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**A COMPARATIVE INTERNATIONAL REVIEW OF POWER
SECTOR REFORM AND ITS IMPACT ON ACCESS TO
ELECTRICITY BY POOR COMMUNITIES**

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This thesis forms part of the fulfilment of the Masters Degree in Philosophy

**ENERGY RESEARCH CENTRE
FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT
UNIVERSITY OF CAPE TOWN**

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ACRONYMS

ADB.....	Asian Development Bank
AMP.....	Ampere
ANEEL.....	Electricity Regulatory Agency of Brazil
BPPCO.....	Bangchak Petroleum Public Company Limited
BMA.....	Bangkok Metropolitan Electricity Authority (Thailand)
BNDES.....	Brazilian Development Bank
BOO.....	Build-Own-Operate
BOOT.....	Build-Own-Operate-Transfer
CAMMESA.....	Compania Administradora del Mercado Mayorista Elctrico SA (Argentina)
CCPE.....	Coordinating Committee for Planning and Expansion (Brazil)
CDEC	Autonomous Generating Industry Groups (Chile)
CEEE.....	Companhia Estadual de Energia Elétrica (Brazil)
CELG.....	Companhia Energética de Goiás (Brazil)
CHILGENER.....	Electricity Generator of Chile
CORFO.....	Corporation for Fostering Development (Chile)
COSATU.....	Congress of South African Trade Unions
CPX.....	Capital Price Index
DISCO.....	Electricity Distribution Companies (Thailand)
DGEED.....	Directorate General for Electricity and Energy Development
EBSST.....	Electricity Basic Subsidy Tariff (South Africa)
ECB.....	Electricity Control Board (Namibia)
EDF.....	Electricite de Francais
EDI.....	Electricity Distribution Industry
EDI-HL (PTY LTD).....	Electricity Distribution Industry Holdings Company Limited (South Africa)
ELDC.....	Economic Load Dispatch Center (Chile)
EGAT	Electricity Generation Company of Thailand
ENCON.....	Energy Conservation Promotion Fund (Thailand)
ENDESUR.....	Electricity Distribution Company (Argentina)

ENDENOR.....	Electricity Company (Argentina)
ENRE.....	Ente Nacional Regulador de la Electricidad (Argentina)
ERA.....	Uganda Electricity Regulatory Authority
EREDCo.....	Erongo Regional Distribution Company (Namibia)
ERT.....	Energy for Rural Transformation (Uganda)
ESI.....	Electricity Supply Industry
ESKOM.....	Electricity utility in South Africa
GEF.....	Global Environmental Facility
GENCO's.....	Competitive Generation Companies
GDP.....	Gross Domestic Product
HTML.....	Hyper Text Mark-Up Language
IGSO.....	Independent Grid System Operator (Malaysia)
ISO.....	Independent System Operator (Thailand)
IADB.....	Inter American Development Bank
IDEC.....	Consumer Defence Institute (Brazil)
IMF.....	International Monetary Fund
INEP.....	Integrated National Electrification Programme (South Africa)
IPP.....	Independent Power Producer
JBTC.....	Java-Bali Transmission Company (Indonesia)
kV.....	Kilovolt
LPG.....	Liquefied Petroleum Gas
MAE.....	Wholesale Energy Market (Brazil)
MCC.....	Management Coordination Committee (Erongo Region Namibia)
MEA.....	Metropolitan Electricity Authority (Thailand)
MEMD.....	Ministry of Energy and Mineral Development (Uganda)
MIG.....	Municipal Infrastructure Grant (South Africa)
MOU.....	Memorandum of Understanding (Malaysia)
MME.....	Ministry of Mines and Energy (Namibia)
MRLGH.....	Ministry of Regional and Local Government and Housing (Namibia)
MW.....	Megawatt

NAMDEB.....	Namibian Development Bank
NERP.....	National Economic Recovery Plan (Malaysia)
NamPower.....	Namibian Power Utility
NSC.....	National Steering Committee (Malaysia)
NESBD.....	National Economic and Social Board for Development (Thailand)
NDC.....	Namibian Development Corporation
NEC.....	National Energy Commission (Chile)
NECC.....	National Electricity Coordination Committee (South Africa)
NER.....	National Electricity Regulator of South Africa
NNWG.....	Northern Namibian Working Group
NORAD.....	Norwegian Agency for Development
NORED.....	Northern Electricity Distribution Company (Namibia)
NRSE.....	New and Renewable Sources of Energy (Thailand)
N\$.....	Namibian Dollar
OFPS.....	Owen Falls Hydro Power Station (Uganda)
ONS.....	National Electricity Operating System of Brazil
PAEPRA.....	The Argentinean Rural Electrification Program
PEA.....	Provincial Electricity Authority (Thailand)
PLN.....	Perusahaan Listrik Negara (Indonesia)
PNER I & II.....	First and second Rural Electrification Programme (Brazil)
PPA.....	Power Purchase Agreement
PTT.....	Petroleum Authority of Thailand
PTTEP.....	Petroleum Authority of Thailand Exploration and Procurement Company Limited
PRODEEM.....	The State and Municipal Electric Power Development Programme (Brazil)
REP.....	Rural Electrification Programme (Thailand)
RDP.....	Reconstruction and Development Programme (South Africa)
REC.....	Regional Electricity Company (Indonesia)
REP.....	Rural Electrification Programme (Chile)
REMP.....	Rural Electrification Master Plan

RESP.....	Rural Electrification Strategy Plan
Rp.....	Rupiah (Indonesia)
PND.....	National Privatisation Programme of Brazil
SAPP.....	Southern African Power Pool
SB.....	Single Buyer
SBU.....	Strategic Business Unit (Indonesia)
SESCO.....	Sarawak Electricity Supply Corporation (Malaysia)
SET.....	Stock Exchange of Thailand
SHS.....	Solar Heating System
SIC.....	Central Transmission Grid of Chile
SING.....	Northern Transmission Grid of Chile
SE/CE.....	South-East/Central-East (Brazil)
SOE.....	State Owned Enterprises
SPP.....	Small Power Producer
TNB.....	Tenaga Nasional Berhard (Malaysia)
TRANSENER SA.....	Transmission Company of Chile
UEB.....	Uganda Electricity Board
UEGCL.....	Uganda Electricity Generation Company Limited
UETCL.....	Uganda Electricity Transmission Company Limited
V.....	Volt

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CHAPTER ONE - INTRODUCTION

“Electricity reform is based on the premise that market mechanisms supply electricity much more efficiently than central planning can. But how will the poor, who have least purchasing power fare in a competitive market? Will those without access continue to be denied it as electricity supply changes from a public service to a profit-seeking business? And will the poor who have access suddenly find it unaffordable?” (Powel & Starks, 2000).

1.1 RATIONALE

The above quote summarises to a large degree the rationale of this study, that is, how will poor communities fare with restructured and often privatised electricity utilities. Will electricity services be extended to those who currently do not have a connection? And will they be able to afford the service?

Since the early 1980's, a number of countries have been undertaking power sector reform. Very often the drivers for change included the need to reduce reliance on public finances and to obtain foreign capital, either to service loans, or for investing in new capacity. Latin American countries were the forerunners in this regard, with Chile amongst the first. The other main driver was to improve the financial and technical performance of the electricity industry. The rationale for this initiative could also be found in other factors, which are discussed as the countries are dealt with individually later in this document. One important aspect thereof is clearly the 'public benefit' implications of power sector reform, which are more pressing in developing countries.

Until the 1980's, the electricity industry was viewed as a natural monopoly, and the concept of economies of scale reinforced this point of view. However, with dramatic technology improvements, it became possible to generate electricity competitively in smaller power plants, and thus alternatives to monopolistic industries were increasingly feasible. Competition is now possible in generation and supply. Developers other than the state can participate in the industry either as Independent Power Producers (IPPs) or as distributors and suppliers of electricity. According to the principle of competition, the introduction of new players into the market should lower electricity prices. This study investigates if this holds true in developing countries and whether power sector reform slows down or accelerates electrification access for the poor.

Power sector reform generally involves a number of discrete steps. If incumbent, state-owned enterprises are performing badly – then initial steps might involve commercialisation and corporatisation: i.e. greater emphasis is placed on financial viability (prices and income covering costs). The utility may also be placed within a corporate governance framework, at arms length to government, with professional management and a clear shareholder performance agreement.

The next step in reform often involves vertical unbundling of the competitive elements of the industry from non-competitive elements: i.e. generation and supply, which are potentially competitive, are separated from transmission and distribution wires businesses – which tend to remain natural monopolies. The generation business might also be horizontally unbundled into a number of competing companies. Competition can then be encouraged through the development of a power exchange or a market for bilateral contracts. Competition might also be encouraged through private investors bidding for Independent Power Producer contracts or for private concessions.

Power sector reform might also involve privatisation – where state-owned assets are divested. Power sector reform invariably also involves the establishment of independent regulators who are responsible for setting electricity tariffs in those sector of the industry where competition is still absent – or, with competition authorities, they might also be responsible for monitoring and safe-guarding against market power and abuse.

Whether the structure is a monopoly and vertically-integrated, or unbundled, competitive and privatised, all power sectors have to strive towards higher efficiency and improved performance, whether the agenda is financial sustainability or public-benefit oriented. In a time when power sector reform is sweeping many parts of the world, it is important to review experience to date with respect to the impact on the welfare of the poor. This is the rationale for this study. It is important to learn about past efforts and mistakes, and to identify areas of improvement for power sector reform initiatives.

1.2 OBJECTIVES

In essence, this study seeks to identify the impacts of power sector reform on access to electricity by poor communities. Access is defined in terms of physical electrification and also in terms of affordable access.

In the first instance, this study investigates the nature of power sector reform in different developing countries in terms of moving from monopolies to competition and steps such as corporatisation, unbundling and privatisation. Secondly, the study looks at progress in electrification and impacts on prices. Thirdly, the study identifies relevant energy policies regulatory instruments, financial mechanisms and implementing agencies that are conducive for promoting access to electricity as power sectors are reformed.

1.3 RESEARCH METHODOLOGY AND LIMITATIONS

The above questions have been investigated in the context of a number of country case studies. The study does not pretend to be comprehensive or representative. Rather, a number of countries in Latin America, Africa and South East Asia have been chosen that cover a range of reform situations that are sufficiently interesting and different – and where some data is available. The intention is to give a broad overview of some international trends – rather than a definitive global answer to the research questions identified above.

The methodology followed in this study relied primarily on information gathering from the internet, as most of the documents used, with particular reference to regions such as South East Asia and Latin America, are very difficult to get hold of in hard copy format. One of the benefits of internet-based research is that documentation is often posted on the internet soon after publication or conferences held. The documentation was generally downloaded in either HTML-format, or PDF format, and saved on hard-drive to work on as the need arose.

There are many limitations of internet-based research for a study of this kind. Often abstracts were given in English regarding a certain topic, but the document itself was in a foreign language. Data is not necessarily up-to-date – and often it was simply impossible to obtain sufficient time-series data to assess real impacts on electrification rates and on electricity prices. Some electrification data, particularly in South East Asia, refers mainly to villages, rather than households.

The ideal would have been to collect primary data personally and to have visited all the case study countries. In the absence of sufficient sources, this was impossible. Nevertheless, this internet-based project has created a useful opportunity to provide a new overview of international progress in this area of power sector reform and electricity access. The

intimidating task of sifting through masses of information has provided a tough test of the author/student's ability to locate, collate and analyse relevant information and present it in a form that provides a coherent picture of international trends and useful lessons for future best practice.

Power sector reform is an ongoing process. At some point, the study had to define a cut-off date around data collection. This was March 2003 – and hence the analysis does not necessarily include latest developments.

1.4 STRUCTURE OF THE STUDY

Each chapter deals with a particular geographical region, with three different countries covered in each region. Each individual country approaches power sector reform in its own particular way, although there are certain general trends noticeable. Each country section attempts to describe the pre-reform situation and drivers for change, the changes themselves, the introduction of laws and bills to accommodate such changes, and impacts on electrification and the affordability of electricity.

Chapter two provides an overview of the Latin American experience with regard to power sector reform, and deals with Brazil, Chile and Argentina. This region was chosen as the first chapter as Chile and Argentina were some of the first countries to embark on power sector reform.

Chapter three provides an overview regarding the status of power sector reform in Africa, and deals with Uganda, Namibia and South Africa. This chapter seeks to showcase a variety of conditions and possible futures of power sectors, and their approaches to widened access to electricity.

Chapter four deals with South East Asian counties – Malaysia, Indonesia and Thailand. They are generally more developed, but still have communities with poor access to electricity and other energy services.

Chapter five is the conclusion to this study and attempts to consolidate the information obtained about the three regions, and to draw some conclusions from their experiences that can be helpful to other economies embarking on the same road.

CHAPTER TWO - LATIN AMERICA

2.1 BRAZIL

2.1.1 OVERVIEW

Brazil is the largest country in South America, with a population of approximately 176 million people. Approximately 78% of the population is urbanised, or peri-urbanised. In 2000, the per capita GDP was US\$ 3,524, and between 1970 and 2000, and average annual population growth rate was 2%, the economic growth rate approximately 4,3%, and total energy consumption grew by 5,4% per annum during this period. The electricity market has approximately 45 million customers, consuming an average of about 300 GWh per annum. Currently Brazil has a power generating capacity of 74GW, of which 95% is hydro-generated. There are three main areas in which the electricity system is operating:

- South/South-Central;
- Northeast; and
- some isolated systems

The heaviest load is carried by the South-Central region; hydro facilities are located on only a few rivers. Brazil has some large river systems, which are utilised not only for electricity generation, but also irrigation and navigation. As droughts were experienced during some seasons, it is recognised that there is a need for some thermal generation. Droughts can wreak havoc with the ability to supply sufficient electricity according to demand (Brown A, 2002).

Brazil had until recently five state-level vertically-integrated utilities (CEMIG, COPEL, CEEE, CESP AND CELG) but some are in a process of unbundling. ELETROBRAS is currently acting as a holding company and sector-financing agent, as well as being responsible for many of the integrative functions of the sector, such as the CEPEL R&D Facility. There are four regional generation/transmission subsidiaries of ELETROBRAS:

- FURNAS – operating in the South-Central area, and is also responsible for the Angra power station
- ELETROSUL – owning hydro and thermal plants in the South;
- CHESF – owning the hydro plants on the San Francisco River in the Northeast; and
- ELETRONORTE – which is responsible for some of the integrated generation/transmission systems in the North, and the Centre-West, as well as many of the larger isolated systems in the North.

Together, the above-mentioned companies represent some 38% of available electricity capacity. In addition, there is also ITAIPU – the Brazil-Paraguay bi-national company, which accounts for 24% of available electricity. (Brazil is entitled to 50% of consumption, but it actually purchases some additional electricity). There are other entities, consisting of 24 more public, private and municipal distribution and retail concessionaires, small rural electricity co-operatives and auto-generators. The distribution utilities – some 31 companies, are primarily responsible for distribution and retail under public service concessions, which cover all, or a substantial part of the 26 states and federal districts. At least three of these have been privatised and preparations are in progress in several states to undergo the same process (no author - www.mnr.gov.br.energia-i.htm).

Currently, the structural players in the market are:

- ANEEL, which is semi-independent, regulating and controlling activities in the electricity sector;
- The National Electricity System Operator (ONS), created in 1988, to coordinate and oversee the optimisation of the generation and transmission activities among the interconnected systems;
- The Wholesale Electricity Market (MAE), which started operating in 2000, and is the official registry for long-term power contracts and the official market-place for short-term market deals. It oversees consumption and monitors prices, centralising and allocating electricity flows and generation schedules to minimise operating risks. MAE membership consists of generators, IPP's concessionaire utilities with more than 50MW capacity, and sellers handling more than 50MW;
- The Coordinating Committee for Planning and Expansion of the Electricity Systems (CCPE) which started operating in 2000
(no author - www.infrastructurebrazil.gov.br/english/perfis/ene1.asp).

2.1.2 INSTITUTIONAL HISTORY AND FRAMEWORK

The electricity industry in Brazil originated in the 1890s. In 1934, it was determined that the federal government would be allowed to grant developmental rights in the electricity sector to private initiatives. Later the federal government decided that multilateral banks could only provide financing for state owned electricity generating projects. With this decision, was born the first state-owned electricity companies that were responsible for supplying Brazil's electricity requirements during the following decades. Some years later, under the

Administration of President Kubitschek, the Targets Plan was launched which called for intensive state-involvement in the energy sector. The process of state-involvement peaked in 1963, with the founding of ELETROBRAS. The state utility grew in the 1970's with the aid of international finance backed by state guarantees. This situation led to surplus installed capacity (no author - www.mrc.gov.br.boletim/energia-i.htm & Costa, 2001).

Between 1950 and 1990, successive governments invested heavily in hydroelectric plants. The systems permitted energy to be stored in huge water reservoirs and different rainfall cycles could be counterbalanced through a federal transmission system that linked the different river basins. The unfavourable economic situation of the 1980's did not directly affect the electricity sector, which was able to meet demand even though investment in the energy sector had dried up. However, the industry became progressively more indebted and for long periods tariffs were below actual costs. (no author - www.mrc.gov.br.boletim/energia-i.htm & Costa, 2001)

Currently, Brazil is experiencing slower than expected economic growth, and is grappling with electricity shortages. The hydro-dependent electricity sector is strained beyond capacity after several years of below-average rainfall. During May 2001, government announced that both industrial and residential consumers had to reduce consumption by 20% for pre-determined times, or face fines. Residential customers were required to cut consumption to 80% of their average use for the months of May to July 2001. The rationing ended on 28 February 2002. Under-investment in the sector was viewed as the primary cause for shortages, as demand grew rapidly in the 1990's with 1999-consumption being approximately 55% higher than in 1990. Installed capacity grew by some 25% during the same period, but over the past twenty years, consumption has risen at rates that outstripped the growth in GDP. For the most part, this has been the result of urban population growth, government's efforts to make electricity more affordable, and the modernisation of the economy. During this period, the increase in residential, commercial and rural consumption is noteworthy, but the industrial sector did not show such intense growth.

(No author-

www.iie.org/programs/energy/downloads/Proceedings/EnergySectorProfiles/Brazil.doc)

Some of the drivers for the restructuring process can be described as the following:

- In an attempt to reduce government debt, power sector reform has taken place in parallel to fundamental changes in economic policy, which have been designed to stabilise the currency, open markets to competition and reduce national debt;

- To address social needs, especially socio-economic needs and low electrification rates;
- Improving the performance of the distribution sector;
- Ensuring reliable electricity supply and enhance access to electricity for those communities not connected to electricity;
- Establishing conditions that encourage economic efficiency in all segments of the sector;
- Supporting the further development of economical hydro-electrical plants as the largest source of indigenous energy;
- Creating conditions that will support the continuation and sustainability of the privatisation programme (no author - www.mre.gov.br/energia-i.htm; and no author www.eletrabras.gov.br/downloads//planejamento/relatorio_eng/Stage%20IV/Draft%20Report%20IV-1/Summary%201.pdf).

2.1.3 REGULATORY REFORM

The Brazilian power sector reform commenced during 1993, with the implementation of important regulatory legislation, based on the 1988 constitution. The following were the legal landmarks paving the way for the reform process:

- The 1995 Concession Laws (Laws No 8987 and 9074);
- The approval of the National Privatisation Program (PND);
- The extension of privatisation to the State Privatisation Program (PED);
- The Federal Law 9427 of December 1996, which created the Electricity Regulatory Agency (ANEEL)
- The creation of two officially recognized private bodies, the Wholesale Energy Market (MAE), and the National Electricity System Operator (ONS). (No author - www.infrastructurebrazil.gov.br/english/perfis/ene1.asp).

ANEEL is a semi-governmental organisation, established with a public, legal personality and assets, with administrative and financial autonomy. The mission of ANEEL is to promote the development of electricity markets in a regulated and balanced manner. Activities started in December 1997. The structure of ANEEL is two-tiered, with a Board of Directors (consisting of a Director-General and four Directors) and twenty superintendents. ANEEL'S main functions are:

- The regulation of generation, transmission, distribution and trade of electricity;
- To mediate disputes between industry players and consumers;

- To authorise new electricity installations and services;
 - Ensure fair competition in the industry, as well as open access to electrical systems;
 - Ensuring fair consumer rates and the provision of quality services to create conditions encouraging continued investment;
 - Ensuring electricity supply to customers of all levels of income – rural and urban – as well as those living in areas with low demographic or economic density;
 - To educate and inform industry players and society about energy policies;
 - Decentralising ANEEL's activities to state-wide regulatory agencies by means of agreements;
 - Ensuring transparency and effectiveness in its relations with society
- (No author - www.aneel.br.org).

Brazil had no history of independent regulation, and the formation of the regulatory agency was preceded by privatisation and concessions. There remain critical issues within ANEEL, such as the ability to attract and retain well-trained staff, and a lack of professional diversity. In addition, the agency is plagued by budgetary uncertainty. The Performance Contract with the Ministry of Mines and Energy and the relationships with other government agencies remain problematic. Challenges revolve around the boundaries of policy and regulation, and the centralisation or decentralisation of regulation. The judiciary is inexperienced in regulatory matters, with a lack of defined criteria for judicial review and remedies. Brown (2003) also notes a lack of resources for consumer advocacy, as well as a lack of coordination with other network regulators (Brown 2003).

2.1.4 PRIVATISATION DRIVE

Subsequently, the State has decided to focus its role on policy-making and regulation, rather than as the owner of electricity assets and has embarked on the National Privatisation Programme (PND). The 1995 passing of the *Ordinary Act (Act 9,074)*, gave legal sanction to the constitutional principle that the State is allowed to transfer the operations of public utilities to private investors. ESCELSA, which was a concessionaire of ELETROBRAS, was the first electricity distributor to be privatised, followed by LIGHT during June 1996. Other companies that were also privatised between 1995 and 1996 were COELBA (Bahia), CEMIG (Minas Gerais) and CFPL (the 2nd largest distribution company in Sao Paolo). The number of invitations to tender for the privatisation of more distributors and new hydroelectric plants picked up during 1997. The 1998 restructuring of ELETROBRAS was authorised by the

National Operator of the Electricity Grid (ONS), and the Wholesale Electricity Market (MAE) (no author - www.mre.gov.br/boletim/energia-i.htm and Lewis et.al. 1999).

Brazil initially chose to limit the scope of the electricity market in various ways. When privatisation commenced, all available generation capacity was allocated among distributors, giving each player a mixture of contracts from older and newer hydro stations. It enabled a mixture of cheaper and more expensive power assets. From 2003 to 2006, these original energy contracts were to be renewed one year at a time, dropping the volume each year by 25% of the original amount to reach zero in 2006. The so-called “original energy” that becomes available (25% per annum) can be negotiated freely, but never for periods of less than a year. The spot market is limited to a maximum of 15% of the total market. The MAE and NOS have established procedures in order to distribute this 15% load between generation companies, using criteria including marginal operating cost and optimisation of reservoir capacity in each hydro basin within the regional sub-markets;

- a) MAE set up a phase-in for spot prices, namely:
 - 1 September 2000 – monthly
 - 1 July 2001 – weekly
 - 1 January 2002 – hourly
- b) Spot market sales are conducted in four regional sub-markets, North, Northeast, South and Southeast and Midwest, and are not allowed to be conducted across regional boundaries. Only long-term contracts of more than one year can cross the regional boundaries;
- c) The spot market acts as a commodity market for energy that is not tied to bi-lateral contracts, and whose price is determined by prevailing conditions of supply and demand (No author- www.infrastructurebrazil.gov.br/english/perfis/ene1.asp).

Critics of the privatisation of the power sector argue that ELETROBRAS’s competent planning staff were disbanded and nothing similar was created in its place. Privatisation also brought tariff increases, which were not popular among consumers. As an example, LIGHT, (Rio de Janeiro), was auctioned in May 1996 to the French EDF, American AES and Brazilian CSN. Under the contract LIGHT would receive energy from the State generating company Furnas at \$23 per MWh, and would sell it to consumers for \$120/MWh. According to a survey carried out by the Consumer Defence Institute (IDEC), since 1995, electricity tariffs have risen 108% above the average rate of inflation for the corresponding period (Costa, 2001).

The following table summarises privatisation transactions in Brazil since 1995:

Table 1- Privatization Record Since 1995

1995	COMPANY	SELLER	BUYER
	ECSELSA	ELETROBRAS	Banks and pension funds
1996	LIGHT	ELETROBRAS	AES, EDF, Houston Industries, CSN
	CERJ	Rio de Janeiro State	CHILECTRA ENDESA and EDP
1997	CEMIG (33% steak)	Minas Gerais State	AES, Southern Electric, local investors (Banco Opportunity)
	COELBA	Bahia State	Iberdrola, Previ, BB Investimentos
	CPFL	São Paulo State	VBC (Votorantim + Bradesco + Camargo Correa), institutional investors
	RGE (CEEE)	Rio Grande do Sul State	PSEG, VBC, Previ
	AES-Sul (CEEE)	Rio Grande do Sul State	AES
	CEMAT	ELETROBRAS, Mato Grosso State	Rede, Inepar
	ENERSUL	Mato Grosso do Sul State	Escelsa
	ENERGIPE	ELETROBRAS, Sergipe State	Cataguazes-Leopoldina
	COSERN	ELETROBRAS, Rio Grande do Norte State	COELBA
1998	COELCE	Ceará State	CERJ
	METROPOLITANA (ELETROPAULO)	São Paulo State	LIGHT
	CELPA	Pará State	Grupo Rede
	ELEKTRO (CESP)	São Paulo State	Enron
	Bandeirante (Eletropaulo)	São Paulo State	EDP, CPFL
1999	Paranapanema (CESP)	São Paulo State	Duke Energy
	TIETE (CESP)	São Paulo State	AES
	CELB	Campina Grande Municipality	Cataguazes-Leopoldina

Source: <http://www.geocities.com/WallStreet/3701/brazilov.htm>

2.1.5 ELECTRIFICATION INITIATIVES

The State and Municipal Electric Power Development Program (PRODEEM), which was created by the Ministry of Mines and Energy, is intended to foster integrated development, while acting as a catalyst for new decentralised power generation projects fuelled by locally available sources. PRODEEM finances the installation of community-oriented projects such as electrification

(No author-

www.worldenergy.org/wec-geis/publications/reports/rural/case_studies/annII_brazil.asp).

It is estimated that about 12% of the country's population remains without electricity. In the three states of Bahia, Ceara and Minas Gerais alone, more than a million households are expected to remain unelectrified in 2005. In the past, special programs were run, subsidised by the federal and state governments as well as bilateral donors, which attempted to provide electricity to dispersed populations through the use of decentralised systems, many of them utilising renewable energy. These efforts were severely limited by lack of resources and the failure to design cost-recovery systems in the projects. (No author-www.worldenergy.org/wec-geis/publications/reports/rural/case_studies/annII_brazil.asp).

Much remains to be done in the rural parts of the country where only 63% of households have electric power. In the poorer areas, the problem of supplying rural communities is particularly acute, for instance in the Northeast less than half of rural households have access to electricity. In 1983, an agreement was signed by two utilities, COPEL and CEMIG, with the World Bank, covering financing for electrification in two states. As a result 123 000 properties in Parana and 95 000 in Minas Gerais were electrified.

Rural co-operates play an important part in the role of rural electrification, particularly through the first and second national rural electrification programs (I PNER and II PNER) which allocated funding from the Inter-American Development Bank (IADB) and the Federal Government to finance rural electrification. Some 115 000 rural properties were covered by these programs, although the regional distribution of these communities were uneven. The Southern region absorbed 56% of these funds, the Northeast 25%, with only 10% for the Southeast and 7% for the Centre-West. From the late 1980s rural electrification slowed down as foreign financing dried up.

In 1994 ELETROBRAS set up the Rural Electrification Priorities Committee to allocate funding from the Global Reversion Fund for rural electrification. The Smallholder Support Program is another important source of investment as it offers a line of credit from the World Bank. In addition to federal funds, rural electrification is also backed up by allocations in state budgets. Based on a pilot project underway in Rio Grande do Sul, BNDES opened a line of credit to finance electrification for farmers. For communities which are remote and dispersed, it would not be viable to connect to either of the main networks, and decentralised systems offer advantages over more traditional solutions (No author - www.worldenergy.org/wec-geis/publications/reports/rural/case_studies/annII_brazil.asp).

The National Programme of Rural Electrification, managed by ELECTROBRAS, was started in 2000 and was due for completion by the end of 2003. The project aimed at bringing electricity to one million rural households and properties, benefiting about five million people. It is however not clear exactly how many households were actually supplied with electricity during this period. (No author – web page - www.br.undp.org/propoorBRAOOO15A.htm).

2.1.5 CONCLUSION

Brazil's reform of its power sector has stopped short of a fully competitive and private electricity market. A hybrid system has emerged with the state continuing to own generation, transmission and distribution companies. However, sections of the industry have been privatised and the private sector has also been invited to build new power plant. The electricity market is determined less by price bids and offers than by engineering algorithms that seek to optimise the operation of the country's hydro basins. It has been a difficult environment for new investments in thermal generating plant. The new government in Brazil has given a stronger role to the state in planning and controlling the power sector.

What has been the impact on access to electricity by poor people? Power sector reform had to deal with the problem of financial solvency of utilities as well as the need for new investment. It was inevitable that prices had to rise. In this respect, the impact of reform was negative for electricity customers, in the short term, although an absence of reforms could have threatened the viability of the industry and its capacity to continue providing reliable services.

Brazil is in the fortunate situation of having the majority of its populace in and around large cities.. Hence electrification efforts have been easier and less expensive than in many other

developing countries with dispersed rural populations. Nevertheless, Brazil still faces considerable challenges in serving remote communities.

The Brazilian government stated explicitly that the restructuring programme will attempt to ensure a reliable electricity supply, and continue to electrify those without electricity.. Special programs attempted to provide electricity to dispersed populations. When all the efforts to enhance access to electricity are reviewed, it is clear that there was always the political will to broaden electricity supply. A case in point is the Federal Program for Energy Development of States and Municipalities launched by the Ministry of Mines and Energy, as well as the National Programme of Rural Electrification.

While certain distributors were privatised, these are subject to regulation by ANEEL whose mandate includes looking after the interests of poor consumers. There is little statistical data available on connection rates, thus making it difficult to translate the efforts made into concrete evidence. However, indicators are that despite flaws in the system as mentioned, there has been greater access to electricity by communities. As in many other sectors, however, the key to success lies in successful private/public partnerships and cohesive concessionaire systems in order to ensure the sustainability of reform efforts.

2.2 CHILE

2.2.1 OVERVIEW

The electricity sector in Chile is divided into two sectors. Firstly, the generation-transmission sector consists of companies which generate electricity from thermal and hydroelectric sources. This sector transmits electricity at high voltage for sale to distribution companies and selected large customers. Secondly, the distribution sector which consists of distribution companies that purchase electricity from generation companies for distribution at lower voltages for sale to customers (Bernstein, 1991)

Currently, the installed capacity is approximately 10,370 MW. Demand is growing at 6% per annum, and it is estimated that an extra 480MW is needed each year to avoid power shortages. A new 570MW plant is being constructed on the Bio-Bio, Chile's largest dam. In April 2003, a 10-year plan outlined the types of investment that government will promote. Government will support the construction of 10 combined-cycle plants until 2012, and one hydroelectric plant. (No author-www.platts.com.features/LatinAmerican/Chile.shtml).

2.2.2 INSTITUTIONAL HISTORY AND FRAMEWORK

As in many other countries, the private sector took the early lead in the development of the power sector in Chile. However, in 1931, Government announced an amendment to the General Law on Electrical Services. This, combined with the economic crisis of the 1930's, saw many private companies abandoning their participation in the industry. This situation led to the state taking charge of the generation and transmission of electricity, and the private sector limited its participation to distribution and maintenance of power stations. ENDESA became the dominant state-owned utility. Finally, CHILECTRA was nationalised in 1970, and during 1971 prices were frozen. Multilateral banks discontinued loans to the power sector, which led to the stagnation of the industry. After 1974, there was a move towards cost-recovery. Private firms could now manage state-owned enterprises, but unfortunately, the commercialisation failed to address the roots of the structural problems of the sector. No real progress was made in terms of efficiency of the overall sector. State-domination of the sector remained, with government owning 90% of the generation sector, 100% of the transmission network and 80% of distribution. In addition, there was also political interference regarding the appointment of excess personnel, as well as the development of projects that were not suited to their needs at that time (Bernstein, 1991).

The State had the obligation to ensure an efficient industry, and had to provide sufficient mechanisms to ensure the meeting of basic needs. A crucial intervention was the clear separation of the regulatory and business-related sections of the industry. The National Energy Commission (NEC) was created during the late 1970's, as well as the National Energy Commission and Planning Office (ODEPLAN). These institutions played a crucial role in the transformation of the power sector. The Corporation for Fostering Development (CORFO) was given responsibility for the management of energy-producing, state-owned companies, serving as a government-controlled holding company. CORFO was central in the re-organisation of the companies, controlling their management, unbundling and privatisation (Bernstein, 1991).

The 1982 Electricity Law created the foundation for electricity sector reform. Market conditions were created where electricity generators could compete to provide electricity to large consumers, whilst sharing the transmission network. Policies were formulated by the NEC, which also acted as the basic regulatory institution. Rudnick (1994, p.2) states that: "The overall energy policy aimed at maximising the welfare of the community by establishing conditions of efficiency in the development and operation of the national energy system, and assigning the state a subsidiary role. The necessity of de-concentrating decentralising and privatisation of the activities and properties of the energy sector companies was recognised as desirable for the stability of the system".

Large state companies were unbundled, and explicit separation took place between generation, transmission and distribution activities. In addition, the Economic Load Dispatch Centre was implemented. This centre co-ordinates the operation of the generation companies in order to obtain the minimum overall operation cost of the system. Open access to the transmission system was ensured as well. One of the most crucial instruments was the full privatisation of state-owned electricity distribution companies, as well as the sale of majority state equity shares in state-owned generation companies (Rudnick, 1994).

2.2.3.1 REGULATION

State-involvement in electricity regulation began as early as 1925, with the introduction of the General Law on Electrical Services. This Law was intended to regulate the use of water for electricity generation purposes, as well as the use of private property and compensation to private parties for the installation of transmission lines. There was some degree of uncertainty regarding the State's regulatory and business roles. In effect, some of the largest state-owned

utilities fulfilled both these roles, which created a conflict of interest between the business and social objectives. The States' regulatory function was handed over to the NEC and ODEPLAN in 1978. The NEC acts as a decentralised advisory body, which reports directly to the President. It consists of a 7-member council, and is presided over by an Executive Secretary. The Secretariat is responsible for the commission's technical activities, as well as its administration. ODEPLAN prepared annual 'Ministerial Programs' with specific goals and defined rules for state-owned firms in particular. The NEC was made responsible for coordinating large-scale investment decisions made by state-owned utilities. Once a significant part of the sector had been privatised, the central planning was replaced by individual efforts undertaken by private companies. Therefore, some institutional and legal adjustments had to be made in order to achieve efficient management within state-owned companies, and to level the regulatory playing field for state-owned and private firms (Bernstein, 1991).

During May 2002, the NEC submitted the new electricity bill to congress. The bill, known as the "*Ley Corta*" was designed to rectify the most pressing distortions in the regulatory system in order to maintain levels of supply and investment in the industry. It is the first part of a three-stage legislation process, which will be followed by a modification of government electricity norms. The submission of a further bill, titled "*Ley II*" is meant to remove all remaining distortions in the regulatory system. Currently, the wholesale prices are regulated and set every six months, and are based on the utilities' marginal cost for the next 48 months. This price makes up approximately 40%-50% of the retail customers' final bill. The other part of the bill is made up of a distribution price, set every four years, which relates to the distributor's costs. Customers with more than 2MW consumption are not subjected to regulated rates and are eligible to freely negotiate power purchase agreements

(No author-www.platts.com/features/LatinAmericanPower/Chile.shtml)

2.2.4 UNBUNDLING AND PRIVATISATION

Large, vertically integrated, state-owned electricity companies were separated into generation and distribution firms and were also sub-divided into regional companies. Subsidiaries of ENDESA and CHILECTRA were formed, as well as new companies dependent on CORFO. CHILECTRA was divided into three sub-divisions. CHILGENER was charged with generating and transmitting energy in the Santiago-Valparaiso area, CHILECTRA METROPOLITANA would distribute electricity in Santiago, and CHILECTRA V-Region took charge of distributing electricity in Valparaiso and the Aconcagua river valley. ENDESA was transformed into a

company dedicated exclusively to the generation of electricity. ENDESA created two generating subsidiaries. Some affiliates broke away to form independent companies.

Essentially, two possible paths of privatisation were identified:

- 1) The sale of entire companies to individual investors and providing 'share packages' to institutional investors; and
- 2) The widespread sale of smaller packets to individuals through so-called *popular capitalism*

During the early part of the sales, criticism emerged from various quarters regarding the price of shares, and arguments were heard that the State was selling property at prices below their book value. In addition, the argument was heard that private investors should make investments with the same low rate of return as the State. The first privatisation phase consisted of the public sale of two ENDESA subsidiaries in the late 1980's. Opposition from CORFO regarding the privatisation of the largest subsidiaries – ENDESA and CHILECTRA – led to a situation, where from 1980 to 1983, almost no progress was made. However, progress was made in the formation of regional distribution companies, and the break-up of CHILECTRA into local subsidiary companies. Between 1983 and 1987, three small-scale hydroelectric plants belonging to CHILECTRA were sold through public bids, as well as the sale of two ENDESA-owned stations, transforming them into subsidiary companies. Following these sales, the process picked up speed with the full-scale sale of the CHILECTRA-Generating, Metropolitana and V-Regions. ENDESA was experiencing considerable financial difficulty due to its huge debt, and during 1985, the government reduced some of the firm's capital holdings to absorb debt. ENDESA'S status improved, which aided the process of attracting private investors. (Bernstein 1991).

2.2.5 ACCESS TO ELECTRICITY AND ELECTRIFICATION

The results of the electricity reform in Chile were wide-ranging. There is a measured improvement in efficiency, with lower electricity tariffs compared to nations where the industry operates without reform. It is important to note that Chile seemingly succeeded in maintaining electrification efforts throughout the power sector reform process. In 1987, 91% of urban households had access to electricity. It would appear that electrification efforts in the greater Santiago area were largely successful. Firms such as CHILECTRA METROPOLITANA have completely revamped their customer service and billing systems, and implemented policies aimed at providing electricity installations speedily (Bernstein, 1991).

In rural areas, however, connection and operational costs increase as populations become more geographically dispersed. According to Jadresic (2000), by the early 1990's, a million people, (almost half of the rural population) still had no access to electricity. The most severe lack of access is concentrated in a few regions where the majority of the rural population lives. Lower-income families are affected the most, as wealthier communities can afford to install generators, or pay for extension to the grid.

The New Rural Electrification Programme (REP) was initiated at the end of 1994 by the NEC. Each of the 12 regions administers and finances its own rural electrification projects according to its developmental priorities. Each region also establishes its own electrification projects according to a pre-established evaluation methodology. The NEC supervises the achievements of the project at Central Government level. There is a specific process to be followed with regard to the evaluation and execution of rural electrification processes. In the first place, rural communities identify their need through Resident's Associations or similar committees, and request the Town Council to become beneficiaries. Secondly, Town Councils extend projects according to profitability, including budgets provided by distribution companies or local co-operatives. In the third place, the REP secretariat makes revisions to the projects according to a General Evaluation Methodology provided by the Ministry (Duhart, 2003).

The electrification drive has the additional objectives of contributing to the improvement of Development Indicators in the poorest regions of the country, by coordinating the efforts of the REP with other poverty-relief programs, particularly with:

- a) The Rural-Connection Programs of the Ministry of Education;
- b) The Rural Accident and Emergency Centres Reinforcement Program from the Ministry of Health;
- c) The Productive Development Programs from the poorest communities from the Solidarity and Social Investment Fund;
- d) The Ministry of Planning's Indigenous Development Support Programs; and
- e) The Rural Telephone Systems and Social Investment from the Ministry of Public Works, Transportation and Telecommunications

Attention has also been given to off-grid systems. Project include the installation and maintenance of 6000 PV systems in households and isolated communities, the supply of energy through diesel/wind generators to 3500 families living in extreme poverty on 32 islands in the

Southern region. In addition there has to be the gradual replacement of diesel generators by hybrid systems based on the use of renewable energy (Duhart, 2000).

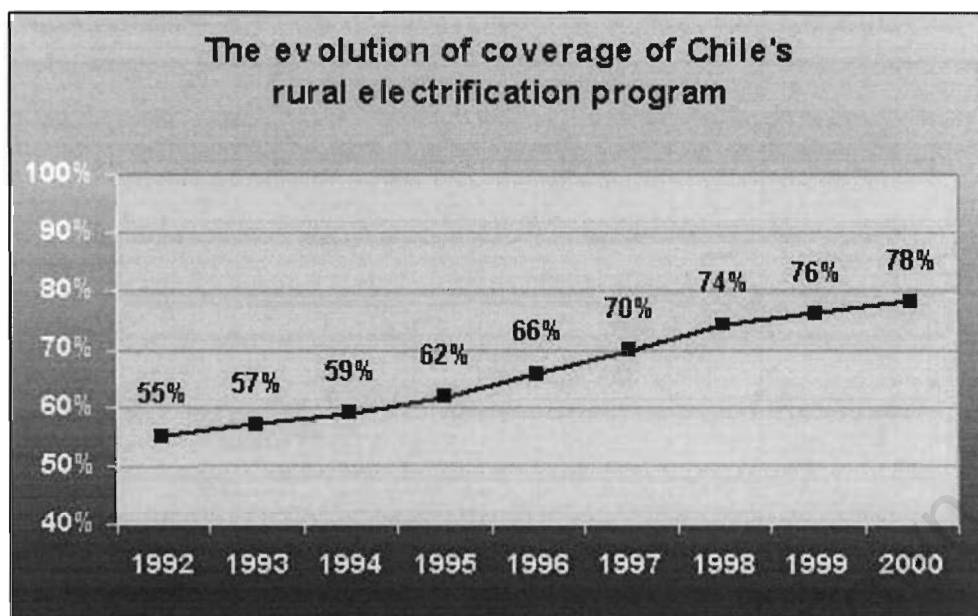
Companies involved in these rural projects are requested annually to apply for a subsidy, presenting their projects to the regional governments which allocate the funds to those that score the best on certain criteria. These criteria include cost-benefit analysis, the amount of investment covered by the companies, as well as the social impacts. The subsidy funds are allocated by central government to the regions on the basis of two criteria:

- a) how much progress a region made in rural electrification in the previous year, and
- b) how many households still lack electricity.

Where the cost of conventional electricity seems too expensive, alternative technologies are considered. The regional planning agency evaluates the projects, and only those with a positive social return but a negative private return are considered for subsidies.

The results of the program seem largely positive. The coverage of electricity systems in rural areas increased from 53% in 1992 to 78% by 2000. The largest part of the funding supplied is due to a state contribution to rural electrification of US\$ 112 million during 1995-1999. Private investment has totalled US\$60 million thus far. Most of the projects involved the extension of the grid (Jadresic, 2000).

Figure 1: *Rural Electrification in Chile*



Source: www.platts.com/features/LatinAmericanpower/chile.shtml

During 2000, the Administration of President Ricardo Lagos initiated the 2000-2005 Rural Electrification Programme. The goal was set of achieving a 90% rural household electrification coverage by 2005, nationally and in each region. Translated, it meant the electrification of 100 000 households, calling for an approximate investment of US\$150 million.

2.2.6 CONCLUSION

As stated above, the main driver for change was to enhance efficiency in the market by means of establishing competition, and Chile chose the route of privatisation of considerable parts of their generation and distribution sector. An important aspect was tariff setting at marginal cost for small consumers and freedom of pricing for large consumers.

Chile also put in place specific measures to achieve widened access to electricity in rural areas. It seems that the decentralised manner in which Chile approached its electrification drive was the key to success in the rural electrification drive. A great deal could be learned from the way in which regions or provinces were granted some degree of self-identification of electrification needs, from provincial level to municipal level. The reason why Chile's electrification drive was successful and sustainable, is because they linked electricity supply with other

developmental and social goals as they were being determined at grass-roots level by local authorities.

The continued electrification process also benefited from the state creating an independent regulatory body, which could oversee the entire sector, and deal with complaints from civil society. This aspect is very important in any attempt to address imbalances in electricity supply in any country.

Figure 3 above speaks for Chile's continued and sustained efforts to supply its populace with electricity in a sustainable manner. It demonstrates that public benefits can be promoted – even in a privatised and competitive industry, provided the state puts in place specific mechanisms. Chile is an interesting example of where this has been achieved.

University of Cape Town

2.3. ARGENTINA

2.3.1 OVERVIEW

Argentina has a population of approximately 37 million people. During 2000, approximately 98% of urban people and 70% of rural people had access to electricity. Thermal generation accounts for 57% of consumption, hydro 39% and nuclear approximately 4%. Since its military government yielded to democracy in 1983, Argentina has battled to restore economic stability. The opinion of policy-makers was that a program of state reform and the concomitant sale of state owned enterprises and assets would reduce the fiscal deficit, and generate funds for other sectors such as social welfare programs. Argentina embarked on a successful privatisation of its utilities – but many of the gains have subsequently been wiped out through macro-economic collapse (Bouille et.al 2001).

2.3.2 INSTITUTIONAL HISTORY AND FRAMEWORK

The Argentine power sector reform and subsequent privatisation drive that was initiated in 1989, was born out of the context of huge operational losses by state-owned enterprises. One example in this regard is the fact that 13 of the largest public companies in Argentina (excluding defence) had an operating deficit of \$3.8 billion during 1989, and during the first half of 1990, the deficit grew another 35 percent. An inability to resolve these problems led to the 1992 privatisation program, as the electricity industry had deteriorated severely. It was also characterised by huge operational and financial difficulties, with constant threats of blackouts, worsening during dry spells affecting hydroelectric power generation. Electricity was expensive, often stolen or customers defaulting on payment.

There was, however an incentive for future private stakeholders in the sector by the fact that between 1985 and 1991 net electricity production increased by 19 percent. In 1991, just prior to the advent of sector restructuring and privatisation, the Argentine electricity industry consisted of four federal utilities and two bi-national agencies shared with Paraguay and Uruguay respectively (mainly large hydroelectric plants). Additional to these were 19 provincial utilities and several electricity co-operatives. One of the four federal utilities generated and distributed electricity to the greater Buenos Aires and La Plata area. Another one served the balance of the country's needs for power generation and transmission. The hydroelectric power generators from Southern Argentina were overseen by the third, and the fourth oversaw nuclear power generation plants. Since 1992, at least some part of the first three mentioned utilities has been privatised (<http://www.eia.doe.gov/emeu/pgem/electric/ch4.html>).

The first three of the federally-owned electricity companies in line to be restructured and privatised were responsible for about 80 percent of the country's electricity supply. These companies were Segba, Ayee and Hidronor. Segba served the greater Buenos Aires area and before privatisation, it was restructured by vertical separation, and to some extent, horizontally. Power generation was separated from transmission and distribution. This process was followed by the constituent generation facilities being separated from one another resulting in six companies. The transmission and distribution activities were also separated with the transmission assets being combined with those of Ayee and Hidronor. A single high-voltage transmission company was created, as well as six regional transmission companies. Segba's distribution assets were separated into three companies, serving northern and southern Buenos Aires and La Plata respectively. Privatisation of Segba began during 1992 with the sale of two power generators, followed by the sale of the two distribution companies during the same year. The sale of the remaining three generation companies, as well as the high-voltage transmission company Transener followed soon.

Ayee, the second federal company privatised had transmission and generation assets nationwide. The restructuring of Ayee also separated the generation and transmission activities, as well as dividing the generation facilities from one another. A total of 12 generation companies were created and the transmission assets were combined with Segba and Hidronor.

The third federal electricity company to be restructured and privatised was Hidronor, which oversaw several hydroelectric power generation activities in the southern part of the country. Hidronor's primary assets were four hydroelectric power facilities and each was restructured into a separate company and then privatised. As mentioned the transmission assets were combined with those of the first two companies.

The nuclear electricity assets were restructured in July 1994, with the functions of the original nuclear agency being divided into three distinct entities. These entities consist of a company with generation assets, the nuclear regulatory agency which will remain government-owned, and the federal nuclear research organisation which will remain government-owned as well.

The two bi-national hydroelectric facilities are still government owned. After the onset of the privatisation of the federal electric companies, the restructuring of the provincial electricity

companies began. However, up to early 1997, relatively few of these companies were privatised (<http://www.eia.doe.gov/emeu/pgem/electric/ch4.html>).

2.3.3.1 REGULATION

The passage of Law No. 23696 of 1989 created the legal basis for the restructuring and privatization of the sector, and was also called the Law of State Reform. This law directed the Executive office to reorganise and privatise public enterprises. Decree No. 634/91 of 1991 issued by the Ministry of Economy, implemented law No. 23696. This decree provided the guidelines for unbundling the electricity sector activities, as well as for private participation in generation, transmission, distribution and dispatch activities. This law also defined the rights and obligations of providers of each area of service. It also directed the establishment of a new sector regulatory entity and of the bulk power market, including a spot market and outlined the privatisation schedule and plan. The Electricity Regulation Act of 1992 was actually the keystone for the ambitious reform and privatisation of the sector. This law restructured and reorganised the sector, and provided for the privatisation of almost all commercial activities carried out by federally owned enterprises. The law also established the regulatory entity, as well as other institutional authorities in the sector, the administration of the wholesale power market, pricing in the spot market, tariff-setting in regulated areas, and evaluating assets to be privatised (www.iadb.org/sds/doc/1846eng.pdf).

The reform of the Argentine electricity sector was heavily influenced by experience in Chile and the United Kingdom. The federal regulator established to oversee the electricity sector is ENRE – regulating all segments of the electricity industry, most extensively the transmission and distribution sectors. It also mediates disputes between electricity companies, as well as enforcing federal laws, regulations and concession terms. ENRE also establishes a standard of service delivery that distribution companies must meet and sets the maximum price level that transmission and distribution companies may charge for their services. ENRE also oversees CAMMESA (Compania Administrador del Mercado Mayorista Electrico SA), the operator of the wholesale electricity market, as well as the generation companies, although these are not subject to price-cap regulation (Estache 1997, p.2-3).

The structure of ENRE consists of a government-appointed board of five directors. The recruitment of the president, and vice president and one director are based on public job advertisements. The remaining two directors are selected from a short list proposed by the Federal Energy Council. The functions of ENRE are:

- To determine the basis and criteria for assigning concessions;
- To enforce the regulatory framework, contracts and public service obligations;
- To issue regulations on safety, technical procedures and norms and the monitoring of the compliance thereto;
- To monitor billing methods and the control and use of meters, reconnection of service, access and quality of service;
- Defining the basis for calculating tariffs and ensuring compliance;
- Making public the general principles regulated entities must follow to avoid discrimination among consumers;
- Organise public hearings;
- The regulation of proceedings to institute sanction and penalties, taking relevant issued to court, and to issue an annual report and recommend policy actions.

ENRE has its own funding sources, sufficient to perform its task, and is endowed with a technically competent and relatively small staff (less than 100). It is also accountable to both the legislative and executive branches of government (Estache 1997, p.2-3).

As a private, non-profit company, CAMMESA has the task of operating the generation dispatch, power flows and the entire administration of wholesale transactions. The high-voltage national network is operated by a regulated private concession, Transener SA. Six other private transmission companies are concession holders to operate and maintain high voltage lines in regional areas. There are five principles regulating transmission. Firstly, monopoly rights to operate the existing network. Secondly, they are prohibited from selling or buying energy, and thirdly open access is ensured to sellers and buyers. Fourthly, there is periodic competition for the concession rights, and fifthly there is incentive-based regulation of prices and quality (Abdala & Chambouleyron, 1999, p.2)

Currently, electricity generation in Argentina is unregulated with no need for generators to obtain permission prior to building or adding to generating facilities. When it comes to selling electricity, the generators operate in two markets. In one market they can contract to sell their output among themselves and directly to distributors and large customers, at any price that both parties agree on. In the second market, they can supply energy in the spot market at marginal prices according to demand. Transmission and distribution companies can propose a change in rates, which must be approved by ENRE, and they must obtain permits from ENRE to build, operate, or extend facilities. The regulatory structure created for privatised electric utilities

privileges status quo tariffs and regulation policy. This regulatory process, which entails hearings and open challenges, essentially gives companies a veto over new policy and makes regulatory policy predictable (Heller & McCubbins 1996).

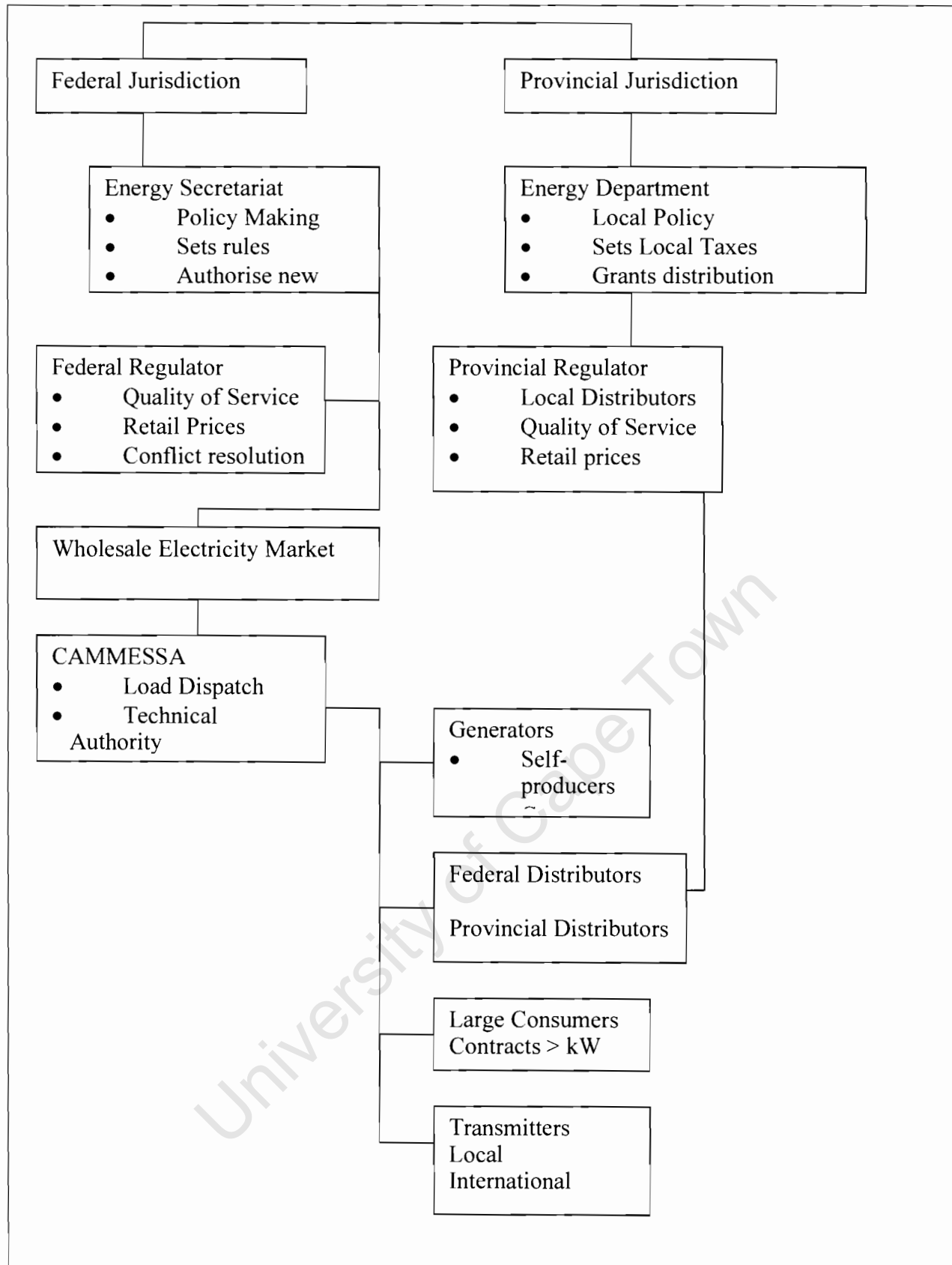
2.3.4 INTRODUCTION OF COMPETITION AND PRIVATISATION

Privatised companies were sold through an auction process. With this process, firms and consortia were pre-qualified and put on a short list of bidders and those selected as bidders submitted a two-part bid. The first part of the bid was a technical offer and firms not meeting requirements were eliminated. The second part of the process contained the financial offers and winners either offered the highest price for the concession offered or agreed to provide a minimum level of service at the lowest price. As much as 90% of formerly government-owned companies were sold, with employees receiving 10% of the companies and the federal government retaining no ownership. The conventional electricity facilities were sold separately, making each privatised generation unit an independent power producer. The thermal generation facilities were sold outright, while concessions were awarded for the hydroelectric plants. The majority of the privatised generation capacity was purchased by foreign companies. The smaller generation facilities were purchased by domestic companies as foreign companies showed no interest in them (<http://www.eia.doe.gov/emeu/pgem/electric/ch4.html>).

Generation companies are prohibited from owning majority shares in transmission facilities, and are also restricted to being responsible for a maximum of 10 percent of the national electricity sales volume. The federal government has restricted its participation in the electricity market to the regulatory, oversight and policy making activities. The federal government's holding in the commercial sector is limited to the operation of the international hydropower project, and to the nuclear plant (www.iadb.org/sds/doc/1846eng.pdf).

The success of these reforms has now been compromised by Argentina's macro-economic crisis. The "pesofication" of the economy and the massive devaluation has created an untenable situation for foreign investors. Government has frozen tariffs, ENRE is moribund and much needed new investment has dried up. It remains to be seen how successful government renegotiations with the private utilities will be.

Figure 2- Argentina's Electricity Sector After Restructuring



Source: Bouille et.al. 2001

2.3.5 ACCESS TO ELECTRICITY

Only a small portion of the country's population is not electrified, less than 5%. The level of electrification in more isolated regions is around 70%. In order to address this situation a special program (PAEPRA) was created in 1995 to promote the provision of electricity to remote areas. The PAEPRA program's aim is to promote electricity supply to 314 000 households within six years in sixteen provinces. The provincial governments are supposed to fund the projects, but in reality prefer grid extensions for political reasons (Covarrubias & Reiche, 2000, p.84-87).

Concessions are granted to private bidders that require the lowest subsidy for serving a given area. The individual concessions are expected to electrify a rural market of between 3 000 and 25 000 consumers and use solar, wind, mini- and micro-hydropower, and other renewable energy technologies. The concession contracts are designed to maximise private investment and minimise public subsidies. Concessionaires are required to provide service to customers who ask for it. A subsidy is paid to the concessionaire and the customer. It is means-based and depends on the energy service level and chosen technology. Investment in renewable technology is rewarded by paying higher subsidies for renewable energy options. The subsidy can cover a share of the installation cost, and for the very poor, a share of the monthly tariff. Subsidies will however, decline over the fifteen-year concession period.

Government also provides subsidies for low-income pensioners in some distribution areas. The subsidy was valued at about 50% of the normal tariff, being paid out of the national treasury. During the last three years, the distribution companies serving Buenos Aires have regularised services for more than three million people with the help of government subsidies.

Power sector reform has indeed created a significant number of public benefits, such as improved quality of service in urban areas, reductions in technical and non-technical losses, supply expansion and increased efficiency. However, there have also been a number of problems.

- **Expanding access to isolated rural areas** – nationally the electrification rate was 91% before reforms were implemented and by 2000 had risen to 95%. This improvement was largely due to the formalisation of previously illegal connection in urban suburban areas rather than true expansion in rural areas. Approximately 30% of the population in isolated areas remain unconnected as privatisation did not make electrification of these areas commercially attractive for private distribution companies to connect these

communities. Distributors maximise their returns on investment by delivering electricity at the lowest average cost and so most distributors made investments in densely populated areas where returns are highest. In spite of the establishment of PAEPRA, by 1999 the program fell short of its announced goals. The principal problems encountered by PAEPRA included provincial governments' unwillingness to contribute subsidy payments to concession holders, as well as a lack of interest from commercial entities. It is clear that federal efforts to provide rural electricity require larger subsidies and concession designs that go beyond what can be achieved by the adaptation of existing models.

- **Connection of poor urban households** – in urban areas privatisation of distribution affected the lowest-income consumers. Those least able to pay – illegally connected consumers concentrated in urban slums - were initially cut off from service. Loans from the International Finance Corporation to distribution companies enhanced the efficiency of the system that made electricity theft more difficult. These changes ensured the economic viability of distribution companies, but ignored the problem of how to provide basic electricity services to those without the economic resources. Several court cases ensued after the cut-off of illegal consumers on the basis that privatisation deprived a significant slice of the population of basic services, even if they were obtained illegally. As a response the federal government, the Province of Buenos Aires and two distribution companies (EDENOR and EDESUR) entered into the “Four-Year Framework Agreement”. As part of this agreement, the federal government, the Buenos Aires provincial government and municipalities reimbursed the companies for unpaid balances associated with illegal connections. The companies waived any claims that accrued on unpaid bills since 1992, pledged to install 10 000 meters a month in low-income areas and agreed to conduct a household census. As a result roughly 650 000 users were formally connected to the network. Mostly, consumption by low-income communities unable to pay for electricity is paid by municipal governments, and cities generally recoup these expenditures by imposing a tax on household electricity consumption. The National Electricity Fund established by the National Electricity Act (Law 24065) capitalised on a tax on electricity sales in the wholesale market. Sixty percent of these tax revenues are distributed to provinces that adhere to the federal scheme for distribution tariffs to subsidise consumers, the remaining 40% is directed to electricity development in the interior.
- **The impacts of electricity pricing on low-income consumers** – by 1995 electricity prices in the wholesale market had fallen by more than 50% for large and wholesale

users, but almost no mention is being made of how these price reductions were distributed among income or consumption classes. One study indicated that between 1991 and 1998 residential and industrial consumers with the highest consumption levels experienced the largest price reductions (71% and 44% respectively). Low-consumption households generally experienced only marginal price declines (1.6%). The new regulatory framework required electricity services to reflect the cost of supply and distribution costs are in inverse proportion to the quantity and voltage of supply. Thus, consumers with low consumption paid more relatively to industrial and high residential consumers. Five-year fixed electricity supply contracts were bundled with the distribution concessions when they were initially privatised. These long-term price contracts were designed to buffer the sector against price volatility faced by potential investors. These contracts covered up to 50% of projected demand, and as a result, although wholesale prices fell, much of the savings were not passed on to residential consumers.

- **Investments in renewable energy** – for the better part of the 1990's private investments mostly went to upgrading or building of gas-fired power plants and developing natural gas fields and pipelines. Neither the creation of distributed power concessions under PAEPRA nor the subsidies offered by international donors proved sufficient to draw investment to renewable energy for distributed power (Bouille et al, 2001 p.1-45).

2.3.6 CONCLUSION

Thus, the main drivers for power sector reform in Argentina, and the subsequent privatisation drive initiated in 1989, was mostly to correct the huge operational losses by state-owned enterprises and to address the huge deficits continuing to plague the power sector. Where other countries stated enhanced public benefits and access to electricity as key drivers, this was not the case here. The sector was restructured text-book-like by unbundling of the generation, transmission and distribution activities. It must be said that the process was done in a coherent way by means of bidding documents, contract terms and conditions being prepared by competent legal advisors. As much as 90% of formerly government-owned companies were sold in a relatively short time by means of a bidding process.

The structural reform process of the power sector took the form of the vertical separation of the industry into generation, transmission and distribution activities. The generation sector was

considered to be a competitive sector, and was broken up into twenty-five business units that were sold separately to private owners. A spot market was created which is open to any generator and this market matches supply and demand with an hourly price, allowing distributors and large users to buy power from any generator of their choice. Transmission was considered a natural monopoly, but the government introduced competition by way of auctioning contractual rights to deliver these services. Transener – the main transmission company - and four of the five regional transmission companies have been privatised. There are twenty-two main distribution companies – most under provincial government jurisdiction. Distribution is also considered a natural monopoly although distributors buy electricity in a competitive spot market and face competition from large users allowed to buy directly from generators (Estache & Rodriguez-Pardina, 1996, p.2).

Argentina has the benefit of having a very high urban electrification rate of 95% and a rural rate of 70%. Thus, power sector reform and its influence on access to electricity has more bearing on rural access to electricity than urban electricity access. As mentioned, the provision of rural electricity is done through a bidding process, with concessions granted to private bidders that require the lowest subsidy for serving a specific area. The concession contracts were designed to maximise private investment and minimise public subsidies. Government also provides subsidised electricity to low-income pensioners.

Provincial governments are supposed to fund decentralised electrification to remote areas, but often prefer to wait for grid-extensions for financial and political reasons. A significant problem was created by the fact that urban areas benefited the most from aspects such as improved quality of service and a reduction in technical and non-technical losses. It is thus clear that there was no public benefits agenda worked into the reform efforts, but second generation reform efforts attempted to address this situation. However, they fell short of creating coherent changes for the poor and rural users, as the reforms consisted mostly of adjustments to the competitive and regulated markets. It is very clear that the reform process in Argentina lacked severe political will to enhance access to electricity by the communities that needed it most. The biggest concern by government was to attract private investment to service certain loan agreements. Public interest is implied in the power sector reform documentation, but lacks clarity regarding the timing and form of intervention to defend consumers and public interest.

Due to the reform efforts, by 1995 wholesale electricity prices in the wholesale market had fallen by more than 50% for large and wholesale users, none of these pricing benefits were carried over to small, especially poor users. The 1990's saw private investment going into the upgrade of gas-fired plants, and the distributed power concessions offered by PAEPRA for the installation of renewable energy sources in remote areas were ignored. It is thus clear that the poor were mostly negatively affected by the process and the rich were the greatest beneficiaries, and there should have been a system of transfer mechanisms favouring the poor by means of cross-subsidies. The failure of the reform effort to ensure public benefit and enhance access to electricity to poor and remote users are ascribed here as a huge failure in the design and execution of regulatory practice. The economic crisis did play a substantial part in Argentina's macro-economic and power sector, but in comparison to the case of Chile, it is clear that Argentina could have instituted checks and balances to protect its electricity sector against such circumstances.

CHAPTER THREE – AFRICA

3.1 NAMIBIA

3.1.1 OVERVIEW

Namibia has an estimated population of 2 million people, which are largely dispersed in rural areas, with approximately 2.3 persons per square kilometre. Only 28% of the population is considered urbanised. Past electricity supply development in Namibia was mainly in response to industrial and urban demand (Uthoni & Dlamini, 2001).

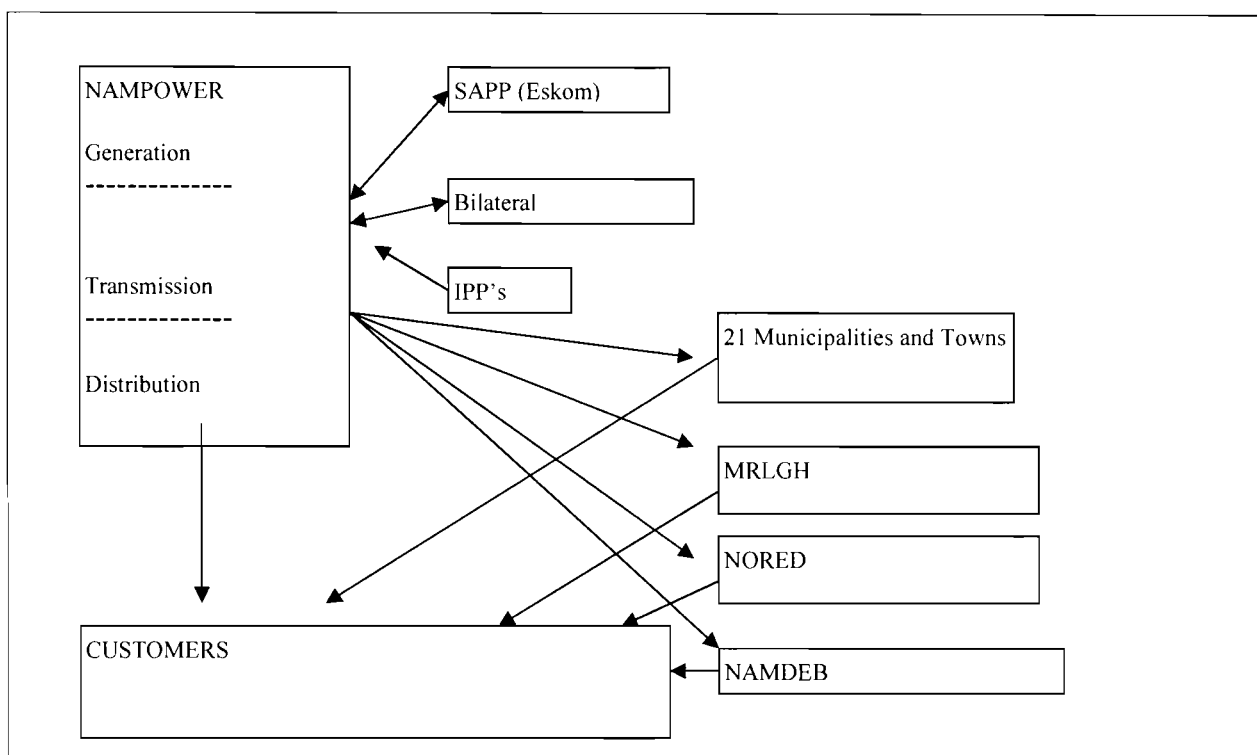
Namibia has one main electricity utility, NamPower, which is responsible for generation, transmission and bulk supply to municipalities. Electricity imports accounted for more than half of total consumption. The coal power generation plant – the Van Eck Power Plant in Windhoek, has a capacity of 120MW, but is mainly used as a back-up facility in case of shortages in imports. Most power is generated from the 240 MW Ruacana hydro power station on the Kunene River. The Ruacana generation facility output varies throughout the year according to seasonal rainfall. The Eastern Caprivi is supplied by a 66 kV line from Zambia, securing a supply of approximately 3MW. (Uthoni & Dlamini, 2001).

The electricity supply industry in Namibia faces a number of challenges, amounting to:

- A loss of economies of scale;
- Varying tariff structures, resulting in an uneven playing field;
- Neglect of the customer base which led to low quality of supply levels and service;
- A severe shortage of skilled staff;
- A difference in financial performance of distributors;
- An inability for distributors to plan, finance and sustain electrification programmes.
- Pre-reform NamPower generation acted as a generation oligopoly. NamPower was also responsible for transmission to local authority distributors
- (No author-http://pdf.wri.org/powerpolitics_chap5.pdf, 2001, p.1).

The White Paper on energy policy was developed by the national energy policy committee and approved by the Cabinet in May 1998. The Directorate of Energy under the Ministry and Mines and Energy is the main government body responsible for the sector. (www.klausdierks.com/Energy/Regulated_energy.htm).

Figure 3- Before Restructuring Efforts



Source: Shilamba, 2000

3.1.2 REGULATION

The Electricity Control Board (ECB) is a statutory authority established in terms of the Electricity Act (Act 2 of 2000). It has the core responsibility of regulating electricity generation, transmission, distribution, supply, import and export. In the execution of its functions the affairs of the ECB are managed by a Technical Secretariat headed by a Chief Executive Officer. The Board consists of five members who must be appointed by the Minister from amongst persons who have appropriate expertise in one or more of the sectors of the electricity industry, law, economics or environmental issues (Electricity Act 2000).

The main activities of ECB are:

- Information collection and establishment of a database;
- Formalise the licensing system and procedures;
- Establish electrification targets as part of licensing requirements;
- Commence review of electricity prices and development of a new national tariff system;
- Formalise processes and procedures for monitoring and control of licences;
- Establish necessary rules for operation of the single-buyer model; and
- Implement quality of supply standards (Shilamba, 2002).

3.1.3 INSTITUTIONAL HISTORY

The 1998 White Paper on Energy Policy states the following as core principals of the electricity sector:

- Granting customers the right to choose their electricity supplier;
- Introducing competition in the industry;
- The creation of a transmission system which is non-discriminatory and ensuring access to the transmission system;
- Encouraging private sector participation in the industry;
- Equate non-conventional energy sources with conventional ones;
- Ring-fencing separate power stations into a number of companies (SAD-ELEC, 2001).

The reform of the Namibian power sector commenced with phase I, which consisted of a detailed investigation into the performance of the ESI, and relevant international experiences. This phase was completed in March 1998. Phase II entailed the evaluation of a limited number of possible restructuring options, with particular focus on rationalisation of the distribution sector. This phase was completed in July 1998. A subsequent Consultation Phase consisted of the sharing of the results and recommendations of the first two phases, with a broad range of stakeholders, in order to fully inform them of the reasons for change. This phase was concluded in April 1999. Phase III consisted of taking the views and positions of the various stakeholders into consideration, and making recommendations regarding key policies and implementation. The outcome of these phases was the Electricity Act of 2000 (SAD-ELEC, 2001).

At a meeting of stakeholders in the Namibian power sector in July 2000, it was generally agreed that the Single Buyer model should be followed, but with the following elements:

- The development of IPP's in order to export power at some stage;
- NamPower should not be excluded from participating in IPP developments;
- The Electricity Control Board or competition authorities should monitor IPP developments and PPA's to ensure NamPower's participation is not to the detriment of Namibian customers;
- Local generators should have preference over imported power when accessing the market;

- All distributors and eligible large users must purchase electricity from the Single Buyers, except in the case of large users buying directly;
- All end-users must purchase power from their local distribution agency, with the exception of large individual users using more than 5MW at a single point or where the local distributor waives the right of supply (SAD-ELEC, 2001).

The recommended route for reform was to start off with creating the Single-Buyer model, together with Southern African Power Pool imports, and the Kudu projects. In addition, it entailed:

- The completion of Economic and Technical Regulations, as well as amendments to the Electricity Act;
- Implementation of a National Tariff Study;
- Creation of the Single Buyer Office (in Nampower);
- Completion of the Grid Code;
- The establishment of the Regional Electricity Distributors (REDs) by 2005;
- Issue of long-term distribution licences to REDs;
- Setting up of quality of supply and service standards;
- Transformation of the wholesale and retail market by 2011 (Shilamba, 2002).

The Cabinet-approved ESI Restructuring Recommendations are:

Market Restructuring

The short to medium term solution with the recommended Single-Buyer Model. NamPower has the lead responsibility, with the involvement of the ECB, to separate the systems operation and transmission network operations from generation and distribution. Medium-term activities include the separation of network operations and market operation, including full separation of transmission network charges from energy charges, with regulatory control over the transmission network operation (SAD-ELEC 2001).

Distribution Restructuring

The principles for reform of the distribution base are:

- The restructuring proposals to focus on the customer base, network characteristics and geographic areas;
- The distribution industry being gradually moved towards the establishment of RED's as the basic distributor structure;
- The financial viability of licensed distributors being ensured;
- Mechanisms to be put in place to safeguard local authority revenue requirements in a restructured distribution industry;
- The rationalisation of the industry being conducive to private sector participation;
- Defining a distribution area to generally only have one supplier until retail competition materialises in future;
- With the exception of a limited number of large users, customers in a defined area are to be supplied from the licensed distributor in that area;

The distribution industry rationalisation should be voluntary, but will be guided by policy and rulings of the ECB (SAD-ELEC, 2001).

Distribution restructuring in Northern Namibia

As a short-term measure, stakeholders in the North have established a Northern Namibian Working Group (NNWG) under the leadership of the Ministry of Mines and Energy. The NNWG is tasked with assisting the Government in defining and implementing a Regional Electricity Distribution Company (RED) for this region. The NNWG also assists government in designing and developing a detailed proposal for the creation, establishment and operationalisation of the Northern RED. It assists Government in communication with stakeholders for the smooth transition from the existing ESI to the RED. The medium term objective consists of the decision to formalise and structure the RED as a company. The Northern RED became operational during the second half of 2001 (SAD-ELEC, 2001).

Distribution restructuring in the Erongo Region

As a short term measure, stakeholders have approved a step-by-step approach towards restructuring which established a regional distributor in Erongo. The Regional stakeholders reviewed a draft constitution for a voluntary organisation - the Management Coordination Committee (MCC) - to undertake the activities. The main Phase I activities established the representative organisation of the ESI in the Erongo Region, to improve and develop the ESI of the region, collect and disseminate statistics on supply, facilitate and coordinate interaction between the programs and mutual members, and obtain funding. The medium term objectives

included the establishment of service agreements between members, and this was done by July 2001 with the involvement of the MCC, stakeholders and ECB. It also included the transformation of the MCC into the Erongo Regional Distribution Company (EREDCo), and the establishment of Agency agreements with distributors in the region. Long-term objectives include the consolidation of all distribution into EREDCo, possibly inviting private participation (SAD-ELEC, 2001).

Distribution restructuring in the Central and Southern Regions

The establishment of regional distributor(s) in these areas was not recommended in the short term, although it remains a longer-term goal. MRLGH's direct involvement should be phased out, either by expanding existing local authority responsibilities to also include nearby settlements, or by private operations to tender for service and operation contracts for those areas. Existing distributors with available capacity are encouraged to pursue ways of providing services on a commercial basis to other distributors experiencing problems. A stakeholder Working Group is proposed to establish and promote restructuring initiatives and to resource the process. Specific activities are recommended to stimulate voluntary restructuring and to create a level playing field, including amongst others, ring-fencing of the electricity businesses. In addition, mechanisms should be explored for service provision between stakeholders (SAD-ELEC, 2001).

The Northern Electricity Distribution Company (Nored) has been granted a 25-year supply and distribution licence by the Electricity Control Board (ECB), effective from 13 March 2003. It is estimated that the number of Nored's customer base had grown from 15 000 in 2001 to 24900 in 2003. Nored has entered into a service agreement with NamPower to maintain the transmission network at Katima Mulilo
(No author-www.nampower.com.na/NamPower/pr_show.asp?r=193).

Namibia has experimented in the past with private participation in distribution. Northern Electricity was contracted in 1996 to undertake electricity distribution in the northern regions. It was successful in reducing losses and restoring financial viability. It also increased connections from 5000 to 15000. However, as a result of political pressures and the desire of local authorities to remain involved in electricity provision, the experiment came to an end and NORED is are now responsible for the areas.

Nampower also established a separate distribution company. Premier Electric was established on 23 August 1999 by Cabinet Resolution as a subsidiary to NamPower to fulfil the objectives of:

- Establishing distribution networks in towns, villages and communities where electricity is not yet available;
- Installing solar PV systems where grid electrification is not economically viable;
- Setting up expertise to render services in the electrical maintenance and operational fields;
- Training people to render specialised electrical engineering services;
- Establishing contracts with municipalities, towns and village councils to operate and maintain their electricity distribution system;
- Enhancing and assisting with the creation of regional electricity distributors (www.esi.co.za/last/ESI_1_2002/ESI12002_023_1.htm).

Premier Electric established partnerships with the Oshakati Premier Electric and Otavi Electrical Company. However, a number of operational and financial problems arose within Premier Electric and it has been folded back into Nampower as an operating division.

(www.esi.co.za/last/ESI_1_2002/ESI12002_023_1.htm).

3.1.4 ACCESS TO ELECTRICITY AND ELECTRIFICATION

Since independence, Government has embarked on a comprehensive rural electrification programme aimed at increasing access to electricity among the rural population in order to enhance economic development, equitable distribution of resources and social upliftment. The goal was to reduce the daily household chores performed by rural women, especially by reducing the time spent collecting firewood. However, this is not a straightforward process. According to Uthoni & Dlamini (2001), even households who are electrified by grid do not switch to electricity for all desired energy services. They still use wood fuel or gas for cooking. Uthoni & Dlamini (2001) are of the opinion that off-grid technologies are often the only option for the electrification of small and remote settlements. They estimate the current installed power generation capacity of off-grid technologies to be around 2 MW. They also add that: “The overall objective of the rural electrification programme is to connect socio-economic centres to the grid”

(No author-www.klausdierks.com/Energy/Annex1.htm & Uthoni & Dlamini (2001).

The present status of electrification is estimated at 75% in urban areas and 9% in rural areas. Namibia's 1998 White Paper on Energy Policy suggests electrification targets of 90% and 25% respectively by 2010.

The government's rural electrification programme was initially supported by funding from the Norwegian Agency for Development (NORAD), and because of its success Government annually commits between N\$20 million and N\$30 million to rural electrification. This has recently been enhanced by a further N\$20 million per year from a donor, who also funded a new 400 kV inter-connector with South Africa. Despite high connection costs due to large distances and low population densities, the rural electrification programme has been highly successful. Prepayment metering, which together with insulated overhead conductor technology has enabled the widespread connection of even the most basic house structures. While all main centres in the country's rural areas have been electrified during the past 10 years (remote settlements having been provided with diesel powered mini-grids), there are approximately 2800 rural settlements that remain to be electrified. The Rural Electricity Distribution Master Plan (REDMP), released in November 2000, prioritises these settlements and provides annual electrification schedules for the next 20 years, based on a budgetary allocation of almost N\$50 million per year. Settlements that will remain remote from the grid for some time are dealt with in the parallel off-grid electrification programme, with an annual budget of around N\$5 million. The software-based master plan co-ordinates these two programmes and enables easy adjustment of the electrification schedules if assumptions and parameters change (Tobich & Muller, 2000).

Prioritisation of centres for electrification is done in consultation with regional offices. During 1992 and 1993 the Western Kavango Region was electrified, followed by the Eastern Kavango region in 1993 and 1994. The electrification programme covered parts of the Otjozandjupa and Omaheke regions in 1994 and 1995, and most main centres in the Hardap and Karas regions were electrified between 1995 and 1998. The first phase of rural electrification in the Caprivi Region took place in 1995 and 1996, with the Oshikoto, Ohangwena, Oshana and Omusati regions benefiting from a second phase during 1997. Larger settlements in Enongo and Kunene Regions were electrified in 1998 and 1999, during which period the third phase of rural electrification of the Oshikoto, Ohangwena, Oshana and Amusati regions was implemented. Consumers located within a radius of 500 metres from the distribution transformers are offered connection at no charge (Uthoni & Dlamini 2001).

Since the start of the rural electrification projects in the country, an estimated 15% of rural communities had access to electricity. The programme has connected approximately 9700 rural households and 400 rural towns, villages and settlements. The rural electrification programme has to date been grant-financed by the Namibian government, the Norwegian government and NamPower. NamPower confirms that within the next 10 years it aims to reach 25% of the rural population.

In ex-post analyses it became obvious that the electricity consumption per capita in newly electrified villages remains very low, covering only the basic needs for lightning, radio and TV and, to a very limited extent only, for cooling and other domestic applications. This low demand and the dispersed structure of settlements are limiting factors for the economic viability of rural electrification programmes based on grid extension. As a result, such rural electrification has to be complemented by decentralised technologies, and it was decided by MME to develop and test an appropriate dissemination strategy for solar home systems based on the needs and means of rural communities. (Muller & Tobich, 2000). Therefore parallel to the grid electrification efforts, the Ministry of Mines and Energy (MME) has instituted a revolving credit fund for solar home systems in an effort to afford remote rural households the opportunity to acquire basic electrification in their homes. This facility, initiated in 1996, falls under the management of the Namibia Development Corporation, and provides loans at low interest rates to purchasers of the systems. The project is called "Home Power". During the pilot phase of the project, the aim was to provide loans at 5% interest rate payable over a maximum period of 5 years. A down-payment of 20% of the total system costs and minimum annual income of N\$ 15 000, were part of the requirements to qualify for the loan. The third phase of the "Home Power" project is underway and allows its beneficiaries to purchase high quality solar home systems of various sizes at a reduced deposit of 10% with the same interest and payback rates. The larger systems now include an inverter for AC applications. A major advantage is the fact that the price includes installation, transport and insurance over 5 years and the systems are thus devoid any further hidden costs, and correct installation is ensured. Customers are buying the system and have the responsibility of maintaining them. By February 2001, 456 systems had been installed in Namibia. Two villages in the Caprivi and Karanga Regions were electrified by solar panels in 2000, with 80% of the equipment donated by the Indian government. Parallel to this initiative, government has installed large solar energy systems in more than 30 schools and clinics across Namibia. LPG cooking appliances are also promoted throughout the project. In 2000, the Minister of Mines and Energy initiated two further off-grid projects with financial assistance from the Indian government. The bulk of the

funding for rural electrification has come from government. NamPower made a significant financial contribution. According to the REMP, a total of 230 off-grid localities have been identified to be electrified between 2003 and 2008

(www.klausdierks.com/Energy/Regulated_energy.htm).

The next phase of rural electrification is to cater for substantially smaller and more remote settlements and farms. Cost-effectiveness as well as financial and economical feasibility are critical factors in allocating available funds in an equitable manner among the unelectrified localities.

3.1.5. CONCLUSION

Power sector reform in Namibia has focused on the distribution sector. An early experiment with private participation was successful in terms of improved technical and financial performance and in terms of increased connections. Unfortunately it was terminated because of political reasons. Efforts are now being made to rationalise the distribution sector into a limited number of REDs – that will also be responsible for electrification.

Namibia is one of those countries that truly faced a huge challenge in terms of electrification after independence – largely due to the fact that only 28% of the population is urbanised. To expand electricity to rural areas by grid implies a huge financial commitment.

Important to note is the fact that a fund was set up in an effort to afford remote rural households the opportunity to acquire basic electrification. This fact demonstrates considerable political will from government to supply energy to its remote areas. In addition, Government annually commits up to N\$30 million to address the rural electrification backlog. Despite the high connection costs due to large distances, and low population densities, the rural electrification programme has been highly successful. However, approximately 2800 rural settlements remain to be electrified, but indications are that government has committed itself to address this situation by developing the Rural Electricity Distribution Master Plan. While the grid has been extended to a number of rural areas, and while others have been recipients of solar home systems, the majority of the rural population remain without electricity. It also became clear that electricity consumption per capita in newly electrified villages remains very low, covering only needs for lights and media. The future challenge remains great.

3.2 UGANDA

3.2.1 OVERVIEW

The economic reforms implemented by the government in Uganda since 1987, together with a situation of relative political stability, have contributed to economic growth rates averaging 6% per annum during the last decade. Inflation rates have decreased from 240% in 1988, to below 10% per annum at present. A tax and tariff regime that allows sustained private sector-led growth has led to substantial private investment. The Government has also extended and improved the country's infrastructure networks in water, electricity and transport, and has embarked on utility reform programs (Nyirinkindi, 2003).

Since colonial times, Uganda has only been supplied with a modern energy infrastructure in a few planned town areas, which were meant to accommodate Government civil servants. Areas with poor communities were not provided for. For a substantial time, Government did not have the capacity to build any energy infrastructure. In the past, domestic consumers enjoyed an electricity subsidy for the initial 200 units. The result has been that more than 37% of the utility customers limit their consumption only to the amount of energy offered by the lifeline tariff, thus seriously affecting the paying customer base of the utility (Kyokutamba, 1999, p2-66).

The Ministry of Energy is responsible for energy sector policy and strategy while the Ministry of Finance supervises and controls the performance of public enterprises. Until the end of 2000, the Uganda Electricity Board (UEB) was the national utility for electricity supply.

3.2.2 INSTITUTIONAL HISTORY AND REFORM INITIATIVES

Uganda's main sources of power are the Owen Falls Hydro Power Station (180MW) and the Owen Falls Extension (120MW). Electricity supplied by the national grid covers only about 5% of the population, and only 20% of the urban population is grid-connected. Total electricity consumption is divided amongst the residential sector (55%), the commercial and general sectors (25%), and the industrial sector (20%). The total population of Uganda is about 25 million of which 12% live in the urban areas of Kampala, Jinja and Entebbe (Mugyenzi, 2000, p.158).

Currently only about 225 000 households have access to electricity, of which less than half is provided through the national grid. The remainder of energy supply is from household generators, car batteries or solar photovoltaic units. Independent studies commissioned by the Utility Reform Unit (URU) indicate that at least one million people have the means to pay for electricity, but are not supplied with it.

The electricity system is characterised by technical losses of up to 20% as well as high non-technical losses. System breakdowns and load shedding lead to frequent power outages and voltage fluctuations. This situation has led to a condition where the utility could not earn an adequate rate of return, service its debt, or contribute significantly to the financing of further development. There is also some degree of corruption. A poorly-planned system of connecting new customers has led to a further overload of the system. The new connections have been affected without paying enough attention to load-balancing, and the low-voltage lines have been over-extended. Through the implementation of rigid enforcement of the monitoring of illegal connections and improved billing systems, collection has improved, reaching a level of 83% in early 2003 (Nyirinkindi, 2003).

The Uganda power sector is currently in a state of transition. Prior to power sector reform efforts in Uganda, the sector was publicly-owned and vertically integrated. Historically, the state-owned Uganda Electricity Board (UEB) was the sole electricity generator, as well as the only transmitter and distributor of energy in the country.

Kabagambe-Kaliisa (1999) summarises the major problems in the power sector as:

- Very poor reliability in the supply sector, characterised by extensive and increasing load-shedding and reduction in voltage;
- Inadequate capital investment;
- Poor commercial performance;
- High technical and non-technical losses and low productivity;
- An insufficient rate of connection of new customers.

These characteristics were the drivers for Ugandan Power Sector Reform.

3.2.3.1 REGULATION

The Electricity Act of 1964 and the Public Enterprises Reform and Divestiture Statute of 1993 were the only enacted legislation governing the electricity sector. As an interim measure, the Electricity Amendment Act of 1997 was passed in order to address the issue of liberalising the

power sector. The Electricity Reform Act was passed in October 1999 that allowed private investment and multiple operators in the system. The process of legal reform was largely dependent on the finalisation of the government's Strategic Plan for the Uganda Power Sector. In addition, it was aimed at the need to attract private sector investment to assist with capacity expansion. The main limitations in the sector addressed in the new Act are firstly the removal of the UEB's monopoly to generate, transmit, distribute and supply of electricity. Secondly, the UEB's powers to regulate the electricity supply sector had to be removed in order to avoid any conflict of interest, and also to create investor confidence in the electricity industry (Mugyenzi, 2000, p. 156-157).

The purpose of the legislation is set out as follows: "it is desirable to improve the efficiency and availability of electricity services in Uganda, and whereas it is expedient to do so through increased private ownership of electricity resources and private provision of electricity services, increased competition in the bulk supply of electricity, and improved regulation electricity services. It is expedient to establish the Uganda Electricity Regulatory Authority (ERA) as an autonomous agency of the government of Uganda empowered to administer the requirements of the Act in furtherance of the purposes thereof" (Mugyenzi, 2000, p.156). The Act established the ERA as the regulator over the electricity supply industry, and was to be funded from an initial grant from government, and thereafter from license fees, fines and penalties, grants and donations and from a levy on gross revenues from electricity sales by each licensee under the Act. No person may engage in the business of generating, transmitting or supplying electricity unless authorised by a licence framework. The ERA must also approve the electricity tariffs and may also approve investment programmes, performance and industry standards and codes of conduct (Mugyenzi, 2000, p. 156 -7).

3.2.4 STRUCTURAL REFORM

According to Mugyenzi (2000), the power sector reform process was initiated in 1985 with a proposal referred to as the Uganda Second Power Project. This involved the rehabilitation and reconstruction of the Owen Falls Power Station, overhauling the transmission and distribution system, and training of the UEB and MNR staff with the aim at improving the electricity supply. The proposal included:

- A Power Development Study of the electricity system;
- Assessing the management structure of the organisation, as well as the manpower and training requirements of the UEB;
- Staff development study and training manual, as well as a billing and collection study;

- Review stores and vehicles workshop facilities and procedures;
- Overseeing a feasibility study of electricity supply to Western Uganda;
- Rehabilitating of the Kampala Network and a Household Energy Planning Programme; and
- Studying the possibility of the extension to the Owen Falls Power Station (OFPS) (Mugyenzi, 2000, p.159).

Some of the recommendations generated by the above have been implemented or are included in the Third Power Project. This was also in keeping with a 1989 ESMAP report which recommended an increased generation capacity and improvements in the Kampala distribution system. Other elements of the project included the construction of the 132 kV Jinja-Kampala double circuit line, support to the MNR, as well as the design for the hydro- project which was developed in 1993. A National Electrification Master Plan was formulated, but findings of the study were that the rehabilitation of the Owen Fall Power Station may only be sufficient for meeting demand until 1995. In addition, there was a lack of protective maintenance of the system, the problem of an ageing network, and that of diesel generation draining the UEB's financial resources (Mugyenzi, 2000).

The main drivers for reform of the power sector can firstly be found in the rapid economic growth, resulting in increased demand, especially industrial demand. In addition, there is the shortage of capital in the country to invest in generation and to expand the current infrastructure, and loans will further increase the country's debt burden and are therefore undesirable. The UEB's institutional structure limits the autonomy of management, allows a margin of inefficiency and does not provide sufficient reward for performance. It was established that the long-term strategy should involve the unbundling of the power system, the establishment of private, regulated, urban distribution companies, that the State should retain the electrification function. In addition, licensed IPP's should be allowed to supply electricity to industrial users. The reform policy is meant to open the generation segment to other generators, while the transmission segment remains under UEB control.

In 1997, a comprehensive and detailed strategic plan was formulated by government for the transformation of the power sector into a financially viable electricity industry. This plan has been revised into the New Strategic Plan of 1999, designed to meet, as before, the objectives of:

- Making the power sector financially viable and able to perform without subsidies from the government budget;

- Increasing the sector's efficiency;
- Improving the sector's commercial performance;
- Meeting the growing demand for electricity and increasing area coverage;
- Improving reliability and quality of supply;
- Attracting private capital and entrepreneurs

The major elements of reform are:

- The formation and implementation of the Power Sector Strategic Plan;
- Internally reforming the UEB;
- Promoting private sector participation;
- Expanding power export opportunities;
- Focus on rural electrification (Kabagamle-Kaliisa 1999).

The UEB was to be unbundled, and each of the three components would operate as a separate, self-accounting entity

Generation - The strategy for generation is to increase the scope of competition in the provision of new generation capacity or in the running of existing generation assets. New generation capacity will be provided competitively by the private sector through IPPs. Both the existing Owen Falls Power Station and the Owen Falls Extension will continue to be owned by the public sector but let to the private sector through concessions.

Transmission - A separate transmission company would be responsible for network maintenance, system operation and dispatch, and bulk purchase and supply of electricity. Initially, responsibility for transmission will remain with the UEB and will be operated as an independent profit-making business. UEB's existing transmission assets will be let under a concession contract to a private sector entity in the medium term, while ownership of the assets will remain in the public sector.

Distribution - Reform of the distribution system is key to the success of the whole program. Concessions would be granted to the private sector.

A ring-fenced business unit within the Transmission Company will be responsible for bulk purchase and supply of electricity. It will therefore oversee PPAs for the Owen Falls Power Station and Owen Falls Extension, and the IPPs under development and contracts to supply distribution companies. It will also be responsible for generation planning, contracting new capacity, settlement, etc. In the long term, distribution and large consumers will contract for

generation capacity directly with generators and the transmission network will be operated on an open-access basis (Kabagamle-Kaliisa 1999).

The implementation of the UEB privatisation formally commenced in April 2000, comprising the following key activities:

- Adhering to financial, legal and environmental due diligence;
- Drawing up an inventory and valuation of UEB assets and liabilities;
- Formalising a distribution and transmission investment needs analysis;
- Finalising the process of drafting licences, regulations, concession and power sale agreements; and
- Financial tariff modelling (Nyirinkindi, 2003).

During April 2001 the functional separation of the UEB started with the preparation of policies for unbundling into individual generation, transmission and distribution sectors/companies. The unbundling included the division of assets and liabilities of UEB into the successor companies, Uganda Electricity Generation Company Limited (UEGCL), Uganda Transmission Company Limited (UETCL) and Uganda Electricity Distribution Company Limited (UEDCL).. After two years it was evident that the UEB separation permitted greater transparency in electricity pricing and in monitoring the efficiency of the three business segments. Corporate governance of the sector improved significantly, opening the way for new independent suppliers in the generation and distribution sectors (Nyirinkindi, 2003).

During September 2001, a 'request for proposals' for a concession was distributed to seven pre-qualified bidders, including an information memorandum, due diligence procedures, bidding procedures, and the concession agreements. Both generation and distribution concessions foresee a major investment commitment by the concessionaire under a restoration and reinforcement plan, which is mutually agreed between the concessionaire and ERA. This commitment amounts to a total of US\$ 6.8 million for the generation concession within the first four years, and a total of US\$59.4 million in the same period for the distribution concession. The distribution concessionaire is required to connect 15 000 new customers in the first four years, followed by a minimum requirement of 25 000 new connections from year 5 of the concession. The concessionaires are bidding at a certain rate of return on investment and an operation and maintenance charge. The structure of the concession was perceived as being positive to both the need for attracting private investors and the country's long-term requirements in developing and expanding the sector. On 26 November 2002 the government

signed a 20-year generation concession with Eskom Enterprises of South Africa. The distribution concession is by volume and nature more complicated and the government has only recently concluded negotiations with the highest ranked bidder. The Utility Reform Unit will, even after the transaction closure, monitor the early stages of the implementation, particularly during the transition period and in the first one or two years of both concessions. The Unit is continuously assisting the statutory companies UEGCL and UEDCL in monitoring the concession agreements, as well as the transmission company UETCL, which still remains under government control (Nyirinkindi, 2003).

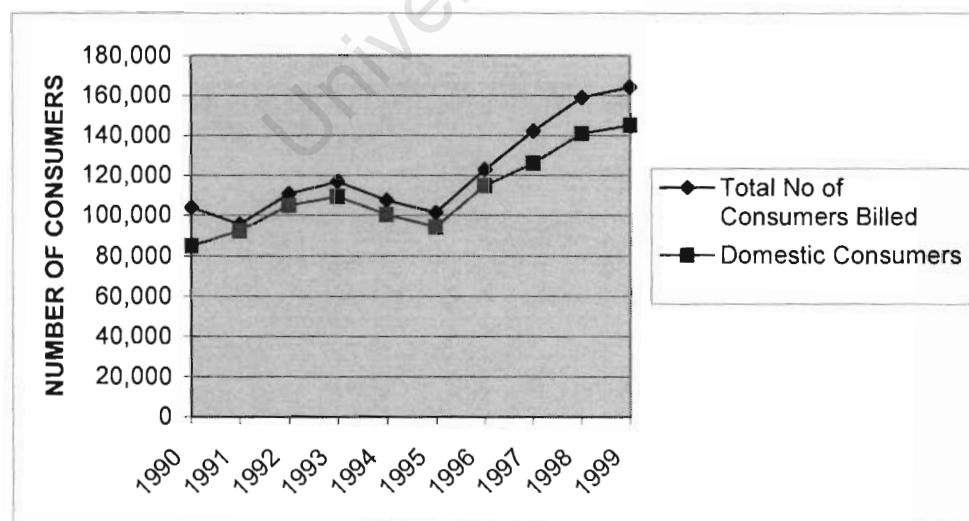
During June 2003, the Uganda Regulatory Authority (ERA) drew up a four-year business plan (2003-2006). Also drawn up was the ten year strategic plan (2003-2013) aiming at developing a well-regulated, private-sector driven energy sector capable of sustaining Uganda's ESI.

However, the energy sector is facing challenges including the facilitation of new IPPs at Bujagali and Karuma and the creation of a single buyer market with Uganda Electricity Transmission Company Limited (UETCL) (www.allafrica.com/stories/200306090964.html).

3.2.5 ELECTRIFICATION AND ACCESS TO ELECTRICITY

Steady progress was made in new electricity connections during the 1990s, although only 5% of the population had gained access by 2000.

Figure 4- Grid Connected customer Figures



(Data Source: Kyokutamba, 1999)

Recent studies conducted by the Ministry of Energy and Mineral Development (MEMD) and an ESMAP/ World Bank team have shown that self-generation is common in outlying areas. It is estimated that there is around 80MW of privately installed captive electricity generation capacity. Most of the energy is produced using diesel generation or from car batteries (Webb & Derbyshire, 2000). It is estimated that, of the 80 MW of privately installed electricity generation capacity (including stand-by generation in urban areas), about 30 MW is in the rural areas. An estimated 200 000 households are using car batteries, which are 30 times more expensive than grid power per unit of energy. It can therefore be argued that there is reasonable willingness to pay for electricity services, especially in rural areas (Bbumba, 2000).

The 1999 Act provides for incentives for rural electrification like the delegation of some powers of the Regulator to Local Authorities for purposes of exercising “light regulation” in order to facilitate the development and functioning of small power supply systems in rural areas. The Act also provides for ownership of generation facilities below 10 MW, under BOOT arrangements. With regard to rural electrification, the Act states that government shall undertake to promote, support and provide rural electrification programmes through public and private sector participation in order to achieve equitable regional distribution access to electricity. The aims are also to maximise the economic, social and environmental benefits of rural electrification subsidies, promote the expansion of the grid and the development of off-grid electrification

The Rural Electrification Strategy and Plan (RE) is a 10-year public-private partnership, with Government creating an enabling environment to invest in rural electrification projects. The cost is estimated at \$ 400 million, and will include a mix of commercial fuels. The RE strategy seeks to maximise the economic, social and environmental benefits of rural electrification subsidies through a close co-ordination of the electrification programme with other Government activities in the rural areas. The primary objective of the RE Strategy is to reduce the inequalities in access to electricity and the associated opportunities for increased social welfare, education, health and income generating opportunities. The objectives of the Government’s RE Strategy are set out in Section 63 of the Electricity Act, which states that:

“The Government shall undertake to promote, support and provide rural electrification programmes through public and private sector participation in order to:

- (a) Achieve equitable regional distribution access to electricity;
- (b) Maximise the economic, social and environmental benefits of rural electrification subsidies;
- (c) Promote expansion of the grid and development of off-grid electrification; and
- (d) Stimulate innovations within suppliers” (Rural Electrification Strategy Plan, p.10).

The main objective of the RE strategy is to reduce inequalities in national access to electricity and the associated opportunities for increased social welfare, education and income generating opportunities. The target is to reach a rural electrification rate of 10%. That means 400 000 rural households are to be serviced by the year 2010.

Another important element of the Government's RE Strategy is the promotion of renewable energy. At present, apart from the large hydropower plants, only a fraction of Uganda's renewable energy potential is being exploited, but it can provide a cost-effective method of electrification, especially in the rural areas.

Substantial amounts of electricity can potentially be generated from co-generation by sugar industries, gasification from coffee processing industries and biogas from biodegradable waste. In order for government to achieve the objective of meeting growing electricity demand, especially in rural areas, there will be more focus on the development of isolated supply systems.

There is some justification for subsidies to rural electrification, which has a history of market failure. This market failure and justification for subsidies has two components, one is the absence of an appropriate institutional framework for supporting rural electrification, and the other is the inability to capture the value of positive development externalities in tariff setting. Without subsidies, there will be little community electrification. Subsidy targets to rural electrification projects are required in the form of direct subsidies to reduce the up-front costs and increase affordability, and indirect subsidies through the financing of awareness and capacity building for the development of the supporting business infrastructure. The Rural Electrification Master Plan by means of the Electricity Act of 1999 obligates the Government to undertake to promote, support and provide rural electrification programmes through public and private sector participation. The main objective of the REMP will be to provide guidelines and establish priorities for public and private investments in rural electrification in order to meet development needs in a coordinated and cost effective manner while addressing the issues pertaining to the imbalances in regional distribution access of electricity. The plan will aim to help the planners to:

- Understand rural electricity demand;
- Identify grid and off-grid areas suitable for electrification;
- Prioritise potential projects;
- Provide indicative costs of potential projects;

- Carry out grid network analysis for rural electrification;
- Identify projects for implementation by the private sector or public\private sector partnership;
- Enable the population to understand the viable options for providing them with electricity (www.energyandminerals.go.ug/PDFs/resp01.pdf).

To address issues of poverty alleviation, Government has formulated the *Energy for Rural Transformation Program* to be implemented with the assistance of the World Bank and other donors. The objectives of this program are:

- Improving rural quality of life and facilitating significant rural non-farm income by accelerating rural electrification, including from Solar PV systems, with a tentative target of increasing rural electricity access from about 1% to over 10% in 2010;
- The promotion of development and use of Uganda's renewable energy resources on a cost-effective basis with a tentative generation target of about 70 MW from small renewable energy resources by 2010 and the development of a tradition of commercial woody biomass;
- The provision of funding for rural electrification. The main purpose of the fund will be to provide "smart subsidies" by buying down the initial cost of investment for connection, but ensuring that the consumers pay the economic cost of supply through the tariff (Kabagambe-Kaliisa, 1999).

The program was designed to be mainly private sector-driven and commercially oriented. The major elements of the program are:

- Grid intensification, to the load centres within the proximity of the grid network;
- Development of isolated generation systems and associated mini-grids for those load centres that cannot be economically connected to the grid network;
- Development of small renewable power supply systems that could be operated as stand-alone connected to the grid (Kabagambe-Kaliisa, 1999).

A Rural Electrification Agency (REA) and a Rural Electrification Fund (REF) were established in 2003. The REA has the responsibility to identify and promote rural electrification projects, whereas the REF provides capital subsidies and support for debt finance. The intention of the subsidy is to "buy-down" the capital cost of investment to the extent that, at reasonable tariffs, the project is attractive to a project sponsor.

Government electrification targets are shown in Table 3 below. It is evident that the government is committed to a steady increase in electrification rates until the end of the decade. Rural electrification shows a slower increase in connection rates, as the argument of affordability and economies of scale is operative. In comparison to other countries these figures may appear very conservative, but given the fact that rural electrification was 2.5% in 2000, and is aiming for a rate of 8.9% by the end of the decade is commendable.

Table 2 - Electrification Targets

CATEGORY	YEAR		
	2000	2005	2010
Rural households	3,8 million	4.1 million	4,5 million
Electrified rural households	100 000	155 000	400 000
Urban electrified households	170 000	220 000	295 000
RURAL ELECTRIFICATION RATE	2.50%	3.80%	8.90%
Urban households	0.8 mil	1.1 mil	1.3 mil
URBAN ELECTRIFICATION RATE	21%	20%	23%
Total number of Households	4.6 m	5.2m	5.8m
Total number of electrified households	270 000	375 000	695 000
TOTAL ELECTRIFICATION RATE	5.90%	7.20%	12.00%

Source: (Karekezi & Kimani, 2002)

3.2.6 CONCLUSION

In conclusion, positive economic reforms in Uganda led to the government seeing the necessity to extend and improve its infrastructure. Previously, the power sector was publicly-owned and vertically integrated. The very low electricity connection rates, as well as the high technical losses and illegal use added impetus to the reform process. Currently the sector is in a state of transition, and there are indications that a considerable number of people can afford grid supply that are not currently connected.

Uganda is one of the few African countries to unbundled its power sector. It has introduced private participation into generation and distribution – and has also set up a Rural Electrification Agency and Rural Electrification Fund.

The Rural Electrification strategy aims to achieve 450 000 connections by 2010, using a combination of grid, mini-grids and off-grid systems. Power sector reform has thus been accompanied by special measures to promote access. It is not yet clear whether these will be successful.

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3.3 SOUTH AFRICA

3.3.1 OVERVIEW

The history of the South African electricity supply industry is linked to the development of the mining and railway industries. Eskom (originally the Electricity Supply Commission) was established in terms of the electricity act in 1922, and was controlled by a commission appointed by the State President. Before 1948, electricity supply was a mixture of privately-owned utilities and municipalities. After 1948 Eskom took over the Victoria Falls and Transvaal Power Company, and the generation and transmission of electricity essentially became a monopoly (Horwitz, 1994, p.2).

Until the 1970's, Eskom benefited from improving technical efficiencies, an active expansion of the national grid, increasing demand as well as economies of scale. During the first half of the 1980's performance was affected by a range of problems such as high inflation rates, increased finance charges, and a reduction in the pace and effect of technical improvements. Simultaneously, forecasters over-estimated capacity requirements and Eskom contracted unnecessary generation facilities. These factors led to erratic tariff increases in the mid-1970's and again in the early 1980's. Government appointed the De Villiers Commission to investigate the electricity sector. The commission criticised demand forecasts among other factors, and this situation led to new legislation in 1987. Until the early 1990's, Eskom was primarily a generation and transmission utility with distribution mostly managed by local authorities and municipalities (Davis 1999, p.4-6).

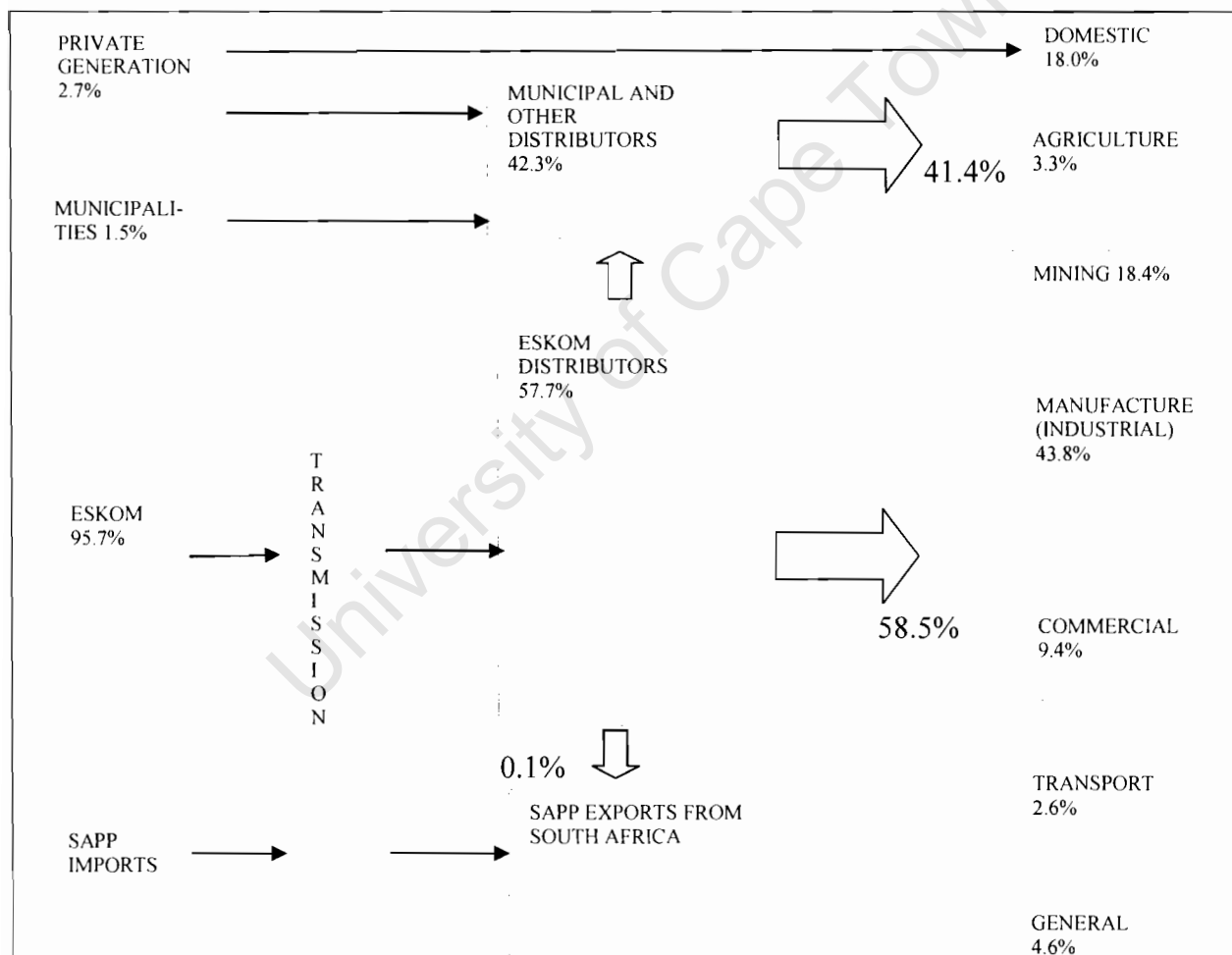
During the mid-1980's Eskom saw significant restructuring. New Eskom and Electricity Acts were passed in 1987. Eskom's governance was overhauled, and it was required to act on a commercial basis. The rationale for this commercialisation without privatisation lay in the belief that efficiencies associated with a greater degree of market orientation can be obtained without changing public ownership. Eskom instituted a two-tier governance structure, namely a board of control (Electricity Council), and a management board. The Electricity Council was to operate in the same way as a company's board of directors and included stakeholder representation from industry, commerce, municipalities and government. The 'zero-profit' principle was replaced with a mandate to provide electricity in the most cost-effective manner. The Eskom Council was awarded a high degree of independence in setting tariffs and policies. Eskom was exempted from paying tax as well (Davis 1999).

The situation facing the Electricity Supply Industry was, and still is, full of challenges. The highly fragmented distribution sector, with more than 400 distributors at one stage, resulted in low efficiencies, high costs, wide tariff disparities, and financial viability problems for distributors. The distribution sector also faced high levels of non-payment and electricity theft, resulting in mounting debt.

Coal-based electricity generation results in significant pollution, with long-term effects on the environment. It is expected that electricity demand will exceed supply by 2007, and strategies are needed to make room for the demands of a growing economy. Despite the above-mentioned challenges, South Africa has to maintain the advantage of low, stable and cost-reflective electricity prices (www.dme.org.za/whitepaper).

Approximately 96% of the electricity generated in South Africa is produced by Eskom. The remaining 4% is generated by 8 municipalities. In addition, a small number of privately-owned co-generators generate about 1200 MW of electricity for own use.

Figure 5- The Current South African Electricity Supply Industry



Source and copyright: Eberhard, 2003

According to Eberhard (2003), most analysts identify four broad international drivers for power sector reform:

- (1) Improvement of investment and operational efficiencies;
- (2) Technological innovation;
- (3) New capacity expansion, which can make difficult demands on public expenditure;
- (4) The potential to unlock economic value and reduce government debt.

Eberhard (2003, p.4) also mentions that “it is probably true to say that none of these drivers are experienced strongly in South Africa”. This is partly because new generation technologies such as Combined-Cycle Gas Turbines have limited application in South Africa, and also because Eskom can raise private capital through bond issues. Public finances are well managed and there is no desperate need for privatisation cash-inputs. However, key to reform efforts will be to avoid the poor investment performance of the past, as well as the need to improve the poor performance of many of the smaller local distributors. Key to the reform efforts is the need to sustain the delivery and expansion of affordable electricity services to all South Africans (Eberhard, 2003)

3.3.2 ELECTRICITY SUPPLY INDUSTRY REFORM

The basis for ESI reform was laid in 1998 in the White Paper on Energy Policy, encompassing the principles of improved social equity by addressing the energy requirements of the poor, enhancing the efficiency and competitiveness of the economy by providing high quality and low cost electricity inputs, and achieving environmental sustainability. In addition, the goal was to give customers the right to choose their electricity supplier, permit open and non-discriminatory access to the transmission system, and encourage private sector participation in the industry (Energy White Paper, 1998).

In August 2000, the Ministry of Public Enterprises published “A Policy Framework: An Accelerated Agenda towards the Restructuring of State Owned Enterprises”, which envisaged the unbundling of Eskom and the introduction of competition.

Government passed the Eskom Conversion Act in 2001 which clarified Eskom’s shareholding and made it liable for the payment of taxes and dividends. With this came the termination of its own internal funding of electrification.

In May 2001, Cabinet approved proposals for the reform of the ESI through a “managed liberalisation” process:

- Structure – Eskom retains 70% of the existing generation market, with the remainder to be privatised, with an initial aim of 10% transferring to black economic ownership no later than 2004;
- Unbundling – ensuring open access to the transmission lines, a separate state owned Transmission Company will be established, with ring-fenced transmission system operation and market operation functions;
- Market structure – to become a multi-market electricity market which ensures that transactions between generators, traders and purchasers may take place on a variety of platforms, including a power exchange;
- Regulation – the regulatory framework will ensure the participation of IPP’s and the diversification of primary energy sources (Eberhard, 2003).

Government engaged consultants to design the new electricity market. However, government has since pulled back from its policy of introducing competition. Eskom’s status of supplier of last resort has been confirmed and it has been given a mandate to invest in new generation capacity. The private sector will be invited to participate on the margin – i.e. government will run tenders for independent power producers (IPPs) to supplement Eskom investments.

3.3.3 ELECTRICITY DISTRIBUTION REFORM

The need and rationale for merging Eskom distributors with the large number of local government distributors has been debated since 1992. There has been broad agreement that rationalisation of the industry will enable economies of scale and scope. In May 2001, Cabinet agreed that local government and Eskom distributors should be rationalised into six Regional Electricity Distributors (RED’s) and that an EDI Holdings Company would be established to manage the transition.

Municipalities in each RED area will have to transfer their electricity distribution business and assets to that RED. They will then enter into a service delivery agreement with the RED to govern distribution of electricity in their municipal area. Each municipality will partly own their RED but the extent of their ownership will depend on the value of the assets they transferred to it. Many municipalities generate significant surpluses from electricity sales, surpluses that are often a large percentage of a municipalities’ income, and the loss of that income would have an adverse effect on their financial viability. The restructuring plan

therefore guarantees the continued payment of surpluses to the municipalities by way of a 'municipal levy'. There are options to include a direct levy by municipalities, a levy imposed by the RED itself on behalf of the municipality, or payment by some other means. Government (through DME) wholly owns the EDI Holdings company – with board representation for South African Local Government Association (SALGA), Eskom and national government. Key stakeholders, including SALGA and national government have also recently signed a co-operation agreement paving the way for the restructuring process. The plan is to encourage individual municipalities to also sign the agreements. The co-operative agreement requires municipalities to 'ring-fence' their electricity distribution businesses in preparation for transfer to the RED's. This means each municipality must create financially separate business units for their electricity distribution function. The timeline for restructuring envisaged that municipalities would start the ring-fencing process from June 2002. It was expected that the establishment of the RED's would begin in October 2003 and end by October 2005, but as yet, it has not materialised. The RED's will be monitored and evaluated until the process is finished, and then EDI Holdings is intended to be phased out (Electricity Distribution Industry Restructuring Bill of 2002).

3.3.4 REGULATION

The Electricity Act was amended in 1994 and 1995 to establish the National Electricity Regulator (NER). This regulatory authority may issue licences for:

- The construction of generation, transmission and distribution of electricity;
- The operation of the above mentioned facilities;
- The import and export of electricity;
- The retail of electricity, and;
- Any prescribed service related to the generation, transmission and distribution of electricity.

The NER may gather and store information regarding the construction, operation and the provision of services in the generation, transmission, distribution and retailing of electricity. It can impose penalties and issue directives to licensees, act as mediator between parties, consult with Government Departments and other bodies and institutions regarding the ESI. The authority will also co-operate with other persons for capacity building, and advise the Minister and Government regarding matters affecting the ESI industry. It is also to approve prices, tariffs and charges levied by licensees, ensure access to transmission and distribution facilities

in a transparent manner, and promote competition in the ESI. The NER must promote an efficient, reliable and economic system of electricity supply, and regulate the industry such that it sustains improvements in efficiency and reliability of electricity supply. The NER also has a role to play in the attainment of social goals such as electrification, and in a broader sense, access to electricity services. The Regulatory Authority consists of nine members appointed by the Minister, who also designates one of the members as chairperson.

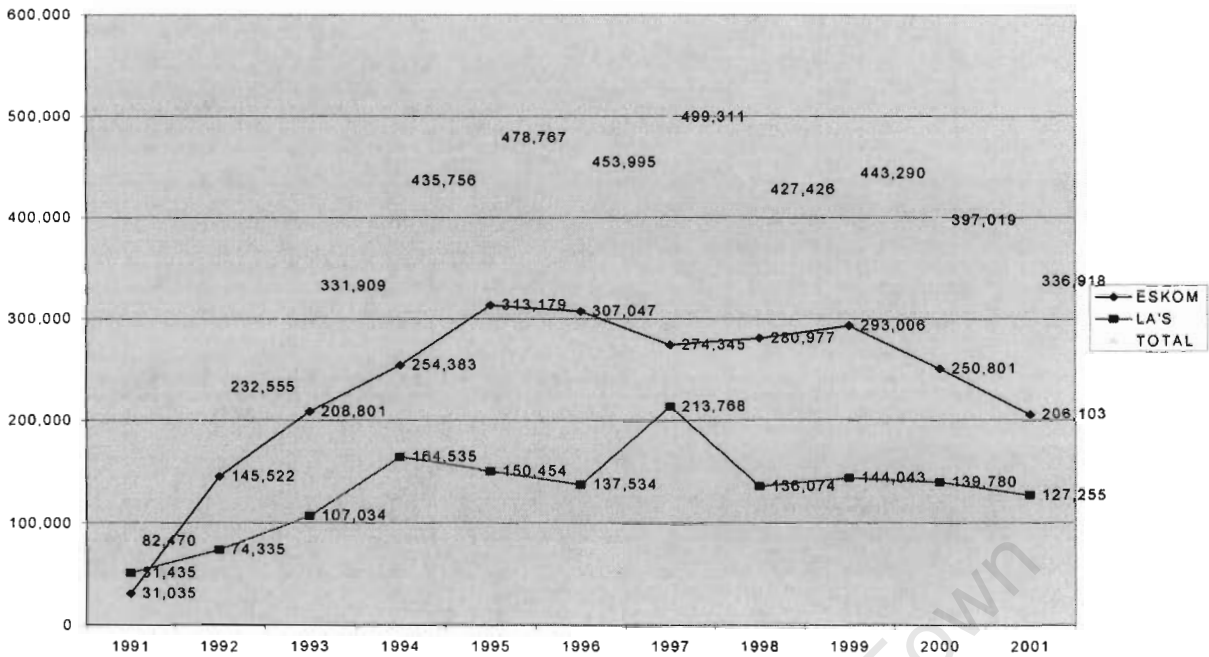
3.3.5 ELECTRIFICATION AND ACCESS TO ELECTRICITY

In 1992, Eskom started a concerted effort to electrify as many households in South Africa as possible. This early initiative culminated in the establishment of the National Electrification Forum in 1993. This forum presented a set of recommendations to cabinet in the second half of 1994, and it developed financial models of various scenarios for the national electrification programme. The information was used by the Reconstruction and Development Programme (RDP) to establish a national electrification target of 2, 5 million households by 1999 (No author - www.dme.org.za/whitepaper).

Before 1994, only 12% of South Africa's rural population had access to electricity. By the end of 1999, this figure has improved to 43%. The overall electrification figure of South Africa was 36% before 1994, a figure which jumped to 70% by the end of 1999. Other obstacles to this problem are the existence of the culture of non-payment stemming from the apartheid era, and low affordability levels due to unemployment (www.bt.co.za). The current Energy White Paper (1998) made provision for a National Electrification Fund to subsidise electrification projects. The Minister of Minerals and Energy appointed the National Electrification Co-ordinating Committee (NECC) in April 1999. The goal of this body is was to advise on the way forward for the National Electrification Programme. Government subsequently established a National Electrification Fund and a national electrification planning process. Annual allocations are made to Eskom and Local Authorities to meet electrification targets.

Figure 10 below illustrates the progress made in electrification since 1990.

Figure 6-Electrification Figures



Source: Eberhard 2003

Until 2000, the electrification programme was largely funded by Eskom or through transfers to an electrification fund that the NER allocated to municipalities. Between 1994 and 1999 more than R8 billion was spent on the electrification programme, with the average cost per connection at around R3 200. The electricity industry has been able to fund and cross-subsidise this programme largely due to the large industrial customer base. At the beginning of the programme it was estimated that the average monthly consumption of newly connected low-income households would be 350 kWh, but in practice an average consumption of around 130 kWh was maintained, sometimes as low as 50 kWh. Nearly all of the new connections have used pre-payment technology, but many connections involve informal housing using pre-wired 'ready-boards'. Eskom has also sought to contain the costs of rural connections through providing load-limited supplies. In addition to the grid-based electrification programme, there has been an active off-grid programme using PV technology. Between 1994 and 2000, 1350 schools were electrified in this way. Government has awarded subsidy concessions to private industry service providers in five geographic areas to supply solar home systems (Eberhard 2003).

The Division of Revenue Bill 2003/2004 on Local Authorities made provision for a separate window for the funding of free basic services, including electricity, which took effect 1 July 2003 for the new municipal financial year. Approximately 1 million of South Africa's poorest

households are eligible to receive a total of 50 kWh free electricity, which will allow for the use of basic services such as lights, radio and a two-plate stove for a month. The proposed level of basic electricity is motivated on the basis that 56% of households in South Africa connected to the national grid consume on average less than 50 kWh of electricity per month. The level of services provided by this amount of electricity can be further increased by introducing energy efficiency lighting. The first year's funding from National Government, as facilitated by the Division of Revenue Bill, amounts to R483 million, with an additional R100 million being set aside to improve billing systems of municipalities. This subsidy applies to rural and urban households, and in non-grid areas, which receive mostly solar energy services, consumers receive a subsidy of up to 80% of the cost of the solar electricity systems. (Business Day 6 December 2002).

3.3.6 CONCLUSION

South Africa's power sector has undergone only modest reform. Eskom was forced to operate on a more commercial basis. It has been corporatised, pays taxes and dividends, and has accountable to its shareholder (government) in terms of its financial performance. One of the consequences of the corporatisation of Eskom was the termination of its internal funding of the electrification programme. Government anticipated this shift by establishing a National Electrification Fund resourced by allocations from National Treasury. The Department of Minerals and Energy manages the national electrification programme and annual allocations to Eskom and local authorities to meet electrification targets. Hence power sector reform has not impacted negatively on access to electricity. Instead, special measures were put in place to secure ongoing electrification.

While the number of new electricity connections has increased dramatically over the past decade, the affordability of electricity remains a problem. It will be crucial for government to sustain the current electricity subsidies to poor communities if their welfare is to be supported into the future. The slow progress in reforming the distribution sector is prejudicing the implementation of affordable and sustainable electricity services for poor consumers.

However, the mammoth task of increasing the household electrification rate from 32% to over 70% in a decade can serve as an excellent example to the world about what can be accomplished with political will and efficient resource allocation. Unfortunately, the reform process in South Africa progresses slower than planned, and no RED's has been established yet.

The key question will be whether the power sector reform efforts and increased access to electricity by especially poverty-stricken households will be sustainable. It would seem that for the foreseeable future, South Africa will have to continue with its current subsidy scheme, not only to make the service affordable, but also to boost consumption. A substantial number of households will remain too remote to provide them with grid-extended electricity, and they will have to be provided for by means of off-grid systems. Finally, the reform process in South Africa seems to have been successful in creating a sound regulatory framework and special programmes to expand access and to supply households with affordable electricity.

CHAPTER FOUR - SOUTH EAST ASIA

4.1 INDONESIA

4.1.1 OVERVIEW

Indonesia is composed of 17 000 islands, of which some 3000 are inhabited. The Indonesian electricity sector was founded at the end of the 19th century. A nationalised electric power company called Perusahaan Listrik Negara (PLN) was established in 1960 for the purpose of providing electricity all over Indonesia. Before the creation of PLN, electricity in Indonesia was provided by several private agencies under the Dutch colonial government. In 1972 the government confirmed the status of PLN as Perusahaan Umum (a state-owned public utility company) (Seymour & Sari, 2001).

PLN's mission was: "to supply electric power on the basis of fair business principles and ensure its existence and development in the long term...as an agent of development, to support the improvement of the welfare and prosperity of the society to stimulate economic growth" (No author-websserver.rad.net.id/pln/).

PLN operates over 600 separate unconnected transmission and distribution systems. The largest, Java-Bali is served by two generating subsidiaries and four distribution units. Around 60% of the population resides on Java. Some rural and island communities meet their own power requirements and are not connected to the PLN grid, but the national electrification plan calls for a 100% electrification rate of villages by 2003-2004 (Seymour & Sari, 2001).

Indonesia was hailed as an example of development success by the International Monetary Fund (IMF) and the World Bank, until the 1997 Thai currency crisis adversely affected many south-east Asian countries. High economic growth during the first part of the 1990's encouraged a large inflow of foreign capital, leading to medium- and long-term electricity expansion and indigenous energy resource development plans being drawn up in anticipation of continued growth. During this period, the country saw substantial growth in electricity demand. However, after 1997, serious economic instability and heavy external debt gave rise to Indonesia's economy being described by the IMF and World Bank as inefficient, plagued with poor governance and corruption. Yet the IMF and the World Bank continued to make huge loans to the government. The economic crisis resulted in reduced industrial electricity consumption. To put this economic crisis in context, it is important to note that the energy

sector generates around 30% of total government revenue and serves as an important source of foreign exchange (no author - www.usaid.gov/country/ane/id/497-013.html).

As the crisis erupted in mid-1997, many energy projects were either ongoing, or scheduled to begin during the following two to three years. Some projects were due for implementation from 2000 through to 2010. The economic health of PLN during the latter part of the 1990's was not only negatively affected by the afore-mentioned economic crisis, but it was also plagued by financial ill-health. These losses occurred despite increases in revenue and subsidies from Government. The reasons were firstly due to expensive power purchase agreements with Independent Power Producers (IPP's) in foreign exchange, while sales were in Rupiah. Secondly, the country had to service large external loans for infrastructural investment - loans amounting to US\$ 876 million, or 10% of the Government's total foreign loans. The Rupiah's devaluation only increased the external debt. A case in point here is the 183% increase in debt service during the 1998-99 financial year, compared to the previous year. Thirdly, corruption and high levels of inefficiency at PLN further exacerbated the problem. Lastly, Indonesia experienced considerably lower electricity demand than previously expected in 1998, which caused an annual loss of US\$ 39 million (Motoyama & Widago, 1999 & No author - www.nepo.go.th/inter/asean/AMEM17-Bangkok/AMEM-CR-Indonesia.html).

According to Motoyama & Widago (1999), due to the monetary crisis many IPP projects were suspended, and by the end of 1999, less than 10 plants were producing power. The purchase price paid to the IPP's by PLN is much higher in comparison to neighbouring countries. This situation can be ascribed to high IPP construction, operation and maintenance costs. Despite a Presidential decree requiring a regulatory framework for private sector participation, it is widely known that competitive bidding was rarely implemented in developing most IPP plants. After the economic crisis broke, many American vendors were reluctant to accommodate PLN efforts to renegotiate firm PPA contracts. In an attempt to recover its financial status, PLN started renegotiating with several IPP's in order to reduce the purchasing price of electricity and re-negotiate the conversion rate of the dollar to Rupiah used in the PPA's (Motoyama & Widago 1999).

Three options offered by PLN to some IPP's with plants already in operation or entering the advanced stage of completion were:

- Adjusting fixed charges, to be based on the project replacement cost;
- A buy-out of the project at a certain discount rate, attaching the assets to a portfolio generation company to be created, and eventually privatised;

- Continuing with the present PPA's until 2003, where-after the IPPs would operate as merchant power plant (Motoyama & Widago, 1999).

4.1.3 RESTRUCTURING OF THE POWER SECTOR

Initial restructuring efforts started in 1985 by means of Act No 15, which was the primary piece of legislation in electricity, which included provisions covering: optimising the use of resources, respect for the environment, etc. The goal was also to increase the welfare and prosperity of the people, stimulating an increase in economic activities by placing the responsibility of general power sector planning on government. Electricity tariffs were to be regulated by the government. (No author

- www.infid.be/backgroundpaperprivatisasienglish1.html) & (Seymour & Sari, 2001).

During 1989, government issued Regulation No. 10, clarifying the relationship between the annual electricity plan and PLN's business plan, requiring the holder of a public interest licence to be an Indonesian corporation; requiring holders of own-use licences to sell surplus electricity to PLN; and confirming the President's rights over sale prices. Presidential Decree 37 of 1992 reflected the government's attitude towards the availability of public finance for the electricity sector, opening the way for private investment in power plants, with an expressed preference for build-own-operate schemes. It stated that the power prices are to be in Rupiah and must be approved by the minister. Section 5 prohibited government guarantees for invested capital or loans (No author - www.infid.be/backgroundpaperprivatisasienglish1.html & Seymour & Sari, 2001).

Service provision by private companies was already allowed in a limited way by means of Act No. 15 of 1985 on Electrical Energy. The role of foreign companies was further encouraged by Government Regulation 20 of 1994 on Share Ownership in companies established under the foreign investment scheme. By adopting these regulations in order to facilitate privatisation, several state-owned enterprises have been taken over by foreign companies. These privatisation actions were a cause of conflict between government and labour unions on the one hand, and foreign investors on the other. Government responded to the economic crisis of 1997 with Presidential Decree No. 39/1997, followed by Decree No. 5 of 1998 regarding the 27 IPP projects. These decrees categorised the status of all of the IPP projects into three groupings, namely "continue", "review" and "postpone"

(No author-www.infid.be/backgroundpaperprivatisasienglish1.html & Seymour & Sari, 2001).

The above-mentioned decree did not intend to terminate signed contracts, but pursued proposed international arbitration in the case of three geothermal plant projects. The renegotiation of contracts with IPP's implied enormous compensation, as well as court arbitration, and it was not clear if sufficient funds could be raised to cover these payments. One potential alternative was to give power companies equity in the state utility. However, this would not guarantee a fair, transparent privatisation process in spite of a need for transparency in PPA renegotiations. It must be kept in mind that successor companies of PLN would have to honour IPP contracts. A fair amount of corruption and nepotism have been revealed in these privatisations, leading to the issuing in 1998 of the Presidential Decree No 72/1998 on the Evaluation Team for Privatisation of State-Owned Enterprises. This Decree replaced the earlier Presidential Decree No. 55 of 1996 on this issue.

August 1998 also saw the official launch of the Power Sector Restructuring Policy. In an attempt to resolve problems faced by the power sector, Presidential Decree No. 139/1998 was issued in September 1998, and a PLN Restructuring and Rehabilitation Team consisting of seven ministers related to the energy industry was appointed. The main tasks of this body were to define and review PLN strategic policy, the implementation of measures regarding the legal relationships between PLN and third parties, and to define steps to ensure PLN's viability in organisational and financial aspects. A working group of senior government and PLN officials had to define the framework of principles within which PLN could conduct the renegotiation of IPP contracts. In addition, this framework had to ensure that fair, well-structured and transparent procedures were followed. However, all negotiations with the IPP's were conducted by PLN on a commercial basis, without direct government involvement (No author-www.infid.be/backgroundpaperprivatisasienglish1.html & Seymour & Sari, 2001).

A number of proposals have been forward to introduce full competition in the Indonesian power sector. For example, the World Bank proposed that PLN should be replaced by several Strategic Business Units (SBU's) with responsibility for power generation, transmission and distribution. The generation units and distribution would eventually be privatised. For the Java-Bali region, a competitive market was proposed as there are already a number of generators and a considerable market to accommodate a commercially-run sector. The power generation, transmission and distribution activities outside Java-Bali was not considered mature enough for such competition (Widago + Motoyama, 1999, p.13). A separate, independent regulatory body would be established to regulate the industry.

The Asian Development Bank suggested that the two existing PLN generation subsidiaries, Pembangkitan Tenaga Listrik I and II will be split into 5 or more generation companies. The regional generation companies would compete with IPP's in bidding into the power pool for the best prices based on short-run marginal costs of generation (Widago & Yokohama, 1999, p.14).

The three government agencies directly involved in the implementation of the restructuring agenda were the Ministry of Mines and Energy, the Ministry for Empowerment of State Enterprises, and the Ministry of Finance. The Ministry of Mines and Energy's functions were:

- Overseeing the development of the new Draft Electricity Law of 2002 with technical assistance from the ADB;
- Developing new tariff codes and tariff increases and new codes and Governmental Regulations;
- Initiating and establishing a regulatory agency and undertaking capacity building through technical assistance for regulatory implementation;
- Renegotiation of IPPs and other contracts involving rationalisation and integration of the IPPs into the new industrial structure.

The Ministry for Empowerment of State Enterprises was in charge of restructuring, corporatisation and privatisation of PLN and ensuring and enhancing its financial viability. The Ministry of Finance was in charge of subsidies and issues related to government finance. The Ministry of Mines and Energy later became the Ministry of Energy and Mineral Resources, while the Ministry for Empowerment of State Enterprises was later dissolved to become part of the Coordinating Ministry of Economic Affairs.

Despite all these restructuring plans – actual reform progress has been very slow. By 2002 nothing much had changed. A new Electricity Law (No 20/2002) was passed that provided a comprehensive legal framework for the development of the electricity sector. Competition for power generation on the islands of Batam, Java and Bali is due by 2007 and private companies will be allowed to enter the distribution sector.

In 2003, the government renegotiated 26 IPP projects. Of these, five were taken over by the government in cooperation with PLN.

Indonesia is facing a looming electricity capacity crisis. It is estimated that severe shortages can be expected from 2005 unless new investment is made in the generation capacity. PLN is

planning to build the Maura Tawar power plant in Bekasi, West Java as part of the state's efforts to meet growing electricity demand, especially in Java and Bali. Currently consumption is growing at 8% per year and new generation investment has been practically non-existent since the 1997 monetary crisis. (<http://articles.ibonweb.com/magarticle.asp?num=1211>).

PLN remains in a dominant position –despite years of restructuring plans. IPPs have been introduced – but there is no effective competition. It remains to be seen whether the latest restructuring plans will come to fruition.

4.1.4 ELECTRICITY PRICES AND ACCESS TO ELECTRICITY

Low-income households are subsidised by Government. There were previous attempts to increase tariffs in order to make up for the negative effects of inflation and financial losses by PLN. After 1994 tariffs for all customer categories were increased by between 29-40%. However, Government had to terminate planned tariff increases in 1998 in the face of strong opposition. The increase would have doubled the tariffs for the lowest income residential customers. According to the PLN-IPP contracts, PLN had to purchase electricity (USD) at 5-8 cents/kWh, while it sold electricity at 2-3 cents/kWh as a result of Government subsidies.

The move to bring tariffs to commercially viable levels is an ongoing process as Government and PLN are trying to persuade the public of the benefits of a competitive market. Their message to the public is that it will result in lower average consumer tariffs in the long term, although they also warned of an increase in tariffs in the transition period. The average tariff increases proposed were 18% by October 1999, a further 20% by the end of February 2000, and whatever additional increases necessary to achieve an 8% rate of return by 2001. The timing of the increases was based on a study funded by the ADB. An automatic monthly tariff adjustment mechanism was to be introduced from 31 March 2000. The purpose of these adjustments is to reflect the movements in the prices of fuel, exchange rate, inflation, and other elements affecting the electricity price. Poor household tariff increases were to be buffered by means of poverty tariffs and lifeline subsidies.

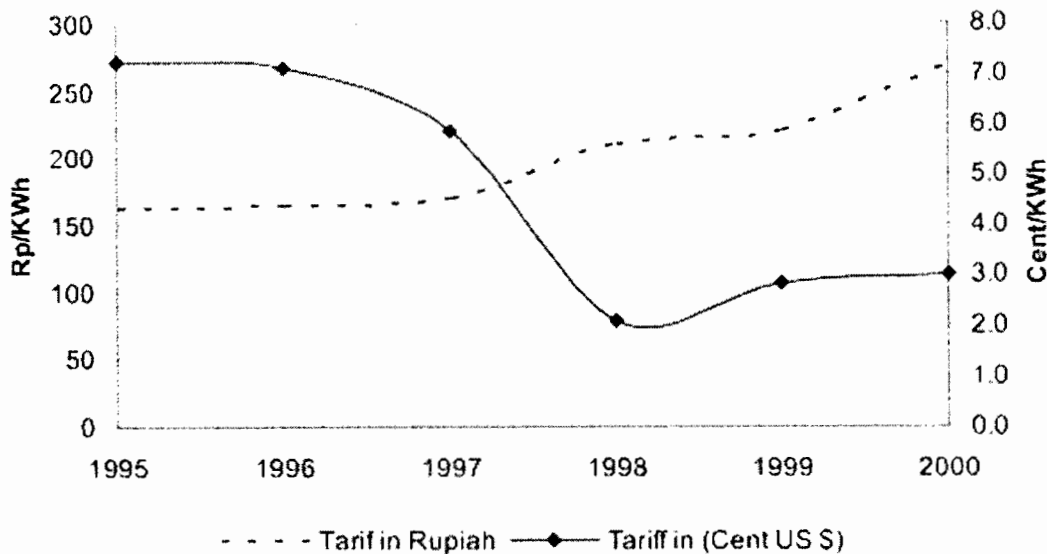
It was recognised “upon the completion of the competitive market, continued government subsidies will still be required for consumers in less developed and rural areas as well as by the urban poor because companies will have difficulty in providing electricity at affordable prices for these people” (Motoyama & Widago, 1999, p.14). Subsidies were to be paid out of general taxes, rather than relying on cross-subsidisation. The subsidies were to be financed by the establishment of a Social Electricity Development Fund. This fund is supposed to assist

residential consumers in the outer islands, as well as subsidising the distribution and retail sectors within Java-Bali for poor consumers unable to afford electricity (Motoyama & Widago, 1999, p.14)

In November 2001, the new electricity rate proposal for 2002 was announced. This increase was applied to all households. The Directorate General for Electricity and Energy Utilisation stated that the increases were still below PLN production cost. Since 1999, low-income households with an installed power capacity of between 250 and 450 VA had been exempted from electricity rate increases. The new pricing scheme was based on the agreement between the House of Representatives and Government in October 2001, to increase electricity by an average 6% every three months in 2002. According to this new scheme households with an installed capacity of 250 VA would increase by 16% in the first quarter, 15% in the second quarter, 15% in the third quarter and 12% in the fourth quarter. For 450 VA the rate increase would be 15%, 16%, 18% and 19% for the four quarters respectively. The middle income households with a 2000 VA capacity, the rate increase would be 8%, 9%, 8% and 7% for each quarter. An average increase of 8% is to be charged to high income households. For small industrial customers, the rate increase would be 7% for every quarter and about 4% every three months for large industrial customers. Thus poor households have experienced substantial tariff increases.

(No author- www.aseanenergy.org/information/news/2001/november/news_10.htm).

Figure 7-Tariff Fluctuations



Source and copyright:

www.aseanenergy.org/energy_sector/electricity/indonesia/average_electricity_tariff.htm

The figure above illustrates the dilemma Indonesia faces as its currency undergoes dramatic devaluation against the dollar, causing a steep increase in the purchase price of electricity in Rupiah. In order for PLN to attain its financial goals, Government is required to implement tariff increases. According to the ADB's Poverty Impact Assessment, the lowest 20% of households are considered poor, and only consume enough electricity to operate a light bulb for 12 hours per day. They advocated that measures would have to be taken by Government to limit tariff increases for the poorest households by means of a lifeline tariff.

Most (91%) urban dwellers have access to electricity. However, nearly 70% of Indonesia's 180 million population lives in rural areas spread across the country's 13 600 islands. Rural household electrification coverage is approximately 40% - considerably less than its neighbours Thailand with 80% and Malaysia at 98%. In the past Government has taken a least-cost grid extension approach to rural electrification, with PLN as the implementing agency. Indonesia has also considered the provision of renewable energy as a means of providing energy services to areas not served by a grid. Financial incentives are provided for this scheme through a commercial framework involving participating banks and private sector solar home system dealers or suppliers who offer instalment-payment to customers with 'reasonable proximity to urban centres'. The grants represent approximately 20% of the total system costs. Government has an underlying goal of installing one million solar home systems to increase the electrification rate. This approach comes at a time when

PLN's resources are already stretched with the implementation of conventional rural electrification approaches. Government also realises that financial burdens associated with rural electrification can be alleviated by allowing the private sector to deliver solar systems to unelectrified areas. However, there are some barriers to large scale delivery of solar home systems:

- High initial input technology costs;
- Delivery infrastructure consisting of supplier-dealer chains, and service arrangements, as well as a market which is not sufficient in volume to achieve economy of scale;
- Lack of credit to end-users

(No author www.worldbank.org/html/fpd/energy/e3_files/e3_2_files/e3_244.html).

In order to remove the above-mentioned barriers and fulfil rural electricity demands with solar home systems, the Government has requested assistance from the World Bank and Global Environment Facility (GEF), and with assistance from the latter, 200 000 solar home systems will be installed via the provision of:

- A financing plan to private dealers through participating banks, which will enable the purchase of the systems by rural households and commercial establishments on an instalment basis plan;
- A GEF-grant which is to be distributed to dealers and suppliers on an installed-unit basis (www.worldbank.org/html/fpd/energy/e3_files/e3_2_files/e3_244.html).

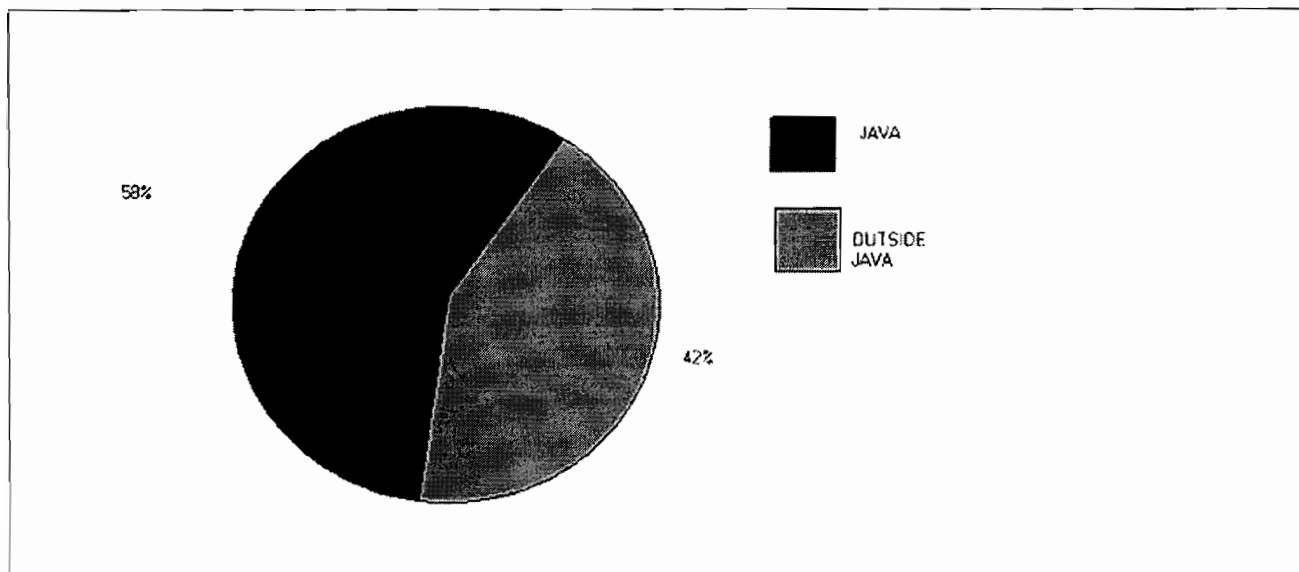
Approximately 100 000 solar home systems have been installed since 1990, with a total installed capacity of about 5MW. More than 6000 villages outside Java-Bali are considered as the most important target for decentralised PV systems. Unfortunately, after the 1998/99 crisis and the devaluation of the Rupiah, the purchasing power of many rural households has diminished, reducing previous market projections. According to a World Bank cost comparison, if the household density is less than 30 households (120-150 persons) per square kilometre, Solar Home Systems (SHSs) are less expensive than grid electricity. If the number of households in a cluster is less than 50, even a kilometre grid extension is more expensive than Solar Home Systems.

(www.ace.or.id/pressea/indonesia/solar/current_and_planned_utilisation.htm)

The Figures below describes vividly the stark contrast in electricity provision to communities in the Java and the outer islands. The problem reverts back to the cost-benefit argument of providing electricity to communities that are more widely dispersed and less able to pay. The

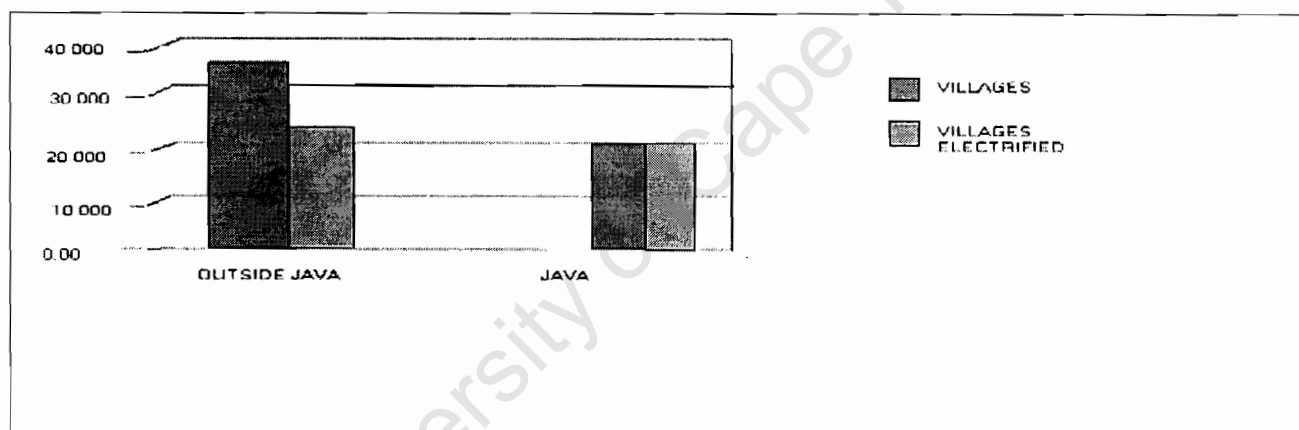
two regions as a whole are characterised by skewed attention from government, whether it is by means of household electrification, or regional electrification.

Figure 8- Rural household access to electricity



Source: Sahud, M & Tumiwa, F. 1999

Figure 9- Rural Electrification Rate— households per year



Source: Sahud, M & Tumiwa, F. 1999

4.1.5 CONCLUSION

In conclusion, it seems that many systemic problems plague Indonesia's efforts to simultaneously reform its power sector, increase generation capacity and keep its tariffs affordable. There was a definitive attempt to move away from a monopoly situation, which resulted in IPP investments with very high PPA's. On the other hand, with the regulatory regime absent, the power sector is characterised by continued state-intervention by means of

tariff setting, amongst other aspects. Entities such as the World Bank and the IMF were extremely critical about the operation of the power sector during the height of the financial crisis, but continued to extend loans to the government to keep the power sector afloat. It is therefore to be expected that they were very prescriptive about planning of the restructuring efforts. Despite all these efforts, PLN remains in a dominant position and competition is still absent.

There is a positive element in the fact that there have been attempts to set tariffs at levels according to household income, and that low-income households are subsidised by Government. However, the increasing tariffs from 1994 onwards for all categories was bound to affect the poor the most, as they were the least able to pay for electricity.

While the great majority of urban households have access to electricity, more than half of rural households do not have a grid connection. The Indonesian government has demonstrated some commitment to rural and remote electrification efforts by promoting Solar PV programmes.

One can not help but get the impression that it is the poor that had to bear the burden of a clumsy attempt by PLN to reform the sector. Indonesia serves as a good example as to what can go wrong if a national utility runs out of capacity, and arbitrarily decides that IPP's should carry the burden of making up for the shortage in capacity. It has been mentioned before, but the fact that electricity was purchased at US\$5-8 cents/kWh, while it sold electricity at 2-3 cents/kWh as a result of Government subsidies, highlights the fact that there were no comprehensive legal and regulatory checks and balances built into the system. It was the poor that became caught in this intricate tug-of-war between IPP's and PLN, and the very expensive process of re-negotiating PPA's. Government is now setting up an Electricity Market Regulatory Board that will regulate and supervise the business of power distribution, secure power supply, set electricity prices, issue licences for power supply companies and resolve disputes.

4.2 THAILAND

4.2.1 OVERVIEW

There has been pressure to reform the energy sector of Thailand since the 1980s from several politicians and businessmen. During the fifth National Economic and Social Development Plan (1982-1986), privatisation efforts focused on the oil and gas sectors. The sixth National and Economic Social Development Plan (1987-1991) laid out guidelines for private sector participation in infrastructure development, and these guidelines were listed in the White Paper on Enterprises by the National Economic and Social Development Board (NESBD) in 1988. March 1992 saw the Royal Act on Private Sector Participation in State Affairs, forming the basis for the ongoing reforms.

The electricity supply industry of Thailand is dominated by the state-owned Electricity Generating Authority of Thailand (EGAT) that is responsible for generation and transmission. Distribution and retail fall under the Metropolitan Electricity Authority (MEA), and the Provincial Electricity Authority (PEA). The Bangkok Metropolitan Administration (BMA) is supplied by the MEA, as well as the two adjoining provinces of Nonthaburi and Samutprakarn. PEA is responsible for the provision to the rest of the country.

Thailand has been confronted with rapid economic expansion during the past two decades and as a result electricity consumption increased from 16.8 GWh in 1982 to 81,9 GWh in 1997. However, the 1997 financial crisis resulted in a decline in power demand in 1998.

Thailand's energy affairs are scattered among many government agencies empowered with various energy laws. Currently, there are six energy-related state enterprises: EGAT; MEA; PEA; Petroleum Authority of Thailand (PTT); PTT Exploration and Production Co. Ltd (PTTEP); and the Bangchak Petroleum Public Co. Ltd (BANGCHAK). The government, through EGAT holds a 25% share in the Electricity Generating Public Co. Ltd (EGCO). PTT holds a 30.6% share in Thai LNG Power Co. Ltd (TLPC) (National Energy Policy Office, 1999).

The above-mentioned enterprises fall under the authority of the Prime Minister and the Minister of the Interior, and each is established and governed by a separate Act. In order to manage Thailand's energy affairs effectively, the National Energy Policy Council (NEPC), chaired by the Prime Minister and the National Energy Policy Office (NEPO), were set up

under the National Energy Policy Council Act of 1992. The NEPC is the major government agency with the responsibility of the supervision of all governmental agencies and state enterprises involved in energy matters. It is also responsible for developing policy guidelines and detailed regulations for the emerging private electric power sector, as well as the evaluation and approval of the long-term power development plan. The NEPC also approves the tariff structures (<http://www.nortonrose.com/publications/apecThailand.html>).

4.2.2.1 REGULATION

There are four main objectives of regulation for electricity in Thailand:

- To ensure the provision of an adequate amount of electricity to satisfy the increasing demand while ensuring high quality of service, reliable supply and reasonable prices;
- To promote efficient and economical use of electricity;
- To promote competition in the ESI and increase private sector participation;
- To prevent and alleviate environmental problems resulting from energy development

(No author –

http://www.apecenergy.org.au/welcome/background/regulators/Thailand_Elec_00.pdf).

To a degree, EGAT, MEA and PEA are self regulated as government enterprises, but as the three utilities are state enterprises, government, through the Prime Minister's Office, indirectly controls its management. Government directly controls prices and investment policies. EGAT issues the Grid Code for the Independent Power Producer programme, as well as the Small Power Producer programme

(No author - <http://www.nortonrose.com/publications/apecThailand.html>).

4.2.3 STRUCTURAL REFORM, COMPETITION AND PRIVATE PARTICIPATION

The main objectives of the promotion of the private sector in the industry were to increase competition in order to improve efficiency within the industry; secondly, to promote adequate energy supply and reasonable prices for consumers; thirdly, to reduce the investment burden of the government, as well as public sector debt in general; and lastly to promote the more efficient use of energy such as the small power projects (SPP) using co-generation (No author - www.probeinternational.org/pi/mekong/index.cfm).

According to the World Bank, the main rationale for privatisation was to avoid future debt and risk generated by government guarantees for EGAT's debt. By the early 1990's, EGAT's debt had grown to more than US\$4 billion. This debt accounted for more than 25% of state and state-guaranteed debt.

Policy debates on the restructuring and privatisation of the electricity supply industry of Thailand in order to promote competition and private sector participation are ongoing. On 5 March 1996 the cabinet decided to separate the generation, transmission and distribution businesses. Under this resolution, EGAT's thermal power plants were to be separated into business units and then corporatised, registered and listed on the Stock Exchange of Thailand (SET) as necessary to raise funds. The cabinet's resolution of 1 September 1998 agreed to the Master Plan for State Enterprise Sector Reform which served as a framework for the scope and direction of restructuring and privatisation of the four main economic sectors, including the energy sector. The Master Plan envisaged that the future structure of the ESI would follow the competitive model being implemented in many countries around the world. This competitive model provided for competitive generation companies (GENCO's), which both compete into a power pool as well as having individual bilateral contracts with major customers. An independent system operator (ISO) would function as an independent referee over the competitive generation process. The ISO was not allowed to own generation assets in order to avoid any conflict of interest. The transmission company was to be owned by a separate company from the ISO (National Energy Policy Office, 1999). The distribution companies (DISCO's) were to have geographically demarcated responsibility. Under this model, distribution acts as a natural monopoly in the particular area, and the regulation of access and tariff levels was to be set by the national regulator. (www.nepo.org & (No author <http://www.worldenergy.org/wec-geis/publications/reports/emd/status/thailand/default.asp>)

The model envisaged several stages in the power sector reform process. During stage one, EGAT was to act as the primary power purchaser/provider. EGAT would be corporatised as a whole, with autonomous business units operating as profit centres, with one power plant – Ratchaburi - being privatised. The first stage represented limited private sector participation in generation, providing a portion of the capital needs of EGAT. This stage provides limited incentives to improve productivity efficiencies, due to a lack of competition between generators. An independent regulatory regime for electricity was to be approved during this stage. Stage two implied that EGAT would remain the central supplier of power, with gradual introduction of direct sales. EGAT would act as a holding company with a transmission

operator as a subsidiary. The key elements of this stage were that EGAT would allow competition in bulk purchase and power supply, and there would also be enhanced private sector participation in both generation and retail supply by permitting generators to sell directly to large customers. Generators would be required to compete for sales to large customers, thus enhancing the efficiency of this sector. The regulator would be responsible for transmission and distribution pricing, as well as the implementation of incentive regulation. Stage 3 was originally designed to run from 2003 onward and was characterised by a competitive wholesale power pool and the introduction of retail competition. Retail competition would be introduced for certain customers and gradually expanded to cover a wider group of consumers. Generators would bid into the wholesale pool and power would be dispatched according to the lowest bid for a certain period (National Energy Policy Office, www.nepo.org). While initial steps have been taken to introduce private participation in the sector, few of the above reforms have actually been implemented.

EGAT's first privatisation step was the formation of a private subsidiary, EGCO. It sold two of the country's largest thermal stations to EGCO. Private investment in the generation sector was also promoted in 1994 by the granting of licences to private companies to become IPP's and SPP's. The results of EGAT's partial privatisation were firstly, that electricity supply options expanded. The overwhelming response to the private power programmes suggests that further state investment in electricity supply expansion is unnecessary. Secondly, it resulted in cleaner and more efficient electricity generation, reducing harmful emissions and cutting fuel consumption. Thirdly, it allowed for decentralised decision making and public accountability. Private ownership of power plants is fostering public scrutiny and demands for greater accountability and transparency between producers, consumers and local residents. (No author - www.probeinternational.org/pi/mekong/index.cfm).

Currently, the different forms of private sector participation allow for a diversified programme. As mentioned above, the SPP programme is such an example. The programme was initiated to promote the construction of small power plants to provide electricity from co-generation projects and for EGAT to purchase excess power from these projects. EGAT gives priority to fuels which are environmentally clean, acceptable to the general public, have stable prices and assured supplies. A mix of fuel types is preferred to avoid undue reliance on any particular fuel. Another form of private sector participation is the negotiation with a number of investors to buy power from projects running in neighbouring economies

(No author - <http://www.nortonrose.com/publications/apecThailand.html>).

In the face of politically embarrassing labour action, the Thai government in mid-2004 postponed the further restructuring of the EGAT indefinitely. Some analysts predict that the reform process will continue after the next general election in 2005, although there are still debates around whether EGAT should remain intact, and if it is privatised, whether the government should retain a majority stake.

4.2.4 ACCESS TO ELECTRICITY AND CONSUMER INTERESTS

Currently close to 98% of the villages have access to electricity, which does not mean that as many households have access. Thailand consumes on average 1448 KWh per capita per year, and compared with China's 827 KWh per year, it gives some indication of the energy-intensiveness of the population and economy. In the more remote, mountainous areas access to the national grid has yet to be achieved.

(No authors-http://www.probeinternational.org/pi/mekong/index.cfm&http://www.atimes.com/atimes/Southeast_Asia/EG17Ae01.html).

Electrification in Thailand was accelerated after the Provincial Electricity Authority (PEA) developed "The National Plan for Thailand Rural Electrification" in 1972. Currently some 66 983 villages out of a total of 67 701 villages have been electrified. The last batch of villages are the most difficult to reach as they are located in national parks, forest reservations, on small islands or high in the mountains. The PEA will continue to investigate alternative approaches to supplying electricity to these villages by investigating other technologies such as mini- or micro-hydro or solar systems. The government has established a policy on New and Renewable Sources of Energy (NRSE). Research, development, production and utilisation under the NRSE are to be directed to the production of commercially viable non-conventional technologies. In addition, the utilisation of non-conventional energy sources and the production and utilisation of proven energy technology equipment such as improved fuelwood or charcoal cooking stoves are being considered. The promotion of the NRSE program is seen as the task of the government. After the devaluation of the local currency, the Baht, the prices of commercial energy rose by 20%, and this in turn increased the interest in renewable energy and energy conservation (No author - www.pressea.org).

In terms of further electrification, the Energy Conservation Promotion Act of 1992 considers Renewable Energies under the heading of Energy Conservation and part of the Energy Conservation Promotion Fund. During 1995 and 1999 this ENCON Fund allocated about 600 million Baht to support 9 projects on renewable technology dissemination. This technology

covers pig manure bio-gas on large and small farms, power generation from municipal solid waste, and PV power for schools in non-electrified areas. In the second phase of ENCON, from 2000-2004, solar PV utilization was given greater emphasis (No author - www.pressea.org).

4.2.5 CONCLUSION

Power sector reform in Thailand has been modest. In 1992 EGCO (Electricity Generating Company) was established as a subsidiary of EGAT, corporatised and registered on the stock exchange in 1994. IPPs and SPPs have been introduced into the market. But EGAT remains largely intact and dominates generation and transmission. MEA and PEA still have a monopoly position in distribution and retail in their particular franchise areas. Thus, when speaking about liberalising the power sector in Thailand, one can not be but very sceptical about such efforts, as EGAT is not willing to relinquish its market position.

Electrification levels were high prior to the beginning of the reform process and efforts have continued to reach even remote villages. However, statistics refer mainly to village electrification and there may be an issue of how many households still require a connection.

Unlike many other countries in the region, Thailand has managed to secure enough capacity and has not faced price pressures as a result of unsustainable power purchase agreements with IPPs.

The long term effects of EGAT's continued dominance remain to be seen. One of the dangers is that efficiencies will suffer with ultimate consequences for prices.

4.3 MALAYSIA

4.3.1 OVERVIEW

Malaysia has a population of 23 million and a per capita income of approximately US\$3400 per annum. Prior to the economic crisis that hit South East Asia in 1997, the economy grew at a rate of approximately 8% per annum, with an electricity demand increase of 12% per annum. Now demand is expected once again to grow between 6% and 8% over the next decade. The total installed generation capacity in 2003 was 15,838MW – 14,221 in Peninsular Malaysia, 819MW in Sarawak and 789MW in Sabah. Approximately 84% of the total is thermal and 16% hydroelectric. Peak demand for electricity is expected to grow from 8 471 MW in 1998 to 14 095 MW in 2007.

Electricity generation in Malaysia is dominated by the following three utilities:

- Tenaga Nasional Berhad (TNB) in Peninsula Malaysia
- Sabah Electricity Sab. Bhd. (SESB) in the state of Sabah, and
- Sarawak Electricity Supply Corporation (SESCO) in the state of Sarawak

IPP's are allowed to sell electricity only to these utilities and thus there is no effective competition. TNB, SESB and SESCO, as vertically integrated entities, are the sole suppliers of electricity to consumers within their jurisdictions. In Peninsular Malaysia, two subsidiaries of TNB - TNB Generation and TNB Hydro, provide 60% of the installed generation capacity, while five IPP's provide the remaining 40%. In Sarawak SESCO provides 61% of the installed capacity, and the rest is provided by two IPP's. In Sabah SESB provides 62% of the installed capacity, and five IPP's supply the rest

(No authors - http://www.metering.com/archive/014/14_1.htm & <http://www.tradepartners.gov.uk/energy/malaysia/profile/overview.shtml>).

The utilities are not inter-connected and operate independently of one another in their separate jurisdictions. TNB is a publicly listed company, and has a monopoly over the transmission, distribution and retail supply of electricity in Peninsular Malaysia. It was created in 1990, following the corporatisation of the National Electricity Board, in line with the implementation of government's privatisation policy. It was floated on the Kuala Lumpur Stock Exchange, with the Ministry of Finance holding about 70% of the shares. TNB has seen substantial restructuring with the formation of many subsidiary companies. Presently TNB Generation (a 100% TNB owned subsidiary) is entrusted with the function of the generation business, with

transmission and distribution sections taken over by TNB Transmission and TNB Distribution respectively.

SESB, formerly known as Lembaga Letrik Sabah, was privatised on 1 September 1998, with the aim of ensuring the reliability and security of the electricity supply system to consumers in Sabah and Labuan. SESCO is a State Statutory Body incorporated under the Sarawak Electricity Supply Corporation Ordinance of 1962 and is responsible for the generation, transmission and distribution of electricity in Sarawak. Sarawak Enterprise Corporation (formerly known as Dunlop Estate Bhd.) became a public listed company on 1 January 1996 and it bought 45% stake of the Corporation from Sarawak State Government

(No authors -

www.apecenergy.org.au/welcome/publications/StrengtheningMicroReform/Annex4Malaysia.rtf & www.metering.com/archive/014/14_1.htm).

In order to keep pace with the expected national demand for electricity, the Government has turned to the private sector to supplement the supply of required generating capacity with the introduction of IPP's. Since 1993 15 IPP's, including one mini-utility have been granted licences, of which most are in Peninsular Malaysia, and 4 in Sabah. In addition, there are also a number of licensed co-generators operating throughout Malaysia in specific areas. During the 7th Malaysia Plan period (1996-2000) the country planned to commission more than 4000 MW of generation capacity in order to bring the total to around 15 000 MW by 2004. Economic problems have caused delays for some projects

(No author-

www.apecenergy.org.au/welcome/publications/StrengtheningMicroReform/Annex4Malaysia.rtf)

In terms of the Privatisation Master Plan of 1991, a change of the Registry Act of 1949 was proposed where TNB was identified as a flagship candidate for privatisation. Under the National Economic Recovery Plan introduced in July 1998, foreign ownership in insurance companies was allowed to increase from 49% to 51%, yet this lift in restriction on majority ownership has not flowed over to the energy sector

(No author-

www.apecenergy.org.au/welcome/publications/StrengtheningMicroReform/Annex4Malaysia.rtf)

4.3.1.1 REGULATION OF THE ELECTRICITY SECTOR

Under the Electricity Supply Act of 1990 the regulator of the ESI is the Director General of Electricity. The Minister of Energy, Communications and Multimedia appoints the Director General. The principal responsibilities of the regulator are:

- to issue licences and ensure the financial vitality of licensees
- promote competition in the industry
- promote consumer interest by ensuring continuous supply
- electricity at reasonable prices, and the protection and safety of the public and property
- tariff review in consultation with the Economic Planning Unit.

The Economic Planning Unit in the Prime Minister's Department is responsible for formulating the privatisation policy, formulating energy policy and selecting IPP's

(No author -

www.apecenergy.org.au/welcome/publications/StrengtheningMicroReform/Annex4Malaysia.rtf)

To some players in the market, in practice, the Director General is not entirely independent of direct Government control. The Regulator takes the policies and development initiatives provided by the Economic Planning Unit (EPU) into consideration. A new legal and regulatory framework is currently being prepared to pave the way for the establishment of an Independent Energy Commission, a power pool system and the independent grid system operator. The proposal is to firstly establish a single buyer market system with the independent market operator as the buyer. The proposed Electricity Bill and Energy Commission Bill is to provide for the establishment of the Energy Commission and empower it to supervise and regulate the energy sector. The directive of the Energy Commission is to promote competitive market behaviour, prevent abuse of monopoly power and to ensure that consumers benefit from competition and efficiency.

System planning, including forecasting and the approval of new generation projects, was the responsibility of the Inter Agency Planning Group, consisting of members of:

- The Electricity Supply Department;
- The Environment Planning Unit;
- The Ministry of Finance;
- The Ministry of Telecommunications and Multimedia; and
- The utilities

- The Ministry of International Trade and Industry and other related authorities (www.apecenergy.org.au/welcome/publications/StrengtheningMicroReform/Annex4Malaysia.rtf).

4.3.2 POWER SECTOR RESTRUCTURING

The restructuring of the ESI was spearheaded by the National Steering Committee (NSC), chaired by the EPU and comprises members from government agencies, TNB and IPP's. (http://www.metering.com/archive/014/14_1.htm).

The restructuring process was designed to be implemented in phases commencing with Peninsular Malaysia and later Sabah and Sarawak. Phase 1 envisaged the introduction of generation wholesale competition on Peninsular Malaysia and the establishment of a market pool operator, called the Independent Grid System Operator. Phase 2 envisaged demand-side participation in the market by 2005. The subsequent phases would involve the restructuring of the industry in Sabah and Sarawak.

However, as with many other emerging economies and developing countries, these initial bold ambitions for wholesale and retail competition have not been fulfilled. There has been limited competition *for* the market but no ongoing competition *in* the market.

The Electricity Supply Act of 1990 and the Gas Supply Act of 1993 were also under review with the emphasis on promoting competition and preventing the abuse of monopoly or market power in the energy sector. A new electricity act to replace the 1990 act has the objectives of, amongst others, ensuring the safe use of electricity and supply to customers at reasonable prices; ensuring the minimising of the negative impacts of electricity supply and usage on the environment and the prevention of the abuse of monopoly power

(No author - www.apecenergy.org.au/welcome/publications/StrengtheningMicroReform/Annex4Malaysia.rtf)

4.3.3 ELECTRIFICATION AND ACCESS TO ELECTRICITY

In 1995, 3.7% of urban households were living in dire poverty, compared to 2.1% in 1997 and 1.9% in 2000. Rural households living in poverty for the same years were 15.3%, 10.9% and 10.0%. For the same period, the overall mean income increased exponentially by 13.1% annually, with all states registering a substantial increase in mean household income, and Kuala Lumpur recording the highest rate.

Substantial progress has been made in electrification, including in rural areas.

Table 3-Electricity Supply – Rural Electrification Coverage by Region

Region	1990	1995	1998	2000
Peninsular Malaysia	91%	99%	98%	100%
Sabah	48%	65%	70%	75%
Sarawak	50%	67%	75%	80%

Source: www.tradeport.org/ts/countries/malaysia/isa/isar0017.html

According to the figures above, it is evident that almost all rural areas in Peninsular Malaysia have full access to electrification, 25% of total rural households in Sabah have no electricity supply, and 20% of total rural households in Sarawak have no access to electricity (infosoc Malaysia 2000, p.11). Between 1991 and 1995 transmission and distribution networks were expanded in order to improve coverage and system reliability and stability. Of total expenditure on rural electrification by the Federal Government, some 87% was for grid extension projects. TNB also invested RP 100 million in rural electrification projects within the Peninsula area, but unprecedented growth in demand resulted in supply interruptions.

The rural electrification programs between 1996-2000 comprised grid extensions and provision of stand-alone generators consisting of solar installations, micro- and mini-hydros, as well as some larger hydro systems. A total of some RM 469 million was allocated for rural electrification, benefiting 137 000 households. The states of Sabah and Sarawak received 75% of the Federal Government allocations.

Initially, almost 1000 domestic TNB consumers were put on a prepayment scheme in two districts using electronic meters and a smart card two-way token system, and it is envisioned that this system is to be extended in the Peninsula at 10% annually.

The Malaysian Government's intention with regard to expenditure on the energy sector in the is illustrated in the following table:

Table 4-Planned Energy Sector Expenditure

	RM million	1991-2000 (RM million)
Program:	6 th Malaysian Plan Expenditure	7 th Malaysian Plan Allocation
Hydro	1,993.50	87.0
Thermal	6,306.70	10,149.60
Rural Electricity	599.20	518.50
Transmission and Distribution	8,227.10	15,178.80
Others	454.30	334.40
Total	17,580.80	26,268.30

(www.tradeport.org/ts/countries/malaysia/isa/isar0017.html).

In Malaysia, there is a trust fund that has been established to pay for electrification of remote regions. All generators contribute 1% of their turnover to this fund and it is administered by the Ministry of Energy. There exists a continuous investment programme in transmission and distribution grids. TNB began reinforcement of the National Grid in 1996 by upgrading the transmission lines to 500kV. In order to ensure better security and reliability of supply SESB constructed the 275kV/132kV East Coast Grid transmission line connecting all the load centres along the East coast of Sabah. Concerning Sarawak, SESCO extended the circuit length of the 275kV transmission line from 569 km in 1995 to 765 km in 1998.

Since October 1998, the Department of Electricity Supply has been regulating transmission tariffs, and the tariffs include cross-subsidies between regions

(No author -

www.apecenergy.org.au/welcome/publications/StrengtheningMicroReform/Annex4Malaysia.rtf)

During October 2003, some IPP's pledged to help provide electricity to more than 1600 villages in the country under the accelerated rural electrification program. The program is a public-private partnership, supported by the Overseas Development Assistance (ODA), aimed at enhancing total electrification of the country. It is hoped that the approximately 3000 remaining villages will be electrified by 2006. The government of the Netherlands also pledged to provide assistance to the electrification program. This assistance will be channelled through three grant programs, namely the Economic Cooperation Projects Program, the Development-related Export Transaction Program, and the Program for Cooperation with Energy Markets (<http://www.news.ops.gov.ph/archives2003/oct17.htm#IPPs%20pledge>).

4.3.4 CONCLUSION

The Malaysian government did not go through a process of unbundling and introduction of competition before it sold off some of its assets. This fact did not help the monopoly situation, but it serves as an interesting case, which illustrates that there does not exist a one-model-fits-all approach. The private sector was also invited to participate as IPPs and these now supply a significant proportion of power. The fact that some IPP's pledged during 2003 to help with electricity provision to approximately 3000 villages, serves as an excellent example to the world to what can be achieved in terms of private/public partnerships.

What is evident is that the Malaysian government committed large sums of capital for the electrification of rural areas. Nearly all households now have access in Peninsula Malaysia and electrification rates have increased from about 50% to nearly 80% in Sabah and Sarawak. Progress continues, despite partial private ownership in the main utilities.

In terms of overall efficiency regarding power sector reform, Malaysia could not be held as a prime example as to how such a process should be approached. However, in terms of governmental commitment to deliver energy to its population by various means, Malaysia serves as an interesting case which calls for further exploration.

CHAPTER FIVE - CONCLUSIONS

The history and pattern of development of the power sector in different countries over the late 19th century and much of the 20th century was remarkably similar. Private capital was instrumental in the early years in mobilising investment in power generation and distribution of electricity to mines, industry and wealthy customers, and sometimes for public purposes such as street lighting. During the course of the 20th century - mostly from the 1920s to the 1960s - the state assumed greater control of the sector and squeezed out private sector participation and any possibility of competition. Electricity was seen to be a strategic industry, critical for industrial and economic development. The dominant industry model became the state-owned, vertically-integrated utility.

At first this industry model was reasonably successful. Economies of scale could be realised and the state could provide, or guarantee, the large amounts of investment capital that were needed.

However, by the 1970s and 1980s, severe problems became evident with this model. State-owned monopolies were not particularly efficient in allocating capital or in terms of operational costs. The costs of poor investment decisions or poor performance were simply passed onto consumers. The cost of supply became unacceptably high – and because of confused governance and management arrangements – governments often intervened in favour of consumers – but at the expense of the financial viability of utilities. Governments refused regular or sufficient price increases that covered costs. Across the globe, the typical and common experience was poorly-performing, financially-insolvent utilities, unable to raise capital for new investment and continually dependent on subsidies from government to provide electricity at prices that were affordable by the majority.

The situation was unsustainable. Governments increasingly became unwilling to provide capital and financial flows to sustain state-owned enterprises. Attention shifted naturally to new possibilities for private finance, investment and management in the sector. The industry had come full circle. The future expansion of the industry was once again dependent on private investment.

Chile was one of the first countries in the world to pioneer this reform path. Following on this experience, England and Wales became the new standard model. Vertically-integrated, monopoly state-owned enterprises were unbundled and privatised. Competition was introduced. Electricity could be traded. Consumers could exercise choice. The intention was for operational efficiencies to be improved and for new private investment to be attracted into the sector.

Many developing countries sought to emulate this model in the 1990s. However, the striking observation from this study is that, despite all the necessities of seeking new investment capital and improved operational efficiencies, very few developing countries or emerging economies have moved fully to a private and competitive industry. Despite countless studies and consultant reports, and even new policy pronouncements and legislation, reform has faltered, stumbled and retreated. At best, parts of the industry have been privatised. Mostly the incumbent utility has remained dominant. Private investment has been encouraged only on the margin, in the form of independent power producers – but often under opaque rules and regulations – and often at great cost to consumers.

Chile and Argentina went further down this reform path than most countries – but in Argentina we now see a retreat to greater state control.

New hybrid models have emerged. In many countries, state-owned and managed systems survive. But new, private investments are sought on the margin. The end result is still unclear. And developing countries need still to learn how to manage these new hybrid electricity markets.

The main focus of this thesis has been to track recent experience in power sector reform in a number of key developing countries, viz. Argentina, Brazil, Chile, Namibia, South Africa, Uganda, Indonesia, Malaysia and Thailand. The thesis has sought to assess the impacts of power sector reform on access to electricity by poor people. The remarkable overall conclusion is that in almost all situations, the level of access has increased over the past decade – even as the electricity industry in developing countries has undergone remarkable and complex change. However, prices have often increased and actual access by poor households has often been compromised.

The experience in the various countries is summarised below.

In Brazil, power sector reform initially involved privatisation of a number of generation and distribution companies. This was undertaken even before the independent electricity regulator was established. Over time an attempt was made to establish a competitive wholesale electricity market – but dispatch of power plants remained subject to engineering optimisation algorithms. The state is once again assuming a primary role in planning new investments and new capacity is allocated via bilateral contracts to distribution companies. The electrification figures obtained are high including the large slum settlements. Efforts continue to extend electricity access to remote rural areas. The state continues to provide capital and subsidies for these schemes.

Chile was the first country in the world to unbundle and privatise its electricity industry. Chile initially benefited from improved efficiencies and lower electricity prices. Some of its privatised electricity companies, used to competition, grew successful international businesses through much of Latin America as many countries began to liberalise their power sectors. However, there has never been full competition in the way electricity markets have developed in England and Wales, Nordpool, PJM or Australia, to name some competitive markets. Fears are also now being expressed around the ability of the power market in Chile to attract new investment in generation capacity which is now desperately needed. Chile, however, has been highly successful in extending access to electricity to more and more of its population – and this has happened despite the privatisation of the industry. Electrification targets were made clear. Development funds were allocated to the regions and utilities were invited to compete for lowest cost subsidies for rural electrification. The consequence has been a dramatic increase in rural electrification rates. Chile provides an excellent example of how public-private partnerships can deliver public benefits efficiently.

Power sector reform in Argentina was initially highly successful. The industry was unbundled and privatised. No generator was allowed to own more than 10% of the market. Competition was introduced in the form a simplified, administered wholesale market with generators bidding in their marginal costs for the months ahead. Significant capacity charges were also made. The consequence was a raft of new private investment in generation capacity. Foreign investors also bought distribution concessions. Efficiencies improved. Illegal connections were regularised. The overall impact on the poor was mixed. More poor households had to pay for their electricity service. Some had to pay more. In other cases, social tariffs were available. However, the macro-economic crisis from 2001 created huge problems. Prices were frozen and

foreign investors suddenly were faced with revenues only a third of previous levels. The powers of the regulator are now emasculated. It is unclear how the crisis will be resolved. In terms of electrification – overall connection rates are high. The challenge is in remote rural areas. A competitive framework was established for rural concessions and access to subsidies – but progress in rural connections has been disappointing.

Power sector reform in Namibia has not progressed very far. The highly fragmented distribution system is being rationalised into a fewer number of regional electricity distributors. A single-buyer model is being introduced in order to attract independent power producers – although no new investment in generation capacity has yet been made. An initial experiment was made in private participation in distribution through the Northern Electricity company. Financial and technical performance was improved. New connections were dramatically increased. Yet the experiment became a victim of political manoeuvring. Namibia is impressive in its development of an integrated rural electrification plan. The grid is being systematically extended into rural areas. However, the focus is on public and economic infrastructure. The number of new households being connected is still unacceptably low.

The focus in South Africa is also on the rationalisation of its distribution sector to increase economies of scale and scope. However, progress is slow and the first RED is still to be formed. On the generation side, bold moves were made to establish a competitive wholesale market through the creation of a power exchange and a market for bilateral contracts. However, competition is now longer a priority for the South African government. Reliability and security of supply has become paramount. Eskom, the dominant state-owned, vertically integrated utility has been given the responsibility for investing in capacity. IPPs will be invited to participate on the margin. Eskom has also been corporatised and has to pay tax and dividends to the state. It now longer makes available internal financial resources for electrification. The South African state makes available funds from National Treasury to a National Electrification Fund. Progress has been impressive. Within seven years, South Africa increased electricity access from one third of the population to 70%.

Uganda has progressed further along the power sector reform path than any other African country. It has broken its national power utility into separate generation, transmission and distribution companies and has privatised generation and distribution through concessions. A Rural Electrification Agency and Fund has been established. Additional concessions have been awarded to rural distribution companies. A large flagship World Bank project seeks to expand access to

electricity in the country. It is probably still too early to gauge the success of these reform efforts. However, electrification access in Uganda remains extremely low.

The level of development in South East Asia is higher than in Africa. Overall electricity access rates are generally higher. Power sector reform initially took the form of introducing IPPs. Many of the associated power purchase agreements were expensive and had to be re-negotiated. In Indonesia, Thailand and Malaysia, power sector reform policy was more ambitious. Incumbent utilities were to be split up and privatised, and competition was going to be introduced in the form of a power pool and customer choice. A degree of privatisation was achieved, notably in Malaysia. However, in all three countries, the incumbent utility remains dominant. Full power sector liberalisation remains on the back-burner. Hybrid systems emerge. The state sector remains important. But space is being opened for private sector participation – often within a confused or contested policy and regulatory framework and environment. Thailand and Malaysia have attained extremely high levels of electricity access. Programs continue to extend access to remote areas – often using off-grid technologies. Indonesian urban access is high – but significant challenges remain in relation to rural access – especially amongst the myriad island communities. Indonesia also has a number of programmes focused on improving rural electrification rates.

In conclusion, power sector reform has been necessary to deal with a range of problems that emerged from the old industry model of state-owned, vertically integrated utilities. However, the new standard model of an unbundled, privatised, fully competitive electricity industry has also not been achieved. In almost all developing countries a hybrid power market is evolving. The private sector is invited to participate – but the state retains a crucial role.

Electrification and affordable access for poor communities remains important for all countries. The impact on prices for the poor is often contradictory. The move to commercialisation and cost-reflective pricing often means price increases for all electricity customers. However, the state remains concerned about affordability for the poor and life-line tariffs or subsidies are often made available.

In terms of electrification and new connections – this has not often been central to the objectives and process of power sector reform. Yet governments have recognised that electrification cannot be ignored and in most cases they have set up special electrification funds and programme to ensure that progress continues.

The final conclusion of this thesis is that power sector reform is generally driven by factors other than the need to arrange increased access to electricity by the poor. The main drivers for power sector reform are to attract new investment and to improve operational efficiencies. Successful progress in these areas is inevitably good for poor electricity consumers. Sufficient power can be secured and costs can be lowered. However, progress in electrification is only possible if special government programmes are put in place in terms of policy, targets, regulation, finance and implementing agencies. In this respect, programs to improved access to electricity for the poor are largely independent of power sector reform.

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