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**INTERNATIONAL POWER SECTOR
RESTRUCTURING EXPERIENCE:
WITH AN EMPHASIS ON CHANGES IN THE
DISTRIBUTION SUBSECTOR**

Final Report

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EXECUTIVE SUMMARY

INTRODUCTION

This report has been prepared as part of the Newly Independent States institutional reform project funded by the United States Agency for International Development. The report is intended to contribute to the discussion and analysis of reform in the electricity distribution subsector. It focuses on the potential benefits of restructuring the distribution subsector by examining the restructuring experience of eleven countries (Argentina, Bolivia, Chile, El Salvador, Hungary, Nicaragua, the Philippines, Poland, Portugal, Sweden and the U.K.).

Major transformations have occurred in the structure, ownership, and regulation of the power sectors in all the study countries. In nine of the countries this has included the subdivision, privatization in some form, and separation of distribution infrastructure from other power sector infrastructure. In the remaining two countries the distribution subsector had traditionally been institutionally separate from other power sector infrastructure.

RESTRUCTURING

Power sector reform in many of the developing nations examined was driven by a common set of problems. These included serious financial problems for the power sector, no clear separation between the regulatory/policy and commercial/operational roles of the state, and high losses in the distribution subsector due to theft and technical problems (e.g., poor or dilapidated infrastructure). Distribution-based problems represented an important share of the major difficulties found in the power sector and thus, became major motivators of change.

In contrast, much of the recent restructuring in more developed nations has been driven by the quest for greater competition in electricity supply. Competition in generation and the establishment of power pooling arrangements have been the foci of such reforms.

For the nine countries where distribution separation has taken place, most if not all distribution infrastructure was vertically integrated with generation and transmission before restructuring. In all eleven of the countries examined the state had majority ownership of the power sector.

The major changes that have resulted from restructuring can be approximately categorized into three areas: structure, ownership and regulation.

Structural Changes

For all of the countries examined, the total separation of distribution functions from generation and transmission has been made, or is underway. Furthermore, in ten of the eleven countries studied (Argentina, Bolivia, El Salvador, Hungary, Nicaragua, the Philippines, Poland, Portugal, Sweden, and the United Kingdom), generation and transmission assets have been, or are proposed to be, separated from one another as a result of restructuring. Thus, distribution separation as part of total power sector vertical unbundling has been the most common outcome of reform in the countries examined.

Accompanying this vertical break-up, the distribution subsectors have been horizontally divided. In nine of the countries studied (Argentina, Bolivia, Chile, El Salvador, Hungary, Nicaragua, the Philippines, Poland, and Portugal) went through, or will be going through, the formation of separate distribution organizations. In the remaining two, the distribution function has been traditionally handled by entities institutionally separate from those involved in generation and transmission, and in these countries the distribution subsector was divided among multiple utilities.

Ownership Changes

State divestiture of electricity sector assets has been the common strategy in the majority of the nations studied. For the entire power sector, ownership changed, or is proposed to change, from predominantly public to predominantly private in eight of the eleven countries. These countries are Argentina, Bolivia, Chile, El Salvador, Hungary, the Philippines, Poland, and the United Kingdom. However, in two of the remaining nations, Nicaragua and Portugal, participation of the private sector is contemplated by independent power producers (IPPs), joint ventures for distribution and transmission system expansion, partial privatization, and in other ways such as outsourcing of specific utility activities.

For the distribution subsector, the pattern of changing ownership under restructuring has followed changes occurring in the rest of the power sector. In all countries the national government has divested, or is planning to divest of all, or at least an important share of its distribution subsector assets. In many countries the only public sector ownership in the distribution subsector will be by provincial, municipal, or co-operative authorities. Where divestment of distribution assets has not been complete private investment is to play an increasingly important role. Private participation will include capitalization programs, outsourcing, and joint ventures.

Regulation of the Distribution Subsector

An integral part of the restructuring process in most of the countries studied has been the separation of the regulatory/policy role of the state from its commercial/operational role. This

was an explicit objective of restructuring in all countries studied. The separation of roles by means of the establishment of a relatively independent regulatory body was of explicit importance even for Hungary, Nicaragua, and Portugal, where the national government was slated to continue to have an ownership role in the power sector. New power sector regulatory agencies have been established in **all** of the nations studied. The regulatory bodies function within the broad power sector policy framework that continues to be determined by national governments.

While these regulatory bodies are government entities, most possess a certain degree of autonomy from direct political interference of government officials. The new regulatory bodies carry out a variety of functions. In the broadest terms they implement power sector policy. This includes the analysis and evaluation of power sector functionality, the monitoring of compliance with all laws and regulations governing power sector activities, the study and approval of expansion options and other investment decisions, the granting of concessions and licences, and the determination of tariff policy.

There is also some variety in the regulation of distribution utilities from country to country. This includes such areas as whether distributor-owned generation is permitted, open access provisions, standards of performance and methods for fostering competition in the distribution subsector (e.g., bidding for the distribution franchise).

FACTORS DRIVING RESTRUCTURING

Power sector restructuring has been driven by a host of objectives. Major objectives include the following.

Improve the Commercialization of the Distribution Subsector

Separating distribution from generation and transmission has been pursued as a way to improve the commercialization of the distribution subsector. In fully-integrated power systems, the organizational and management structure governing the distribution subsector may not be able, or have appropriate incentives, to devote its full attention to the problems in the subsector. Even the personnel involved primarily in distribution-related activities may not have the authority to address the specific problems seen in the distribution subsector and there may be little incentive for them to attempt to find innovative ways of improving performance.

Clarify the Regulatory and Commercial Role of the State

In every country studied, a primary objective of restructuring has been the clarification of the state's role in the power sector. In every case the state has withdrawn from day-to-day commercial operation and has focused its efforts on sector regulation and the determination

of broad policy. In turn, corporatization has strived to create an environment in which the utilities can operate with greater market-orientation and free of political interference.

Demonopolization of the Power Sector

Power sector demonopolization entails the “opening” of the industry from a structure in which one enterprise holds all rights and responsibilities to a situation where multiple entities participate in the sector. In all of the countries studied, demonopolization has occurred in generation and distribution. Demonopolization of the subsectors of the power sector allows for the decentralization of management decision-making thereby helping to improve the quality of the managerial process by facilitating better understanding of the factors affecting decisions and allowing management to better tailor its activities to local conditions. In addition, demonopolization facilitates private investment in the power sector.

Privatization

In some countries, an increased role for the private sector and privatization have been major objectives of power sector reform. Private capital will be more likely in an environment where investment risk is clearly understood and can be managed. A rational regulatory framework with well-defined procedures and transparency in decision-making greatly improves any chances of private participation. Through regulatory reform, the study countries have been able to attract private investment.

Encouraging Competition in Generation

For the nations examined, unless distribution was already handled by separate distribution utilities, the distribution subsector was separated from generation and transmission to facilitate the introduction of competition in generation.

LESSONS LEARNED

Based on this examination of international experience with distribution subsector restructuring, there are several general conclusions that can be drawn:

- ▶ Even in relatively small countries in crisis conditions, power sector restructuring, that includes the complete institutional separation and commercialization of distribution enterprises, has been undertaken. Of equal importance, increasing centralization of the power sector under direct government control has not been viewed as a solution to the power sector problems found in any of the countries examined.

- ▶ The major factors that have driven restructuring in developing nations include:
 - higher-than-normal losses (both commercial and technical);
 - poor financial viability of the power sector;
 - political interference in the management and operation of the power sector that has contributed to tariffs being insufficient to cover the costs of the power system;
 - a lack of financing to rehabilitate a dilapidated system and meet new supply requirements;
 - a lack of a commercial orientation in the operation of the power sector including an investment decision-making process that does not necessarily prioritize investments in accordance with economic criteria;
 - an inability to meet the basic electricity supply requirements of consumers.

- ▶ Restructuring in the study countries has been effective in addressing each of the problems identified above. Further, restructuring has “across-the-board” met with the support of private investors and multi-lateral financing bodies such as the World Bank, and in fact has been supported with significant financial commitments.

CHAPTER 1

DISTRIBUTION SEPARATION

1.1 INTRODUCTION

This report has been prepared as part of the Newly Independent States institutional reform project funded by the United States Agency for International Development. The report is intended to contribute to the discussion and analysis of reform in the electricity distribution subsector including:

- ▶ potential benefits that may be gained through power sector restructuring;
- ▶ structural alternatives for distribution;
- ▶ ownership options for distribution utilities;
- ▶ relationships between distribution utilities and other subsectors including transmission and generation;
- ▶ relationships between distribution utilities and end-users; and,
- ▶ regulation of the subsector.

The report examines the international experience with the separation of electricity distribution from generation and transmission (G&T) and draws general conclusions.

The organization of the report is as follows. The present section outlines the background, objectives and describes briefly the countries considered. The next section, Chapter II, is a presentation of the overall results of this research while in Chapter III, general conclusions are provided.

1.2 COUNTRIES EXAMINED

A total of eleven countries are examined including Argentina, Bolivia, Chile, El Salvador, Hungary, Nicaragua, the Philippines, Poland, Portugal, Sweden, and the United Kingdom. These nations can be divided roughly into two groups:

- ▶ countries where the management and ownership of the distribution subsector has been separated (either managerial separation and/or changes in ownership) from generation and transmission as part of restructuring; and,
- ▶ countries where an important share of the distribution subsector has historically been separate from generation and transmission.

Uneven depth of coverage has been afforded the eleven nations in this report. Considerable research is presented on the experience of Latin American countries. The economies and societies of the region have been undergoing considerable change since the beginning of the 1980s. Development models based on state intervention in the economy are giving way to free market approaches. Significant characteristics of this change are an increased role of the market in establishing prices and allocation and a reduced role for the state which includes divestiture from a direct managerial and ownership role in the economy. In the electricity sector this has meant withdrawal from state ownership and management and an increased role for the private sector.

Power sector reform in many of the developing nations examined in this paper was driven by a common set of problems. These include serious financial problems for the power sector, no clear separation between the regulatory and commercial roles of the state, and high losses in the distribution subsector due to theft and technical problems (e.g., poor or dilapidated infrastructure). Distribution-based problems represented an important share of the major difficulties found in the power sector and thus, became major motivators of change.

In contrast, much of the recent restructuring in more developed nations has been driven by the quest for greater competition in electricity supply. Competition in generation and the establishment of power pooling arrangements have been the foci of such reforms. Nonetheless, the fact that the developed nations have had some share of distribution separated from other subsectors has led to their inclusion in this report.

Exhibit 1-1 provides some overall comparative economic and power sector data for the countries examined.

**Exhibit 1-1
Countries Examined**

| Name | Population (million 1994) | Per Capita GNP (US\$/capita 1993) | Power Sector Size (MW) |
|-------------|------------------------------|--------------------------------------|---------------------------|
| Argentina | 33 | 7,600 | 15,700 |
| Bolivia | 7.0 | 1,000 | 850 |
| Chile | 13.8 | 3,200 | 4,300 |
| El Salvador | 5.5 | 1,210 | 820 |
| Hungary | 10 | 3,700 | 7,196 |
| Nicaragua | 4.3 | 410 | 350 |
| Philippines | 68 | 830 | 7,500 |
| Poland | 38.5 | 2,250 | 32,200 |
| Portugal | 9.9 | 6,640 | 6,600 |
| Sweden | 8.7 | 20,300 | 34,500 |
| UK | 58 | 15,600 | 65,000 |

1.3 STUDY APPROACH

The distribution subsector exists in the context of a nation's entire power sector; it cannot be examined in isolation. For this reason, overall power sector data was gathered so as to facilitate a deeper understanding of the experience of each country's distribution subsector.

A list of specific topics guided this examination including:

- ▶ background conditions of relevance to the separation of distribution;
- ▶ the situation within the power sector before restructuring, including structure, ownership and regulation;
- ▶ reasons for restructuring the power sector and the distribution subsector in particular;
- ▶ the objectives of distribution restructuring;
- ▶ the restructuring options considered and the interplay between the problems and objectives and how they influenced the selection of a specific restructuring option;
- ▶ characteristics of the power sector after restructuring including structure, ownership and regulation;
- ▶ evaluation of the power sector restructuring experience and the extent to which the objectives of restructuring have been achieved.

Unfortunately, not all of the information was available for all the countries studied. This was due to limitations in source material. The Appendix to this report contains more detailed descriptions of each of these nation's power sector restructuring experiences.

CHAPTER 2

INTERNATIONAL EXPERIENCE WITH DISTRIBUTION SEPARATION

2.1 DISTRIBUTION SUBSECTOR RESTRUCTURING EXAMPLES

The major aim of this report is to survey power sectors where distribution separation has taken place as part of restructuring. This has occurred, or is proposed to occur, in nine of the eleven countries studied. They are Argentina, Bolivia, Chile, El Salvador, Hungary, Nicaragua, Poland, Portugal, and the Philippines. The other two nations included in the study, the United Kingdom and Sweden, were included because most of the distribution subsector has traditionally been separate from generation and transmission.

For the nine countries where distribution separation has taken place, most, if not all, distribution infrastructure was vertically integrated with generation and transmission before restructuring. The majority of electricity customers in these countries were served by distribution infrastructure owned and operated by the same institution that owned and operated the transmission and generation subsectors of the nation's power sector.

Furthermore, in all eleven of the countries studied there was majority state ownership of the power sector. Most commonly, it was the national government that held these power sector assets, though in a few countries regional and municipal authorities performed some ownership and administrative functions.

Thus, for the majority of nations studied, and all of them developing countries, power sectors were operated by vertically integrated state-owned utility companies. These entities carried out all of the commercial, regulatory, and planning functions required for power sector functioning.

Brief summaries and exhibits describing each country are provided. More detailed information on each can be found in Appendix A. From a review of this information, it is clear that major transformations have occurred in the structure, ownership, and regulation of the power sectors in all the study countries. In nine of the countries this has included the subdivision, privatization in some form, and separation of distribution infrastructure from other power sector infrastructure. In the remaining two countries the distribution subsector had traditionally been institutionally separate from other power sector infrastructure.

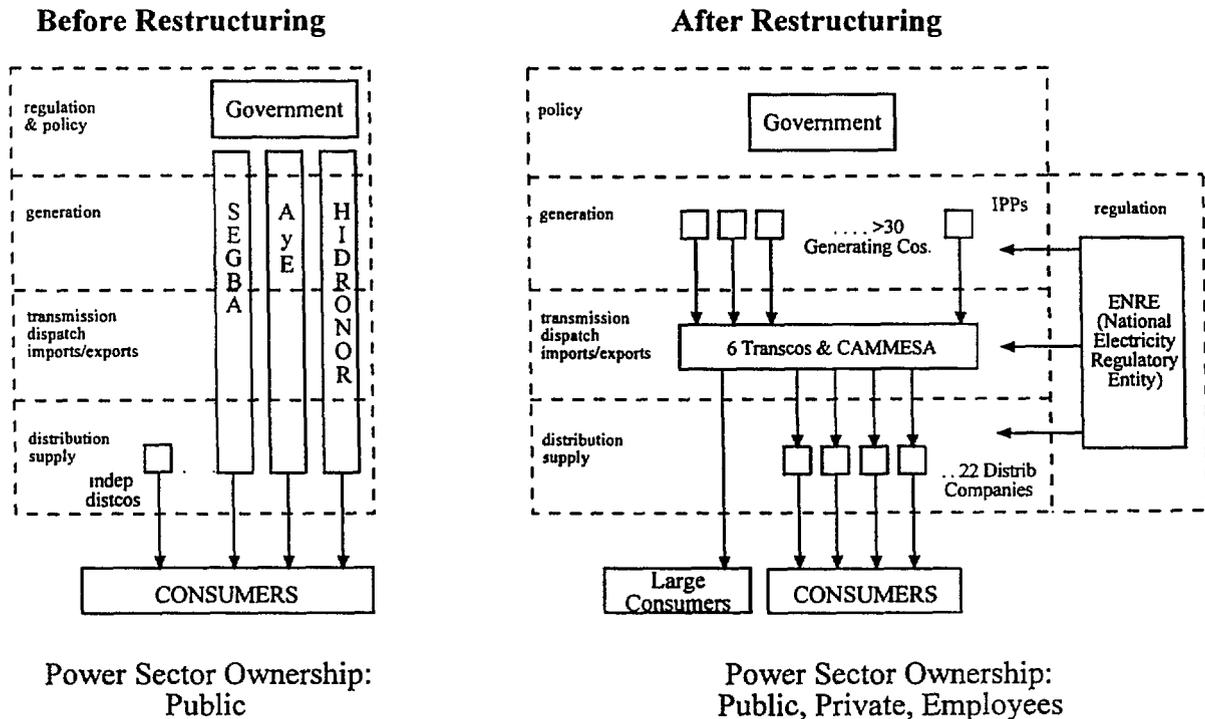
ARGENTINA

Restructuring and Distribution Separation

Argentinean electricity sector reform has meant a major overhaul of the nation's power sector. The 15,700-MW capacity power sector was wholly state-owned until the beginning of the 1990s. It was characterized by low generation availability, political interference in tariff setting and operation, and extremely high losses in much of the nation's distribution subsector. Distribution losses reached 30% in much of the capital, Buenos Aires.

Restructuring has involved the split-up of state-owned assets according to function and region, quickly followed by privatization. Generation, transmission, dispatch, distribution, and regulation are now performed by separate entities. There are now more than 30 private generation companies, an independent entity that manages the transmission grid and determines dispatch, 22 distribution companies, and a new regulatory body called ENRE. The distribution subsector is managed according to innovative regulations on power purchases, concessions, and tariffs. The primary goals of restructuring were the creation of a bulk power market based on marginal production costs, privatization, and general efficiency gains for all parts of the sector.

Exhibit 2-1
Argentinian Power Sector Restructuring



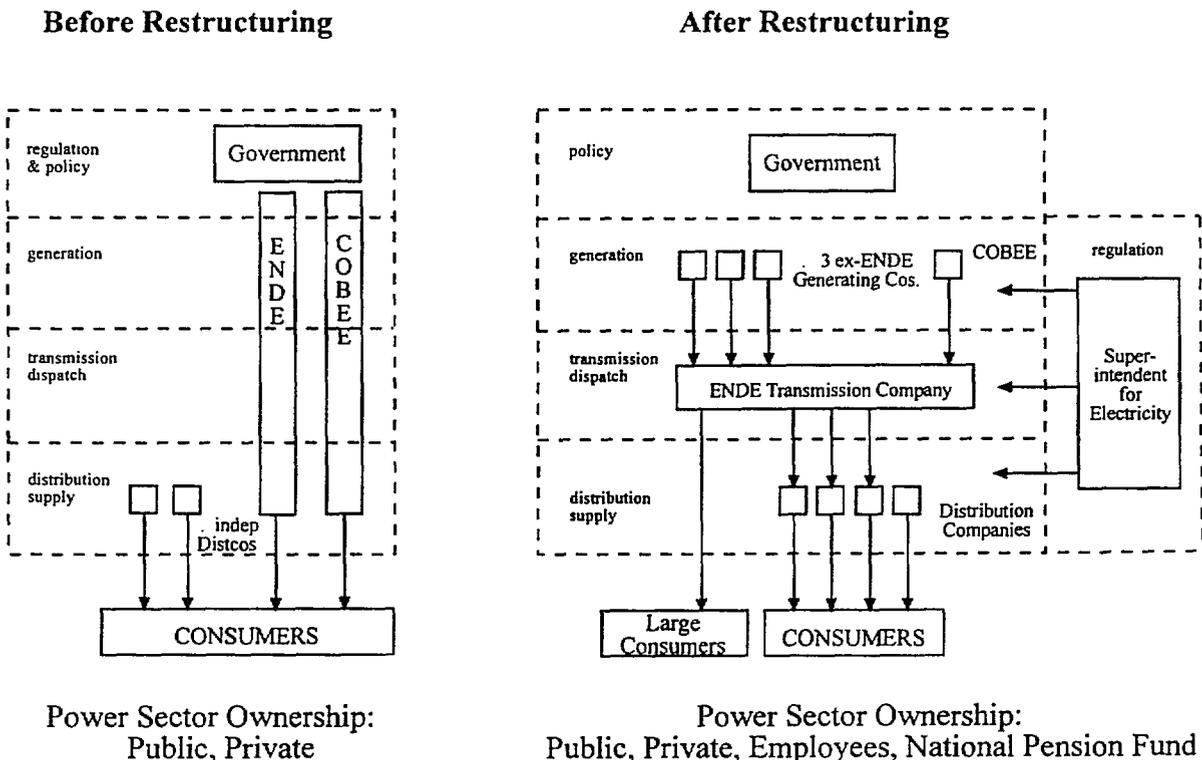
BOLIVIA

Restructuring and Distribution Separation

Restructuring of the Bolivia's 849-MW electricity sector began in 1994 with legislation that paved the way for the split-up and privatization of ENDE, the state-owned vertically-integrated power utility. Fifty percent of ENDE's generation assets were won in a competitive solicitation by three US companies; the companies also have a management contract and have pledged to invest US\$140 million over the next seven years as part of a capitalization program. Proceeds of the sale will go to a pension fund for all Bolivians, and ENDE employees have been offered ownership stakes.

Further legislation has established a Superintendent for the power sector, an autonomous regulatory body that will oversee the sector, protect the public interest, and approve tariffs. In the restructured power sector no single generator is permitted to hold more than 35 percent of the nation's capacity. ENDE will continue to operate the nation's transmission system, and other distribution infrastructure is in the process of separation from generation and transmission for subsequent sale. Direct access is contemplated.

Exhibit 2-2
Bolivian Power Sector Restructuring



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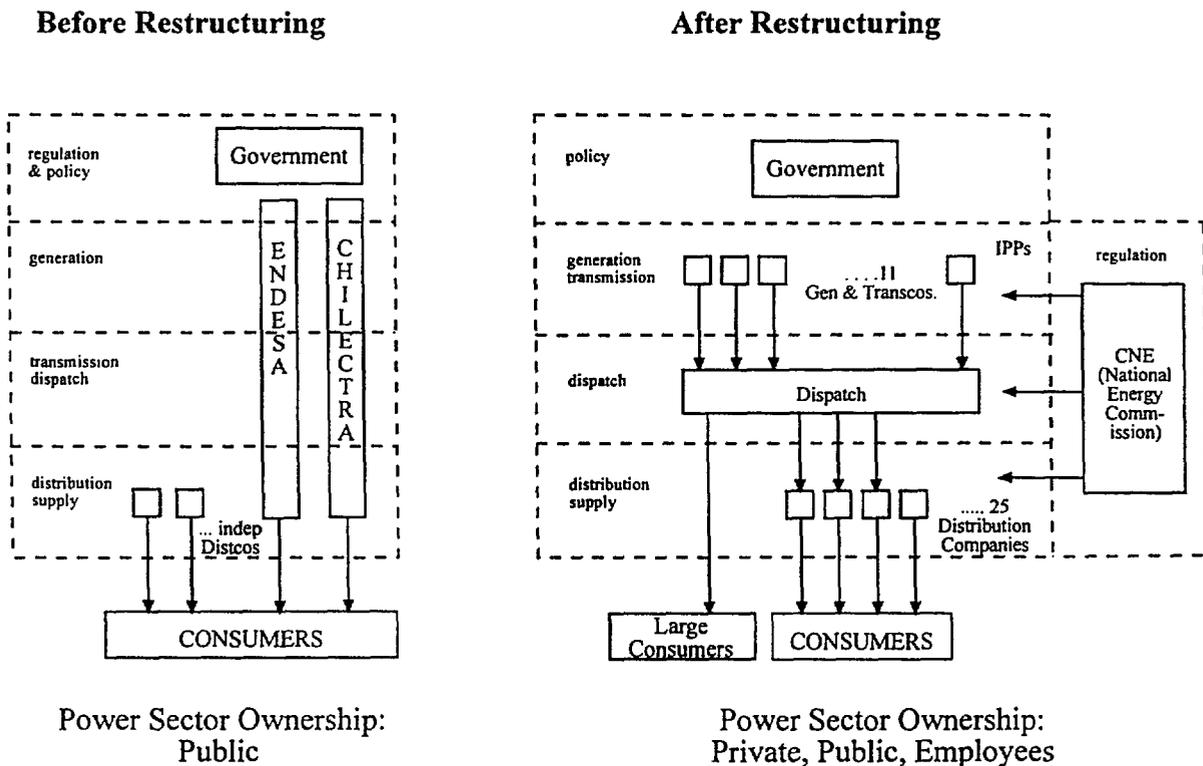
CHILE

Restructuring and Distribution Separation

Chile's 4,300-MW power sector showcases the separation and divestiture of state-owned distribution, transmission, and generation infrastructure through a process of restructuring and subsequent privatization that took place between 1978 and 1990. Chile was the first power sector restructuring and privatization to occur in the recent period and is often cited in the literature on restructuring in developing nations. An autonomous regulatory body, working in conjunction with other branches of the government, coordinates and regulates the nation's power sector.

Major objectives of restructuring were privatization, a redefinition of the role of the state in the power sector as regulator, widespread citizen stock ownership of infrastructure assets (popular capitalism), increased efficiency in the use of capital and labor resources, and the facilitation of investment flows to the sector. Evaluations to date show that these general objectives have been achieved.

Exhibit 2-3
Chilean Power Sector Restructuring



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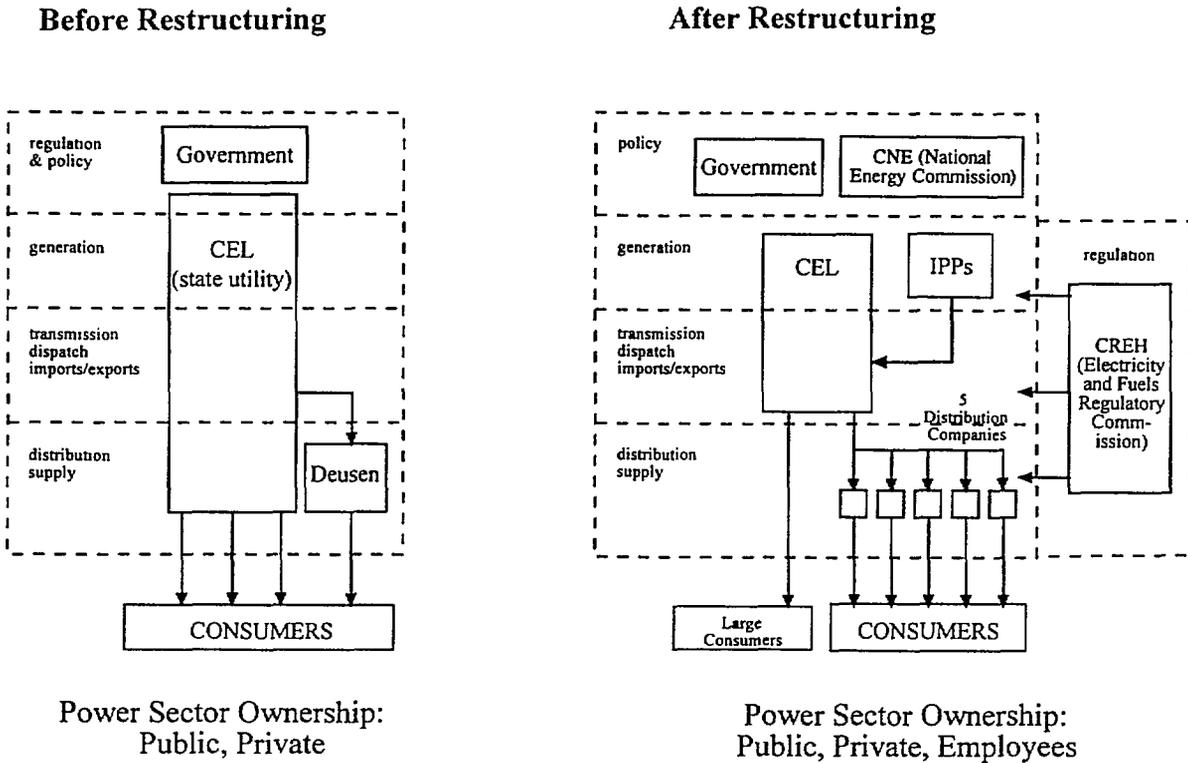
EL SALVADOR

Restructuring and Distribution Separation

The El Salvadorean government has been studying private participation in the nation's 818-MW electricity sector since the late 1980s. New capacity is being developed by private companies. The government recently announced the reorganization and divestiture of the distribution subsector as a major component of its plans to restructure the sector and attract private participation.

Restructuring legislation is currently being discussed in the national assembly. It includes the creation of two new regulatory bodies to oversee the sector, protect the public interest, approve tariffs, coordinate expansion planning, and evaluate the nation's energy resource development options. The distribution subsector will be separated from generation and transmission and there will be a total of five distribution companies operating in different regions of the country. Direct access for large customer is proposed.

**Exhibit 2-4
Proposed El Salvadorean Power Sector Restructuring**



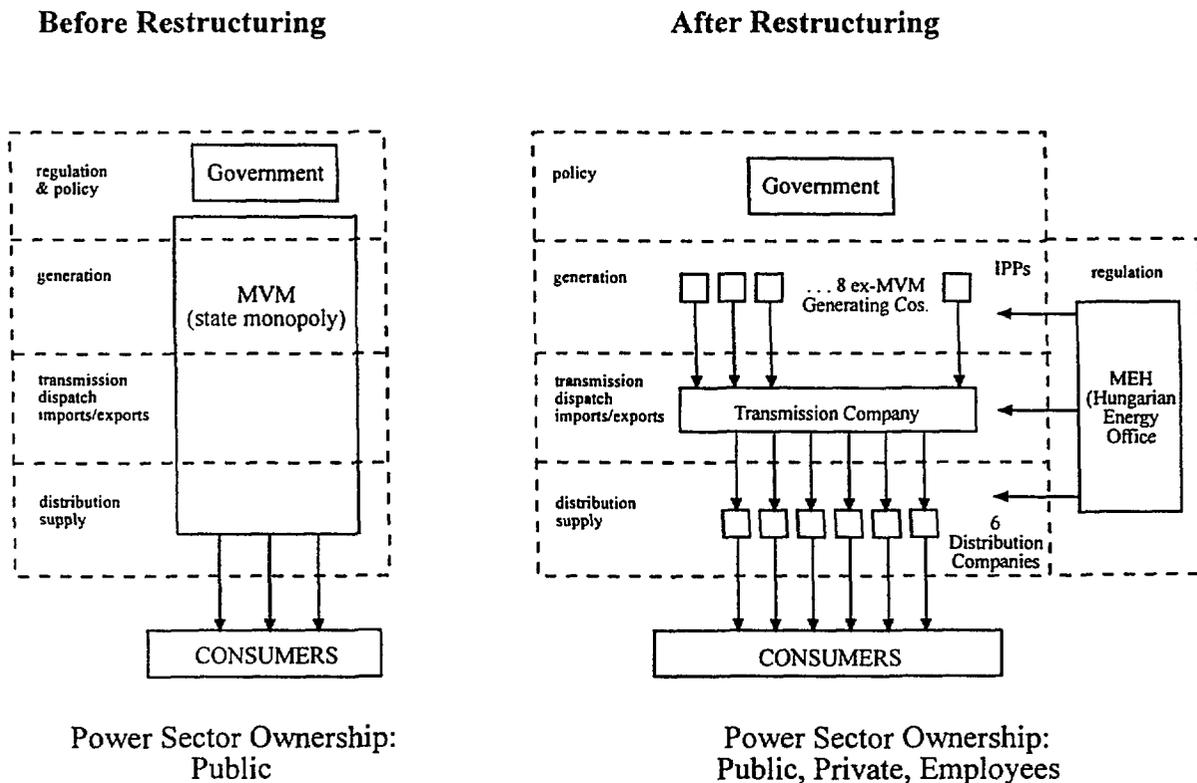
HUNGARY

Restructuring and Distribution Separation

Hungary's 6,600-MW electricity sector was reorganized in 1992 with the separation and corporatization of generation, transmission, and distribution assets of the state-owned and vertically-integrated power sector monopoly enterprise MVM. The generation assets of MVM were divided into eight companies, and sector demonopolization encourages bulk power generation by independent power producers. A transmission company has been set up to manage dispatch, coordinate transmission, and control power imports and exports. Six distribution companies have been formed out of MVM's distribution assets.

A regulatory body has been formed for the power sector and it is authorized to approve tariff increases. The partial privatization plan for the electricity sector has recently been agreed upon. Ownership of MVM's assets will be divided between strategic foreign investors, employees, municipalities, and the government's asset holding company.

**Exhibit 2-5
Hungarian Power Sector Restructuring**



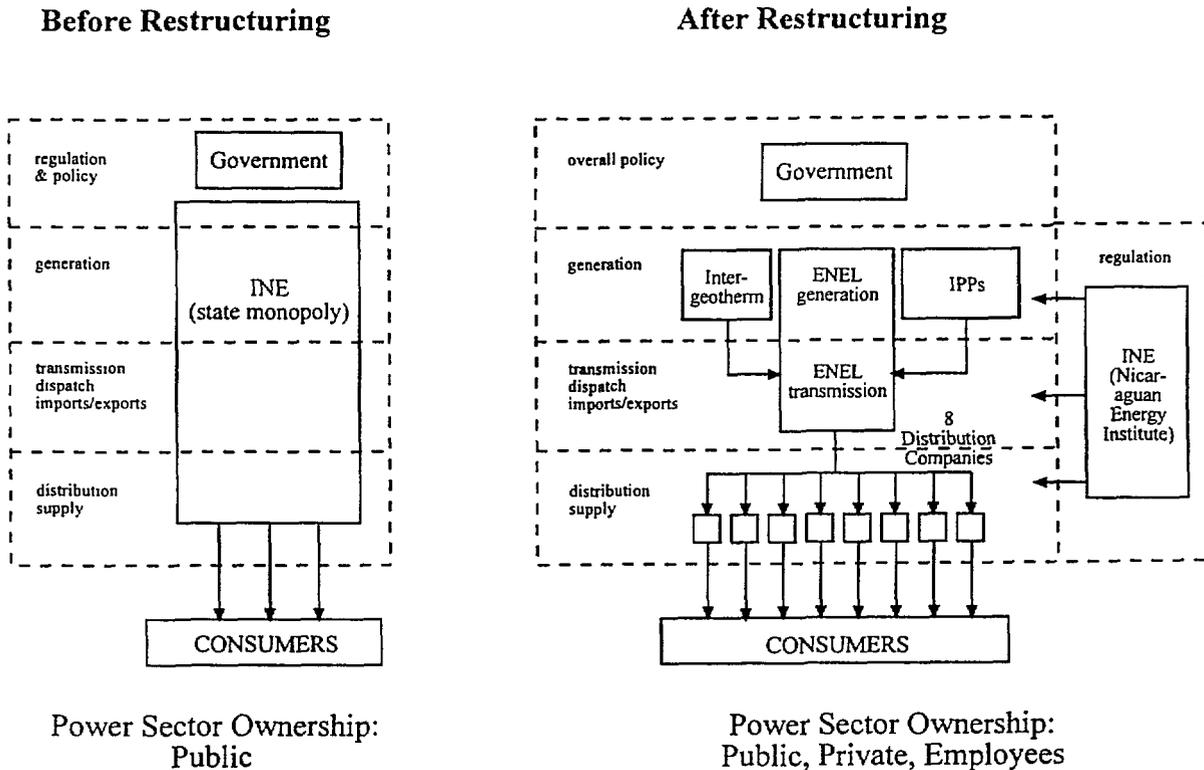
NICARAGUA

Restructuring and Distribution Separation

Nicaragua's restructuring program was motivated by a host of problems in the power sector. Significant among these were the need to solve distribution-side problems, as well as financing shortfalls on the supply-side. Distribution separation is being undertaken as part of the strategy to address these problems. The goal is the creation of well-regulated regional monopoly distribution companies.

Before restructuring the nation's 350-MW power sector was comprised of a single vertically integrated state monopoly. After an extensive period of study and consideration of options, the sector was reorganized in January 1995. An autonomous regulatory body has been established to coordinate sector activities and approve tariff changes. Generation is to be separated from transmission, and distribution will be carried out by eight regional enterprises. Innovative regulation will aim to introduce competition into the distribution subsector. Private participation is being encouraged in all activities of the nation's power sector.

**Exhibit 2-6
Nicaraguan Power Sector Restructuring**



PHILIPPINES

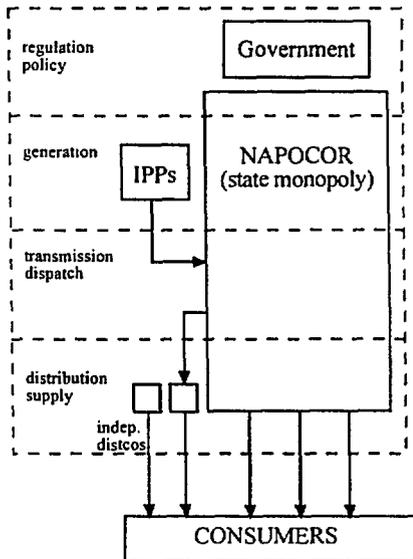
Restructuring and Distribution Separation

The Philippine 7,500-MW power sector is just coming out of a six-year period of chronic brownouts, largely solved by the addition of 1,300-MW of privately-owned capacity. At one point there was a 1,300-MW capacity shortfall. Further independent power producer generation is under development and it has been proposed that direct access provisions be added to the power sector regulatory and legal framework.

Accompanying the introduction of independent private power producers and recent power sector regulatory reform in the Philippines, there has been ongoing debate over whether and how further power sector restructuring should take place. A recent restructuring plan calls for the restructuring and privatization of the state-owned vertically integrated utility, Napocor, into a U.K.- or Argentinean-style electricity industry. At the same time, the existing multitude of independent distribution companies and cooperatives will remain as they are.

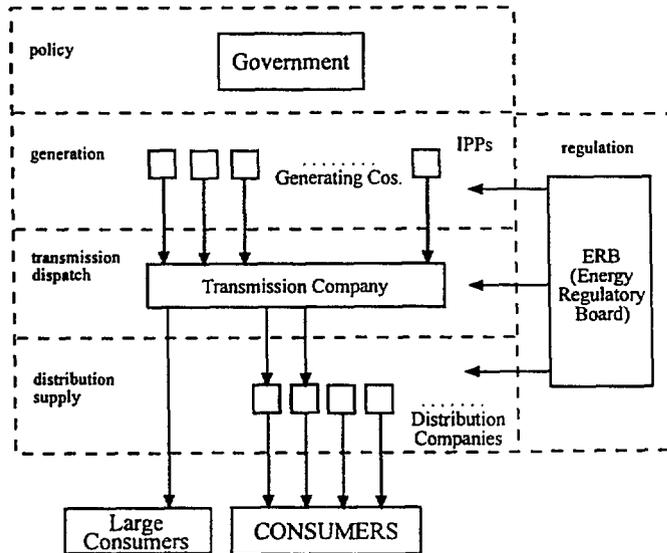
**Exhibit 2-7
Proposed Philippine Power Sector Restructuring**

Before Restructuring



Power Sector Ownership:
Public

After Restructuring



Power Sector Ownership:
Public & Private

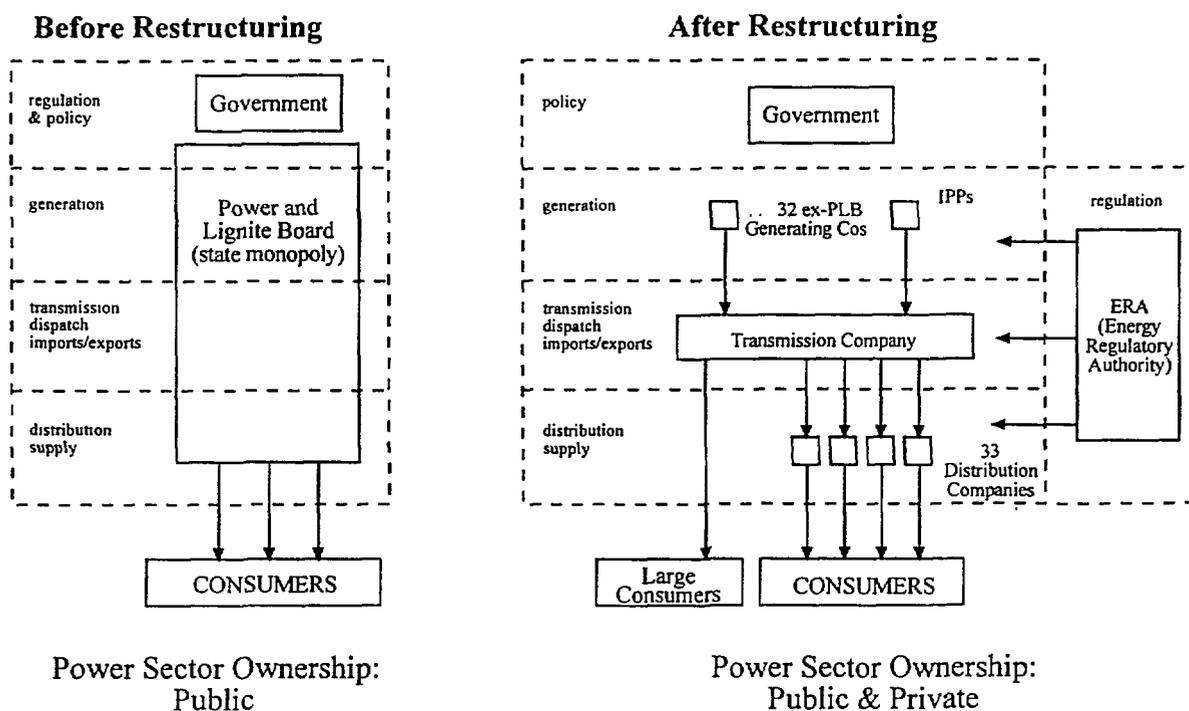
POLAND

Restructuring and Distribution Separation

Until 1989 Poland's 32,200-MW electricity sector was entirely state-owned and was operated by the Polish Power and Lignite Board. In 1989 restructuring began with a power sector reorganization. Thirty-three distribution companies and thirty-two generating companies were set up, and in 1990 the Polish Power Grid Company was formed to manage transmission and dispatch. The goal of restructuring is to create a competitive generation market, form a regulatory body, introduce private ownership, and separate transmission and distribution from other sector activities. It is hoped that reform will increase sector efficiency, facilitate requisite sector investment, and eventually ease pollution from coal burning (96% of electricity is generated from coal).

An Energy Law has been under formulation for four years and is soon expected to be approved by the parliament. In the meantime the distribution companies, district heating plants, hydroelectric plants, and transmission companies have been set up as state-owned joint stock companies. Generation plants are to follow. The Energy Law will establish a regulatory body, permit open access, pave the way to privatization, and reform tariff-making procedures.

**Exhibit 2-8
Proposed Polish Power Sector Restructuring**



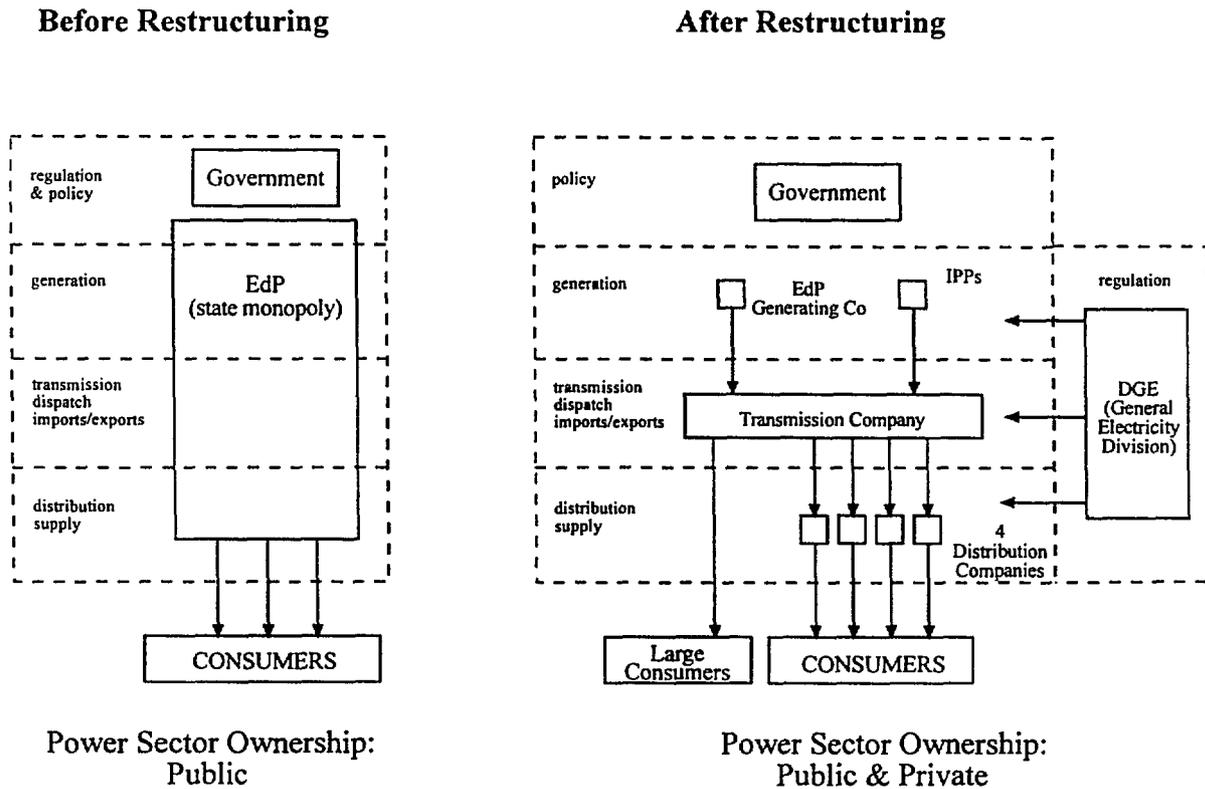
PORTUGAL

Restructuring and Distribution Separation

Until 1993, one State-owned company, Electricidade de Portugal (EDP), comprised 90 percent of the nation's 7,000-MW electricity sector. Last year, new legislation began restructuring the power sector. EDP was incorporated and divided into several business areas; one is charged with overall sector management, another with generation, one with transmission, and four with distribution. Restructuring is ongoing and eventually a regulatory body will take charge of oversight of the power sector. Privatization of EDP is being considered and allowing independent power producers is being contemplated.

Restructuring has been driven by high losses in distribution, insufficient financing for electricity production expansion, and pressure from the nation's industries who stand at a competitive disadvantage due to the nation's highest electricity tariffs in Europe

Exhibit 2-9
Portuguese Power Sector Restructuring



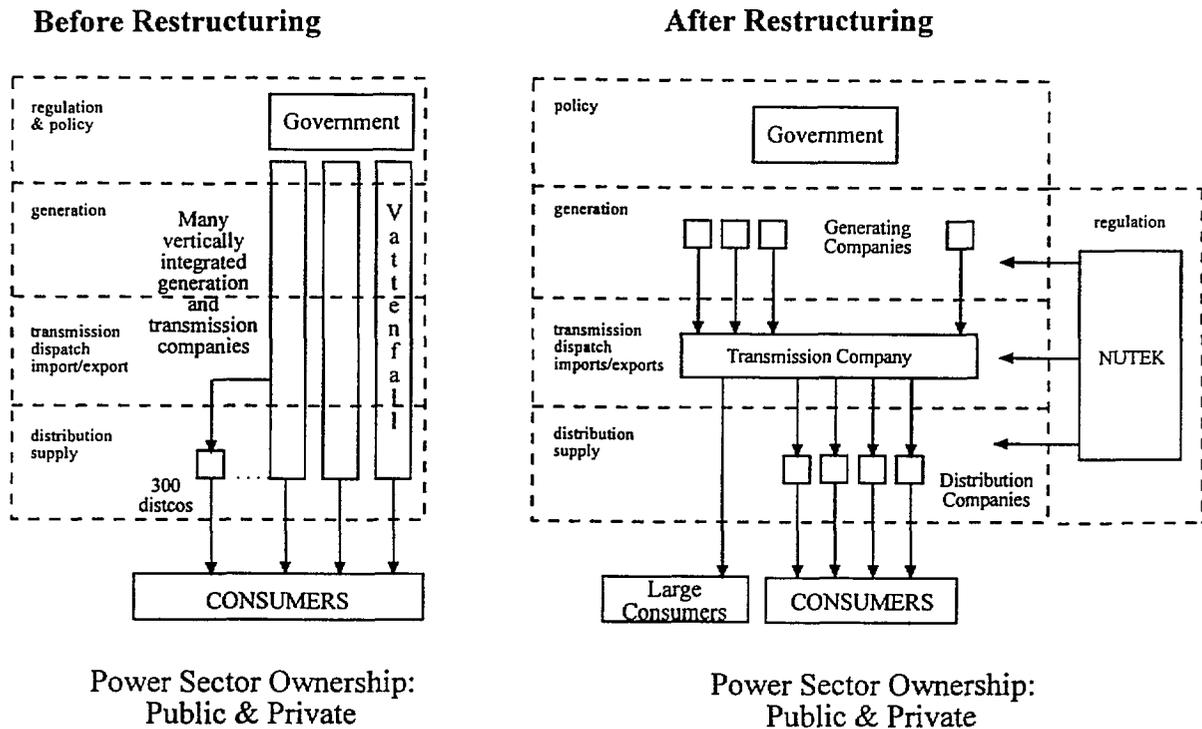
SWEDEN

Restructuring and Distribution Separation

Recent reforms have been introduced to the nation's 34,500-MW power system with the primary intention of bringing competition to generation and distribution, as well as non-discriminatory access to the transmission grid. On January 1, 1995, a new transmission company and regulatory body was established. There will be direct access and contracts between generating companies and distribution companies as well as sales and purchases to the pool. Competition will be stimulated in the power sector by allowing open access and by breaking the geographical monopoly of distribution companies to supply electricity to customers.

The distribution subsector has always been largely separate from generation and transmission, and is made up of more than 300 distribution companies. The largest distribution company has 12 percent of customers, while the second largest, Sydkraft, has ten percent of distribution. All together, the ten largest distribution companies cover only 50 percent of the market.

**Exhibit 2-10
Swedish Power Sector Restructuring**



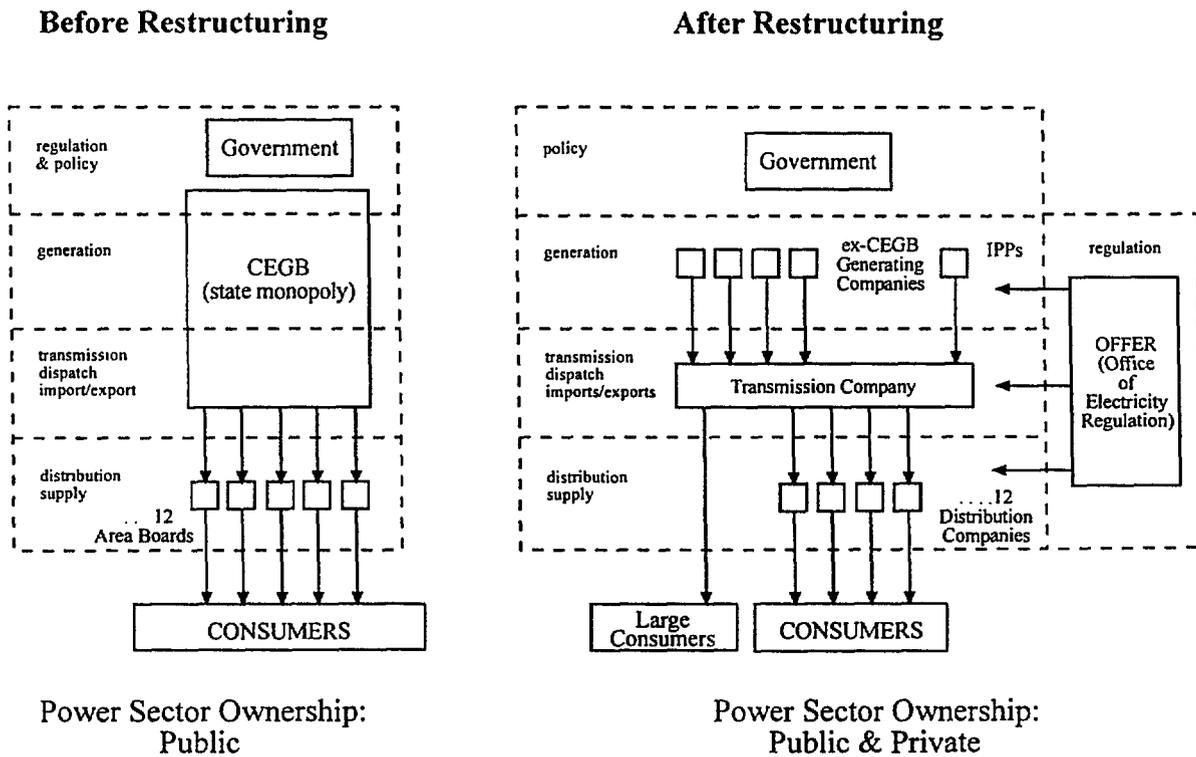
UNITED KINGDOM

Restructuring and Distribution Separation

The UK restructuring experience is widely cited as an example of how to encourage competition in generation and privatize large state-owned enterprises. The nation's 65,000-MW electricity sector was transformed by the 1989 Electricity Act. The state-owned Central Electricity Generating Board was divided into three generating companies and a grid company; two of the generating companies were privatized. A regulatory body, the Office for Electricity Regulation, was set up to oversee sector functioning, licensing and approve tariffs.

The nation's distribution subsector has traditionally been operated by organizations separate from generation and transmission, though the recent industry restructuring involved a change in ownership from the public to the private sectors. Performance-based regulation has attempted to provide incentives to improve efficiency in the distribution subsector.

Exhibit 2-11
United Kingdom Power Sector Restructuring



2.1.1 Overall Power Sector Restructuring

A study of distribution subsector restructuring is not complete without an understanding of the transformations of a nation's entire power sector. In all the countries studied distribution subsector restructuring has taken place in the context of changes in the entire power sector. Thus, to facilitate analysis of distribution subsector restructuring, data was compiled on the entire power sector of all the nations studied.

Exhibits 2-12, 2-13, 2-14, and 2-15 summarize all data collected from the eleven study nations. Exhibits 2-12 and 2-13, titled "Power Sector Restructuring," summarize pre-restructuring and post-restructuring sector structure, ownership, and other details of the nation's entire power sectors.

The bulk of analysis in this paper, though, centers on the distribution subsector. Accordingly, discussion of broader power sector issues are only mentioned as they relate to, and lend a deeper understanding to, changes in the distribution subsector. Exhibits 2-14 and 2-15, titled "Distribution Subsector Restructuring," contain summary information on transformations to the distribution subsectors in the eleven study countries.

It should be noted that the information presented in these four exhibits, particularly for the *Pre-Restructuring Problems* and *Restructuring Objectives* columns, includes only information gleaned from the source material available. While multiple documentary sources of information were used to compile data, plus personal communication for confirmation, it must be noted that all problems and objectives involved in restructuring may not have been identified.

Exhibit 2-12
Power Sector Restructuring, 1 of 2

| Country | Power Sector Pre-Restructuring | | | Identified Restructuring Objectives | Power Sector Post-Restructuring | | |
|--------------------|---|--------------------------------|---|--|---------------------------------------|---|--|
| | Structure | Ownership | Problems | | Structure | Ownership | Regulation* |
| Argentina | Vertically Integrated + independent Distcos | 100% state | -Government interference -Low supply availability -Critical financial situation | -Competition in generation & distributn -Attract private investmt -Economic efficiency -Tariffs to MC -Government role only as regulator -Bulk power pool | >30 Gencos 6 Transco 22 Distcos | -53% private generatn -1 private Xmis -50% private distrib -50% public distrib -privatization ongoing | ENRE administration of pool by CAMMESA |
| Bolivia | Vertically Integrated + public Distcos | Majority state Some private | -No competition | -Clarify cost structure -Bring competition -Trans wheeling -MC prices | Gencos Transcos Distcos | -State divestiture | Superintendency |
| Chile | Vertically Integrated + independent Distcos | 95+% state | -No expansion financing -No reg. and comm. separation | -Privatize -Separate regulation from commercial role -Pricing on MC | 11 Gen and Transcos 25 Distcos | -90+% private -Private and public Distcos | CNE |
| El Salvador | Vertically Integ + indep Distco | 95+% state | -No expansion financing | -Privatize | 1 Gen/Xmco 5 Distcos | -State gen/Xm + IPPs -4 private Distcos | CREH & CNE |
| Hungary | Vertically Integrated | 100% state | -No expansion financing | -Privatize -Competition in generation | 8 Gencos 1 Transco 6 Distcos | -Majority private -Minority state -Private IPPs | ME |

* For all countries broad overall power sector policy is determined by the nation's government.

Exhibit 2-13
Power Sector Restructuring, 2 of 2

| Country | Power Sector Pre-Restructuring | | | Identified Restructuring Objectives | Power Sector Post-Restructuring | | |
|-------------|---------------------------------------|-------------------|---|--|--------------------------------------|--|--|
| | Structure | Ownership | Problems | | Structure | Ownership | Regulation* |
| Nicaragua | Vertically Integrated | 100% state | -No expansion \$ -No regulatory and commercial separation -Distribution high losses | -Separate regulation and operation -Bring competition -Tariff reform -Improve efficiency -Meet lender req'rmts | 2 Gencos 1 Transco 8 Distcos | -95+% state -Private IPPs -Public/private ventures in distrib & Transmission | INE National Comm. on Energy Prices |
| Philippines | Vertically Integrated + other Distcos | 90+% state | -No expansion financing | -Split regulatory and commercial functions | Gencos Transcos Distcos | Increasing Role for Private Sector | DOE & ERB |
| Poland | Vertically Int | 100% state | -Efficiency -Pollution | -New Expansion Financing -Separate reg & comm | 33 Gencos 1 Transco 32 Distcos | Privatisation to take place | ERB |
| Portugal | Vertically Integrated | 100% state | -No expansion financing | -Increase efficiency -Competition | 1 Genco, IPPs 4 Distcos 1 Xco | -Most public -Private IPP | DGE |
| Sweden | 20 Genco 1 Transco 300 Distcos | State and private | -Inadequate competition | -Competition in generation and distribution | Gencos 1 Transco 300 Distcos | No Data | NUTEK |
| UK | Integrated Gen & Trans 12 Distcos | 100% state | -No competition -Inefficiency -Lack of incentives | -State divestiture -Competition in gener and distribution | 3 Gencos 1 Transco 12 Distcos | -2 Private Gencos -Private Distcos -Collective Xmco | OFFER |

* For all countries broad overall power sector policy is determined by the nation's government.

Exhibit 2-14
Distribution Subsector Restructuring, 1 of 2

| Country | Distribution Subsector Pre-Restructuring | | | Identified Distribution Restructuring Objectives | Distribution Subsector Post-Restructuring | | |
|--------------------|---|------------------|---|--|---|--|-----------------|
| | Structure | Ownership | Problems | | Structure | Ownership | Regulation* |
| Argentina | Vertically Integrated + >15 indep Distcos | 100% public | -Government interference -Critical financial situation -Bad billing procedures -Losses up to 25.9% | -Competition in distribution -Attract private investment -Improve technical and economic efficiency -Government only as regulator | 20+ Distcos | 50% private 47% provin'l 3% national privatization ongoing | ENRE |
| Bolivia | Vertically Integrated + indep Distcos | Public & private | -Insufficient expansion financing | -Make cost structure clearer -State divestiture | Private and public Distcos | Some Private Others Public | Superintendency |
| Chile | Vertically Integrated + some independent Distcos | 85+% state | -Part of restructuring -Inadequate cost breakdown | -Privatize -Separate distribution from generation -Separate regulation and operation | 25 Distcos | 22 Private 3 Public | CNE |
| El Salvador | Vertically Integrated + 1 ind distco | 95+% state | -No expansion financing | -Privatize -Improve efficiency | 5 Distcos | 100% Private | CREH & CNE |
| Hungary | Vertically Integrated | 100% state | No Data | -Privatize | 6 Distcos | state, private, municipal | MEH |

* For all countries broad overall power sector policy is determined by the nation's government.

Exhibit 2-15
Distribution Subsector Restructuring, 2 of 2

| Country | Distribution Subsector Pre-Restructuring | | | Identified Distribution Restructuring Objectives | Distribution Subsector Post-Restructuring | | |
|---------------------|--|--------------------------|--|--|---|---|--------------------------------------|
| | Structure | Ownership | Problems | | Structure | Ownership | Regulation* |
| Nicaragua | Vertically Integrated | 100% state | -No expansion financing -No reg/comm separation -Low end-use efficiency -High electricity theft -No cost breakdown -Low power quality -Distribution system losses approx 22% | -Separate regulation and commercial operation -Tariff Reform -Improve sector efficiency -Clear reg framework -Reduce losses -Meet requirements of multi-lateral lenders | 8 Distcos | 100% State but Pub/Priv venture in distribution | INE National Comm . on Energy Prices |
| Phillippines | Vert Integ + others | 90+% state | -No expansion financing | -Split regulatory and commercial functions | Many Distcos | Private proposed | DOE & ERB |
| Poland | Vertically Integrated | 100% state | No Data | -Improve commercialization -Enhance comp in gener | 33 Distcos | Privatisation to follow | ERB |
| Portugal | Vertically Integrated | 100% state | -No expansion financing -Expensive electricity | -Improve efficiency | 4 Distcos | 100% public | DGE |
| Sweden | 300 Distcos | Mostly municipally owned | No Data | -Open Access -Retail Wheeling -Breaking regional monop | 300 Distcos | Variety | NUTEK |
| UK | 12 Distcos | 100% state | -No Competition | -Retail Wheeling -Partial Competition | 12 Distcos | 100% Private | OFFER |

* For all countries broad overall power sector policy is determined by the nation's government.

2.2 DISTRIBUTION SUBSECTOR AFTER RESTRUCTURING

As is obvious from a review of Exhibits 2-1 through 2-15 dramatic changes to power sector structure, ownership, and regulation have been made, are underway, or are proposed in the countries examined. This has been accomplished by the approval of a new set of laws, constitutional changes, and executive decrees.

Typically, restructuring has been a process involving study, legislation, restructuring and privatization over a three to five year period. The particular time period has depended on the degree of changes proposed, the amount of public debate on the issues, the relative strength of opposition to the proposals made, and, for cases of privatization, the eagerness of investors to purchase divested assets. In each country, a variety of restructuring options were proposed and evaluated by policy makers before the selection of a specific approach was determined.

The major changes that have resulted from restructuring can be approximately categorized into three areas: structure, ownership and regulation. The following section details these changes.

2.2.1 Structural Changes

For all of the countries examined, the total separation of distribution functions from generation and transmission has been made, or is underway. Furthermore, in ten of the eleven countries studied (Argentina, Bolivia, El Salvador, Hungary, Nicaragua, the Philippines, Poland, Portugal, Sweden, and the United Kingdom), generation and transmission assets have been, or are proposed to be, separated from one another as a result of restructuring. Thus, distribution separation as part of total power sector vertical unbundling has been the most common outcome of reform in the countries examined.

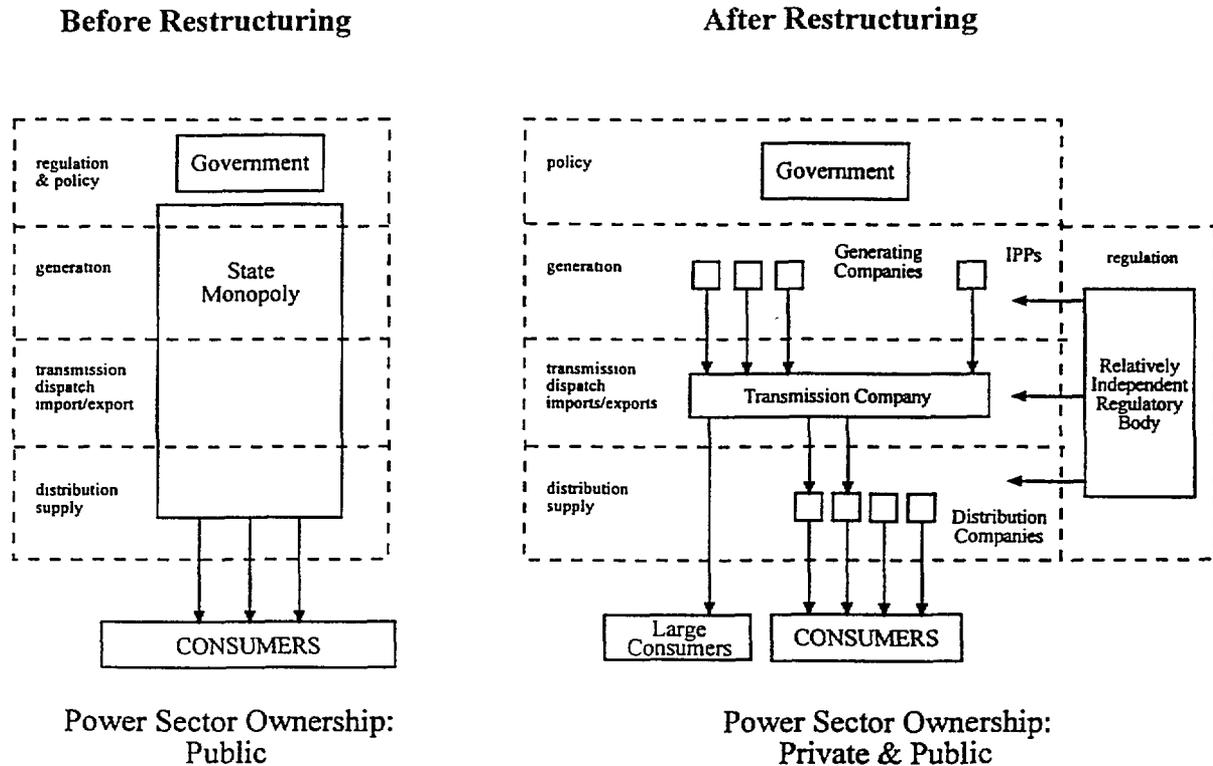
Accompanying this vertical break-up, the distribution subsectors have been horizontally divided. In all, nine of the countries studied (Argentina, Bolivia, Chile, El Salvador, Hungary, Nicaragua, the Philippines, Poland, and Portugal) went through, or will be going through, the formation of separate distribution organizations. In the remaining two, the distribution function has been traditionally handled by entities institutionally separate from those involved in generation and transmission, and in all of these countries the distribution subsector was divided among multiple enterprises.

The number of different distribution organizations varied greatly among the countries examined. Generally, the more populous the nation, the greater the number of distribution companies. Nicaragua, with a population of 4.5 million (of which only 35 percent have electricity service) is scheduled to have eight distribution companies while the 14.2 million citizens of Chile (where 92 percent have electricity) are served by 25 distribution companies. El Salvador will have five distribution companies, Argentina has more than 20, there are 12 in the UK, 6 in Hungary, 33 in Poland, 300 in Sweden and it is proposed that Portugal will

have four. The two other nations studied, Bolivia and the Philippines, already have independent distribution companies; restructuring will create even more.

Typically capital cities, particularly in the developing nations, are served by their own distribution companies, while remote areas may be served by isolated distribution systems not connected to a nation's interconnected transmission grid, and are managed by independent distribution companies. This indicates horizontal division is a function of regional differences and attributes, be they geographic, population density-related or political-administrative. Such differences have determined how the distribution subsectors were disaggregated in all of the countries studied.

Exhibit 2-16
Typical Restructuring of Country Power Sectors



2.2.2 Ownership Changes

State divestiture of electricity sector assets has been the common strategy in the majority of the nations studied. For the entire power sector, ownership changed, or is proposed to change, from predominantly public to predominantly private in eight of the eleven countries. These countries are Argentina, Bolivia, Chile, El Salvador, Hungary, the Philippines, Poland, and the United Kingdom. However, in the two nations where the state still holds an important

share of power sector assets, Nicaragua and Portugal, participation of the private sector is contemplated by independent power producers (IPPs), joint ventures for distribution and transmission system expansion, eventual partial privatisation, and in other ways such as outsourcing of specific utility activities.

For the distribution subsector, the pattern of changing ownership under restructuring has followed changes occurring in the rest of the power sector. In all countries the national government has divested, or is planning to divest of all, or at least an important share of its distribution subsector assets. In many countries the only public ownership in the distribution subsector will be by provincial, municipal, or co-operative authorities. Where divestment of distribution assets has not been complete private investment is to play an increasingly important role. Private participation will include capitalization programs, outsourcing, and joint ventures.

Employee share ownership has also resulted or is proposed for shares of distribution companies divested of by the state. A minority of total distribution entity value in Nicaragua as well as in Hungary, Chile, Argentina (ten percent), and El Salvador (20 percent) has been, or will be, turned over to employees. This has been carried forth to reduce opposition to restructuring from employees within the enterprises undergoing privatization, as well as their sometimes powerful power sector labor unions. In addition, it reinforces the achievement of restructuring's operational efficiency objectives by granting workers a financial stake in company performance.

Other owners of newly privatized distribution subsector assets include a variety of shareholder types for the different nations studied. In Argentina, foreign companies were able to compete for the purchase of divested assets on the same terms as domestic investors. As a group, Chilean domestic pension funds, with a 26.3 percent holding of the assets of the old state-owned utility ENDESA, are the largest share holding group. In Bolivia, it is proposed that after privatization 50 percent of the nation's largest utility will be held by a pension fund for all Bolivian's over age 21.

There has been a certain amount of diversification into other power sector activities by the private owners of some distribution companies. In Chile, shareholders of the capital's distribution company (ENERSIS) hold shares in generating companies. In Argentina, the rules for distributors' bulk power purchases will most likely lead to strategic alliances between distributors and generators. This will probably include joint stock ownership by investors.

Exhibit 2-17 provides an overview of the changes in ownership that have occurred as part of reform in each nation's power sector.

Exhibit 2-17
Ownership of Distribution Assets

| Country | Before Restructuring | | After Restructuring | | | | |
|-------------|----------------------|--------------------|-----------------------|-----------|-----------------------|---------------|------------------------------|
| | Public | Private | State Holding Company | Municipal | Employee Shareholders | Pension Funds | Private (Domestic & Foreign) |
| Argentina | ✓ | | ✓ | ✓ | ✓ | | ✓ |
| Bolivia | ✓ | minor ¹ | | ✓ | ✓ | ✓ | ✓ |
| Chile | ✓ | minor ² | | ✓ | ✓ | ✓ | ✓ |
| El Salvador | ✓ | minor ³ | | | ✓ | | ✓ |
| Hungary | ✓ | | ✓ | ✓ | ✓ | | ✓ |
| Nicaragua | ✓ | | ✓ | | ✓ | | ✓ |
| Philippines | ✓ | minor ⁴ | | ✓ | | | ✓ |
| Poland | ✓ | | ✓ | | | | ✓ |
| Portugal | ✓ | | ✓ | | | | ✓ |
| Sweden | ✓ | ✓ | ✓ | ✓ | | | ✓ |
| U.K. | ✓ | | | | | | ✓ |

Notes

- ¹ Distribution in the capital, La Paz, as well as in some mining communities remote from the national grid are served by private companies.
- ² There were a handful of private distribution companies providing electricity distribution services before restructuring. Together they supplied 18 percent of total electrical energy.
- ³ One private company, Deusen, distributed electricity in the south-east of the country.
- ⁴ There have been 17 private distribution companies operating in the Philippines, out of a total of 136.

2.2.3 Regulation of the Distribution Subsector

An integral part of the restructuring process in most of the countries studied has been the separation of the regulatory role of the state from its commercial and long term broad policy roles. This was an explicit objective of restructuring in all countries studied. The separation of roles by means of the establishment of a regulatory body was of explicit importance even

for Hungary, Nicaragua, Poland, and Portugal, where the national government was slated to continue to have an ownership role in the power sector.

New power sector regulatory agencies have been established in all of the nations studied. In Chile, restructuring began with the creation of the National Energy Commission (CNE) in 1978. In Nicaragua, regulatory functions will be carried out by the recast Nicaraguan Energy Institute (INE), with tariff approvals made by the National Commission on Energy Prices. In Argentina, ENRE (National Electricity Regulatory Entity) was created, in El Salvador the CREH (Electricity and Fuels Regulatory Commission) and the CNE (National Energy Commission). In Bolivia, the Superintendent was established, in the Philippines the ERB (Energy Regulatory Board), in Portugal the DGE (Electricity Department at the Energy Ministry), in Sweden NUTEK (the National Board for Industrial and Technical Development (NUTEK)), in Hungary the MEH (Hungarian Energy Office), in the UK OFFER (the Office of Electricity Regulation), and in Poland the ERA (Energy Regulatory Authority) is to be created.

While these regulatory bodies are government entities, most possess a certain degree of autonomy from direct political interference of government officials. In most countries their relationship with other institutions of government can be described as relatively independent, though interdependent. The scope of jurisdiction of these regulatory bodies is usually defined by higher levels of government, and the government (usually by way of an Energy Ministry) remains responsible for overall national energy sector policy. The approvals of the operating budgets of these regulatory bodies, the appointment of their personnel, and expenditure audits may be performed by other branches of government. Within their area of jurisdiction, however, the regulatory bodies have independence decision-making authority. Exhibit 2-18 provides an overview of each nation's regulatory body, as well as some of their characteristics and responsibilities.

The new regulatory bodies carry out a variety of functions. In the broadest terms they implement power sector policy. This includes the analysis and evaluation of power sector functionality, the monitoring of compliance with all laws and regulations governing power sector activities, the study and approval of expansion options and other investment decisions, the granting of concessions and licences, and the determination of tariffs. This last activity is the usual way of determining profitability for distribution subsector market participants.

Among the nations examined, there is variety in the rules governing tariff-setting. Restructuring, particularly through the establishment of competition in generation and power pooling arrangements, has facilitated a change in the structure of generation prices. Cost-based approaches have yielded to more market-oriented prices.

Exhibit 2-18
Regulatory Bodies and their Responsibilities

| Country | Regulatory Body | | Responsibilities |
|-------------|-----------------------------|--|--|
| Argentina | ENRE ¹ | Ente Nacional Regulador de Electricidad (National Electricity Regulatory Entity) | Tariff calculations and approvals; licenses; technical specifications; politically independent. |
| Bolivia | Superintendent ² | Electricity Sector Superintendent | Guard against monopoly power; tariff approval. |
| Chile | CNE ³ | Comisión Nacional de Energía (National Energy Commission) | Tariff calculations; licenses; technical specifications; jurisdiction over disputes. |
| El Salvador | CREH ⁴ | Comisión Regulador de Electricidad y Hidrocarburos (Electricity and Fuels Regulatory Commission) | Tariff calculations; compliance of sector participants; formulation of regulations. |
| Hungary | MEH | Hungarian Energy Office | Licenses; wheeling tariffs. |
| Nicaragua | INE ⁵ | Instituto Nicaragüense de Energía Nicaraguan Energy Institute | Tariff calculations; licenses; expansion planning; politically independent. |
| Philippines | ERB ⁶ | Energy Regulatory Board | Tariff calculations and approvals; integrated resource planning; bid evaluation; prevent monopoly power. |
| Poland | ERA ⁷ | Energy Regulatory Authority | Issue Licenses, approve resource plans, approve tariffs. |
| Portugal | DGE | Electricity Sector Regulatory Body at the Energy Ministry | Tariff calculations; general oversight. |
| Sweden | NUTEK | Price Control Board | Tariff calculations; general oversight. |
| U.K. | OFFER | Office for Electricity Regulation | Tariff calculations and approval; licenses; general oversight and guard against monopoly power. |

Notes

- ¹ ENRE regulates the electricity sector in conjunction with the Secretary of Energy. CAMMESA, the Wholesale Electricity Market Administrative Company, administers the transmission grid and the bulk power pool.
- ² The Superintendent of the electricity sector has not yet been appointed, though will be by 1996.
- ³ The CNE regulates the electricity sector in conjunction with the Superintendent for Electricity and Fuels, the Ministry of Economy, the Ministry of Planning, and municipalities.
- ⁴ The El Salvadorean National Assembly is currently debating proposals for power sector restructuring. Along with the CREH, it is proposed that a Comisión Nacional de Energía (National Energy Commission) be formed to coordinate electricity sector planning, functionality, and policy.
- ⁵ INE regulates the electricity sector. The National Commission on Energy Prices approves tariffs.
- ⁶ The ERB regulates the electricity sector in conjunction with the government's Department of Energy.

⁷ The ERA will be formed upon passage of the Energy Law presently under discussion by the government.

There is also some variety in the regulation of distribution utilities from country to country. This includes such areas as whether distributor-owned generation is permitted, open access provisions, standards of performance and methods for fostering competition in the distribution subsector (e.g., bidding for the distribution franchise).

For illustrative purposes, some of the regulations governing distribution subsector functionality and tariff determination are explained below for Nicaragua, Chile and Argentina.

In Nicaragua, it is contemplated that distribution companies will be permitted to invest in their own generation facilities up to a capacity of 10 MW, while regulations to facilitate competition in the distribution sector are presently under development. This limited vertical reintegration is allowed for purposes of enhancing competition in generation and to add needed capacity.

In Chile, the distribution market is divided into two market segments; the regulated and unregulated segments. All customers with a demand below two MW must pay regulated rates for electricity from their local distribution company while others are free to negotiate directly with generators. Distribution tariffs for the regulated franchise market are calculated based on the electricity value for generation and transmission at the “node” of the transmission system where the distributor receives power. To this is added a “Value Added of Distribution” (VAD) which includes the cost of investment, operation, maintenance, losses, and the fixed costs of administration, billing, and customer service. The VAD is calculated by CNE by use of a computer simulation of a “model firm”. Tariffs are then determined to bring distribution entities a forecast profitability of between six and fourteen percent.

Argentinean distribution companies are regulated monopolies with exclusive franchise rights, and obligations to serve, as set out in their concession agreements. Penalties are imposed for failing to supply as well as for poor power quality. The quality of delivered power must be within certain voltage, frequency, and interruption specifications. Distribution companies must contract for power in long term contracts with generators and purchase other requirements from the pool at spot market rates.

Similar to Chile, there is an unregulated end-user market segment in Argentina though it is for consumers whose peak consumption is greater than 100-kW. Unregulated market contracts must be made public. In the regulated franchise market, distributors are entitled to recover their costs (network expansion, O&M, commercial activities, and power purchases) and a reasonable profit.

Distribution Tariffs in Argentina: The Regulated Market

Tariffs for the regulated segment of the distribution subsector are set by the regulatory body, ENRE. They vary by customer category (residential, commercial, industrial) and are formed by three components:

- ▶ **The Wholesale Cost of Electricity.** Distribution companies purchase electricity in long-term contracts (8 years, typically 60 percent of total energy) or from the pool (typically 40 percent of total energy). The Seasonal Market Price is used for tariff calculations. It is set by the power pool administrating body, Cammesa, and is a measure of the Wholesale Cost of Electricity. It includes costs of energy and capacity on the system, plus the costs of connection and transmission, and is adjusted every six months. Technical losses of 11 percent are recognized in these costs, and are passed through to customers.
- ▶ **A Distribution Margin.** This is the value added by distribution. It includes the cost of distribution and a "reasonable" return to distributors. This figure is fixed by ENRE for the first ten years of a concession period, and then revised for every subsequent 5-year period.
- ▶ **Taxes.** Distributors are liable for all national taxes. In addition, distributors pay the National Electricity Fund tax that subsidizes electricity supply and grid extension in rural areas.

Tariffs are calculated in US dollars and converted to local currency at the time of billing.

In Argentina, distribution licenses last for 95 years and are divided into nine management periods (15 years for the first and ten years each for each of the remaining periods). Six months before the expiration of a management period, ENRE will invite tenders for the license for the next management period, while at the same time announcing distribution charges for the next five years. The current licensee has the option of keeping the license or being paid the highest bid for the next period. This is intended to eliminate complaints about distribution charges and to add competition into the determination of distribution licenses.

Restructuring has resulted in major changes in the regulation, management and operation of the distribution subsector. The next section of this report examines the factors and objectives that have been responsible for driving the restructuring process.

2.3 FACTORS ENCOURAGING DISTRIBUTION RESTRUCTURING

Power sector restructuring has been driven by a set of factors. In some cases, especially for the developing nations, distribution subsector problems were prominent among them. For the developing countries, the need to reduce losses (both commercial and technical), the inability of existing institutions to attract investment, the need for clear separation of the state's regulatory and commercial roles, and the demonopolization of the subsector to encourage competition were the primary drivers for restructuring. In the developed nations, the enhancement of competition in generation has been the primary goals. Addressing these issues aimed to facilitate greater sector resource-use efficiency, reduced energy costs, and improvements in the provision of electrical energy services.

It should also be noted that for most of the developing nations studied, the recommendations, support, and lending conditionality of bi- and multi-lateral lending institutions, such as the World Bank, have been important drivers of restructuring.

Exhibit 2-19
Major Objectives for Distribution Subsector Restructuring

| Country | Enhance Competition in Generation | Commercialization/ Attract Investment | Improve Sector Regulation | Decentralization of Political Control | Public Sector Self-Off | Encourage Distribution Utility Competition |
|-------------|-----------------------------------|---------------------------------------|---------------------------|---------------------------------------|------------------------|--|
| Argentina | 3 | 1 | 2 | 3 | 2 | 2 |
| Bolivia | 1 | | 1 | 3 | 3 | 2 |
| Chile | 2 | 3 | 3 | 1 | 1 | |
| El Salvador | 2 | 2 | 2 | | 1 | |
| Hungary | 1 | 2 | 2 | 3 | 1 | 3 |
| Nicaragua | 1 | 1 | 1 | 3 | 3 | 1 |
| Philippines | 1 | 1 | 3 | 3 | 1 | 3 |
| Poland | 1 | 1 | 1 | | | |
| Portugal | 2 | 2 | 2 | 3 | | 3 |
| Sweden | 1 | | 2 | | | 1 |
| U.K. | 1 | 1 | 1 | 3 | 1 | 1 |

Importance of Objectives:

1 Primary
 2 Secondary
 3 Tertiary
 Unimportant

2.3.1 Improve the Commercialization of the Distribution Subsector

Separating distribution from generation and transmission has been motivated so as to improve the commercialization of electricity by the distribution subsector. In fully-integrated power systems, the organizational and management structure governing the distribution subsector may not be able, or have appropriate incentives, to devote its full attention to the problems in the subsector. Even the personnel involved primarily in distribution-related activities may not have the authority to address the specific problems seen in the distribution subsector and there may be little incentive for them to attempt to find innovative ways of improving performance.

An example of this can be seen with the handling of technical and commercial losses. In Buenos Aires, losses (both technical and commercial) on the distribution side were estimated at 26 percent of total generation; in Nicaragua, the figure was 22 percent. In both countries electricity theft was largely responsible for these higher-than-normal losses. Separation of the distribution subsector was used to better “internalize” the need for pursuing loss reduction strategies and take responsibility and action to do so. By severing the ownership and managerial relationships between distribution and generation and transmission, the responsibility for controlling costs and increasing revenues from distribution-related activities became clearer. Furthermore, privatization and regulation created incentives for loss reduction as profitability depended on it. The distribution subsector could not rely on hidden subsidies and “opaque” cost accounting to keep the subsector afloat financially. Separating distribution allowed the managerial and technical staff to focus exclusively on the task of distributing and commercializing electricity.

Restructuring has helped to establish distribution entities whose costs of operation are more easy to identify, and better understood. This facilitates improved subsector management and planning, as well as facilitating regulation. With improved financial and operational management, distribution companies are more likely to be able to build-up financial reserves for self-financing. In addition, with improved commercialization perceived risk on the part of potential joint venture partners and other investors is reduced.

Thus, commercialization of the distribution subsector facilitates investment. In Argentina, Bolivia, Chile, El Salvador, Hungary, Nicaragua, the Philippines, Poland, Portugal, and the UK, a primary goal of restructuring has been to attract capital from new sources so that existing equipment could be upgraded and new infrastructure installed. Commercialization helps accomplish this.

Distribution Fighting Losses in Argentina

Since restructuring and privatization in September 1992, two of the new distribution companies operating in the Greater Buenos Aires area of Argentina, Edesur and Edenor, have made important reductions in losses.

Between 1991 and 1994, Edesur reduced losses from 25 percent to 18 percent, while over the same period Edenor has cut losses from 30 percent to 20 percent. Losses continue to fall and are expected to drop to below 10 percent by the year 2000.

In 1993 47 percent of Edesur's losses were considered "technical losses", while 53 percent were considered "non-technical losses". This means that technical losses accounted for 10 percent of total electricity distributed, and non-technical losses accounted for 12 percent. Technical losses are the natural losses incurred in the transportation of electrical energy and, until newer technology can be installed, technical losses of nine percent are considered reasonable for the vintage of equipment in Buenos Aires. Non-technical losses are caused by theft, fraud, non-payment of bills, and other administrative problems. For Edesur, theft alone accounts for 33 percent of all losses.

The regulatory framework in force allows Edesur to "pass through" only 11 percent as losses. So even though Edesur's losses have been dropping steadily since privatization seven percent of its electricity purchases in 1994 had to be paid for by the company, as no revenues were collected to cover them. Understandably, major efforts are being undertaken to continue loss reduction so that Edesur can achieve improved profitability.

2.3.2 Clarify the Regulatory/Policy and Commercial/Operational Role of the State

Separating the state's regulatory and operational roles in the power sector to remove any contradictory or politicizing government role from the daily operation of the power sector has been a major restructuring objective in all of the countries studied.

Public ownership of the distribution subsector has often led to conflict between the state's goals for the commercial operation of the subsector and the goals of the state's regulatory and policy roles. When one state monopoly organization sets policy, self-regulates, and at the same time operates an enterprise, there can be great difficulty in separating and reconciling regulatory and policy objectives from commercial objectives. Often the results are contradictory objectives and responsibilities, and a lack of clarity in operational focus.

These contradictions are typically seen in the tariff-setting process. Before restructuring in Nicaragua tariffs had been held by the government at levels insufficient to cover even fuel purchases. Political interference in tariff-setting was seen in Chile and Argentina before restructuring. In each instance, self-financing for state-owned utilities was made difficult. Subsidies were required to meet the day-to-day operational costs, leaving insufficient investment for rehabilitation, maintenance and system expansion. In addition, low tariffs sent

price signals has stimulated poor end-use efficiency thereby further exacerbating problems in the energy sector (supply shortages, overloaded infrastructure, bad power quality).

In every country studied, a primary objective of restructuring has been the clarification of the state's role in the power sector. In every case the state has withdrawn from direct commercial operation and has focused its efforts on sector regulation and the determination of broad policy. In turn, corporatization has strived to create an environment in which the utilities are free to operate with greater market-orientation and free of political interference. The state has withdrawn from the day-to-day operation of power sectors and concentrated on the extremely important tasks of effective sector regulation and broad policy determination. This is demonstrated by Exhibit 2-17.

2.3.3 Demonopolization of the Power Sector

Power sector demonopolization entails the opening of the industry from a structure in which one enterprise holds all rights and responsibilities to a situation where multiple entities participate. In all of the countries studied demonopolization has occurred in generation and distribution.

In the study countries, demonopolization of the distribution subsector was achieved by separating it from generation and transmission and disaggregating the subsector horizontally. This new industry structure facilitates the attainment of restructuring objectives in a variety of ways.

Demonopolization facilitates private participation in the power sector. It permits industry to self-generate and sell excess power to the national grid or other users. Furthermore, demonopolization and disaggregation makes for smaller entities with smaller asset values and liabilities that can more easily be privatized as lower investment amounts are required for their purchase.

Demonopolization permits "benchmark" competition between distribution utilities. With several distribution utilities operating independently regulators can gauge the extent to which one utility is outperforming another in its operations. Benchmark competition combined with a performance-based regulatory scheme can lead to improvements in efficiency and encourage unique solutions to the problems of the subsector (such as how to reduce losses). Further, expanding the role of the private sector either through privatization of a distribution utility or through the outsourcing of certain activities can also help stimulate benchmark competition.

Power sector demonopolization is beneficial in that it forces a decentralization in the management of the sector. The management of the power sector in vertically integrated power systems is often heavily centralized. Decisions, including those related to investment,

are made by a central management authority that may not effectively use information from outside of the centralized management structure. As a result, decisions made in this way may be based on less-than-perfect information. Demonopolization of the subsectors of the power sector allows for the decentralization of management decision-making. This helps improve the quality of the managerial process by facilitating better understanding of the factors affecting decisions, and thus allowing management to better tailor its activities to local conditions.

The degree to which a power sector is disaggregated in a process of power sector demonopolization, does however, have limits. Splitting the distribution subsector into too many separate utilities can be counterproductive as scale economies are lost.

2.3.4 Privatization

In some countries, an increased role for the private sector and privatization have been major objectives of power sector reform. Broadly speaking, there are four perceived benefits of privatization:

- ▶ privatization and private participation allow new sources of investment to flow to the sector.
- ▶ privatization can be a method to gain monies for the public sector through a one-time sell-off of public sector assets;
- ▶ privatization can reduce or avoid altogether any public sector subsidies to the power sector;
- ▶ privatization introduces greater market orientation into the operation and management of a company or stated differently, privatization avoids the perceived inefficiencies associated with public sector ownership; in some cases (such as Russia), privatization has been used to effect a change in senior management at an organization.

In countries such as Chile, the UK and Bolivia, privatization of the power sector was, and still remains, an important objective. Bolivia intends to use the monies earned from privatization to establish a pension fund for Bolivians. In Chile, privatization was used for financial reasons including the state's perception that the power sector needed at least \$200 million annually to meet its requirements. However, there was also a political objective to dramatically break with the past state interventionist economic practices and to encourage "popular capitalism" by distributing shares to the populace. In the UK, privatization of the distribution subsector (as well as most of the power sector with the exception of nuclear generation) was used as a way to gain funds from a one-time sale of assets and to improve the efficiency of the distribution subsector. In the case of the UK, productivity has risen sharply in the distribution subsector due in part to significant workforce reductions.

In countries that have privatized, the spin-off and break-up of distribution assets allowed for the division of liabilities and can lead to greater transparency of distribution subsector finances (such as more clearly identifying the source of financial losses).

Experience shows, however, that private capital will only be forthcoming where investment risk is clearly understood. A solid regulatory framework with defined procedures, and transparency in decision-making greatly improves any chances of private participation. By accomplishing this, the study countries have facilitated restructuring objectives for privatization and have attracted private investment.

2.3.5 Encouraging Competition in Generation

Encouraging competition in generation was a major motivation for reform in Argentina, Bolivia, Chile, El Salvador, Hungary, Nicaragua, the Philippines, Poland, Portugal, Sweden, and the UK. It has also been a major motivator for reform in other countries undergoing restructuring such as Australia and New Zealand. For these nations, unless distribution was already handled by separate distribution utilities (which was the case in the UK, Sweden and New Zealand), the distribution subsector was separated from generation and transmission to facilitate this introduction of competition in distribution.

The direct retail access by large electricity consumers to bulk power purchases from the transmission grid may also add competitive pressures to the competitive generation market.

2.4 SUMMARY OF EVALUATIONS ON DISTRIBUTION RESTRUCTURING

Most of the information available on the evaluation of the results of distribution subsector restructuring is descriptive. The evaluations of power sector restructuring tend to focus on the bulk power side of the industry (generation and transmission). This is understandable as the creation of competitive bulk power markets has been a driver underlying much of the restructuring undertaken to date.

Distribution is often overlooked in discussions of power sector reform when such reform is focused on increasing competition in generation. In the developed nations this is understandable as the distribution subsector is rarely a major source of inefficiency or other fundamental power sector problem. In stark contrast, within developing nations problems of the power sector can often be traced to the distribution subsector. Electricity theft, inadequate attention to consumers, poorly maintained and overloaded distribution infrastructure are some such problems.

Given the importance of the distribution sector in many developing nations, it is unfortunate that little detailed evaluation of distribution subsector restructuring experience has been made. What has been identified discusses experiences in Chile and Argentina. Highlights of these evaluations are found below. More complete evaluations, particularly of Chile and Argentina, are included in the Appendix.

2.4.1 Distribution Separation in Chile

An evaluation of Chile's largest distribution company, Enersis, was recently commissioned by the World Bank (Galal, 1994). The study evaluated the company's performance from 1981, when it was separated from generation and transmission and corporatized, through its divestiture in 1986 and up to the early 1990s.

The study concluded that divestiture facilitated a significant reduction in electricity losses due to theft, from a high of 22.4 percent in 1983 to a low of 14.2 percent in 1989. Losses were reduced faster under private ownership than under state ownership and are expected to be reduced to 12.5 percent in the medium term. In addition, the report concludes that as regulated tariffs in Chile are in part derived from actual losses, then tariffs would have been higher had divestiture not occurred.

Also accompanying corporatization were increased public and private profitability as well as improved labor and capital productivity, with gains being greater after divestiture. The number of employees working for Enersis increased since privatization, contrary to expectations that divestment would mean a reduction in the workforce. Since divestiture, particularly since 1989, the company has invested in extremely profitable nonoperating assets which have boosted profitability.

Other conclusions stemming from the evaluation are that “divesting monopolies in well-regulated markets limits their ability to exercise their market power and improves resource allocation,” although “reforming and regulating public enterprises improves efficiency.” On balance though, for the case of Enersis, “the net benefits of divestiture accompanied by effective regulation can outweigh the net benefits from reforming and regulating public enterprises.”

2.4.2 Distribution Separation in Argentina

An evaluation of the Argentinean reforms (Perez-Arriaga, 1994) includes the results of two well informed Argentinean studies, which reached opposite conclusions. Though empirical evidence is certainly lacking (very little time has passed since the reforms), the paper does reach some general conclusions.

Positive aspects of the reforms in Argentina are that political interference in the power sector has been reduced, there is a new competitive atmosphere including a quest for economic efficiency, investment has been stimulated, and the diversity of market agents makes it difficult to exercise market power.

On the other hand, it was concluded that technical regulation is complex and has not been finalized, there has been no hoped-for reduction in electricity prices, that new regulation does not encourage energy conservation or load management, and that the roles of ENRE, CAMMESA, and the Secretary of State for Energy still need to be adjusted to minimize political interference.

Analysis of Argentinian power sector reform by other experts has resulted in the expression of concern on the apparent lack of prohibition on ownership of both distribution and generation assets. Share ownership of distribution companies by holding companies that also own generation assets, or even directly by generating companies, would allow a return to vertical integration and affect competition in bulk power markets.

2.4.3 Evaluation in Perspective

When reviewing the results of the evaluation of any restructuring, it should be noted that reviewers may criticize a restructuring effort for its failure to achieve specific results that are considered to be of importance to the evaluator. However, it has also been the case that the metric being used by the evaluator may not have been an explicit objective set by policy makers for the restructuring. For instance, in the UK, the restructuring and privatization of the power sector has been criticized by some reviewers for failing to encourage utility-sponsored activities to promote energy efficiency. Although energy efficiency is no doubt a worthy objective, encouraging utility-sponsorship of energy efficiency was not a specific target of the UK restructuring. Improved pricing was felt to be the appropriate driver for energy efficiency. Therefore, interpreting the results of any evaluation should include an

examination of all important aspects including the extent to which the restructuring achieved its originally expected results. The next chapter of the report examines the lessons that can be learned from the experience with distribution subsector restructuring.

CHAPTER 3

LESSONS LEARNED

3.1 INTRODUCTION

The recent power sector restructuring trend began in Chile in the late 1970s. For Latin America, this started a reversal of the power sector vertical integration and state-ownership that occurred in the 1950s. Since the Chilean restructuring and privatization, and particularly since the overhaul of the UK's power sector in 1990, there has been a rising tide of power sector restructuring worldwide.

This report has surveyed available information in the restructuring literature with special attention to the structure, ownership, and regulation of the distribution subsector. In the following some of the major trends that have emerged are indicated, along with general lessons learned.

3.2 TRENDS IN RESTRUCTURING

3.2.1 Trajectory: Horizontal and Vertical Division and Privatization

It is clear that the trajectory of restructuring is towards vertical and horizontal division of the power sector. To promote competition in bulk power markets, existing generation assets have been divided and new capacity is being constructed by new players. Transmission assets have been recognized as being of great strategic importance in the power sectors. It has been common for all transmission infrastructure to be consolidated and managed by one organization, though in some countries transmission assets are still owned in common by other power sector enterprises.

Horizontal division, or break-up, of the distribution subsector has accompanied these changes on the bulk power side of the market. Where distribution entities have not been spun-off from generation and transmission, it is because they were traditionally independent anyway. In none of the countries examined have any distribution assets been absorbed by an enterprise that operates generation or transmission, though common share holding has occurred in some countries.

Accompanying vertical and horizontal break-up of integrated power sectors has been significant ownership change. Ownership has shifted from public to predominantly private, though with great variety in ownership structure between countries. This change in ownership

has occurred in all areas of the power sector. Increased private participation has been motivated by the search for improved sector efficiency, access to new sources of financing, and for other reasons.

The restructuring process has been long in some nations (12 years in Chile, and much faster in others). It has depended on the size of the sector and the degree of break-up and divestiture contemplated. More time has been required for the inclusion of public debate to build confidence in and consensus for reform as well as to avoid potentially costly errors. In some countries restructuring has perhaps taken too much time, resulting in ongoing situations where serious power sector problems have been left to devastate national economies and cause severe social problems.

Different problems in the power sector have focused varying degrees of emphasis on various aspects of reform. If low generator availability and efficiency drove reform then emphasis was placed by policy makers on maximizing generation competition through the use of new participants, reformed pooling arrangements and direct access. If high losses in distribution circuits and electricity theft by end-users were identified as the most significant problems of the power sector, then efforts were directed accordingly. If access to financing for infrastructure upgrading and capacity expansion was constrained then reform was directed at gaining access to new sources.

Due to the fact that separation of distribution assets from generation and transmission has taken place within the context of entire power sector restructuring, and that restructuring has been implemented for multiple reasons, it is difficult to disaggregate the effects that particular distribution subsector problems alone have had on restructuring of the entire power sector. Nevertheless, the separation of distribution assets appears to have been implemented for two major reasons: first, so that distribution subsector problems could be isolated and addressed directly, and second, to facilitate the functional independence of generation and the neutrality of transmission with the goal of bringing competition to bulk power markets.

To conclude, the separation of distribution has been driven by a complex web of reasons. Nevertheless, no matter how slight the restructuring proposal, distribution spin-off has been implemented and separate distribution institutions maintained.

3.2.2 Horizontal Breakup of Distribution

When considering the breakup of vertically-integrated distribution assets, none of the nations presented in this report grouped all distribution assets in one enterprise. The branching logic of the transmission system and distribution systems themselves suggest “natural” divisions in the structure of the distribution subsector. In the countries studied there are between four and 300 distribution enterprises.

The restructuring experiences examined in this report have all had the establishment of competition as a reform objective. This has been most important for the generation subsector. The distribution subsector, however, has also been the target of regulation to stimulate competition. This has been carried out by the division of the distribution subsector and by the implementation of innovative rules on distribution concessions, direct access, tariff design and the encouragement of self-generation.

With distribution assets now held in private hands, new regulatory frameworks now use rules that facilitate competition. These regulations are intended to preempt the exercise of monopoly power by private owners of distribution subsector assets. To further limit the exercise of monopoly power in the generation subsector, distribution subsectors have been divided to create markets for the purchase of bulk power.

To form these distribution companies, distribution assets have been split along regional lines. They have been divided according to the logic of the branching of distribution power lines, which usually follow differences in population density, political administration, and geographic land-form. These “natural” divisions, and in some cases limits to economies of scale (for example, for cases of grids remote from a nation’s main interconnected system) have served as the boundaries of the new distribution subsector enterprises.

When designing the division of the distribution subsector, particularly in a country where limited resources mean a shortage of qualified administrators and technicians, policy makers have been careful not to establish an excessive number of distribution companies. This could have resulted in inadequate administrative and technical capacity in the new companies and doom a new distribution company to commercial failure right from the start. Furthermore, too small a size for a distribution company may be unable to capture scale economies.

To avoid such problems, regional differences in distribution subsector operations, maintenance, and administrative costs were given serious consideration by policy makers when formulating the break-up of the distribution subsector.

3.2.3 Separation of Regulatory/Policy and Commercial/Operational Functions

Accompanying the vertical and horizontal disaggregation and dramatic changes in ownership, a major aspect of reform has been the establishment of a relatively independent regulatory function. Regulatory bodies have been established as the regulatory representative of the national government in the power sector. Such agencies perform the regulatory functions of the state, and insulate commercial power sector enterprises from day-to-day political interference and other forms of state control. Commercial enterprises are thus able to concentrate on operational efficiency within the clear regulatory environment maintained by the regulatory body. Importantly, by assuring stable and transparent “rules of the game” for the power sector the regulatory body gives confidence to private investors and thereby facilitates financing for the power sector. Despite the creation of these relatively independent

regulatory bodies, national government's and ministries continue to determine broad power sector policy.

A major responsibility of the regulatory body is the execution of tariff studies or their approval. In some countries, the regulatory body acts more autonomously and may make final tariff approval. In others, the regulatory body submits its recommended tariff proposals to higher authority in the national government. In Chile, for instance, the Minister of Economy can refuse to approve tariffs submitted by the regulatory body, but only if certain conditions are believed to have been violated by the regulatory body. If the Minister refuses to approve, there is an automatic appeal to the judiciary and the judiciary will decide whether the Minister correctly withheld approval.

In many of the countries examined, electricity price reform has accompanied restructuring. In these countries electricity tariffs now more generally correlate with the long run marginal costs of electricity production and supply. This has allowed for an appropriate valuation of electricity relative to other factors of production, and has facilitated efficiency. Furthermore, such a tariff level is invaluable if the power sector is to attract the financing required for investment in infrastructure upkeep and expansion. Without reasonable revenue streams, banks and other private investors will not risk financial commitments or if they do so, there will be a very high risk premium or requirements for guarantees.

By withdrawing all regulatory/policy functions from power sector enterprises utilities are now able to focus on their commercial/operational activities. At the same time, efficient power sector enterprise operation has been facilitated by utility corporatization and improvements in commercialization. Corporatization has involved the establishment of new organizational structures and objectives for power sector enterprises, as well as the clarification of the responsibilities of management and owners. To complement the benefits of corporatization, improvements in commercialization have meant better control of costs, increased revenues, and more efficient management of power sector enterprises.

3.3 LESSONS LEARNED

Having examined power sector restructuring in several countries, the major lessons from this experience include:

- ▶ Even in relatively small countries in crisis conditions, power sector restructuring, that includes the complete institutional separation and commercialization of distribution enterprises, has been undertaken. It is only necessary to examine the experience of Nicaragua to understand that restructuring is a way to address a crisis in the power sector. Further, increasing centralization of the power sector under direct government control has not been viewed as a solution in any of the study countries.

- ▶ The major factors that have driven restructuring in developing nations include:
 - higher-than-normal losses (both commercial and technical);
 - poor financial viability of the power sector;
 - political interference in the management and operation of the power sector that has contributed to tariffs being insufficient to cover the costs of the power system;
 - a lack of financing to rehabilitate a dilapidated system and meet new supply requirements;
 - a lack of a commercial orientation in the operation of the power sector including an investment decision-making process that does not necessarily prioritize investments in accordance with economic criteria;
 - an inability to meet the basic electricity supply requirements of consumers.

- ▶ For the study countries, restructuring that has included power sector corporatization, commercialization, and the establishment of clear regulation has been effective in addressing each of the problems identified above. Further, restructuring has “across-the-board” met with the support of private investors and multi-lateral financing bodies such as the World Bank, and in fact has been supported with significant financial commitments.

- ▶ Those countries that have restructured and established a transparent regulatory process based on sound economic principles and concepts of regulatory autonomy have successfully gained access to investment on reasonable terms.

- ▶ An increased role for the private sector and privatization have been important components of restructuring and have occurred in all study countries. Although vertical disintegration of a state-owned enterprise is better than the status quo, private participation can be a significant driver of improved efficiency and investment. Private participation includes total or partial privatization, joint ventures with private firms, private participation in generation or grid interconnection, or outsourcing of specific utility functions.

- ▶ Regulatory reform must be undertaken in concert with restructuring. The importance of sound economic regulation of natural monopoly functions especially using performance-based approaches will help to spur efficiency gains for the power sector.

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COUNTRY DATA**

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A. ARGENTINA

A.1 Summary

Argentinean electricity sector reform has meant a major overhaul of the nation's power sector. The 15,700-MW capacity power sector was wholly state-owned until the beginning of the 1990s. It was characterized by low generation availability, political interference in tariff setting and operation, and extremely high losses in much of the nation's distribution subsector. Distribution losses reached 30% in much of the capital, Buenos Aires.

Restructuring has involved the split-up of state-owned assets according to function and region, quickly followed by privatization. Generation, transmission, dispatch, distribution, and regulation are now performed by separate entities. There are now more than 30 private generation companies, an independent entity that manages the transmission grid and determines dispatch, 22 distribution companies, and a new regulatory body called ENRE. The distribution subsector is managed according to innovative regulations on power purchases, concessions, and tariffs. The primary goals of restructuring were the creation of a bulk power market based on marginal production costs, privatization, and general efficiency gains for all parts of the sector.

A.2 Power Sector Organization

The installed capacity for the nation is 15,700MW. Of this, 6,200MW is hydroelectric, 1,018MW is nuclear, 5,070MW is oil-fired, 2,138MW is gas-fired, and 405MW uses coal or lignite.

Restructuring Period

The restructuring process began in 1991 and continues with the sale of generation, transmission, and distribution assets. As much as 8,000 MW remains to be sold to the private sector, including the 2,700 MW Yacireta hydroelectric project which is presently under construction.

After Restructuring

Reform of the Argentinean power sector started in 1991 with the introduction of the wholesale electric power market (WEEM). WEEM is administered by CAMMESA who manages the pool. WEEM's management board is made up of the Energy Secretary and four representatives of each market participant group: generators, distributors, transmission companies, and large customers with a demand exceeding five MW. A regulatory body, ENRE, was established to set tariffs for distribution companies, award licences and protect consumers.

The former state-owned utilities SEGBA, AyE, and Hidronor were split and much of their assets sold. Restructuring was based on the disaggregation of generation, transmission and distribution activities into separate companies and then selling their shares by open competitive tender in which foreign and domestic investors competed on an equal footing.

The reform has been based on the electricity sector restructuring and privatizations of both the UK and Chile.

Competition has been introduced to generation, while transmission and distribution remain monopolies. Transmission and distribution have been established as public services and as such are considered regulated monopolies. Nevertheless, some innovative regulatory rules attempt to introduce competition into distribution and transmission activities.

Distribution companies operate under a license and have regulated tariffs, while both transmission and distribution can be performed by any company with the proper concession and which is granted under a public bidding process.

Electric utilities and private companies are free to sign supply deals with distribution companies, large end-users and other private companies, and to negotiate the terms. The minimum effective period of such a contract may not be shorter than two six-month settlement periods for distributors. In addition, these contracts must be made public. A generating utility may not contract for power it is not able to generate from its own capacity. Consumers wanting to buy directly from a generating utility must contract for at least 50 percent of their anticipated demand with such a utility and have a peak demand greater than 100-kW. When distributors contract for more than 60 percent of their planned demand, they must purchase the remaining share of energy from the spot market at pool prices.

Transmission companies and distribution companies are required to provide open access to third parties after publishing relevant rates, though transmission companies may neither buy nor sell electricity. Distribution companies, power producers, private power companies, and industrials may not own transmission facilities. Distributors buy electricity with transmission charges calculated from the load center to the bulk power supply point on their network.

A.3 Why Restructure the Power Sector?

Electricity sector restructuring and privatization was part of a broad plan by the Menem government to privatize public commercial undertakings. These policies are founded on a new conception of the role of the state in the industrial sector.

Problems Pushing Restructuring

The following problems have been identified as contributing to the decision to restructure and privatize:

- ▶ Excessive government interference in the electricity sector. The government planned excess capacity, but serious delays in construction and poor management resulted in low plant availability and consequent power shortages.
- ▶ The power sector found itself in a critical financial situation as a result of government interference to keep tariffs artificially low.
- ▶ There were cross subsidies to the electricity sector that were economically inefficient.

Objectives of Reform

Reform was implemented so as to promote:

- ▶ Competition and to attract private investment to ensure reliable power supply in the long term.
- ▶ Free, non-discriminatory access to transmission and distribution facilities.
- ▶ Private sector involvement in power generation, transmission, and distribution.
- ▶ Fair and reasonable rates and protection for end-users. Tariffs were to be based in conformance with marginal cost pricing.
- ▶ The entrance of private capital to the sector within a well defined and competitive framework.
- ▶ Enhance economic efficiency, encourage investment and improve plant availability.
- ▶ A limitation of the government role to that of the regulation of tariffs, promotion of efficiency and the protection of consumers.

A.4 Distribution Sector After Restructuring

There are more than twenty distribution companies operating in Argentina. Of these, three are privately-owned and the rest are publicly-held, either by municipal, state, or national governments. Although there are only three privately-held distribution companies, they represent a significant share of the market. The following table shows the new structure of the distribution subsector:

Exhibit A-1
Argentinean Distribution Companies Post-Restructuring

| Type of Company | Number | Market Share |
|-----------------|--------|--------------|
| Private | 3 | 50 percent |
| Public | 16 | 47 percent |
| National | 2 | 3 percent |

Source: (Perez-Arriaga, 1994)

There are three distribution utilities that have been privatized; they are EDENOR, EDESUR, and EDELAP. The major problems of power theft and losses are being addressed. EDESUR has embarked on a program of meter repairs at industrial sites and the installation of special transformers that shut down upon the detection of illegal connections. In addition, the municipal government of Buenos Aires has agreed to pay for the electricity used by a large shanty town. These measures should reduce losses and lead to an annual revenue boost of US\$3 million. On top of these measures consumers have been reclassified to assure that appropriate charges for electricity are made. At the same time, deals are being negotiated with consumers that owe back-payments. EDESUR's losses have dropped from the 25.9 percent before restructuring and privatisation in 1991 to 18.7 percent in 1994; it is expected that losses will be further reduced to below the nine percent mark within five years.

Distribution companies are regulated monopolies with exclusive franchise rights and an obligation to serve. Penalties for failing to supply are imposed. Electricity service quality must be within certain voltage, frequency, and interruption specifications. Customers receive tariff discounts if power quality falls outside of these specifications. Distribution companies must expand their facilities when needed to meet their license obligations, while the government acts as distributor of last resort to areas where private capital is not investing.

The distribution obligation to serve is not related to the availability of energy in the bulk power market. Distribution companies must contract for power in long term contracts. Eventually, this may result in the participation of distribution companies in the generation market.

In the regulated distribution market, distributors are entitled to recover their costs (network expansion, O&M, commercial activities, and power purchases) as well as a reasonable profit. Tariffs are determined based on two components including the wholesale electricity price at the corresponding node on the transmission grid and the distribution charge (value added by distribution).

Distribution licences last for 95 years and are divided into nine management periods (15 years for the first and ten years for each of the remaining periods). Six months before the

expiration of a management period ENRE will invite tenders for the license for the next management period, and will announce the distribution charges for the next five years. The current licensee has the option of keeping the license or being paid the highest bid for the next period. This is intended to eliminate complaints about distribution charges and to add competition into the determination of distribution licenses.

The three privatized utilities still have minority state-ownership of 39 percent, which will eventually be sold off in a public offering. The companies have allowed for ten percent employee ownership, while their controlling stakes are held by consortiums that include Argentinean, Chilean, US, and Spanish investors.

A.5 Evaluation of Restructuring

It is perhaps too early for any definitive assessments, as empirical evidence is lacking. Nevertheless, two studies by local experts have been carried out, and they reached different conclusions. Despite these contradictory results, some preliminary conclusions can be made about the reforms to date:

Positive aspects of the reforms are the following:

- ▶ Political interference in the power sector has been reduced;
- ▶ System operational performance has improved;
- ▶ Generation availability has improved;
- ▶ There is a new competitive atmosphere and a quest for economic efficiency;
- ▶ There is encouraging investment activity;
- ▶ The diversity of market agents makes it difficult to exercise market power;

On the other hand, the following negative aspects have also been identified:

- ▶ There has been no discernable improvement in the performance of the distribution sector;
- ▶ Technical regulation is complex and has not been finalized;
- ▶ There has been no hoped-for reduction in electricity prices;
- ▶ New regulation does not encourage energy conservation or load management;
- ▶ The roles of ENRE, CAMMESA and the Secretary of State for Energy still need to be adjusted to minimize political interference.
- ▶ There has been concern on the lack of regulations on vertical integration of ownership in the power sector. Generators, or holding companies owning generation assets, appear able to purchase distribution assets.

B. BOLIVIA

B.1 Summary

Restructuring of the Bolivia's 849-MW electricity sector began in 1994 with legislation that paved the way for the split-up and privatization of ENDE, the state-owned vertically-integrated power utility. Fifty percent of ENDE's generation assets were won in a competitive solicitation by three US companies; the companies also have a management contract and have pledged to invest US\$140 million over the next seven years as part of a capitalization program. Proceeds of the sale will go to a pension fund for all Bolivians, and ENDE employees have been offered ownership stakes.

Further legislation has established a Superintendent for the power sector, an autonomous regulatory body that will oversee the sector, protect the public interest, and approve tariffs. In the restructured power sector no single generator is permitted to hold more than 35 percent of the nation's capacity. ENDE will continue to operate the nation's transmission system, and other distribution infrastructure is in the process of separation from generation and transmission for subsequent sale. Direct access is contemplated.

B.2 Overview of the Power Sector

Installed capacity in Bolivia is 849 MW. The electricity industry consists of a mixture of investor-owned, co-operatively owned, and publicly-owned (national and regional government) electricity utilities. Major institutions are ENDE (national government-owned), COBEE (privately-owned concession serving La Paz), COMIBOL (state mining company), ELFEC (distribution utility serving Cochabamba) owned by ENDE, private investors, and Cochabamba's municipal government, CRE, a rural distribution cooperative serving Santa Cruz, and others. Most of the distribution companies are served by the Empresa Nacional de Electricidad (ENDE). There are also more than 100 rural electricity co-operatives engaged in generation and distribution.

B.3 Reforms

The 40-year COBEE concession has expired, and so there is now the possibility to remodel the system of power trading so as to make it more effective and to lower the costs of generation. The national government and municipalities have undertaken efforts to reform the sector with the help of World Bank.

A proposal by the World Bank recommended a split of the existing companies. The aim is to make the trade settlements and cost structures of the generation, transmission, and distribution sectors more transparent. To accomplish this, there will be independent operation

of generation, transmission, and distribution. At first, generation will be able to sell only directly to distribution companies, though later they will be able to sell directly to large customers such as industrial consumers. There will also be a rudimentary form of marginal costing and wheeling at the transmission level.

Multilateral aid organizations including the World Bank and the Interamerican Development Bank have provided much of the financing for studies of restructuring options. In addition, funds have been promised to the government to cover costs of any layoff payments to ENDE employees.

In December 1994, final legislation specific to the electricity sector and its reform was passed, clearing the way for the privatization of state-owned ENDE's generation assets through a capitalization program. Thirty-one firms pre-qualified for bidding. Three US companies won the bid and management responsibility was turned over to them in July 1995. The three firms have pledged to invest US\$140 million over the next seven years in the generating companies.

The winner received 50 percent ownership plus an exclusive management contract over ENDE's generating capacity. The three companies will split the approximately 600MW capacity in the following way: one received the hydroelectric capacity while two others gained the two thermal units. The companies will be operating this generating infrastructure under a 40 year concession. The remaining 50 percent of shares in ENDE's generating assets are presently held by a subsidiary of Citicorp in lieu of their transfer to pension plans for the 3.2 million Bolivians over age 21, with funds available only at retirement.

ENDE employees were offered shares as part of the capitalization and privatization process. This offer was very positively received and more than 90 percent of workers have participated in the plan. As a result more than five percent of shares in the old ENDE are now held by employees.

ENDE will continue to manage its transmission assets for the time being, though this may change in the future. A regulator for the electricity sector was legislated by the SIRISE act, passed by the government earlier this year. Under this law an autonomous Superintendent for the electricity sector will be appointed, whose responsibilities are to include the regulation of distribution tariffs, assure that monopoly power is not exercised, and provide for the general oversight of the sector. The new structure should be in place by mid-1996.

Under the new electricity law owners of electricity distribution assets are not allowed to also own generation infrastructure. Therefore COBEE must sell off its distribution assets (book value approx. US\$30 million) so that it can participate in the new open generation market. The new law also prohibits any one company from owning more than 35 percent of the nation's capacity.

Currently, there are many small utilities owned by different municipalities and there is a high difference in rates between regions; restructuring aims to resolve this. In addition, the distribution assets of the city of Cochabamba, the third largest distribution system in Bolivia, are now being sold through a private offering.

There has been strong criticism of the proposals to date, mostly based on a questioning of how effectively competition can be brought to a system of only 849MW. Some have questioned whether the current vertical structure has economy of scale benefits that may be lost through restructuring.

C. CHILE

C.1 Summary

Chile's 4,300-MW power sector showcases the separation and divestiture of state-owned distribution, transmission, and generation infrastructure through a process of restructuring and subsequent privatization that took place between 1978 and 1990. Chile was the first power sector restructuring and privatization to occur in the recent period and is often cited in the literature on restructuring in developing nations. An autonomous regulatory body, working in conjunction with other branches of the government, coordinates and regulates the nation's power sector.

Major objectives of restructuring were privatization, a redefinition of the role of the state in the power sector as regulator, widespread citizen stock ownership of infrastructure assets (popular capitalism), increased efficiency in the use of capital and labor resources, and the facilitation of investment flows to the sector. Evaluations to date show that these general objectives have been achieved.

C.2 Overview of Country

There are 14.2 million inhabitants, 84 percent of which live in urban areas. Average annual real per capita GDP growth has been about 3.4 percent over the 1983-1992 time period. Chile is the only country in Latin America to be rated as investment grade by both Standard and Poor's and Moody's Investors Service.

A military coup brought down the Allende government in 1973. The military dictatorship of General Pinochet ruled Chile from 1973 to 1988 when, through a plebiscite, Chileans voted for a return to democracy. The first democratically-elected government since 1970 was subsequently elected in 1989, and there has been one hand-over of power since. The military regime fundamentally reorganized Chilean society and the economy, implementing free market policies and divesting from direct state-involvement in the economy.

C.3 Entire Power Sector Organization

Overview

Within Chile, there is 4,342 MW of installed capacity. In 1992, 22.4 GWh of energy was produced. Between 1983 and 1993, 70 percent of electricity generation was from hydropower. This included the period of severe drought ending in 1991, which lowered the hydropower contribution from 92 percent in 1987 to 65 percent in 1989. Current electricity

rates are \$0.063 per kWh for industrial users, \$0.102 per kWh for commercial, and \$0.111 per kWh for residential.

The vast majority of power sector infrastructure is privately owned. In 1978 the majority was state-owned. A major restructuring and subsequent privatization of the power sector took place between 1978 and 1990. The total value of power sector assets in 1993 was US\$8,016 million, of which US\$5,232 million (65 percent) was generation, US\$1,510 million (19 percent) was transmission, and US\$1,274 million (16 percent) was distribution.

Before Restructuring

Before the restructuring period began in 1978 nearly all the nation's electricity generating, transmission, and distribution infrastructure was owned by the state. Most of these assets were held by two state-owned vertically integrated utilities called ENDESA and Chilectra. On Chile's largest interconnected system, the Central Interconnected System (SIC which represents 84 percent of the installed capacity), ENDESA controlled 70 percent of generation and Chilectra virtually all of the remaining 30 percent. ENDESA was also the owner of the majority of the transmission system, except for the metropolitan area which was controlled by Chilectra. In addition, ENDESA controlled some generation and all transmission and distribution in the Norte Grande Interconnected System, as well as most of the country's two largest isolated systems.

Chilectra was nationalized in 1970, and became a part of the Corporacion de Fomento de la Produccion (CORFO), the state's holding company. The following three year period, under the Allende administration, was characterized by an increasingly direct role of the state in the economy. This period was also a period of hyperinflation though no electricity price adjustments were allowed. This led to the inability of the power utilities to self-finance, cover projected investments, and operating costs. The operating deficit was carried by the national treasury.

Subsequent to the coup that brought Pinochet to power there was a process of financial normalization at the state power companies. Electricity tariffs, as in the pre-1970 period, again were set to give up to a 10 percent return on assets, with automatic revaluation of fixed assets. In addition, efforts to improve administrative standards and management of the state-owned electricity companies were made. This was part of the larger transformation of the state-owned portion of the Chilean economy, and laid the way for the subsequent privatizations.

The Restructuring Period 1978-1990

The restructuring and privatization process took place between 1978 and 1990. First there was a separation of the state's regulatory role from its commercial role as operator of the power utilities by means of the creation of the National Energy Commission (CNE). This was

followed by the break up of the two state-owned and vertically integrated power utilities. The last step was privatization of nearly all assets.

The CNE was created by the government in 1978 as an autonomous regulatory agency. At the same time ownership of state-owned electricity infrastructure was assigned to the government holding company, the CORFO. In 1980, electricity tariff-setting policy was changed from a methodology that assigned up to a 10 percent return on fixed assets to a marginal cost methodology.

In 1982, a new electricity law was passed called the General Electricity Service Law. It legislated the new methodology for electricity tariffs setting, the deregulation of generation-transmission, the rules for distribution concessions and tariff-setting, and the organizations charged with running the various interconnected systems.

The last step of the restructuring process was the divestiture of most of the country's state-owned electric power enterprises. Chilgener S.A. was incorporated in 1981 as a state-owned limited company. It was subsequently divided into three entities, one generator and two distribution companies, thus splitting the company's debt three ways. The sale of its stock to the public began in 1982 though the economic recession impeded the process. In 1985 there were better conditions for sale and by 1987 all of the company had been sold off to the private sector.

In 1981, nine distribution companies were spun-off from ENDESA. In 1982, ENDESA was incorporated as a limited company and its shares began to be traded on the Chilean stock market. Also in 1982, three hydroelectric generating plants were established as separate entities while in 1985, the Colbun generating company was spun-off. By 1986, the national treasury had absorbed about \$500 million in ENDESA debt as a prelude to privatization.

Between December 1986 and December 1990 ENDESA was gradually sold to the private sector. Over this period state ownership of the company dropped from 99 percent to only one percent. By December 1990, the ownership structure was as shown in Exhibit C-1.

By 1986, almost all distribution functions of ENDESA and Chilectra had been separated from generation and transmission by means of the creation of more than twenty distribution entities across Chile.

Exhibit C-1
Chilean Distribution Companies (1991)

| <i>ENDESA Shareholding (Dec. 1990)</i> | <i>Share (%)</i> |
|--|------------------|
| CORFO (state holding company) | 1.0 |
| AFP (pension fund associations) | 26.3 |
| Public Employees | 13.8 |
| Armed Forces | 13.0 |
| Chilean Citizens | 12.0 |
| Foreign Investment Funds | 7.3 |
| ENDESA Personnel | 3.3 |
| Others | 23.3 |
| Total number of shareholders | 51,833 |

Source: ENDESA (1992)
"La Privatización en Chile" in (CEPAL, 1995)

After Restructuring

Today, there are eleven power generating companies, 25 electricity distribution companies and two integrated companies. Many of these companies are traded on the Chilean stock exchange. In fact, in 1992 the average daily trading of eleven of the companies was 45 percent of the value of all stock trading; of these ENDESA accounts for 21 percent and ENERSIS 12 percent. In the SIC, ENDESA controls 50 percent of generating capacity. Bulk electricity is sold through the Economic Load Dispatch Center (ELDC).

As a result of restructuring, electricity prices appear to closely approximate long run marginal costs and the market is fairly dynamic as measured by the variety of contracts among and between suppliers and end-users. Also, private investment is being undertaken in hydropower and other infrastructure and importantly, the regulatory regime appears to have withstood government and interest group influence.

Regulatory Framework Set Up During Restructuring

The regulatory framework was spelled out in the General Law of Electric Power of 1982. It's most important features are as follows:

- ▶ Prices paid to generators are based on short- and long-run marginal costs (SRMC and LRMC). CNE calculates LRMC twice a year from a model that calculates the least-cost investment program to meet peak demand. Differences due to location are taken into consideration. Spot prices are set by the ELDC based on SRMC at stations of origin.
- ▶ Prices are unregulated for consumers with a demand exceeding two MW. In 1989, this unregulated segment of the market accounted for 52 percent of all electricity consumption. These negotiated tariffs must be made public, and regulated tariffs can be automatically adjusted if they deviate from unregulated tariffs by more than 10 percent.
- ▶ Wheeling, with appropriate toll charges, is permitted to any producer. Self-generation is encouraged, subject only to pre-specified technical standards.
- ▶ CNE advises the government on tariff, system expansion, and investment policy. It also arbitrates disputes. Its board includes a representative of the presidency, and the ministers of defense, economy, finance, mining, and planning, as well as CNE's chief administrator. The Ministry of Economy has the approval authority for the tariff changes. There is, however, a predisposition to assume that the tariffs recommended by CNE are appropriate and the Minister must approve the tariffs unless the Minister believes that they fall outside of certain guidelines. If the Minister refuses to approve the tariffs as recommended, there is an automatic appeal to the judiciary.
- ▶ CNE carries out studies on node prices for electricity generated and delivered at the various nodes on the transmission grid. In addition it calculates the value added by distribution (VAD) which is the basis of price regulation for the monopoly distribution subsector.
- ▶ A Superintendent of Fuels and Electric Service (SEC), established in 1985, oversees that technical and financial requirements of the law are met and keeps information on the various electricity companies. For the distribution companies the entity oversees distribution concessions and determines various components of the distribution companies' VADs.
- ▶ The Economic Load Dispatch Center is administrated by a commission made up of representatives of the generating companies and is known as the "generators club."
- ▶ The regulatory framework requires a high degree of coordination, is highly transparent, and facilitates competition between generators. CNE encourages larger projects that are in the national interest but yet would not be undertaken alone by the private sector.

C.4 Why Restructure the Chilean Power Sector?

Problems that Motivated Restructuring

In the mid-1970s Chilean electricity prices returned to levels that covered operations. Despite achieving self-financing, the government identified several further problems:

- ▶ Huge state financial commitment in the electricity sector for system expansion. The growing investment requirements were reaching \$200 million annually in the mid-1970s. The state was not prepared to make this commitment, and it is doubtful whether it could have even if there had been the political will to do so.
- ▶ The government of the time believed that private economic agents could run the electricity sector better than the state, and that breaking up the state-owned and vertically integrated companies would allow for a more efficient operation of the sector.
- ▶ Concern about the growing monopolization of the electricity sector under one state-owned company ENDESA.
- ▶ No clear separation of the regulatory and commercial roles of the state in setting sector policy and operating infrastructure. This complicated the potential entrance of new private agents into the market.
- ▶ Absence of economic efficiency criteria and transparent procedures for the fixing of tariffs. Tariffs were set based on what each company had spent producing electricity, without regard to its efficiency. Furthermore, the law governing the electricity sector before restructuring was weak in governing how tariff studies were to be carried out. As a result the Tariff Commission had lost influence to the Economy Ministry in tariff setting, thereby allowing non-technical and economic factors to enter into tariff determinations. Within the context of high inflation during the early 1970s this led to reduced profitability of the electricity companies.

Objectives of Restructuring

The following objectives were to be accomplished by restructuring and privatization:

- ▶ Development of a regulatory framework that tended to decentralize and deconcentrate activities so as to stimulate competition and increase efficiency. Monopoly power could thus be controlled in generation, while distribution companies could operate as for-profit companies with performance and profits

regulated by the state's regulatory body. By taking the state out of the commercial side of the electricity sector it could concentrate instead on regulation.

- ▶ The formulation of a pricing policy based on the true costs of producing, transmitting, and distributing electricity.
- ▶ Focusing of the State's resource evaluation efforts on the evaluation of hydropower resources.
- ▶ The formation of a policy on least cost expansion planning.
- ▶ The establishment of a policy for the efficient and reliable operation of power plants and the transmission system.
- ▶ To achieve a broad degree of efficiency in the electricity sector, that promotes competition, assigns a major role to the private sector, and a subsidiary role to the state.
- ▶ By divesting of state ownership privatization would help recast the role of the Chilean state as a leader in economic reform. At the same time "popular capitalism" could be stimulated by having workers and pension funds own shares in the new private companies.

Additional Considerations – Political-Economic Context for Restructuring

The establishment of the CNE was of major importance in restructuring the electricity sector, though it appears to have been the privatizations that defined the process. In a relatively short time the structure and ownership of the sector changed dramatically. Although economic, financial, and efficiency goals contributed to the decision to restructure the sector, they were subordinated to the dictates of a political strategy to recast Chilean society. As a consequence, the restructuring can only be truly understood within its political and economic context.

Starting in 1973, Chile underwent a social and economic reordering. The political-economy of the Military Government was based on the belief that the Import Substitution Industrialization economic development model followed all over Latin America, characterized by major state intervention, had stunted the action of the market. In response, the new government drastically reduced import taxes, reduced the role of the state in the economy, and increased the role of the market as arbiter of economic activity.

In this context the private sector was the favored economic agent, whose actions in free markets would allow the most efficient use of resources. Consequently, the privatization of companies was initiated with sales that included worker ownership (popular capitalism) and

the involvement of new financial institutions. Financial markets were liberated and new institutions appeared such as the Pension Fund Associations (AFP).

Thus the political and economic context of the Chilean restructuring clearly affected the final outcome. Privatization appears to have been the goal. Some observers of the reforms point to ongoing imperfections in the regulatory framework as evidence that the search for efficiency was not the primary objective. Rather, the restructuring of the electricity sector was part of the process to remold the Chilean economy and society.

C.5 Opposition to Restructuring and Privatization

Criticism of the reforms fall into the following categories:

- ▶ Claims that the process and valuation methods used for privatization were not open and that the “dictatorship had a monopoly on information.” There were alleged undervaluations of infrastructure and conflicts of interest in certain of the sales.
- ▶ Concerns on the strategic nature of electricity public service passing into private ownership.
- ▶ Potential personnel losses from privatization. Opposition from labour was diffused by letting the employees of ENDESA be the first to participate in the privatization. They were permitted to purchase shares at prices lower than the general public.
- ▶ Fear that private investors would not continue to invest in infrastructure as required to keep up with demand growth and thus constrain development of the Chilean economy and society.
- ▶ Critiques that privatization was the end in itself rather than the goal being a reregulation and restructuring to optimize the efficiency of the sector.
- ▶ The decision to sell the state’s substantial power sector holdings was made by a relatively restricted group of authorities of the military government with little public discussion and certainly no public consensus.

C.6 Evaluation of the Results of Restructuring and Privatization

Market Structure

Competition was a major motivation for privatization. But today there is a high degree of concentration of ownership in the electricity sector. ENDESA controls 63.1 percent of the value of the market, Chilgener 19.3 percent, and Colbun 12.5 percent. ENDESA and Chilectra together control 90 percent of the market on Chile's SIC. In transmission ENDESA owns the country's main transmission company Sistemas de Transmision del Sur. The distribution subsector is totally privatized with the exception of some isolated systems that include cooperatives. ENERSIS controls over 73 percent of Chilectra Metropolitana and 85 percent of Rio Maipo, which together control the major share of the market in the Metropolitan Market. Chilectra Metropolitana is the biggest distribution company on the SIC with nearly 50 percent of the total.

ENERSIS controls ENDESA though does so by holding only 16 percent of its shares. This is explained by a series of interrelations of executives and board members. Similarly ENERSIS board members and executives are present to a significant extent in all areas of the electricity market: generation, transmission, and distribution.

Regulatory Issues

Internationally the Chilean restructuring and privatization is seen as successful, though in Chile very little analysis of the pros and cons has been done, despite the economic importance of the sector. From a broad perspective the Chilean electricity sector works well, though there are certain things that impede a more efficient operation of the sector:

1. Further regulation is needed on transmission system use and wheeling charges.
2. Incentives need to be improved to facilitate investment in generation.
3. There is an absence of adequate rules governing service quality.
4. The composition of the management of the EDLC, the "generators club."
5. The efficiency and transparency in the fixing of distribution tariffs. According to law, distribution prices are set using the "value added of distribution" (VAD). This is calculated for model firms operating efficiently in one of the three distribution zones (low, medium, and high density). This method is meant to incentivize efficient operation because it considers only the model company not the actual cost of the distribution companies. What actually happens is that the CNE and the distribution companies commission studies on costs to the model firm and then settle on the average from the two studies. This obviously tends to stimulate the distribution company to raise its study results so as to attain a better negotiating position.

Chilgener: Case Study of a Generating Company

A recent World Bank paper evaluated the performance of the Chilgener generating company. It concludes that divestiture meant an increase in productivity due to coal fuel-use consumption improvements and the use of Chilgener infrastructure for other purposes, they now rent out their wharf. But there has been no increase in investment attributable to divestiture.

The productivity increase has meant total welfare improvements of Ch\$4.0 billion, equivalent to 21 percent of the private value of the company. Private shareholders were the biggest winners of the divestiture, making Ch\$6.6billion. Foreigners made Ch\$2.7billion of this benefit. The big loser was the Chilean government's treasury. It came out Ch\$2.7billion poorer; thus the fiscal impact of divesting Chilgener was negative by 22 percent of the sale price (Galal, 1994).

C.7 Distribution Sector after Restructuring

Organization of the Distribution Subsector

Exhibit C-2 lists the distribution companies that operate in Chile today, as well as their pre-restructuring affiliation:

Regulatory Framework for Distribution

The distribution companies are regulated according to their density. Only CHILECTRA Metro is considered "high" density, the others are "medium" density (17 companies) and "low" density (seven companies).

Regulated rates are established for customers consuming less than two MW, freely negotiated for the rest. The final price to customers has two components: the node price at which distribution companies buy power from generators and the transmission grid, and the value added of distribution (VAD). The VAD includes the cost of investment, operation, maintenance, and losses from distribution infrastructure, plus the fixed costs of administration, billing, and attention to customers. The VAD is determined and then electricity rates are set to bring a profitability of between 6-14 percent for the distribution companies.

Exhibit C-2
Chilean Distribution Companies (1991)

| SYSTEM | OWNERSHIP | CUSTOMERS (1000s) | CAPACITY (MW) | ENERGY (GWh) |
|---|-----------|----------------------|------------------|-----------------|
| <i>NORTE GRANDE INTERCONNECTED SYSTEM</i> | | | | |
| EDELNOR | S <1> | 140 | 96 | 139 |
| <i>CENTRAL INTERCONNECTED SYSTEM</i> | | | | |
| CHILECTRA METRO | P <2> | 1106 | 902 | 4741 |
| CGEI | P | 365 | 217 | 1138 |
| CHILECTRA RegV REGION | P <2> | 285 | 213 | 1119 |
| SAESA | P <1> | 114 | 62 | 328 |
| EMEC | P <1> | 110 | 55 | 289 |
| FRONTEL | P <1> | 107 | 35 | 184 |
| CONAFE | P | 94 | 52 | 271 |
| EMEL | P <1> | 91 | 37 | 195 |
| ELECDA | P <1> | 84 | 36 | 187 |
| EMELAT | P <1> | 46 | 36 | 187 |
| EMELARI | P <1> | 39 | 17 | 90 |
| ELIQSA | P | 35 | 17 | 90 |
| EE DEL SUR | P | 16 | 6 | 29 |
| EE PTE ALTO | P | 14 | 5 | 26 |
| CE LITORAL | P | 13 | 3 | 14 |
| OTHERS | | 12 | 4 | 22 |
| TOTAL | | 2531 | 1699 | 8932 |
| <i>AYSEN ISOLATED SYSTEM</i> | | | | |
| EDELAYSEN | S <1> | 14 | 8 | 148 |
| <i>PUNTA ARENAS ISOLATED SYSTEM</i> | | | | |
| EDELMAG | S <1> | 36 | 46 | 72 |
| NOTES: | | | | |
| <1> Previously owned by ENDESA | | | | |
| <2> Previously owned by CHILECTRA | | | | |
| P Private company | | | | |
| S State owned company (CORFO) | | | | |
| SOURCE: CNE. and Philippi (1991). [MW est. w/ 0.6 load factor. 1988 energy value] | | | | |

C.8 Why Restructure Distribution?

In addition to the reasons stated above in the section describing the motivations for the restructuring of the Chilean power sector, the following issues specific to the distribution subsector should be mentioned.

The Chilean distribution subsector was restructured as part of the restructuring of the entire Chilean power sector. This involved a split of infrastructure along functional lines and regional lines. The different functions of the power sector have different market characteristics and therefore require different regulation. To facilitate regulation of the

distribution subsector distribution was broken down into high, medium, and low density regions as explained above.

In addition to regulatory motivations, distribution was separated and divided to ascertain its profitability and cost breakdowns, the state of distribution infrastructure, as well as the management capability and ability to attract financing of the various parts of the system. In addition, division allowed for the splitting of the company's debt. This information facilitated the subsequent privatizations as it reduced investor's perceived risk and broke the size of the state enterprises to asset and liability levels more manageable for private investors to acquire.

The process of spin-off, breaking-up and rationalization of distribution prior to privatization meant that ENDESA and Chilectra's distribution infrastructure was transformed into regional companies with limited responsibility. This permitted the identification of geographic areas that were generating losses.

C.9 Evaluation of Distribution Restructuring

In terms of access to electricity by Chilean citizens, distribution coverage has increased from 85 percent of population in 1980, at the beginning of the restructuring period, to 92 percent in 1993.

In addition to the aspects on the distribution subsector included in the above evaluation of the Chilean power sector reform, the following recent World Bank sponsored evaluation of the activities of one of Chile's distribution companies is included:

Case Study of Enersis

Enersis is the largest of Chile's distribution companies. Its customer base, in share of total electricity consumption, breaks down in the following way: Industrial 40 percent, residential 30 percent, commercial 16 percent, while the remaining 14 percent is split between agriculture, government, and transportation. Since 1987 the company has diversified into other electricity sector activities.

The Enersis distribution company used to be called Chilectra Metropolitana. Enersis has the concession to distribute electricity in the metropolitan area of Santiago, Chile. The enterprise is regulated as a natural monopoly and has the largest economies of scale of any of Chile's distribution companies because it has the largest and most densely packed customer base. The entity was a private firm until it was nationalized in 1970 by the Allende government. In 1985 the government announced divestiture. In 1986 62 percent of the enterprise was sold, and in 1987 it became 100 percent privately-owned.

Chilgener, Enersis, and Chilquinta were the three subsidiaries of Chilectra S.A., a government-held company. Together they comprised one of the nations largest vertically

integrated electricity companies (second largest after ENDESA). In 1981 the government incorporated the three enterprises. This accomplished three objectives: first, the tariff setting process was facilitated by avoiding the joint cost problem; second, it enhanced competition between generating companies prior to divestiture; and third, it facilitated divestiture by splitting the company and its debt into three smaller entities that were easier to find buyers for.

A recent study (Galal, 1994) shows that divestiture facilitated a significant reduction in electricity losses due to theft. Furthermore, it made output diversification possible, and increased returns from nonoperating investment. Also accompanying divestiture, but not directly attributable to it, were increased profitability and improved productivity.

The study shows that the combined effects of divestiture on welfare are positive to a level of 31 percent the private value of the company. The welfare gain was made mostly by private shareholders, including employees, but gains were also made by customers due to reduced losses and the consequently cheaper electricity. Nevertheless, the government and the Chilean citizenry as a group were worse off as a result of the privatization.

Further conclusions of the evaluation are that “divesting monopolies in well-regulated markets limits their ability to exercise their market power and improves resource allocation,” although “reforming and regulating public enterprises improves efficiency.” On balance though, for the case of ENERSIS, “the net benefits of divestiture accompanied by effective regulation can outweigh the net benefits from reforming and regulating public enterprises” (Galal, 1994).

D. EL SALVADOR

D.1 Summary

The El Salvadorean government has been studying private participation in the nation's 818-MW electricity sector since the late 1980s. New capacity is being developed by private companies. The government recently announced the reorganization and divestiture of the distribution subsector as a major component of its plans to restructure the sector and attract private participation.

Restructuring legislation is currently being discussed in the national assembly. It includes the creation of two new regulatory bodies to oversee the sector, protect the public interest, approve tariffs, coordinate expansion planning, and evaluate the nation's energy resource development options. The distribution subsector will be separated from generation and transmission and there will be a total of five distribution companies operating in different regions of the country. Direct access for large customer is proposed.

D.2 Power Sector Overview

There is 818MW of capacity in El Salvador of which 388MW is hydropower, 105MW geothermal, and 325MW oil-fired. At present, only 547MW is currently available because of poor maintenance and the deterioration of old equipment. The state-owned vertically integrated utility, CEL, manages and operates the majority of El Salvador's power sector. CEL is projecting a 40MW capacity shortfall for 1995; this will worsen because demand is growing at 15 percent per year.

D.3 Before and After Restructuring

Restructuring of El Salvador's electricity sector is presently being debated in the country's National Assembly. It is proposed that the new legislation will overhaul the power sector. El Salvador's state-owned and vertically integrated power utility, la Comision Ejecutiva Hidroelectrica del Rio Lempa (CEL), will concentrate on electricity generation and transmission. Distribution will be spun-off, direct access is contemplated, and private participation will be allowed in generation and transmission. Furthermore, the Comisión Nacional de Energía (National Energy Council, known as the CNE) will be set up to coordinate electricity sector planning, functionality, and policy. In addition, a Comisión Regulador de Electricidad y Hidrocarburos (Electricity and Hydrocarbons Regulatory Body, known as CREH) will also be established. The CREH will perform regulatory functions such as tariff calculations, legal compliance of sector participants, and the formulation of regulations.

CEL presented its plan for the privatization of its distribution subsector to the president of El Salvador on 4 April 1995. It is expected that subsequently the legislature will make approve of the plan.

CEL opted for dividing its distribution assets in the country into four distribution companies and selling off the assets to the private sector by the beginning of June 1995. According to one observer there is a lot of turmoil over the privatization process and the process itself is not at all transparent.

The four distribution companies to be privatized include infrastructure consisting of CEL's Rural Electrification Program and four old distribution companies currently under the ownership and management of CEL. The assets will be auctioned to the highest bidder, with no limits on ownership. To make the distribution assets more attractive to potential buyers electricity rates were scheduled to increase by 30 percent in June 1995. At that time average tariffs were to go to \$0.052 per kWh from \$0.04 per kWh. The national constitution has already been amended so that there is no term limit on electric power concessions; this is also designed to attract private investors. CEL believes that the distribution assets in the nation's largest city, San Salvador, are worth some \$150 million.

D.4 Why Restructure the Power Sector?

CEL had originally planned to sell off its generation assets to the private sector but it has now decided to keep its hydropower and geothermal infrastructure. Nevertheless, it may perhaps sell its 325MW of oil-fired capacity. All new generating capacity will be by private firms, and 250MW of private new capacity is presently under solicitation.

CEL and the Salvadorean government have been trying to bring private participation to the power sector for some time. A conference was held in 1991 by CEL and USAID to promote private participation in the sector. At the time the government stated that it did not have the financial capability to fully develop the 1,100MW of new capacity required between 1992 and 2007 to meet demand. It convened the conference to discuss with the private sector how private investment could supplement the public development of the power sector. At the time, President Cristiani stressed that the public and private sectors needed to work together and that the participation of the private sector was indispensable.

D.5 Why Restructure Distribution?

Objectives

The distribution sell-off will bring in cash that CEL needs to upgrade existing generating capacity. In addition, CEL believes that the establishment of the four distribution companies, each with an ample area of operation, will allow for an improvement in service and the

speeding up of the operations that electricity service requires. Improvements in operation and maintenance are expected, as well as a reduction in construction time and the adoption of new technologies and administrative systems.

The expected private participation in the new distribution companies is in accordance with the current government's policies, as well as the government's commitments under loans it has acquired, and the need to modernize public administration.

According to CEL, one of the principal advantages of private participation is that the State need only regulate distribution and can thus concentrate its activities and resources on the basic needs of the population as well as social projects. The sale of distribution assets will facilitate the reduction of public-sector loans, and allow for the use of capital from investment markets.

Opponents

The Sindicato de la Industria Electrica (SIES), the union of the country's principal distribution company, went on strike against key provisions in the privatization plan immediately upon the plan's announcement. CEL quickly agreed to include the counter-proposal of the union and the union went back to work. The union stated that they had approved a CEL restructuring plan, but the proposal submitted was different. The union said that the workers are not against privatization, but only CEL's proposal. They ask that CEL finance the purchase of shares for employees with interest-free loans. CEL proposes that the shares be purchased with the indemnification that workers will receive upon privatization.

D.6 Distribution Subsector Restructuring

The Integral Public Service Management Plan for Electrical Power Distribution calls for the creation of four companies from the assets of the Compania de Alumbrado Electrico de San Salvador (CAESS), the Compania de Luz Electrica de Santa Ana (CLESA), the Compania de Luz Electrica Sonsonate (CLES), the Compania de Luz Electrica de Ahuachapan (CLEA), and CEL's rural electrification program (REP). These four distribution companies came under CEL administration in 1987 when their 50-year state-issued operating concession expired.

The new companies are to be:

1. The Western Distribution Company, whose assets will come from those of CLES, CLEA, CLESA, and zones 1,2,3 and 17 of the REP;
2. The Central Northern Distribution Company, whose assets will be formed from those of CAESS and the REP's zone 6 and 7;
3. The Central Southern Distribution Company, whose assets will be formed from those of CAESS and REP's zone 14, 15 and part of 17;

4. The Eastern Distribution Company, whose assets will be made up of those assets in the east of the country, except for the those of the private company DEUSEM. These include assets of CAESS and the REP's zone 8,9,10,11 and 18.

The country will be divided into five distribution regions represented by the four companies described and the private company DEUSEM which operates in the southeast of the country. The following table lists the assets of the distribution companies to be reorganized:

Exhibit D-1
Data on Distribution Entities to be Restructured

| Company | Km of Lines | Substations | Transformers |
|---------|-------------|-------------|--------------|
| CAESS | 7,407 | 29 | 15,069 |
| CLESA | 1,118 | 6 | 1,095 |
| CLES | 784 | 12 | 1,191 |
| CLEA | 475 | 1 | 523 |
| Total | 9,854 | 48 | 17,878 |

Source: El Diario de Hoy (4.5.1995), San Salvador

The assets of CEL's rural electrification program are in the process of being valued so as to be subsequently included in the privatization program. Employees of CEL will have access to the shares of the four new electricity companies, shares to them will be sold in two stages; first, to workers of CEL, CAESS, CLESA, CLEA, CLES and CECSA (a generation cooperative to be retained by CEL), and then subsequently to the private sector at a price to be determined by CEL. Twenty percent of all shares will be sold to workers, up to a maximum of 100,000 Colones per person. CEL will provide financing to workers for this purchase. Purchases will be made at the Stock Exchange.

Generation assets of CAESS, CLESA, CLEA, and CLES have been transferred to CEL jurisdiction and will not form part of the privatization. The only other private distribution company in El Salvador, DEUSEM, will continue to operate independently.

E. HUNGARY

E.1 Summary

Hungary's 6,600-MW electricity sector was reorganized in 1992 with the separation and incorporation of generation, transmission, and distribution assets of the state-owned and vertically-integrated power sector monopoly enterprise MVM. The generation assets of MVM were divided into eight companies, and sector demonopolization encourages bulk power generation by independent power producers. A transmission company has been set up to manage dispatch, coordinate transmission, and control power imports and exports. Six distribution companies have been formed out of MVM's distribution assets.

A regulatory body, the Hungarian Energy Office (MEH), has been formed for the power sector and it is authorized to approve tariff increases. The partial privatization plan for the electricity sector has recently been agreed upon. Ownership of MVM's assets will be divided between strategic foreign investors, employees, municipalities, and the government's asset holding company.

E.2 Power Sector Overview

In 1992, the state-owned electric utility, MVM, accounted for 98 percent of domestic electrical energy generation with a workforce of 38,000. The nation's total installed generating capacity is approximately 6,600MW. In 1992, coal and lignite accounted for 31 percent of generation, nuclear 39 percent, hydroelectricity one percent, with the remaining 29 percent generated from oil and gas. Demand for electricity fell six percent in 1991 and 1992, though a slight recovery began in 1993. More than half of the country's total gas consumption is imported. In 1992, imports from the former USSR made up ten percent of total electrical energy supply, down from a high of 30 percent in 1989. The Hungarian electricity system is interconnected with Ukraine, Slovakia, the former Yugoslavia, and Austria.

E.3 Power Sector Organization and Restructuring

On December 31 1991, the Hungarian Electricity Board was reorganized into a two-tier joint stock company called Hungarian Power Companies Ltd. (MVM). The first tier of MVM is made up of eight generating companies, organized by fuel type and region, and six regional electricity distribution companies. The second tier of the electricity sector is a holding company for the group and is the owner and operator of the transmission grid and the national dispatch center. The dispatch center buys power from the cheapest generator.

Power sales to distribution companies are made according to a compensation scheme where prices are adjusted to account for different proportions of industrial and residential customers. It is a long-term goal of the Hungarian government that private power producers will be permitted to sell power to the grid company. By 1993 MVM had already signed an agreement with a private company and the Hungarian oil and gas company for the construction of a 40MW gas-fired power plant.

The vast majority of MVM shares are held by the State Asset Management Company, APV Rt. This entity has been charged with improving MVM's financial performance and preparing for privatization. MVM was to receive no subsidies from the state and no state guarantees, while being required to remit a dividend to the national treasury. There has been ongoing debate, and controversy, on the schedule of tariff increases that will bring Hungarian electricity rates up to international levels. Institutions involved include the Ministry of Industry and Trade, the Ministry of Finance, APV Rt, the nation's trade unions, and the government's budget-making body.

Electricity price reform has aimed at achieving adequate revenues to cover depreciation, insurance and dividends to shareholders (not covered at 1993 tariff levels), though MVM has run into serious problems caused by forint devaluation and the accompanying increase in its costs of imported fuels and investment requirements. According to a recent report MVM was having trouble even covering maintenance costs in early 1995. A mid-April request by MVM to the MEH for a reported ten percent immediate tariff increase was turned down, though apparently an increase will be permitted later in the year.

E.4 Regulation

A new Electricity Law was passed by the Hungarian government in April 1994. It gave power sector regulatory responsibilities to the Hungarian Energy Office (MEH). The MEH had been established by Act XLI on Gas Supply of 1994 to regulate the Hungarian gas and electricity industries.

The MEH is a new office of the Ministry of Industry and Trade, and its specific activities and procedures are currently in the process of development. MEH is headed by a professor, and a number of ex-MVM managers are also on its staff. It has been a weak institution in the power sector in comparison to the influence on power sector policy that MVM has traditionally held. This will undoubtedly change as a result of the break-up and partial privatization of MVM that is currently underway (see the following section for details).

To further strengthen the role of MEH in the Hungarian power sector the institution will soon be separated from the Ministry of Industry and Trade and be established as a wholly independent entity. Dates and a timetable for the separation of MEH have not yet been announced.

In the electricity sector MEH's duties include the establishment of energy tariffs, general oversight of the power sector, and the granting of licenses for the production, transport, and supply of electricity. Specific responsibilities of the MEH include the approval of the operational codes and charters of companies operating in the nation's power sector, the elaboration and application of the regulations by which electricity tariffs are set, ensuring that power sector participants abide by the regulations and procedures established for their operation, and the protection of consumer interests. International development assistance has played an important role in the training of MEH staff and the development of its activities.

In addition to calling for the establishment of the MEH the 1994 Electricity Law demonopolized the electricity sector and includes provisions for the grid inter-tie of renewable energy production, self-generators, and private producers.

E.5 Privatization

There has been much debate over the last three years on the specifics of MVM privatization, particularly on the proportion of the generation and distribution companies to be divested by the government. Parliament passed legislation in May to speed up the pace of divestiture of state-owned infrastructure assets.

The firing of the trade and industry minister, Laszlo Pal, by the prime minister, which took effect July 15, will facilitate the implementation of the plan. Pal did not disguise his opposition to earlier plans, openly siding with MVM's management and employee unions and had delayed the privatization plan by slowing down the establishment of appropriate regulatory and pricing mechanisms. International Monetary Fund requirements for cash injections that would be forthcoming from divestment have also contributed to the recent movement on power sector privatization. With an external debt approximately equal to one year's GDP, capital is needed to shore up the nation's economic performance.

As of July 1995, the Hungarian government has decided to keep a majority ownership of the national grid company and the Paks nuclear plant and to reduce the share of the other companies that it plans to sell off.

On June 29 of this year, the Hungarian government passed a resolution spelling out a process for the partial privatization of the nation's strategic energy assets, so as to facilitate required investment in the sector and to improve its management and operation. Oil, gas, and electricity infrastructure were included. For MVM's assets, the sale will proceed in two stages. The first stage of sales has already been announced and a tender submission date of 30 November 1995 has been set.

In the first stage of the privatization process APV Rt will divest of between 46.15 and 49.23 percent of its ownership of MVM's six electricity distribution companies. It is also contemplated that purchasers will be permitted some management rights and the chance to

increase ownership to 50 percent plus one by the end of 1997. Upon completion of these first stage asset transfers 25 percent of the shares of these regional electricity companies (RECs) will be given to local municipalities. Local municipalities had already been in the process of receiving ownership shares of the distribution companies to a level proportional to the value of land upon which electricity infrastructure installations had been built.

Strategic partners will be offered partial ownership of MVM's seven non-nuclear generating companies. Ownership of between 34 and 49.71 percent is being offered. These share sales will be combined with a capitalization plan, thus allowing investors to take majority stakes right away. Further expansion of this private ownership to 100 percent is contemplated, and will probably include any shares held by municipalities.

The core transmission company will be partially privatized with the sale of an initial 24 percent of shares. Buyers will be also offered an opportunity to increase ownership to 25 percent plus one subsequently. A plan is being considered to offer three to four percent of the core company to owners of the compensation coupons issued to victims of the former regime.

Many analysts and potential investors are disappointed that the government's original privatization plans have been watered down, though at the same time are glad that a divestiture plan has been decided upon. After last year's election, the momentum towards privatization in the energy sector slowed considerably, despite encouragement from the US president, Western governments, and officials at the World Bank and International Monetary Fund. Concern has also been expressed about the lack of experience at APV Rt and within the government that could impede the smooth execution of these sales. Nevertheless, Hungary is under pressure to divest of some of the electricity companies this year so that it can reach its US\$1.2 billion privatization revenues.

On a state visit to the US this summer, the Hungarian prime minister met with US investors at the Overseas Private Investment Corporation in Washington D.C. As well as keen interest from US companies, many European companies have expressed interest in the purchase of Hungarian electricity sector assets. The sale is scheduled to begin in September and be concluded by the end of the year. Industrial action may be taken by MVM employees in opposition to the privatizations, though an as yet unspecified plan to include worker ownership in the new ownership structure of the electricity companies may help alleviate such opposition.

Hungary has been quite successful in attracting foreign direct private investment. It is estimated that Hungary has been the destination of half of such investment coming to the region over the last five years. This is approximately US\$8 billion, 40 percent from the US, with the second most important share coming from Germany, followed by Austria. Thirty-five of the world's 40 largest multinational companies now have interests in the country.

F. NICARAGUA

F.1 Summary

Nicaragua's restructuring program was motivated by a host of problems in the power sector. Significant among these were the need to solve distribution-side problems, as well as financing shortfalls on the supply-side. Distribution separation is being undertaken as part of the strategy to address these problems. The goal is the creation of well-regulated regional monopoly distribution companies.

Before restructuring the nation's 350-MW power sector was comprised of a single vertically integrated state monopoly. After an extensive period of study and consideration of options, the sector was reorganized in January 1995. An autonomous regulatory body has been established to coordinate sector activities and approve tariff changes. Generation is to be separated from transmission, and distribution will be carried out by eight regional enterprises. Innovative regulation will aim to introduce competition into the distribution subsector. Private participation is being encouraged in all activities of the nation's power sector.

F.2 Overview of Country

The country has about million inhabitants. Since the Sandinista revolution of 1979, and during the civil war of the 1980s, the Nicaraguan economy has been in steady decline. Average annual per capita GNP growth rate was an average -5.0 percent between 1983 and 1992, and the nation currently has the highest per capita external debt of any nation in the world. The Sandinista period was characterized by high inflation, and an expanding state role in the economy (in 1990 more than 30 percent of GNP was owned or controlled by the state). In 1990, free elections were held and the Chamorro government came to power. Since 1980, and with financial support from the International Monetary Fund (IMF) and the Interamerican Development Bank (IDB), the current government has lowered import tariffs, run tight fiscal and monetary policy, cut the public workforce, and sold off much of the state-owned sector of the economy. Inflation has been controlled, though the economy has not shown many improvements. Unemployment remains high, and even in nominal US\$ terms, exports are still below the levels of the mid-1970s.

F.3 The Nicaraguan Electricity Sector

Total installed capacity in 1992 was approximately 350MW of which 60MW is geothermal, 120MW hydro, and most of the remainder oil-fired thermal capacity. Approximately 35 percent of the population has electricity service. System losses were 22 percent of generation in the early 1990s. Much of industry operates at low power factor (75 percent common). Ten percent of residential customers pirate electricity & pay no bills. Tariffs now approximate

utility average costs, after a 3 year period of gradual increases. Four to five hours (and more) of electricity rationing per day has not been uncommon during the 1990s, especially during the dry season when hydropower generation is reduced.

Before Restructuring

In 1979, subsequent to the Sandinista revolution, all energy-related activities including in the electricity and hydrocarbons sectors came under the control of one centralized state-owned entity called the Nicaraguan Energy Institute (INE). INE was divided into 4 divisions: Operations, Distribution and Commercialization, Planning, and Hydrocarbons.

After Restructuring

The old INE organization was divided up in January 1995 when a new organizational structure for the electricity sector was declared by presidential decree. A new electricity law should be approved soon; it is currently held up due to the nation's constitutional crisis. All hydrocarbon-related activities had been previously separated and are now managed under the government-held organization Petronic. INE's electricity sector activities have been restructured in the following way:

- ▶ INE remains a branch of the government, with its director retaining ministerial status, though it is now only staffed by 50 people. It has assumed electricity sector planning, regulatory, import/export control, and other functions. The newly recast INE proposes tariffs, expansion policy, and performs evaluations of bids for new capacity for the electricity sector;
- ▶ A National Commission on Energy Prices was established. It is made up of the director of INE, the Minister of Economy and Development, the Minister of Finance, two representatives of the private sector, and two customer representatives. It approves the energy prices suggested by INE.

The electricity generating, transmission, and distribution activities of the old INE were temporarily reconstituted into one wholly state-owned entity called ENEL. ENEL is to be further restructured in January, 1996, when the generation, transmission, and distribution functions will be separated into distinct state-owned entities. The long term goal is the formation of a state-owned transmission company which will be open to private investors for joint ventures for expansion. A state-owned generation company will compete against private producers to supply power to the transmission entity. No new solely state-owned generating capacity will be built. The distribution sector will most likely be separated into eight companies where private investment will be welcomed for partial ownership for capitalization and joint venture arrangements for system expansion.

Intergeotherm, the state-owned and Russian joint venture geothermal development entity has been established as a separate generating entity. It has been developing a 100MW geothermal

site, though it has not been able to achieve financing as Russian nuclear submarine turbines, unproven in any geothermal application, have been proposed.

Private Participation

The new structure of the electricity sector aims to facilitate the participation of private investors. Foreign and privately-owned generators have already been granted concessions to develop generating capacity in the country. Forty MW of diesel-powered base load is presently under construction, electricity will be purchased by ENEL at around \$0.06 per kWh, and it will be operational in 1995-96. Private participation is proposed for geothermal capacity and in the sugarcane cogeneration industry. As mentioned, private participation is now possible in the transmission and distribution sectors though the state will remain in firm control of transmission system operation.

Restructuring Process Time Period

The reform process began in 1991 when an original restructuring proposal by INE was submitted to the World Bank (WB). This was under the new government and policies of president Chamorro. Projects financed by the IDB and the Swedish government began in 1992, with the goal of developing restructuring proposals after detailed study of the Nicaraguan power sector. By 1993, elaborate restructuring proposals had been developed. At the same time, and as part of efforts to educate and build consensus on restructuring among the Nicaraguan public, government officials, and INE employees, INE officials published an informative and widely distributed six times a year "Information Bulletin" starting in May of 1993.

The first reorganization step was made in January 1995 by presidential decree; a new electricity law should be approved soon, though it is currently held up by the constitutional crisis. In January 1996, a second phase of restructuring will commence. In this second stage ENEL will be split into generating, transmission, and distribution companies. The distribution subsector will be further broken down into eight separate entities over the following year.

The total period of time from initial presentation of proposals to the consolidation of the final institutional structure will be perhaps five years. Officials at the old INE have led a cautious and well thought-out process of study of options, analysis of international experience, and proposals for change. Their aim throughout has been the institutionalization of a transparent structure of regulation that minimizes perceived risk on the part of foreign investors, and maximizes competition. As a result it is hoped that the nation will have access to the cheapest electricity possible.

Opponents and Proponents of Restructuring

There has been opposition to the proposed changes from within INE, from certain sectors within the central government, and from some of the nation's bilateral and multilateral aid donors. Nevertheless, the leadership of the old INE has led a detailed, cautious, and well informed process of restructuring and has managed to successfully defend its positions and proposals by demonstrating that they are in the best interests of the whole nation and work towards reasonable long term goals and under realistic assumptions of the present and future context. Complete privatization has been called for by some government officials and members of the private sector. On the other side of the issue, Nicaragua's powerful labor unions would most likely have supported strikes by INE's employees' union had any abrupt privatization occurred.

Outside the small core of INE policy makers, there is very little understanding of the Nicaraguan electricity sector, of international experience in electricity sector regulation, or an appreciation of the high costs and importance of electricity for the nation's economy. More than once, INE officials have successfully defended their course of action against the critique of government officials and members of the private sector. The INE-led restructuring of the hydrocarbons sector has been criticized, but because of INE's policies the nation had an oil import bill savings of US\$6 million in 1992, purchasing the cheapest fuel in Central America by buying it on the open market, as opposed to leaving purchases to the oil companies as is common within other countries of the region.

The "Information Bulletin," combined with the generally open nature of restructuring discussion and proposal formulation, has greatly contributed to the achievement of consensus on the proposed trajectory of restructuring.

F.4 Why Restructure the Electricity Sector?

The major motivations for restructuring were INE's inability to raise financing for adequate system capacity expansion and the sorry state of existing infrastructure. There was low efficiency in power delivery to the consumer (22 percent losses), and a high degree of customer theft. The economic crisis during the war years between 1977 and 1990, along with the previous model of organization and central government control over the sector had combined to create a situation of near crisis in the electricity sector. By the early 1990s utility officials were convinced that restructuring and reform were desperately needed to turn around the troubled electricity sector. They were greatly encouraged in this regard by the policies of the new government as well as those of the multilateral financial institutions (IMF, WB, and IDB).

Electricity Sector Problems

The problems of the Nicaraguan electricity sector, as envisioned by INE in 1993, are as follows:

- ▶ A deterioration of existing infrastructure. There were frequent power interruptions, voltage fluctuations, and an increase in losses to 22 percent of generation at customer point of sale. The heavy losses included the widespread theft of electricity by an estimated 10 percent of residential customers, in addition to bill non-payment.
- ▶ Insufficient capital for capacity expansion, old infrastructure in need of rehabilitation and low reserve generation levels.
- ▶ Centralization of regulatory and operational activities for hydrocarbons and electricity in one institution, with different, and sometimes contradictory, objectives and responsibilities. Resulting lack of clarity between regulatory and commercial roles.
- ▶ Lack of a regulatory system that could critically evaluate the commercial role of the state as electricity producer, evaluate projected investments, proposed prices, quality of service, and efficiency.
- ▶ Electricity users without protection in case of problems. INE was the judge of problems, while it was at the same time seen as the cause.
- ▶ Tariff levels and structure set mainly as a function of national government macroeconomic and social policy. This had led to a weak financial situation for the electricity company that has not allowed it to cover its operating costs, obtain spare parts, give adequate maintenance to existing infrastructure, pay its debt, finance required investments and gain access to foreign capital.
- ▶ Lack of strict application of commercial criteria in management of the institution. This had tended to lead to the accumulation of a significant debt.
- ▶ On the consumer side there was a very low energy use efficiency. The energy intensity of the country was 5.4 BEP/1000 US\$ of GDP. Low energy prices in previous years had disincentivized efficient use of energy and led to the increasing use of energy without a corresponding increase in production. Primary energy imports had therefore increased, further exacerbating the trade and current account deficit of the nation. This was particularly troublesome for the nation as the performance of Nicaragua's economy is extremely sensitive to foreign exchange availability.

- ▶ Lack of qualified personnel in the country, made worse by emigration of such individuals since 1980.

Objectives of Restructuring

The objectives of electricity sector restructuring, as stated by INE's planning division in 1993, were the following:

- ▶ The creation of a transparent legal framework and institutional structure that works to best address the aforementioned problems.
- ▶ To establish conditions that facilitate the highest possible levels of competition and efficiency in the electricity sector, while protecting consumers from monopoly power.
- ▶ The definition of a new market structure that encourages private participation, foreign investment, and access to funds from the multilateral financial institutions.
- ▶ The establishment of a level and structure of rates that reflects economic costs of the resource, and that:
 - Sends correct price signals to consumers, particularly as it relates to efficient use of energy, and makes possible adequate incentives to capital for such investments.
 - Permits the electricity sector entities to generate funds adequate to cover operating costs, future investment, as well as debt service.
 - Efficiently assigns subsidies only to the poorest customers.
- ▶ Assures the independence of daily management from political interference through a clear separation of regulatory and commercial functions.\
- ▶ Separates generation and transmission from distribution so that organizations can focus on function.
- ▶ Improves efficiency in use of resources in the construction and rehabilitation of infrastructure through the introduction of commercial criteria, competition, and the use of private capital.
- ▶ Establishes realistic and verifiable regulatory financial oversight of the new entities.

- ▶ Guarantees minimum electricity cost through the coordinated operation of the system, while achieving acceptable standards of reliability, safety, and quality of service.
- ▶ Facilitates the expansion of the electricity system at minimum cost using a diversification of indigenous natural resources and imported fuels so as to reduce the adverse impact on electricity supply of any potentially disturbing natural, commercial or political circumstances.
- ▶ Increases the share of the population receiving electricity from 35 percent in 1994 to 60 percent in 2003.
- ▶ Allows for the construction of efficient infrastructure, by efficient use of financial and other resources, while reducing impacts on the environment to a minimum.

Additional Considerations Affecting Restructuring

These additional considerations affecting restructuring were also stated by INE in 1993:

Nicaragua's multi-lateral lending institutions, most particularly the Interamerican Development Bank (IDB), have been encouraging power sector restructuring for quite some time. The IDB had placed balance of payments support lending under conditionality of restructuring in the electricity sector during 1993 and 1994. This has, therefore, been an extremely important driver of restructuring.

INE wanted to establish a clear legal framework governing the electricity sector so as to promote and attract private investment to the sector. The attraction of private capital was a major goal of restructuring, though it was not considered an end in itself. Rather, it was considered a means, among others, by which the needs of the population, and national economic development, could be achieved. Private participation is part of the strategy to bring the benefits of competition to the electricity sector, that at the same time avoids monopolistic or oligopolistic conditions in the small and easily dominated Nicaraguan market.

INE officials quote studies by the World Bank and OLADE (Latin American Energy Organization) showing that electricity system operational efficiency does not correlate with the form of ownership (public vs. private), rather it is more the degree of government intervention driven by political decisions.

While the levels of investment required for generation and transmission infrastructure are probably too large for domestic financial groups to take on, INE hopes that domestic capital will be invested in the distribution sector where more appropriate opportunities will be available.

Different Restructuring Models Considered

Five different models of electricity sector restructuring were chosen as options by INE in the preliminary stages of their discussions on an appropriate restructured form for the sector. See the following Figure for a graphical representation of the different restructuring options:

Model 1: Complete vertical and horizontal integration in that all generation, transmission, and distribution in the country would be concentrated in one entity. Could be entirely publicly- or privately-owned, or a combination.

Model 2: A number of completely vertically integrated entities operating in different regions of the nation. Could be publicly- or privately-owned, or a combination. One of these entities should be responsible for economic dispatch and international interchanges, this entity would remain state-owned.

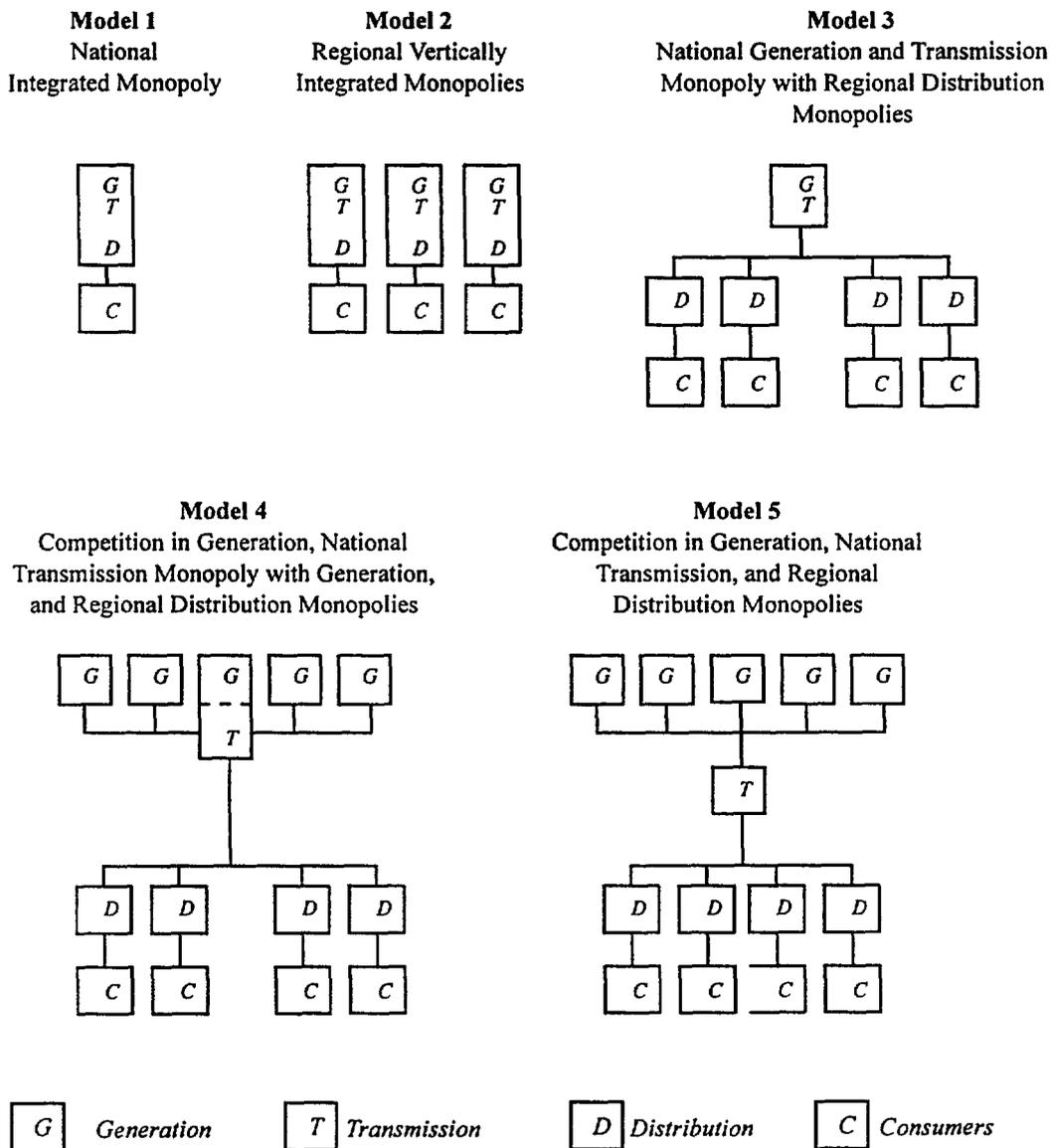
Model 3: A state-owned generation and transmission company owns all generation and transmission, and distribution is separated and broken into regional distribution companies. The state-owned generation and transmission company would sell energy to the distribution companies. It would also manage economic dispatch and international exchanges. The distribution companies could be publicly- or privately-owned, or a combination.

Model 4 -- Model Selected: Maintain a state-owned generation and transmission entity (though with the generation and transmission functions organizationally and financially separated), and separate the distribution function into various regionally-defined companies. Additional privately-owned generating companies are encouraged to form, that will sell their electricity production to the national generation-transmission company. The national generation-transmission company will sell power to the distribution companies and manage dispatch and international exchanges.

Model 5: Present and new generating capacity, as well as distribution infrastructure, to be separated from transmission. One state-owned transmission company would determine economic dispatch and international exchanges. The generation and distribution companies could be publicly- or privately-owned, or a combination.

Of the five models chosen for consideration model 4 was chosen as the new structure for the electricity sector. It was thought to facilitate the expeditious resolution of electricity sector problems, attract private participation to the sector, retain the institutional cohesion and more than 40 years experience of INE, and to do this while preserving the interests of the widest Nicaraguan public.

Figure F-1
Restructuring Models for the Nicaraguan Power Sector



Source: INE (1993a)

F.5 Distribution Sector Restructuring

Planned Structure of the Distribution Sector

In the second phase of restructuring, to begin in January 1996, the distribution function will be separated from ENEL. It is most likely that one distribution entity will be established at the beginning, though by the end of 1996 there will most likely be eight separate distribution companies. The exact arrangement is yet to be determined, and will be decided upon when the recommendations of a Swedish consulting company (Sydkraft) are made later this year.

Issues being studied by Sydkraft are the actual management capability of current ENEL staff working on the distribution side, as well as issues related to rate differentiation and costs of service in the different distribution zones of the country. The distribution and commercialization companies to be set up will be exclusively dedicated to such activities, and shall most likely be the following:

Exhibit F-2
Proposed Distribution Companies in Nicaragua

| Distribution Company Name | Estimated Value (US\$m) |
|-------------------------------------|-------------------------|
| Empresa Eléctrica de Managua | 33.90 |
| Empresa Eléctrica del Sur | 15.50 |
| Empresa Eléctrica de Occidente | 7.96 |
| Empresa Eléctrica del Norte | 15.22 |
| Empresa Eléctrica del Amerisque | 8.20 |
| Empresa Eléctrica de Bluefields | N.A. |
| Empresa Eléctrica de Puerto Cabezas | N.A. |
| Empresa Eléctrica de Ometepe | N.A. |

Source: INE (1991)

Since 1979 all electricity sector distribution functions were managed by INE. However, before 1979 there were a variety of distribution companies operating in the country. They were municipally- and privately-owned and there were also rural distribution cooperatives; all together they served 37 percent of the nation's consumers and sold close to 17 percent of all electricity consumed. An important segment of distribution had been constructed in the 1970s in rural areas with the technical and financial support of NRECA (the National Rural Electric Cooperative Association; a US government-funded agency). A number of the proposed distribution entities (Table A.1.) very closely resemble the rural distribution cooperatives established by NRECA and incorporated into INE in 1979.

The distribution entities spun-off from ENEL will initially be wholly state-owned. Private ownership, and share holding by employees is contemplated, however. A one to two year period of gradual privatization of up to 70 percent of distribution assets was proposed in 1993. This original distribution subsector restructuring proposal called for an initial sale of 40 percent of assets by international solicitation, with a further 30 percent going to employees. The state would retain 30 percent of ownership. Subsequent distribution system expansion by means of private sector (foreign and domestic) joint venture would be encouraged by the distribution companies. The smaller scale of required investment and technical capability (compared to generation and transmission) lends itself to such participation by Nicaraguan national construction, engineering, and financing companies.

The INE hopes that the exclusive focus of the proposed distribution entities be electricity distribution and commercialization. They would not compete or involve themselves in larger national level generation and transmission projects. INE hopes this will allow for the dedication of effort and resources to solving problems of energy losses, the installation of meters, and attention to customer needs at the distribution level.

Distribution Subsector Regulation

The principal function of the distribution companies will be to distribute and commercialize electricity. They will be required to purchase electricity from the transmission entity that will be established from ENEL. The details of this arrangement have yet to be determined, though it is contemplated that the distribution companies will be able to own and operate generation assets up to plants of 10 MW capacity. There is much small hydropower potential in the central and northern regions of the country.

INE and the Commission will work with the distribution companies to set prices according to geographic location, type of customer, etc. Tariff structure determination could be by the company or in accordance with a national tariff schedule. The distribution companies will be obliged to serve customers within their areas, while customers requesting connections may be asked to contribute to the cost of making a connection.

Investment decisions for the distribution companies will be made by the companies themselves, though they would be required to inform and consult with INE, the Commission, and ENEL on such undertakings.

F.6 Why Restructure Distribution?

The restructuring of the distribution sector is considered by INE officials as an integral component of sector reform and is conceived of to address pressing needs on the distribution side. The specific problems on the distribution side are the following:

- ▶ Deteriorated quality of electrical service and infrastructure: frequent power interruptions, voltage fluctuations. 30,000 legal customers without meters or with broken meters, distribution lines, transformers, and protection equipment in need of replacement.
- ▶ Technical inefficiency of electricity supply, particularly on the distribution side. Total generation to sale point inefficiency was estimated at 22 percent in 1993, one of the highest system inefficiencies in Latin America. Reduction of losses to 12 percent of generation is desired. On the distribution side utility officials have very little data on the real and reactive loads in individual distribution voltage circuits; many circuits do not have the minimum power factor correction equipment, while phase balance problems are also prevalent. Distribution circuit protection is by means of only the most rudimentary devices, which often trip due to overloading. Furthermore, distribution circuits have been extended beyond their design limits due to a lack of knowledge of loading as well as the absence of a system expansion plan. A detailed inventory of circuit routing, protection, and loading is needed.
- ▶ Large amount of electricity theft, particularly in urban areas. It is estimated that more than ten percent of the nation's residential users of electricity obtain it from illegal connections to distribution circuits. In many situations this has led to severe overloading of distribution voltage circuits and a consequent reduction in service quality for paying customers. The utility lacks the required funds to expand the distribution grid and purchase the required transformers and metering equipment to legitimize these connections.
- ▶ Officials in charge of electricity distribution and commercialization have no direct control over their operating budgets, which would be required for setting aside funds for system repairs and expansions and turning illegal connections into paying customers.
- ▶ Inefficient use of electricity by customers. Many large industrial users of electricity consume at low power factors (75 percent is common), while only the very largest users are metered for reactive power consumption. Many smaller industrial, commercial, and government consumers that are not measured for reactive power consumption have very low power factors. Much electricity end-use equipment is old, obsolete, and highly inefficient though

customers have no incentive to change and in many situations are not even aware of the extremely fast paybacks from investments in efficiency improvements. Although tariffs have been recently increased to better reflect production and delivery costs, there is still a lack of appreciation on the part of customers of the real economic costs of the use of electricity and its alternatives.

- ▶ Inadequate billing system. There is a great need for a new billing system that facilitates the obtaining, recording, and reporting of accurate data in a timely fashion. In addition, the system for issuing bills and distributing and receiving payment for them needs to be improved, as does the response of the utility for cases of disconnection and connection of service.

F.7 How has Distribution Restructuring been Carried Out?

As stated in the above general description of the restructuring of the Nicaraguan electricity sector the distribution subsector will not be spun-off from ENEL until the beginning of next year, although a structure is contemplated and it has been described above. Sydkraft has been working closely with INE since March 1993 on these issues. While the INE-Sydkraft cooperation has been directed at most aspects of the restructuring there has been particular emphasis on institutional reinforcement within INE (and now ENEL) so that the various entities that ENEL will be broken into in January 1996 will be equipped and able to succeed as independent organizations. The program aims to assist in the commercial areas of generation, transmission, and distribution so that the entities can operate under commercial criteria. Establishing such a "commercial culture" within what was once INE is the goal, and represents a major challenge to employees of the institution.

There has been much activity by the INE-Sydkraft project on distribution subsector issues; this has been headed by the INE-Sydkraft working group on distribution and commercialization. Detailed analysis of equipment, personnel, and capacity within the proposed distribution entities has been undertaken so that the proposed structure of the sector will be successful. Areas where institutional, technical, and management inadequacies have been identified are being addressed through project programs and training.

Specific activities of the project include a detailed analysis of the costs of electricity distribution (including technical and commercial losses) in the different regions of the country. In addition, there has been the establishment of, and training on, financial investment and accounting computer models, and an in-depth market analysis. This last activity included customer categorization, improved internal reporting systems, and attention to customer needs and marketing including establishment of free technical assistance to large customers and easier bill payment for customers (payment through banks, establishment of new payment offices).

The project has also assisted in the establishment of “centers of responsibility” within the existing ENEL institution. These centers of responsibility will soon become the administrative and management leadership of the new autonomous generation, transmission and distribution entities. Each entity will have financial and operational independence from other electricity sector entities. This will facilitate the commercial objectives of the restructuring.

It is expected that these autonomous entities will be better able than the old INE to respond to the challenges and opportunities in the distribution side of the electricity sector -- such as improvement of service quality, reduction of illegal connections, and improvement of system operational efficiency. In addition, a more direct and dynamic relationship will be established between management and workers within the various entities. Furthermore, such an organization will permit more direct control of profitability by bringing those responsible for commercial operation closer to customers. Detailed market studies are currently underway so as to better inform distribution company personnel and at the same time facilitate a new culture with an emphasis on customer service.

F.8 Evaluation of Restructuring

Private participation in the Nicaraguan electricity sector is currently underway. Nicaraguan indigenous energy resources are being developed within this new framework including geothermal, small hydropower and sugarcane biomass cogeneration. Thus, on the supply-side private capital has been attracted for system capacity expansion.

For the distribution subsector, assessment and evaluation of the restructuring process is not possible as the new distribution utilities have not yet been created.

G. PHILIPPINES

G.1 Summary

The Philippine 7,500-MW power sector is just coming out of a six-year period of chronic brownouts, largely solved by the addition of 1,300-MW of privately-owned capacity. At one point there was a 1,300-MW capacity shortfall. Further independent power producer generation is under development and it has been proposed that direct access provisions be added to the power sector regulatory and legal framework.

The period of severe electricity rationing in the early 1990s was partially motivated by the failure to complete a large nuclear reactor that the national power utility, Napocor, had commissioned Westinghouse to build in the 1980s. Construction of the nuclear power plant had come close to completion, though problems forestalled its entering into service. Napocor and Westinghouse are still in litigation to determine responsibility for failure to complete the project. At the same time, conversion of the plant for gas fueling has been considered.

Under the Ramos presidency the Philippine government took active steps to address the problems of the power sector. As stated above, private power capacity was contracted to alleviate electricity supply shortfalls. This included the connection of barge-mounted power generating systems to the national grid and the purchase of power under relatively short term contracts at elevated prices. Regulatory reform was also introduced during this period with the establishment of the Department of Energy. The Energy Regulatory Board is also responsible for regulation of the Philippine power sector.

Accompanying the introduction of independent private power producers and power sector regulatory reform in the Philippines, there has been ongoing debate within the government and among the nation's international development assistance organizations over whether and how further power sector restructuring should take place.

A detailed restructuring proposal for the significant overhauling of the nation's power sector was presented to the Philippine government at the end of 1994. However, it appears that little progress has occurred toward the implementation of the plan.

The plan calls for the restructuring and privatization of the state-owned vertically integrated utility, Napocor, into a U.K.- or Argentinean-style electricity industry. At the same time, the existing multitude of independent distribution companies and cooperatives will remain as they are. It is proposed that Napocor be split into five subsidiaries, including one each with Napocor's generation, transmission, and distribution assets. Assets will temporarily remain under government ownership but will be operated by the private sector and then subsequently privatized. The government's commercial and regulatory roles will be split in this way, and power sector regulation will continue to be coordinated by the two existing regulatory bodies.

H. POLAND

H.1 Summary

Until 1989, Poland's 32.2-GW electricity sector was entirely state-owned and was governed by the Polish Power and Lignite Board. In 1989 restructuring began with a power sector reorganization. Thirty-three distribution companies and thirty-two generating companies were set up, and in 1990 the Polish Power Grid Company was formed to own and operate transmission and dispatch. The goal of restructuring has been to create a competitive generation market, form a regulatory body, introduce private ownership, and separate transmission and distribution from other sector activities. It is hoped that reform will increase sector efficiency, facilitate requisite sector investment, and eventually ease pollution from coal burning (96% of electricity is generated from coal).

An Energy Law has been under formulation for four years and is soon expected to be approved by the parliament. In the meantime, the distribution companies, district heating plants, hydroelectric plants, and transmission companies have been set up as state-owned joint stock companies. Generation plants are to follow. The Energy Law will establish a regulatory body, permit open access, pave the way to privatization, and reform tariff-making procedures.

H.2 Power Sector Overview

Ninety-six percent of Poland's electricity generation is from coal, of this 57 percent is from hard coal and 39 percent from brown coal. There is 32.2-GW of installed capacity in the country, of which 94 percent is generated by publicly-owned power plants. The rest is autogeneration by industry. Fifty percent of electricity is generated from plants over 1000-MW in size, the largest plant is 4,300-MW. There are 115 hydro plants with a total capacity of 600-MW and 220 plants run by industry making up 3.2-GW. Many plants produce both heat and power for district heating systems. Tariffs were a third those of Western Europe until 1989. They have increased but still remain below those in the West. In 1992 tariff revenues made up only 45% of the total cost of electricity supply -- including investment costs for reconstruction and development up to 2001. By 1994 revenues only covered 50% of this required value.

H.3 Power Sector Organization and Restructuring

Until 1989, the Polish power sector was state-owned and operated by five regional power utilities under the Polish Power and Lignite Board. At that time the utilities were broken up and reorganized. Thirty-two generation enterprises and thirty-three distribution companies were formed.

Further restructuring plans were announced in 1990 after a team of Polish and international experts were commissioned to study reform options for the power sector. The proposed model called for the establishment of competition in the generation market, with transmission and distribution remaining as natural monopoly market segments. The restructuring experience of the UK was an important influence on the proposed sector structural design.

This general restructuring model was approved by the government and parliament in early 1990, and the Polish Power Grid Company (PSA) was formed to manage transmission, dispatch, and international interconnections. PSA also acted as pricing policy and system development coordinator for the enterprises of the sector. While more progress has been made towards the proposed industry structure, there have been many delays.

The Energy Restructuring Group (ERG) was formed in November 1992 to facilitate reform, but ongoing debate on an appropriate Energy Law has been a major source of delay. International development assistance has made important contributions to reform in the power sector. This assistance has included funding for the ERG, facilitating improved commercialization of power sector enterprises, pricing and tariff reform, and work in the area of energy conservation.

In 1993 the 33 distribution companies were incorporated as joint stock companies, a move designed to emphasize an improvement of commercialization and prepare for privatization. Until they become privatized they are to be controlled by the Ministry of Industry and Trade.

There are no plans to privatize the PSA. This allows it to carry the support of the government in backing the contracts it enters into with generators and distributors. In 1993 all power transmission systems over 110-kV were transferred to its ownership. It also became the main shareholder in the newly created joint-stock company that owns all the nation's pumped storage assets.

There have been many delays in the reform of the Polish power sector. Opposition to reform has been the major source of delays. This has come both from the management and workers of power sector entities. Major opposition from the Solidarity trade union federation has held up the break-up of Poland's immense mining and power generation complexes. In addition, opposition has come from the institutions of the Polish power system that have had considerable difficulty adjusting to and gaining experience in the new free-market context towards which restructuring has directed the power sector.

Despite the delays there has been progress on the passage of a new Energy Law (see below). Another recent development has been the formation of the PAK coal-fired generation company as a joint-stock enterprise. It's progress will have implications for the other coal generating entities in the country that currently all remain as state enterprises. It has been proposed that they eventually be restructured and managed by seven different holding companies. The state would maintain ownership for the present and privatization would be expected in the future.

Despite these hold-ups in the restructuring of the coal generating companies the nation's large hydroelectric plants and, in 1994, its combined heat and power plants, have been established as commercial joint stock companies.

Restructuring has been driven by a number of factors. The context for reform has been the nation's turn away from the command economy model of economic development. The need to attract investment for future system expansion of the sector has been of major importance and was the initial driver of reform in the late 1980s. Also of importance is the drive for improved efficiency of resource-use in the sector, and compliance with growing environmental protection regulations.

H.4 Regulation

The Polish Ministry of Industry and Trade (MoIT) has been responsible for Polish energy policy since 1987. Since the formation of joint stock companies in the sector it has acted on behalf of the single shareholder of the enterprises, the State Treasury. Under a 1934 law, however, the Ministry of Finance is responsible for setting electricity prices to final consumers. The MoIT is responsible for setting prices within the industry between generators, the transmission grid, and distributors.

The MoIT is also responsible for power sector expansion planning. In January 1995 it introduced a wholesale tariff for all distribution companies and large industrial customers. As energy prices to customers are set by the Ministry of Finance, the wholesale tariff led to different economic results for the distributors.

An Energy Law has been under debate for four years. The law deals with generators, transmission, distribution, and the use of energy and fuels. It will not cover fuel extraction and atomic energy. A basic principle of the new law is the clarification and separation of the state's role in the areas of policy making, regulation, and ownership.

The new law leaves the MoIT responsible for national energy policy. A newly established Energy Regulatory Authority (ERA) will be the central administrative body overseeing power and gas enterprises. It will issue licenses, approve resource plans, and enforce provisions of the energy law. The law also gives the go-ahead for privatization of the energy sector, though the State will maintain ownership of a few strategic enterprises (such as the PSA). In addition, the law provides for third party access and right of way on the transmission grid.

The main goal of the Energy law is to reconfigure the setting of prices for electricity. The MoIT will publish ordinances on the calculation of justified costs and reasonable rates of return on investments for power sector enterprises. On this basis, enterprises will submit tariff requests to the ERA. The ERA will balance the interests of customers and energy enterprises with final electricity price determinations. There will be a transition period for the

implementation of these plans up to the end of 1996. Within this period the Ministry of Finance shall hold the right over final determination of electricity prices.

In August 1995 the Economic Committee of the Council of Ministers accepted a draft of the new energy policy guidelines. This was subsequently approved by the entire Council of Ministers and sent to the lower house where discussions on the draft Energy Law will start in the autumn.

I. PORTUGAL

I.1 Summary

Until 1993, one State-owned company, Electricidade de Portugal (EDP), comprised 90 percent of the nation's 7,000-MW electricity sector. Last year, new legislation began restructuring the power sector. EDP was incorporated and divided into several business areas; one is charged with overall sector management, another with generation, one with transmission, and four with distribution. Restructuring is ongoing and eventually a regulatory body will take charge of oversight of the power sector. Privatization of EDP is being considered and allowing independent power producers is being contemplated.

Restructuring has been driven by high losses in distribution, insufficient financing for electricity production expansion, and pressure from the nation's industries who stand at a competitive disadvantage due to the nation's highest electricity tariffs in Europe

I.2 Power Sector Organization and Restructuring

In 1991, 27.9 TWh of energy was produced with 7,000-MW of installed capacity. A third of generation is from hydroelectric sources with the rest coming from traditional thermal plants.

EDP was created soon after the 1974 revolution by the nationalization of 14 private electricity companies. Subsequent transformations to the power sector began after the country joined the EEC in 1986. In 1991, the Portuguese government decreed that EDP's status should change from wholly state-owned to a public limit company, and the company was instructed to develop a restructuring plan. This was brought about to pave the way towards better efficiency, improved service, and better financial results for electricity sector participants.

As well as the incorporation of independent electricity generation, transmission, and distribution joint stock companies, the 1993 restructuring plan recognized the regulatory role of the Ministry of Energy's Department of Energy (DGE) and led the way to the creation of four other companies in the EDP Group. These entities cover the areas of technical services, international trade, and information technology.

The restructuring plan opens the sector to private investment, both in the form of subcontracting to EDP and direct sales to the national grid. There is already non-EDP generation in the country including two 300-MW blocks owned by the UK-generation firm National Power, and a 900-MW natural gas-fired plant currently under construction. This plant is owned by Siemens and is to come on line in 1997.

The new industry structure establishes a concession regime for transmission grid operation as well as binding and non-binding power market segments. The binding market consists of long-term agreements between generators, the transmission company, and distributors. In this market segment the government would determine which energy resources are to be developed. The non-binding market, on the other hand, is to be more market-oriented.

Tariff regulation sets out to accomplish three main objectives. Primarily, the main objective is to improve the economic signals seen by all sector participants; second, to balance risk and reward for all parties; and lastly, to keep tariffs reasonably stable and uniform throughout the country. Tariff regulation will be carried out by the independent regulatory body, who will also ensure consumer protection, adequate competition, and supervise the construction of new power stations.

Direct access will be permitted for large consumers, and the transmission grid operating company will be remunerated on a rate of return on assets basis. For distributors there will be a Bulk Supply Tariff, and separation of the costs for supply and the costs for electricity. These costs will be determined every five years by the regulator and adjusted according to a Consumer Price Index minus a regulated productivity offset (CPI-X) method.

J. SWEDEN

J.1 Summary

Restructuring of the Swedish power sector began in January 1992 with a major overhauling of the State Power Board. The bulk power network was spun-off and constituted into a new state utility called the Swedish National Grid company. This entity controls the transmission system and international power exports and imports. The rest of the State Power Board was corporatized into a state-owned limited liability corporation called Vattenfall AB. Subsequent emphasis has been placed on achievements for Vattenfall's commercial performance. At present, the government is considering the partial or total privatization of Vattenfall.

Further power sector reform legislation was passed by the Swedish parliament in May 1994. The aim of the legislation was to bring competition to the generation and distribution subsectors of the nation's 34,500-MW power system, as well as non-discriminatory access to the transmission grid. On January 1, 1995, a new regulatory body was established. The regulatory body is called the National Board for Industrial and Technical Development (NUTEK).

In the new power sector structure and regulatory environment there will be direct access and contracts between generating companies and distribution companies, as well as sales and purchases to the pool. Competition will be stimulated in the power sector by allowing open access and by breaking the geographical monopoly of distribution companies to supply electricity to customers. Electricity customers will be able to purchase power from any domestic or foreign provider.

The distribution subsector has always been largely separate from generation and transmission, and was traditionally made up of more than 300 distribution companies. About 280 of these were municipally owned companies. The largest distribution company has 12 percent of customers, while the second largest, Sydkraft, has ten percent of distribution. All together, the ten largest distribution companies cover only 50 percent of the market. The average number of customers per distribution company is 19,500. Only 23 distribution companies have more than 50,000 customers.

Within the restructured power sector environment it is expected that there will be a consolidation in the distribution subsector. Some municipalities are divesting of their electricity distribution interests due to an inability to compete in the new environment. At the same time, others are forming pools with other municipalities or outright combining assets and creating new larger distribution and supply entities more commercially viable in the new power sector context.

K. UNITED KINGDOM

K.1 Summary

The UK restructuring experience is widely cited as an example of how to encourage competition in generation and privatize large state-owned enterprises. The nation's 65,000-MW electricity sector was transformed by the 1989 Electricity Act. The state-owned Central Electricity Generating Board was divided into three generating companies and a grid company; two of the generating companies were privatized. A regulatory body, the Office for Electricity Regulation, was set up to oversee sector functioning, licensing and approve tariffs.

The nation's distribution subsector has traditionally been operated by organizations separate from generation and transmission, though the recent industry restructuring involved a change in ownership from the public to the private sectors. Performance-based regulation has attempted to provide incentives to improve efficiency in the distribution subsector.

K.2 Power Sector Overview

Total capacity in 1993 was 65,000-MW. There are more than 25 million customers. The fuel mix in 1992-93 for England and Wales was as follows: coal 66 percent, nuclear 20 percent, oil and orimulsion five percent, natural gas one percent, while imports from France and Scotland comprised eight percent. It is estimated that by 1998 coal's share of fuel used in the electricity sector will drop to 38 percent while natural gas will rise to 29 percent.

K.3 Restructuring in the UK

The UK electric power industry was restructured and privatized on March 31, 1990 under the 1989 Electricity Act. The privatization of the electricity sector was undertaken at the same time as state divestiture of other infrastructure. Water, natural gas, and telephones were privatized under the policies of a series of Conservative governments that dominated British politics during the 1980s.

Before restructuring, the state-owned and managed Central Electricity Generating Board (CEGB) was the sole entity responsible for all generation and transmission. Twelve Area Boards handled distribution, sales, and retail services. The Boards purchased power from the CEGB at a bulk supply tariff. Other players were large consumers who purchased power directly from the CEGB, and independent generators who sold power to the Area Boards.

After restructuring, the CEGB was separated into four entities: the National Grid Company and three generating companies. Two of the generating companies were privatized, National Power and PowerGen. The other generating company, Nuclear Electric, remains state-owned.

The 12 Area Boards were privatized and renamed Regional Electricity Companies (RECs). The RECs generally have two main functions: the so-called “wires” business (distribution network operation) and the supply business (sales of electricity to consumers within or outside of their specific service area).

The power pool created by the restructuring legislation is operated by the National Grid Company. Generating companies bid 1/2 hour prices a day in advance to the pool and the pool price is the marginal dispatch bid price. Generating companies receive the pool price for all power sold into the pool. The RECs purchase power from the pool at a price equal to the pool price plus a surcharge for transmission, reserves, and ancillary services. The RECs have a responsibility to purchase power economically for their franchise market (any customer with consumption at or below the 100-kW level). At the same time, the customers in the nonfranchise market (above the 100-kW threshold) can purchase from a RECs supply arm, from the pool or from another licensed supplier. By 1998, it is expected that the franchise market will be removed entirely permitting any consumer to purchase from the supplier of their choice. In addition to the electricity supply price, the consumer must also pay the applicable wheeling charges for the power.

The regulatory body is the Office for Electricity Regulation (OFFER) which is headed by the Director General of Electricity Supply. In broad terms, OFFER approves tariffs for transmission and distribution wheeling and retail supply functions (such as metering and billing) using a price cap formulation. Additionally, OFFER is responsible for monitoring and enhancing competition and establishing standards of performance for power sector participants.

There are many conclusions that can be drawn from the UK restructuring experience. Some of the few of particular importance include:

- ▶ to establish a market structure that is effectively competitive, there is a need to consider the number of players in that market; the UK restructuring established a duopoly that has resulted in “gaming” of the pool and pool prices being driven higher than would be expected in a sufficiently competitive market;
- ▶ standards of performance are important components to the licensing process and enforcement of the standards is critical;
- ▶ privatization combined with the performance-based regulatory mechanism used to regulate the RECs has led to dramatic improvements in productivity through aggressive cost-cutting; it is doubtful that a state owned enterprise could ever have achieved such impressive productivity improvements;
- ▶ having twelve RECs has provided an opportunity for OFFER to consider benchmarks in reviewing the performance of each REC and determining the

components of the price cap formulation; additionally, having numerous has led to the development of new options for serving customer needs;

- ▶ establishment of a semi-autonomous regulator is a critical need to insulate the power sector from serious government interference and to support market reform.

APPENDIX B
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