.3	GJ/t	Diesel	42.5	GJ/t
Botswana coal	24.0	"	Fuel oil	41.5	"
Coke	26.0	"	Ethanol	33.8	GJ/m3
Crude oil	42.6	"	Electricity	3.6	J/Wh
LPG	45.5	"	Woodfuel	11.4	GJ/m^3
Gasoline	44.0	"	Charcoal	33.1	GJ/t
Jet-fuel	43.2	"	Biomass	13.9	"
Kerosene	43.2	"	Bagasse	13.9	"

CRITERIA FOR THE SELECTION OF REGIONAL PROJECTS

1. Criteria For the Selection of Regional Projects

1.1 The basic criteria for the selection of regional projects is whether or not they contribute to the achievement of the development objectives of SADCC as defined in the Lusaka Declaration - Southern Africa: Toward Economic Liberation which are:-

- the reduction of dependence, particularly, but not only, on the republic of South Africa;
- the forging of links to create a genuine and equitable regional integration;
- the mobilisation of resources to promote the implementation of national, interstate and regional policies;
- concerted action to secure international cooperation within the framework of our strategy for economic liberation".

1.2 In the energy sector there are three types of criteria which can be applied in the selection of SADCC projects. These criteria relate to:-

(a) The Energy Crisis

SADCC projects should contribute to:-

- the reduction of dependence on external supply of energy;
- the lessening of fossil, especially petroleum fuel, consumption;
- energy conservation;
- meeting the energy needs of the rural population.

(b) Regional Cooperation

SADCC projects should:

- contribute to the energy balance of more than one country;
- represent a significant investment;

- be owned, managed and operated from within the region;

- utilise inputs from within the region.

(c) Technical Criteria

SADCC projects should:

- satisfy a clearly defined need;

- be technically feasible;

- be socially and economically justifiable;

- be clearly preferable to other alternative or competing projects;

- make a positive contribution to development.

- seek to provide for the long term operational conditions and manpower implications.

1.3 Given the nature of SADCC, and in the light of the above, five types of regional project can be distinguished:

(a) projects of overall regional utility which result from a coordination of the investment programmes of two or more member States, with a view to reducing competition, avoiding unproductive duplication and taking advantages of a larger market;

(b) projects located at the frontier between two or more countries which depend on the presence of natural resources which they exploit, as in the case of hydroelectric power, coal and gas deposits or other raw materials;

(c) pilot and research projects whose results can be repeated in other member States, especially those promoting the utilization of new and renewable sources of energy;

(d) studies, training programmes and other general service activities/project;

(e) national projects with a regional impact; have a significant impact on the national energy balance, but cannot be replaced by regional projects and for which economic alternatives cannot be found in neighbouring countries.

2. PROCEDURE FOR PROPOSAL EVALUATION AND APPROVAL OF PROJECTS

2.1 Formulation of New Projects

For a project to be considered, it should be formulated in a standardized manner covering the following aspects:

Objectives

Description

- reference to how the project relates to SADCC objectives.
- why it has relevance as a regional project.
- relation to national energy programmes.
- socio-economic justification.
- full technical description of how the work is to be carried out.
- cost estimates and sources of financing

Implementation

- Executing Agency
- work programme and time schedule.

Projects can be proposed by member Governments and/or the Sector Coordinator.

The formulation can be done by:

- a member State, or member States in cooperation
- the Energy Sector (TAU)
- the TAU and (a) member State(s) in cooperation.

2.2 Approval Procedure

A new project shall go through the following steps:

a) Project Formulation and Documentation

This should be done by the entity proposing the project.

b) Presentation to TAU

The project document should be submitted to the TAU at least three months prior to a meeting of Energy Ministers, in order to allow for due consideration and analysis.

c) Evaluation by TAU

The TAU shall carry out an evaluation to ascertain that the project proposal is consistent with the objectives, strategy and criteria of the SADCC Energy Sector, before being submitted to the relevant sectoral authority for approval.

d) Distribution of project proposals

The documentation for new projects should, preferably, be distributed to all member States well in advance of the meeting in which they will be considered.

e) Presentation to Energy Officials

The member State(s) concerned, supported by the TAU present(s) the project for consideration at a Meeting of relevant sectoral authority.

f) Approval

Project proposals must be considered by Energy Ministers for recommendation for approval by the Council of Ministers, before they are formally placed on the Sectoral Programme of Action.

g) Urgent proposals

Only in exceptional circumstances, as in the case of emergency projects, should consideration be given to project proposals which have not been processed as above.

3. PROCEDURE FOR CONTACTS WITH THE COOPERATING PARTNERS

Sectoral programmes and projects are, generally communicated through the sectoral programme document produced for the Annual Consultative Conference. However, in between Annual Consultative Conferences, specific projects may be communicated to interested cooperating partners directly.

In the case of a project located in one country, the member State which is host for the project, assisted by the TAU, will coordinate contact with interested cooperating partners. In the case of projects involving more than one

country, and general coordination activities or projects involving all member States, the TAU assisted as appropriate, by the member States, will coordinate contacts. Both the TAU and member States must be kept fully informed of progress in consultations on the implementation of projects.

4. AGREEMENT AND CONTRACT PROCEDURES

The Council of Ministers has agreed that as a matter of general principle, SADC project agreements should be signed by the member States directly involved and cooperating partners, and witnessed by the relevant Sector Coordinator. Such agreements should spell out the rights and obligations of all parties and, in particular, should indicate clearly the reporting and monitoring procedures.

5. PROJECT IMPLEMENTATION OPERATION AND MONITORING

Implementation refers to the preparation and execution of a project but does not include subsequent operation and maintenance (e.g. of a plant).

Member States involved in each project, with the assistance of the Coordinating Country, are responsible for its implementation and operation, through their appropriate institutions.

The Coordinating Country will provide the required assistance to member States in all stages of the project.

Financial responsibility for each project will be of the member State (s) involved, and each member State will be responsible for servicing its financial commitments.

It will, in a number of cases, be necessary to have a project steering committee, which is responsible for overseeing and monitoring the implementation of the project and serves to give policy guidance and control. The steering committee would have the following members:

- representatives of the Member Government(s) responsible and involved;
- a representative of the cooperating partners supporting the project; and
- a representative from the Sector Coordinating Country.

The executing agency, implementing the project, will not be a member of the committee, but will participate in the meetings for reporting and liaison purposes.

When a project involves simultaneous and inter-dependent implementation in more than one country, the steering committee will ensure the overall coordination of the implementation of the various parts of the project.

The Sector Coordinating country is responsible for reporting on the status and progress of sectoral programme and project implementation and related activities to the Sectoral Officials and Ministers, and to the Council of Ministers and Summit of Heads of State and Government, at the scheduled meetings.

Annex III

Project Statistics

Project	Project Title	Estimated Cost US$ Million Total	Foreign	Local	Funding Secured & Source US$ Million	Funding Under Negotiation US$ Million	Financing Gap US$ Million	Comments/Status
ENERGY								
OVERAL COORDINATION								
0.0.3	General Support to the Energy Sector - TAU	14.06	10.50	3.56	3.50 (ANG) 6.50 (NOR) 3.50 (CAN) 0.50 (BEL, BRA, EEC, FRA, POR, UK) 0.06 (SADCC)	-	-	Under implementation.
0.0.4	Energy Bulletin	0.69	0.26	0.43	0.43 (ANG) 0.26 (CAN)	-	-	Under implementation.
0.0.5	Information Coordination System	1.70	1.70	-	1.40 (BEL) 0.30 (SWE)	-	-	Under implementation.
0.0.7	Documentation Centre for Energy Sector	0.31	0.31	-	0.31 (NOR)	-	-	Under implementation.
0.0.8	Establishment of a Regional Energy Planning Network in SADCC	2.00	2.00	-	-	-	2.00	Funding sought.
0.0.9	Development of Manpower Assessment in the SADCC Energy Sector	-	-	-	-	-	-	Under review.
0.0.10	TAU Office Facilities	-	-	-	-	-	-	Withdrawn.
	Sub-total	18.76	14.77	3.99	16.76	0.00	2.00	
PETROLEUM								
1.0.2	Regional Petroleum Training Centre	0.59	0.59	-	0.30 (UNDP)	-	0.29	Phase I completed. Training needs survey completed.
1.0.4	Specialist Training for the SADCC Petroleum Sector	2.34	2.34	-	-	-	2.34	New project. Funding sought.
1.0.5	Joint Petroleum Exploration Programme	0.45	0.44	0.01	0.01 (MOZ & TAN)	-	0.44	New project. Funding sought.
1.0.6	Potential Petroleum Cost Savings	0.18	0.18	-	-	-	0.18	New project. Funding sought
1.1.1	Oil Supply from Lobito to the SADCC Region	-	-		-	-	-	Suspended. Under reformulation.
1.3.1/ 1.6.1	Strategic Fuel Storage in Lesotho and Swaziland	0.20	0.20		0.20 (NZ)	-	-	Under implementation.

Project	Project Title	Estimated Cost US$ Million Total	Foreign	Local	Funding Secured & Source US$ Million	Funding Under Negotiation US$ Million	Financing Gap US$ Million	Comments/Status
1.4.1	Hydrocarbon Exploration in the Malawi Rift Valley	-	-		-	-	-	Suspended. Under evaluation.
1.5.3	Use of CNG as a Transport Fuel - Pilot Study	1.50	1.50	-	1.50 (ITA)	-	-	Under implementation.
1.7.1	Rehabilitation of TAZAMA Pipeline Phase I	14.40	12.00	2.40	12.00 (ITA) 2.40 (TAN/ZAM)	-	-	Under implementation.
	Phase II	29.20	29.20	-	-	15.00 (WB) 14.20 (EIB)	-	
1.7.2	SADCC Seismic Interpretation Centre in Dar es Salaam	-	-	-	-	-	-	Under evaluation.
1.7.3	Biostratigraphic Reference Colletion	0.10	0.10	-	-	-	0.10	New project. Funding sought.
	Sub-total	48.96	46.55	2.41	16.41	29.20	3.35	
COAL								
2.2.1	Investigation into Possible LTC and other Carbonisation Proceses in the SADCC region	-	-	-				Under review.
2.2.2	Coal Distribution Yard and Coal Information, Botswana	0.80	0.40	0.40	0.40 (FRG) 0.40 (BOT)	-	-	Under implementation.
2.8.1	Investigation of Coal Briquetting	11.09	11.09	-	1.09 (ZAM)	-	10.00	Studies completed.
2.9.1	Coal Stoves for Use in Rural Areas	-	-	-	-	-	-	Under evaluation.
	Sub-total	11.89	11.49	0.40	1.89	0.00	10.00	
ELECTRICITY								
3.0.1	Regional Rural Electrification Programme Phase I: National Surveys	0.18	0.18	-	0.18 (CAN)	-	-	Work on Phase I started in June, 1989.
3.0.2	Specialised Training in the Field of Electric Power	0.14	0.14	-	-	0.14 (CAN)	-	
3.0.3	Maintenance of Mechanical Equipment in in SADCC Power Stations	-	-	-	-	-	-	Completed.

Project	Project Title	Estimated Cost US$ Million Total	Foreign	Local	Funding Secured & Source US$ Million	Funding Under Negotiation US$ Million	Financing Gap US$ Million	Comments/Status
3.0.4	Regional Hydroelectric Hydrological Assistance Programme	2.84	2.84	-	0.84 (BRA) 1.50 (CAN) 0.50 (POR)	-	-	Implementation started early 1989.
3.0.5	Plan for Integrated Utilization of the Cunene River Basin	0.62	0.60	0.02	0.02 (ANG)	0.60 (BRA & POR)	-	
3.0.6	Power System Control and Operation Technical Support and Training	0.40	0.40	-	-	-	0.40	New project. Funding sought.
3.0.7	Computer Model for Analysis and Planning of SADCC Transmission Systems	0.10	0.10	-	-	-	0.10	New project. Funding sought.
3.0.8	Coordinated Utilisation of Regional Generation and Transmission Capacities - Prefeasibility Study	0.25	0.25				0.25	New project. Funding sought.
3.0.9	Power Station Maintainance Programme	0.15	0.15				0.15	New project. Funding sought.
3.1.3	Completion of the Gove Hydroelectric Development - Revision	0.28	0.28	-	0.28 (CAN)	-	-	Prefeasibility study completed. Report being reviewed.
3.1.4	Provision of a communications and information system on the Angolan National Power Grid - Evaluation Study	0.12	0.12	-	-	-	0.12	Funding sought.
3.1.5	Reorganisation of Angolan National Electricity utility (ENE)	-	-	-	-	-	-	Withdrawn.
3.2.1	Interconnection of the Botswana and Zimbabwe Grids	38.36	38.36	-	38.36 (CAN)	-	-	Under implementation.
3.2.2	Power supply to Northern Botswana	-	-	-	-	-	-	Completed.
3.2.4	Second 220KV Line from Moropule to Gaborone	18.00	15.50	2.50	2.50 (BOT)		15.50	New project. Funding sought.
3.3.1	Development of Small Hydropower Facilities - Lesotho Phase II	3.50	3.50	-	-	-	3.50	Funding sought.
3.3.2	Transmission Network Development in Lesotho Phase III	6.30	6.30	-	-	-	6.30	Funding sought.
3.3.4	Oxbow Multipurpose Scheme	-	-	-	-	-	-	Withdrawn.
3.3.5	Quthing Small Hydropower Project	15.40	15.40	-	-	-	15.40	Funding sought.
3.3.6	Muela Hydropower Project	137.00	137.00	-	-	-	137.00	New Project. Funding sought.

Project	Project Title	Estimated Cost US$ Million Total	Foreign	Local	Funding Secured & Source US$ Million	Funding Under Negotiation US$ Million	Financing Gap US$ Million	Comments/Status
3.4.1	Malawi-Mozambique Electricity Supply in the Eastern and Western Border Regions							
	Phase I	2.96	2.96	-	2.96 (NOR)	-	-	Under implementation.
	Phase II	16.00	16.00	-	-	-	16.00	Funding sought.
3.4.2	Small Hydropower Plants in Malawi	-	-	-	-	-	-	Withdrawn.
3.4.3	Rehabilitation & Expansion of Power Network Communication	2.28	2.22	0.06	0.06 (MAL)	-	2.22	Funding sought.
3.4.4	Limbe Reinforcement - Malawi	-	-	-	-	-	-	Withdrawn.
3.4.5	Supply to Chitipa and Karonga in Malawi from Mbeya in Tanzania	3.98	3.05	0.93	0.93 (MAL, TAN)	-	3.05	Funding sought.
3.5.1	Zimbabwe/Mozambique Cooperation in Electricity Supply	14.90	14.90	-	-	-	14.90	Funding sought.
3.5.2	Master Plan for Swaziland & Southern Mozambique - Feasibility Study	-	-	-	-	-	-	Withdrawn.
3.5.3	Corumane Hydropower Scheme	23.00	21.40	1.60	1.60 (MOZ) 13.09 (SWE) 7.40 (NOR)	-	0.91	Under implementation. To be completed in 1989.
3.5.4	Mavuzi Hydropower Project	0.89	0.89	-	0.89 (NOR)	-	-	Under implementation. Preliminary report is due shortly.
3.5.5	Mozambique/Malawi Interconnection of Electricity Supplies	-	-	-	-	-	-	Implementation postponed to 1997.
3.5.7	Reconstruction of Mavuzi Hydropower Station, Mozambique	8.00	6.00	2.00	2.00 (MOZ) 6.00 (FRA)	-	-	Under implementation.
3.5.8	Completion of Chibata Sub-station in Manica Province, Mozambique	0.13	0.13	-	-	-	0.13	Funding sought.
3.5.9	Power supply to Beira	-	-	-	-	-	-	Completed.
3.5.10	Power Cooperation in Zimbabwe/ Mozambique Border Areas	3.09	2.20	0.89	0.89 (MOZ, ZIM)	-	2.20	Funding sought.
3.5.11	Mozambique Central Region Transmission & Distribution Network Study	0.25	0.25	-	-	-	0.25	New project. Funding sought.
3.5.12	Cahora Bassa Power for SADCC - Prefeasibility Study	0.09	0.09				0.09	New project. Funding sought.
3.7.4	Songwe River Hyropower Development	0.17	0.15	0.02	0.02 (TAN)	-	0.15	Funding sought.

Project	Project Title	Estimated Cost US$ Million Total	Foreign	Local	Funding Secured & Source US$ Million	Funding Under Negotiation US$ Million	Financing Gap US$ Million	Comments/Status
3.8.1	Zambia/Malawi/Tanzania Interconnection System	-	-	-	-	-	-	Study completed. 4 sub-projects identified.
3.8.1(1)	Power Supply to Tunduma and Mbozi in Tanzania from Nakonde in Zambia	2.19	1.80	0.39	0.39 (ZAM)	-	1.80	Funding sought.
3.8.1(2)	Supply of Sumbawanga in Tanzania	0.15	0.14	0.01	0.01 (TAN)	-	0.14	Funding sought.
3.8.1(3)	132 kV Tieline Zambia-Malawi, Feasibility study	0.40	0.40	-	-	-	0.40	Funding sought.
3.8.1(4)	330/220 kV Tieline Zambia-Tanzania, Prefeasibility Study	0.25	0.25	-	-	-	0.25	Funding sought.
3.8.2	Upgrading of Kafue Gorge power Plant Phase II	4.58	4.58	-	1.70 (NOR) 1.40 (SWE)	-	1.48	Under implementation. Funding sought.
3.8.3	Rehabilitation of the National Control Centre Phase I	0.06	-	0.06	0.06 (ZAM)	-	-	Under implementation.
	Phase II	8.00	8.00	-	-	-	8.00	Funding sought.
3.8.4	Provision of new Private Telephone Exchange for the 330kV Transmission System	-	-	-	-	-	-	Completed.
3.8.5	Power Line Carrier Communications on the Northern Transmission System	-	-	-	-	-	-	Under review.
3.8.6	Rehabilitation of Victoria Falls Power Station	0.25	0.25	-	-	-	0.25	Funding sought.
3.9.3	Expansion of the National Control Centre in Harare	4.08	4.00	0.08	0.08 (ZIM)	-	4.00	New project. Funding sought.
	Sub-total	319.34	310.77	8.57	83.67	0.74	234.94	
NEW AND RENEWABLE SOURCE OF ENERGY								
4.0.6	Solar and Wind Power Pilot Programme	1.45	1.45	-	1.45 (CAN)	-		Under implementation.
4.3.1	Renewable Energies Development, Lesotho	-	-	-	-	-	-	To be reviewed.
4.6.1	Investigation into the acceptability of New Technology in Rural Communities, Swaziland	-	-	-	-	-	-	To be reviewed.
	Sub-total	1.45	1.45	0.00	1.45	0.00	0.00	

Project	Project Title	Estimated Cost US$ Million Total	Foreign	Local	Funding Secured & Source US$ Million	Funding Under Negotiation US$ Million	Financing Gap US$ Million	Comments/Status
WOODFUEL								
5.0.6	Strengthening of Planning Capacity for Implementation of Woodfuel Programmes In SADCC Countries	0.85	0.85	-	0.85 (EEC)	-	-	Under implementation.
5.0.7	Support to TAU Woodfuel Section	-	-	-	-	-	-	Incorporated into Project 0.0.3
5.0.8	Development of National Woodfuel Strategies and Plans	1.20	1.10	0.10	0.10 (SADCC)	-	1.10	Funding sought.
5.0.9	Identification & Support to NGO and Women's Groups Dealing with Woodfuel & Environmental Protection	0.46	0.40	0.06	0.06 (SADCC)	-	0.40	Funding sought.
5.0.10	Identification of Suitable Tree Species for Energy Production in the SADCC region	0.99	0.90	0.09	0.09 (SADCC)	-	0.90	Funding sought.
5.0.11	Assessment of Environmental & Socio-Economic Impacts of Woodfuel Scarcity	2.53	2.30	0.23	0.23 (SADCC)	-	2.30	Funding sought.
5.0.12	Household Woodfuel Consumption Surveys in the SADCC Region	0.50	0.45	0.05	0.05 (SADCC) 0.45 (WB)	-		Under implementation.
5.0.13	Development of Fuelswitch Opportunities	0.69	0.60	0.09	0.09 (SADCC) 0.60 (WB)	-		Under implementation.
5.0.14	Increase of Public Awareness on Woodfuel and Environmental Issues	1.80	1.50	0.30	0.30 (SADCC)	-	1.50	Funding sought.
5.0.15	Improvement of Woodfuel End-use Efficiency in Rural Industries of the SADCC Region	0.56	0.50	0.06	0.06 (SADCC)	-	0.50	Funding sought.
5.0.16	Development of Improved Charcoal Production Techniques	0.50	0.45	0.05	0.05 (SADCC)	-	0.45	Funding sought.
5.1.1	Evaluation of the Use of Woodfuel in Angola	-	-	-	-	-	-	To be reviewed.
5.1.2	Harnessing the Seasonal Flow Rates of Coruca, Giraul, Bero and Bentiaba rivers to Reforest River-Banks for Energy Purposes, Angola	-	-	-	-	-	-	To be reviewed.
5.1.3	Luanda Woodfuel Project, Angola	6.67	6.34	0.33	0.33 (ANG)	-	6.34	Funding sought.

END

Project	Project Title	Estimated Cost US$ Million Total	Foreign	Local	Funding Secured & Source US$ Million	Funding Under Negotiation US$ Million	Financing Gap US$ Million	Comments/Status
5.3.1	Wood/Charcoal Stoves Development and Dissemination, Lesotho	-	-	-	-	-	-	Under review.
5.5.1	Urban Fuelwood Agro-Forestry Project for Maputo	4.60	3.00	1.60	1.60 (MOZ)	-	3.00	Funding sought.
5.6.1	Reafforestation in the Eastern Part of Swaziland & Southern Mozambique	-	-	-	-	-	-	Suspended.
5.6.2	Fuelwood Strategies in Swaziland	-	-	-	-	-	-	Suspended.
	Sub-total	21.35	18.39	2.96	4.86	0.00	16.49	
ENERGY CONSERVATION								
6.0.2	Energy Saving in Industry	4.29	4.29	-	3.61 (CAN)	-	0.68	Under implementation.
6.8.1	Energy Conservation Indeni Petroleum Refinery, Zambia	0.95	0.80	0.15	0.15 (ZAM)	-	0.80	Funding sought.
	Sub-total	5.24	5.09	0.15	3.76	0.00	1.48	
	GRAND TOTAL	426.99	408.51	18.48	128.79	29.94	268.26	