Power Sector Reform in Africa: Assessing Impact on Poor People

Report

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JOINT UNDP / WORLD BANK

ENERGY SECTOR MANAGEMENT ASSISTANCE PROGRAMME (ESMAP)

PURPOSE

The Joint UNDP/World Bank Energy Sector Management Assistance Program (ESMAP) is a special global technical assistance partnership sponsored by the UNDP, the World Bank and bi-lateral official donors. Established with the support of UNDP and bilateral official donors in 1983, ESMAP is managed by the World Bank. ESMAP's mission is to promote the role of energy in poverty reduction and economic growth in an environmentally responsible manner. Its work applies to low-income, emerging, and transition economies and contributes to the achievement of internationally agreed development goals. ESMAP interventions are knowledge products including free technical assistance, specific studies, advisory services, pilot projects, knowledge generation and dissemination, trainings, workshops and seminars, conferences and roundtables, and publications. ESMAP work is focused on three priority areas: access to modern energy for the poorest, the development of sustainable energy markets, and the promotion of environmentally sustainable energy practices.

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Abbreviations and Acronyms

¢	Cedis Ghana currency unit
AMADER	Agence Malienne pour le Développement de l'Energie Domestique et de l'Electrification Rurale
AEG	Aroab Electrical Group
BEE	
CENORED	Central-North Regional Electricity Distributor
CREE	Commission de Régulation de l'Eau et de l'Electricité
CFLs	compact florescent lamps
CPI	Consumers Price Index
DBSA	Development Bank of Southern Africa
DME	Department of Minerals and Energy
DES	Domestic Energies Strategy
EDF	Electricité de France
ECG	Electricity Company of Ghana
ECB	Electricity Control Board
ERA	Electricity Regulatory Authority
EDM SA	Electricité du Mali Société Anonyme
EWURA	Energy and Water Utilities Regulatory Authority'
ERT	Energy for Rural Transformation
ESMAP	Energy Sector Management Assistance Program
FBE	free basic electricity
GEF	Global Environment Facility
GDP	gross domestic product
GNI	gross national income
GWh	Gigawatt-hours
HEURA	Household Energy and Universal Rural Access
IPPs	Independent Power Producers
IPS	Industrial Promotion Service
IPTL	Independent Power Tanzania Limited
IECs	integrated energy centers
IDA	International Development Association kilovolts (kV)
kWh	kilowatt-hours
LRMC	long-run marginal cost
CFAF	Malian unit of currency
MME	Ministry of Mines and Energy
MRLGH	Ministry of Regional and Local Government and Housing
MW	Megawatt
N$	Namibian dollar
NER	National Electricity Regulator
NEAC	National Electrification Advisory Committee
NEF	National Electrification Fund
NEP	National Electrification Programme
NIEP	National Integrated Electrification Programme
NGOs	nongovernmental organizations
NE	Northern Electricity
NED	Northern Electricity Department
NORED	Northern Regional Electricity Distributor
OBA	Output-Based Aid

OMVS	Organisation pour la Mise en Valeur du Fleuve Sénégal
OPE	Oshakati Premier Electric
PPI	Purchasing Power Index
PV	photovoltaic
PPA	Power Purchase Agreement
PURC	Public Utilities Regulatory Commission
R	rand
RDP	Reconstruction and Development Programme
REDs	regional electricity distributors
RESPRO	Renewable Energy Services Project
REDMP	Rural Electricity Distribution Master Plan
REA	Rural Energy Agency
REF	Rural Energy Fund
SAPP	Southern African Power Pool
Selco	Southern Electricity Company
SHEP	Self-Help Electrification Programme
SBMS	single-buyer market structure
SME	small and medium-size Enterprise
SOGEM	Societé de Gestion de l'Electricité de Manantali
SSDs	Decentralized Service Companies
SOEs	state-owned enterprises
TICO	Takoradi International Company
TANESCO	Tanzania Electric Supply Company
T Sh	Tanzanian shillings
UEB	Uganda Electricity Board
UEDCL	Uganda Electricity Distribution Company Limited
UEGCL	Uganda Electricity Generation Company Limited
UETCL	Uganda Electricity Transmission Company Limited
UNDP	United Nations Development Programme
U Sh	Uganda shilling
VRA	Volta River Authority
WVES	Wayleave Village Electrification Scheme
WAPP	West African Power Pool
WNRECO	West Nile Rural Electrification Company
ZSFPC	Zanzibar State Fuel and Power Corporation

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Alix Clark, Mark Davis, Anton Eberhard, and Njeri Wamukonya contributed to the overall analysis and writing of the final document. Katharine Gratwick produced the initial summary versions of the country case studies included in appendix A of this report. Margaret Winterkorn-Meikle assisted with editing and the executive summary. Marjorie Araya coordinated the preparation of the final report and Nidhi Sachdeva formatted this report.

Country case studies were undertaken by Ishmael Edjekumhene and J. Amissah-Arthur of KITE in Ghana, Hartmut Krugman and Ralf Tobich of EMCOM in Namibia, Alix Clark and Anton Eberhard in South Africa, Hieronomi Shirima in Tanzania, and May Sengendo and Mark Davis in Uganda.

Executive Summary

1. Power sector reform has been on the public agenda in Africa for more than a decade. In an effort to improve the technical, commercial, and financial performance of utilities; boost sector cash flow; facilitate mobilization of resources for capital investment on a commercial basis, thereby releasing public funds for other investments; and extend access to electricity to poor and rural communities, many countries have adopted plans to reform the structure, operation, and financing of their state-owned electricity utilities.

2. The goal of this study is to examine the impact of power sector reform on poor people in Africa by tracing the relationship between this process and certain key factors that directly affect the poor, such as access to electricity, the affordability of electricity services, quality and reliability of supply, access to such social services as electrified clinics and schools, economic development, and net impacts on public finances. The study examines power sector reform in six African countries—Ghana, Mali, Namibia, South Africa, Tanzania, and Uganda. Poverty impacts can be evaluated at the micro level through surveys and direct interviews with poor people. However, the micro approach should be accompanied by a macro-level or national analysis, which is the approach adopted in this study. Some interviews and focus group discussions were undertaken, but these country studies relied mainly on sector-wide data.

3. Power sector reform has conventionally begun with an initial stage of commercialization and corporatization of state-owned utilities, which is followed by their unbundling and the introduction of competition when country size allowed and private sector participation. Although many countries have begun this reform process, no African country has completed the transition to a fully unbundled, competitive, and private electricity sector; in fact, among the six countries studied, so far only Uganda has successfully unbundled its utility. Some have introduced limited competition *for* the market by allowing bids by independent power producers (IPPs) or concession agreements, but none have succeeded in developing competition *in* the market through a competitive power market or at the distribution level. Nevertheless, private participation is now present in the form of IPPs (Ghana, South Africa, Tanzania), concessions (Mali, Uganda), and management contracts (Mali, Tanzania and, briefly, northern Namibia). Finally, throughout the continent, countries that have undertaken the reform of their power sectors have established electricity regulators with various levels of success.

4. The impact of these reforms on the poor in Africa is difficult to quantify. The challenge of this study was to examine the impact of power sector reform on certain factors that directly affect poor people. Compounding this challenge is the reality that in most cases the reforms are not complete and there are many indirect factors involved.

Access

5. At a minimum, the extent to which power sector reform affects poor people depends on their ability to access electricity. Reforms have the potential to affect access levels in many ways. By improving the efficiency and financial soundness of the power sector, reforms can attract new investors or free up government resources to be used in expanding access, provided there is an effective demand. However, introducing market-driven private sector participation may encourage utilities to focus on providing electricity to communities that are already proven to be profitable and can be connected at a low cost, and to not extend the network to poor areas.

6. In most of the case study countries, access to electricity, defined as the number of effective connections, has more than doubled over the past decade (Ghana, Mali, South Africa); for other countries for which data are available, there has been a substantial increase in access (Tanzania, Uganda), although, with the exception of Ghana and South Africa, it remains at very low levels, especially among the rural populations. This increased electrification, however, cannot be definitively attributed to reform initiatives. Instead, it appears to be a result of government policies, programs, and subsidies specially intended to expand access to electricity by making it physically available and making the access affordable for more in the population.

7. The experience in Tanzania, for example, suggests that private participation and reforms alone have not produced dramatic acceleration in access. It should be noted, though, that Tanzania's two-year management contract was designed primarily as an interim measure toward preparing the company for privatization and unbundling. Its target was essentially to instill commercial discipline rather than increase access. Electrification actually continued to increase during the management contract period, although less than in the period before Net Group Solutions' management contract with the national utility, Tanzania Electric Supply Company. In contrast, in Namibia, the private company Northern Electricity invested in new electricity connections that can account for the expansion.

8. In South Africa, where electrification has swelled, expanding access has been a dominant feature in the policy debate. The government set national electrification targets and initially the state-owned utility Eskom cross-subsidized the national electrification program with earnings from industry and wealthier households. Since Eskom was corporatized and started paying taxes, the government has funded the capital costs of new connections and the first 50 kilowatt hours (kWh) per month for poor households. As a result of these hands-on policies, the percentage of the population with access to electricity increased from a third of the population in the early 1990s to about 70 percent today; as many people were connected in 7 years as in the previous 100 years.

9. Ghana represents a further example of the potential impact of dedicated electrification programs and funding. Under the Self-Help Electrification Programme, the government offered to connect communities within 20 kilometers of the existing network that could demonstrate a minimum number of interested households and provide the required low-voltage wooden distribution poles. This program has been so popular, particularly among smaller communities, that it had to

be divided into several phases so the government can meet demand. Its sustainability, however, is still under review: a large number of voluntary disconnections due to affordability constraints were registered recently.

10. Despite rising numbers of connections and increased availability of electricity, it is interesting to note that per capita rates of electricity use have declined in many countries. In Ghana, although access to electricity increased by 500 percent between 1991 and 2000, per capita consumption actually fell over the same period. This suggests that although more people are connecting to the network, poverty limits their use of electricity services and many poor households continue using other fuels, such as kerosene, wood, or charcoal. Nevertheless, there is also the example of Mali, where both access levels and per capita consumption increased, although both remain at very low levels.

Price

11. Reforms often are expected to result in improved utility performance and lower costs, but power sector reform is typically associated with price increases aimed at making the utility more financially sound. In order to attract private investors, most reform programs have included measures to increase tariffs to cost-reflective and commercially profitable levels, accounting for inflation and market risks, and reducing across-the-board subsidies.

12. Price increases can cause social hardships, particularly for the poor, and many countries have encountered political opposition to reform efforts to make the utility financially solvent. In most cases, therefore, countries have adopted alternative strategies or relief systems such as government subsidies to IPPs or the utility (Ghana, Mali, Tanzania, Uganda), cross-subsidization programs (South Africa), or "lifeline" tariffs that supply a limited quantity of energy at a subsidized rate (Ghana, South Africa, Tanzania, Uganda). It is important to note, however, that lifeline tariffs do not always benefit the poorest of the poor because they target populations that already have access to electricity instead of using available funds to expand access to the poor.

13. However, higher tariffs have the potential to create revenue that utilities can use to develop and expand electricity networks that would benefit the poor. Bankrupt utilities are in no position to invest in expansion of electricity services to poor people, and tariff reform, provided it is combined with efficient management, is often essential to restore the financial health of utilities. In Uganda, increased prices were followed by investment in new connections, and in Mali and Tanzania, the introduction of private actors was intended to increase commitment to investment and expansion in the future (although this commitment has yet to be fulfilled). The introduction of private participation in the electricity sector has not always resulted in price increases. The case of Northern Electricity in Namibia demonstrates that improved billing and reduction of technical and nontechnical losses allowed the utility to actually reduce tariffs.

Quality and Reliability of Supply

14. Improving the quality and reliability of electricity supply was a major factor driving some of the reform programs in Africa. Patchy service negatively affects people's lives by requiring them to invest in expensive backup systems. In addition, reliable service can reduce costs, improve efficiency, and stimulate growth for small businesses that rely on electricity, which can have a huge impact on the lives of poor people by creating jobs. Introducing private sector participation can greatly improve quality and efficiency by establishing enforceable quality standards and introducing independent regulators to monitor and enforce quality standards.

15. Among the case study countries, the quality and reliability of electricity supplied to poor people varies, largely in proportion to the level of private sector involvement. In Mali and Uganda, private investment has been followed by significant improvements in the quality of electricity supply. In contrast, in Ghana and South Africa, where the industry has not yet been restructured and remains almost entirely state-owned, quality still varies regionally.

16. Reforms have also affected the quality of power in Africa through special customer service arrangements. New prepayment methods have allowed poor people to choose and monitor how much they wish to spend on electricity each month. In Namibia, Northern Electricity proved that by revamping billing methods and improving customer service, a private manager could improve the level of trust between the distributor and the consumer, ultimately increasing the utility's willingness to expand electrification to new communities.

Social Services

17. Electricity reforms potentially can have a great impact on social services to poor people in Africa. Increased electrification in schools, health clinics, and other community buildings can improve local education and health care, as well as connect people within and between communities, because these buildings sometimes serve as the main power source for many poor people. In Ghana and Namibia, for example, educational and health institutions have been among the first to be connected, and some communities have even ridden on the back of these facilities to obtain access for the whole village. Moreover, the hope is that private participation and investment could free public funds to use for social services, although this has not yet been realized on a large scale, and it would be impossible to guarantee that any surplus resources would be used to benefit the poor.

Economic Development

18. Potentially, the most far-reaching impact of power sector reform is the facilitation of economic development by creating a reliable and affordable electricity supply that powers industry and small businesses. Although tariff reform and the removal of many cross-subsidies has increased the price of electricity for small businesses, increasingly broad and reliable access may also reduce operational costs (and the need for costly backup systems) and enable new types of businesses to be built. Interviews in case study countries showed that as a result of electrification, some new businesses include welding, sewing, and telecommunications in South Africa; bread making, ice making, and battery charging in Mali; and welding, sewing,

and hairdressing in Ghana. Furthermore, a financially sound electricity industry will encourage related services to grow.

Public Finance

19. One of the initial reasons to reform the power sector and introduce private participation was to reduce the industry's dependency on public funds. Overall, power sector reform probably has not dramatically changed levels of public finance because many governments continue to provide support through subsidies, lifeline tariffs, electrification funds, and deferred taxes. In Ghana and Mali, the government pays a monthly subsidy directly to the utility so consumers do not bear the full weight of increased electricity tariffs. In South Africa, despite the corporatization of Eskom, the government defers Eskom's taxes and often finances the utility's non-electricity-related activities. However, by attempting to make the industry more financially sound, reforms have inspired reviews of tariffs and subsidies, which have likely made them more transparent and more targeted at poor customers. For example, Tanzania's lifeline tariff, which used to provide relief to commercial and domestic consumers indiscriminately for the first 100 kWh of electricity, now has been revised to target small domestic consumers who use less than 50 kWh.

Conclusions

20. Broad trends across the case study countries suggest that the impacts of power sector reform on the poor are neither direct nor inevitable. Although the introduction of private actors may actually result in prices increases and not necessarily expand access to electricity, reform also provides opportunities that would not otherwise exist to improve quality and reliability, expand networks, and re-direct public resources more transparently to the poor and rural communities.

21. A chief concern in introducing private participation is that it may increase electricity prices and therefore reduce the possibility that the poor can pay for access. Yet the case of northern Namibia is an interesting example in which prices fell and electrification rates actually increased when the private company Northern Electricity concluded a management contract for distribution operations of the state-owned utility. By updating the customer database, improving the reliability of service, and implementing a small rural electrification levy, Northern Electricity increased the connection rate in northern Namibia beyond initial expectations while the real cost to consumers fell. Similarly, under a management contract in Tanzania, Net Group Solutions improved the efficiency, reliability, and financial performance of the state-owned utility while prices went up a small percentage (4.3 percent) and the number of customers increased, although not significantly more than prior to the contract.

22. The direct benefits to the poor in these cases may not be dramatic, but they did provide opportunities for governments to implement special additional programs with social benefits. Evidence from case study countries indicates that despite unfinished reform programs, access and quality of service are improving in such countries as Ghana and South Africa, where the government has implemented special programs directly geared toward rural electrification. These programs, although implemented separately, will be most successful at providing broad, reliable

access to poor people if they are driven by clear national targets and plans, operated on a firm financial and operational footing supported by transparent financial transfers, led by market-driven managers, and monitored by a competent, legitimate, and independent regulator.

1

Introduction

Research Objectives

1.1 The majority of people who live on the continent of Africa remain without access to electricity, and many of those who do have access experience unreliable supply or are forced to rely on expensive backup solutions. With few exceptions, the power sector in Africa has failed to provide adequate electricity services in support of economic growth and improved social welfare.

1.2 The technical, financial, and investment performance of many state-owned electricity companies has been poor. Since the 1990s, new ways of organizing the industry have begun to be explored. Reform rhetoric in Africa has often mimicked that in other regions. A number of African countries have adopted policies and plans to unbundle and privatize their power sectors and to introduce competition. Yet rhetoric has seldom been matched with implementation of the end-state model. Nowhere in Africa are there examples of full wholesale or retail competition, possibly because in most cases, reforms focused on more immediate commercial issues.

1.3 Nevertheless, while the depth and pace of reforms in Africa have not been as extensive or as rapid as in many industrialized countries, sufficient experience has developed over the past decade to assess the impact and efficacy of these reforms. There are interesting examples of private participation through management contracts, concessions, and new investments in power production. Most countries are establishing independent electricity regulators, and many power sector reform initiatives have also involved the establishment of electrification funds and agencies.

1.4 How effective have these reforms been? Has the performance of electricity utilities in Africa improved? Are they better able to provide reliable and affordable electricity services for households and support economic activity and employment growth? What has been the impact of power sector reform on the poor?

1.5 Despite governance reforms that distinguish the separate roles of policy making, regulation, and ownership and management of utilities, electricity provision remains highly politicized in Africa. In many cases, African policy makers, politicians, and researchers are questioning the power reform process and whether poor people are seeing the benefits.

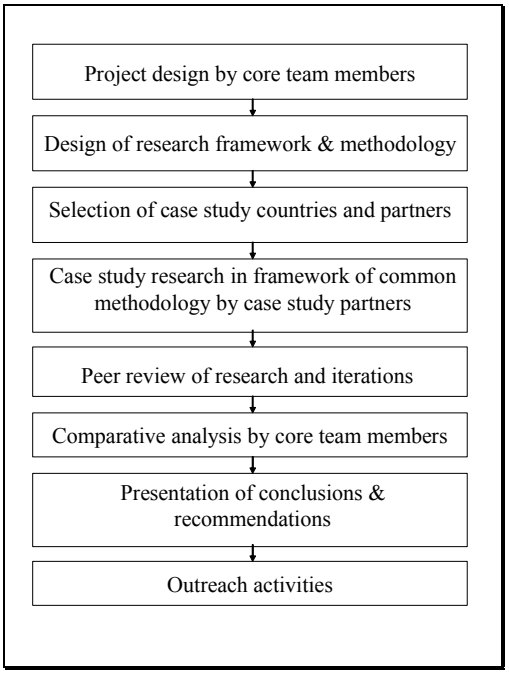
1.6 This project has sought to:

- Develop an in-depth understanding of the impact that power sector reforms are having on the continent's poor people
- Suggest innovative ways of ensuring that power sector reforms improve poor people's livelihoods

Study Framework

1.7 Analysis, conclusions, and recommendations appearing in this report are based on case study research undertaken in six countries in Africa: Ghana, Mali, Namibia, South Africa, Tanzania, and Uganda. The study is centered on a common research methodology established during the early stages of the project.[1] The framework is summarized in figure 1.1

Figure 1.1: Project Framework



Project Methodology

1.8 The study documented power sector reforms in six African countries and assessed their impacts on poor people by seeking to answer questions related to electricity access levels and trends, price levels and trends, quality of supply, and the impacts of electricity access on social services and economic activity and of power sector reforms on public finances (Table 1.1 below). Although some data were gathered through interviews with individuals in the case study countries and focus

1. See appendix B.

group discussions, most information in this study was collected from sector-wide data.

Table 1.1: Research Methodology

Theme number	Research themes	Research questions
1	Access to electricity	Do incumbents invest in more electrification during and after reforms? What are the factors that are likely to drive investment decision making during and after reforms? Do new agents emerge that invest in access to electricity? To what extent do these new agents engage in energy services to the poor? What mechanisms, if any, are in place to enable new agents in the market? Do reforms include the establishment of any special access supporting mechanisms? How effective are these mechanisms?
2	Price of electricity supply	What happens to costs of supply during and after power sector reforms? What happens to tariff structure and are there moves to cost reflectivity? Are new targeted, transparent subsidies put in place by reforms? What price changes have resulted from power sector reforms? How have these changes affected household expenditure? How have prices changes affected fuel choice and strategies? How have these choices affected household welfare?
3	Quality of supply and customer services	Has quality of supply to households changed? How have these quality of supply changes affected fuel use and expenditure? Has quality of supply to businesses changed? How have these changes affected fuel use and small business expenditure? Do utility systems fit poor households' income patterns and other needs?
4	Secondary services	Have reforms improved access of health and education facilities to electricity? Have reforms improved quality of supply to health and education facilities? How have these changes affected health and education services to the poor? To what extent has extension of telecommunications services depended on power? How have reforms affected the ability to extend

		telecommunications services?
5	Economic development	How have the energy costs of businesses been influenced by power sector reforms? How has this influenced employment and expansion? Have electrification programs expanded electricity access of small business? How have these business responded to having access? Have electricity services been coordinated with other infrastructure? Have these practices led to clusters of economic activity emerging? Have utility investment levels increased? Has utility outsourcing stimulated small business development?
6	Public sector finances	Have reforms affected subsidy payments to utilities? Have reforms led to changes in tax-take and dividend payments? Have receipts been used to release funds for increased expenditure on social programs?

Case Study Country and Partner Selection

1.9 Case study countries and partners were selected after a scan of the plans for and status of power sector reform in a wide set of countries in Africa. Selection of countries was undertaken according to reform progress—that is, the extent of commercialization, corporatization, restructuring, and unbundling in preparation for competition, private sector participation, as well as the nature of regulation. The study was also concerned with the extent and nature of policies, regulations, tariffs, finance, and institutions oriented toward achieving widened access to electricity. Partners and institutions selected to undertake the case study research and analysis are listed in table 1.2.

Table 1.2: Case Studies

Country	Institution	Authors
West Africa		
Ghana	KITE	Ishmael Edjekumhene J. Amissah-Arthur
Mali	Malian consultants	Ibrahim Togola Tom Burrell Youssouf Sanogo
Southern Africa		
Namibia	EMCON	Hartmut Krugman Ralf Tobich
South Africa	University of Cape Town	Anton Eberhard

		Alix Clark
Eastern Africa		
Tanzania	Independent consultant	Hieronomi Shirima
Uganda	ECON Analysis East African Energy Technology Development Network	Mark Davis May Sengendo

Limitations of the Research Outputs

1.10 As research and analysis were being conducted, it became apparent that the study has the following limitations:

- Many power sector reforms in Africa are generally not far advanced, and in some cases have been reversed. This has made the evaluation of impacts difficult and sometimes speculative.
- Because of budgetary constraints, the case studies could not examine all dimensions of power sector reform, but had to focus on the most prominent and relevant reforms present in that country. Research partners were not able to conduct complete primary research to comprehensively address all research questions and research themes presented in the common methodology. This applies particularly to indirect and social impacts.
- Some research partners have noted that data and information required for the type of analysis spelled out in the project research methodology have not been available to them.
- In some instances, it has been difficult to establish unambiguous causal linkages between reform and poverty-related issues. Some impacts could be ascribed to other interventions not directly related to power sector reform.

Report Structure

1.11 Section 2 summarizes the origins, nature, and pace of power sector reform in the case study countries. He authors then assess the primary impacts of these reforms on programs to expand access to electricity and on electricity prices, costs, and subsidies, which can have direct consequences for the lives of poor people. The authors also look briefly at secondary impacts of power sector reform, such as the quality and reliability of electricity services and the degree to which expanded electricity services have supported the provision of social services (for example, schools and clinics) and economic activity in the form of small-business development. These, too, can affect poor populations by reducing their need to rely on expensive alternative power sources, improving the quality and availability of education and health care, and increasing employment opportunities. The authors also provide some brief comments on the impacts on public finances, which can be used to promote all types of services to help the poor. The final section of the report states some overall conclusions about the effects of power sector reform on these key elements and recommendations for using what The authors have learned to improve poor people's

access to affordable and reliable electricity. Summaries of the case studies in Ghana, Mali, Namibia, South Africa, Tanzania, and Uganda are included in appendix A.

2

Power Sector Reform in the Case Study Countries

Overview

2.1 Over much of the last century, the electricity industries in the countries studied were dominated by state-owned, vertically integrated power companies. The Volta River Authority was dominant in Ghana, as was Energie du Mali Société Anonyme (EDM SA) in Mali, Nampower (previously Swawek) in Namibia, Eskom (previously Escom) in South Africa, Tanzania Electric Supply Company (TANESCO) in Tanzania, and the Uganda Electricity Board (UEB). The electricity industry was widely believed to be a natural monopoly, and private participation and competition came to be seen as unnecessary and potentially even inefficient. The quote below, from the Prime Minister of South Africa in the late 1940s, typifies this view: "[Electricity is] as cheap as anywhere in the world, because wasteful competition had been eliminated…. There will always be a very large field for private capital to operate in, but there are certain industries which experience has taught us can be driven better by Government without loss through wasteful competition".[2]

2.2 However, the traditional organization of the power sector in Africa began to be questioned in the 1990s. State-owned enterprises in most of the countries were not performing well. Some utilities were insolvent. Technical performance and reliability of supply was declining. Public funding was not sufficiently available and, with the exception of Nampower and Eskom, state-owned enterprises were struggling to finance new investment. And the industry was not making rapid enough progress in extending electricity services to more of the population.

2.3 Following the wave of power sector reforms in industrialized countries in the late 1980s and through the 1990s, developing countries began to explore new organizational and market models. The traditional monopoly view of the industry was superseded by the standard model of power sector reform: there would be vertical and horizontal unbundling of generation, transmission, and distribution, and private participation and competition would be introduced with independent regulation.

2.4 However, after more than a decade of reform, this standard model of an unbundled, competitive, and privatized industry is nowhere to be found in Africa.

2. Quoted in Steyn, G. 2001. "Governance, Finance and Investment: Decision Making and Risk in the Electric Power Sector," p. 67. PhD diss., University of Sussex

Instead, there has been piecemeal reform and, with the exception of Uganda, the original state-owned utility has remained dominant. Attempts have been made to commercialize and corporatize state-owned enterprises to achieve improved performance, sometimes through management contracts, for example in Ghana, Mali, and Tanzania. Only in Uganda have generation, transmission, and distribution been recently unbundled. In some countries, there has been an attempt to privatize or concession parts of the industry—for example, EDM SA in Mali, the generation and distribution businesses of the UEB in Uganda, and the short-lived experimentation with private distribution in northern Namibia. New private investment has been encouraged in the form of independent power producers (IPPs). However, with a limited set of bidders for new IPP or concession contracts, competition for the market has been limited, and competition to dispatch and sell electricity is almost nonexistent.[3]

2.5 The drivers, and the nature and pace of power sector reform in the case study countries, are described in more detail below.

Reform Drivers

2.6 There are two primary drivers for power sector reform in Africa. The first has been the need to attract new investment to improve security of supply and meet future needs. Governments have sought to diminish the burden on public finances and attract private investment into the sector. The second driver has been the need to improve the financial, commercial, and technical performance of incumbent state-owned utilities—either by commercialization, corporatization, or rationalization or concentration initiatives or by seeking private sector participation through management contracts, concessions, or divestiture.

2.7 In Ghana, the reform process was greatly accelerated when the country experienced power shortages in 1997 and 1998 that occurred not only because of drought-induced reductions in hydroelectric capacity, but also because there had been no new investment in power expansion. Accordingly, IPPs were encouraged. A new investment was made in a thermal IPP, and plans have been developed to secure open access to the system through ring-fencing and perhaps even unbundling of transmission. The World Bank also made the credit agreement for the IPP investment contingent on a management contract for distribution.

2.8 Power shortages in Mali in 1998 and 1999 were also a driver for reform. Drought and reduced hydroelectric capacity were only part of the problem. The existing thermal facilities were unable to make up the load because of their degenerating condition. Within this context, the partial privatization of EDM was accelerated.

3. Eskom in South Africa has a limited, internal pool to encourage more efficient dispatch, and the Southern African Power Pool allows trade of small amounts of electricity between countries in the region. In addition, 16 West African states are looking to establish a trading pool, the West African Power Pool (WAPP). WAPP was established in 1999 by the Economic Community of West African States. So far, the project remains in its planning phase.

2.9 Looming power shortages in Namibia and South Africa are creating new opportunities for private sector participation. Namibia is seeking to institute a single-buyer framework that would attract IPPs, and South Africa is also preparing tenders for IPPs.

2.10 The unbundling and concessioning of generation and distribution in Uganda were also motivated primarily by the need to attract new investment into the sector, although utility performance has also been a primary concern.

2.11 The imperative of needing to improve the financial, commercial, and technical performance of the incumbent utilities has been most evident in Tanzania and in Mali. The national utilities were corporatized entities but were still performing badly. The initial strategy in both countries was to put in place private management contracts as a step toward privatization.

2.12 The key challenges facing financial and technical performance in Namibia and in South Africa have been in the distribution sector, and the solution attempted there has been to consolidate municipal distributors into larger, regional corporate entities. A desire to position the distribution sector to continue expanding access to electricity, especially in rural areas, has been linked to these initiatives. A management contract has also been proposed for the distribution company in Ghana.

2.13 The need for competition has sometimes featured in proposed government policies for the sector (for example, in Ghana and South Africa), but this has been more rhetoric than serious intent. In reality, the need for new investment (for supply security and system expansion) and the imperative of improved financial, commercial, and technical performance (to reduce costs and relieve the drain on public finances) have been the main drivers. The need to improve the financial performance of the incumbent utilities is also sometimes a prerequisite for privatization and private investment.

The Nature and Pace of Reform in Case Study Countries

Ghana

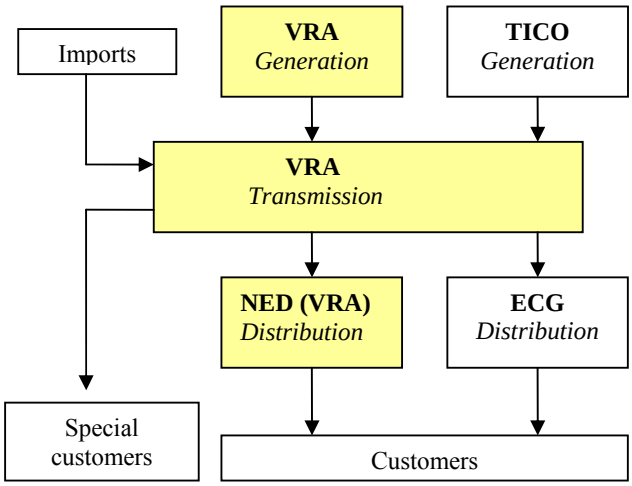
2.14 Ghana's power sector is dominated by the Volta River Authority (VRA), a state-owned corporation established in 1961. It provides generation, transmission, and distribution services (distribution is accomplished via its subsidiary, Northern Electricity Department [NED]). Combined generation capacity stands at 1,730 MW, with two VRA hydroelectric facilities accounting for 1,180 MW. The Takoradi Thermal Facility was planned as a 660 MW development, which was to be constructed in two blocks. The first 330 MW was commissioned in 1998 and is 100 percent VRA owned. The second block (220 MW of which was completed in 2000) is operated by Ghana's first and only IPP, Takoradi International Company (TICO), which provides high-cost electricity to the VRA through a Power Agreement (PPA). It is owned 10 percent by the VRA and 90 percent by CMS Energy Corporation. About one-third of the electricity is consumed by an aluminum smelter and provided at a special price, and another 20 percent is consumed by large bulk users, such as mines. NED distributes only 5 percent of electricity; the remainder is

distributed by the commercially inefficient Electricity Company of Ghana (ECG), which was converted into a limited liability company in 1997.

2.15 Power sector reform began in 1994 with government-commissioned studies and the appointment of a Power Sector Reform Committee. The urgency of reform was emphasized in 1997 and 1998, when power outages began to be experienced. The primary objective of the reform process was to establish a competitive framework, improve commercial management, and attract private investment and participation in the ownership and operation of new generation and distribution systems.

2.16 The structure of Ghana's power sector is illustrated in figure 2.1.

Figure 2.1: Structure of the Power Sector in Ghana



2.17 The Public Utilities Regulatory Commission (PURC) and the Energy Commission were established in 1997. PURC is responsible for economic regulation, primarily tariff setting; the Energy Commission is responsible for technical regulation, licensing, and policy advice.

2.18 The VRA has recorded a net financial loss since 1998, in part as a result of onerous financial obligations toward the Volta Aluminium Company (VALCO) and TICO, with the magnitude of losses increasing from each year to the next (except in 2001). The VRA's rate of return on net fixed assets has averaged −3.3 percent since 2000. Similarly, the ECG has incurred financial losses largely as a result of its weak commercial performance.

2.19 In April 2003, the cabinet approved a revised strategy and five-year schedule for power sector reform. A Power Sector Reform Secretariat has been formed to manage implementation. The plan envisages the formation of a VRA holding company in preparation for the unbundling of the current entity into the distinct business entities of hydro generation, thermal generation, and transmission by 2005. These entities would then be required to operate at "arm's length" despite being publicly owned. Also, in the first year, the VRA holding company is expected to

implement a performance-based management contract for the Takoradi plant and initiate the competitive procurement of new thermal generation facilities.

2.20 New rules for the electricity market were expected to be developed in 2004-05. An independent transmission system operator is planned for 2005. The formation of a distribution holding company, including the award of a management contract, was implemented in 2004, with operations set to commence in 2005.

2.21 The Energy Commission has now been restricted to licensing and technical regulation, and the Ministry of Energy assumes responsibility for energy planning, policy formulation, implementation, and monitoring.

Mali

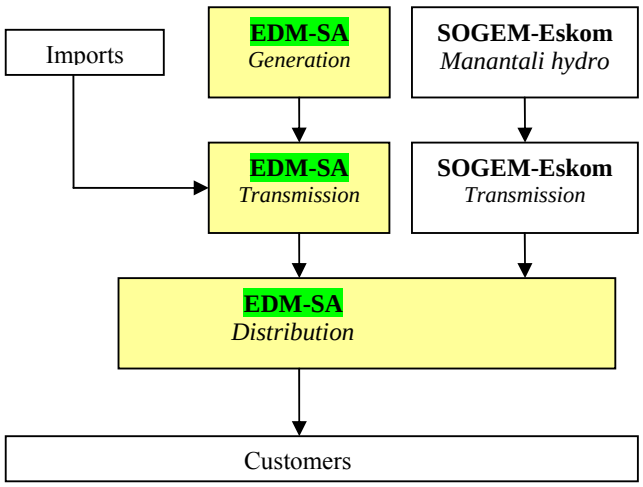
2.22 Mali's power sector is dominated by EDM-SA, a public limited company that is responsible for all almost all generation, transmission, and distribution of electricity. The firm is also responsible for providing water services. In the period following 1960, 97 percent of EDM-SA was owned by the Malian state and the remainder was owned by Electricité de France (EDF). Privatization was first considered in 1994. However, because of the company's high levels of debt, as well as resistance from unions and the general public, this action was ultimately abandoned. Instead, in an effort to improve the company's financial and operating performance, a management contract was awarded in 1995 to SAUR International, Hydro-Quebec International, EDF International, and CRC SOGEMA. The management contract was terminated in 1998. Supply reliability was still a problem, and little expansion of the system had occurred.

2.23 In 2000, the government of Mali made EDM SA shares available to private investors. 40 percent of the company is now owned by the Malian state, and the other 60 percent is owned by the international group SAUR/Industrial Promotion Service–West Africa, which has a 20-year concession with investment and service obligations to provide electricity and water to 97 localities throughout the country.

2.24 Thermal (diesel and gas) and hydro plants each provide about half of Mali's power needs. Mali's two largest hydroelectric installations are Sélingué, owned and operated by EDM SA, and Manantali, which is owned by the Organisation pour la Mise en Valeur du Fleuve Sénégal (OMVS), a trust company formed between Mali, Senegal, and Mauritania. The OMVS has delegated responsibility for this project to a sub–trust company, Société de Gestion de l'Electricité de Manantali (SOGEM), which has in turn awarded a 15-year operation and maintenance contract to Eskom Energie Manantali, a subsidiary of Eskom, the South African national utility.

2.25 There are also two small Sociétés de Services Décentralisés (SSDs) or decentralized service companies: SSD Koutiala, operated by NUON and EDF, and SSD Kayes (operated by EDF and Total). These two firms generate and distribute off-grid power (solar photovoltaic (PV) and diesel-generated thermal) in two rural areas. Figure 2.2 illustrates Mali's electricity sector.

Figure 2.2: Structure of the Power Sector in Mali



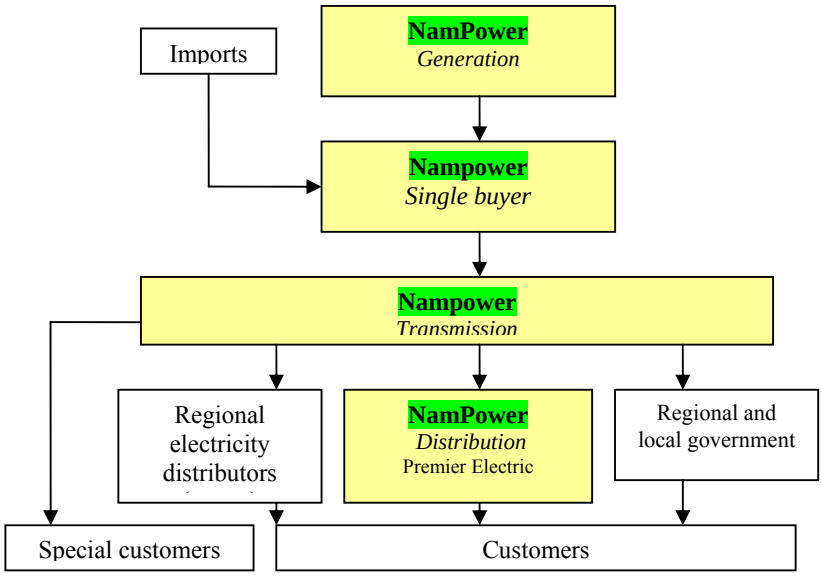
2.26 The Commission de Régulation de l'Eau et de l'Electricité (CREE), established in 2000, serves as the regulator for the sector. CREE is responsible for approving and controlling tariffs and ensuring compliance with contracts. The commission also helps draw up sectoral development policy and monitors calls for tenders and concessions. Finally, CREE is expected to arbitrate conflicts between service providers and consumers and generally to defend consumers' interests.

Namibia

2.27 The national public utility, Nampower, has primary responsibility for electricity generation, import, export, and transmission, and directly supplies large customers such as mines, as well as commercial farms. In the capital city and towns, the local municipality is generally responsible for distribution. Until recently, the Ministry of Regional and Local Government and Housing (MRLGH) was responsible for distribution to rural villages. With the implementation of the government's decentralization policy, the MRLGH's assets and operations are being transferred to the regional councils. In the north of the country, these assets have been transferred to a limited liability company, Northern Regional Electricity Distributor (NORED), which is jointly owned by regional councils and Nampower.

2.28 The Electricity Control Board (ECB) has the responsibility of regulating all aspects of electricity supply in Namibia. In most areas, however, the ECB has only an advisory role, and final decisions are the prerogative of the Minister of Mines and Energy. Figure 2.3 illustrates Namibia's power sector.

Figure 2.3: Structure of the Power Sector in Namibia



2.29 Namibia's demand is met mainly by the Ruacana hydropower facility, which is an old, coal-fired plant, some diesel generators, and imports: more than 50 percent of consumption is supplied by Eskom in South Africa.

2.30 Nampower is a profitable utility. Over the past decade or more, the company has accumulated considerable financial reserves, and its financial performance derives primarily from interest earned (return on fixed assets is rather low).

2.31 Namibia's reforms have mainly targeted the reorganization of the distribution sector, which has lacked both resources and capacity to deliver and extend acceptable levels of service. Attention is also being given to the establishment of a single-buyer office to attract IPP investments.

2.32 Before the formation of the Regional Electricity Companies (REDs), Namibia experimented briefly with private sector participation in distribution. The MRLGH made poor progress with electrification, and the program was experiencing unsustainable financial losses. In 1996, this caused the government to invite the private sector to take over the operation of existing distribution systems in the recently electrified central northern regions (where the majority of the population resides) for an interim period. The experience of Northern Electricity, as well as other, more recent examples of private sector participation, is described in box 2.1.

Box 2.1: Private Participation in Distribution: The Case of Northern Electricity and Subsequent Developments in Namibia

In 1996, a private company, Northern Electricity (NE), was contracted to operate the existing distribution infrastructure in the north of the country. Under the agreement, NE did not own any of the assets, but was responsible for all other costs and revenues associated with the business.

During a comprehensive initial meter audit, NE found that fewer than half of all customers were recorded in the customer database, which explained previous financial losses to a large extent. New supply contracts were signed with all customers, documenting the parties' rights and obligations, and all meters were sealed. Subsequently, payment rates in the region of 99 percent were achieved and very little tampering by customers with their supply infrastructure was experienced, indicating that customers were willing to pay for a good service.

To improve power system reliability (frequent power outages had occurred mainly in towns with older networks), NE strengthened and upgraded the major urban networks, with funding assistance from the government, and prepared a five-year network development plan to ensure system integrity. A preventive maintenance program was implemented and callouts were attended to promptly.

NE had only limited contractual obligations for electrification, which consisted primarily of extending existing reticulation networks and connecting additional customers. In its area of supply, the company was responsible for facilitating the government's rural electrification program. However, these two initiatives were unable to satisfy the demand for electrification, and in 1998, NE applied for loan funding from the Development Bank of Southern Africa (DBSA). Although approved in principle by the DBSA, this initiative failed because of the company's lack of collateral (they did not own the networks) and the government's refusal to provide guarantees. As an alternative, NE then implemented a rural electrification levy (N$ [Namibian dollar] 0.015/kWh) that increased the connection rate. In addition, the company spent almost N$14 million from its net income (over and above its contractual obligation) on rural electrification over its five-year term.

NE also implemented a Community Development Fund (funded by a charge of N$0.011/kWh) for each local authority and regional council area. These funds were applied to development projects that benefited the broader community, and allocations were decided by community leaders in consultation with NE. The company also sponsored local sporting, educational, and social events.

Despite its apparent success, the NE experiment came to an end in 2002, when the government did not renew NE's contract as a result of pressure from Nampower, the MRLGH, and local authorities—all of whom sought to extend their influence over an increasingly profitable and productive activity.

The Namibian government is now amalgamating local authority distributors (nationally) into four REDs. The private sector has been invited to participate through outsourcing, rather than through equity capital. There are a number of interesting developments underway in the distribution sector:

- Oshakati Premier Electric is a joint venture formed by the Oshakati town council and Nampower's Premier Electric in 2000; Premier Electric has also joined forces with the Otavi town council to improve electricity supply in that town.
- Reho Electricity, a joint venture between the Rehoboth town council and the holding company of NE, began operations in 2000 to rehabilitate and manage the local electricity distribution system in the town of Rehoboth.
- Southern Electricity Company, a private, largely South African–owned firm, entered into management contracts in 2000 with the town councils of Keetmanshoop and Karasburg and the Karas regional council to operate, maintain, and expand their local electricity reticulation systems.
- Various commercial farm electricity distribution schemes—including Saltblock Power, Osire Power, Aroab Electrical Group, and Kalahari Farming—are in the business of electrification of and electricity supply management in their own commercial farming areas.
- NORED, a company formed in 2001 by Nampower and northern local authorities (Katima Mulilo, Rundu, Ongwediva, Ondangwa, Eenhana, Uutapi, and Opuwo) and regional councils (Caprivi, Kavango, Oshikoto, Ohangwena, Oshana, Omusati, and Kunene), was the first RED. NORED took over from NE in March 2002, under license from the ECB.
- Central-North Regional Electricity Distributor, was established in 2003 by north-central local authorities (Otjiwarongo, Outjo, Tsumeb, Otavi, Grootfontein, Khorixas, and Kamanjab), regional councils (Otjozondjupa, Kunene, and Oshikoto) and Premier Electric, as Namibia's second RED.

2.33 Apart from the redesign and restructuring of distribution, the reform process has also involved modest restructuring within Nampower. The new structure adopted in 2000 consists of four regulated business units: generation, transmission, distribution, and the single buyer within the Nampower group. Nonregulated business units include support services and a commercial entity, Nampower Investments, which consists of Nampower Properties and Nampower International (formed with the objective of pursuing activities beyond Namibia's borders). Premier Electric, a wholly owned subsidiary, is Nampower's regulated distribution entity, focusing on the operation and maintenance of the distribution business.[4]

2.34 With regard to the prospective IPP market, in 2001, the single-buyer role was conferred upon Nampower by a cabinet resolution for a transitional period intended to lead to full market development. Locating the single-buyer function within Nampower poses a potential conflict of interest, because the company is also one of the power producers and therefore could potentially exploit its monopoly position. However, in the absence of any other player with a sufficiently strong balance sheet to underwrite single-buyer contractual agreements, it was recognized that Nampower was the best possible option.

2.35 The ECB was established in July 2000. Although the Minister of Mines and Energy retains overall policy authority, the ECB has promulgated the regulatory apparatus necessary for the rationalization of distribution, together with ring-fencing of Nampower and the single buyer. The ECB has also been responsible for administering a new licensing system, which requires licensees to motivate their tariff structures and levels in accordance with a recently developed cost of supply methodology that prescribes transparency and encourages cost-reflective pricing.

2.36 Although the primary driver for reform—the need to restructure the distribution industry—has yielded some impact (albeit with only limited private sector involvement), the second driver—security of supply and new investment—has not yet led to any concrete changes. No new generating facilities have been developed since the inception of the reform process. Meanwhile, plans for potential IPP plants have been drawn up: the 450 MW Epupa hydro plant on the lower Kunene River in northwestern Namibia; an 800 MW combined-cycle gas turbine plant at Oranjemund in the far south, supplied by the Kudu offshore gas field; a 15 MW hydro facility on the Okavango River in the northeast; and a 10 MW wind farm in Luderitz. The Epupa investment seems unlikely, and the Kudu project faces many hurdles.

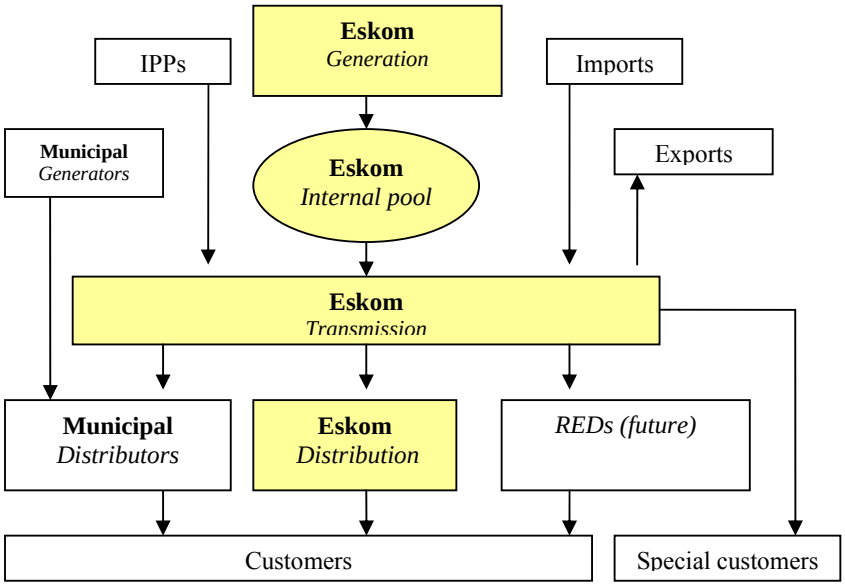
South Africa

2.37 The South African electricity supply industry remains dominated by the state-owned and vertically integrated utility, Eskom, which ranks ninth in the world in terms of electricity sales. It generates about 96 percent of South Africa's electricity requirements, which equals more than half of the electricity generated on the African continent. Eskom owns and controls the high-voltage transmission grid

4. Unable to stay in the distribution business on its own (without cross-subsidies from Nampower), Premier Electric is in the process of being shut down, with the distribution function being reintegrated within Nampower.

and it supplies about half of electricity directly to customers. The remainder of electricity distribution is undertaken by about 180 local authorities. They buy bulk-supplies of electricity from Eskom, with some also generating small amounts for sale in their areas of jurisdiction. A few industries have private generation facilities for their own use. Figure 2.4 illustrates the power sector in South Africa.

Figure 2.4: Structure of the Power Sector in South Africa



2.38 Eskom has 24 power stations: 10 large, coal-fired stations account for most of generation and are mainly situated on coal mines in the northeast of the country. Africa's only nuclear power station is at Koeberg, 30 kilometers north of Cape Town, and it is also owned and operated by Eskom. There is modest hydroelectric capacity on the Orange River, located on two dams, and there are two pumped storage schemes that play a critical role in meeting peak demand, as well as in system balancing and control. Municipalities own 22 small power stations and backup gas turbines, but these now produce less than 1 percent of national output. Private generators produce the remaining 3 percent essentially for their own consumption.

2.39 South Africa sells electricity to neighboring countries (Botswana, Lesotho, Mozambique, Namibia, Swaziland, Zambia, and Zimbabwe), representing less than 5 percent of total net energy produced. Eskom also holds the contractual rights to the output of Mozambique's Cahora Bassa hydroelectric station on the Zambezi River. Eskom also imports some power from the Democratic Republic of Congo and from Zambia, mainly for peak load management.

2.40 Eskom sells most of its electricity as bulk power to its large mining and industrial customers and to the municipal distributors. These three customer categories account for 77 percent of its revenue and 83 percent of its electricity sales in 2003. In addition to the approximately 4 million customers served by the municipal distributors, Eskom itself operates retail distribution services for 3.5 million customers. The average selling price in 2003 to industrial customers was US¢2.2/kWh

and, for residential customers, US¢5.6/kWh. Eskom's average tariffs cover average costs, which were approximately US¢2.0/kWh in 2003.

2.41 Reform has been a multistaged process in South Africa, yielding four major developments: establishment of an independent regulator, corporatization of Eskom, restructuring of the distribution sector, and the preparation of tenders to attract private IPPs.

2.42 The National Electricity Regulator (NER), founded in 1995, is responsible for licensing all electricity suppliers, approving their tariffs, monitoring the quality of supply, and settling disputes. The NER has implemented rate-of-return regulation and will be introducing incentive-based regulation in coming years. Its tariff determinations have consistently been below those applied for by Eskom and the municipalities, while still allowing these utilities an economic rate of return. Nevertheless, the NER still faces huge challenges in terms of building sufficient capacity to ensure further efficiency improvements by Eskom and the many municipal distributors.

2.43 After a series of poor investment decisions in the 1970s and 1980s, Eskom's governance was reformed and greater emphasis was given to commercial imperatives. In 2001, Eskom was corporatized, which involved converting the statutory body into a registered company with defined shareholding (wholly government), subject to the payment of taxes and dividends.

2.44 The third significant development involves a new plan for the distribution sector. After a protracted period involving a number of studies, a stakeholder forum, government committees, and negotiations, the cabinet agreed in 2001 to rationalize the distribution businesses of local government and Eskom into six REDs, with an EDI Holding Company to manage the transition. However, the cabinet also recommended further consultation. The president, in his State of the Nation Address to Parliament in 2004, set June 2005 as a target date for the establishment of the first RED. To date, however, there has been considerable opposition to the implementation of the RED plan, particularly from local government, which fears losing its influence over the sector. They also argue that the Constitution provides municipalities with the right to own and operate electricity distribution.

2.45 One area of innovation in the distribution sector has been the granting of six concessions to private companies to supply off-grid (PV) electricity services to rural customers. Although many thousands of installations have been made, the experience has not been altogether satisfactory. Original targets have not been met, in part as a result of policy and legal uncertainty and confusion regarding the concession agreements, including timeframes, access to subsidies, and overlap with Eskom's jurisdiction and rural electrification plans.

2.46 Although some changes have been made, reforms have not implemented the more radical pro-market policy as spelled out in the 1998 White Paper on Energy, which envisioned:

- "Giving customers the right to choose their electricity supplier
- Introducing competition into the industry, especially the generation sector

- Permitting open non-discriminatory access to the transmission system, and
- Encouraging private sector participation in the industry."

2.47 The White Paper further stated that the government believes that Eskom will be restructured into separate generation and transmission companies and the government intends to separate power stations into a number of companies. The White Paper also affirmed the importance of independent regulation. Building on the White Paper, in 2001, the cabinet approved proposals for the reform of the electricity supply industry through a managed liberalization process:

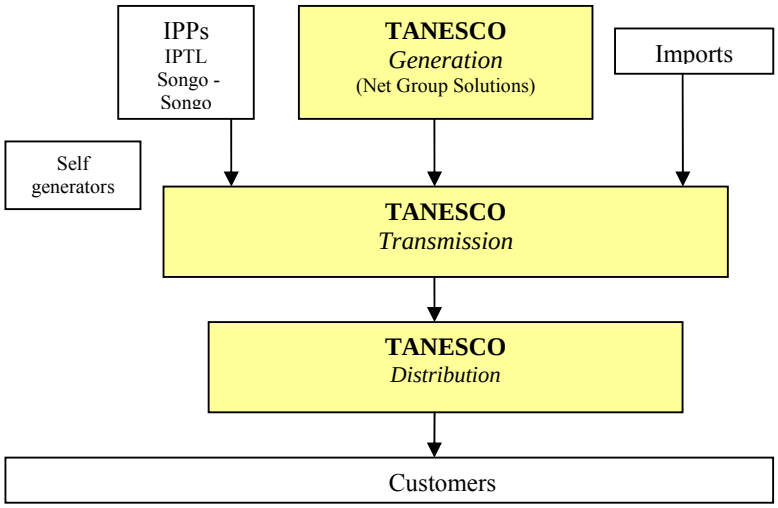
- Structure of the generation industry: Eskom is expected to retain no less than 70 percent of the existing electricity generation market, with privatization of the remainder, with the initial aim of transferring 10 percent to black economic ownership no later than 2003.Vertical unbundling: To ensure nondiscriminatory and open access to the transmission lines, a separate, state-owned transmission company will be established, independent of generation and retail businesses, with ring-fenced transmission system operation and market operation functions. Initially, this transmission company would be a subsidiary of Eskom holdings and would be established as a separate, state-owned transmission company before any new investments are made in generation capacity;
- Market structure: Over time, a multimarket, model electricity market framework will ensure that transactions among electricity generators, traders, and power purchasers take place on a variety of platforms, including bilateral contracts, a power exchange, and a balancing mechanism. The market design should facilitate both physical and financial hedging. A transparent and independent governance mechanism would be developed for the power exchange.
- Regulation: A regulatory framework will be put in place that ensures the participation of IPPs and the diversification of primary energy sources.

2.48 However none of these reforms has yet materialized. Currently, security of electricity supply is seen as paramount. Eskom is now expected to remain in state ownership. Private IPPs will only be invited to bid for new peaking capacity. There may be some limited competition *for* the market, but a fully competitive, wholesale electricity market now looks unlikely. The Minister of Minerals and Energy stated in Parliament on June 22, 2004, that "the state has to put security of supply above all and above competition especially."

Tanzania

2.49 TANESCO is a state-owned utility supplying most of the power consumed in Tanzania. The company is vertically integrated, generating, transmitting, and distributing electricity across the country. TANESCO also sells bulk power to the Zanzibar State Fuel and Power Corporation (ZSFPC). In addition to TANESCO, two IPPs, Independent Power Tanzania Limited (IPTL) and Songo Songo, feed the grid. There are also a number of small self-generators. Power imports from neighboring Zambia and Uganda complement internal generation capacity by supplying isolated centers near the borders. Figure 2.5 illustrates the organization of Tanzania's power sector.

Figure 2.5: Structure of the Power Sector in Tanzania



2.50 The country's installed electricity generation capacity is split more or less evenly between hydro and thermal plants. The IPTL is fired by heavy fuel oil, and Songo Songo is fueled by natural gas.

2.51 The grid system supplies power to the major cities and towns, and isolated diesel generators supply power to five regional and several district headquarters that are remote from the main grid system.

2.52 In 1992, the government of Tanzania embarked on a program for liberalizing and reforming its power sector. With TANESCO operating under Tanzania's Company Ordinance Act, which stipulates that the firm must follow business principles, including paying taxes and dividends, since 1931, there was no need for corporatization in the early stage of reforms. Commercialization of TANESCO was, however, in order, because the firm had been performing poorly from commercial, technical, and financial perspectives. The first step toward commercialization involved implementing tariff reforms. Between 1993 and 1995, average tariffs (in local currency) nearly doubled.

2.53 As part of the reforms, it was further recommended that TANESCO be unbundled to form two generation companies, one transmission company (which was to remain government owned) and two distribution companies. The aim was to privatize generation and distribution. However, despite more than a decade passing since this recommendation, TANESCO remains an integrated and publicly owned utility.

2.54 Meanwhile, repeated price hikes improved neither financial nor technical performance. Reasons for TANESCO's persistently poor performance are attributed to inadequate revenue collection, including a significant portion owed by the government and the ZSFPC. Other reasons include dependence on more expensive thermal power in place of hydro during dry years. In addition to high commercial losses, the utility has also experienced fairly high technical losses. For the past 15 years, the utility has failed to declare dividends.

2.55 In 2002, the government took a new approach to commercializing the firm by hiring an external company, Net Group Solutions (Pty) Limited of South Africa, to manage TANESCO. The original two-year management contract expired in April 2004 and was renewed for a further two years.

2.56 The management contract sought to enact a series of reforms to turn around the company commercially, financially, and technically: improving sales and collections, improving liquidity, improving efficiency of power system operations, reducing outages and improving system stability, and reducing staff and increasing overall staff competency. As of 2005, improvement had been recorded on each of the above. (See box 2.2.)

Box 2.2: Private Participation in Distribution: The Case of the Net Group Solutions–TANESCO Management Contract

After a competitive tender, Net Group Solutions (Pty) Limited of South Africa, was granted a management contract for TANESCO in 2002. The original two-year management contract expired in April 2004 and is was renewed for a further two years.

The management contractor was asked to improve sales and collections; liquidity, financial, and technical performance; labor productivity; and system stability and to reduce outages. The contractor was also asked to make TANESCO ready for privatization (that is, profitable) so as to attract buyers. Privatization of TANESCO has been delayed by uncertainty concerning the management contract in the medium term.

Notable achievements during the first two years of the management contract include:

- Liquidity has improved. When the contractor took office, TANESCO owed various creditors about US$ 33.8 million and had a bank overdraft equivalent to US$ 9.2 million. The debt has been cleared and now there is cash in the bank.
- Investment has increased. TANESCO is now creditworthy, and it has managed to raise a loan of US$33 million. Thirty-eight million U.S. dollars in capital, generated from TANESCO's own funds, was spent in 2003.
- Ninety-three percent of bills are now collected every month, compared to only 67 percent before.
- Operating efficiency has improved. There has been an improvement in the customer to employee ratio from 67 in 2001 to 97 in 2003, came about after retrenching 21 percent of the employees and as a result of an increase in the number of connections.
- System losses have been reduced, from 27 percent to 23 percent.
- There has been some improvement in the reliability of supply, including the implementation of supply-side management, thus avoiding load shedding in spite of drought.
- The number of customers has increased, from 450,947 in 2001 to 530,000 in April 2004.
- Employees have received intensive training: managerial, technical, safety, first aid, and computer courses.

Average prices went up by 4.3 percent (in nominal terms), and tariff subsidies were reduced from the 100 kWh consumption tranche to the 50 kWh tranche only. However, industrial tariffs were kept constant, resulting in an 8 percent real reduction.

2.57 The stalled unbundling of TANESCO has not, however, prevented development of IPPs. Starting in 1994, the government reached agreement with the IPTL, a Malaysian-Tanzanian joint venture, private company, to install 100 MW of thermal capacity. With a controversy over the investment cost and associated capacity payment, which was ultimately reconciled by international arbitration, power came

online only in January 2002.[5] Still, the resulting capacity charge—even with the reduced investment cost—has been beyond TANESCO's means, requiring the government to pay US$1.5 million per month in charges.

2.58 The second major IPP is part of the Songo Songo Gas Development and Power Generation Project, for which financial closure occurred in 2001. The project involves establishing gas infrastructure on Songo Songo Island for gas supplied by offshore and onshore wells, a 207-kilometer pipeline, and the conversion to gas firing of a 115 MW oil-fueled generating plant. As was the case for the IPTL, TANESCO has been unable to fully meet the monthly payment obligation, which amounts to US$5 million for a capacity charge and US$1 million for an energy charge, from its internal cash generation (that is, without a steep increase in tariffs). A liquidity fund equivalent to four months' capacity payment has therefore been established by the government to cushion nonpayment should it occur.

2.59 Part and parcel of the reforms has been an effort to strengthen the regulatory apparatus in Tanzania. In April 2001, enabling legislation to establish an independent, multisector (energy and water) regulatory agency, the Energy and Water Utilities Regulatory Authority' (EWURA), was passed by Parliament. EWURA's mandate is expected to include licensing, tariff quality, environment, consumer protection, and dispute resolution. EWURA is expected to be established in 2005.

Uganda

2.60 Uganda has opted for the single-buyer model of competition in electricity supply, with a vertical unbundling of the sector. The transmission company, Uganda Electricity Transmission Company Limited (UETCL), is designated as the single buyer of bulk generated electricity, and it manages imports and exports of power in the transmission system. Currently all generation assets, with the exception of a small percentage of independent hydro generation, are owned by Uganda Electricity Generation Company Limited (UEGCL). A long-term lease agreement has been concluded with Eskom of South Africa to operate the UEGCL and fulfill certain investment commitments.

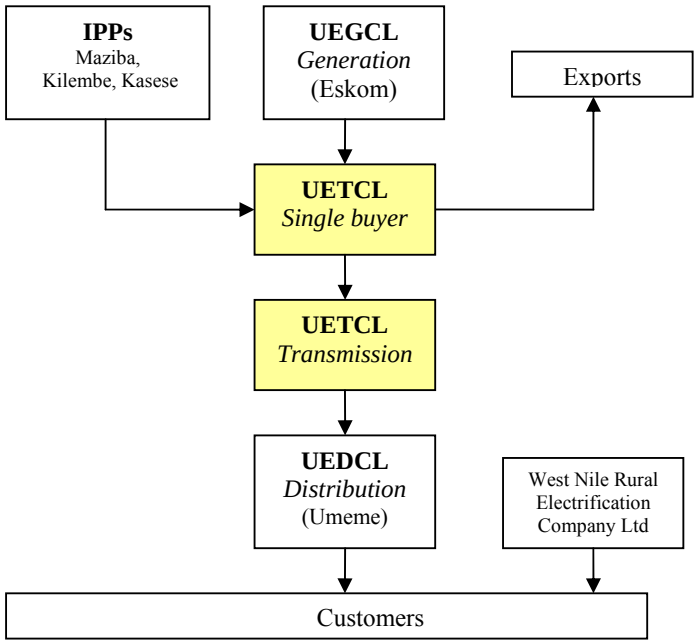
2.61 Distribution is currently carried out primarily by Uganda Electricity Distribution Company Limited (UEDCL), which has an exclusive license to supply within 100 meters of existing networks. As with the UEGCL, the UEDCL's assets are to be leased to a private entity, Umeme (Pty) Ltd, which is jointly owned by Globeleq (a CDC company) and Eskom.

2.62 Other companies have the right to bid to expand the network to new areas. To date, one developer has received a license to expand the network in a rural district, although there are several proposals currently being developed. The sector is regulated by the Electricity Regulatory Authority (ERA), an independent board composed of five individuals, which has authority over all electricity undertakings in

5.The IPTL claimed that it invested US$150 million in the project, but TANESCO maintained that the project was worth US$90 million. The World Bank's International Center for the Settlement of Investment Disputes has since determined an investment cost of US$130 million.

the country. Electricity services pricing policy under the unbundled sector structure, however, has not yet been set. Figure 2.6 illustrates the structure of the sector.

Figure 2.6: Structure of the Power Sector in Uganda



2.63 The hydropower installations at the source of the Nile River provide the majority of Uganda's electricity supply. There are two stations at the outlet of Lake Victoria: Nalubale (formerly Owen Falls) and Kiira (also known as Owen Falls Extension). Kiira is currently undergoing further expansion. There is significant hydropower potential on the Nile River, including the currently stalled Bujagali project. In addition, there are a number of small, independent producers connected to the grid, primarily small hydro generators. A bagasse project is under development and has concluded a power purchase agreement with the UETCL.

2.64 Uganda has a national transmission system, with assets down to 66 kilovolts (kV), that connects most towns and district centers in the country. The transmission system has export links to Kenya and Tanzania, and the distribution system includes links in the southwest to Rwanda. The distribution system includes reticulation in the major towns. In addition, there are some isolated networks powered by diesel-fueled generators.

2.65 Households, although making up more than 90 percent of the customers, account for about 42 percent of total consumption. In contrast, industrial consumers amount to just under 800 customers and account for the same amount of total of consumption. Commercial users and street lighting account for the remainder of consumption.

2.66 The main driver for reform was the urgent need to attract investment into the power sector, both in generation and in distribution, to underpin economic growth in Uganda. In addition, there was a need to improve operations in the industry

to address the high levels of losses, low collection rates, and poor customer services. To provide just one illustration, in a 1998 survey, private sector firms reported that they were without power for an average of 89 days per year.[6] Some 43 percent of firms surveyed had their own generators, and investment in backup generation facilities was estimated at 34 percent of all private sector investment, representing a considerable diversion of capital away from other productive activities. Privatization became the main mechanism for carrying out the reform agenda.

2.67 In 1999, Parliament passed a new Electricity Act, which removed the UEB') statutory monopoly and paved the way for private sector participation and industry restructuring. Until then, since its inception in 1964, the UEB had served as the sole player in generation, transmission, and distribution. The UEB was broken into three separate companies in 2001: the UEGCL, UETCL, and UEDCL. All three companies are subject to the Companies Act. Private participation was subsequently sought in the generation and distribution companies, as described in box 2.3.

Box 2.3: Privatization though Long-Term-Leases in Uganda

The generation and distribution assets of the UEGCL and the UEDCL, respectively, have been targeted for privatization. The structure of the transaction in both cases has been in the form of a long-term lease rather than outright sale of assets. That is, the UEGCL and UEDCL will remain publicly owned companies and will lease their assets to private companies through a long-term concession agreement. The lease fee is set to recover costs associated with the assets (principally loan repayment) and not to extract rent for Government.

The privatization process has taken longer than expected, and it has been negatively affected by the changes in the international business environment for private power. Interest in the transactions dwindled in response to the changing environment, and ultimately only one bid was received for each of the concessions.

The generation concession has now been awarded to Eskom Enterprises, which took over operation of the assets at Nalubale and Kiira in 2003. The UEGCL has an obligation to complete the ongoing expansion at Kiira; thereafter, investment obligations are to be met by the concessionaire. Eskom's own investments in generation at the site are expected to be fairly small, but the company is expected to improve performance at the site.

The distribution concession has been more difficult to finalize, and negotiations with the bidder (CDC Globeleq) have been protracted. The transaction is less attractive for several reasons:

- First, there are large investment obligations in the distribution concession, whereas investment obligations in generation are much smaller.
- Second, the generation concessionaire has a power sales agreement with the UETCL, a public entity, whereas the distribution concessionaire must sell power directly to customers. Nonpayment levels have been especially high in Uganda, implying considerable commercial risk.
- Third, the generation concessionaire sells power to the UETCL on a capacity availability basis (that is, a "take or pay" PPA). The UETCL takes volume risks if demand is lower than expected. The distribution concessionaire, though, is partially exposed to volume risks. Although the regulatory system allows tariffs to be adjusted in response to demand growth, there is a risk that low demand growth will lead to rising unit costs, which will result in higher prices and thus higher levels of nonpayment.
- Finally, the generation concessionaire is largely unaffected by the risks implied by expansion at Bujagali. The distribution concessionaire, however, must pay bulk supply prices to the UETCL that reflect the costs of the Bujagali PPA. Regulation allows these costs to be passed through to end-consumers, but there is a risk that Bujagali will result in higher end-use prices and again higher levels of nonpayment.

Despite these obstacles, in early 2004, most outstanding issues were resolved, and Globeleq has taken over the UEDCL's operations under a locally registered company named Umeme (Pty) Ltd.

6. Ugandan Investment Authority. 1998. "Private Investment Survey." Kampala

2.68 The reforms have also paved the way for new generating and distribution entities to enter the sector.

2.69 There have been private sector efforts to invest in large-scale generation, although these are currently stalled. Development of an isolated grid together with a distribution concession has also begun, with the 2003 award to West Nile Rural Electrification Company.

2.70 The ERA, also established by the 1999 act, has undertaken a variety of regulatory activities, including the establishment of secondary legislative instruments (regulations) as well as more routine regulatory activities. Specific highlights include:

- Publication of new standards: The Primary Grid Code, Quality of Service Code, Safety Code, and Tariff Code, as well as installation permit regulations and license fees
- Issuance of licenses to the UEGCL, UETCL, UEDCL, Eskom Uganda, and independent companies
- Annual price reviews of submissions made by each of the companies, including public hearings, which has led to radical tariff reform

2.71 From 1999 to the present, the ERA has exhibited its independence from the government, particularly in relation to tariff reform. However, the design of the two key privatization transactions—the generation and distribution concessions—includes detailed price determination in the concession contracts and licenses, leaving the ERA with only limited regulatory discretion. Nevertheless, the ERA is the public sector entity that will monitor compliance with the concessionaires' obligations (particularly investment obligations), and it is preparing to fulfill this responsibility.

Significant Reform Steps

2.72 Power sector reform in African countries has often commenced with grand visions of unbundling, competition, and privatization. Ghana envisaged the establishment of a contestable market. South Africa envisaged unbundling of Eskom, partial divestiture, and the establishment of a multimarket involving a power exchange and bilateral contracts; Tanzania planned full unbundling and privatization of TANESCO. There has been a substantial retreat from these policy pronouncements. Many governments have been loath to fully privatize the main utility, believing national utilities continue to play a vital role in development. Reliability of supply is generally seen as more important than competition. Indeed, other than limited competition *for* IPP investments and concession bids, competition *in* electricity markets exists nowhere in Africa other than small trades between Southern African Power Pool (SAPP) members and a simulated pool inside Eskom.

2.73 Nevertheless, significant steps in power sector reform have occurred. Tariff reforms have been instituted in all countries to improve cost reflectivity and financial viability. Private participation has been encouraged in the form of management contracts in order to improve the financial and technical performance of utilities (for example, currently EDM SA and SOGEM in Mali and TANESCO in Tanzania) and also to prepare them for privatization. Private sector participation has

also been explored in distribution, for example in Ghana and Namibia. Private players are also being attracted into rural concessions in Ghana, Mali, South Africa, and Uganda. Privatization has occurred in the form of long-term concessions and takeovers of the old state-owned utilities in Mali and Uganda (generation and distribution). Investment has been attracted into system maintenance and expansion through these concessions and also through new IPP projects in Ghana, Tanzania, and Uganda. Namibia and South Africa hope that they will be able to attract new IPP investments.

2.74 The old, traditional industry model is dead. In none of the case study countries is the old state-owned utility the sole player. Instead, private participation is being explored to a greater or lesser degree. Further, in all the countries, either an independent regulator exists or legislation has been passed for its establishment.

2.75 All case study countries also have special measures to promote electrification and widened access to electricity. These will be explored in more detail in the next section.

3

Impacts of Reform on Electricity Access Levels

Electrification Progress and Status

3.1 In this study, *access* is defined as connection to an electricity supply. Effective access to electricity services by consumers is also influenced by the quality and reliability of electricity supply and also its price, which affects affordability and usage patterns. These latter issues are explored in subsequent sections of this report. Over the past decade, electricity access levels have continued to increase in nearly all the countries studied. In all of the case study countries, electrification levels have increased significantly over the last decade. Most notably, in Ghana, Mali, and South Africa, access to electricity has more than doubled. However, these increases have been off a very low base and, with the exception of South Africa, remain low.

3.2 Still, while electrification levels have been steadily rising, in some countries per capita consumption of electricity has been declining (Ghana, Uganda). In Ghana, for example, while overall electricity access in the north increased by more than 500 percent between 1991 and 2000, per capita consumption fell almost 20 kWh per person. Many households could not afford their electricity service and were forced to rely on other power sources for many of their daily activities or even disconnect their households from the network altogether. However, in Mali, per capita consumption of electricity has increased from 22 kWh per person in 1990 to more than 34 kWh in 2000, while access levels increased almost threefold.

3.3 Table 3.1 provides an overview of the current situation in the case study countries. Access to electricity remains at very low levels in Mali, Tanzania, and Uganda. Ghana, Namibia, and South Africa have made considerable progress, yet large numbers of their population remain without access to electricity. As expected, urban electrification rates are reasonably high, although there is still substantial potential to extend access. Rural electrification in all countries, except South Africa, is minuscule. The high cost of providing electricity to dispersed rural populations, limited affordability, and the lack of financial resources to meet the capital investment and operating costs continue to render these areas financially unattractive even after reform. Therefore, although electrification may increase dramatically in some areas, it is possible for the poorest rural populations to be unaffected by these improvements and remain without access to electricity.

Table 3.1: Electricity Access Levels in Urban and Rural Areas

Country	Electricity access levels (%)		
	Overall	**Rural**	**Urban**
Ghana	49		
Mali	12	1	42
Namibia	34	12	75
South Africa	70	50	85
Tanzania	10	2	39
Uganda	5	1	20

3.4 Ghana has made impressive progress in electrification of its northern areas—14 percent annual growth in connections over the past decade—as demonstrated in figure 3.1.

Figure 3.1: Number of Electricity Connections in Northern Ghana

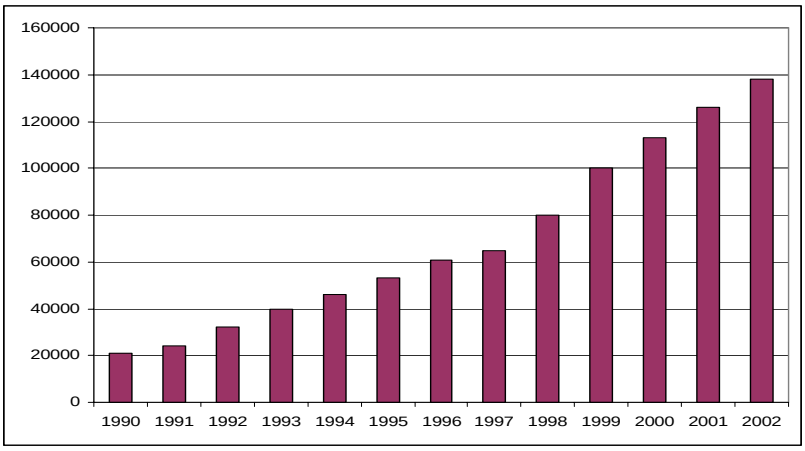
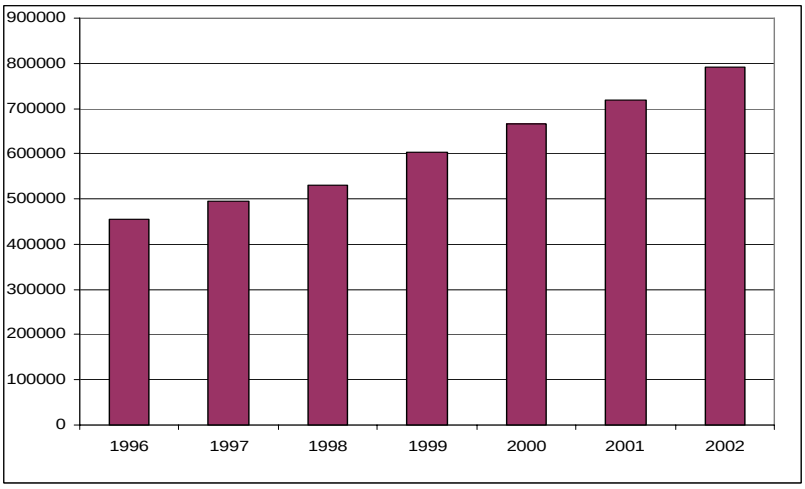
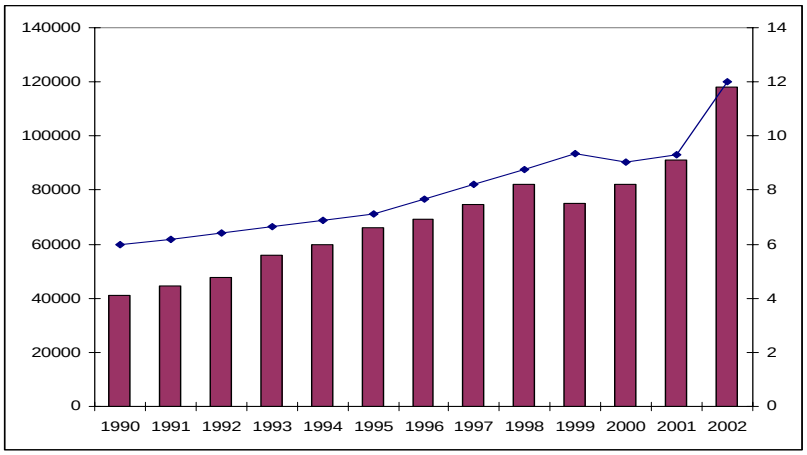


Figure 3.2: Number of Electricity Connections in Southern Ghana



3.5 Connection rates have also been improved significantly by the main distributor, which is ECG in the south. Connections have grown at about 10 percent per year in recent years, from 456,000 in 1996 to 793,000 in 2002 (see figure 3.2). Overall, electricity access levels in Ghana have increased from 43 percent in 1999 to 49 percent in 2003. New connections have been mainly concentrated in urban areas and have not focused on the poor. Despite the subsidized lifeline tariff, many households are not able to afford electricity service, with arrears and disconnections fairly prevalent.

Figure 3.3: Number of Electricity Connections and Access Percentages in Mali



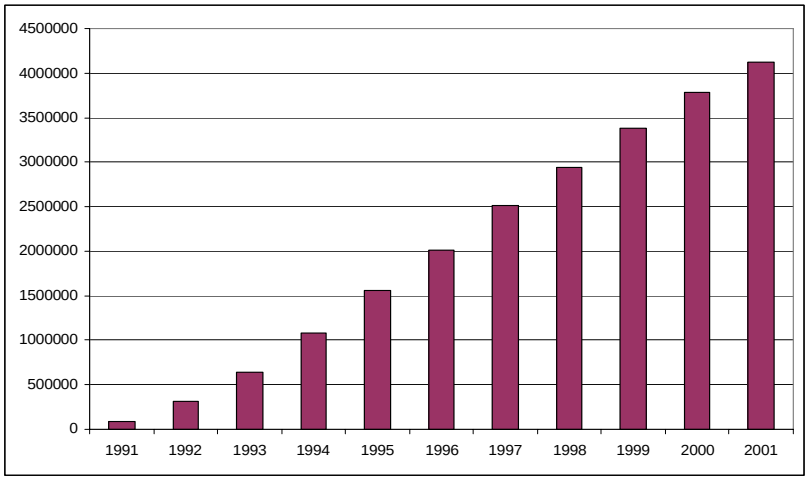
3.6 In Mali, electrification levels have doubled in 12 years (see figure 3.3), although the percentage with access is still extremely low. The fall in 1999 was due to a large number of disconnections resulting from nonpayment following widespread dissatisfaction with the reliability of supply. The largest increase, from 9.3 percent in 2001 to 12 percent in 2002, can be attributed to the government-funded promotional program that enabled consumers to pay their connection fees over an extended period rather than as a lump sum. This increase in access was accompanied by an increase in per capita electricity consumption in Mali, also perhaps facilitated by a more flexible payment program.

3.7 Namibia's 17 municipalities and 19 towns are all currently served by grid electricity, with urban access levels at 75 percent. Rural access to electricity is much lower at 12 percent, up from 5 percent in 1991. The national aggregate electrification level is in the region of 34 percent. Targets of 25 percent (rural) and 95 percent (urban) have been set for 2010 by the government.

3.8 South Africa's electrification program took off in the early 1990s as it moved toward its first democratic election. As many households were connected in a decade as in the previous 100 years. Access levels doubled from about one-third of the population to 70 percent.

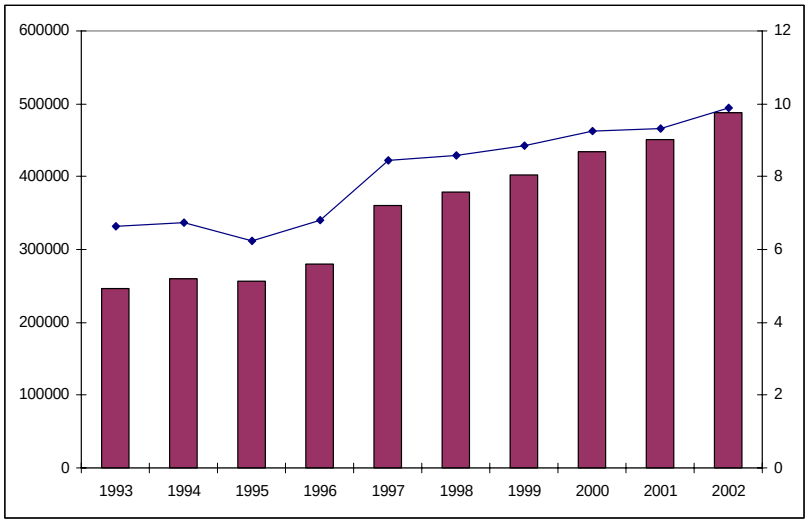
3.9 Figure 3.4 shows the number of new connections made by Eskom and by local government distributors.

Figure 3.4: Number of New Electricity Connections in South Africa since 1991



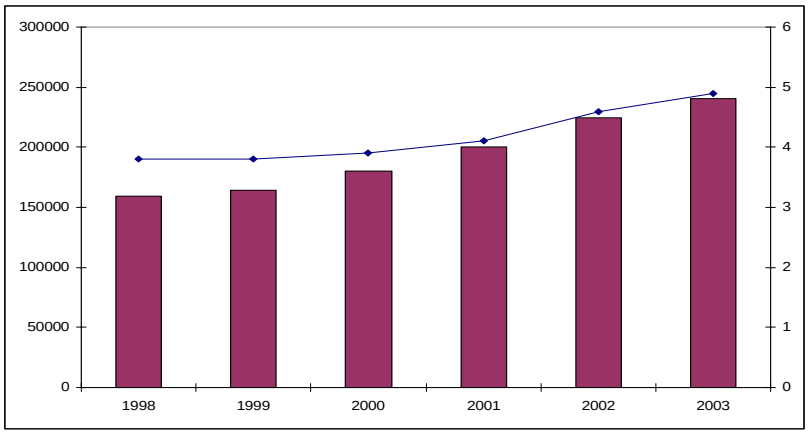
3.10 The number of customers in Tanzania increased at a slightly higher rate during the 2002-2004 period when TANESCO was under a management contract, than in 2000–02. However, TANESCO in the prereform period (1997–2002) had been able to achieve similar rates.

Figure 3.5: Number of Electricity Connections and Access Percentages in Tanzania



3.11 In Uganda, approximately 5 percent of the population has access to electricity (see figure 3.6). There are about 200,000 domestic connections in a population of some 20 million people.

Figure 3.6: Number of Electricity Connections and Access Percentages in Uganda



3.12 Though overall access levels remain relatively low, most governments recognize electrification as critical to economic and social development, which will ultimately benefit poor people. Nearly all the countries have set relatively ambitious targets. Ghana, for example, expects a doubling of demand in fewer than 10 years; Namibia aims to provide 95 percent of its urban population and 25 percent of its rural population with electricity by 2010; Tanzania's demand is forecasted to grow by 6 percent per year in 2004–06 and 5.7 percent in 2007–15; Uganda plans to raise rural access rates to 10 percent, reaching a total of 450,000 rural connections by 2010. In addition, electricity demand is projected to continue growing rapidly into the foreseeable future.

Role of Special Programs in Implementation of Electrification

3.13 The progress noted above is mostly *not* a direct result of power sector reform, but rather stems from special government and utility programs that have occurred either prior to, or in parallel with, the reform process. Various strategies are being adopted, with the most common being the establishment of a national rural electrification program, fund, or both. Table 3.2 presents the rural electrification initiatives in the various countries. Some of these programs are relatively young and as yet have had modest impact on electrification levels—with the exception of Ghana and South Africa, where significant progress has been made.

Table 3.2: Rural Electrification Initiatives and Status

Country	Program	Approach	Status
Ghana	National Electrification Fund (NEF) and Self-Help Electrification Programme (SHEP) launched in 1989.	Households within 20 km of grid eligible. Capital subsidies. Communities provide poles and minimum number of wired households ready for supply.	Program oversubscribed. Phase 3 complete. Phase 4 in planning.

Mali	Agence Malienne pour le Développement de l'Energie Domestique et de l'Electrification Rurale (AMADER) established 2003. Household Energy and Universal Rural Access started 2004. Both off grid.	Investment subsidies to service providers.	Operational manual and terms yet to be developed.
Namibia	National Rural Electrification Programme launched in 1991. Rural Electricity Distribution Master Plan, 2001.	Capital subsidies. Initial focus on public institutions and infrastructure. Free connections to households within 50 m; the rest pay.	Ongoing. Ambitious targets.
South Africa	National electrification program initiated by Eskom, supported by local authorities. Reconstruction and Development Programme targets, 1994–99. National Electrification Fund and National Integrated Electrification Programme, 2000 onward.	Initially, Eskom cross-subsidies and Development Bank finance for local authorities. Now capital subsidies from the state to National Electrification Fund allocated to utilities.	Ongoing. Uncertainty around creation of REDs is slowing electrification rate.
Tanzania	Rural Energy Agency and Fund.	Promote private sector–led rural electrification initiatives focusing on productive applications. Provision of capital grants.	Legislation drafted but not yet passed. Institutions not yet established, but first projects being prepared.
Uganda	Rural Electrification Agency and Energy for Rural Transformation, 2003	Promote private sector–led rural electrification initiatives focusing on productive applications. Provision of capital grants.	Agency and fund established, and first grants awarded.

3.14 A number of countries initiated electrification programs before power sector reforms. From 1988 onward, the government of Ghana, with the utilities, initiated a National Electrification Programme (NEP) that connected all 10 regions and 110 districts of the country. To realize electrification goals, Ghana established the NEF in 1989 and as part of the implementation plan started the 30-year SHEP. Under

SHEP, the government directly shared connection costs with communities within 20 kilometers of pre-existing 33 or 11 kV lines. Communities provided the required wood poles for distribution and identified the required minimum number of households that were wired and ready for supply. The first three SHEP phases have been completed and have connected a total of 1,700 communities. The funds used for effecting the NEP and SHEP were raised through an electricity levy. Electrification progress has been impressive.

3.15 Mali established AMADER in May 2003 and has not yet defined the operational modalities. AMADER differs from other initiatives in that it has been established as a project to operate over a five-year period, with a goal of connecting 40,000 consumers. Targeted subsidies are provided.

3.16 In Namibia, the National Rural Electrification Programme was launched in 1991, before the reform program began. Priority setting, planning, design, and construction have been under the control of the Ministry of Mines and Energy, with increasing participation by the regional councils. Local government has been responsible for operation and maintenance. The program began in the most densely populated central northern regions and then proceeded in a clockwise direction around the country. The initial focus was on electrifying public institutions and productive infrastructure. Free connections were offered to households within 50 meters of a low-voltage line. Households within 500 meters could be connected, but at a cost. By 2001, the program had electrified 400 rural settlements, but only 9,700 rural households had been connected. A Rural Electricity Distribution Master Plan has mapped out the remaining electrification requirements and established prioritized annual electrification schedules for the next 20 years. This master plan has pioneered an innovative approach to development planning in that it provides a dynamic planning tool. Instead of a purely technocratic analysis of network development requirements, the master plan facilitates the objective prioritization of electrification projects on the basis of cost and social benefit, and it integrates both grid and off-grid electrification options. The software-based master plan enables scenario analysis and allows utility and infrastructure planners to adjust the electrification program as circumstances or priorities change.

3.17 It was only in 2003 that Tanzanian policy called for the establishment of a Rural Energy Agency and its financing arm, the Rural Energy Fund; enabling legislation has yet to be passed.

3.18 Uganda established a Rural Electrification Agency and Fund in 2003. The Rural Electrification Agency has the responsibility to identify and promote rural electrification projects, whereas the Rural Electrification Fund provides capital subsidies and support for debt finance. The intention of the subsidy mechanism is to buy down the capital cost of investment to the extent that, at reasonable tariffs, the project is attractive to a project sponsor. Initial grants have been made.

Box 3.1: South Africa's Grid Electrification Program

The recent progress made in South Africa in electrification is probably unprecendented internationally. In 1990, about one-third of the population had access to electricity. Today, access levels stand at 70 percent. The program was initiated in the early 1990s and gained momentum after the first democratic election in 1994.

In 1994, the election manifesto of the African National Congress, the Reconstruction and Development Programme (RDP), explained that:

> Although energy is a basic need and a vital input into the informal sector, the vast majority of South African households and entrepreneurs depend on inferior and expensive fuels. Rural women in particular face a heavy burden collecting wood, which is an inefficient and unhealthy fuel. Urban households face high costs for paraffin and gas. Coal, where it is available, is cheap but results in severe health problems, an underpaid workforce, and the failure to assess and internalise environmental costs. Although Eskom has excess generating capacity, only 36 per cent of South African households have access to electricity, leaving some three million households un-electrified. Furthermore, some 19 000 black schools (86 per cent) and around 4 000 clinics are currently without electricity. Little attention has been paid to utilising sustainable energy sources such as solar power (RDP 1994, p 31)**.**

It further noted that:

> An accelerated and sustainable electrification programme must provide access to electricity for an additional 2.5 million households by the year 2000…. Both grid and non-grid power sources (such as solar cells and generators) must be employed. All schools and clinics must be electrified as soon as possible. Communities must be involved in the planning and execution of this programme. Micro, small and medium-sized enterprises must be given support and shown preference in the tendering process.

Thus began a new era for electrification in South Africa. From the point of view of increasing the overall number of households with electricity, this program has been very successful. This is mainly due to the efforts of Eskom and, to a lesser extent, local authorities and municipalities. In fact during this period, targets were overshot: by the end of 1999, 2.7 million new households had been electrified (Department of Minerals and Energy 2001).

Up until 2000, the entire electrification program was funded by Eskom, either through internal subsidies (garnered mainly from higher-than-cost electricity charges to large industrial and mining customers) or through transfers to an electrification fund that the NER allocated to municipalities. Thus, low-income households have not had to pay for connection costs, and these continue to be subsidized.

Nearly all of these new connections have used prepayment technology: customers buy tokens or renewable electronic cards to activate their electricity dispenser. The costs of the electricity supply and use were to be recovered through a flat energy unit charge. Actual consumption of electricity in low-income homes has been much lower than forecast—thus, revenues from electrification have also fallen short of plan. Many connections involve informal houses (shacks) and use prewired "ready boards"—typically with a few lights and plug points.

In 2001, Eskom was corporatized, meaning that Eskom would start to pay taxes and dividends to the government, its sole shareholder, and would consequently no longer carry the main burden of the electrification program. The government moved to secure the national electrification program through establishing a separate National Electrification Fund in the Department of Minerals and Energy funded by the National Treasury. A team seconded from Eskom undertakes macroeconomic electrification planning. The National Integrated Electrification Programme Business Planning Unit makes recommendations to a National Electrification Advisory Committee on resources committed to the program each year.

The government has stated that its goal is universal access. More than 300,000 new connections continue to be made each year.

Impacts of New Entrants on Access Levels

3.19 Reform makes possible the entry of new, private electricity service providers, mainly operating in rural areas beyond the service areas of incumbent utilities. The extent to which these companies have increased access to electricity remains limited, even though they all depend on subsidies from government and grant aid. In addition, most of these companies provide solar home systems, which many consumers consider temporary electrification while awaiting connection to the grid.

3.20 In rural Ghana, new agents, such as nongovernmental organizations, are providing services mostly to non-grid-connected communities, mainly through the deployment of solar systems. Some of these schemes have been government- or grant-funded projects such as those undertaken by New Energy of Tamale, a Renewable Energy Services Project in the Mamprusi district, and the Isofoton project in the Kpasa area. The costs of these systems have been higher in comparison with grid-connected areas.

3.21 Mali has witnessed two main new agents, SSD Koutiala and SSD Kayes, after reform. However, despite the fact that they get tax exemption on imported equipment and receive additional financial support from donors, these agents have had limited impact in increasing access levels but are pioneering a replicable model for selected regions in Mali. After 18 months of operation, SSD Koutiala had installed solar home systems for 1,000 customers in 18 localities and SSD Kayes had installed 600 in 4 localities. These two projects, implemented by local entrepreneurs with back-office support from a Western utility, demonstrate the willingness to pay by users in isolated areas if an economic potential exists, as well as the sustainability of commercially managed, renewable energy systems if the choice of the area to be served is made on a commercial basis and in partnership with the private sector..

3.22 In Namibia, the Ministry of Energy established a revolving fund for solar home systems. More recently, a fee-for-service supply option has been introduced. Donor agencies have also initiated a number of programs—however, total installations number only about 1,000.

3.23 The South African government awarded five concessions to private companies to provide solar home systems. The equivalent of the grid-connection capital subsidy is provided for each installation. Four of these concessionaires are operational, and by the end of 2003, 16,000 installations had been completed. Bids were invited for a sixth concession in 2004. However, uncertainty regarding the concession framework and the government's commitment to future subsidies has created further uncertainty about the future of this program.

3.24 The electricity cooperatives in Tanzania, which are notable access initiatives, are described in Box 3.2.

Box 3.2: Rural electricity co-operatives in Tanzania

Tanzania has four fully established electricity cooperatives serving about 3,000 people. These are Urambo, Mbinga, Kasulu, and Kibondo, which were established in 1995, 1996, 1998, and 2000 respectively. Further rural townships are looking to adopt this model.

An elected development committee consisting of a chair, secretary, treasurer, and committee members manage the power cooperatives. The development committee members volunteer to manage the power supply on behalf of the co-op members. Each week, one such committee member is responsible for part-time management of the power supply services. This includes supervision of fuel purchases, revenue collections, power disconnections, and so forth. To become a member of the co-op, one has to acquire at least one share and pay membership fees. To get connected, the member has to meet full connection costs.

Two to three permanently employed staff are responsible for full-time work on power production, distribution, and sales to cooperative members (consumers). These are experts trained by TANESCO. On the basis of a technical agreement, TANESCO provides technical assistance to the power cooperative at cost for repair work beyond the technical capabilities of its staff. Otherwise, the co-op's staff undertake all day-to-day operation and maintenance of the co-op power system as well as service provision.

3.25 In Uganda, the first rural concession awarded has been to the West Nile Rural Electrification Company. The company is owned by Investment Promotion Services, which is linked to the Aga Khan Foundation. It has the obligation to expand supply, including construction of local hydropower and expansion of the network. The government's strategy is supported by the World Bank– and Global Environment Facility–funded Energy for Rural Transformation project. This project provides resources to assist implementation of the rural electrification strategy, including resources for the Rural Electrification Fund, support for establishing a rural energy business advisory service at the Private Sector Foundation, and a range of technical assistance activities to the Ministry of Energy.

Effects and Impacts of Private Sector Participation on Access

3.26 In Namibia, a private operator, NE, was successful in improving access levels after being awarded a concession distribution contract to serve the densely populated central northern regions. The company was able to triple its consumer base within the five-year contract period (1996–2001) through various measures, including improved management practices. The company implemented a computerized billing system, the establishment of several regional service centers spread throughout its 120,000-square-kilometer supply area of , the appointment of local vendors of prepaid electricity tokens, and a 24-hour fault-reporting center with a toll-free telephone number. Unable to obtain a loan guarantee to access funds from a development bank for extending the rural electrification system, NE implemented a rural electrification levy, which it combined with retained earnings to fund electrification.

3.27 TANESCO in Tanzania, under a management contract with Net Group Solutions (Pty) of South Africa, has continued to increase the number of customers, although there was no significant acceleration in connection rate.

3.28 These two examples may not be significant compared to the increase in connections that has been achieved in general in nearly all the countries over the past

decade, yet they provide interesting insights into what might be possible with well-designed private participation initiatives.

3.29 In summary, access to electricity expanded at a steady rate throughout the 1990s. The national electrification programs in Ghana and South Africa have been operational since 1987 and 1994, respectively; they have been government led, have been undertaken by state-owned utilities, and have been supported by public or donor funds. Namibia also has an impressive rural electrification program, but its main focus has been on extending the grid to district centers and infrastructural services; an insufficient number of households have benefited. Although Mali, Tanzania, and Uganda have doubled access rates over the past decade, these are off very low bases. Electrification has mostly been a result of incremental growth. Tanzania and Uganda established new rural electrification agencies and national electrification funds in 2003; it is too early yet to assess whether these initiatives have managed to accelerate access. As mentioned above, two examples of private sector participation (NE in Namibia and the TANESCO management contract) have been positive for expanded access, but these experiences are neither widespread not sufficient. Finally, although most countries have permitted a number of new private and community initiatives in off-grid electrification, the overall impact of these programs on access to electricity services has been minimal.

3.30 It cannot be concluded that power sector reform has had a negative impact on access to electricity. There is also insufficient evidence that power sector reform has accelerated access to electricity. Electrification programs continue to depend on government and donor support, and special mechanisms need to be put in place to accelerate access. Private sector participation in the electricity sector can contribute to expanded access if concession, lease, and management contracts provide clear performance objectives and incentives.

4

Impacts of Reforms on Prices, Costs, Tariffs, and Subsidies

4.1 As mentioned previously, the two strongest drivers of power sector reform in much of Africa have been the need to improve performance and the need to attract new sources of capital. Both of these drivers are very much linked to the level of power prices. Poor utility performance is evident in poor commercial and financial performances, which are often a consequence of political control over power prices and result in tariff levels that are far below cost recovery levels. The desire to attract private sector capital also has an impact on price levels. First, the establishment of cost-reflective prices is almost a prerequisite to attracting private sector capital (and multilateral credit). Second, the need to meet private sector returns on capital can put an upward pressure on price levels if not compensated fully by efficiency gains.

4.2 For these reasons, price reform has typically been a key and initial element of the power reform process. In all the case study countries, tariff reform has taken place with the intention of introducing cost-reflective prices, in both average tariff levels and across tariff categories—that is, minimizing the degree of cross-subsidies between customer categories. Tariffs are generally set by new, independent regulators, although where concessions have been granted (for example, Mali and Uganda), the concession agreement often establishes the tariff regime for a number of years. A controversial area in tariff setting is whether the tariff should be based on the cost of supply to each category of client or on the tariff level needed for the utility to be financially viable and profitable: The underlying issue is who would pay for power thefts and nonpayments. If the corresponding cost is added to the cost of supply, paying customers, including the poor, are penalized for the inability of the utility to enforce commercial discipline over power thieves and to collect electricity bills. If such costs are not factored into the tariff, the utility may not be financially viable and may be unattractive to private investors. Price reforms in the sample countries tended to put the theft and nonpayment risks on consumers, at least initially, and in cases such as Mali, the mechanism of gradual transfer of the power theft and nonpayment risks to the utility through benchmarking has not worked effectively.

Table 4.1: Establishment of Regulatory Institutions in Case Study Countries

Institution and date	Mali	Ghana	Namibia	South Africa	Tanzania	Uganda
Regulatory institution	CREE	PURC	ECB	NER	EWURA	ERA
Date	2000	1997	2000	1995	2003[a]	1999

a. Legislation has been passed, but the new regulatory authority has not as yet been established.

Tariff Reforms in the Case Study Countries

4.3 All of the countries included in our case studies have undergone some form of tariff reform, typically associated with the establishment of a new regulatory authority, as indicated in table 4.1. The experience with tariff reforms is presented in table4.2**.**

Table 4.2: Summary of tariff reforms

Actions	Ghana	Mali	Namibia	South Africa	Tanzania	Uganda
Trends in costs	Introduction of thermal generation and imported fuel (with depreciating local currency) increased costs.	Introduction of new hydropower lowered cost of production, but the common national tariff is inflated by the cost of remote diesel generators.	Electrification has increased the cost base in the industry. Energy costs dependent largely on South African imports.	Downward trend in wholesale costs, but increase in electrification costs. New generation will raise costs.	Costs increase with IPPs. Losses reduced and higher revenue collection.	Costs reduced since reforms, but increased costs expected with IPPs.
Adjustments to average tariffs	Tariff increases in 1998 eroded by inflation. Increases in 2002–03 partially corrected for inflation.	Planned increase of 45 percent over 2001 levels. In 2003, political intervention to bring tariffs back to 2000 levels.	Intention to move to long-run marginal cost (LRMC) tariffs, but not yet implemented. NE achieved reductions in tariffs.	Prices reduced in real terms in the 1990s, but expected to increase in the future.	Increase in the mid-1990s to LRMC levels. Some decreases since then.	Prices adjusted in 2001 by 30 percent and reduced thereafter as costs were reduced.
Adjustments to cross-subsidies	Lifeline flat payment for consumers using less than 50 kWh per month.	Introduction of "social tariff" implies cross-subsidies.	Intention to reduce cross-subsidies but not yet implemented.	Cross-subsidization of electrification customers continues.	Reduction in cross-subsidies.	Cross-subsidies removed from tariffs.
Special poverty tariff measures	Lifeline tariffs available. Government pledge to reduce lifeline rate through subsidies.	Lower tariffs for consumers using less than 5 Amperes and the first 50 kWh.	Use of prepayment tariffs for low-income customers.	Prepayment tariffs, plus "free basic electricity," 50 kWh for low-income customers.	Lifeline tariff, but recently limited to fewer customers and lower kWh threshold.	Lifeline tariff provided, but limited to 30 kWh per month.

Ghana

4.4 The reform program in Ghana has aimed to move to fully cost-reflective prices. Because the government had subsidized the industry, this implied tariff increases, which were accentuated by the introduction of more expensive thermal generation. The large tariff increases in 1998 (close to doubling of tariffs) were followed by a period of currency devaluation and inflation, which eroded the real level of tariffs. Over 2002–03, successive tariff adjustments partially corrected this, although tariffs have increased significantly in nominal terms, they remain below the 1998 level in real terms. A lifeline tariff ameliorates the impact of tariff increases on the poor (as described in box 4.1).

Box 4.1: Lifeline Tariffs in Ghana

A low block charge for small consumers to make electricity affordable for the poor had been in existence before the establishment of the independent regulator, PURC. The structure of rates was stepwise, and the price was progressively higher for higher bands of monthly consumption.

In 1997, when PURC assumed responsibility for rate setting, the price structure was such that all consumption of electricity below 100 kWh was billed at the below-cost lifeline rate. PURC has retained the lifeline concept but has revised its implementation to address some unintended consequences and maintain its relevance. An obvious flaw in the initial structure was that the subsidy was not targeted and everyone enjoyed it, that is, the first 100 kWh used by every consumer was billed at the lifeline rate. As a result, the proportion of energy sales that enjoyed the subsidy was very large and the burden of funding the subsidy fell disproportionately on industrial consumers and a few high-use residential consumers. This "flaw" had, however, turned out to be an important ally that helped make the 300 percent price increase in 1998 acceptable by allowing officials to describe the lifeline as equitable to all and yet sensitive to the poor whose consumption stayed within the threshold. The flaw was later corrected in August 2002 by applying the lifeline rate to only those consumers whose total consumption for the month fell below the threshold. The lifeline tariff set by PURC currently provides for residential consumers whose consumption is no greater than 50 kWh to be charged a block amount of 19,978 cedis (¢) per month, which is equivalent to about US$2.00. The government of Ghana, in a reaction to complaints from consumers about the magnitude of the increases, has intervened further and pledged to pay ¢5,000 of this amount directly to the utilities on behalf of consumers so that the utilities bill consumers for only the balance.

Mali

4.5 Although Mali has established a regulatory authority (CREE), tariffs are governed by the concession contract awarded in 2001 for EDM SA, and final authority rests with the Minister of Energy rather than the regulator. The concession contract allowed for a series of tariff adjustments to bring prices to cost-reflective levels—a planned increase of some 45 percent over 2001 levels. However, these increases have proven difficult to implement politically, and the government has reacted by providing subsidies to the utility in order to buy down the cost of power supply and bring tariffs (in 2003) back to the levels of 2000. Nevertheless, Mali's is still among the most expensive electricity tariffs in West Africa.

Namibia

4.6 As in South Africa, much of electricity distribution is undertaken by municipalities, and wholesale power is supplied by a national utility, Nampower. The establishment of the ECB brought both Nampower and municipal distributors under a single regulatory authority. The ECB's policy is to price electricity at cost-reflective levels, and it has introduced new methodologies to determine cost reflectivity. The government wishes to rationalize the distribution industry under a small number of regional distributors, as opposed to the 20 or more municipal distributors at present. Hence, the ECB is seeking to rationalize prices across regions to prepare for the new structure of the distribution industry.

4.7 The ECB has found that most distributors' prices are currently below fully cost-reflective levels (as defined by LRMC methods), but it has not yet begun to bring municipal prices in line with these higher levels. The one case where tariffs have been reformed is in the northern area of the country, where an implicit subsidy to the distributor was removed, resulting in an 18 percent increase in tariffs.

4.8 The brief experiment with a private contractor operating NE resulted in tariff increases consistently below inflation—that is, the real price for consumers fell each year.

South Africa

4.9 Wholesale electricity prices in South Africa have declined considerably over the past decade, driven by the financial effects of overinvestment in the 1980s. As Eskom has reduced its debt burden, as the depreciation of older plants has eroded with inflation, and as demand growth has taken up the surplus capacity, so the unit cost of power from Eskom has declined notably. The NER has consistently awarded annual price increases lower than those applied for by Eskom and is now beginning to put pressure on costs. Prices to end-users, particularly domestic consumers, have been affected by the costs of the electrification program and the requirements of municipalities to cross-subsidize other services with electricity tariffs. The NER has been reasonably successful in its efforts to rationalize the diversity of tariff structure and levels offered by different distributors. Even though the costs of electrification have been modest in relation to the results achieved, the revenues from newly electrified customers have been lower than originally anticipated. Consequently, the NER and Eskom have revised upward their estimates of the cross-subsidy required to sustain electrification. Nevertheless, the cost remains manageable, and there have not been major adjustments to real tariff levels. In a move unrelated to the overall power sector reform program, the Government introduced "free basic electricity," which is a lifeline tariff targeted at the poor: 50 kWh per month is priced at zero. This has been funded from government fiscal resources rather than cross-subsidized by other customers.

Tanzania

4.10 Following a tariff review in 1993, TANESCO's tariffs were increased to LRMC levels of about US¢10/kWh. In 2000–01, the government refused to instate periodic tariff adjustments, leading to some reduction in the real level of tariffs, although prices have recently been restored to the LRMC level. The benefits of reduced losses and higher collection rates have to a large extent been offset by the increased costs associated with private power and heavier reliance on thermal generation. The government pays capacity payments directly to IPPs and thus subsidizes generation costs. TANESCO has also incorporated a lifeline tariff into its tariff structure. However, the threshold level for this subsidized tariff rate used to be high: 500 kWh per month, available to several customer categories. Tariff reform has been accompanied by a targeting of the lifeline tariff at purely domestic customers and a reduction in the threshold level to 50 kWh per month.

Uganda

4.11 Tariffs in Uganda had not been adjusted for seven years prior to the establishment of the ERA. Consequently, price levels were considerably below cost-reflective levels, having been eroded by inflation. One of ERA's first steps was to implement a tariff reform in 2001, affecting both average tariff levels and tariff structures.

4.12 On average, tariffs increased by 30 percent, which was significantly less than the accumulated inflation since the previous tariff adjustment. The reform also addressed cross-subsidization between tariff categories. Prices charged to domestic customers more than doubled, and prices for industrial customers actually decreased. Since this initial reform, tariffs have been adjusted annually in response to costs, and prices have now been reduced by about 20 percent, to a level of around US¢8/kWh. There has been considerable public opposition to tariff increases, and the issue was highlighted in both presidential and parliamentary elections. In 2002, the government offered a temporary subsidy to buy down electricity prices. Further, ERA introduced a lifeline tariff, allowing domestic customers to purchase 30 kWh per month at a reduced rate.

4.13 Tariff reforms in the case study countries have followed a general trend of price increases and an ensuing period when the government implements special subsidies and other measures intended to bring down costs, particularly for the poor. In Mali and Uganda, tariff increases were met by significant public opposition, causing the government to introduce subsidies. In Ghana, however, the real value of price increases was partially offset by inflation and currency devaluation. With the important exception of Namibia, tariffs continue to be greater than they were before reforms. Nevertheless, no country has achieved a self-adjusting, fully cost-reflective system for pricing electricity.

The Impact of Tariff Reforms on the Poor

4.14 Potentially, there are both direct and indirect impacts of tariff increases on the poor:

- First, direct effects on household disposable income, as well as energy consumption patterns, arise from changes in electricity prices for these customers.
- Second, there is the possibility for extended access to electricity as the improved financial position of the utility or utilities allows for more investment in network expansion.
- Third, there are the effects of changes in electricity prices on the general economy, and the indirect effects these may have on job creation and wage levels.
- Fourth, it is possible that tariff reforms may reduce the need for government operational subsidies to the power sector, which can be redirected toward other social expenditure.

4.15 The analysis focus on the first two impacts below. Subsequent sections in the report cover the last two impacts.

Direct impact on household disposable incomes and energy consumption patterns

4.16 Electricity price trends in the case study countries have been mixed over the past decade. In some countries, there have been periods when, in the absence of price reviews, inflation has resulted in real tariff decreases to consumers. However, the general movement, after the introduction of reforms, has been toward price-reflective tariffs, and this has meant periods of real price increases. For the poorest, these increases have, in many cases, been offset by lifeline tariffs.

4.17 Tariff increases in the case study countries have tended to be met with substantial public and political resistance. In Ghana, Mali, Tanzania, and Uganda, governments mitigated sharp price increases by introducing tariff and other compensatory measures, such as fiscal transfers to IPPs or to the utility itself.

Box 4.2: Political Reaction to Price Increases in Mali

(As reported in *Essor*, the national daily newspaper, February 18, 2004.)
The Minister for Mines, Energy and Water, Hamed Diane Semega, recalled that "…. since 21 December 2001, the State and EDM-SA have been linked by a concession contract. The planned tariff index formula in the concession contract forecast a tariff increase of 26.5% in 2001, 4.57% in 2002 and 10% in 2003. However, it quickly became clear that the formula was inappropriate. This is why the State agreed to a contribution of some 18 billion FCA in subsidies between 2001 and 2003 to soften the impact of the planned tariff increases on the consumer."

"Despite everything, the Minister continued, tariffs remain high for the average consumer. Moreover, it certainly cannot be said that they have no impact for those who might decide to set themselves up in our country. Since the 16th of last January, an economic and financial simulation model has been proposed, which also decided the regulatory framework and the freezing of tariff levels for a period of three months, the time to negotiate acceptable and consensual tariff formula. Actions are also planned in the framework of rural electrification as well as for the promotion of renewable energy and the construction of the Kenié station downriver from Bamako. According to Minister Semega, our country will also be able to count on the completion of second generation works on the river Senegal and on the interconnection with Ivory Coast."

"Today's electricity tariffs are killing the Malian economy," he stated. "In the context of liberalization and integration, the competitiveness of our economy is at stake."
"This is why the State and the concession-holder have not always been defended as well as they could have been and today we must manage the consequences. "
"The State will respect its commitments, but it is determined to do everything in its power to achieve a tariff goal suitable for our development".

4.18 Data from interviews indicated a fairly high price elasticity of demand at the household level (in other words, price changes have a significant impact on how electricity and other fuels are used within the home). An analysis of data from the South African National Income and Expenditure Survey in 2000 indicates that at the micro level, domestic demand for prepaid electricity (by low-income consumers) is fairly elastic at −1.35. This means that if the price of electricity were to increase by 10 percent, the demand for electricity, holding all other variables constant, would decrease on average by 13.5 percent. The income elasticity of demand for prepaid electricity was determined to be 0.32 and therefore relatively inelastic. When all other variables are controlled for, a 10 percent increase in household income will on average be associated with a 3.2 percent increase in electricity consumption.[7]

4.19 It is interesting to note that while the level of access to electricity has been increasing over the past several years, per capita consumption in most countries has actually declined. Research interviews in Ghana and South Africa indicated that some households have been voluntarily disconnecting themselves from their electricity service and have been using other fuels as alternatives. In other instances, arrears are mounting, and there appears to be little way of paying these off in the future. In Uganda, a tougher stance on nonpayment for electricity services has also resulted in a switch to other fuels to satisfy household energy requirements.

7. Anderson, P. 2004. "Household Consumption of Electricity: An Estimation of Price and Income Elasticity for Pre-paid users in South Africa." Master's thesis, University of Cape Town.

4.20 Most householders interviewed tend to use electricity primarily for lighting. Households tend to be loath to switch to kerosene and candles for lighting if at all possible, yet sometimes this switch cannot be avoided. Households in Mali report lower consumption as electricity prices rise. In the case of Ghana, many households are now using energy-saving lights (compact fluorescent lamps [CFLs]) in an attempt to keep electricity costs down. In 1998, the Volta River Authority imported CFLs and sold them at highly subsidized rates, many of which were then resold at higher rates in neighboring Côte d'Ivoire, where electricity prices were higher. But with subsequent increased tariffs in Ghana, CFL sales have increased and the private sector is now involved in supply.

4.21 Where, less commonly, electricity is used for activities such as cooking, heating, and refrigeration, the impact of a tariff increase appears to take place more obviously and rapidly, though householders do note that a switch entails new investment in alternative appliances. Our research shows that a small tariff increase can quite possibly bring about a straightforward move away from electricity to other fuels, most notably kerosene and wood. The Ghana Living Standards Survey indicates that only 1 percent of households there use electricity for cooking.

4.22 Small businesses that operate out of households (for example, in South Africa) tend to endure tariff increases for as long as possible, preferring to maintain their established level of production and cut down on household expenditure instead. Small-business owners argue that they can also pass costs on to customers—but only small increases, because most of their customers are also poor. Thereafter, they must absorb price increases themselves.

4.23 One obvious fact needs to be –emphasized again. Most of the poor remain without access to electricity and are thus not immediately affected by electricity tariff restructuring.

Power prices and expanded access

4.24 In several of the countries studied, price reforms have been intended to restore the financial performance of utilities. It is possible that this, in turn, allows for larger capital expenditure budgets, network development, and thus greater access to electricity, which would help the poor.

4.25 The Ugandan case study appears to bear this out, with evidence of significantly increased investment following tariff reforms (an increase of more than 400 percent) and a more than doubling of the annual number of connections made. Tariff reforms in Uganda have also been viewed as essential to attracting a private investor into the distribution business, who will have an obligation to invest considerably larger sums in the network than has been possible under public ownership.

4.26 As in Uganda, the privatization of the utility in Mali, EDM SA, has also involved a commitment to investment (US$70 million in electricity services in the first three years). Although the company has managed to mobilize a part of its investment obligation, investments targeted at electrification have not materialized. When the

company has been unable to mobilize all the investment resources required, it has clearly prioritized other needs, including dividend payment, over electrification. In this case, the relationship among reform, prices, and investment in access has not materialized as anticipated. A similar experience is apparent in Tanzania, where the award of a management contract has restored the financial performance of the utility to a point where at least some investments can be financed from retained earnings. However, this has yet to lead to a significant increase in the rate of new connections.

4.27 In South Africa, the causality between price increases and increased access is reversed from the Uganda case. Here, the commitment to a large-scale electrification program was essentially a political one, and Eskom's financial resources mean that there has not been a constraint in access to capital. As the financial consequences of electrification have unfolded, there have been implications for tariffs. The change in electrification financing (from utility-financed to government-financed) suggests that continued electrification should not lead to further tariff increases (although operating losses may continue to accumulate).

4.28 The Ghanaian case suggests that tariff reforms can even act as a barrier to investment. This is because lifeline tariff rates mean that revenues from electrification projects remain below the marginal costs of supply. Further, the national tariff structure implies that distributors in regions with a high electrification burden will fail to recover the cost of supplying low-income and rural customers. Consequently, the reform program in Ghana has failed to stimulate additional investment in extending access.

4.29 A common feature of several countries has been a policy to attract new (and private) entrants into rural electrification by providing rural electrification capital subsidies as an incentive. In some cases (for example, Mali and South Africa), this has been focused on off-grid supply, whereas in others (for example, Tanzania and Uganda), it includes grid-connected areas. To date, it is difficult to judge whether these policies are proving successful in attracting investment. So far, Uganda has not managed to replicate the West Nile Rural Electrification Company in other areas. Similarly, the South African off-grid concessions have yet to deliver the anticipated number of connections. One issue is the reluctance of governments to depart from the national uniform tariff policy by category of customer and to differentiate tariffs for off-grid supply. Off-grid tariffs, even when supported by government subsidies, can rarely be commercially sustainable if aligned with grid-based tariffs.

5

Impact of Reforms on Quality and Reliability of Supply

5.1 The effect of reforms on quality and reliability of supply varies among case study countries. Public and private investment in new capacity in Mali and Uganda have brought about significant improvements in the quality and reliability of electricity supply in both countries, and new service standards have been introduced in Mali. Prior to reforms, both countries experienced capacity constraints, which resulted in frequent power outages. In Ghana and South Africa, where the distribution industries remain fragmented and have yet to be restructured, quality and reliability of supply vary regionally and significantly. In Ghana (and, to a lesser extent, South Africa), electricity customers continue to experience frequent power outages and voltage dips. In Namibia, the experiences of NE show that private sector assistance with electricity reticulation can have a significant and rapid positive effect on quality of supply and service. The management contractor in Tanzania has brought about improvements in the quality and reliability of supply.

5.2 Research in South Africa suggests that poor households—particularly those in rural areas—are somewhat voiceless in this regard. They tend to wait until supply is restored rather than raise concerns about the problem. Also, they tend not to switch to other fuels and appliances, because they prefer the electricity service and would rather wait until it has been fixed. This seems to be the case in Ghana, too: customers prefer to use electricity for lighting, even if the electricity service has problems. Quality and reliability of supply concerns have little effect on cooking patterns in poor households, because they tend not to use electricity for cooking in the first place. In Mali, where the standard of the electricity service has improved, limited fuel switching has been recorded. Nevertheless, better quality and reliability of electricity have great potential to improve the lives of poor people by causing less inconvenience in their daily lives, instilling confidence that their service will not fail, and possibly increasing their willingness to depend on electricity as a primary source of power.

5.3 Utility customer service systems—including metering, billing, and collection processes—vary considerably among countries, as do customer perceptions of these systems. Private participation in distribution results in significant changes: often

they revert to prepayment methods in an attempt to improve payment levels. This was the case in Namibia with NE, which comprehensively revamped billing methods with great and rapid success (see box 5.1)**.** The management contractor in Tanzania has also introduced prepayment meters. Prepayment methods are perceived by customers differently, but in most cases these methods are gaining support because they help customers to effectively control the amount of electricity they consume. They appear to be more readily accepted, though, when accompanied by customer education initiatives.

Box 5.1: Quality of Supply and Customer Service in Namibia

NE introduced efficient management systems, reduced tariffs in real terms, upgraded and extended existing power supply infrastructure, and improved customer services to unprecedented levels in densely populated northern Namibia. The result was a high level of customer satisfaction, which manifested itself through high payment levels (about 99 percent), insignificant tampering by customers with their supplies, a rapidly expanding customer base, and high levels of consumption (in excess of 200 kWh customer per month for domestic customers). NE adapted their service approach to local conditions—for example, by making use of community agents for marketing and the sale of prepaid electricity. The firm was very careful not to antagonize customers by unreasonable actions and always sought to understand their customers' circumstances (for example, by investigating reasons for nonpayment and devising mutually acceptable solutions with defaulters), which earned them a lot of credit. NE was also the first utility to offer a 24-hour, toll-free customer call service, and the company also hosted a radio show for customers to call in and ask questions.

5.4 Fee-for-service arrangements for off-grid systems are slowly being introduced into different countries, including Ghana, Mali, and South Africa. It is too early to assess their suitability, but so far the record looks promising. Generally, such models are initiated by newly introduced private sector participants.

5.5 A traditional barrier to expanded access has been the requirement by many utilities to pay the connection fees upfront. Utility schemes that provide capital subsidies or financing and repayment via monthly accounts can greatly increase electrification rates.

5.6 The extent to which utilities are adhering to service standards established by regulators or government depends on the extent to which these standards are able to be enforced. Enforcement depends on regulatory independence and capacity. Newer regulators in Africa appear to be still in the throes of establishing tariff and licensing regimes and do not have the capacity or staff to assess service quality. In some countries, such as South Africa, this is slowly changing as these regulators become better established.

5.7 Finally, experience around Africa indicates a difficulty in implementing a social tariff. Of primary difficulty is the identification of qualifying households. This has been the experience in South Africa, where the tariff has not yet been offered in various areas for this reason. In Ghana, the lifeline tariff operates per household customer and not per family, yet many families live together in "compound houses," sharing energy costs associated with one official electricity connection (thus, one lifeline tariff).

6

Impact of Power Sector Reforms on Social Services

6.1 Social service infrastructure—in particular, schools and (rural) clinics—have tended to benefit tremendously from electrification programs established in each of the case study countries. In turn, this has frequently enabled better educational performance from teachers and pupils and improved health service delivery. Access to electricity in schools, for example, enables students to study at night. In Ghana, it was found that students' performance was largely correlated with the availability of electricity at home and at school. Most hospitals and clinics also use a wide range of electrical equipment, including specialized laboratory equipment, sterilization instruments, refrigerators, and lights for performing procedures at night. During power cuts in Mali, health centers are left using oil lamps and are often forced to reduce or suspend their services until electricity returns. In Namibia, it was found that many of these facilities maintain backup diesel generators in case the electricity supply falters or fails. Such facilities could greatly benefit from improved quality and reliability of supply by saving the cost of maintaining expensive backup power sources.

6.2 The overall impact on poverty cannot be assessed, but numerous studies indicate that the poor have been positively and significantly affected by this investment. In Ghana and Namibia, educational and health institutions tend to be among the first users to be connected when grid supply reaches any community. The same now seems to apply in South Africa. Community members take advantage of the availability of electricity. Indeed, in the South Africa case study, many instances were observed where community members are using clinic facilities to undertake household tasks, such as ironing, cooking, and mobile-phone charging.

6.3 School and clinic electrification has been achieved with both grid and off-grid electricity services in the case study countries. In most instances, grid services have been offered by public utilities and off-grid services are being installed and managed by private sector operators. Most times, subsidies are required to enable sustained service.

6.4 Yet, in most instances, the electrification programs that have enabled these improvements have not been core or explicit elements of power sector reform strategies,

but have been initiated or managed separately. Thus, the benefits brought about by improved social services through electrification cannot be attributed directly to the reforms. If links between reforms and improved social services are to be drawn, they are most likely to be with respect to improved quality of supply and service Box 6.1).

Box 6.1: Electrified Health Clinics Provide Multiple Electricity Services

Sister Mlaza has worked at the Mphopomeni Clinic in South Africa since 1982. The clinic itself has been in operation since 1981, though the building in which the clinic is now housed was erected in 1992. This is a day clinic, with doctors who visit once a month and six permanent sisters (nurses). The clinic is located in the older part of Mphopomeni township. It is quite large and well kept. Sister Mlaza says that it is normal for there to be a queue of people waiting to be attended. The clinic's vision is "to render total quality care to family, individuals, and the community," and its core values include having respect for people, transparency, and ensuring excellence in all that is done.

Mphopomeni Clinic is receives electricity service from Eskom. The clinic does not pay for the electricity, which is managed on a credit system (that is, not prepaid). It receives electricity bills and forwards them to Grace Hospital in Pietermaritzburg, which pays the bills out of a budget allocated to smaller clinics. This is the procedure followed for many of the clinic's expenses. Indeed, Sister Mlaza says that they have a "clinic budget," which is administered for the Department of Health by Grace Hospital, and they rarely spend all of the funds available to them. In Sister Mlaza's office, there is a large, new color TV for education and training in the clinic. The TV was ordered because the clinic needed to spend some of its funds. Sister Mlaza notes that these funds are for the running of the clinic, and they purchase medicines and other equipment with a different fund, which tends to be too meager for the burgeoning needs.

Sister Mlaza says that there is not really much of an incentive to control the use of the clinic's electricity. During this interview, the clinic was being visited by a range of people coming to do their ironing, welding, and other electricity-consuming activities. Officially, though, Sister Mlaza says that they do try to control electricity usage. The lights are on for 40 hours a week, and outside security lights are left on all night. Electricity is also important for refrigerating vaccines and some drugs. Sister Mlaza says that they do a small amount of cooking with electricity, too, but this is an infrequent activity because the sisters usually bring lunch boxes from home every day.

According to Sister Mlaza, the quality of their electricity is good. They do not experience power surges; if Eskom needs to cut their electricity off, they are informed beforehand, and Eskom is quick to restore electricity when the situation has been seen to.

7

Impact of Reforms on Economic Activity

7.1 It is harder to evaluate the impact that changes in power prices have on economic activity and growth, given the large number of factors that play a role. Further, several of the countries examined in our case studies have undergone Structural Adjustment Programs, making it harder to separate the influence that electricity prices have in relation to other factors.

7.2 However, most countries have continued to experience growth in demand, despite increases in tariffs. In Uganda, tariff increases were introduced in 2001, and consumption has grown by 40 percent since. However, this growth can be, at least in part, attributed to the level of suppressed demand that existed before the commissioning of new generation capacity. Ghana, too, has seen significant increases in demand, despite rising prices associated with the reform and the introduction of thermal generation.

7.3 In several countries, tariffs on industry have not increased as much as those levied on other consumer groups because of the removal or reduction of cross-subsidies between customer groups. These customers thus benefit from improvements in quality of supply (see discussion below) with minimal exposure to price increases. This combination would appear to explain the sustained growth in demand in several of the case study countries—although, in several cases, demand growth has also been particularly strong in the domestic sector. However, it should be noted that in several cases (for example, Tanzania), removal of cross-subsidies has increased prices to small businesses, and this may impede the growth of small enterprises. However, there is little quantitative data to support this, and other input costs to these businesses are likely to be more influential than power prices.

7.4 For businesses, it appears that the benefits of quality of supply improvement, particularly measures that increase available capacity to meet suppressed demand, outweigh the negative impacts of price increases. Several case studies reported that industrial and commercial customers are aware of the high cost of self-generation, and they place a high priority on the quality and reliability of supply. Further, few of the countries included in the case studies (South Africa being the main exception) have an economy based on energy-intensive production. Other input costs are likely to be more important than electricity in influencing economic activity.

7.5 Nevertheless, there is strong evidence from the case studies to support the notion that ongoing electrification programs in Ghana, Mali, Namibia, South Africa, Tanzania, and Uganda have stimulated poor people's ability to start small businesses and generate income.

7.6 The nature of small businesses established as a result of electrification initiatives varies. In Ghana, tailors, seamstresses, woodworkers, metalworkers, hairdressers, and other business operators have been identified. In Mali, grid electricity access has created opportunity for new businesses in ice making, soft drink and ice cream sales, battery charging, welding, and bread making. Off-grid solar projects have assisted the development of retail shops, taverns, hairdressing salons, truck parks, and market points where solar street lighting has been installed. In South Africa, research has identified welding, sewing, telecommunications, and retail activities directly emerging from new access to electricity Box 7.1).

7.7 One interesting survey in Namibia found that business creation in households with grid electricity was fourfold greater than in households with off-grid, solar systems. This finding is to be expected, given the power limitations of small PV systems, but it is an important reminder that productive uses of electricity are more likely with grid-electrification

7.8 In Namibia, it has been noted that small businesses have been set up as electricity has become available, but that if these businesses are to flourish, a broader (and integrated) set of cross-sectoral policies has to be developed. This is also a conclusion of research conducted in Ghana and South Africa. In all three countries, small businesses need, for instance, access to microfinance and improved road and telecommunications infrastructure, in addition to electricity.

7.9 Tariff increases associated with tariff reforms are generally difficult for micro and small businesses to absorb. In Ghana and South Africa, small-business operators have noted that the ability of small businesses to pass on tariff increases to customers through a higher service or product price varies, and it depends on the wealth of customers receiving the service. In Mali and South Africa, small-business operators interviewed have said that they are "suffering" from increased electricity costs and have not been able to expand their business by increasing the number of people they employ.

7.10 But they also note that, thanks to a more stable electricity network, there has been a significant improvement in the quality of the electricity service that they receive.

7.11 In Ghana and Mali, electrification programs are said to have somewhat stemmed rural-urban migration patterns. Indeed, it is noted in electrification policy that this pattern can be sustained only if electricity access in rural areas results in increased economic opportunity.

Box 7.1: An Electricity Supply Enables Businesses to Be Run from Home

Mr. Khumalo lives in an RDP house on the outskirts of Mphopomeni township, which is near Howick, South Africa, and about one and a half hour's drive from Durban. About 9,000 people live in Mphopomeni township, which comprises older or less formal houses and a large RDP housing development. Mr. Khumalo has lived with his wife and child in his home for three years (since it was built).

Mr. Khumalo is a welder by trade and the sole breadwinner for his family. He has added a corrugated shelter and storeroom onto his two-roomed home and uses this for his business, which has been in operation for one year, mainly welding security bars, gates, doors, and fences for clients in the township. (He traveled to Pietermaritzburg to purchase his welding equipment.) Mr. Khumalo works on his own, but if he gets more work than he can handle, he employs one of his friends to help him. Most of his friends are unemployed and confirm that they are "very pleased to get temporary employment." The business does not keep Mr. Khumalo occupied all the time, and he estimates that he is engaged with welding for about 15 to 18 days of each month. He struggles to get his clients to pay for his services, but says that this is because they are all poor, so he understands.

The Khumalo family buys electricity, in advance and just down the road, at the Eskom office. They purchase a card for about R (rand) 10 and say that this lasts for about three weeks. The Khumalos do not use much electricity for cooking. They barbecue their meat outside on a grille and use charcoal, which they purchase at the Howick fuel station (about 5 kilometers away) for R 12.95 (less than US$2) per bag. This bag lasts for about three meals. They use kerosene for cooking porridge and also use a two-plate electric stove as an occasional complement.

Mr. Khumalo says that he "would not be happy if the price of the electricity card went up" to, say, R 20 for three weeks, but he would still buy it because he needs the service. He said, however, that he would have to "battle to get the money." If the price of the card increased, he would use electricity less for household purposes and thus would use more kerosene for cooking, and heating. He would have to try to be more flexible about his business's electricity consumption.

Mr. Khumalo says that the main costs of his business are steel, electricity, welding rods, cutting discs, and paint. A small change in the price of any of these inputs makes a "big difference" to his business and what he is able to do.

He has not heard of the free basic electricity and says that he has not received it either. The Eskom office confirms this. Mr. Khumalo says that the electricity service he receives is "very weak." His welding equipment (including air cooler) uses 20 amperes for each plug, and he uses three plugs. He wishes that he had a "stronger current."

8

Impact of Reforms on Public Finances

8.1 One of the goals of electricity reform has been to reduce dependence on public finances so that governments can redirect scarce funds to other social programs. Power sector reform also creates opportunities to unlock economic value. Although private sector participation has increased, overall impacts on public finances are mixed.

8.2 First, governments face a tradeoff in terms of maximizing privatization receipts versus lower prices or concession values that build in investment obligations for the new operator. The Uganda concessions have favored the latter approach.

8.3 Second, corporatized or private utilities are liable for payment of taxes (and dividends). However, governments, when they are shareholders, have often waived dividend payments and have granted tax deferments. The VRA in Ghana has never paid taxes on its power operations to the government, but rather reinvests any excess revenues it would otherwise have distributed as dividends. The ECG, as a limited liability company, should pay taxes, but to date, it has not made sufficient profit to warrant this. However, tax and dividend payments from EDM-SA in Mali have improved. And in Namibia, Nampower pays taxes and dividends and the first regional electricity distributor, NORED, will be paying dividends in the form of royalties to regional councils and local authorities who are partners in this joint venture. Eskom in South Africa was corporatized in 2001, but in each subsequent year, the government has agreed to substantial deferment of taxes and their dividend policy is flexible; the government often accedes to Eskom's requests for financing non-electricity-related activities.

8.4 Third, although increased private participation in the sector was often meant to ensure that the government no longer has to guarantee debt (for example, in South Africa), many governments have continued to be obliged to provide sovereign guarantees after privatization. This has been the case in Mali and Ghana in terms of the government guaranteeing foreign loans. The state-owned transmission company in Uganda bears much of the financial risk, and the government continues to act as final guarantor. Governments have also ended up guaranteeing IPP power purchase agreements, and in countries such as Tanzania, they face ongoing monthly payments to IPP investors that the utility cannot afford.

8.5 Fourth, governments also face ongoing demands to assist poor electricity consumers. Fiscal transfers to bail out public utilities are no longer common. However, internal utility cross-subsidies for poor consumers have been reduced, and governments have frequently found it necessary to provide direct grants to support the capital costs of new connections for poor consumers or to provide support for lifeline tariffs. Power sector reforms have not changed the level of subsidies that flow from the Ghanaian government to distribution utilities and to end-users. But the amount of subsidies is now more transparent. The Malian government continues to provide tariff compensation to keep tariffs low. The South African government subsidizes both capital connection costs and 50 kWh a month for small consumers. Many governments have also established electrification funds to subsidize access to electricity.

8.6 The overall impact of power sector reform in Africa has probably not been reduction of dependence on public finances, but rather making government transfers more transparent and more targeted at poor consumers.

9

Conclusions

The Nature and Extent of Power Sector Reform

9.1 Many countries in Africa have planned and embarked on a set of power sector reforms. These reforms have encompassed new approaches to the organization of the sector, including changes to utility structure, ownership, and governance as well as removal of utilities' monopoly status and the introduction of new market arrangements.

9.2 Although each country has its own set of policy drivers, in general, reforms have been primarily driven by two factors:

- There has been concern with performance, at the commercial, technical, and financial levels.
- There has been the need to attract new sources of finance to the industry, largely to fund expansion of generation capacity, but also for the rehabilitation and expansion of networks.

9.3 Despite this commitment to reform, progress has been generally slow and patchy. With the exception of Uganda, few countries have moved beyond the establishment of new regulatory institutions, tariff reform, and, in some cases, the implementation of IPPs and management contracts. There has been little effective utility unbundling or privatization, and competition has not featured beyond a few cases of tendering for the right to build new capacity.

9.4 In some cases, the limited progress with reform can be attributed to unrealistic expectations or inappropriate reform design. Industry models based on experiences in larger countries with more developed infrastructure may be inappropriate in the context of many African countries, and competition may be difficult to reconcile with the desire to attract IPPs. However, it must also be noted that the international climate for private investment in power, particularly in developing countries, deteriorated dramatically prior and subsequent to Enron's bankruptcy, and this has handicapped governments in their implementation of reforms.

9.5 Most reform programs, driven as they are by performance and investment concerns, have not been specifically designed to deal directly with poverty-related issues.

Instead, the intention has been that power sector reform will improve physical infrastructure in the country and thus support economic growth and development. However, several countries have developed measures specifically dealing with poverty parallel to, and not always coordinated with, the general reform program. Examples include special electrification programs, including rural electrification, as well as pricing measures to alleviate the impact of tariff reforms on low-income customers.

Impact of Reforms on Access

9.6 With the notable exception of Ghana and South Africa, access to electricity remains at a low level throughout the continent. Nevertheless, many countries have experienced a significant increase in access (which has more than doubled over the past decade) and have succeeded in accelerating the rate at which new connections are made. In many respects, this is a remarkable achievement, given the context of capital shortages and pressing demands in other parts of the industry.

9.7 However, this increase in access is not obviously a direct result of the reform program itself, although there are some interesting exceptions to this general statement. Instead, governments have tended to design special access programs parallel to the reform program. In some cases—again, notably in South Africa—electrification has dominated the policy debate, and in South Africa, efforts to promote electrification have taken precedence over other parts of the reform program.

9.8 Expanded electrification does not always translate into increased access for the poorest of the poor. In most countries, rural electrification levels remain very low, meaning that the great majority of poor people still do not have access to electricity.

9.9 Nevertheless, governments are increasingly aware that there is a need to design access programs that are compatible with other reform efforts. There is an increased focus on ensuring that electrification programs address the incentives that commercialized utilities face, and ensure that the subsidization and cross-subsidization required is transparent and separately accounted for. Further, several countries are attempting to harness the resources, both financial and technical, of the private sector in promoting access to electricity.

9.10 The approaches being adopted include the establishment of special electrification funds and electrification agencies (which facilitate rather than implement electrification), as well as efforts to attract private sector investment where the investment costs are shared on a public-private partnership basis. There is considerable experience with the use of special electrification funds, and these have proved successful in working with utilities to develop the necessary infrastructure, particularly in rural areas. The public-private approach, with a public agency as an intermediary, has less of a track record but is an increasingly common approach. However, experience to date indicates that although it holds some promise, it is proving difficult to scale up operations to a level that will make a significant impact on access rates.

9.11 Similarly, privatization of distribution has the potential to have a positive impact on access rates, especially if the privatization transaction is designed to maximize investment rather than realize a financial reward for the state (as has been the strategy in Uganda). However, experience with privatized distribution utilities is limited, and private investors appear more interested in generation rather than distribution assets. Licensing systems tend to give incumbents rights to towns and allow newcomers the right to expand the network. However, there is little evidence that this strategy is effective in attracting new entrants.

9.12 Management contracting and other forms of private sector participation in the distribution sector have proved easier to implement than outright privatization and, if structured appropriately, can yield significant benefits for access and customer service.

Impact of Reforms on Prices, Costs, Tariffs, and Subsidies

9.13 Tariff reform has been a key component of reform programs, typically involving significant increases in tariffs to bring them to cost-reflective levels, and often involving tariff rebalancing to reduce the degree of cross-subsidization in the industry.

9.14 However, several countries have found it politically difficult to sustain tariff increases, and they have either rescinded tariff reforms or allowed inflation to erode tariffs to levels below full costs. The tension around tariff reforms has tested the independence of newly established regulators, with several bowing to political pressures to reduce tariffs. Nevertheless, there are cases where regulatory institutions have managed to withstand political pressures and establish a track record for independence. Given that one of the key intentions of creating regulatory authorities is to build confidence in the institutional framework among potential investors, the ability to sustain cost-reflective prices is a test of commitment to reform.

9.15 The impact of IPPs operating under take-or-pay PPAs is still difficult to evaluate with certainty. Some of them had destabilizing effects on the finances of national utilities, as is the case in Ghana, Tanzania, and potentially Uganda, because of the high capacity charge (particularly in the early years); altogether it is not demonstrated that power generation under IPPs is cheaper than under alternative arrangements. To the extent that, without the IPPs, the investment cost would have been borne by the budget rather than by users, some social gains in terms of "fiscal space" created for social spending in health or education, for example, might have occurred, but remain difficult to pinpoint.

9.16 Price reforms are intended to restore the financial viability of the industry, and they create the basis for renewed investment in infrastructure, including distribution networks. The effect of this is naturally dependent on the utility's ability to collect revenue and maintain downward pressure on costs. As such, price reforms may be conditional on other reform measures that target commercial, technical, and managerial performance if they are to be effective. However, there is evidence that a suitable combination of price reform and improved utility management can rapidly improve

commercial and financial performance, and in these cases, resources have been invested back into the business with a positive impact on access and service levels.

9.17 Tariff increases will clearly have a negative impact on household welfare, and there is evidence of low-income consumers switching to alternative fuels in the face of tariff increases (and stricter revenue collection). However, concerns with quality of supply and service can be just as important, if not more so, than price.

9.18 Several tariff reform programs have incorporated measures to minimize the impact on low-income households. These typically include lifeline tariff rates, where a limited quantity of energy is available at a subsidized rate. In some cases, these rates have always existed, and the tariff reform has reduced the level of subsidized consumption to target the subsidy more effectively. In addition, prepaid metered supplies have often proved popular with low-income households because they allow more careful control of energy expenditure.

9.19 Further, it must be noted that with access rates of 10–20 percent, maintaining low residential tariffs benefits only a minority of the population—and inevitably subsidizes the wealthier portion of the population, because it is this community that is more likely to have electricity supply. As such, subsidized residential electricity tariffs represent a poorly targeted and regressive subsidy.

Impact of Reforms on Quality and Reliability of Supply

9.20 The poor quality of supply and customer service is a significant problem in many countries, and one that reforms aim to address. In many cases, the problems derive from financial constraints: as demand has grown with economic growth, the incumbent utilities have been unable to finance capacity expansion. In other cases, this problem may be compounded by poor managerial and technical performance, with inadequate attention to maintenance and customer service. Improvements in the reliability and quality of supply can have important benefits for low-income consumers. Direct effects arise from the improvement in quality of supply to these customers.

9.21 Indirect affects arise from the fact that commercial and industrial activities are severely and critically affected by poor power supply, and restoring service levels can be a key element of sustaining economic international competitiveness and growth in the country, with implications for job creation and wages.

9.22 For many countries, the key focus and success measure of power sector reform was the ability to attract IPPs into the industry. Some countries have succeeded in establishing IPPs, but, as noted above, the appetite for investment in independent power deteriorated dramatically a few years ago. Several projects have suffered as a result, and have forced a reassessment of the approach to attracting private investment in the power sector. Where IPPs have been established, the costs of production have proved higher than existing supplies, partly because of the effect that inflation has had on existing asset values, and as a result of the project development cost and the cost of capital faced by

private investors. Several countries have succeeded in attracting new IPP investment, but they have been reluctant to pass through the costs of this to customers. However, in most cases, the alternative to the high cost of independent power might have been shortages, with an even higher cost for the economy.

9.23 Apart from the need to increase investment in generation, several countries have aimed to improve the level of customer service that utilities deliver. In addition to concern with prices, consumers complain about inaccurate bills, poor consumption estimates, and utilities allowing arrears to build up to unserviceable levels. Few countries have privatized distribution, but several have adopted management contracts in the distribution sector. Where this has occurred, the experience is that in certain cases, there can be significant and rapid improvements in customer service levels.

Impact of Reforms on Social Services

9.24 Concern with the availability and quality of electricity supply to social services has rarely been a prominent issue in the design and implementation of sector reforms. However, some countries have targeted the provision of supply to schools and clinics as part of their electrification programs. In these cases, public funding has been made available to support the electrification activity, and the social benefit has been significant. Unelectrified communities often use electrified schools and clinics for a range of personal and business purposes.

Impact of Reforms on Economic Activity

9.25 Most reform programs have included measures to increase tariffs to cost-reflective levels. In these cases, the effect on economic activity should be expected to be negative. However, there is little evidence to suggest that price reforms have had a significant impact on economic growth. Outside electricity-intensive industries, industrial willingness to pay is generally fairly high, given the level of other input prices and the high cost of unserved demand. Most industries are more concerned about power reliability and quality than price. Reform programs that combine tariff reforms with improvement in supply quality will thus mitigate the negative economic impacts of tariff increases.

9.26 Further, several countries have shielded industrial consumers from price increases as the reforms have both increased average tariff levels and removed cross-subsidies. The result is more moderate tariff increases for industrial and commercial consumers.

9.27 Access programs can also stimulate the development of informal and small-scale enterprises. Experience indicates that electrification does stimulate commercial activities, although not always to the degree claimed before the fact. Electrification projects that prioritize and target commercial applications will also experience higher load growth and so require fewer subsidies. Several countries have explicitly incorporated this approach into their electrification strategies.

Impact of Reforms on Public Finances

9.28 Reducing the sector's dependence on public finances has been a key driver of reforms. In particular, there has been a focus on shifting the investment burden away from the public sector. In addition, where utilities have been dependent on government subsidies, there has been an intention to remove this drain on public resources.

9.29 However, the success of separating the sector from dependence on public finance has been limited. In several cases, there has been a reluctance to accept the tariff increases that this policy requires, and some governments have intervened with public funds to buy down tariff rates. In other cases, governments have been unwilling to pass on the full cost of new IPPs and have intervened to cover a portion of the cost of IPP contracts.

9.30 There has been an expectation that corporatized and commercial utilities would make a positive contribution to the fiscal space through tax and dividends. However, in several cases, special tax deals have limited tax receipts, and where profits are made, these often have to be retained in the business rather than paid as dividends to the government shareholder.

9.31 There is a tradeoff between maximization of privatization receipts versus the level of investment obligations. Uganda, for example, has opted to maximize investment in the structure of its distribution privatization transaction, and this should prove to have considerable benefits for expansion of distribution services.

9.32 It is clear that electrification itself cannot be fully financed by the utility business itself, particularly rural electrification. Governments in general are expected to provide subsidies for this purpose, but most have established systems to ensure that the subsidy is targeted at capital costs rather than operating subsidies, and, in certain cases, disbursed according to Output-Based Aid (OBA) principles rather than as a flat subsidy.

9.33 In summary, the outcome of reform has been a change in the financial relationship between governments and utilities, rather than a separation. Public finances are more targeted at specific interventions and outputs (mainly to support access programs), and there is greater transparency in the allocation of resources.

10

Recommendations

10.1 This study is not about electrification per se: it is about the linkages between power sector reform and effective access to electricity by poor people. Thus, the recommendations do not focus on how to better achieve electrification. They focus on improving the design and implementation of power sector reform such that poor people benefit. Given country-specific differences, it is difficult to prescribe recommendations that apply in general. However, the conclusions stated above lead to certain general observations about what worked best and what may have been absent from the reform programs that can be useful elements in the design and implementation of reforms. These are summarized below.

Design Plausible and Realistic Programs

10.2 Power sector reform ambitions need to be realistic in the national context, in scope, content, and implementation schedule. It is not always possible to transfer ideologies or practice elsewhere to the environment in most African countries. In particular, competition is difficult to encourage in small systems, and it is not always compatible with IPP development. Privatization of distribution faces several hurdles due to higher risks and limited interest in the investor community in taking commercial risk. Management contracts can be easier to implement and have brought benefit for customer service levels and financial performance in at least one case. Several countries view this as a short-term measure prior to privatization, it may be possible to structure longer-term asset leases with management contracts.

Promote an Integrated Approach to Improving Access to Electricity by Poor People

10.3 Making new physical electricity connections for households is not enough to ensure that people enjoy the benefits of electricity. Electricity cost and connection charge have to be affordable, and the quality and reliability of supply and customer service need to be adequate. Moreover, access should not be considered as an end in itself. Access extension programs need to be integrated in an overarching government strategy for social and productive uses of electricity and as an enabling element of

programs for wealth creation for the poor. Power sector reform aims to improve the technical and financial efficiency of utilities and to attract new investment. The electricity industry is thus positioned to serve existing customers better, and system expansion becomes possible. However, power sector reform may not, in itself, be positive for poor people *unless* special measures are put in place for expanded access, for mitigating possible tariff increases, and for ensuring improved quality of supply. These special measures—such as electrification agencies and funds to expand and buy down the cost of access and social tariffs for the poor—have often been separate from the main power sector reform process or have been add-ons. The legitimacy of power sector reforms will be enhanced if explicit and integrated policies and mechanisms are put in place for expanding effective access to electricity by poor people.

Include Special Measures to Promote Access

10.4 The largest direct impact of reforms on poverty will come from improving access to electricity. Commercialization of the industry, though, can undermine incentives to promote access; hence, special mechanisms need to be used. A clear national electrification policy with specific, ambitious electrification targets is needed, supported by electrification planning capability. This function could reside in government or a special electrification agency. Responsibility for meeting these targets needs to be allocated to distribution utilities and new private entrants. Special funding mechanisms need to be put in place (system levies, fiscal allocations, donor funds, OBA), consolidated in a national electrification fund, and linked to the electrification planning and a transparent fund allocation process. Transparency and accountability in the allocation of these funds are crucial, because there are far too many instances where funds have either been diverted or allocated politically to favored constituencies. There are few examples in Africa where these capital subsidies for electrification have been awarded on a competitive basis (as is done, for example, in Chile). In such a system, utilities requiring the least-cost capital subsidies for a given tariff level, or the lowest tariff for a given subsidy level, receive preferential allocation of funds disbursed through OBA mechanisms, providing incentives to reduce the costs of electrification and also to improve the efficiency of fund allocation. Provision of public finance seems inevitable. However, a combination of suitable incentives with good commercial practices can create an environment where utilities are able and willing to reinvest in network expansion.

Encourage Replicable Electrification Projects

10.5 Although project-based public-private partnerships hold some promise, there is a problem of scale and transaction costs. It is more effective to design access programs with distribution utilities rather than project-based ventures.

Mitigate Negative Impacts of Price Reforms on the Poor

10.6 Establishing and maintaining cost-reflective prices (with suitable incentives to reduce thefts and nonpayments) are essential in order to restore financial performance and attract new investment. Compromising on this will undermine the viability of the industry. Nevertheless, cost-reflective tariffs often mean substantial increases for poor households, which results in reduced consumption and welfare and, in serious cases, fuel switching to dirtier and less convenient fuels. Special pricing systems for low-income households can mitigate some of the negative impacts of price reforms and, as the case studies show, are in almost all cases necessary. These pricing systems need to be set at levels that are affordable for poor households, yet also sustainable for the electricity supply industry, the government budget, or both. They also need to be targeted. This can be done through restricting lifeline or social tariffs to those consumers who consume less than a specified amount (for example, 50 kWh per month), or they could be targeted to consumers who accept current-limited supplies or are on prepaid metering systems, provided these are proxies for poverty. Public education programs are important for informing poor households about eligibility for social tariffs.

Ensure that Reforms Improve the Quality and Reliability of Supply

10.7 A significant indirect impact on poverty comes from improving the reliability of supply and thus enhancing competitiveness of the economy and enabling economic growth. Firms that face frequent power interruptions or have to invest in costly and duplicate backup systems struggle to be competitive. The availability of reliable and secure electricity supplies is a precondition for expanded investment in developing countries. Reforms should focus on measures to balance supply and demand, as is often the case.

Incorporate Off-Grid Policies and Legislation into Power Sector Reform

10.8 The focus of power sector reform is understandably on the main grid utilities. Rural electrification using off-grid or remote minigrids is often neglected, and confusion arises around grid versus off-grid planning, concession areas, and so forth. Power sector reform generally opens space for private sector participation. Legislation should create clear rules for off-grid or minigrid concessions, which should preferably be awarded on a transparent, cost-effective, and preferably competitive basis. There also need to be equitable arrangements around capital subsidies and lifeline tariffs for grid and off-grid or minigrid systems, as well as flexibility with regard to the national uniform tariff rule.

Build Pro-Poor Regulatory Capacity

10.9 As private participation in the electricity industry expands, the role of the regulator is often curtailed as many important regulatory provisions (such as future price

paths) are specified in the contracts. Nevertheless, regulators, if truly independent, can play a critical role in a range of special measures that promote more effective access to electricity by the poor. They can design and set social tariffs that are affordable, targeted, and sustainable. They can also design and enforce service and quality standards. Regulators can also promote transparency and accountability in the electrification planning process and in the management and allocation of electrification funds. They need not—indeed, perhaps they should not—be directly responsible for allocating electrification funds, but they can play an important monitoring role. At a minimum, regulators should not be captured either by the government, by private investors, or by special consumer groups.

10.10 This study has shown that expanded access to affordable and reliable electricity supplies by poor people is possible as the power sector is reformed in Africa. These possibilities will be much enhanced if the above recommendations are taken into account.

Appendix A

Country Case Studies

Ghana

Country overview

A1.1 Ghana, with a per capita annual income of US$270, ranks 156th in the world in terms of its gross national income (GNI) adjusted for purchasing power parity. The country, with 20 million inhabitants and an annual population growth rate of 2.8 percent, is faced with rising child and infant mortality rates. Poverty is particularly prevalent in the northern areas of the country. The percentage of the population living under the national poverty line has, however, decreased from 50 percent in 1992 to 39 percent in 1998, indicating an overall improvement in welfare. Furthermore, Ghana's above-noted rank of 156 is well ahead that of its neighbors, including Benin, Burkina Faso, Côte d'Ivoire, Mali, and Togo. Almost two-thirds of Ghana's 20 million inhabitants reside outside cities—though, as with most developing countries, this figure is shrinking rapidly.

A1.2 Since gaining independence in 1957, Ghana has weathered a series of military coups, which have coincided with extended periods of political and economic instability. In 2001, a new government was elected democratically.

A1.3 Ghana's economy is largely agriculturally based, though both the mining and industrial sectors are growing, with gold now responsible for a significant percentage of the country's foreign exchange earnings. Gross foreign direct investment was only 0.8 percent of gross domestic product (GDP) as of 2002, far below levels needed to stimulate sustained and profound economic transformation. Meanwhile, the country's dependence on aid has increased in the recent past, which today amounts to 10 percent of GNI. Still, despite the increasing external debt burden of US$7.3 billion, or nearly one and a half times its GNI, Ghana experienced real GDP growth of 5.2 percent in 2003, up from 3.7 percent in 2000.

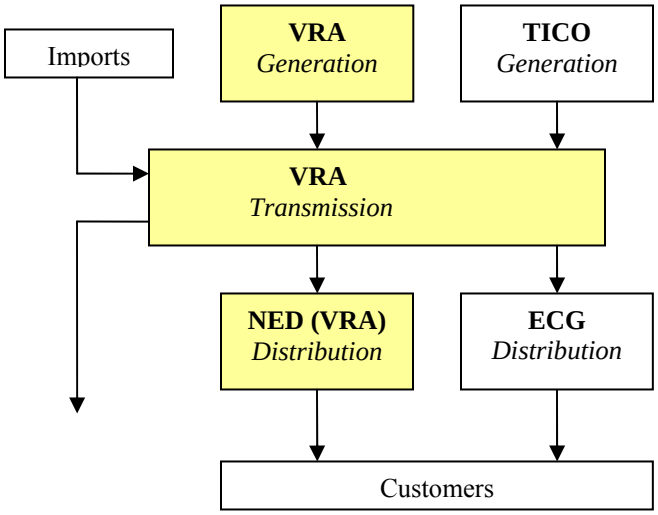
A1.4 Ghana has experienced a sharp currency devaluation since 1998—a change from ¢ (cedis) 2,345 to the dollar in 1998 to ¢8,352 in 2002. This has placed a huge strain on, among others, domestic power producers, who were seeking to expand

beyond traditional sources of hydropower to thermal-powered plants dependent on imported fuel and machinery.

Ghana's power sector

A1.5 Ghana's power sector is dominated by the Volta River Authority (VRA), a state-owned utility, which provides generation, transmission, and distribution services (the latter via its subsidiary, Northern Electricity Department). The VRA does not, however, maintain a monopoly. Takoradi International Company (TICO), owned 10 percent by the VRA and 90 percent by CMS Energy Corporation, has recently made inroads into generation. The Electricity Company of Ghana (ECG) is another player in the distribution sector. Efforts are also being made to exploit Ghana's solar power potential through the Renewable Energy Services Project (RESPRO), the Solar Project, New Energy, and Isofoton, although the impacts of these projects are small compared to grid electrification.[8] All but one of the main players (TICO) are state owned. Figure A.1 is an overview of the sector.

Figure A.1: Structure of Ghana Power Sector



A1.6 The Public Utilities Regulatory Commission (PURC) is responsible for economic regulation, primarily tariff setting, and the Energy Commission is responsible for technical regulation, licensing, and policy advice.

A1.7 Lake Volta feeds two hydroelectric facilities (1,180 megawatt [MW]) owned and operated by the VRA, and imported crude oil fuels the Takoradi Thermal

8. RESPRO, a joint program of the Global Environment Facility (GEF) and the government of Ghana, operates in nine districts and serves 1,800 households, local water-pumping stations, and community buildings. The Spanish government's Solar Project meanwhile serves 10 communities in the Kpasa area. Two additional projects include New Energy of Tamale and an Isofoton project, also in the Kpasa area.

Facility (550 MW).[9] Takoradi comprises a 330 MW block, commissioned in 1998 and owned and operated by the VRA, plus 220 MW commissioned in 2000 and owned by TICO.

A1.8 Total consumption in 2002 was 7,750 gigawatt-hours [GWh], with just 60 percent of the power consumed generated from hydropower. The balance was made up by thermal (30 percent) and imports (10 percent). Average per capita consumption is around 350 kilowatt-hours (kWh), significantly higher than in neighboring countries. Transmission and distribution losses are estimated at 15 percent.

A1.9 Average real residential tariffs were about US¢6/kWh at the beginning of 2003. Meanwhile, the VRA has recorded a net financial loss since 1998, with the magnitude of losses increasing from each year to the next (except in 2001). The VRA's rate of return on net fixed assets has averaged −3.3 percent since 2000. Similarly, the ECG has incurred net financial losses.

Electrification

A1.10 Approximately 50 percent of all Ghanaians have access to electricity, which is almost exclusively used for lighting. Fewer than 1 percent of the Ghanaian population rely on electricity for cooking.

A1.11 Electrification efforts were intensified starting in 1987 under the government's National Electrification Programme (NEP). At that time, electricity access was estimated at only 20 percent, and grid supply covered only one-third of the country's land area. (Of 10 regions, 4 were not connected to the national grid.) The focus of power sector policy at that time was first and foremost to extend the grid and increase access (in contrast to later reforms in 1997–98, which had the main goal of increased competition).

A1.12 Starting in 1987, the utilities, with the support of the government, obtained concessionary financing from several multilateral and bilateral donors to extend the 161-kilovolt (kV), high-voltage backbone of the network to all regional centers. In addition, subtransmission lines were constructed to reach each of the 110 districts in the country and all communities within approximately 20 kilometers of these lines. As a result, more than 500 communities in the four northern regions, without service prior to 1988, have been connected, representing a total of 140,000 customers as of 2002 (up from 24,000 in 1990). Coverage has also increased in southern Ghana, which as of 2002 has reported approximately 793,000 customers, up from 456,000 in 1996.

A1.13 Among the most successful programs for advancing the NEP was the Self-Help Electrification Programme (SHEP), through which communities within a certain proximity to the network were able to be connected by purchasing low-voltage distribution poles (not required in urban communities) and demonstrating the readiness of a minimum number of premises to receive power. Phase three of SHEP is currently under way, and a fourth phase is in the planning stages. Other important initiatives that were

9. The Takoradi Thermal Facility is expected to have a total capacity of 660 MW; however, to date, only 550 MW have been completed.

spearheaded during this time include the Productive Uses Initiative, which had the goal of ensuring that investments made in electrification would generate economic activity; RESPRO and the Solar Project (see footnote 2). In addition to donor aid and direct government assistance, the National Electrification Fund, which was funded from a 1 percent levy on electricity tariffs, went a long way in supporting SHEP and other programs.

A1.14 The NEP continues as an important program today, with the goal of providing electricity throughout the country to all communities of 500 inhabitants or more by 2020.

Drivers for power sector reform

A1.15 Ghana's power sector reform originated in 1994 with government-commissioned studies and the appointment of a Power Sector Reform Committee. The reform process, which began in earnest in 1997–98, was motivated by a number of factors. With growth in electricity demand exceeding 10 percent for more than a decade, by 1996, the country ceased being a net exporter of electricity. Power shortages began to be felt in 1997; in 1998, these shortages were exacerbated by reduced hydropower production. During this period, customers, particularly industrial and commercial users, started demanding more reliable service. In addition, the government was eager to open the sector to private investors in order to reduce the public financing burden. Last, the World Bank made the Takoradi Thermal Credit Agreement contingent on private sector participation through management contracting to improve distribution. The more costly thermal stations led the utilities to propose substantial hikes in tariffs, which prompted customers to demand greater transparency in the tariff-setting process.

Description of reform

A1.16 The VRA was established in 1960 as an autonomous corporate body with a technocratic management team. Given its autonomy, restructuring of the VRA was not a priority in the initial reform process. The ECG, the main distributor in Ghana, was converted into a limited liability company in 1997.

A1.17 The primary objective of the reform process was to establish a competitive framework and attract private investment and participation in the ownership and operation of new generation and distribution systems. Of these two systems, generation was the first priority and with it a goal of wholesale competition.

A1.18 The reform program has the following goals:

- Independent regulators to oversee licensing and competition and operational rules, thereby ensuring participants of impartiality and noninterference by the government
- Transparency in tariff setting to provide a structured formulation for price setting that would give predictability to rates

- Open access to create a suitable environment for independent power producers (IPPs) and large power consumers
- A contestable market to provide for capacity expansion through competitive bidding.

A1.19 The primary outcomes to date have been:

- Establishment in 1997 of two new regulatory agencies, PURC and the Energy Commission
- Adjustment of tariffs, including the lifeline tariff, by PURC, as well as publication of tariff-setting guidelines
- Commencement of operations in 2000 of TICO, the country's first, and only, IPP.

A1.20 The small size of the distribution industry has been a structural impediment to the implementation of the reform as earlier conceived. The aluminum smelter accounts for as much as 30 percent of power produced in Ghana. After accounting for consumption of other bulk customers, such as the mines, the proportion of power that is retailed by the distribution utilities is less than 50 percent. It is also noted, for example, that the consumption for the four regions in the north, which constitute two-thirds of Ghana's land area, together represent only 5 percent of total energy consumption in Ghana. The government recognizes that horizontal unbundling of distribution will not result in reasonably sized distribution entities. Low tariff levels have also been cited for making the sector unattractive to private investors.

A1.21 Planned reforms have tended to focus on challenges in generation, to the detriment of pressing issues in distribution. Insofar as civil society was not consulted, there were few avenues to influence policy and implementation. In 2001, however, reform plans were withdrawn by the newly elected government, which identified the growing disconnection with the needs on the ground.

A1.22 In April 2003, the cabinet approved a revised strategy and schedule for the reform of the power sector to be undertaken over a five-year period. In pursuance of the revised strategy, a Power Sector Reform Secretariat has been formed to manage implementation. Regarding the generation function, the revised strategy and schedule for the first year specified the formation of a VRA holding company in preparation for the unbundling of the current entity into the distinct business entities of hydro generation, thermal generation, and transmission by 2005. These entities would then be required to operate at "arm's length" despite all being publicly owned. Also in the first year, the VRA holding company was expected to implement a performance-based management contract for the Takoradi plant and initiate the competitive procurement of new thermal generation facilities.

A1.23 New rules for the electricity market were expected to be developed in 2004. An independent transmission system operator is planned for 2005. The formation

of a distribution holding company, including the awarding of a management contract, was also made a target for 2004, with operations set to commence in 2005.

A1.24 Concerning regulation, per the revised strategy, the Energy Commission has been restricted to licensing and technical regulation and the Ministry of Energy assumes responsibility for energy planning, policy formulation, implementation, and monitoring. In addition, PURC was also expected to regulate the gas sector.

Impacts of the power sector reform

A1.25 Although significant changes—the creation of PURC and the establishment of Ghana's first IPP—have taken place since the launch of reforms in 1997–98, these changes fall short of meeting the larger power needs of most Ghanaians.

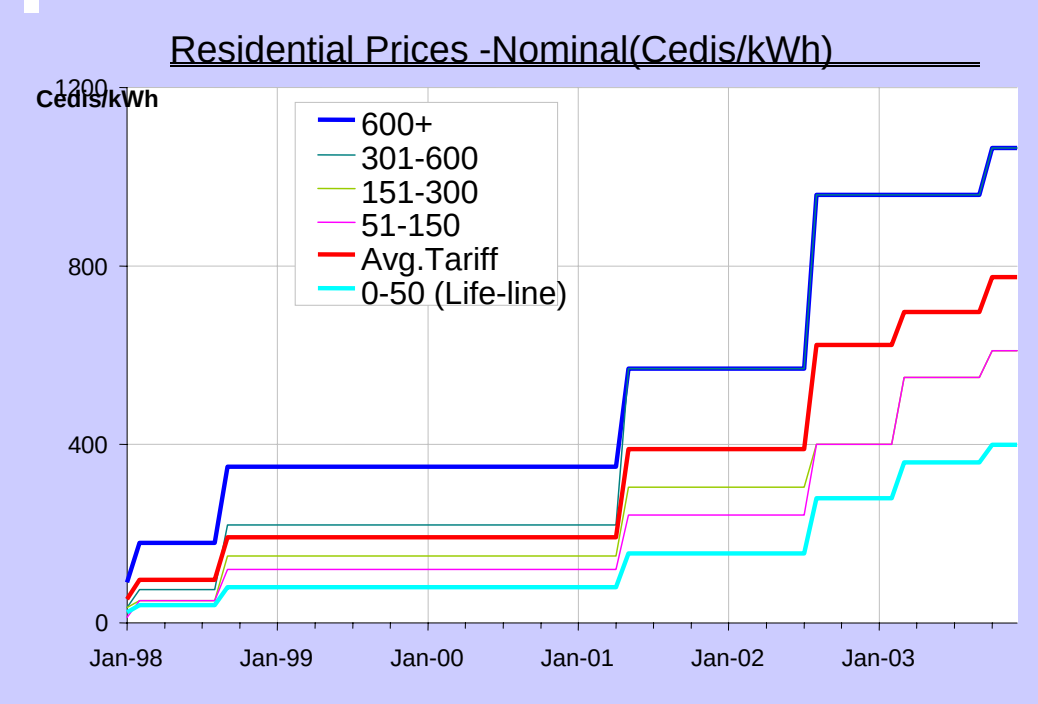
A1.26 *Access.* In the period coinciding with power sector reform, access rates have risen from 43 percent in 1999 to a current estimate of 49 percent. However, this increase can largely be attributed to initiatives from prior to the reform program, such as SHEP, RESPRO, and the Solar Project from the late 1980s.

A1.27 Even as access has increased, there is anecdotal evidence pointing to the fact that in many rural communities after initial connection of households, the use of the service has declined because of either inability to pay for appliances or the services consumed.

A1.28 Tariffs do not cover average costs, thus there is little incentive for distributors to engage in rural electrification, because it only increases financial losses. The lack of incentives has also kept private investors from entering the market to provide the rural poor with electricity services. Supply to such consumers, which is due in large part to bilateral development assistance, has therefore continued to occur not on the basis of business decisions but rather in response to either political or social equity pressures.

A1.29 Energy service companies, such as AB Management Ltd and Dekons Engineering, are providing large consumers with energy efficiency, demand-side management services, and renewable energy alternatives. These service agents are, however, mostly found in the urban areas. In the rural areas, new agents, such as nongovernmental organizations (NGOs), are providing services mostly to non-grid-connected communities and mainly through the deployment of solar systems. Some of these schemes have been government- or grant-funded projects, such as those undertaken by New Energy of Tamale, RESPRO in the Mamprusi district, and the Isofoton project in the Kpasa area. The costs for these systems have been higher than for grid-supplied electricity because of higher capital costs of off-grid systems as well as the concessionary lifeline tariff available only for grid-connected customers. In addition to the policy and financial barriers, there is a widespread perception that off-grid systems are inferior to grid systems in quality and performance, which serves as a barrier to attracting and maintaining customers.

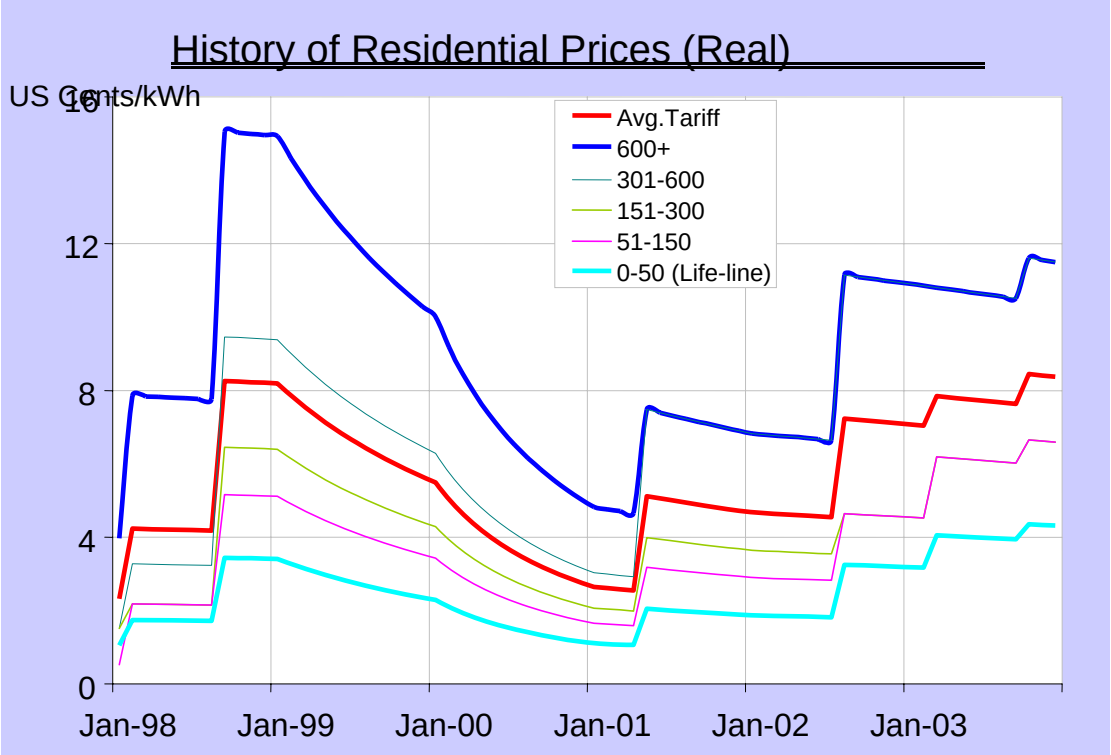
Figure A.2: Residential Electricity Tariff in Ghana



A1.30 *Price.* Prices have vacillated significantly since the start of power sector reform. Average nominal residential tariffs have risen from approximately ¢75/kWh in 1998 to just under ¢800/kWh in 2003 (see Figure A.2). Bulk tariffs have been increasing in a similar fashion, from about ¢40 in 1998 to 425 in 2003. This 10-fold increase is much more than a function of inflation, which has been growing at an annual average rate of 27 percent over the period 1990–2002. The steep price rise can be attributed primarily to the cost of new thermal power and increased import costs after the devaluation of the cedi. As noted before, Ghana began supplementing its hydropower supply with thermal power in 1998. With the exception of distribution conductors, all other capital equipment for the production, transmission, and delivery of electricity service was manufactured outside Ghana. In addition, all fuel for the thermal generators was imported. The net result is that a high proportion of the cost of providing electricity was foreign currency denominated. With the sharp devaluation of the cedi starting in 1999, the utilities were put under tremendous pressure to raise prices in order to cover costs and service debt. This pressure was compounded by the reform process, which also called for cost-reflective pricing, including reflecting TICO's required 17.5 percent return on investment (compared to the government's 8 percent target).

A1.31 While nominal prices have increased, real prices, denominated in U.S. currency, have been falling steadily since 1999 and are today just over two-thirds of their 1999 levels. As a result, despite the pressure to meet costs, utilities have been running deficits since 1999.

Figure A.3: Real Residential Electricity Tariff in Ghana



A1.32 To mitigate the impact of the price increase on the poor, PURC has been revising the structure of the lifeline tariff. In 1997, when PURC assumed responsibility for rate setting, the price structure was such that all consumption of electricity below 100 kWh was billed at the lifeline rate. An obvious technical flaw in the initial structure was that the subsidy was not targeted—the first 100 kWh of every consumer was billed at the lifeline rate. As a result, the proportion of energy sales at the subsidized rate was very large, and the burden of funding the subsidy fell disproportionately on industrial consumers and a few high-end residential consumers. Since 1998, PURC has revised its implementation to address this. The lifeline tariff set by PURC currently provides for residential consumers whose consumption is no greater than 50 kWh to be charged a block amount of ¢19,978 per month (or approximately ¢400 per kWh), which is equivalent to about US$2.00. Currently a quarter of domestic consumers qualify for the subsidy.

A1.33 In a reaction to complaints from consumers about the magnitude of the increases in nominal tariffs, the government has pledged to pay ¢5,000 of this monthly block amount directly to the utilities on behalf of consumers, so that the utilities bill consumers only for the balance.

A1.34 Even with the adjustment of the lifeline tariff, many households are not able to afford the electricity service. Many poor users have accumulated considerable arrears on their account, and numerous consumers are reducing consumption by

conserving energy and switching to kerosene. In many cases, households have completely switched to other fuels.

Conclusions

A1.35 Although the power reform process has helped the country cope with its shortage of supply by introducing Ghana's first IPP, reform of the distribution sector has been largely overlooked. Furthermore, the introduction of thermal generation and private capital has made the sector more vulnerable to currency devaluation.

A1.36 The access challenges are threefold: extending the electrification program to smaller and more remote communities, ensuring the sustainability of the currently financially unviable operations, and keeping tariffs affordable. The essential tradeoff is to provide incentives to electrify while keeping tariff affordable. To date, it is arguable that none of these challenges have been addressed, with smaller communities still unserved and utilities unable to cover costs even as tariffs have skyrocketed. Much remains to be done to ensure a more equitable and efficient implementation of reform.

A1.37 Ghana has been caught between the proverbial rock and a hard place. Until macroeconomic stability is restored, it will not be easy or even possible to have a successful electricity supply industry. In hindsight, it is quite possible that thermal generation remained the lowest cost (and perhaps only) form of new capacity. The combination of new capacity and greater vulnerability to exchange rates had a profound impact on prices, but there was probably no other choice (except shortages). If the industry is to be sustainable at all, it requires tariffs to be set at cost-reflective levels. In fact, tariff increases have been cushioned from lifeline tariffs, but also because tariffs have not kept up with costs. The core challenge is still attracting new investment and ensuring financially viability while promoting widened access to affordable electricity services.

Mali

Country overview

A1.38 Mali is ranked 192nd worldwide in terms of GNI purchasing power parity, placing it on par with Mozambique, Nigeria, Tajikistan, and Zambia but well behind most of its immediate neighbors (Algeria, Burkina Faso, Côte d'Ivoire, Guinea, Mauritania, and Senegal), with the exception of Niger. Its population of 11 million has grown approximately 2.5 percent per year over the last two decades and is expected to continue at this rate, reaching 15 million by 2015. Among the country's challenges is its low literacy rate, with only 48 percent of all men and 34 percent of all women aged 15 years or older able to read and write. Just over 30 percent of Mali's inhabitants reside in cities, with the majority still settled in rural areas.

A1.39 Mali gained its independence from France in 1960. In 1991, a popular uprising brought down the 23-year-old military dictatorship. The transition to civilian rule saw the election of a new president supported by an elected, civilian Parliament. In

2002, new presidential elections were held with the full participation of all opposition groups, marking the first peaceful transfer of power between two democratically elected leaders since independence. Among the major regional factors to affect Mali since 2002 has been the political and social upheaval in Côte d'Ivoire, through which most of Mali's trade traditionally has transited.

A1.40 The Malian economy, which exports cotton, gold, and livestock, is hampered by its landlocked position and vast expanses of desert. As of 2002, Mali's GNI stood at US$2.7 billion. Nevertheless, the country managed an average 5 percent annual GDP growth in the period 1994–2002, accredited to its increasingly stable political situation coupled with economic liberalization policies. Between 1990 and 2002, the country saw foreign direct investment rise 16-fold, to US$102 million. Meanwhile, foreign aid has diminished as a percentage of GNI, from 17 percent in 1997 to 15 percent, or about US$405 million, in 2002.

A1.41 Fossil fuel imports weigh heavily on Mali because the country has no indigenous petroleum sources. In 1998, petroleum imports amounted to US$75 million; by 2000, this figure rose to US$100 million or about 5 percent of Mali's GNI. Given the focus of this report, it is also important to note that electricity makes up only 0.9 percent of Mali's final energy consumption, with 90 percent of final energy consumption coming directly from such traditional sources as firewood, charcoal, and agriculture residues. The balance is mostly oil products (8 percent).

Mali's Power Sector

A1.42 The power sector is dominated by Energie du Mali (EDM-SA), a public limited company that is responsible for all almost all generation, transmission, and distribution of electricity. The firm is also responsible for providing water services. The EDM-SA is owned by SAUR International/Industrial Promotion Service (IPS)–West Africa (60 percent) and the government of Mali (40 percent) and has a 20-year concession to provide electricity and water to 97 localities throughout the country.

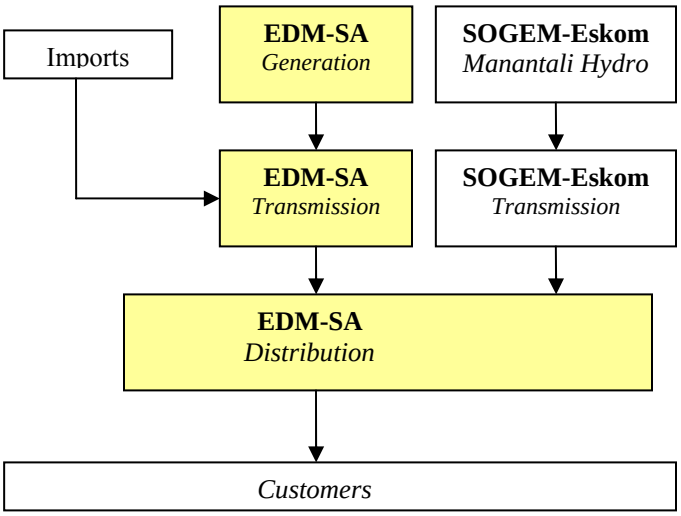
A1.43 Mali's electricity demand is met by a mixture of: thermal (both diesel and gas), which, in 2002 accounted for 49.8 percent (92.7 MW) of the total installed capacity; hydro, amounting to 49.7 percent (92.6 MW); and solar photovoltaic (PV), which is a mere 0.46 percent (0.85 MW) of installed capacity. Although installed capacity is split nearly evenly between thermal and hydro, Mali's hydropower facilities produced 73 percent of total supply in 2003.

A1.44 Mali's two largest hydroelectric installations are Sélingué, with a capacity of 44 MW and annual production of 180 GWh, owned and operated by the EDM SA; and Manantali, which will have a total capacity of 200 MW and a predicted total annual production of 800 GWh, serving Mali (52 percent), Mauritania (15 percent), and Senegal (33 percent). The Manantali hydro facility and the associated high-voltage transmission system connecting the three utilities of Mali, Mauritania, and Senegal is owned by the Organisation pour la Mise en Valeur du Fleuve Sénégal (OMVS), a trust company formed by the three countries. The OMVS has delegated responsibility for this project to

a sub–trust company called Société de Gestion de l'Electricité de Manantali (SOGEM), which has in turn awarded a 15-year operation and maintenance contract to Eskom Energie Manantali, a subsidiary of Eskom, the South African national utility.

A1.45 In addition to the EDM-SA and the government of Mali, there are two *sociétés des services décentralisés* (SSDs) or decentralized service companies: SSD Koutiala, operated by NUON and Electricité de France (EDF) and SSD Kayes (operated by the EDF and Total). These two firms generate and distribute off-grid power (solar PV and diesel-generated thermal) in rural areas. Figure A.4 maps Mali's electricity sector.

Figure A.4: Structure of Power Sector in Mali



A1.46 The Commission de Régulation de l'Eau et de l'Electricité (CREE) serves as the regulator for the sector. CREE is responsible for approving and controlling tariffs and ensuring compliance with contracts. The commission also helps draw up sectoral development policy and monitors calls for tenders and concessions. CREE is also expected to arbitrate conflicts between service providers and consumers and generally to defend consumers' interests.

A1.47 Through the integration policy of the Economic Community of West African States, two localities in the south of Mali (Kadiolo and Zégoua) have been connected to Côte d'Ivoire's electrical grid system since 1996. There is increasing interest in creating a connection between the main Malian grid and that in Côte d'Ivoire. In 2000, the West African Power Pool was set up to promote the interconnection of national grids and harmonize regulatory frameworks in order to facilitate the interconnection of the power supply among 14 member states. The pool should operate in two phases, to be completed by 2005. The first phase will be made up of Benin, Burkina Faso, Côte d'Ivoire, Ghana, Niger, Nigeria,, and Togo. The second phase will involve Cape Verde, Guinea, Guinea-Bissau, Liberia, Mali, Senegal, and The Gambia.

A1.48 Mali's total energy consumption in 2002 of 429.6 GWh implies an annual per capita consumption of 40.3 kWh, but this average figure hardly paints an accurate picture, given that only 12 percent of the country's population of 10.7 million has access to electricity. It is more revealing to consider the customer base, which is broken up into about 120,000 households and 800 industrial customers, or low-voltage and medium-voltage customers, respectively. Industrial users consume 46 percent of the total (198 GWh), with average consumption amounting to 245 MWh each year. In contrast, households consume 54 percent of the total (232 GWh), with annual average consumption amounting to 2 MWh per household. Technical and nontechnical losses appear to be high (27 percent) if electricity production is contrasted with recorded consumption.

A1.49 In a departure from the practice in most countries, Mali maintains the same tariffs across the entire country, with no distinction in cost between urban and rural dwellers. Tariffs in Mali are also higher than in any country in the subregion. Domestic tariffs are about US¢2/kWh.

A1.50 A social tariff also exists for small consumers with supplies of less than 5 Amperes. Currently, the social tariff is broken down into four consumption bands: 0–50 kWh per month, 51–100 kWh per month, 101–200 kWh per month, and >200 kWh per month, with costs increasing with consumption.

A1.51 Tariffs are proposed by the EDM-SA and approved by the government of Mali, with CREE serving an intermediary function by providing both analysis and opinion of tariffs to the government.

Electrification

A1.52 In 2002, about 12 percent of the Malian population had access to electricity (for the rural population, the figure was less than 1 percent; for the urban population, about 42 percent). The specific objective of the government's energy policy is to increase the population's level of access to electricity to 23 percent in 2007, in effect supplying electricity to all of the urban population and 3 percent of the rural population (those living in areas with easy access to the electric grid system).

A1.53 Until 2003, the only government agency that focused on energy in the rural areas was the Domestic Energies Strategy (DES) for traditional energies. However, the DES did not promote modern energy services, including electricity, but concentrated instead on wood and charcoal. The largest government-led program to support modern energy services in rural areas emerged in 2003: Household Energy and Universal Rural Access (HEURA) is a US$53 million program spanning five years and funded by the government of Mali and the GEF with an International Development Association (IDA) credit and support from the United Nations Development Programme (UNDP). The objectives of HEURA are:

- Acceleration of use of modern energy in rural and periurban areas for increased productivity of small and medium Enterprises and improvement of health and education centers and living standards
- Promotion of community-based woodland management to reduce unsustainable pressure on natural resources and encourage the use of alternative domestic fuels and energy efficiency
- Strengthening of the reform processes in the energy sector and of related institutions to create a favorable environment for investment in order to facilitate increased private sector participation in the delivery of decentralized energy services in rural and periurban areas.

A1.54 Agence Malienne pour le Développement de l'Energie Domestique et de l'Electrification Rurale (AMADER) has since been created by the government of Mali to manage the HEURA program. AMADER will provide investment subsidies to electricity producers working on the basis of fee for service, although no information has yet been released on the different subsidy regimes. By partnering with private companies, NGOs, and community-based organizations, AMADER is expected to achieve the following results:

- Provision of 40,000 new off-grid electricity connections in the rural and periurban areas
- Provision of 135 schools and 100 health centers with access to electricity
- Installation of 500 solar PV systems for community use
- Installation of 10,000 individual solar home systems.

Drivers for power sector reform

A1.55 The primary driver for reform has been the poor condition of the state-owned power facilities in Mali. This situation was exacerbated in 1998–99, when droughts in Mali led to reduced power production at Sélingué (at the time, the largest hydro facility in the country). Meanwhile, the existing thermal facilities were unable to make up the load because of their degenerating condition. The drop in production caused significant power cuts, which ultimately led to plans to liberalize the industry and privatize the EDM SA.

A1.56 The poor operating condition was a result of the EDM SA's equally poor financial situation, which prevented the utility from making requisite repairs and extensions.

Description of power sector reform

A1.57 Privatization of the EDM SA, which was characterized as a mixed investment company, with 97 percent of the capital held by the Malian state and the remainder by EDF since 1960, was first considered in 1994. However, because of the company's high levels of debt and resistance from unions and the general public, this action was ultimately abandoned. Instead, in an effort to improve the company's financial and operating performance, in 1995, the EDM SA delegated its management to an

external body composed of SAUR International, Hydro-Quebec International, EDF International, and CRC SOGEMA.

A1.58 Despite this management contract, the EDM SA still struggled to provide uninterrupted service, and little extension of the system took place. The management contract came to an end in 1998.

A1.59 In 2000, the government of Mali made EDM SA shares available to private investors. The amount of private capital in the company increased significantly from CFAF (Malian francs) 2.5 billion (US$4.7 million) to CFAF 32 billion (US$60.2 million) in 2001. Since 2002, 40 percent of the company has been owned by the Malian state and the other 60 percent by the international group SAUR/IPS–West Africa. The stated objective of the arrangement, as documented in a concession contract signed between the government and the EDM-SA on November 21, 2000, is to ensure the quality of the electricity service.

A1.60 The contract covers 97 localities in Mali and stipulates that the EDM-SA will make investments totaling US$345 million over the 20 years of the concession. For the first 3 years following the privatization, the EDM SA has agreed to make investments of US$140 million (of which more than US$70 million is for electricity and the remainder for water and other commercial activities).

A1.61 In its 2001 five-year investment plan, the EDM-SA has noted the following goals:

- Make full use of the Manantali hydroelectric power station by preparing the electricity grid to make it more stable, permit transfer of the newly available power, and extend the system to distribute the new power to other areas
- Work toward the interconnection of the energy system with Côte d'Ivoire and examine all other alternatives to help the country deal with the increasing internal demand, and examine the viability of the system, taking into account the future integration of the Malian network within the West African regional network
- Reduce energy losses in the interconnected system
- Improve existing installations
- Reinforce and expand the existing grid including to:

  - unelectrified parts of zones already considered to be electrified (for example, many parts of Bamako)

  - new isolated centers

  - localities where thermal power stations can be closed and reach important autoproducers
- Reduce production costs by closing down thermal power stations as well as by reducing production costs in those remaining.

A1.62 Along with these goals, the EDM-SA has stated its commitment to increasing the total number of electricity customers, including providing access to electricity by rural populations. However, the EDM SA has recently announced that it is unable to mobilize financing for the agreed investment program, and the concession is being transformed into a lease contract between the government and the private sector, with investment obligation falling on the government.

A1.63 The creation of CREE in 2000 provided the regulatory apparatus to launch the privatization of the EDM SA as well as the overall liberalization of the sector. According to Ordinance 00-021/P-RM of March 15, 2000, and its Decree of Application 00-185/P-RM of April 14, 2000, the opening of the electricity sector is dependent on the state's disengagement from operational activity in the electricity industry, the liberalization of the sector, and the clarification of the roles of the different sectoral actors (the government of Mali, municipalities, operators, and CREE). Within this new regulatory context, all public electricity service is subject to a concession, permission, or license for a clearly defined area.

A1.64 In an effort to advance both further liberalization of the sector and electrification of rural areas, CREE has also established tax exemptions for imported renewable energy equipment and investment subsidies for operators in the rural electrification sector. These measures have benefited the two SSDs that became active in the sector starting in 2000.

Impact of Power Sector Reform

A1.65 *Access.* Access to electricity has increased over the reform period—from a mere 7 percent of the population in 1995 to 12 percent as of 2002. However, access rates of rural dwellers remained at 1 percent while those of urban dwellers rose from 24 percent to 42 percent. During this time, there were 52,632 new subscribers, for a total of 118,806—a growth of more than 80 percent over the period or an average of 9 percent per year. Growth of subscribers was highest between 2001 and 2002 (30.57 percent).

A1.66 There was a more rapid increase in connections in 2001–02, which coincides with two distinct developments. In December 2000, the Manantali Power Plant came on line, making more power available to the grid. The government and its development partners also sponsored a connection fee promotion. The promotion involved requiring users to pay 50 percent of the connection fee upfront, with the remaining half paid off over the subsequent five to eight months (instead of the traditional EDM SA scheme, which required new customers to pay 100 percent of the fee upfront).

A1.67 In addition to the progress in grid connections, 1,600 new users were provided with off-grid power by SSD Koutiala and SSD Kayes between 2000 and 2002. These two SSDs were a product of the power reform process and benefited from the new regulatory environment. Since starting operations in 2000, the SSDs are now working in 22 localities, providing off-grid electricity generated from diesel and solar PV. The firms have targeted customers who are ready and able to pay, administering a means or income

test to potential customers. The firms operate on a fee-for-service model, with their smallest systems consisting of a 25 Watt photovoltaic (Wp) solar panel and regulator with two lamps and about five hours of operation per day for a fee of US$7.30 per month.

A1.68 Access rates are also expected to increase with the inception of the HEURA program, which plans 40,000 new off-grid electricity connections in the rural and periurban area by 2008.

A1.69 Meanwhile, the EDM-SA's ambitious investment targets so far have not been realized, with the exception of 2001. As a result, the government has continued to intervene in the sector, mobilizing support from development partners to extend the grid. With the envisaged transformation of the concession agreement into a lease agreement, all investments to increase access will have to be met by the government or from the cash flow of the state-owned lessor company.

A1.70 *Prices.* Since the beginning of the reform process, nominal tariffs first increased and then declined in 2002–03. In 1995, the household social tariff[10] for those using 51–100 kWh per month was CFAF 82/kWh (US¢15). In 2002, the same user was paying CFAF 103 (US¢19), an increase of about 25 percent. The rise in the household normal tariff was even more pronounced for those using 51–100 kWh per month; this grew from CFAF 82/kWh (US¢15) in 1995 to CFAF 128 (US¢24) in 2002, an increase of 60 percent. Connection fees have increased from about US$115 to about US$150.

A1.71 In the second half of 2002, however, as a result of government intervention, all household tariffs started dropping, and by January 2003, tariffs had returned to their 2000 levels, as illustrated in the table below. From 2001 to 2003 the government transferred CFAF 18 billion (US$33.8 million) to the EDM-SA. In 2001 alone, the cost to the government was estimated at US$10 million.

Table A.1: Household Electricity Tariffs, 1985–2003, CFAF/kWh

Tariffs and tariff categories	**Date of effect**								
	11/07/85	**02/01/94**	**04/01/98**	**04/01/99**	**01/01/00**	**07/01/01**	**01/01/02**	**10/01/02**	**01/01/03**
Social tariff (2-meter cable and 5 Amperes)									
Band 1: 0–50 kWh/month	58	58	58	64	64	65	67	66	64
Band 2a: 51–100 kWh/month	58	82	90	99	99	100	103	102	99
Band 2b: 101–200 kWh/month	58	82	90	99	99	100	103	102	99
Band 3: >200	58	82	105	115	115	117	121	119	115

10. The (household) social tariff is defined as a 2-meter cable and 5 Ampere current limit.

kWh/month									
Normal tariff (2-meter cables >5 A and 4-meter cables)									
Band 1: 0–50 kWh/month	76	82	90	99	112	120	128	124	112
Band 2a: 51–100 kWh/month	68	82	90	99	112	120	128	124	112
Band 2b: 101–200 kWh/month	49	82	90	99	112	120	128	124	112
Band 3: >200 kWh/month	49	82	105	115	131	140	149	145	131

A1.72 If the above data were adjusted for inflation, real electricity prices have actually fallen slightly between 1995 and 2002.

A1.73 At the same time, it is clear that increased access was subsidized by the government and multilateral and bilateral funding agencies: the EDM-SA was not required to cover the cost for the extended access program in 2001–02. Furthermore, in 2001, power from the Manantali facility became available, which was significantly cheaper than power produced in Mali's thermal plants. Thus, the EDM-SA switched from sourcing nearly 50 percent of its supply from thermal to supplying just 27 percent, bringing down overall costs for the EDM-SA. In addition, Mali's tariffs are higher than those of any of its neighbors in the subregion, including other landlocked countries such as Niger and Burkina Faso, which also import fuel. Since the EDM-SA has started from a relatively high base, its argument to seek cost-reflective pricing has met significant public resistance. In the absence of the EDM-SA providing figures on its actual cost of supply, the general sentiment is that the company is taking advantage of its monopoly position to exploit customers rather than improve the situation.

A1.74 As regards tariffs charged by the SSDs, the cheapest installation is CFAF 3,881 for no more than 26 kWh per month, implying CFAF 149/kWh at best. This stands in contrast to the social tariff, which, as of 2003, was CFAF 64/kWh for up to 50 kWh per month, because their costs are indeed much higher than those of the EDM SA. Although no price record is available for the SSDs, the current SSD tariffs are therefore more than double those of the lowest social tariffs of grid-based EDM SA supply. This price differential apparently could be reduced in part if the value added tax exemption that applies to the social tariff were extended to the SSDs, but it leaves open the issue of the need to depart from the uniform national tariff approach if SSDs are to develop in a sustainable manner, even under heavy subsidization schemes.

Conclusions

A1.75 The government of Mali has sought to disengage from the power sector—first through the EDM SA management contract of 1995–98 and subsequently through the partial privatization of the EDM SA. The operation of Manantali was contracted out to Eskom. At present, however, the government of Mali continues to be heavily involved in the sector through the large transfers it makes to the EDM-SA for tariff compensation (US$33.8 million between 2001 and 2003). With the envisaged conversion of the concession of the EDM SA into a lease arrangement, the involvement of the government will increase further, as will its financial commitment in the sector.

A1.76 Furthermore, although two SSDs have begun supplying rural areas, the EDM-SA is not subject to competition within its concession of 97 localities. The company, as in the prereform era, enjoys a monopolistic status. Although CREE is intended to regulate the market, its authority only goes so far, as illustrated by the fact that tariff decisions ultimately lie with the government.

A1.77 Access has increased over the reform period, but has been largely unrelated to power sector reform, indicating that liberalization alone has not been a catalyst for increased access in Mali.

Namibia

Country overview

A1.78 Namibia ranks 89th worldwide in terms of per capita GNI adjusted for purchasing power, just behind its neighbors, Botswana and South Africa. In common with South Africa, Namibia's income distribution is one of the most unequal in the world, with total expenditures of the richest 7,000 people equal to that of the poorest 800,000 and 56 percent of the population living on less than US$2 per day. Among the most sparsely populated countries in Africa, with only 2 million inhabitants, Namibia's annual population growth rate at 3.1 percent is, however, among the continent's highest. Furthermore, although 68 percent of the country's population is currently residing in rural areas, the 5 percent annual growth of urban populations is also among the highest in Africa.

A1.79 Since gaining independence from South Africa in 1990, Namibia has operated as a parliamentary democracy. Its economy is predominantly based on natural resources, with mining accounting for about 70 percent of export earnings and up to 25 percent of GDP. In contrast, subsistence agriculture accounts for only 1.5 percent of GDP, but is an essential means of livelihood for nearly 70 percent of the population. The fastest growing industry is tourism, which reflects, among other factors, the relative stability of the country. GNI as of 2002 was US$3.5 billion, with real GDP growth averaging 3 percent per year between 1994 and 2002. Meanwhile, aid as a percentage of GNI has remained largely constant since 1997 at 4 percent, in line with Kenya.

A1.80 Largely because of the long road transport routes, liquid fuels, in the form of gasoline and diesel, dominate the Namibian energy sector. The balance of energy consumption involves electricity, a small amount of coal, and widespread use of fuelwood in rural areas. Namibia has proven reserves of offshore gas, which have not yet been developed.

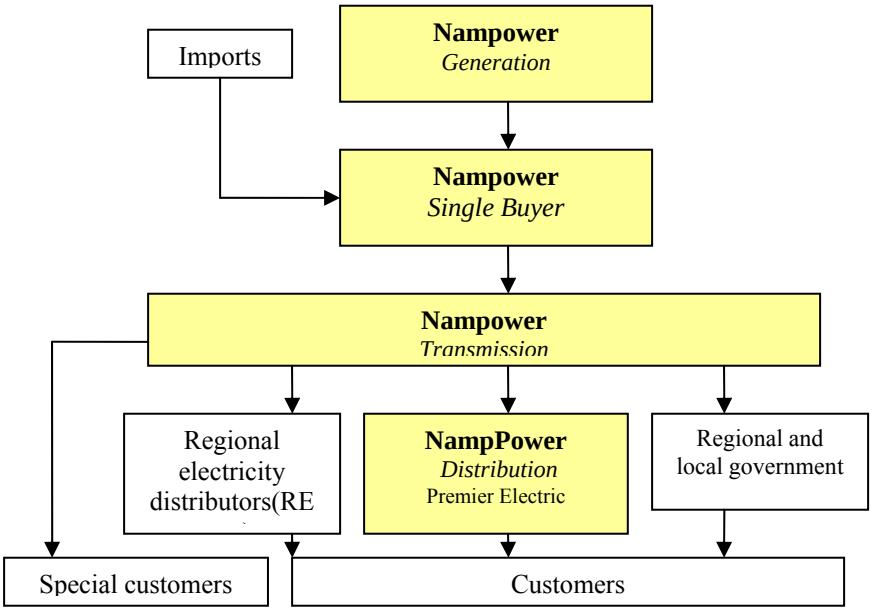
Namibia's Power Sector

A1.81 The national public utility, Nampower, has primary responsibility for electricity generation, import, export, and transmission and directly supplies large customers such as mines, as well as commercial farms. In the capital city and the towns, the local municipality is generally responsible for distribution. Until recently, the Ministry of Regional and Local Government and Housing (MRLGH) was responsible for distribution to rural villages. With the implementation of the government's decentralization policy, the MRLGH's assets and operations are being transferred to the

A1.82 regional councils. In the north of the country, these assets have been transferred to a limited liability company, Northern Regional Electricity Distributor (NORED), which is jointly owned by regional councils and Nampower.

A1.83 The Electricity Control Board (ECB) has the responsibility of regulating all aspects of electricity supply in Namibia. In most areas, however, the ECB has only an advisory role and final decisions are the prerogative of the Minister of Mines and Energy. Figure A.5 highlights the sector.

Figure A.5: Structure of the power sector in Namibia



A1.84 Namibia's peak demand of 350 MW and annual electricity consumption of approximately 1,200 GWh is met by imports and the output of three Nampower generators: Ruacana, a 240 MW hydropower facility on the Kunene River along the northern border with Angola; Van Eck, a 120 MW coal plant in the capital, Windhoek;

and Paratus, a 24 MW diesel plant in the coastal city of Walvis Bay. More than 50 percent of consumption is supplied by Eskom in South Africa, via two transmission lines with a combined capacity of 700 MW. An isolated network is also supplied by imports from Zambia Electricity Supply Company (ZESCO) in Zambia via a 3 MW connection (supplying an isolated network). Namibia exports small amounts of electricity to cross-border regions in Angola and Botswana.

A1.85 Although the 120,000 domestic users constitute 91 percent of all customers, domestic consumption accounts for 45 percent of total demand. There are 1,150 industrial and mining users who account for 26 percent of demand. The balance is made up by 10,000 commercial users.

A1.86 Bulk tariffs in Namibia are made up of an extension (network capital recovery) charge, a demand charge, and an energy charge. Retail tariffs are made up of bulk tariffs and the costs of distribution. Although the ECB has established a standard methodology for determining tariffs, existing retail tariffs vary across distributors by a factor of nearly four, with domestic customers paying from US¢2.7–10.5/kWh.

A1.87 Nampower is profitable. Its financial strength results primarily from its return on financial assets (but its return on fixed assets is rather low).

Electrification

A1.88 Namibia's 17 municipalities and 19 towns are all currently served by grid electricity, with urban access levels at 75 percent. Rural access to electricity is much lower at 12 percent. The national aggregate electrification level is in the region of 34 percent. Targets of 25 percent (rural) and 95 percent (urban) have been set for 2010 by the government.

A1.89 The existing electrification levels are largely the result of state-led efforts that originated shortly after independence in 1991. Of all efforts, the largest has been the rural electrification program, sponsored by Ministry of Mines and Energy (MME), with participation from the MRLGH and regional councils and local authorities. Initially, the rural electrification program aimed to connect all main rural centers and larger settlements, with a priority given to public institutions. The relatively densely populated northern areas were targeted first, followed by larger communities in the eastern, central, southern, and western areas**.**

A1.90 Electrification efforts in periurban areas have been headed by the MRLGH, and Nampower has undertaken the electrification of commercial farms. Numerous remote settlements and commercial farms still rely on diesel generators to meet their power demands.

A1.91 At its inception, funding for electrification came primarily from donors, principally the Norwegian government and the German Agency for Technical Cooperation (Deutsche Gesellschaft für Technische Zusammenarbeit [GTZ]), with the balance being made up by government subsidies. Currently, the program is almost entirely funded by annual budgetary allocations from the government, with a 100 percent

capital subsidy provided to cover transmission infrastructure, substations, supply feeders, distribution networks, and customer connections. Poor customers are also provided with a prefabricated distribution panel that allows lighting and the use of electrical appliances without house wiring.

A1.92 To date, nearly all (97.5 percent) of the public investment of US$52 million in rural electrification has been allocated to grid extension. Only a small percentage has been allocated to other technologies, including the installation of 1,500 to 2,000 solar home systems, one-third of which have been funded through a government-administered, revolving solar home fund. In the future, however, the government expects that off-grid technologies will play a greater role in electrification as population densities decrease further, settlements become even smaller, and distances to the existing grid increase.

A1.93 Electrification planning was fairly ad hoc until the Rural Electricity Distribution Master Plan (REDMP) of 2000 proposed a more systematic approach.

Drivers for power sector reform

A1.94 Namibia's reforms have been fourfold: the first phase focused on the rural electrification program and was largely state driven; the second phase targeted the reorganization of the distribution sector and involved private sector participation; the third phase saw an overhaul of the regulatory process. Finally, ongoing institutional and legal reform seeks to create the conditions for private sector investment in generation. The second and third phases of this reform process constitute the focus of this analysis.

A1.95 The major driver for reform was Namibia's distribution sector, which lacked both resources and capacity to deliver and extend an acceptable level of services. With the rural electrification program, initiated in 1991, primary responsibility for distribution resided with the MRLGH, but the ministry faced severe constraints, which led to mounting and ultimately unsustainable financial losses. This caused the government, starting in 1996, to invite the private sector to take over the operation of existing distribution systems in the recently electrified central northern regions for the interim.

A1.96 A second driver, prompting reform measures, was Namibia's dependence on foreign sources of electricity (as noted, more than 50 percent is imported). The government therefore sought to create an industry model that would be conducive to attracting new investment into power generation. The cabinet has approved a single-buyer model that aims to create a level playing field for new investors.

Description of power sector reform

A1.97 The main drivers for Namibia's power sector reform were resource constraints at the level of distribution and domestic capacity constraints at the level of generation. As the reform was implemented, more ambitious and far-reaching goals were put in place: social uplift, effective governance, economic competitiveness and efficiency, security of supply, and sustainability.

A1.98 The three main initiatives adopted to realize these goals were:

- Distribution restructuring, including outsourcing planning and implementation of the rural electrification program to the private sector
- Establishment of an ECB
- Restructuring Nampower and the single-buyer market structure (SBMS).

A1.99 The pioneering distribution restructuring project began in 1996 and involved a private company, Northern Electricity, which was contracted to operate the existing distribution infrastructure in the north of the country. Under the agreement, the company did not own any of the assets, but was responsible for all other costs and revenues associated with the business (with the exception of certain elements of Nampower's charges, which were to the government's account).

A1.100 During a complete meter audit that Northern Electricity conducted immediately after takeover from the government, it was found that fewer than half of all A1.101 customers were recorded in the customer database, explaining to a large extent the high financial losses. New supply contracts were signed with all customers, documenting the parties' rights and obligations, and all meters were sealed. Subsequently, payment rates in the region of 99 percent were achieved and very little tampering by customers with their supply infrastructure was experienced, indicating that customers were willing to pay for good service.

A1.102 To improve power system reliability (frequent power outages had occurred mainly in towns with older networks), Northern Electricity strengthened and upgraded the major urban networks with funding assistance from the government and commissioned a five-year network development plan to ensure system integrity. A preventive maintenance program was implemented and callouts were attended to promptly. The company worked closely with Nampower in restoring power after outages (most of which were found to occur on Nampower's system).

A1.103 Northern Electricity had a limited contractual obligation for electrification, which consisted primarily of extending existing reticulation networks and connecting additional customers. In its area of supply, the company was responsible for facilitating the government's rural electrification program. However, these two initiatives were unable to satisfy the demand for electrification, and, in 1998, Northern Electricity applied for loan funding from the Development Bank of Southern Africa (DBSA). Although approved in principle by the DBSA, this initiative failed because of the company's lack of collateral (they did not own the networks) and the government's refusal to provide guarantees. As an alternative, Northern Electricity then implemented a rural electrification levy of N$ (Namibian dollar) 0.015/kWh, which increased the connection rate. In addition, the company spent almost N$14 million from its net income (over and above its contractual obligation) on rural electrification over its five-year term.

A1.104 Northern Electricity also implemented a Community Development Fund (N$0.011/kWh) for each local authority and regional council area. The application of

these funds was restricted to development projects that benefited the broader community and was decided by community leaders in consultation with Northern Electricity. The company also sponsored local athletic, educational, and social events.

A1.105 Despite its apparent success, the Northern Electricity experiment came to an end in 2002 as a result of pressure from Nampower, the MRLGH, and local authorities—all of whom sought to extend their influence over an increasingly profitable and productive activity. The government also aimed to establish four REDs: one covering the entire northern region, one covering the coastal Erongo region, one in the central regions of the country, and one for the southern regions. The establishment of REDs was initiated in all four proposed regions early in 2001, and technical committees were established in April and May 2002 to expedite the processes. Ring-fencing of the municipal electricity businesses is currently under way in all regions. The MME has provided a strong directive so that all REDs have been established and are operational by July 2004 when the distribution and supply licences wee up for renewal.

A1.106 The REDs policy encourages the commercialization of electricity supply utilities, but the government expects that within the present political framework these new entities will be public (that is, Nampower, local authorities, and regional councils) rather than private. Liberalization in this sense assumes that the private sector is invited to participate through outsourcing rather than through equity capital. Northern Electricity provided a valuable example of a public-private partnership, beneficial to both the government and end-users, but the company's ultimate demise is an indication of political influences on sector policy.

A1.107 A number of developments are under way in the distribution sector:

- Oshakati Premier Electric (OPE), a joint venture company formed by the Oshakati town council and Premier Electric in 2000, is responsible for electricity supply in that town.
- Premier Electric has also joined forces with the Otavi town council to improve electricity supply there.
- Reho Electricity, a joint venture company formed by the Rehoboth town council and the holding company of Northern Electricity, began operations in 2000 to rehabilitate and manage the local electricity distribution system in Rehoboth.
- Southern Electricity Company (Selco), a private, largely South African–owned firm, entered into management contracts in 2000 with the town councils of Keetmanshoop and Karasburg and the Karas regional council to operate (and maintain or expand) their local electricity reticulation systems.
- Various commercial farm electricity distribution schemes—including Saltblock Power, Osire Power, Aroab Electrical Group (AEG), and Kalahari Farming—are in the business of electrification of and electricity supply management in their own commercial farming areas.

- NORED, a company formed in 2001 by Nampower and northern local authorities (Katima Mulilo, Rundu, Ongwediva, Ondangwa, Eenhana, Uutapi, and Opuwo) and regional councils (Caprivi, Kavango, Oshikoto, Ohangwena, Oshana, Omusati, and Kunene), as the first RED, took over from Northern Electricity in March 2002, under licence from the ECB.
- Central-North Regional Electricity Distributor (CENORED), established in 2003 by north-central local authorities (Otjiwarongo, Outjo, Tsumeb, Otavi, Grootfontein, Khorixas, and Kamanjab), regional councils (Otjozondjupa, Kunene, and Oshikoto), and Premier Electric, was Namibia's second RED.

A1.108 Apart from the redesign and restructuring of distribution, the reform process has involved an evolution within Nampower since 2000. The new structure consists of four regulated business units: generation, transmission, distribution, and the single buyer within the Nampower Group. Nonregulated business units include support services and a commercial entity, Nampower Investments, which consists of Nampower Properties and Nampower International (formed with the objective of pursuing activities beyond Namibia's borders). Premier Electric, a wholly owned subsidiary, is Nampower's regulated distribution entity, focusing on the operation and maintenance of the distribution business.[11]

A1.109 With regard to the SBMS, in 2001 the single-buyer role was conferred upon Nampower by a cabinet resolution for a transitional period intended to lead to full market development. Locating the single-buyer function within Nampower poses a potential conflict of interest because the company is also one of the power producers and therefore could potentially exploit its monopoly position. It was, however, recognized that in the absence of any other player with a sufficiently strong balance sheet to underwrite single-buyer contractual agreements, Nampower offered the best possible option. Through the SBMS, a market framework based on clear rules, planning codes, and electricity generation is being developed; special concern is being given to regulating the buying power of future IPPs as well as Nampower's internal transfer pricing.

A1.110 The establishment of the ECB in July 2000 has facilitated many of these reforms. Although the Minister of Mines and Energy retains overall policy authority, the board has promulgated the regulatory apparatus necessary for the rationalization of distribution, along with ring-fencing of Nampower and the SBMS. The ECB has also been responsible for administering a new licensing system, which requires licensees to motivate their tariff structures and levels in accordance with a recently developed cost of supply methodology that prescribes transparency and encourages cost-reflective pricing.

A1.111 Although the primary driver for reform—the need to restructure the distribution industry—has yielded some impact (albeit with restricted private sector involvement), the second driver—security of supply—has not yet led to any concrete

11. Unable to stay in the distribution business on its own (without cross-subsidies from Nampower), Premier Electric is in the process of being shut down, with the distribution function being reintegrated within Nampower.

changes. No new generating facilities have been developed since the inception of the reform process. Meanwhile, plans for potential IPP plants have been drawn up, including the 450 MW Epupa hydro plant on the lower Kunene River in northwestern Namibia; an 800 MW combined-cycle gas turbine plant at Oranjemund in the far south, supplied by the Kudu offshore gas field; a 15 MW hydro facility on the Okavango River in the northeast; and a 10 MW wind farm in Luderitz. The Epupa investment seems unlikely, and the Kudu project faces many serious hurdles.

Impact of Reform

A1.112 *Access.* Access has increased over the reform period, most notably in the rural areas where the majority of the population resides. In 1997, between 8 and 9 percent of rural households had access; by 2000, this figure had risen to 12 percent. Meanwhile, the access rate for urban households remained relatively constant at 75 percent. However, given the rapid growth of urban populations, there has been significant electrification activity in urban areas.

A1.113 The best-documented statistics on access concern Northern Electricity. Under Northern Electricity's program, approximately 10,000 new users were connected during 1996–2002. Northern Electricity's experiment in distribution is being emulated by other areas, albeit with somewhat curtailed private sector involvement (for example, OPE, Reho, Selco, AEG, NORED, and CENORED). Although not yet documented, it is expected that these initiatives will also register an increase in access.

A1.114 In addition, a series of off-grid initiatives has led to increased access in rural areas, as profiled in table A.2.

Table A.2: Description of Off-grid systems in Namibia

Program or project	Since	Installed systems to date	Stakeholder
Home Power! program	1996	620	MME, Premier Electric, local suppliers, solar technicians
Fee-for-service program	2002	98	MME, Premier Electric, SunTechnics/Alemdar
Solar electrification of Lianshulu and Spitzkoppe project	2000	140 (Indian) +48 (Namibian)	MME, Indian government, solar technicians
Uupindi Pilot Battery Charging Station	1999	148	MME, UNAM, MRCC, SunTechnics/Alemdar

Source: Emcon (2003).

A1.115 It is important to note, however, that although the government has been either directly or indirectly involved with all such initiatives (and no significant private

sector investments in electrification have taken place), government spending on electrification, in real terms, did not increase during the period. In 1996, real expenditures amounted to N$49 million (US$7.4 million); by 2002, this figure had dropped to N$44 million (US$6.6 million). The power sector reform process has not yet had a profound impact on electrification. New electrification rates have been steady, supported by government grants and supplemented by donor aid. The one small, but significant, exception was reinvestment by the privately operated Northern Electricity, which saw a threefold increase in electrification in its area of operation.

A1.116 Going forward, to achieve the target access rate of 25 percent in rural areas by 2010, the REDMP of 2000 estimates that about 34,000 new grid connections in 1,350 rural localities, of which 23,000 are households, need to be made. Total costs are estimated at N$422 million (US$63.5 million), which includes a sum of N$17.5 million (US$2.6 million) required to fund a five-year off-grid electrification program to reach about 500 clinics and schools in remote rural localities. These investments are all within the envisaged available rural electrification budget of N$50 million (US$7.5 million) per year, but, even assuming funding is forthcoming, there is doubt as to whether local industry and government could execute and administer such a vast program.

A1.117 Meanwhile, a UNDP-GEF initiative on the removal of barriers to renewable energy technology promotion and use in Namibia, which is about to get under way, projects the installation of about 6,800 solar home systems over a five-year period (GEF 2000. This would add another 3.3 percent to the percentage of rural households that are electrified. Finally, if Nampower's business plan on large-scale, off-grid electrification were to be fully implemented (Nampower 2001), then that would imply further movement toward stated rural electrification targets.

A1.118 *Prices.* As indicated in figures A.6 and A.7, real electricity prices from Nampower have been more or less constant over a 10-year period. Nampower has benefited from low electricity costs at its hydro station, Ruacana, and a favorable bilateral contract with Eskom, which has allowed it to keep power production from the expensive coal-fired van Eck plant to a minimum.

Figure A.6: Power Tariff in Namibia

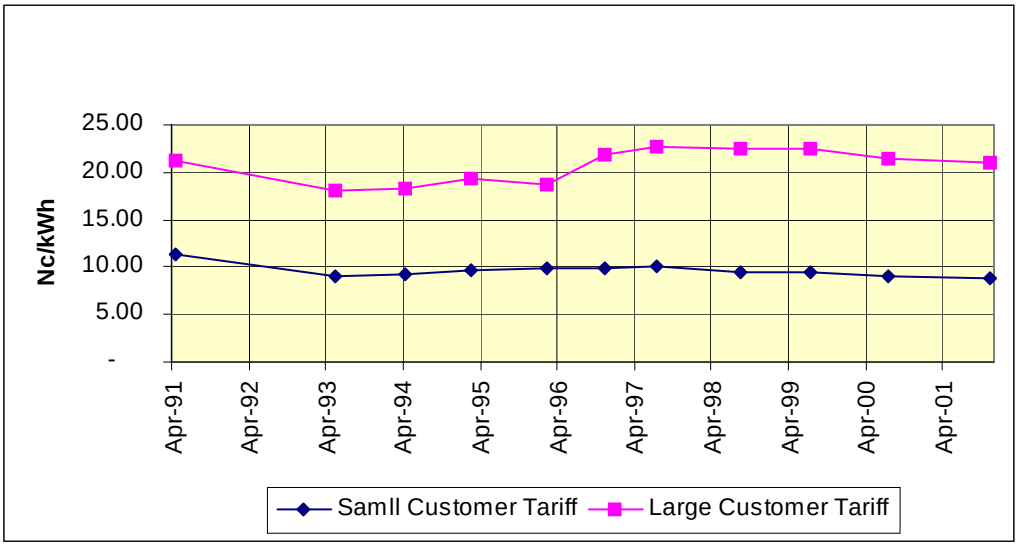
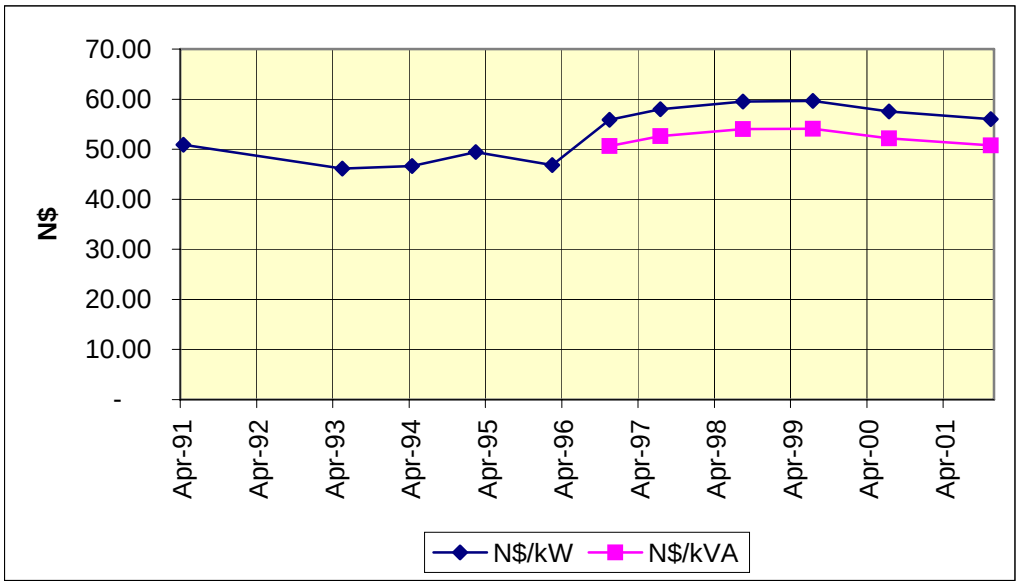


Figure A.7: Demand Charge in Namibia

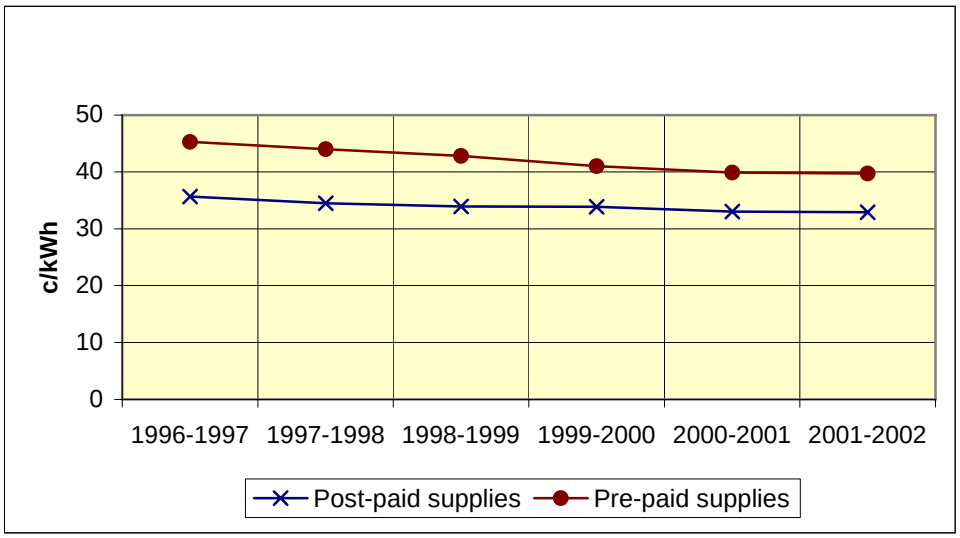


A1.119 For an analysis of retail tariffs, data are limited to the experience of Northern Electricity and its successor, NORED. When Northern Electricity took charge of electricity supply in northern Namibia in December 1996, the company retained existing MRLGH tariffs until the end of July 1997, at which point it decreased large-

power-user energy charges by N$0.03/kWh and increased domestic energy charges by N$0.01/kWh (average, 3 percent). Small-business energy charges, previously the same as those for domestic users, were increased by N$0.30/kWh (average, 7 percent). With 8–10 percent annual inflation, Northern Electricity's nominal price increases from 1996 to 2002 of less than 5 percent per year for prepaid customers and 6 percent for postpaid customers amounted to a decrease in real retail tariffs.

A1.120 Domestic supply tariffs, which incorporate a rural electrification levy (N$0.015/kWh) and a community development levy (N$0.011/kWh), are shown in figure A.8. It should be noted that Northern Electricity paid only a nominal lease for the assets it operated, and the company was also exempt from certain Nampower charges.

Figure A.8: Domestic Tariff Northern Electricity, Namibia



A1.121 NORED, Northern Electricity's successor, has redefined its tariff structure to reflect the characteristics of its larger supply area and has calculated its tariff levels in accordance with the new tariff methodology to be cost reflective. NORED's domestic energy charge presently stands at N$0.46/kWh for postpaid supplies and N$0.57/kWh for prepaid supplies. Because these tariffs exclude any rural electrification and community development levies, the increase since NORED's takeover has been 18.3 percent for postpaid supplies and 19.2 percent for prepaid supplies. This reflects the fact that NORED, unlike Northern Electricity, has to bear the full extent of Nampower's extension charges and also pays for the use of urban-area power infrastructure that was formerly provided (without a lease fee) as a subsidy by local authorities.

A1.122 Northern Electricity's involvement in the sector led to an absolute reduction in tariffs. Given that Northern Electricity, unlike NORED, did not bear the full costs of either the extension charge or the use of infrastructure, however, this decline was

not simply a function of private sector innovation. NORED and the other REDs have not benefited from the same support; these partnerships continue to benefit from the 100 percent subsidy for rural electrification, which the government is committed to providing, as articulated in the REDMP, for the next 20 years.

A1.123 Furthermore, under the RED concept, the introduction of uniform tariffs and harmonized customer categories implies cross-subsidies from centers with a high customer density to remote, low-density areas as cost-reflectivity is approached from an aggregate rather than a localized perspective. Also, cross-subsidization can be expected to happen between customer categories, particularly where it is attempted to maintain affordable domestic tariffs. These cross-subsidies may not, however, be transparent.

A1.124 Cross-subsidization has been practically implemented in NORED's most recent tariff increases, and care was taken to avoid large increases in prepayment tariffs even though calculations indicated they were far below cost-reflective levels. Some municipalities (for example, Swakopmund) have capacity-limited prepaid supplies that have a lower tariff, specifically targeted at low-income households. This is a de facto subsidization because the cost of providing this lower-capacity supply is the same as a larger-capacity, prepaid supply. The capacity limitation is a way of containing the subsidy to low-income households while containing the cost of network development.

Conclusions

A1.125 At first glance, Namibia's power sector appears to reflect a move toward competition. The existence of an SBMS implies the prospect of multiple generating sources. The emerging REDs, with their public-private partnerships, would also seem to indicate an openness to private sector participation in the power sector. Finally, the existence of the ECB should indicate independent regulation of the sector.

A1.126 On closer examination, however, it becomes evident that Nampower, the national utility, remains the dominant player in both generation and transmission. Private investment in new generation capacity on the Kunene River seems unlikely, and the Kudu project has yet to demonstrate that it can compete with other power generation investments in the region. The REDs are indeed evolving, but they have simultaneously crowded out meaningful private sector participation, as illustrated by the case of Northern Electricity. The ECB ultimately advises the Minister of Mines and Energy, who retains overall regulatory authority. Finally, no new rural electrification institutions or financing mechanisms have been established so far. Thus, the reality of Namibia's power sector is one in which reform is slowly taking hold, but as of yet, reform includes neither competition nor significant private sector participation.

A1.127 Still, improvements in access rates have occurred over the period. A reduction in tariffs was also evident when Northern Electricity was in operation. But what will the future hold? Electricity costs are likely to rise as imports from South Africa become more expensive and if or when the Kudu project materializes. The challenge for the ECB will be to mitigate price increases through extracting further efficiencies out of

Nampower and the newly formed REDs. Expanded electrification and affordable electricity prices will be more difficult to attain in coming years.

South Africa

Country overview

A1.128 With 45 million inhabitants, South Africa's GNI per capita stands at US$2,500. The country ranks 95th worldwide in terms of GNI purchasing power parity, just behind neighboring states Botswana (84th) and Namibia (89th), but well ahead of the remaining border states: Swaziland (122nd), Lesotho (143rd), Zimbabwe (153rd), and Mozambique (189th). These figures, however, fall short of revealing that South Africa has among the highest income disparities in the world. It is estimated that 13 percent of the population lives in "first world conditions" and the majority live in "third world conditions." Put another way, if white South Africa (and the black elite) were a separate country, it would rank 24th, just after Spain, in terms of the UNDP's Human Development Index, whereas black South Africa would rank 123rd, just above the Democratic Republic of Congo. Among the most pressing challenges faced by South Africa today is the prevalence of HIV/AIDS; one-fifth of the adult population is infected. As of 2002, the majority (58 percent) of the population inhabits urban areas, up from 48 percent in 1980.

A1.129 Since the end of the 19th century, South Africa's economy has evolved from being based on agriculture, then mainly mining, and currently services, which today contribute approximately 60 percent of gross national product. Mining and industry contribute about 35 percent, and the remainder is made up by agriculture. Chief export products include manufactured goods, metals, chemicals, foodstuffs, and diamonds. From 1980 to 2000, economic growth averaged 1.8 percent, but growth has picked up lately, with real GDP growing at 3.5 percent in 2000, 2.8 percent in 2001, and 3.0 percent in 2002. Throughout the 1980s, inflation averaged 15 percent per year, but the 1990s and early 2000s has seen inflation halved. Foreign direct investment is low, about 1 per cent of GNI.

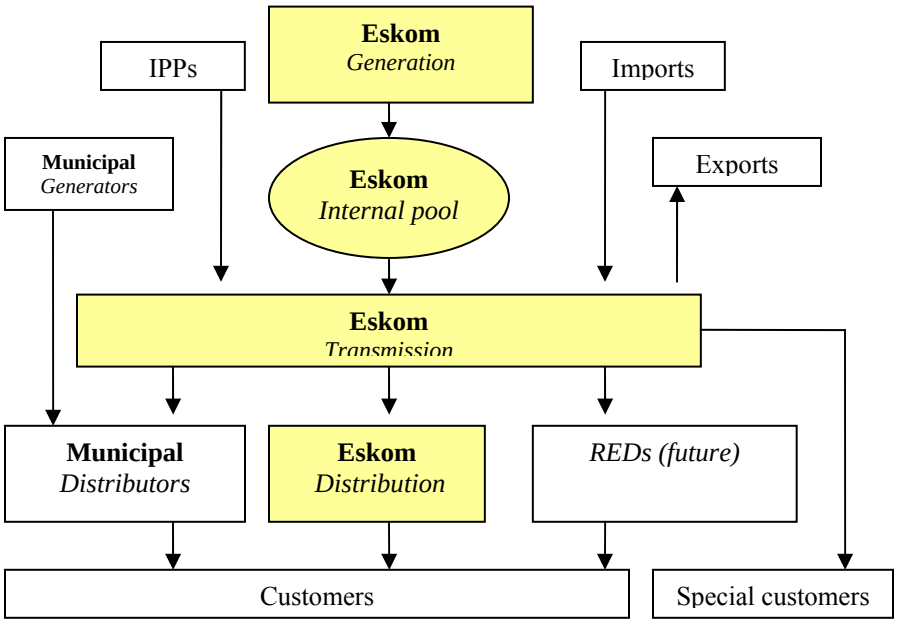
A1.130 South Africa has large coal reserves, and coal contributes three-quarters of primary energy supply. Coal is converted to electricity and also synthetic liquid fuels. Petroleum imports supply just over half of liquid fuel requirements. Proven gas and oil reserves are minuscule. A small, offshore gas deposit is also converted to synthetic liquid fuel. Hydroelectric potential is limited. South Africa also produces uranium as a by-product of gold mining. The majority of the rural population still uses fuelwood.

South Africa's power sector

A1.131 The South African electricity supply industry remains dominated by the state-owned and vertically integrated utility, Eskom, which ranks ninth in the world in terms of electricity sales (Figure A.9). It generates about 96 percent of South Africa's electricity requirements, which equals more than half of the electricity generated on the African continent. Eskom owns and controls the high-voltage transmission grid, and it

supplies about half of electricity used directly to customers. The remainder of electricity distribution is undertaken by about 188 local authorities. They buy bulk supplies of electricity from Eskom, and some also generate small amounts for sale in their areas of jurisdiction. A few industries have private generation facilities for their own use.

Figure A.9: Structure of the Power Sector in South Africa



A1.132 Ninety-three percent of electricity is generated from coal; nuclear energy accounts for 5 percent; bagasse, hydro, and emergency gas turbines make up the remaining 2 percent. Total licensed generating capacity is 43 GW. Some capacity is moth balled, and total net Eskom operating capacity amounts to 36.2 GW. Peak demand on the Eskom system reached 34.2 GW in July 2004. Eskom's Integrated Strategic Electricity Plan suggests that by 2025, total maximum demand is likely to rise to around 60 GW. New peaking capacity might be needed on line as soon as 2007—perhaps earlier.

A1.133 Eskom has 24 power stations: 10 large, coal-fired stations dominate, most of them situated on coal mines in the northeast of the country. Africa's only nuclear station is at Koeberg, 30 kilometers north of Cape Town, and it is also owned and operated by Eskom. There is modest hydroelectric capacity on the Orange River, located on two dams, and there are two pumped storage schemes that play a critical role in meeting peak demand, as well as in system balancing and control. Municipalities own 22 small power stations and backup gas turbines, but these now produce less than 1 percent of national output. Private generators produce the remaining 3 percent, essentially for their own consumption.

A1.134 South Africa sells electricity to neighboring countries (Botswana, Lesotho, Mozambique, Namibia, Swaziland, Zambia, and Zimbabwe), which represents less than 5 percent of total net energy produced. Eskom also holds the contractual rights to the

output of Mozambique's Cahora Bassa hydroelectric station on the Zambezi River. Eskom also imports some power from the Democratic Republic of Congo and from Zambia, mainly for peak load management.

A1.135 The national grid comprises 26,500 kilometers of high-voltage lines, the bulk of them at 400 and 275 kV. Transmission energy losses are less than 4 percent. There are an additional 364,000 kilometers of low-voltage lines owned by Eskom and local authorities.

A1.136 Eskom sells most of its electricity as bulk power to its large mining and industrial customers and to the municipal distributors. These three customer categories account for 77 percent of its revenue and 83 percent of its electricity sales in 2003. In addition to the approximately 4 million customers served by the municipal distributors, Eskom itself operates retail distribution services for 3.5 million customers. The average selling price in 2003 to industrial customers was US¢2.2/kWh and for residential customers was US¢5.6/kWh. Eskom average tariffs cover average costs, which were approximately US¢2/kWh in 2003

Electrification

A1.137 As of 2002, approximately 68 percent of the population (30.8 million people) had access to electricity in South Africa. In rural areas, this figure amounted to 50 percent; in urban areas, about 80 percent had access. Up to the early 1990s, practically all white South Africans, including remote farms, had electricity connections, but few black households had access.

A1.138 Eskom, in anticipation of the shift to political democracy and with excess electricity-generating capacity, announced in 1991 the target of electrifying 700,000 new households by 1997. Initial progress was slow, but connections picked up in the period leading to the first democratic elections.

A1.139 The African National Congress came into power in 1994 and embarked on a Reconstruction and Development Programme (RDP) that included the goal of electrifying 2.5 million new homes between 1994 and 1999. These targets were met, bringing the total number of new connections over the decade to more than 4 million, representing an increase in access from about one-third of the population to about 70 percent.

A1.140 Up until 2000, almost all of the electrification program was funded by Eskom, either through direct investment in Eskom's own electrification projects or through transfers to an electrification fund that the National Electricity Regulator (NER) allocated to municipalities. This funding was primarily sourced through cross-subsidies from other customer categories. In addition to Eskom's effort, the DBSA made funds available to municipalities, some of which also used their own resources. In 2001, the government took over funding of electrification through a separate National Electrification Fund (NEF) in the Department of Minerals and Energy (DME) funded by the National Treasury.

A1.141 Since the mid-1990s, it has been national policy that a portion of the capital cost of connections should be subsidized and households should pay only nominal connection fees. In practice, the subsidy has extended to the entire cost of connection as
A1.142 well as a portion of the operating costs. Actual consumption of electricity in low-income homes has been much lower than forecast—thus, revenues from electrification have fallen short of plan. At the beginning of the program, it was estimated that the average monthly consumption of newly connected, low-income households would be 350 kWh per month (compared with an average of 750 kWh per month for a middle-income family in South Africa). However, actual average monthly consumption has been less than one-third of these estimates.

A1.143 According to government policy released in 2003, local governments should identify poor electricity users with a record of consuming less than 150 kWh of electricity monthly. These households qualify for a free allocation of 50 kWh of electricity per month. This is referred to as "free basic electricity" (FBE) and is regarded as adequate electrical energy to meet household needs, primarily for lighting and media access but also for a kettle and ironing for a poor household. Some municipalities are now finding that there are more qualifying households than funds available from the central government, and they must therefore re-evaluate qualification criteria. Eskom estimates that 56 percent of households in South Africa connected to the national grid (in Eskom-licensed areas) consume on average less than 50 kWh per month. Other local authorities—generally the larger metropolitan councils—are able, through cross-subsidies within the electricity customer base, or across municipal services, to self-finance the FBE.

A1.144 Nearly all of these new connections have used prepayment technology: Customers buy tokens or renewable electronic cards to activate their electricity dispenser. Many connections involve informal houses (shacks) and use prewired "ready boards" that typically have a few lights and plug points.

A1.145 The current grid electrification scheme is overseen by the DME with inputs from both the National Integrated Electrification Programme (NIEP) Business Planning Unit, a team seconded from Eskom that undertakes macroeconomic electrification planning, as well as the National Electrification Advisory Committee (NEAC), comprising representatives of major stakeholders. Typically, the NIEP Business Planning Unit undertakes an annual electrification planning exercise to determine national electrification infrastructure needs. Local governments apply to the NIEP Business Planning Unit for funds. The NIEP Business Planning Unit makes a recommendation on resource allocation to the NEAC, which in turn makes a recommendation to the Minister of Minerals and Energy. The minister makes the final decision on resource allocation, and local authorities are then informed.

A1.146 In addition to grid electrification, the DME is also responsible for an off-grid electrification program. To date, five private companies have been granted concessions to provide off-grid electricity services in specific remote and rural areas of the country: RAPS/NOUN, SolarVision–Renewable Energy Corporation of Norway,

EDF-Total, Eskom–Shell Solar, and Renewable Energy Africa.[12] Off-grid service providers are encouraged to improve poor rural households' access to a range of fuels, such as gas or kerosene, in addition to solar home systems and minigrid systems.

A1.147 The off-grid electrification program is subsidized by the government. Over a five-year period, companies have access to a subsidy of R (rand) 3,500 per system installed. Depending on individual cost structures of concessionaires, this amount should pay for about 80 percent of the cost of the system. Concession companies are expected by the government to contribute the remainder of the finances required to install a system.

A1.148 By late 2002, the off-grid concessions program had progressed slowly, largely because of policy and administrative hurdles as well as the time and cost to establish the infrastructure required to operate effectively. Program momentum has since picked up, with just over 16,000 solar home system accounts active by the end of 2003. The government's estimate is that there is a current electrification backlog of 3 million households in rural areas. It is hoped that over time, the off-grid program will be able to install 300,000 solar home systems and contribute to reducing this backlog (with grid connections accounting for the balance). This means that each of the six concession companies will need to install about 50,000 systems over five years, then continue to service these systems for 20 years. Recently, however, it appears that there are insufficient public funds available to enable this steady increase in installations: As of August 1, 2003, subsidies were restricted to 300 installations per concessionaire per month, and in January 2004, concession companies were informed that until a full program review had been completed and until further notice, no new installations would be subsidized. The government, concerned that the program is not targeting the neediest and is also not achieving anticipated outcomes, is currently in negotiation with the off-grid concession companies about the future of the program.

A1.149 In addition, there have been initiatives in energy efficiency and in integrated energy centers (IECs) that have targeted poor households. With regard to energy efficiency, a range of programs has been piloted to reduce electricity consumption and make monthly bills more affordable, including efforts to promote compact florescent lamps for households (implemented by the organization Bonesa) and basic consumer awareness and education programs implemented by Eskom. To date, however, none of the residential programs appear to have had a significant impact. The NER has recently issued a draft energy efficiency policy for stakeholder comment, with a focus on commercial and industrial energy efficiency; residential energy efficiency plans are essentially limited to an obligation of licensed distributors to advertise on their electricity bills tips and measures that customers should adopt to reduce their consumption of electricity.

A1.150 As for IECs, the Minister of Minerals and Energy has initiated an effort to develop hybrid minigrid systems, which deliver, in addition to solar services, a variety of energy carriers, water purification, and telecommunications services to rural households.

12. At the time of writing, a sixth concession was being negotiated.

These centers are being established as local community cooperatives and are providing sales outlets for such energy products as gasoline, diesel, kerosene, gas, and energy-efficient appliances. The DME has entered into public-private partnerships in the establishment of these IECs at a cost of about R 3 million (more than US$400,000) per center. To date, two IECs have been set up in Eshane (KwaZulu-Natal province) and Kgalakgadi (Northern Cape province). Currently, these centers are under scrutiny: the DME has placed a moratorium on the establishment of further IECs until the business model adopted thus far has been comprehensively reviewed. The DME notes that it is important that the IECs are able to sustain themselves and that the model adopted is able to be replicated before additional investment in new IECs is made.

Drivers for power sector reform

A1.151 In the period leading to the democratic revolution in 1994, attention was given to the fact that apartheid policies had resulted in a highly fragmented local government system with poorly performing service delivery. There was a massive backlog in electricity connections to households in black areas. Also, there was a perceived need for consolidation of electricity distributors to improve financial viability and technical performance and position the sector to mount an accelerated electrification drive.

A1.152 A second reform driver emerged in the mid-1990s within the context of government economic policy that sought to improve efficiencies in the state-owned enterprises (SOEs). Although Eskom was generally regarded as being better managed than other SOEs, there was a new approach to SOE governance, focusing on the corporatization of these entities, emphasizing the role of the state as shareholder, clarifying tax obligations, and establishing performance contracts.

A1.153 A third reason for reforming the electricity industry was expressed in a new, comprehensive energy policy that evolved in the mid- to late 1990s. Policy analysts pointed out the need to avoid the mistakes of the past, when Eskom heavily overinvested in capacity expansion, and to create an industry structure that allocates risk in a manner that encourages investment efficiency. The need for new generation capacity has raised the questions of whether or not Eskom should build the next power station and what the appropriate industry and market structures should be to encourage least-cost investments.

Description of power sector reform

A1.154 Reform has been a multistaged process in South Africa, yielding four major developments: establishment of an independent regulator, corporatization of Eskom, restructuring of the distribution sector, and preparation of tenders to attract private IPPs.

A1.155 The NER, established in 1995, is responsible for licensing all electricity suppliers, approving their tariffs, monitoring the quality of supply, and settling disputes. The NER has implemented rate-of-return regulation and will be introducing incentive-based regulation in coming years. Its tariff determinations have consistently been below

those applied for by Eskom and the municipalities, while still allowing these utilities an economic rate of return. Nevertheless, the NER still faces huge challenges in terms of building sufficient capacity to ensure further efficiency improvements by Eskom and the many municipal distributors.

A1.156 The second major development has been the corporatization of Eskom in 2001, which involved converting the statutory body into a registered company with defined shareholding (wholly government), subject to the payment of taxes and dividends.

A1.157 The third significant development involves a new plan for the distribution sector. After a protracted period involving a number of studies, a stakeholder forum, government committees, and negotiations, the cabinet agreed in 2001 to rationalize the distribution businesses of local government and Eskom into six REDs, with a holding company, EDI Holdings, to manage the transition. However, the cabinet also recommended further consultation. President Mbeki, in his State of the Nation Address to Parliament in 2004, set June 2005 as a target date for the establishment of the first RED. To date, however, there has been considerable opposition to the implementation of the RED plan, particularly from local governments, which fear losing their influence over the sector. They also argue that the Constitution provides municipalities with the right to own and operate electricity distribution.

A1.158 Although some changes have been made, reforms have not implemented the more radical pro-market policy spelled out in the 1998 White Paper on Energy, which envisaged:

- "Giving customers the right to choose their electricity supplier
- Introducing competition into the industry especially the generation sector
- Permitting open non-discriminatory access to the transmission system, and
- Encouraging private sector participation in the industry."

A1.159 This approach represented a sharp break from the earlier apartheid-era energy policy, which had emphasized state provision of energy services and security of supply at any cost and was epitomized by the state-controlled programs for nuclear power, the synthetic fuels program, and Eskom's overinvestment in generation capacity.

A1.160 The White Paper further stated that the government believes that Eskom will be restructured into separate generation and transmission companies and the government intends to separate power stations into a number of companies. The White Paper also affirmed the importance of independent regulation. Building on the White Paper, in 2001, the cabinet approved proposals for the reform of the electricity supply industry through a managed liberalization process:

- Structure of the generation industry: Eskom is expected to retain no less than 70 percent of the existing electricity generation market, with privatization of the remainder, with the initial aim of transferring 10 percent to black economic ownership no later than 2003.Vertical unbundling: To ensure nondiscriminatory

and open access to the transmission lines, a separate state-owned transmission company will be established, independent of generation and retail businesses, with ring-fenced transmission system operation and market operation functions. Initially this transmission company would be a subsidiary of Eskom holdings and established as a separate state-owned transmission company before any new investments are made in generation capacity.

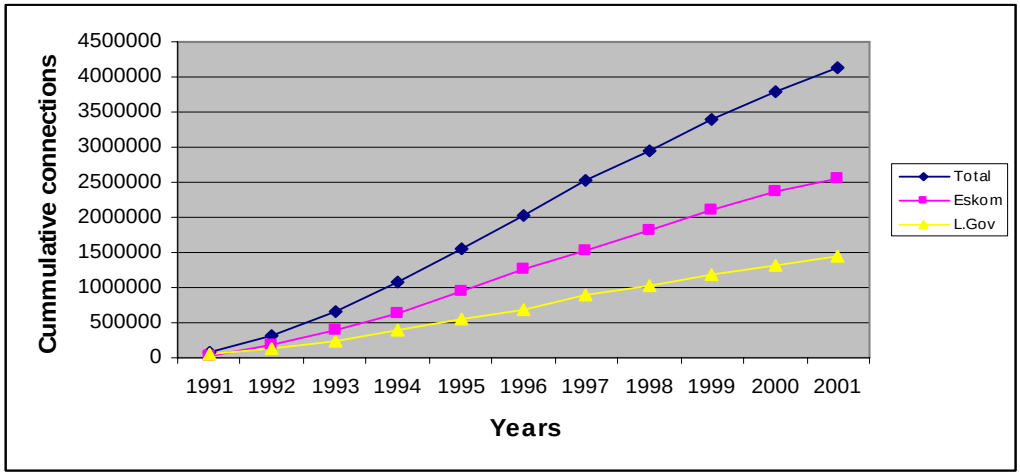
- Market structure: Over time, a multimarket, model electricity market framework will ensure that transactions among electricity generators, traders, and power purchasers may take place on a variety of platforms, including bilateral contracts, a power exchange, and a balancing mechanism. The market design should facilitate both physical and financial hedging. A transparent and independent governance mechanism would be developed for the power exchange.
- Regulation: A regulatory framework will be put in place that ensures the participation of IPPs and the diversification of primary energy sources.

A1.161 However, none of these reforms has yet materialized. Currently, security of electricity supply is seen as paramount. Eskom is now expected to remain in state ownership and will assume primary responsibility for new investments. Private IPPs will be invited to bid only for a small part of new capacity. There may be some limited competition *for* the market, but a fully competitive, wholesale electricity market now looks unlikely. The Minister of Minerals and Energy stated in Parliament on June 22, 2004, that "the state has to put security of supply above all and above competition especially."

Impact of power sector reform

A1.162 *Access.* Since 1991, nearly 4.5 million new households have been supplied with electricity. Approximately two-thirds of these connections were made by Eskom, and the remainder was accomplished by local government. The proportion of South Africans with access to electricity has increased from just over one-third to 70 percent.

Figure A.10: Comulative Number of Electricity Connections – South Africa



A1.163 Eskom and local authorities initially funded these connections themselves through cross-subsidies. In 1996, the government, the NER, and Eskom agreed that Eskom would be required, for five years, to make R 300 million per year available for the electrification of households in municipal supply areas. The NER managed this fund until 2003, when all remaining funds were exhausted. In addition to this annual transfer, Eskom undertook to pay for its own electrification projects during this time. In 2001, the end of this five-year agreement coincided with a change in Eskom's tax status. For the first time, Eskom was required to pay taxes and dividends, and it stopped subsidizing the costs of new connections. However, cross-subsidies for the energy and operating costs for low-income consumers continued.

A1.164 Since 2001, the capital costs of new connections for low-income households have been funded from the National Treasury. Funds are transferred to the NEF, managed by the DME, and then channeled to Eskom and local governments.

A1.165 Eskom achieved its RDP targets by 1999 (one year ahead of schedule) with an investment of R 7.5 billion. It set a three-year target between 2000 and 2002 of a further 600,000 connections in rural areas. Again, this target was exceeded, with Eskom electrifying just under 666,000 households (excluding farmworker dwellings) during this period. Further, Eskom has managed to achieve significant cost savings over time: average costs of connections have dropped by 60 percent since 1994 despite the increasing rural focus of electrification.

A1.166 South Africa has not yet implemented privatization or competition in its electricity supply industry. Power sector reform has been restricted to commercialization and corporatization of Eskom, including the requirement to pay taxes and dividends to the state. The most obvious impact of these reforms on access programs has been Eskom's termination of internal financing of new connections for low-income households, instead relying on grants from the government. The effect of these new arrangements has been to make electrification funding transparent. This also allows the

government to weigh electrification needs versus other demands on the government budget for infrastructure spending. In principle, Eskom taxes and dividends exceed government expenditure on electrification. However, because of deferred taxes, Treasury receipts from Eskom are currently less that the amount it allocates to the NEF.

A1.167 The timely establishment of the NEF has allowed for a relatively smooth transition to these new funding arrangements. There has been a decline in the number of new connections made by Eskom, but this might have happened anyway, given that targets had been achieved, and the number of connections that could be made cost-effectively through increased grid access is now reduced.

A1.168 Eskom and municipalities remain responsible for grid electrification. Prevailing legislation defines local government in most instances as the "service authority" within its boundaries; Eskom, in some areas, is the "service provider." In the future, the REDs will be the responsible service providers. The government has not (yet) chosen a path involving private participation in the distribution industry. Rather, distribution of grid electricity will remain, for the foreseeable future, a function implemented by public sector utilities.

A1.169 The off-grid electrification program, however, provides an example of private sector participation in a public-private partnership to promote increased electricity access. By the end of 2003, the government had provided about R 60 million (US$9 million) in subsidies for about 16,000 solar home systems. The lack of precedent for this type of arrangement resulted in an arduous process leading up to the establishment of the program, and there is still a difficult relationship between the government and the companies involved. To date, two concession companies have withdrawn before interim contracts were established, one of the five current companies is threatening to abandon business, and the other four are clearly unhappy with the current situation.

A1.170 Programs to extend access to electricity have largely occurred independently of other elements of power sector reform. This is true for the initiatives in FBE, capital subsidies for an expanded national electrification program, the IECs, and other energy stores by off-grid service providers, as well as the piloting of hybrid minigrid systems.

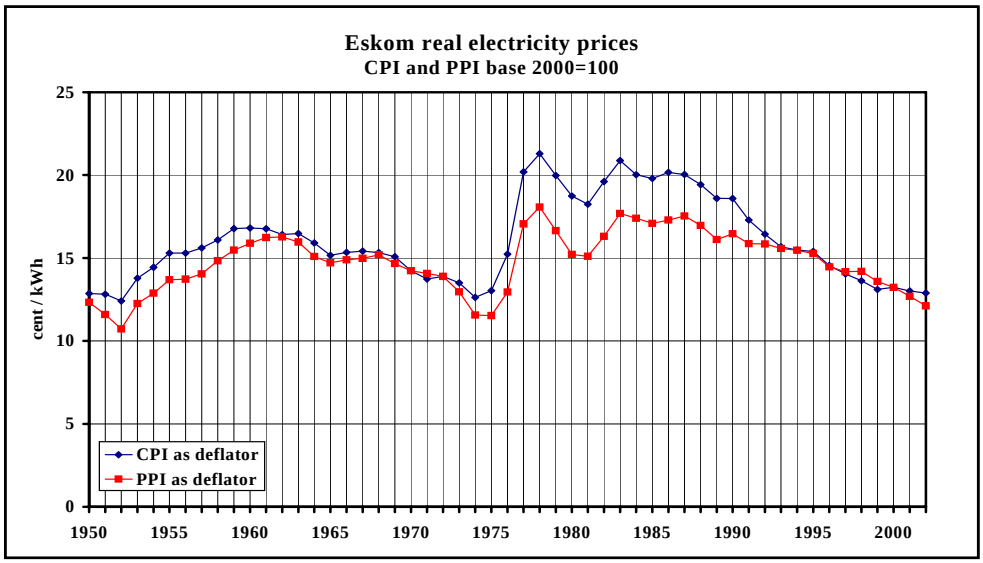
A1.171 However, there are a number of areas where power sector reforms have affected access programs. For example, the corporatization of Eskom necessitated the establishment of the NEF. Previously, electrification was vulnerable to changes in the industry and conditional on Eskom management decisions. In the face of increasing commercial pressures in the industry, the government moved to secure funding for electrification through fiscal allocations. Electrification expenditure is now influenced by cross-sectoral priorities for expenditure on poverty alleviation rather than commercial decision making within the electricity industry itself. Although connection rates have declined since their peak in 1997, more than 300,000 new connections continue to be made each year. The government appears committed to ensuring that the electrification effort continues and has set universal access as the ultimate goal.

A1.172 The restructuring of the distribution industry will affect the implementation of grid electrification. It is envisaged that grid electrification will be the responsibility of the REDs. EDI Holdings, which was established in 2003, will bring together grid electrification experts who will provide training, technical, and other assistance to the six REDs, while the DME will maintain overall responsibility for the strategic management of the program. This arrangement has the potential to improve the coordination and planning of electrification and removes the problem of Eskom having resources to electrify, but not access to unelectrified urban areas. However, there is a risk that the transition will increase costs and introduce delays and other barriers to implementation.

A1.173 Finally, in its draft energy efficiency policy, the NER mentions the establishment of a public benefits fund to finance energy efficiency policy. Currently, the NER envisages that this fund will finance all investments in energy efficiency, rather than investments that have social benefits but negative private sector returns. If this fund is established, it could result in finances being set aside specifically for electricity-related programs for poor people. Again, this fund could not be attributed to an element of electricity reforms, but is rather a spin-off program resulting from the NER's mission to establish itself as a credible and "world-class" electricity regulator.

A1.174 *Prices.* On a historical basis, Eskom's average prices are reflective of average costs. Eskom's costs and prices peaked, in real terms, in 1978 and 1983, and since then they have steadily declined. These real price reductions have been primarily the result of lower finance costs, because surplus capacity has meant that Eskom has not had to order a new power plant since the 1980s. Consequently, Eskom's debt to equity ratio fell from 2.93 in 1986 to only 0.09 in 2003. The change in Eskom management in the mid-1980s and the greater emphasis on commercial and financial targets have also had the effect of increasing efficiencies and lowering costs. Regulation has also contributed to lower prices in recent years, because the NER has consistently awarded lower price increases than those applied for by Eskom. Nevertheless, examination of long-term price trends shows that, in real terms, prices today are no lower than in the early 1950s or 1970s. This would indicate that Eskom has not improved its performance as much as would have been expected.

Figure A.11: Real Electricity Price – South Africa



Consumers Proce Index CPI); Purchasing Power Index (PPI).
Note: Unit of currency is South African cents.

A1.175 The trend in municipal electricity prices has generally followed Eskom prices, although large variations exist that are due to the different cost drivers and electricity levies applied by different local authorities. The NER is, however, progressively trying to narrow the tariff range for each customer category according to benchmarks established for each prospective RED area. Low-income users in each RED will have a uniform tariff.

A1.176 Electricity tariffs for low-income users are currently around US¢6/kWh. In the future, prices are likely to rise as new investment is incurred for new electricity-generating capacity. The price of a new base-load plant is two to three times Eskom's current average generating costs, reflecting how age and inflation have eroded the accounting value of existing assets.

A1.177 Individual tariffs for different customer classes are progressively being adjusted to lower cross-subsidies. Each year, the NER approves not only the average level of prices, but also the tariff structures applied by Eskom and municipalities. A national tariff guideline was published by the NER in 1995 and was updated in 2004. The DME also published an Electricity Pricing Policy in 2004. Cost-reflective tariffs are recommended, but it is accepted that there will be a degree of cross-subsidization for low-income consumers. Within Eskom, these cross-subsidies currently exceed R 1 billion (US$150 million) per year. The DME has mandated the NER to determine what levels of cross-subsidization should remain.

A1.178 Most middle- to high-income residential customers are on a two-part tariff (a fixed monthly charge plus energy consumption) with credit meters and monthly billing. The majority of low-income customers are on a single energy tariff with

prepayment meters. As mentioned, the first 50 units consumed each month are available free of charge, thereafter consumption is charged at a fixed rate.

A1.179 Research interviews denoted a high price elasticity of demand at the household level (price changes have a significant impact on how electricity and other fuels are used within the home). When electricity becomes more expensive, principal alternatives are wood, kerosene, and coal for heating, ironing, or cooking and candles for lighting. Bottled gas is used only by a minority and is generally regarded as a dangerous fuel. Poor households do not frequently use electricity for refrigeration and cooking. Electricity is used mainly for lighting and telecommunications. But as oil and kerosene prices increase, reverse substitution is also possible.

A1.180 A recent analysis of data from the 2000 national Income and Expenditure Survey indicates that domestic demand for prepaid electricity is fairly elastic at −1.35. This means that if the price of electricity were to increase by 10 percent, the demand for electricity, holding all other variables constant, would decrease on average by 13.5 percent. This result also suggests that any future increase in the price of prepaid electricity will result in a significant fall in electricity consumption.

A1.181 The income elasticity of demand for prepaid electricity was determined to be 0.32 and therefore relatively inelastic. When all other variables are controlled for, a 10 percent increase in household income will on average be associated with a 3.2 percent increase in electricity consumption.

A1.182 As anticipated, sensitivity of demand due to changes in prices is not as high for small businesses. Interviewees noted that if the price of the prepayment card increases, there is nothing that they can do. Generally, this means that electricity usage in the home, or other household expenses, are cut to absorb increased electricity costs for business activities.

A1.183 *Other impacts.* Quality of supply: It is premature to comment on whether electricity reforms have resulted in improved quality of supply to households. As noted, the distribution industry has yet to undergo the reforms planned, and the government has backed off from more ambitious reforms in the generation and transmission industries. Rather, there is growing evidence to suggest that quality of power for South African households has been decreasing in the last few years. Given commitments to extend other forms of service delivery, municipalities do not have the finances to upgrade distribution infrastructure. There is also some evidence to suggest that municipalities have delayed maintenance and general network investment in anticipation of the REDs taking on this responsibility.

A1.184 Electricity customers interviewed around South Africa respond similarly when questioned about trends in power quality. Most respondents say that the quality of power is good in the sense that they do not get power surges strong enough to destroy their appliances. All respondents cite instances of power failures resulting from electrical storms. Furthermore, all interviewees mentioned lack of satisfaction with the strength of the local substation. Time needed to restore power seems to depend on whether Eskom or

municipalities are involved, with Eskom responding more quickly to callouts than municipalities.

A1.185 The following issues arose from interviews with electricity customers:

- Electricity customers felt that they have been left out of the discussions and progress around the status of FBE, and many households have still not received the free 50 units per month.
- Installation of prepayment meters is contested in some areas, such as Soweto, where customers complain that they have not been involved in decisions to replace their meters and these new, prepaid meters have been "shoved down their throats." Customers argue that they are not necessarily averse to these meters, but that they would like to be consulted on this change, as well as be advised on the advantages and disadvantages of the various systems.
- Nonpayment for electricity services—or rather, payment of bills in arrears—is also an issue that urban customers raise. They argue again that they are not necessarily averse to paying for electricity but need help to establish an achievable payment plan to do so. They claim that their service providers do not help them to do this, but rather say that if customers want to be reconnected, they should pay at least half of the outstanding bill. Poor electricity customers are asking to see the human face of the utility, or at least for a utility representative to work with them to establish a plan for repayment that is realistic.

A1.186 Improved secondary services: South Africa's post-apartheid electrification program has also included a component to increase electricity access to schools and clinics in remote areas of the country. Table A.3 provides data on the number of schools connected under this program.

Table A.3: Schools Connected from 1994 to 2002

	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
Urban	77	188	260	38	95	0	28	19	45	750
Rural	485	802	768	511	856	486	383	313	936	5,540
Nongrid	0	57	988	196	103	3	0	0	0	1 347
Total	562	1,047	2,016	745	1,054	489	411	332	981	7,637

Source: NER Lighting Up South Africa.

A1.187 As of 2002, agreement was reached that all electrification projects involving schools and clinics would be funded through the NEP and the DME. These new school and clinic connections are the direct result of the government's electrification program and not specifically the result of other electricity reforms.

A1.188 People residing in the locality of these clinics (and some schools) also use available electricity for charging mobile phones, ironing, welding, cooking, and so on. This happens quite frequently where bills are not monitored. Where electricity is charged, these secondary activities are not evident. The electricity supply to many of these rural schools and clinics is often to be found in disrepair. Light bulbs, fluorescent tubes, plug points, and a range of appliances are often found to be broken and out of use for some time.

A1.189 Impact of utility outsourcing on small-business development: The NER compiled a questionnaire on project outsourcing that was then sent to all distribution licensees. Questionnaire results (including 77 responses) are presented in table A.4.

Table A.4: Electrification through SMMEs and BEEs in South Africa

	2001	2002	Total (2001 and 2002)
No. of SMME companies used in the electrification process	460	558	1,018
Amount of money paid to SMME companies used in the electrification process	R 120 million	R 139 million	R 259 million
Number of BEE companies used in the electrification process	104	96	200
Amount of money paid to BEE companies used in the electrification process	R 55 million	R 42 million	R 97 million
Number of jobs created through the electrification process	3,233	3,132	6,365

Source: Lighting up South Africa 2002. NER

A1.190 Public sector finance: The only significant privatization receipt has been Johannesburg's sale of 50 percent of its Kelvin power station to AES for R 225 million plus commitments on capital, environmental, and social expenditure. AES subsequently sold their stake to CDC Globeleq. The city of Johannesburg received the benefit of much-needed capital and maintenance expenditure to improve the performance of Kelvin, but high capacity payments mean that it is doubtful whether Johannesburg's customers have benefited from cheaper electricity. There have been no other sales of power sector assets at either the national or local level.

A1.191 The corporatization of Eskom has resulted in tax and dividend receipts since 2001. These receipts and the fiscal allocations to the NEF are shown in table A.5.

Table A.5: Eskom Tax and Dividend Payments and Government Electrification Expenditure *(R millions)*

	2000	2001	2002	2003
Eskom tax (including deferred tax)	1,454	1,211.0	1,727	1,859.0
Eskom dividends				549.0
Fiscal allocation to electrification	1,027	909.6	950	1,039.6

Source: Eskom Annual reports, DME Annual Reports

A1.192 Taxes and dividends from Eskom to the government exceed its fiscal allocations to electrification, although it should be noted that the majority of Eskom's tax obligations have been deferred.

Conclusions

A1.193 Initiatives such as the South African NIEP, distribution of FBE, residential energy efficiency programs, and IECs, which seek to increase poor people's access to modern energies, are ongoing and largely independent of the modest steps that have been taken to reform the power sector. Some of these programs have a history that precedes the reform years: the grid electrification program began in the early 1990s and has made remarkable progress in the last decade in increasing electricity access. Residential energy efficiency programs have been implemented by Eskom and some municipalities since the mid-1990s. National rollout of FBE, establishment of IECs, and the off-grid electrification program are more recent. None of these programs can be regarded as essential to the current steps being undertaken to reform of the distribution industry, although the implementation of each will be affected by distribution restructuring.

A1.194 It is therefore difficult to establish direct impacts of reform measures on access programs and on poverty. Although the modest reform step of corporatizing Eskom had the effect of Eskom stopping its subsidization of connection costs for poor customers, the government has allocated a high proportion of its tax receipts to the NEF, which continues to subsidize these connection costs.

A1.195 This experience is important because it demonstrates that the meeting of social goals and public benefits can be largely independent of industry structure or reform measures. Electrification was carried out by the old, vertically integrated, publicly owned utility, Eskom, and by local government distributors. The electrification program will continue, even if Eskom is unbundled and a degree of competition is introduced. Explicit policy and regulatory instruments have been put in place to ensure the continued commitment to move to universal access to electricity in South Africa.

A1.196 The electrification program in South Africa is remarkable in a number of respects. Doubling access to electricity from one-third to more than two-thirds of the population in a matter of years is probably without international precedent. The program

was clearly driven by the unique challenges that South Africa faced in overcoming the legacy of apartheid inequity. Yet there are lessons from this program that have more universal relevance. The South African experience demonstrates that it is possible to make substantial progress in widening access to electricity services for the poor, even as electricity industries are restructured. Although Eskom has not yet been unbundled or privatized, it has faced pressures to operate on a sound commercial basis and has discontinued internal subsidies for new electricity connections. The electrification program was driven by the advent of democracy and a political commitment to provide services for the poor. It was made possible by an electricity industry that was technically competent and financially strong, and it has been put on a sustainable basis through explicit policy and regulatory instruments that will give expression to the government's social goals, even when the electricity industry is unbundled and possibly privatized.

A1.197 Electricity tariffs have decreased in real terms over the past two decades, not because of any reform measures, but mainly because Eskom's finance charges have decreased in a period when it has not had to build any new generation capacity. However, even modest nominal increases have been difficult for poor electricity customers and microbusiness owners to absorb. Low-income electricity customers have access to 50 units per month of free electricity. Their electricity tariffs are also cross-subsidized by large users.

A1.198 There are increasing concerns about the reliability of supply in some areas. Distributors have delayed vital expenditure in maintenance and upgrades in anticipation of the REDs assuming this responsibility. However, the delay in establishing the REDs has meant that blackouts are now being experienced by some customers.

A1.199 Broadly, various conclusions can be reached:

- South African electricity reforms have not progressed sufficiently to draw strong conclusions concerning their impacts on poor electricity customers.
- However, the South African government has prioritised programs to widen access to and affordability of electricity. The funding of these programs is largely independent of the power sector, and they are likely to continue even after further power sector reform.
- Delays in reforming the distribution sector are negatively affecting the reliability and quality of supply.
- Private sector participation has been instrumental in the area of off-grid electrification. Experience indicates that for further and future private sector involvement to be encouraged, a multiyear governmental policy framework outlining institutional roles and funding must be established.

Tanzania

Country overview

A1.200 With GNI per capita of US$290, Tanzania ranks 206th worldwide in terms of GNI purchasing power parity. The country falls behind all of its neighbors (Burundi, the Democratic Republic of Congo, Kenya, Mozambique, Rwanda, Uganda, and Zambia) with regard to purchasing power parity ranking, with the one exception of Malawi, which scores 207th. However, in 2001, about 35 percent of the country's population was living below the poverty line—considerably less than most of its neighbors. Life expectancy is decreasing (from 50 years in 1990 to 43 years in 2002), and infant mortality is increasing (from 102 per 1,000 births in 1990 to 104 in 2001), but there is measurable success in improving literacy. In 1990, 63 percent of the total adult population was recorded as literate; this figure increased to 77 percent in 2002. Another significant improvement relates to access to clean water (68 percent in 2000 versus 38 percent in 1992). Tanzania's population, which has been growing at a rate of about 2.9 percent per year (from 1980 to 2002), currently stands at 35 million, with 34 percent residing in urban areas. Urbanization levels have doubled since 1980.

A1.201 After gaining independence in 1961, Tanganyika united with Zanzibar in 1964 to form the United Republic of Tanzania. Zanzibar, however, maintains substantial autonomy over its internal affairs and has its own president and House of Representatives. The first multiparty elections were held in 1994, followed by elections again in 2000. Zanzibar's electoral process has been tainted by political violence, but mainland Tanzania remains relatively stable.

A1.202 In 2002, mainland Tanzania's GNI stood at US$9.7 billion and GDP growth for the period 2001–02 was recorded at 6.3 percent. Agriculture contributes about half of Tanzania's GDP and more than 60 percent of total export earnings. The sector also employs more than 75 percent of the workforce. Foreign direct investment amounted to US$240 million in 2002, or slightly more than 2 percent of GNI. Aid has been growing slightly as a portion of GNI, amounting to 13 percent in 2002 or approximately just over US$1 billion.

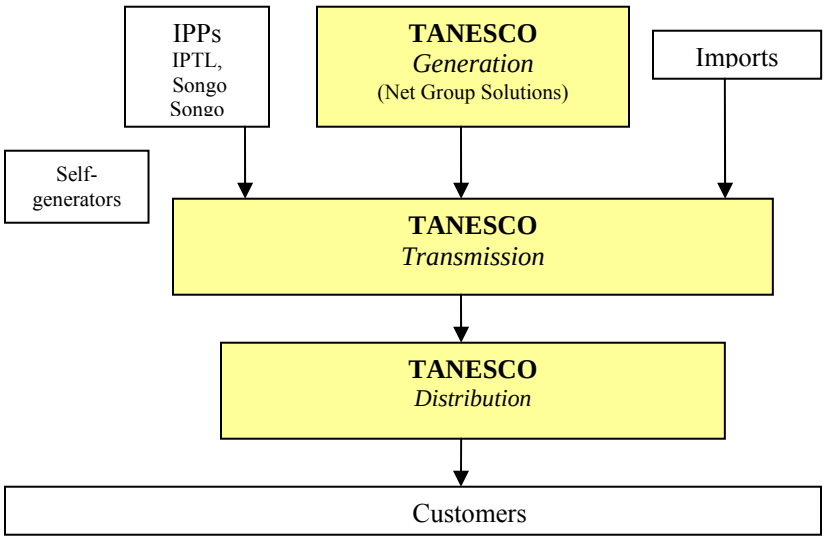
A1.203 With regard to Tanzania's energy consumption, biomass-based fuel accounts for 90 percent of the primary energy supply. The country has hydroelectric resources and small natural gas and coal reserves. It imports all its liquid fuel requirements.

Tanzania's power sector

A1.204 The Tanzania Electric Supply Company (TANESCO) is a state-owned utility supplying most of the power consumed in Tanzania. The company is vertically integrated, generating, transmitting, and distributing electricity across the country. TANESCO also sells bulk power to the Zanzibar State Fuel and Power Corporation. In addition to TANESCO, two IPPs, Independent Power Tanzania Limited (IPTL) and Songo Songo, feed the grid. There are also a number of small self-generators. Power

imports from neighboring Uganda and Zambia complement internal generation capacity by supplying isolated centers near the borders. Figure A.12 depicts the organization of the sector.

Figure A.12: Structure of the Electricity Sector in Tanzania



A1.205 The country's installed electricity generation capacity is about 1,000 MW, with 560 MW hydropower and the remaining capacity supplied by thermal plants. The IPTL owns a 100 MW plant fired by heavy fuel oil, and Songo Songo owns a 115 MW gas turbine. The small self-generators feed surplus electricity into the grid (Kiwira coal mine, 6 MW and TANWAT, 2.3 MW).

A1.206 The electricity system in Tanzania is composed of both the main grid and a number of isolated systems. The grid system supplies power to the major cities and towns, and the isolated diesel generators supply power to five regional and several district headquarters that are remote from the main grid system. In 2002, the main grid had a backbone of 2,658 kilometers of 220 kV transmission lines, 1,420 kilometers of 132 kV lines, and 378 kilometers of 66 kV lines.

A1.207 The country's peak demand in 2003 was about 506 MW, which is projected to grow to approximately 590 MW in 2005. This corresponds to an energy demand of about 2,708 GWh and 3,380 GWh, respectively.

A1.208 In 2001, total system losses were about 23 percent (7 percent for technical reasons, 16 percent for nontechnical reasons); in 2002, total system losses were 19 percent (technical, 5 percent; nontechnical, 14 percent). Loss reduction programs currently under way are expected to further reduce system losses to 16 percent in 2005.

A1.209 TANESCO has incurred financial losses since 1998, with an average annual loss from 1998 to 2002 of US$56.4 million. For the past 15 years, the utility has failed to declare dividends because of poor financial performance.

Electrification

A1.210 Approximately 10 percent of the population has access to electricity. It is estimated that about 39 percent of the urban population has access, compared to only 2 percent of the rural population.

A1.211 Although levels of electrification, particularly for rural areas, are low, rural electrification projects were identified as a government priority as early as 1965, four years after independence. At that time, national policy did not prioritize projects by financial viability. Projects were supported primarily by public funds, including donor funds, with subsidies flowing to TANESCO from the government, local authorities, and large consumers. The power sector reforms of 1992 altered this noneconomic approach to electrification by prioritizing projects based on their relative economic merits. Areas with agriculturally based industries and communities that were within an economic breakeven distance from the interconnected grid were prioritized.

A1.212 Since 2003, further reforms in rural electrification have been pioneered with the establishment of the Rural Energy Agency (REA), supported by a Rural Energy Fund (REF). The REA will not implement rural energy projects itself, but will facilitate community and private sector initiatives, as well as supporting TANESCO's electrification efforts. The REF is expected to be financed through donor funds, government subventions, levies on energy products, and other contributions. The REA and REF are expected to be operational in 2005.

A1.213 There have been a number of initiatives to introduce locally managed electricity supply cooperatives in order to widen access to electricity in rural areas. Currently, Tanzania has four fully established electricity cooperatives serving about 3,000 consumers: Urambo, Mbinga, Kasulu, and Kibondo, established in 1995, 1996, 1998, and 2000, respectively. A number of rural townships are exploring the possibility of establishing power cooperatives.

A1.214 Power cooperative members opt in by paying membership fees and obtaining a minimum of one share. In addition, the member must bear the full cost of connection. The cooperative members elect a development committee consisting of a chairman, secretary, treasurer, and committee members to manage the co-ops on behalf of all the members. Each week, one committee member is responsible for part-time management of the power supply services, which involves supervision of fuel purchases, revenue collection, and power disconnections. Two to three permanently employed staff, who are trained by TANESCO, are responsible for full-time work on power production, distribution, and sales to cooperative members. Furthermore, a technical agreement exists between the cooperatives and TANESCO, whereby the utility provides technical assistance to the cooperative at cost for repair work beyond the technical capabilities of its staff.

A1.215 In addition to the power cooperatives, the Wayleave Village Electrification Scheme (WVES), which is linked to the Songo Songo gas development project, provides a second example of innovative access schemes resulting from private sector participation. Like the REA and REF, the WVES is not yet under implementation, but plans are significantly developed. The WVES involves electrification of villages located along the gas pipeline. The scheme is being developed as part of the compensation and social mitigation package of the Songo Songo Gas Development and Power Generation Project and involves a combination of rural electrification technologies (solar, grid extension, and gas-based generation). In addition to the energy services, drilled water wells and selected health facilities are provided. The government is financing the initial capital from proceeds of an IDA credit.

Drivers for reform

A1.216 The main driver for reform of the electricity sector was the inability of TANESCO to deliver the requisite services. The first stage of reforms were also the result of the government's decision to reform and privatize corporations involved in the provision of infrastructure services, such as water, electricity, transport (air, water, and road), telecommunications, and so on.

Description of reform

A1.217 The government of Tanzania embarked on programs for liberalizing and reforming its power sector in 1992. Prior to 1992, TANESCO had maintained a monopoly over generation, transmission, and distribution.

A1.218 With TANESCO operating under Tanzania's Company Ordinance Act since 1931, which stipulates that the firm must follow business principles, including paying taxes and dividends, there was no need for corporatization in the early stage of reforms. Commercialization of TANESCO was, however, in order, because the firm had been performing poorly from both a technical and a financial perspective. The first step toward commercialization involved implementing tariff reforms. Between 1993 and 1995, average tariffs nearly doubled (in local currency).

A1.219 As part of the reforms, it was further recommended that TANESCO be unbundled to form two generation companies, one transmission company (which was to remain government-owned), and two distribution companies. The aim was to privatize generation and distribution. However, although more than a decade has passed since this recommendation, TANESCO has yet to be unbundled and is still in public ownership.

A1.220 Meanwhile, repeated price hikes improved neither financial nor technical performance. Reasons for TANESCO's persistently poor performance are attributed to inadequate revenue collection, including a significant portion owed by the government and the Zanzibar State Fuel and Power Corporation. Other reasons include the need for fuel substitution, namely more expensive thermal power in place of hydropower during dry years. In addition to high commercial losses, the utility has also experienced fairly high technical losses.

A1.221 Therefore, in 2002, the government took a new approach to commercializing the firm by hiring an external company, Net Group Solutions (Pty) Limited of South Africa, to manage TANESCO. The original two-year management contract, amounting to US$2.6 million, expired in April 2004 and was renewed for a further two years.

A1.222 The management contract sought to enact a series of reforms to turn around the company financially and technically: improving sales and collections, liquidity, and efficiency of power system operations; reducing outages and improving system stability; and reducing staff and increasing overall staff competency. As of August 2004, improvement had been recorded in each of these, with the following notable achievements:

- Ninety-three percent of bills are collected every month from both private and government sectors, compared to only 67 percent at the start of the contract.
- Company debt, which amounted to US$33.8 million, in addition to a bank overdraft equivalent to US$9.2 million, has been cleared; TANESCO currently has cash in the bank.
- Capital of US$38 million was spent in 2003, generated from TANESCO's own funds.
- TANESCO is now creditworthy and has borrowed US$33 million.

A1.223 The stalled unbundling of TANESCO has not, however, prevented development of IPPs. Starting in 1994, the government reached agreement with the IPTL, a Malaysian-Tanzanian joint venture private company, to install 100 MW of thermal capacity. With a controversy over the investment cost and associated capacity payment, which was ultimately reconciled by international arbitration, power came online only in January 2002.[13] Still, the resulting capacity charge, even with the reduced investment cost, has been above TANESCO's means, necessitating government payments of US$1.5 million per month in charges.

A1.224 The second major IPP is part of the Songo Songo Gas Development and Power Generation Project, for which financial closure occurred in 2001. The project involves establishing gas infrastructure for gas supplied by offshore and onshore wells, respectively; a 207-kilometer pipeline; and the conversion to gas firing of a 115 MW oil-fueled generating plant. The project is expected to reduce foreign expenditure on fuel by US$42 million from 2005. As with the IPTL, TANESCO has been unable to meet fully the monthly payment obligation, which amounts to US$5 million for a capacity charge and US$1 million for an energy charge, from its internal cash generation (that is, without a steep increase in tariffs). A liquidity fund equivalent to four months' capacity payment

13. The IPTL claimed that it invested US$150 million in the project, but TANESCO maintained that the project was worth US$90 million. The World Bank's International Center for the Settlement of Investment Disputes has since determined an investment cost of US$130 million.

has therefore been established by the government to cushion nonpayment, should it occur.

A1.225 Part and parcel of the reforms has been an effort to strengthen the regulatory apparatus in Tanzania. In April 2001, enabling legislation to establish an independent, multisector (energy and water) regulatory agency, Energy and Water Utilities Regulatory Authority (EWURA), was passed by Parliament. EWURA's mandate is expected to include licensing, tariff quality, environment, consumer protection, and dispute resolution. It is expected to be established in 2005.

Impacts of the power sector reform

A1.226 *Access.* The proportion of the population with access to electricity grew from 7 percent to 10 percent over the reform period, 1993–2002. Since then, Net Group Solutions has assumed management of TANESCO and electricity connections have continued to expand—from 450,947 in 2001 to 530,000 in 2004. However, the rate of growth, 17 percent, over the period 2001–04 is less than the 19 percent growth recorded in 1998–2001, implying no major change in access since the management contract began. Taken altogether, although reforms did not stop access programs, they have not yet led to a dramatic increase. However, before the award of the management contract, TANESCO was clearly not financially viable, bringing into question the sustainability of its access program.

A1.227 Among the reasons provided for this relatively limited growth is the government's own failure to honor its electricity bills. Nonpayment forced TANESCO to operate under huge debts carrying heavy interest rates until 2002, thereby limiting the utility's ability to invest in further electrification. A second possible reason explaining the slow growth of access since 1992 was the new criteria for projects, namely that electrification investments should be based on economic and financial viability. The absence of such projects may have inhibited growth. Previously, electricity investments were politically influenced, meaning that the utility was forced to implement nonviable projects.

A1.228 Although the reform has not yet brought about a large increase in access rates, it has been responsible for introducing new electricity investments and thereby making available more power for distribution. As mentioned, there are two main IPPs with total installed capacity of around 220 MW. Meanwhile, the outstanding needs are primarily in the distribution segment, which remains part of TANESCO.

A1.229 There is some potential for private distribution from the gold mines, which have set up their own generation and transmission facilities. These businesses have plans in place to supply electricity to their neighborhood population in the. For instance, the 9 MW surplus capacity from Geita (40 MW) could be distributed through suitable mechanisms to benefit the local population. Further, the 220 kV line financed by private investors to supply the mining load in Kahama has surplus capacity, and a spare bay has been provided at the receiving substation for future distribution to local villages. TANESCO could not have reached these areas under its investment plans. However, rural

electrification, particularly in isolated areas, may ultimately prove to be difficult and too expensive for private players, unless subsidized by the REF.

A1.230 Over the course of the reform (from 1993 to 2002), investment in electrification projects has averaged US$6.3 million per year, with 1998 and 1999 recording levels as high as US$ 23 million and US$18 million, respectively.

A1.231 It is expected that the REA and REF may alter this slow rate of growth in access. Meanwhile, the energy cooperatives have already succeeded in reaching 3,000 customers, and there is the promise of more as the initiative grows. In addition, the WVES should provide electricity supply to those living along the Songo Songo pipeline.

A1.232 *Price.* Prices have increased during the reform period, with average retail tariffs increasing from T Sh (Tanzanian shillings) 18.38 in 1992 (US¢6.5/kWh) to T Sh 80 in 2001 (US¢9.2/kWh), for an average annual increase in Tanzanian shillings of 20 percent.[14] Meanwhile, bulk supply tariffs have increased from T Sh 9.3 in 1992 (US¢1.2/kWh) to T Sh 52.45 (US¢6/kWh), for an average annual increase in Tanzanian shillings of just over 25 percent. The steepest rise in retail tariffs was recorded between 1992 and 1993, when average Tanzanian shilling prices jumped 76 percent; bulk tariffs registered their largest increase between 1993 and 1994, with a rise of 77 percent.

A1.233 Average annual inflation in Tanzania has been 17.8 percent over the period 1990–2002. If prices were adjusted for inflation alone, retail prices would be exactly on target at T Sh 80. Bulk supply tariffs would, however, be a mere T Sh 40, or just 60 percent of their 2001 value. The real cost of generation has increased in part because of the increased reliance on thermal power, and this was fully passed on to consumers from 1992 to 2001.

A1.234 Reform measures were intended to introduce cost-reflective pricing (reflecting the long-run marginal cost of power supply) to tariffs in an attempt to rectify the insolvent TANESCO, but the utility was only partly successful at tariff adjustments.[15] TANESCO did succeed in reducing tariff categories from 10 to 5 and with this began to reduce cross-subsidization. In the latter half of the reform, though, regular biannual increases in the tariffs almost ceased because the government was reluctant to provoke further dissent, particularly from industrial consumers, whose tariffs were already among the highest in the region.

A1.235 In addition to tariffs, TANESCO's efforts at altering connection costs, which have been highly subsidized, have been curtailed by the government. In May 2001, with the Ministry of Energy and Minerals' approval, TANESCO raised the service line connection charges from US$103.30 to US$161.80 (about 57 percent) for a single-phase connection, and from US$206.50 to US$670.10 (about 224 percent) for a three-phase

14. Prices in U.S. currency are based on historical exchange rates.

15. According to its existing license, TANESCO is permitted to increase its tariffs by up to 5 percent biannually, and the Minister of Energy and Minerals, in consultation with the Ministry of Finance, is allowed to raise tariffs by an additional 10 percent; any excess of this has to be approved by the cabinet.

connection to reflect costs. Price hikes were met with widespread opposition, including arguments that the hike would perpetuate illegal connections as well as the use of traditional forms of energy rather than promoting use of electricity. Within one month, the increases were reversed by Parliament, with no additional means provided to TANESCO to service new connections.

A1.236 During the period of the initial Net Group Solutions management contract, between 2002 and 2004, average prices in Tanzanian shillings rose by just 4.3 percent, again in contrast to an average of 20 percent per year under previous management. During this same period, industrial tariffs were kept constant, resulting in a reduction of 8 percent in real terms. Net Group made additional adjustments in an attempt to reduce cross-subsidization between industrial and residential consumers.

A1.237 Another major change during the period involved the equivalent of Tanzania's lifeline tariff. Until June 2004, subsidies were provided for the first 100 kWh of consumption, which applied equally to commercial and household users, including wealthy, large consumers. Since June 2004, the subsidy has been limited to 50 kWh and targeted at small domestic consumers. Insofar as such limits have been tried and rejected in the recent past, however, these changes may yet provoke political opposition.[16]

A1.238 *Other impacts.* With the reforms, households already connected to the grid have experienced some improvement in quality of supply, as evidenced by reduced load shedding. In 2001, prior to IPTL coming online, about 2,000 MWh of load was shed, compared to 1,700 MWh and 900 MWh for 2002 and 2003, respectively.

A1.239 For economic development, the story is mixed. Starting in 1994, light industrial and light commercial users were charged the same rate as residential customers, allowing them to benefit from the subsidy regime. The ongoing power sector reforms have already brought about significant change in the cost of energy for small businesses in Tanzania. Removal of subsidies for the informal and small businesses has increased their overall cost of electricity, which may result in an increase in the price of goods and services and potentially negatively affect the poor.

A1.240 In addition to the change in the subsidy regime, further barriers to small businesses include the high initial connection cost, which must be borne by the customer; the stringency of connection standards; poorly monitored shared meters, which may lead to higher than justified costs for small businesses; and a long waiting period due to lack of service line material from the utility. The emergence of small businesses involved in the power sector, including at this point in prepaid meter vending, however, creates new opportunities.

A1.241 Finally, the reforms have not brought about the intended changes in public finances. Rather than freeing up funds for other sectors, the reforms have led to an increase in government transfers. This increase is the government's contribution to the

16. An attempt to reduce subsidy levels to 50 kWh in 2002 was met with fierce opposition, and the government subsequently intervened, reversing the subsidy cut.

IPTL capacity charge. In 2002, the government paid approximately US$1.5 million a month, for a total of US$18 million. For the entire 20-year period for this Power Purchase Agreement (PPA), the government will pay a total of US$360 million over and above what the utility, TANESCO, will pay. Also, as previously mentioned, a further transfer may be required with Songas. However, the improved financial position of TANESCO has meant that it is less reliant on the government.

Conclusions

A1.242 Tanzania's power sector reform has been a long time in the making. Starting in 1992, the government registered its interest in unbundling, liberalizing, and privatizing the sector to increase the quality and scope of services. Progress since 1992 is visible with the emergence of a series of IPPs and the promise of a new regulatory authority. The management contract establishing Net Group Solutions at the helm of TANESCO has also led to improvements, particularly in the company's commercial performance and financial position.

A1.243 At the same time, after more than a decade, TANESCO remains a state-owned utility with privatization still only a goal. Furthermore, rather than decreasing its expenditure, the government has seen its contribution to the sector increase with the reforms because of high capacity charges required by the IPTL. However, if TANESCO had invested in a new thermal plant, generation costs may also have been high. Meanwhile, the most striking feature is that access rates remain as low as 10 percent, 12 years after the inception of reform.

A1.244 Rural electrification plans are in the making, with the REA, backed by the REF, establishing a new vehicle for private sector and community-based involvement and innovation. Electrification cooperatives are already beginning to change the landscape of rural electrification as they now supply 3,000 users. Coordination among these diverse efforts and the reforms, however, is not yet clear, which could be an impediment to going forward.

Uganda

Country overview

A1.245 With GNI per capita at a mere US$240, Uganda ranks 180th worldwide in terms of its GNI purchasing power parity, just below the Central African Republic, Rwanda, and Burkina Faso. The population of Uganda stands at approximately 25 million as of 2002, and it has been growing annually at about 3 percent. Meanwhile, life expectancy has been decreasing: 47 years in 1990, compared to 43 years in 2002. Nevertheless, the proportion of the population living below the poverty line decreased from 56 percent in 1992 to 35 percent in 2000. Furthermore, access to safe drinking water increased from 54 percent in 2000 to 65 percent in 2003. There have also been significant improvements in primary school enrollment and total youth literacy in recent years.

A1.246 HIV/AIDS prevention is a major goal of the government of Uganda because, starting in the early 1990s, the country experienced rates of 18 percent prevalence within the adult population. Today, rates have been reduced to 6.1 percent, which can be largely attributed to the political will to tackle the issue.

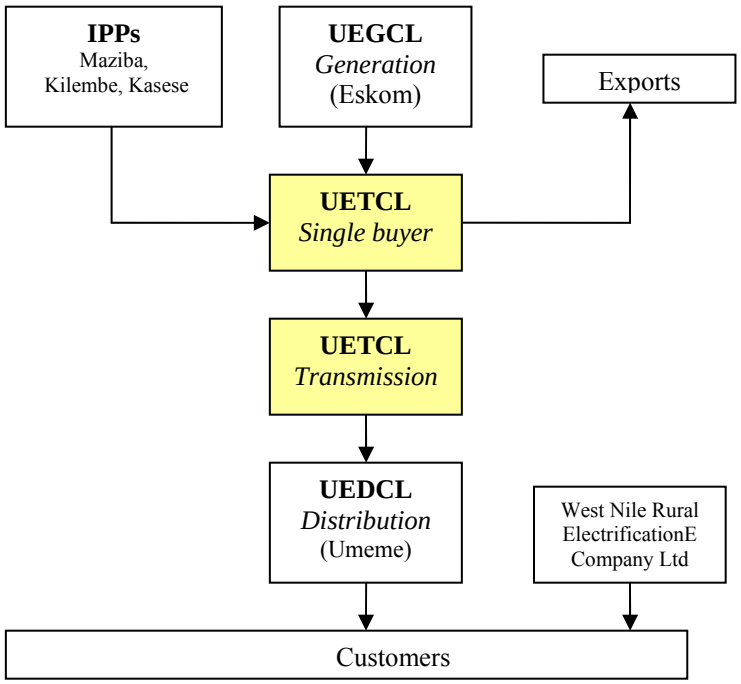
A1.147 Over the past decade, Uganda has experienced rapid economic growth; in the past five years, annual growth has averaged 6–7 percent. This growth has contributed in part to increased urbanization, with the urban population growing from 9 percent of the total population in 1980 to 15 percent in 2002. Gross foreign direct investment amounts to just 2.6 percent of GDP, or US$150 million. Aid as a percentage of GNI was 11 percent in 2002. The country's debt burden stands at 22 percent of GNI, and Uganda is considered a less indebted country within the realm of developing countries.

A1.148 Uganda has hydroelectric and geothermal potential but no economically exploitable fossil fuel reserves, although potential reserves are being explored in the west of the country.

Uganda's power sector

A1.249 Uganda has opted for the single-buyer model of competition in electricity supply. The transmission company, Uganda Electricity Transmission Company Limited (UETCL), is designated as the single buyer of bulk-generated electricity, and it manages imports and exports of power in the transmission system. Currently, all generation assets, with the exception of a small percentage of independent hydro generation, are owned by Uganda Electricity Generation Company Limited (UEGCL). A long-term lease agreement has, however, been concluded with Eskom of South Africa to operate the facilities. Distribution is currently carried out primarily by Uganda Electricity Distribution Company Limited (UEDCL), which has an exclusive license to supply within 100 meters of existing networks. As with the UEGCL, the UEDCL's assets are to be leased to a private entity, Umeme (Pty) Ltd, jointly owned by CDC Gobeleq and Eskom. The takeover took place on November 1, 2004, when the UEDCL ceased to operate the distribution system. Other companies have the right to bid to expand the network to new areas. To date, one developer has proposed to expand the network in a rural district. The sector is regulated by the Electricity Regulatory Authority (ERA), an independent board composed of five individuals, with authority over all electricity undertakings in the country. Figure A.13 illustrates the structure of the sector.

Figure A.13: Structure of the Electricity Sector in Uganda



A1.250 The hydropower installations at the source of the Nile River provide the majority of Uganda's electricity supply. There are two stations at the outlet of Lake Victoria: Nalubale (formerly Owen Falls) and Kiira (also known as Owen Falls Extension), with 180 MW and 120 MW, respectively. Kiira is undergoing further expansion, with the expectation that the facility will have an installed capacity of 200 MW . (Actual output will be a function of lake levels.) In addition, there are approximately 17 MW of independent generation connected to the grid, primarily from small hydro generators at Maziba (2 MW), Kilembe Mines (5 MW), and the Kasese cobalt mine (10 MW). There is significant hydropower potential on the Nile River, including the currently stalled Bujagali project (200–250 MW), Kalagala (340–450 MW, which can be built only in the absence of Bujagali), and Karuma (150–180 MW). The Karuma plant competes with Bujagali to be the next large generator to be developed. A bagasse project at Kakira is under development and has concluded a PPA with the UETCL.

A1.251 Uganda has a national transmission system with assets down to 66 kV, which connects most towns and district centers in the country. The transmission system has export links to Kenya and Tanzania, and the distribution system includes links to Rwanda in the southwest of the country. The distribution system contains assets at 33 kV and below, and it includes reticulation in the major towns. In addition, there are some isolated networks powered by diesel generators. These are in the West Nile region in the northwest of the country (Arua, Nebbi, Moyo, and Adjumani) and the Karamoja (Moroto) region in the northeast. The 33 kV network also supplies the border town

Katuna in northern Rwanda and imports from Rwanda at the extreme southwest in Kisoro.

A1.252 Annual production is approximately 1,600 GWh, with 25–30 percent lost in transmission and distribution. Annual consumption stands at 1,100 GWh, with another 200–250 GWh exported, primarily to Kenya (90 percent) and the remainder going to Tanzania. Annual demand growth is estimated at approximately 25–30 MW, or 8 percent per year. Households, more than 90 percent of the customers, accounted for about 42 percent of total consumption (500 GWh) in 2003. In contrast, industrial consumers amount to just under 800 customers and account for around 42 percent of consumption. Commercial users are significantly more numerous at 22,000, consuming 15 percent of the total. Street lighting accounts for a small proportion of total consumption (Table A.6).

Table A.6: Electricity Consumption by Category of User in Uganda, 2003

Category of Customer	**Customer numbers (September 2003)**		**Consumption (2003, extrapolated from September 2003 data)**	
	No.	%	GWh	%
Domestic	216,936	90.2	496	42
Commercial	22,041	9.4	168	15
Medium industrial	686	0.3	222	24
Large industrial	89	0	251	19
Street lighting	347	0.1	5	0
Total	240,099	100.0	1,142	100

Source: UEDCL (2003).

A1.253 Average retail tariffs today stand at approximately US¢8/kWh, with households paying just above US¢9/kWh.

Electrification

A1.254 Currently, approximately 5 percent of the population has access to electricity. There are about 200,000 domestic connections in a population of some 25 million people. Increasing access to electricity is a core objective of the government's energy policy. Urban electrification should be furthered by the investment obligations of the distribution concessionaire, but there are special challenges in providing supply to rural areas.

A1.255 The government's strategy, outlined in "Rural Electrification Strategy and Plan, 2001," is to promote private sector and community-based solutions to rural electricity service provision, with an emphasis on productive use and public services. Project sponsors may include private companies, NGOs, local authorities, and community organizations. Sponsors must satisfy two requirements: projects are not to be managed or majority-owned by the public sector and must demonstrate local community support.

A1.256 A Rural Electrification Agency and a Rural Electrification Fund were established in 2003 – the Rural Electrification Agency has the responsibility to identify and promote rural electrification projects, whereas the Rural Electrification Fund provides capital subsidies and support for debt finance. The intention of the subsidy mechanism is to buy down the capital cost of investment to the extent that, at reasonable tariffs, the project is attractive to a project sponsor.

A1.257 The target set out in the 2001 strategy is to increase rural access from 2 percent to 10 percent by 2010, reaching a total of 450,000 rural connections. Progress to date has focused on a select number of flagship projects. The first rural concession was awarded in 2003 to the West Nile Rural Electrification Company (WNRECO), owned by the company Investment Promotion Services, part of the Aga Khan Foundation. This company has the obligation to expand supply in the isolated grid area of Arua and Nebbi districts, including construction of local hydropower and expansion of the network.

A1.258 The government's strategy is supported by the World Bank– and GEF-funded Energy for Rural Transformation (ERT) project. This project provides US$60 million over five years to assist the implementation of the rural electrification strategy, including resources for the Rural Electrification Fund, support for establishing a rural energy business advisory service at the Private Sector Foundation, as well as a range of technical assistance activities to the Ministry of Minerals and Energy Development related to rural energy.

Drivers for reform

A1.259 The main driver for reform was the urgent need to attract investment into the power sector, both in generation and distribution, to underpin economic growth in Uganda. In addition, there was a need to improve operations in the industry to address the high levels of losses, low collection rates, and poor customer services. As just one illustration, in a 1998 survey, private sector firms reported that they were without power for an average of 89 days per year.[17] Some 43 percent of firms surveyed had their own generators, and investment in backup generation facilities was estimated at 34 percent of all private sector investment, representing a considerable diversion of capital away from other productive activities. Privatization became the main mechanism for carrying out the reform agenda.

Description of reform

A1.260 In 1999, Parliament passed a new Electricity Act, which removed the Uganda Electricity Board's (UEB) statutory monopoly and paved the way for private sector participation and industry restructuring. Until then, since its inception in 1964, the UEB had served as the sole player in generation, transmission, and distribution. The UEB was broken into three separate companies in 2001: the UEGCL, UETCL, and UEGCL.

17. Ugandan Investment Authority (1998).

A1.261 All three companies are subject to the Companies Act. Meanwhile, the privatization of the generation and distribution assets of the UEGCL and UEDCL is under way. The structure of the transaction in both cases is in the form of a long-term lease rather than outright sale of assets. That is, the UEGCL and UEDCL will remain as publicly owned companies and will lease their assets to private companies through a long-term leasing agreement. The lease fee is set to recover costs associated with the assets (principally loan repayments) and not to extract rent for the government.

A1.262 The generation lease has been awarded to Eskom, which took over operation of the assets at Nalubale and Kiira in 2003. The UEGCL has an obligation to complete the ongoing expansion at Kiira, and thereafter investment obligations are to be met by the concessionaire. Eskom's own investments in generation at the site are expected to be relatively small, but the company is expected to improve performance at the site. The distribution lease has been more difficult to finalize, and negotiations with the bidder (CDC Globeleq and Eskom) have been protracted. The distribution transaction is less attractive for several reasons:

- There are large investment obligations in the distribution lease, whereas investment obligations in generation are much smaller.
- The generation lease has a power sales agreement with the UETCL, a public entity, whereas the distribution concessionaire must sell power directly to customers. Nonpayment levels have been especially high in Uganda, implying considerable commercial risk.
- The generation concessionaire sells power to the UETCL on a capacity availability basis (a "take or pay"–style PPA). Hence, the UETCL takes volume risks if demand is lower than expected, as well as hydrological risks. The distribution concessionaire, however, is partially exposed to volume risks. The regulatory system allows tariffs to be adjusted in response to demand growth, but there is a risk that low demand growth will lead to rising unit costs, which will feed through into higher prices and so higher levels of nonpayment.
- Finally, the generation lessee is largely unaffected by the risks implied by generation expansion. The distribution lessee must pay bulk supply prices to the UETCL that reflect the costs of purchasing power from the new station. Regulation allows these costs to be passed through to end-consumers, but there is a risk that new capacity will result in higher end-use prices and again higher levels of nonpayment.

A1.263 Despite these obstacles, in early 2004, most outstanding issues were resolved, and CDC Globeleq and Eskom took over the UEDCL's operations in November 2004 under Umeme (Pty) Ltd, a locally registered company.

A1.264 The reforms have also paved the way for new generating and distribution entities to enter the sector. Today, independent power production amounts to 17 MW. Furthermore, there have been private sector efforts to invest in large-scale generation,

although these are currently stalled, as detailed below. Development of an isolated grid together with a distribution concession was also in 2003 to the WNRECO.

A1.265 The ERA, also established by the 1999 act, has undertaken a variety of regulatory activities, including the establishment of secondary legislative instruments (regulations) as well as more routine regulatory activities. Specific highlights include:

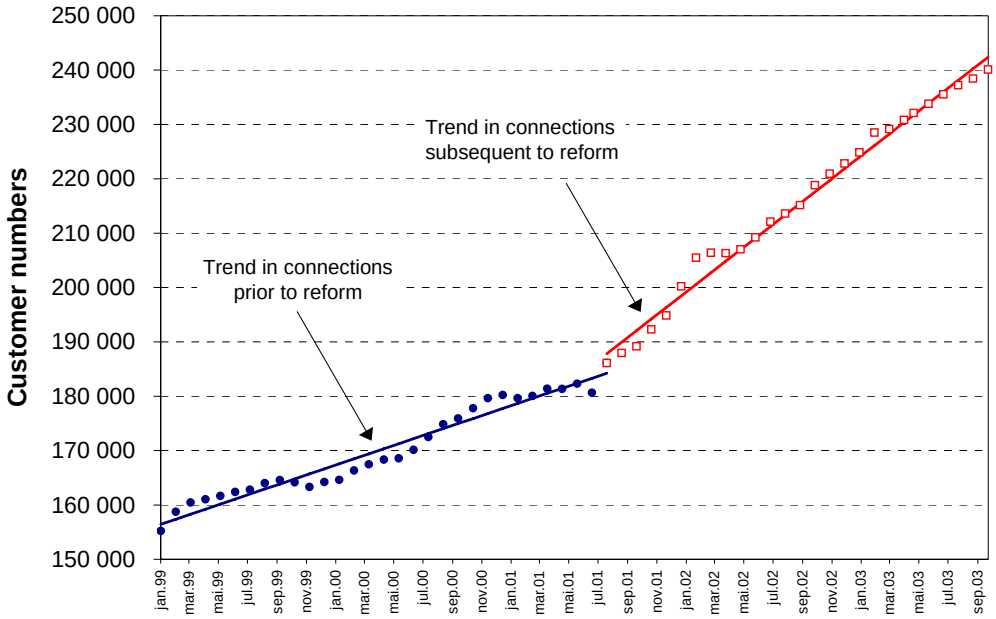
- Publication of new standards: Primary Grid Code, Quality of Service Code, Safety Code, Tariff Code, and installation permit regulations and license fees
- Issuance of licenses to the UEGCL, UETCL, UEDCL, Eskom Uganda, and independent companies (Kasese Cobalt, Kilembe Mines, WNRECO
- Annual price reviews of submissions made by each of the companies, including public hearings, which has led to radical tariff reform.

A1.266 From 1999 to the present, the ERA has exhibited limited independence from the government, particularly in relation to tariff reform. However, the design of the two key privatization transactions, the generation and distribution concessions, have detailed price determination in the concession contracts and licenses, leaving the ERA with only limited regulatory discretion. Nevertheless, the ERA is the public sector entity that will monitor compliance with the concessionaires' obligations (particularly investment obligations), and it is preparing to fulfill this responsibility.

Impacts of the power sector reform

A1.267 *Access.* With a target of national access set by the government at 13 percent (and rural access at 10 percent), for a total of 535,000 new connections by 2010, the country has a long way to go from its 5 percent access rate in 2003. The Uganda power sector reform, particularly following the tariff reforms of 2001, led to a notable increase in the rate of access: in the period from January 1999 to July 2001, the UEB made about 11,000 new connections per year. Subsequently, the UEDCL has more than doubled this rate, to 25,500 new customers per year, as shown in figure A.14.

Figure A.14: Trends in New Connections before and after Reforms



A1.268 The increased access rate is attributed primarily to the financial position of the UEDCL, which improved with the tariff adjustments in 2001. Since this period, investments increased more than threefold: US$1.5 million per year in the period 1998–2000 versus US$6.5 million per year from 2001 onward.

A1.269 In addition to the increased rate of access, there has been improved access to public sector capital. In the early stages of the reform, investments were made by multilateral agencies and regional development banks, which have contributed a total of US$120 million since 1999:

- A World Bank–IDA loan of US$33 million made in 2000 for construction and rehabilitation on the Kiira and Nalubale dams and technical assistance to the UEB
- A World Bank–IDA loan of US$62 million made in 2001 for continued expansion at Kiira
- An African Development Bank loan of US$25 million made in 2000 to improve distribution systems in Kampala, Jinja, and Tororo, including connections of nearly 10,000 new customers
- Both African Development Bank assistance and World Bank assistance were also made available to the Bujagali project.

A1.270 Much of this early support was contingent on sector reform, namely the liberalization of the sector, followed by corporatization and eventual privatization or transfer under private management of assets.

A1.271 In addition to public finance, capital is expected to be raised by the private lessees. The generation lease itself is not, however, expected to involve large-scale investment. Obligations relate to investments in substations at both Nalubale and Kiira, and they are expected to be on the order of US$6–7 million to be made in the first 4 years of the 20-year lease.

A1.272 The distribution lease involves considerable investment obligations in the rehabilitation of the existing network, as well as expansion of the network and connection of new customers. The government's initial requirements of the lessee were to invest a minimum of nearly US$60 million over the first four years of the lease, largely for rehabilitation of the existing network. There is also an obligation to connect at least 15,000 customers per year in the first four years, and 25,000 new connections per year from year five onward.[18] The obligations of the distribution lessee imply 135,000 new connections in the first seven years of operation, which would, however, have only a small impact on national access to electricity (an increase from 5 percent to 6 percent, less than half of the national target of 13 percent), given the expected increase in household numbers over this period. Still, the extent of investment expected in both rehabilitation (the short term) and system expansion (the medium term) is significant and could well approach US$150–200 million over a 10-year period.

A1.273 Finally, the government has targeted private capital for the development of new generation facilities. The track record here is somewhat tainted by the experience of Bujagali, which is currently stalled because AES pulled out in 2003, after seven years of project development. Before its withdrawal, most of the US$580 million required in capital investment had been secured from a number of entities and instruments, including equity, multilateral debt, and export credits. The firm ultimately decided to pull out because of governance concerns, after a dramatic decline in its own stock price since 2001 and a general trend of Organisation for Economic Co-operation and Development member–based companies to withdraw from developing country IPP development. Now that AES has withdrawn, the government and the World Bank are seeking to secure a new investor in the project, possibly in a public-private partnership. The main challenges, particularly in attracting new private investment, are the perceived country risk in Uganda; the lack of willingness within multinationals to venture into foreign projects, as noted in the case of AES; and the international opposition to hydropower projects, which has been particularly pronounced in the case of Bujagali. It now appears likely that the

18. The increase in new connections after four years is required partly because attention early on should be on rehabilitation and partly because, until new capacity is built, there is limited power available to supply new customers. Nevertheless, the government has stressed the importance of the lessee preparing the network for expansion, particularly because failure to significantly increase sales would make it difficult to honor the power sales agreement underpinning Bujagali.

project, if it is to be implemented at all, will have to rely on a considerable degree of public financing.

A1.274 The experience in Uganda with privately owned, smaller-scale generation projects is more successful. To date, there are two privately owned and operated generating plant at the Kasese Cobalt and Kilembe Mines, both of which are small-scale hydro developments providing a total of about 15 MW of power to the grid. There is also small hydro power station at Maziba with an installed capacity of about 2 MW. In addition, there are several other projects in the process of being developed, including a bagasse project and a number of other small-scale hydro projects. However, the total of currently estimated potential from small-scale projects is on the order of 110 MW, of which only a portion could reasonably be expected to be realized in the medium term. Hence, in a situation where annual demand growth is on the order of 25–30 MW, it will be difficult to rely only on small-scale projects to meet future demand.

A1.275 Experience in isolated grid development has been mixed concerning access to capital. The sole example at this stage is the WNRECO, which has a concession to upgrade the existing supply arrangements in the districts of Arua and Nebbi, construct a 5 MW hydro facility, and increase customers to 5,000 (from 1,000) within five years. The firm has found it difficult to reach financial closure on its project. Financing for capital investments was made up of a combination of subsidy, equity, and commercial debt. The ERT program planned to make debt finance available through a facility with the Bank of Uganda. This facility allowed for a loan to be made to the concessionaire through a local commercial bank. However, the terms of the agreement implied that all commercial risk is carried by the commercial bank—not the Bank of Uganda or the ERT program. Consequently, commercial banks have been reluctant to make the loan without some form of guarantee from either the WNRECO's parent company or some other form of risk guarantee.

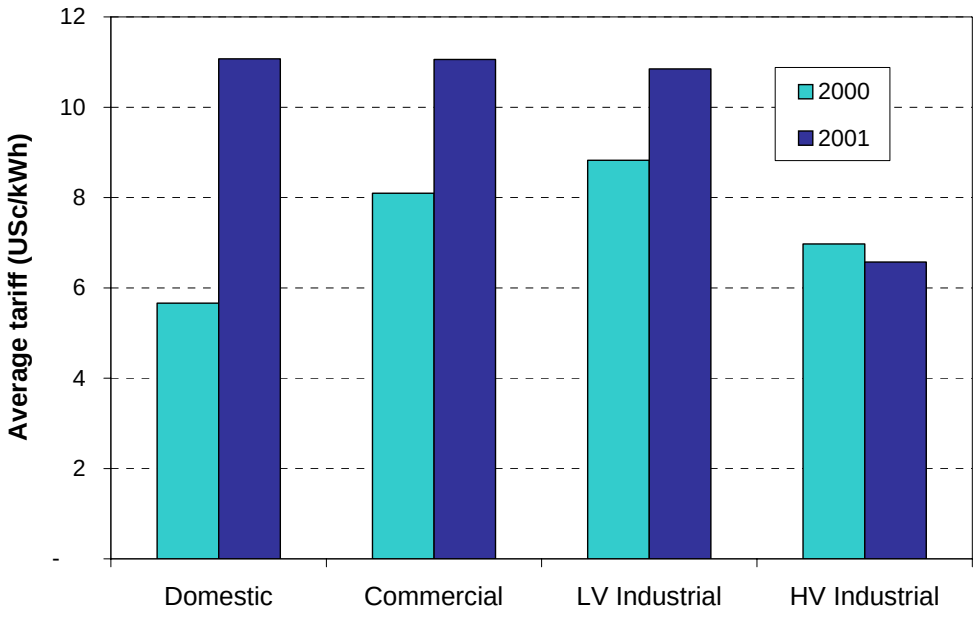
A1.276 *Price.* One of the ERA's first actions after being appointed was to introduce a major tariff reform. Prior to 2001, tariffs had not been adjusted for seven years, despite the effects of inflation eroding the real level of tariffs.

A1.277 Based on work undertaken by the government's privatization transaction advisers, the ERA adopted a price adjustment that reflected the best available picture of industry costs. This required a revaluation of UEB assets, determination of revenue requirements at each level (generation, transmission, and distribution), and estimation of other tariff parameters, such as loss allowances, return on assets, and so on. In addition, a methodology was proposed by the transaction advisers, and adopted by ERA, that allocated costs to each customer category and structured tariffs across the groups.

A1.278 The result was a new tariff schedule, introduced in 2001, that both increased the average level of tariffs and rebalanced tariffs among customer categories. Tariff increases were particularly high for domestic customers, who had been on tariffs well below the cost-reflective level for their cost of supply. The weighted average tariff increase (in nominal Uganda shilling [U Sh] terms) for all customer groups was 30

percent—largely reflecting an inflation catch-up, given the seven-year period in which no tariff increases had been made. However, the average domestic tariff went from U Sh 88/kWh to U Sh 194/kWh (US¢11), an increase of 120 percent. This increase was considerably higher than for industrial customers, for whom the increase (in Uganda shilling terms) was 39 percent and 6 percent for low-voltage and high-voltage industrial consumers, respectively. Figure A.15 compares tariffs in 2000 and 2001, expressed in nominal U.S. dollars. (The increases are lower than in Uganda shilling terms because of currency devaluation.)

Figure A.15: Tariff Reforms Introduced by the ERA in 2001



Note: Average tariffs are calculated as the average payment per unit of energy consumed, combining all elements of tariffs (fixed charges, energy charges, and maximum demand charges).

Source: Calculated from data presented by the ERA, available at http://www.era.or.ug/pxDistribution.asp. Accessed.

A1.279 With the tariff reform introduced in a single increase, there was notable negative public reaction, as well as critical response from politicians. Significant nonpayment followed. Still, the ERA did not adjust prices. The government responded by offering tariff relief targeted at domestic customers, limited to early 2003. This was incorporated into a revised tariff, and the ERA also introduced a lifeline tariff in the domestic tariff category by providing the first 30 kWh consumed per month at a low rate (U Sh 50/kWh, equivalent to US¢2.5/kWh). The under-recovery was made up by a small surcharge on all other customers, although in the tariff schedule for 2004, the recovery was confined to a surcharge applied only to the domestic tariff.

A1.280 Since the initial price increases, retail tariffs have declined, with domestic tariffs at just over US¢9, down from US¢11, and the average of all tariffs at US¢8. This decline is partly due to debt relief that has been provided on electricity-related public sector debt and partly due to economies of scale as consumption has increased. Further, access rates have been increasing.

A1.281 At the same time, a household survey identified that households were fairly sensitive to electricity costs, with several opting to switch to other fuels (fuelwood and kerosene) as an alternative to electricity.[19] However, the reason for switching was not only an increase in price, but also a response to the UEDCL's tougher stance with regard to electricity theft and nonpayment as well as concerns with reliability. It should also be reiterated in this context that household access in Uganda is less than 5 percent, implying that 95 percent of the population is unaffected by the direct effects of power price increases. For these 95 percent, the increased possibility of obtaining access, as a result of increased investment on the part of the distribution company, is likely to have a more significant impact on poverty than the level of prices.

A1.282 In the short term, only limited changes to tariffs are expected as Umeme takes over the distribution operation. However, once loss reduction targets are fulfilled together with expected increases in consumption, cost levels should decline. In the medium term, major changes are anticipated as new generation facilities come online. Existing bulk tariffs are approximately US¢1/kWh; in contrast, the cost of new generation facilities is estimated at about US¢6/kWh, regardless of whether facilities are small- or large-scale hydropower plants. The effect on tariffs will occur with or without private sector participation, a reflection of the marginal cost of generation in Uganda. Furthermore, insofar as the regulatory system allows for a cost pass-through, the new bulk tariff would be reflected in the end-user tariff. In anticipation of these changes, the government and the ERA have instituted a tariff-leveling mechanism, with the intention of over-recovering costs in the period leading up to the establishment of the next large power station, then using the surplus to smooth out any sharp peaks in power prices that may arise.

A1.283 *Other impacts.* In addition to access and price, quality of supply has improved with the reforms. In 1999, as much as 6 percent of total demand was load shed. This has now been reduced to less than 1 percent with the additional units installed at Kiira power station. However, as demand continues to grow, load shedding can be expected to increase until the two remaining units at Kiira are commissioned.

A1.284 Social service improvements and rural economic development are expected to take hold as the Rural Electrification Strategy is implemented. However, at the current state of implementation, these benefits have not yet materialized.

A1.285 Finally, with regard to public finances, tariff reforms have enabled a reallocation of government expenditure away from the power sector. The exact impacts

19. The survey was carried out by May Sengendo in preparation for the study in 2003.

of this reallocation are difficult to quantify, because funds in government budgets are fungible and inflows cannot be traced to specific expenditures. However, because Uganda has placed a high priority on poverty alleviation expenditures, it can be understood that any additional resources made available to the government will have a positive impact on the poor.

Conclusions

A1.286 Uganda's power sector reform has brought about drastic changes in the industry since 1999, with the privatization of generation and distribution activities. In addition, new players are beginning to enter both generation and distribution—albeit with some stops and starts, as demonstrated in the case of Bujagali and AES. Foreign and private investment flows are projected in the future. Among the most significant achievements is that funds traditionally diverted to maintain an insolvent utility are now freed up for potential investment in poverty reduction.

A1.287 The reforms have ushered in a new price regime, which, while improving the financial situation of the utilities and thereby enabling them to expand access rates, have simultaneously put pressure on consumers, particularly households, who saw the steepest rise in tariffs. A lifeline tariff has been put in place to mitigate the effects on the poor; furthermore, a tariff-smoothing mechanism has been developed by the ERA and government to reduce future abrupt increases as new and more costly supply comes on line. Even with these measures, 95 percent of the Ugandan population remains unserved with electricity.

A1.288 The Government's Rural Electrification Strategy, which is supported by a US$60 million World Bank–GEF loan and grant, may go a long way in improving access rates for the rural poor. This approach is through private-public partnerships that are demand driven and decentralized.

Appendix B

Research Framework and Methodology

Introduction

B1.1 The Energy Sector Management Assistance Program (ESMAP) appointed the University of Cape Town to undertake study work for the project Power Sector Reform in Africa: Assessing the Impact on Poor People. The project aims to develop a better understanding of the relationship between electricity reform and the poor in Africa. The project also intends to identify best practice in reform strategies and disseminate research findings to policy makers.

B1.2 The project was implemented in collaboration with research partners in several African countries. The research approach is case study based, with a series of studies undertaken across various African countries. This document presents the research framework and methodology that case study partners were requested to adhere to.

Research Framework

B1.3 The research framework outlines a common foundation upon which the research and analysis were conducted. The framework includes specification of the project background, objectives, structure, activities and outputs, as well as guidelines on the treatment of key project concepts.

Project background and objectives

B1.4 Over the last decade or about, African governments have been implementing a range of power sector reforms. These reforms have mainly included commercialization, corporatization, and privatization initiatives and the establishment of new regulatory institutions. Some initial attempts have also been made to restructure electricity industries in preparation for competition in various aspects of the electricity industry. These reforms have generally taken their lead from models of reform emanating from industrialized and other middle-income countries, but they now appear to be taking on their own shape, as is evident with the establishment of electrification funds and access initiatives in various countries.

B1.5 Power sector reforms currently being implemented in many African countries may not be positively affecting Africa's poor people. In many cases, African policy decision makers, politicians, and researchers are questioning the reform process and why it is not making a contribution to Africa's core energy sector developmental objective of increasing poor people's access to electricity.

B1.6 The overall objectives of this project are to:

- Develop an in-depth understanding of the impact that power sector reforms in Africa are having on the continent's poor people
- Draw on best practice to suggest innovative ways of ensuring that power sector reforms improve poor people's livelihoods.

B1.7 Power sector reforms do not move directly to some ideal end-state model but are likely to evolve over time and, in many cases, take on their own country-specific character. In many African countries, reforms are only just beginning to be implemented (see appendix A). The objective of the project is that this project becomes positioned to influence reform agendas as they are designed and implemented.

B1.8 To achieve its main objectives, this project sought to understand the most appropriate power sector contexts in which both access and efficiency improvements can be achieved. In particular, this project tried to understand how the window of opportunity brought about by power sector reforms can best be used so as to bring about extensive improvements in electricity access programs.

B1.9 Specific objectives of this project are to:

- Generate materials that will assist Africa's senior energy decision makers in making informed decisions about power sector reform, with particular emphasis on having positive impact on Africa's poor
- Provide opportunity for key African energy research institutions to develop sustainable capacity in this area
- Create direct contact, training, online training, or both, as well as learning materials for Africa's regulators, policy decision makers, and other interested groups in the area of power sector reform and its social, environmental, and economic implications.

Project structure, activities, and outputs

B1.10 Project activities, approach, and outputs are described in table B.1.

Table B.1: Project Structure, Activities, and Outputs

Activities	Approach and purpose	Outputs
Activities 1 & 2 Developing a methodology and research framework for case study	The purpose of the research framework and methodology is to provide guidance to case study partners in conducting their research and analysis for this project. Current	This document.

partners.	debates and research questions are outlined. Guidelines in drafting country reports, as well as requirements of case study partners, are defined.	
Activity 3 Undertaking case study research and analysis according to the research framework and methodology.	Each case study partner is responsible for using the research framework and methodology defined in activities 1 and 2. Case study reports based on outcomes of this task are written by each case study partner. Case study partners are responsible for country-specific analysis once the methodology has been implemented. This aspect of the project also generates country-specific recommendations on achieving both efficiency and access improvements through electricity sector reforms.	Seven case study reports are peer reviewed. See the research framework and methodology framework in the main text of this document for guidelines on content.
Activity 4 Analyzing case studies and presenting recommendations to policy makers.	Case studies are analyzed both specifically (see activity 3) and generally. Common themes and conclusions emerging from all of the case studies are drawn. Recommendations put forward are likely to be in the form of regulatory, legislative, and governance-related strategies and instruments that achieve efficiency and access improvements. Materials generated are used to influence reform debates and agendas, as well as form the basis of material utilized.	A synthesis report is peer reviewed.
Activity 5 Initiating and undertaking a series of outreach and advocacy activities.	This activity, which is financed separately from the rest of the project, begins when activities 1–4 have been completed.	A Web site provides project background and research outcomes. Research material in suitable format is transformed into regulatory training materials. Seven country-specific workshops or seminars, targeted stakeholder meetings, and presentations

		to disseminate research results. Journal articles. Peer review.

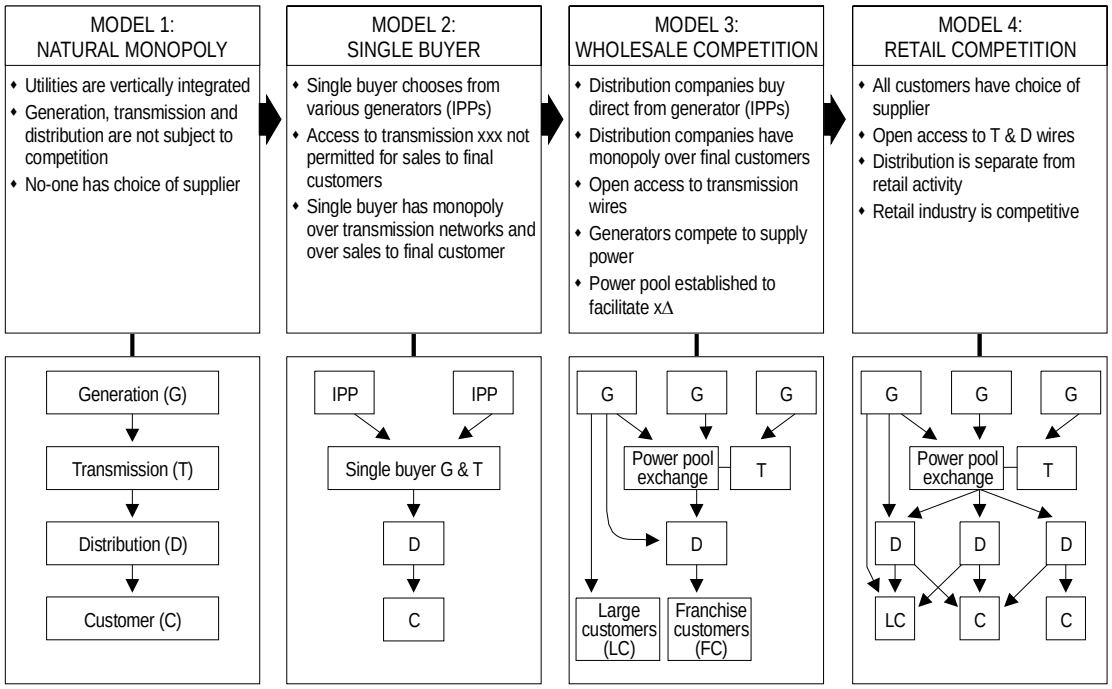
B1.11 This document concerns activities 1 and 2.

Guidelines on key research concepts

B1.12 To ensure excellent research and analysis, it is important that all core and case study research partners share a common understanding of key concepts used frequently by the research. These are discussed in the next sections.

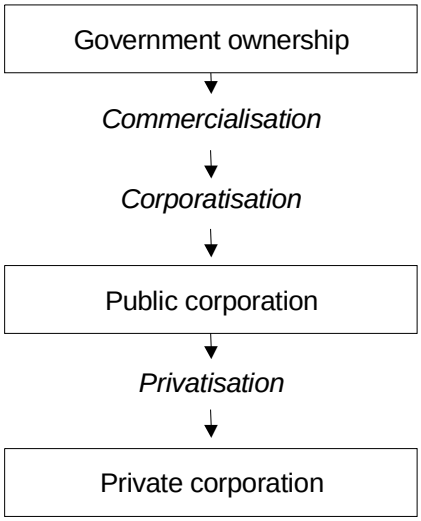
B1.13 *Electricity (or power sector) reform.* Traditionally, electricity reforms have been presented as a process involving various critical steps. These have been presented by Hunt and Shuttleworth (1996) as *structural* adjustments and changes in the *ownership* of electricity industries, as shown in figures B.1 and B.2.

Figure B.1: Alternative Electricity Sector Structures



Source: Hunt and Shuttleworth (1996).

Figure B.2: The Ownership Dimensions of Electricity Industries in Transition



Source: Adapted from Hunt and Shuttleworth (1996).

B1.14 Drawing from a wealth of experience in implementing electricity reforms in both industrialized and developing countries, theorists now view power sector reform differently. Commercialization, corporatization, and privatization initiatives, as well as those undertaken in preparation for competition, continue to be regarded as key elements (rather than steps) of reform. Also, there is no longer wide support for the "one ideal" power sector reform model. Indeed, experience reflects the wide range of approaches and models that have been adopted—sometimes successfully and other times not.

B1.15 This research project regards the following as important elements or aspects of reform but not necessarily logical or sequential steps of reform:

- Government ownership: The government both owns and has direct managerial control over the industry. In other words, the government is owner, regulator, and manager, although sometimes different "nameplates" are assigned to the different roles. The industry is viewed as an element of the government's infrastructure.
- Commercialization involves government relinquishment of direct management of the enterprise in favor of more independent management and a focus on financial viability and profitability. This involves a change in behavior rather than organization. It normally involves adoption of commercial accounting practices, economic tariffs, and an effort to separate the core business from other activities.
- Corporatization of statutory utilities involves the formal and legal move from direct government control to a legal corporation with separate management. The ownership of assets and the capital structure need to be determined before this

step is taken. The government also needs to set out objectives for the corporation and the process by which public policy objectives are taken into account. Economic regulation may be introduced at this stage to oversee pricing and investment policies.

- Restructuring for competition involves vertical unbundling of generation, transmission, and distribution to separate the competitive elements of the industry from the natural monopoly (wires) components. Horizontal unbundling involves the separation of the generation utility into a number of competing companies. New players are allowed into the market in the form of independent power producers (IPPs).
- Private sector involvement results from a move from a government corporation to a privately held company. Incentives for efficiency are considered even greater if management is subject to the disciplines of investor risk. These companies may be listed on stock exchanges and are expected to make profits for their shareholders. The managers of the company are accountable to the board of directors, which represents the shareholders. These companies tend to be regulated by an independent entity. Note that private sector participation might not necessarily be achieved through a privatization initiative. Alternative models include private investment in system expansion, with existing assets remaining under government ownership. Typical examples are IPP development. Another example involves concessions, where assets remain under public ownership but are leased to the private sector with associated investment obligations.

B1.16 As illustrated later in this document, an important focus of this research project is to provide detailed descriptions of these various elements of reform. For instance: What have been the elements of commercialization and corporatization ventures? How have performance contracts been established? To what extent can competition be realized and risk apportioned more equitably between investors and customers? What has been the structure of new regulatory institutions?

B1.17 *Access programs.* Electricity access programs include a variety of public or private sector–initiated programs that seek to bring about access to electricity. These can be grid- or off-grid-based programs, and they may or may not be subsidized by government (or another funding source) at various stages in the electricity supply chain or cross-subsidized by other electricity customers.

B1.18 In line with common practice in Africa, an important focus of the research and analysis of this project is on subsidized or nonsubsidized, grid-based programs, and research partners should include discussion and analysis of off-grid (or nongrid) initiatives when undertaking the impact assessment.

B1.19 *Poverty and the poor.* Measuring the welfare impact of energy sector interventions on the poor is not the same as measuring the impact of poverty. For example, electricity reform might result in the cost of electricity to poor households being

reduced. This would imply that poor households' welfare would increase. This same price change might indirectly take some of these households out of poverty—for example, by releasing women and children from the time-consuming task of gathering traditional fuel or by raising productivity in household chores or in the operation of home-based entrepreneurial activities. Though measurable in principle, this spin-off effect is much harder to measure with acceptable reliability. In particular, it is difficult to attribute changes in poverty to one intervention rather than another. Thus, it would be a more modest objective to examine how electricity sector interventions directly benefit the poor, and that is what this research seeks to adopt: Research outcomes will not necessarily make any statement of the impact that electricity reforms are having on "poverty."

B1.20 For more information on this topic, see Vivien Foster's "Measuring the Impact of Energy Reform—Practical Options" in *Energy Services for the World's Poor, ESMAP's Energy and Development Report 2000*. Copies are available upon request from ESMAP.

B1.21 *Different levels of poverty.* This research takes into account the different levels of poverty in Africa. Some poor households are able to afford to use some electricity if they have access to it, but others are not. The latter category of people relies on traditional fuels to satisfy their household energy needs. This research will produce comment on the impact of electricity reforms on the poor, yet this impact will mainly be felt by a certain category of poor people. Or there will be direct effects on some category of poor people and indirect effects on others. Attempts must be made to categorize these impacts according to specific level of poverty.

Further reading

B1.22 Please see www.energypublicbenefits.com for an extensive bibliography on power sector reform theory and experience, energy public benefits and their relation to power sector reform, and regulation and power sector reform.

Research Methodology

B1.23 The project team has devoted a considerable amount of effort toward understanding how best to measure the impacts of power sector reform on Africa's poor. A wide range of methodologies was considered, including input analyses measuring the productivities of utilities and output-related methodologies measuring price and programs, to direct poverty impact assessments based on household surveys. The authors have had to decide whether this project warrants a rigorous quantitative analysis or whether a qualitative study would be more appropriate.

B1.24 It was decided to conduct this study in a more qualitative way, making use of interviews and data collection. Where possible, formal household surveys were not conducted; the study has relied on existing studies and survey data coupled with rapid appraisal techniques. Where data and surveys did not exist, nonsurvey techniques—

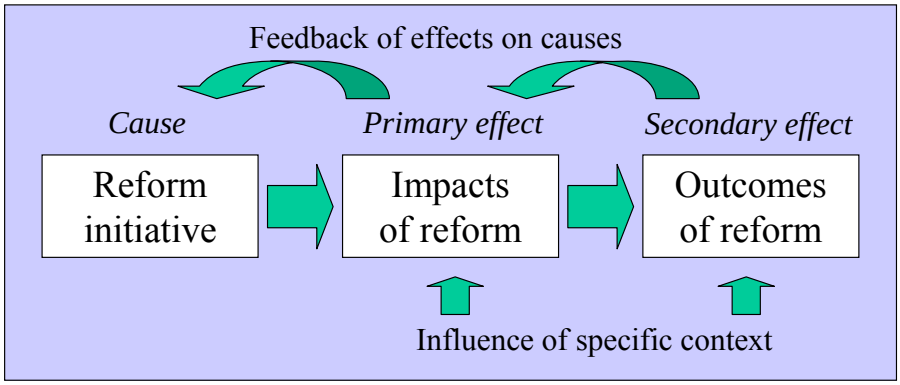
including discussion or focus groups, interviews, and other PRA–type approaches—were employed, and outcomes were treated as illustrative (that is, providing anecdotal evidence to illustrate what is found elsewhere). Because this area generally tends to be under-researched, interviews with people running businesses and informal generating activities were useful.

B1.25 This approach was chosen instead of a quantitative study because it may be too difficult to establish causality between reforms and impact on Africa if a purely "macroanalytical" or "top-down" approach is applied, and data requisite for a macroeconomic analysis are likely to be unavailable.

Research Challenges

B1.26 As noted above, one of the greatest challenges in any evaluation research is to identify causality. Figure B.3 presents the anticipated nature of causal relationships.

Figure B.3: Causal Relationships in Evaluation Research



Factors that influence detection of causal relationships

B1.27 The detection of these relationships is difficult because of several factors, including the influence of other causes on outcomes, the fact that outcomes may be conditional on specific factors in the environment, the feedback loops that may exist between effects and causes, and the time delay between the implementation of reforms and the emergence of impacts. All of these complexities are likely to exist in the topic being researched in this project.

B1.28 The issue of time delays is of particular significance because, in many cases, reforms are at a preliminary stage of implementation. Hence, impacts may not have had a chance to manifest themselves. In these circumstances, research work inevitably will contain an element of speculation on what the likely impacts and outcomes will be. Nevertheless, we anticipated that the research would be able to discern certain trends, which would inform the conclusions drawn.

Measurement of impacts and outcomes

B1.29 Measurement issues can also be difficult to deal with. Measurement of impacts can usually be undertaken with more confidence than measurement of outcomes. For example, measurement of changes in the extent of access to electricity, one possible impact of reforms, can be undertaken fairly easily. The outcome of this, anticipated to be social and economic benefits in the home and community, is harder to detect and measure. To a large extent, research conducted in the various case studies focused on measurement of impacts, with the nature of outcomes detected with a lower degree of confidence.

Generalizing research findings

B1.30 A challenge of case study–based research is avoiding the pitfall of generalizing research findings that are conditional on the specific context of the case study. First, the authors hope that this problem is minimized because the countries forming the focus of this research share a similar context. Although there are certainly differences, often marked, between countries, there are also strong similarities that should make the generalization of findings somewhat easier. Second, the choice of a reasonably large number of case studies means that cross-referencing and triangulation will assist in identifying findings that can be generalized and those that cannot. In this sense, the comparative analysis of the case studies forms an important element of the research method used.

B1.31 Nevertheless, glib generalization is a dangerous pitfall, which the project has aimed to avoid through caution in the drafting of recommendations and conclusions.

Research Themes

B1.32 Power sector reforms potentially have an impact on poor people in various direct and indirect ways. The impacts and associated outcomes are illustrated in figure B.4 and briefly described below.

Price of electricity services

B1.33 Reforms will almost certainly affect the price of power for end-users. In fact, often one of the first reforms to implement is price reform. Two aspects influence price levels:

- Changes to the underlying cost of supply: One of the core objectives of reforms is to promote efficiency in utility operations. New management and technology are intended to reduce service costs, which should feed through into prices. However, reforms that introduce private sector capital as well as those that refurbish and upgrade infrastructure can lead to increases in the cost of supply. These cost increases may be efficient from an economic point of view (for example, reflecting country and market risks in the cost of capital or improving the quality of infrastructure), but they can lead to cost increases.

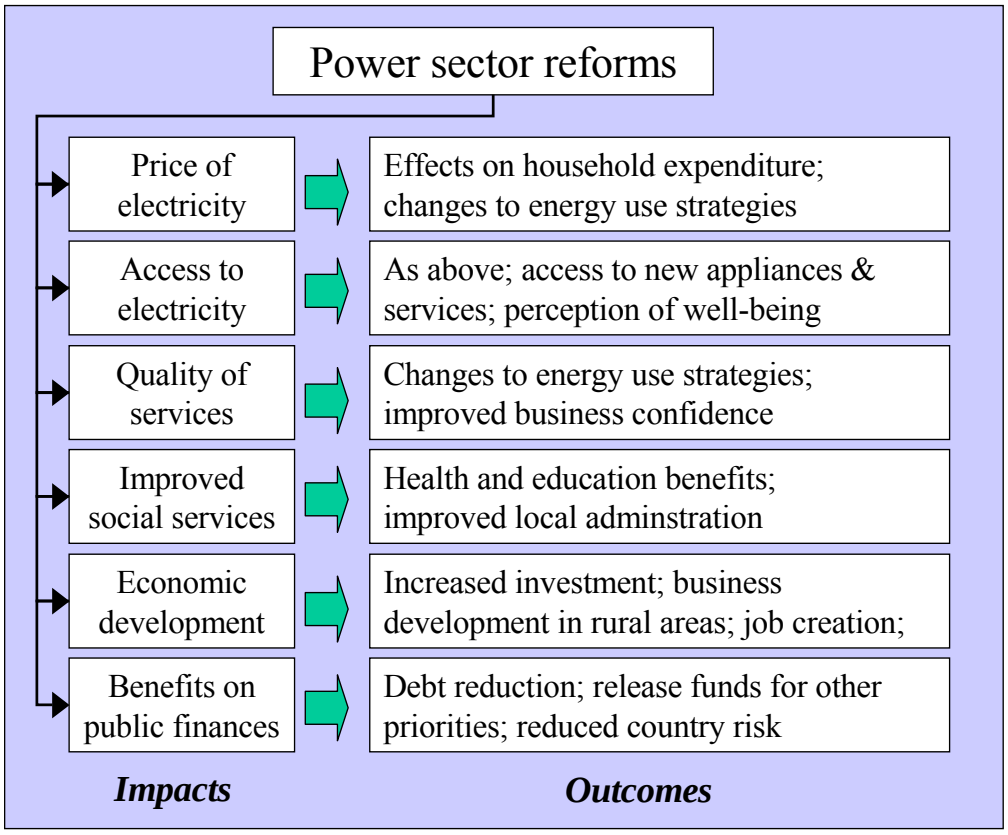
- Moves toward cost reflectivity: Price reforms in Africa may increase prices in an attempt to catch up with inflation during a period when prices were suppressed as a result of political controls. Further, reforms tend to remove existing cross-subsidies to domestic consumers, leading to even higher price increases for domestic consumers. Removal of cross-subsidies may be associated with mechanisms to focus subsidies on extending access rather than lowering prices. In this context, there is a tradeoff between the social benefits of low prices and the benefits of extended access.

B1.34 Reform programs might include special targeted tariffs for the poor to mitigate the price increases associated with a move to cost reflectivity and make electricity more affordable for the poor.

B1.35 There will be both direct and indirect effects of price changes. The indirect effects, such as improved services, extended access, and so on, are dealt with elsewhere in this discussion. The direct effects deal simply with:

- The impact on household income and the resulting changes in consumption and expenditure priorities that result
- The fuel-switching and conservation strategies that households may use.

Figure B.4: Impacts and Outcomes of Power Sector Reform



Access to electricity

B1.36 Reforms may influence the extent to which utilities and other agencies invest in promoting access to electricity services:

- Access via existing utilities: On the one hand, improved efficiencies may yield investment resources that enable utilities to increase investment. On the other hand, more commercial approaches may focus utilities on profitable segments of the market, thereby reducing or altering commitment to extending access.
- Access via new agents: Liberalization may open up new opportunities for non–utility investors to enter the electricity market. Such investors may provide additional resources and opportunities for expanding access to electricity.
- Access via special mechanisms: Several reform initiatives include a dedicated focus on promotion of access, including the establishment of dedicated electrification funds and institutions. These mechanisms, built into the reform process, may be more effective than utility-driven efforts to expand access.

B1.37 In many respects, the goal of increased access is the key poverty reduction objective in the power sector. The extent to which increased access does lead to poverty reduction will depend on the ways in which households are able to utilize electricity and the income-generating activities that may be enabled by having access.

Quality of supply and service provision

B1.38 Many African electricity industries provide a poor level of supply, partly as a result of older technologies and poor management practices, but mainly as a result of inadequate investment in generation and networks. Customer services may be correspondingly poor, including issues concerning billing or prepayment, connection fees, and how applications and complaints are dealt with. A key objective of reforms is to increase the quality of supply in the industry, and this will influence poor households in different ways:

- Improved electricity supply to households that have power and the changes in fuel-switching and security mechanisms that these households employ: A better-quality supply may mean that households rely more on electricity and no longer depend on more expensive backup systems (for example, diesel generators).
- Improved quality of supply and service to businesses may both reduce the costs of supply to these businesses and stimulate the growth and number of businesses—including in areas outside urban settlements, where supply quality and customer service tends to be poor. Informal, micro, and small businesses are particularly important segments to consider, because these businesses are typically large employers among poorer households.

B1.39 Poverty reduction outcomes arising from these effects should be related to the income impacts on household budgets and the income generation and job creation associated with business activities.

Improved social services

B1.40 Social services, in particular health and education, make use of electricity where it is available. The quality of these services depends, to some extent, on the availability and quality of electricity supply. Reforms may affect both access and quality and hence affect service provision to poor households. For the purposes of this study, the authors looked at two areas of social infrastructure and one area of physical infrastructure:

- Health services: Power sector reforms may improve health services by extending power supply to additional clinics and other facilities, and improved quality of supply may influence the ability of health facilities to provide health services.
- Education services: Similarly, power sector reforms may improve educational services by improved access, extended use of electrically powered equipment, and enabling access to the Internet in schools. A related question is whether students have access to good-quality lighting at home and school for study purposes.
- Telecommunications: The extension of telecommunications services may be influenced by the availability and quality of electricity supply. Although the benefits of improved access to communication should not be attributed to electricity reforms, the complementary nature of physical infrastructure should be recognized and identified where it exists.

Stimulation of economic development

B1.41 Electricity is widely seen as an essential part of a country's physical infrastructure and one that, indirectly, is an enabling element in promoting economic and social development. Although the causal link between power sector reform and the stimulation of economic activity is difficult to research and prove, it remains potentially the greatest impact that reforms may have on poverty.

B1.42 The nature of impacts can be expected to work in several ways:

- First, improved quality of supply (albeit offset by price changes) may reduce input costs to existing businesses, particularly if backup supply options can be avoided.
- Second, extended access to electricity may allow new (small and other) enterprises to emerge and enable existing businesses to benefit from the use of electrical equipment.
- Third, where a reliable electricity supply is provided with other infrastructure services, the combined synergistic effect may be to lead economic development (from both small and other industries) in an area.
- Finally, where the electricity industry itself becomes a significant investor in the economy, it may stimulate the development of related services, particularly

because commercialized utilities tend to outsource noncore functions (to Small and Medium Size Enterprises [SMMEs] and other business enterprises).

Public sector finances

B1.43 The last theme to be researched in this project involves the impact of power sector reform on public finances. Poorly performing utilities typically represent a significant drain on public sector finances, diverting resources away from others priorities of the government. Reforms are intended to place utilities on a commercial footing, and they should affect government finances in three:

- First, reducing or removing the need for subsidies to the sector
- Second, producing tax revenue from profitable companies, and where public ownership remains, dividend payments to the state
- Third, receipts from privatization could provide opportunities for debt and interest reduction and increased social and welfare expenditure.

B1.44 Whether the resources generated from these effects are spent on poverty reduction measures is a separate question, and the fungible nature of government funds makes it impossible to trace the impacts of individual fiscal flows. Nevertheless, if the country enjoys a reasonable level of governance with a program of poverty alleviation activities, then any positive fiscal effects can be assumed to generate positive poverty relief effects.

B1.45 An associated impact is the effect that reform policies, together with the associated impacts on public finances, have on investor confidence in the country. Improving the macroeconomic framework can do much to reduce country risk. Microeconomic reforms, such as power sector liberalization, can contribute to this process.

Research Approach

B1.46 The research is based on a set of seven country case studies.

Reform topics investigated

B1.47 Case studies were chosen to pursue different power sector reform strategies or elements of reform. The intention was to identify specific areas of reform and attempt to trace the effects of such reforms on the poor. The elements of reform explored include:

- Commercialization (including performance contracts)
- Corporatization (including clarification of shareholding, taxes, and dividends)
- Restructuring for competition (including IPPs and unbundling)
- Private sector participation (including management contracts, concessions, privatization, and new investment)
- Establishment of new regulatory institutions

- New electrification funding mechanisms.

B1.48 The case studies do not attempt to pursue the impacts of all the different elements of reforms, but focus on specific aspects that are present in that country and are of special relevance to the experiences there. Table B.2 presents a matrix illustrating the reform strategies and the associated anticipated effects that are investigated.

Table B.2: Reform Topics and Linkages to the Poor

Reform initiative	Research themes					
	Prices	Access to electricity	Quality of supply	Improved social services	Economic development	Public finances
Commercialization	✓	✓	✓			
Corporatization	✓	✓	✓			✓
Restructuring for competition	✓	✓	✓			
Private sector participation	✓	✓	✓		✓	✓
New regulatory systems	✓	✓	✓	✓	✓	
Electrification funding	✓	✓		✓	✓	✓

Research hypotheses

B1.49 Table B.2 indicates the anticipated linkages that may be found between reforms and poverty, presented in terms of the research themes identified for the project. These linkages can be expressed in the form of a set of research hypotheses, setting out in hypothesis form the linkage between reform and poverty. Each of these hypotheses is outlined below.

B1.50 *Commercialization.* Efforts to commercialize the sector, encouraging commercial behavior, is often a first step in the reform process. This type of reform can affect the poor in the following ways:

- The attention paid to commercial and financial indicators of performance, rather than social indicators, will limit efforts to promote access to electricity, and a move to cost-reflective tariffs will make electricity less affordable for poor households.
- Commercialization could lead to greater financial viability, and more resources could be made available to maintain an acceptable level of supply.

B1.51 These reforms typically lead to staff reductions in utilities, as well as an increase in outsourcing to small enterprises, with associated job losses and creation.

B1.52 *Corporatization.* Often, the next reform step involves statutory enterprises being converted to corporations (under companies acts). These reforms do not generally have direct impacts on poverty in themselves, although they are typically associated with commercialization drives and hence can affect prices, access, and quality of supply. Corporatization clarifies the role of the state as shareholder, and the shareholder compact could include commercialization targets. However, it could also include targets for widened access. Corporatization can also lead to a change in public finances because these new institutions are required to pay taxes and dividends (often exempt before), and they are required to raise finances from the markets rather than from the government.

B1.53 *Restructuring for competition.* Competition in electricity supply tends to be an element of mature electricity markets rather than a core element of African power sector reforms. However, a level of competition can be introduced through IPPs. Competition will change the nature of price determination, with consequent effects on price levels and structures, thereby affecting household welfare. Vertical and horizontal unbundling are undertaken to structure the electricity market for future competition. The unbundling also facilitates the commercialization and corporatization process through the ring-fencing of accounts and the clarification of purpose of the various entities.

B1.54 *Privatization and private sector participation.* Private participation in the industry introduces new technology, new management, and new capital to the industry. Various models are being explored in Africa, including management contracts, concessions, sales, and opportunities for new investment. Impacts on poverty will arise from:

- The beneficial effects on public finances (directly from privatization receipts and indirectly from relieving the public sector of the investment burden) release public sector resources for social and poverty reduction programs.
- On the one hand, private capital may increase industry costs by incorporating country and sector risks into the costs of capital. On the other, privatization may result in efficiency gains, thereby reducing costs. The resulting impact on prices will have consequences for domestic welfare.
- Private participation, and the associated investment, will improve the quality of supply. This, in turn, will influence energy use in households and businesses, with associated effects on household welfare and producer surplus.
- Privatization transactions can incorporate a commitment to invest in network development (or off-grid supplies), thereby directly extending access to electricity with the associated impacts on affected households. Private participation could lead to new innovations in extending access through new institutional arrangements and utilizing new technologies.
- Private sector participation can be associated with outsourcing of utility functions to private enterprises, particularly where private participation is

associated with new investment. This will have impacts on poverty through the stimulation of secondary and contracting industries.

B1.55 *Establishment of new regulatory institutions.* The establishment of new regulatory institutions is typically an initial and core element of reform. The intention is to improve governance in the sector, with associated incentives to invest and improve pricing. New governance arrangements will affect poverty in the following ways:

- Regulatory institutions will be responsible for price reform, with consequent impact on household welfare.
- Regulatory institutions will incorporate incentives and obligations to promote access to electricity in licences or concessions awarded. Electrification obligations could be specified in ways that maximize social and economic benefits.
- Regulators are also concerned with the quality of supply.

B1.56 *New electrification funding mechanisms.* Several reform initiatives have incorporated new financial mechanisms to promote access to electricity, typically taking the form of electrification funds administered through public governance institutions (for example, a Ministry of Energy or a quasi-independent board). New planning and implementation mechanisms might also be put in place. These mechanisms will influence poverty in the following ways:

- They should increase access to electricity by providing dedicated finance for network expansion, and perhaps also cross-subsidization of tariffs.
- They will provide finance for connecting public service institutions (schools, clinics, and so on) to an electricity supply.
- The promotion of electrification will stimulate the development of small and informal businesses in areas where service is provided.

Identification of case study countries

B1.57 Identification of case study countries has been undertaken through the following process: First, a scan of power sector reform status and plans in a wide set of countries was undertaken (see appendix A). Thereafter, case study countries were selected according to criteria described in table B.3. Terms of reference have been drafted for each of these case studies.

Table B.3: Final Selection of Case Study Countries

Countries	Reform progress	Relevant aspects of reform	Research partner	Other key contacts
Southern and Eastern Africa				
1. South	Commercialization and	Grid and off-	Alix Clark	Numerous

Africa	corporatization complete; restructuring for competition, including licensing of new IPPs; extensive grid program built into distribution reform; private concessions to extend rural access; regulatory framework being established for new contexts; electrification fund established.	grid electrification programme, history behind electrification fund and poverty tariff.	and Anton Eberhard, Graduate School of Business, University of Cape Town.	contacts in the National Electricity Regulator, Eskom, Department of Minerals and Energy, and Department of Public Enterprises.
2. Namibia	Commercialization and corporatization of Nampower, rationalization of distribution, rural electrification company, establishment of independent regulator.	Rural electrification program and plans, distribution industry restructuring, establishment of an electricity regulator.	Ralf Tobich, EMCON.	Siseho Simasiku, CEO, Electricity Control Board; Paulinus Shilumba, Electricity Control Board; Foibe Jacobs, Nampower; Mark Davis (for work with Sadelec on Nampower restructuring).
3. Uganda	Full unbundling, beginning of privatization.	Impacts of unbundling and privatization, special arrangements for rural electrification.	May Sengendo, East African Energy Technology Development Network; Mark Davis	Economic and NVE work supporting restructuring; Emmanuel Nyirinkindi, Director, Electricity Reform Unit.
4. Tanzania	Moves toward commercialization, management contact, IPPs, and new investment.	Management contract, move toward electrification fund.	Hieromini Shirima, Planning Economist, Tanzania Electric Supply Company	
North and				

West Africa				
5. Senegal	Two attempts at privatization, establishment of a regulatory authority.	Privatization experience, rural electrification institutional arrangements (independent body to administer).	Youba Soukona and Fatima Denton, ENDA-TM.	Alione Fall, Chairman, Power Sector Regulatory Commission
6. Ghana		Process adopted to bring through significant tariff increases, grid-electrification initiatives.	Abeeku Brew-Hammond, KITE.	Albert Kan-Dapaah, Energy Commission; Stephen Adu, Executive Secretary, Public Utilities Regulatory Commission
7. Côte d'Ivoire	Large-scale privatization, new wave of reform.	Concessions, management contracts, privatization.	M'Gbra M'Guessan, Econoler International	Joseph Assi Bénié, Director General, Autorité Nationale de Régulation du Secteur de l'Electricité ; various contacts in the Ministry for Energy and Environment

Case Study Research Methodology

B.158 Case study research partners were requested to cover all of the research questions outlined in section 4 of the main report. and table B.4. It was anticipated that some of these research questions would be more applicable and relevant than others. Where experience is particularly interesting, case study research partners were requested to delve more deeply into these areas when reporting on research outcomes and conclusions. As noted table B.5 and in appendix B, case study research partners could consider achieving this through a series of boxes in the text and present relevant details. It was further anticipated that this type of material would be particularly instrumental in assisting the team in developing its understanding of each research hypothesis presented in section 3.4.2 of the main report.

Case study research questions

B1.59 Table B.4 identifies a set of research questions relevant to each research theme outlined in section 3.3 of the main report. These questions are designed to provide material that will assist in understanding the research hypotheses presented in the initial section of the main report.

Table B.4: Research Questions Related to the Research Theme

Theme	Subtopic	Research questions	Question Number
Access to electricity	Access via existing utilities	Do incumbents invest more in electrification during and after reforms?	1
		What are the factors that drive investment decision making during and after reforms?	2
	Access via new agents	Do new agents emerge that invest in access to electricity?	3
		To what extent do these new agents engage in energy services to the poor?	4
		What mechanisms, if any, are in place to enable new agents in the market?	5
	Access via special mechanisms	Do reforms include the establishment of any special access mechanisms?	6
		How effective are these mechanisms proving to be?	7
Price of electricity supply	Impact on household income	What happens to costs of supply after power reforms? What happens to tariff structures and moves to cost reflectivity? Are new, targeted, transparent subsidies put in place? What price changes have resulted from power sector reforms?	8
		How have these changes affected household expenditure?	9
	Response to price changes	How have price changes affected fuel choice and strategies?	10
		How do these choices influence household welfare?	11
Quality of supply and customer	Supply to households	Has quality of supply to households changed?	12
		How have these changes affected fuel use and expenditure?	13

services	Supply to businesses	Has quality of supply to businesses changed?	14
		How have these changes affected fuel use and expenditure?	15
	Customer service procedures (marketing, applications, connection fees, billing)	Do utility systems fit poor households' income patterns and other needs?	16
Improved secondary services	Health and education	Have reforms improved access of health and education facilities to electricity?	17
		Have reforms improved quality of supply to health and education facilities?	18
		How have these changes affected health and education services to the poor?	19
	Telecommunications	To what extent has extension of telecommunications services depended on power supply?	20
		How have reforms affected the ability to extend telecommunications services?	21
Economic development	Input costs to businesses	How have energy costs of businesses been influenced?	22
		How has this influenced employment and expansion?	23
	Access of businesses to power	Have electrification programs expanded the access of small businesses?	24
		How have these businesses responded to having access?	25
	Integrated infrastructure	Have electricity services been coordinated with other infrastructure?	26
		Have these practices led to clusters of economic activity emerging?	27
	Utility investment	Have utility investment levels increased?	28
		Has utility outsourcing stimulated business development?	29
Public sector finance	Utility subsidies	Have reforms affected subsidy payments to utilities?	30
	Utility taxes or dividends	Have reforms led to changes in tax receipts and dividend payment?	31

	Privatization receipts	Have receipts been used to release funds for increased expenditure on social programs?	32

Research methods

B1.60 Case studies attempted to cover all the research themes and questions outlined above. Further, each case study began with a review of the reforms that have been implemented and identified the key features of these reforms (see appendix A). This review assisted in selecting those research questions that warrant further or more in-depth investigation. Special emphasis was given to those areas where the impacts have been significant or where particular countries have adopted policy or regulatory mechanisms to protect the poor. The methods used to investigate the questions are presented in table B.5, where the third column provides guidelines on reporting format and content.

Table B.5: Research Methods Related to Each Research Question

	Research questions	**Research method**	**Reporting requirements and guidelines for case study research**
	Theme: access to electricity		
1	Do incumbents invest more in electrification during and after reforms?	Government and regulatory policy documents, legislation, regulatory framework (prereform and during reforms). Annual (time series) data on electrical connections (urban, rural, and total). Comparison of investment patterns before and during reforms. Analysis of financial reports of utilities, regulator, government, and utilities Interviews with utility executives, government officials, and regulatory authorities.	Detailed description of prereform policy, regulatory, institutional, and financing instruments (baseline information) *(approximately ½-page discussion).* Detailed description of policy, regulatory, institutional, and financing instruments during reforms (or planned) *(approximately ½-page discussion).* Presentation and discussion of disaggregated time series and other investment data and information (prereform and during reform), leading to an overall assessment of investment trends and progress made *(approximately ½-page discussion, including data on percentage of urban and rural electrification each year, percentage of total electrification each year, U.S. dollars [2000] spent each year).* Data and information sources and view on their credibility.

2	What are the factors that are likely to drive investment decision making during and after reforms?		Assessed view on drivers for investment prereform and during reforms *(approximately ½-page discussion with drivers at different levels [financial, policy, institutional, and so on]).* Assessment of why reforms do or do not affect utility electrification investment *(approximately ½-page discussion)*. Information and data source and view on their credibility.
3	Do new agents emerge that invest in access to electricity?	Overview of new energy businesses. Investment data. Interviews with government officials and relevant associations. Interviews with executives of relevant businesses.	Description of new businesses or discussion of reasons for lack of new businesses *(approximately ½-page discussion)*. Names of information and data sources.
4	To what extent do these new agents engage in energy services to the poor?		Data on new access investments (progress and future or potential) (*U.S. dollars [2000] per connection, total U.S. dollars [2000] invested per year)*. Description of barriers inhibiting investment or success factors *(approximately ¼-page discussion, with possible box text with examples)*. Assessment of new energy businesses' potential to increase electricity access for the poor *(approximately ¼-page discussion)*. Discussion of why or how new businesses are able to emerge *(approximately ¼-page discussion with examples)*. Information and data sources.

5	What mechanisms, if any, are in place to enable new agents to enter the market?	Government policy documents, regulatory framework. Interviews with executives of relevant businesses, regulatory authority.	Detailed description of prereform and reform-introduced policy, regulatory, institutional, and financing mechanisms *(approximately ¼-page discussion).* Information sources.
6	Do reforms include the establishment of any special access mechanisms?	Interviews with responsible officials. Collection of financial data. Interviews with utility executives.	Detailed description of policy, regulatory, institutional, and financing mechanisms brought about by the reform process *(approximately ½-page discussion)*. Discussion of barriers (at different levels) and future prospects *(approximately ¼-page discussion with examples where relevant)*. Information and data sources.
7	How effective are these mechanisms proving to be?		Data on actual investments in new access initiatives (versus planned or expected investments) *(discussion or table, including U.S. dollars [2000] investment per year, rural, urban and total; percentage of new electrification investment)*. Assessment of new energy businesses' potential to increase electricity access for the poor *(approximately ½-page discussion)*. Data and information sources.
	Theme: price of electricity supply		

8a	What happens to costs of supply during and after power sector reforms?	Collection of price data (prereform and onward). Interviews with regulatory authorities and utility executives.	Presentation of relevant price data, including assumptions behind data generation *(U.S. dollars per kilowatt hour [$/kWh], U.S. dollars per kilowatt, and other assumptions*). Analysis of price data, leading to an overall assessment of impact *(approximately ¼-page discussion)*. Information and data sources and view on their credibility.
8b	What happens to tariff structures and moves to cost reflectivity?		Presentation of prereform and onward tariff structures *(table format and short discussion).* Commentary on extent of, and plans for, cost reflectivity and illustration of impacts and implications of moving toward cost reflectivity (*approximately ¼-page discussion, including discussion of percentage deviation if possible).* Information sources.
8c	Are new, targeted, transparent subsidies put in place by reforms?		Commentary on debates and outcomes around subsidies in general and in particular, subsidies for the poor *(approximately ¼-page discussion, including extent and nature of subsidies, level of social tariff kWh)*. Information sources.

8d	What price changes have resulted from power sector reforms?		Presentation of price change trends *(table format, $/kWh, percentage change)*. Commentary on prices before and during reforms, as well as anticipated postreform price trends *(short discussion)*. Commentary on extent to which price changes can be linked to power sector reforms *(short discussion showing strong or weak linkages)*. Information sources.
9	How have these changes affected household expenditure?	Limited household survey or focus groups in selected areas; preference for qualitative techniques to large quantitative surveys.	Description of household expenditure impacts *(for example, relative estimation of expenditure in fulfillment of household needs prereform and during reforms)*. Broad estimation of price elasticity of household demand for electricity versus other expenditure items *(high or low price elasticity of demand)*. Discussion (anecdotal) of reasons for given impact on household expenditure levels. *(approximately two-page discussion, with possible box text for detailed case study material)*. Information sources and research and interview methodology.
10	How have price changes affected fuel choice and strategies?		Description of fuel use choices and strategies prereform and during reforms. Anecdotal discussion of impact on fuel choices *(approximately one-page discussion, with possible box text for detailed case study material)*. Information sources and research methodology.

11	How do these choices influence household welfare?		Description of influence on household's general state of well-being *(approximately ½-page discussion, using indicators such as income, environmental impact, health, education)*.
	Theme: quality of supply and customer services		
12	Has quality of supply to households changed?		Anecdotal description of supply reliability and customer services prereform and during reforms *(approximately ¼-page discussion, using indicators such as number of power cuts, level of customer services, and so on, with possible box text for detailed case study material).* Information sources.
13	How have these changes in quality of supply affected fuel use and expenditure?		Anecdotal description of impacts of above changes on fuel use and expenditure *(approximately ¼-page discussion, with possible box text for detailed case study material)*. Information sources.
14	Has quality of supply to businesses changed?		Commentary on reliability of supply and customer services to small business before and during reforms *(approximately ½-page discussion, including information on number of hours of power cuts per month, nature of interface between utility and customer, services offered, and so on)*.
15	How have these changes affected fuel use and small business expenditure?		Anecdotal description of fuel use choices and expenditure patterns of a range of small business (rural and urban) prereform and during reforms (*approximately ½-page discussion, with possible box text for detailed case study material)*. Information sources.

16	Do utility systems fit poor households' income patterns and other needs?	Interviews with commercial managers at utilities. Customer focus groups.	Detailed description of prereform and during reform utility systems and services for poor electricity customers *(approximately ½-page discussion, using indicators such as marketing, applications, connection and reconnection fees, billing, complaints, additional services, and so on)*. Assessment of effectiveness of utility systems for the poor *(short discussion)*. Information sources.
	Theme: improved secondary services		
17	Have reforms improved access of health and education facilities to electricity?	Interviews with officials at health and educational departments. Visits to selected health and education facilities to interview staff. Interviews with electric utility staff. Collection of relevant investment and time series data. Customer focus groups.	Description of electricity access programs for schools and clinics before and during reforms *(approximately ¼-page discussion)*. Presentation of new plans to increase the electricity access of schools and clinics. Schools and clinics' electrification investment and time series data prereform and thereafter *(table format, number of new urban, rural, and total connections, percentage of urban, rural, and total electrified, U.S. dollars [2000] invested each year)*. Analysis of data leading to an assessment of overall impact *(short discussion)*. View on whether reforms can justifiably be linked to access impacts *(short discussion)*. Sources of data and information and assessment of their credibility.

18	Have reforms improved quality of supply to health and education facilities?		Description of supply reliability and customer services to schools and clinics *(approximately ¼-page discussion including number of supply interruptions per month, nature of interface with utility, change in utility services and approach).*
19	How have these changes affected health and education services to the poor?		Specific, example based-discussion of impacts (better, worse, or neutral) of electricity access on education and health services to the poor *(approximately ½-page discussion, with possible box text on detailed case study material).* Sources of information, location-based
20	To what extent has extension of telecommunications services depended on power?	Interviews with telecommunications personnel. Interviews with electricity utility staff, as well as energy company personnel, where relevant. Customer focus groups.	Description of structure and dynamics of telecommunications services *(approximately ¼-page discussion).* Discussion of linkages between telecommunications services to poor people and the electricity industry (urban and rural) *(approximately ¼-page discussion).* Information sources, location-based.
21	How have reforms affected the ability to extend telecommunications services?		Assessment, through specific examples of impact of reforms on telecommunications services for the poor *(approximately ½-page discussion, with possible box text for detailed examples).* Information sources, location-based.
	Theme: economic development		

22	How have the energy costs of businesses been influenced by power sector reforms?	Focus on informal and small businesses. Survey of small businesses in targeted areas. Interviews with staff and proprietors of businesses. Collection of relevant price data.	Presentation of prereform and during reform tariffs or special packages for small business, leading to a general assessment of reform impact on small business *(table format for data, approximately ¼-page discussion)*. Discussion of short-term impact, as well as likely medium- and longer-term impact of reform on energy costs for small businesses *(approximately ¼-page discussion).* Information and data sources.
23	How has this influenced employment and expansion?		Discussion, through specific examples, of impacts of changing energy costs and subsidies on employment and opportunities for business growth *(approximately ¼-page discussion with possible box text for detailed examples).* Discussion of electricity- and energy-related barriers inhibiting new opportunities for small business growth *(short discussion)*. Information and data sources.

24	Have electrification programs expanded electricity access of small business?		Discussion, through specific examples and experiences, on whether generally targeted or small-business-targeted electrification programs have had *real* (as opposed to *planned*) impact on existing and new small-business activity. Discussion to lead to a general indication of whether electrification programs have expanded electricity access for small businesses *(approximately ½-page discussion with possible box text with example-specific material).* Information and data sources.
25	How have these businesses responded to having access?		Discussion of whether businesses are able to take up reform opportunities and benefits *(approximately ½-page discussion, including barriers and success factors)*. Discussion on small businesses' perception of the appropriateness of electric utility solutions for small business *(approx ¼-page discussion).* Discussion, through specific examples, on whether electrification reform programs and changing energy costs have contributed to business expansion and employment of existing small businesses and establishment of new small business *(approximately ¼-page discussion, with possible box text for more detailed example)*. View on whether linkages between small business expansion and reforms can effectively be made *(short discussion).* Information and data sources.

26	Have electricity services been coordinated with other infrastructure?	Overview of infrastructure developments. Interviews with business managers in utility companies.	Discussion, through specific examples, of the linkages, prereform and during reform, of electricity and other service delivery and infrastructure development *(approximately ¼-page discussion, with possible box text for detailed examples).* Information sources.
27	Have these practices led to emerging clusters of economic activity?		Presentation of prereform and during reform economic activity, as well as prospects for local economic development and activity *(approximately ½-page discussion)*. Presentation of specific examples and case studies that would contribute to a general indication of local economic development. The discussion will include an explanation of the types of economic activities that are (or are not) emerging *(approximately ½-page discussion, with possible additional box text for detailed examples).* View, with substantiation, of extent to which emerging economic activity (or lack thereof) can be linked to electricity reforms *(short discussion)*. Information and data sources.
28	Have utility investment levels increased?	Collection of investment data. Interviews with utility managers. Interviews at subcontracted firms.	Presentation of a breakdown of capital expenditure with trends of "before and after" pictures *(table format and short discussion).* Indication of whether this investment can be linked to power sector reforms, or more so to other interventions *(short discussion*). Information and data sources.

29	Has utility outsourcing stimulated small business development?		Discussion, through specific examples, of nature, type, and extent of utility-outsourced services prereform and during reforms, as well as future outlook, barriers, and best practices for outsourcing *(approximately ½-page discussion with examples).* View on which income or market sector benefits from utility outsourcing, including an assessment of the extent to which outsourcing affects poor or disadvantaged individuals, communities, and enterprises *(short discussion).* Information sources.
	Theme: public sector finance		
30	Have reforms affected subsidy payments to utilities?	Collection of financial data from utilities. Government policy documents and regulatory frameworks.	Presentation of prereform and during reform financial and economic data, with discussion or analysis *(approximately ½-page discussion with data and information on policy choices).* Information and data sources.
31	Have reforms led to changes in tax receipts and dividend payments?		Presentation of prereform and during reform, time-relevant financial data with analysis *(short discussion with table format for data).* Discussion of impact on access programs if changes have occurred in this area *(approximately ¼-page discussion)*. Information and data sources.

Power Sector Reform in Africa: Assessing the Impact on Poor People

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Energy Sector Management Assistance Program
ESMAP

32	Have receipts been used to release funds for increased expenditure on social programs?	Analysis of changes in public accounts arising from privatization programs. Interviews with government officials (treasury departments).	Discussion on whether privatization initiatives have resulted in increased spending on other social programs *(approximately ½-page discussion, with possible box text presenting detailed examples).* Information and data sources.

B1.61 Please note:

- The third column gives some expectation of the types of answers required of case study partners. Case study partners were, however, requested to respond to these research questions in a manner relevant to case study material. In other words, case study partners should answer all questions, but emphasize those that are more relevant than others.
- The general expectation of this research was that case study partners would substantiate all responses given to research questions. In some cases, this could be made possible through the collection of published data. In other cases, this would come from interviews with relevant actors in the electricity industry.
- The project management expected the reports received from case study authors to be standalone or self-contained documents in the sense that they would not just seek to routinely answer research questions as specified, but provide publishable, well-structured, and logically ordered material.
- Where it is suggested in the third column that box text could be given, the intention was to create an opportunity for the case study partners to provide detailed materials on specific and relevant issues. This is an important aspect of this research, because this approach can go some way toward avoiding the dangers of making generalizations that are not always applicable.
- Finally, it was important that case study partners sought to understand the impacts of reforms according to the specific reform initiative (commercialization, corporatization, structuring for competition, private sector participation, new regulatory institutions and frameworks, and establishment of electrification funding mechanisms). Indeed, the impact of commercialization initiatives is likely to be quite different from restructuring for competition or encouragement of private sector participation.

Joint UNDP/World Bank

ENERGY SECTOR MANAGEMENT ASSISTANCE PROGRAMME (ESMAP)

LIST OF REPORTS ON COMPLETED ACTIVITIES

Region/Country	*Activity/Report Title*	*Date*	*Number*
	SUB-SAHARAN AFRICA (AFR)		
Africa Regional	Anglophone Africa Household Energy Workshop (English)	07/88	085/88
	Regional Power Seminar on Reducing Electric Power System Losses in Africa (English)	08/88	087/88
	Institutional Evaluation of EGL (English)	02/89	098/89
	Biomass Mapping Regional Workshops (English)	05/89	--
	Francophone Household Energy Workshop (French)	08/89	--
	Interafrican Electrical Engineering College: Proposals for Short- and Long-Term Development (English)	03/90	112/90
	Biomass Assessment and Mapping (English)	03/90	--
	Symposium on Power Sector Reform and Efficiency Improvement in Sub-Saharan Africa (English)	06/96	182/96
	Commercialization of Marginal Gas Fields (English)	12/97	201/97
	Commercilizing Natural Gas: Lessons from the Seminar in Nairobi for Sub-Saharan Africa and Beyond	01/00	225/00
	Africa Gas Initiative – Main Report: Volume I	02/01	240/01
	First World Bank Workshop on the Petroleum Products Sector in Sub-Saharan Africa	09/01	245/01
	Ministerial Workshop on Women in Energy	10/01	250/01
	Energy and Poverty Reduction: Proceedings from a Multi-Sector And Multi-Stakeholder Workshop Addis Ababa, Ethiopia, October 23-25, 2002.	03/03	266/03
	Opportunities for Power Trade in the Nile Basin: Final Scoping Study	01/04	277/04
	Énergies modernes et réduction de la pauvreté: Un atelier multi-sectoriel. Actes de l'atelier régional. Dakar, Sénégal, du 4 au 6 février 2003 (French Only)	01/04	278/04
	Énergies modernes et réduction de la pauvreté: Un atelier multi-sectoriel. Actes de l'atelier régional. Douala, Cameroun du 16-18 juillet 2003. (French Only)	09/04	286/04
	Energy and Poverty Reduction: Proceedings from the Global Village Energy Partnership (GVEP) Workshops held in Africa	01/05	298/05
	Power Sector Reform in Africa: Assessing the Impact on Poor People	08/05	306/05
Angola	Energy Assessment (English and Portuguese)	05/89	4708-ANG
	Power Rehabilitation and Technical Assistance (English)	10/91	142/91
	Africa Gas Initiative – Angola: Volume II	02/01	240/01
Benin	Energy Assessment (English and French)	06/85	5222-BEN
Botswana	Energy Assessment (English)	09/84	4998-BT
	Pump Electrification Prefeasibility Study (English)	01/86	047/86
	Review of Electricity Service Connection Policy (English)	07/87	071/87
	Tuli Block Farms Electrification Study (English)	07/87	072/87
	Household Energy Issues Study (English)	02/88	--
	Urban Household Energy Strategy Study (English)	05/91	132/91
Burkina Faso	Energy Assessment (English and French)	01/86	5730-BUR
	Technical Assistance Program (English)	03/86	052/86
	Urban Household Energy Strategy Study (English and French)	06/91	134/91
Burundi	Energy Assessment (English)	06/82	3778-BU
	Petroleum Supply Management (English)	01/84	012/84
	Status Report (English and French)	02/84	011/84

Region/Country	*Activity/Report Title*	*Date*	*Number*
Burundi	Presentation of Energy Projects for the Fourth Five-Year Plan (1983-1987) (English and French)	05/85	036/85
	Improved Charcoal Cookstove Strategy (English and French)	09/85	042/85
	Peat Utilization Project (English)	11/85	046/85
	Energy Assessment (English and French)	01/92	9215-BU
Cameroon	Africa Gas Initiative – Cameroon: Volume III	02/01	240/01
Cape Verde	Energy Assessment (English and Portuguese)	08/84	5073-CV
	Household Energy Strategy Study (English)	02/90	110/90
Central African Republic	Energy Assessment (French)	08/92	9898-CAR
Chad	Elements of Strategy for Urban Household Energy The Case of N'djamena (French)	12/93	160/94
Comoros	Energy Assessment (English and French)	01/88	7104-COM
	In Search of Better Ways to Develop Solar Markets: The Case of Comoros	05/00	230/00
Congo	Energy Assessment (English)	01/88	6420-COB
	Power Development Plan (English and French)	03/90	106/90
	Africa Gas Initiative – Congo: Volume IV	02/01	240/01
Côte d'Ivoire	Energy Assessment (English and French)	04/85	5250-IVC
	Improved Biomass Utilization (English and French)	04/87	069/87
	Power System Efficiency Study (English)	12/87	--
	Power Sector Efficiency Study (French)	02/92	140/91
	Project of Energy Efficiency in Buildings (English)	09/95	175/95
	Africa Gas Initiative – Côte d'Ivoire: Volume V	02/01	240/01
Ethiopia	Energy Assessment (English)	07/84	4741-ET
	Power System Efficiency Study (English)	10/85	045/85
	Agricultural Residue Briquetting Pilot Project (English)	12/86	062/86
	Bagasse Study (English)	12/86	063/86
	Cooking Efficiency Project (English)	12/87	--
	Energy Assessment (English)	02/96	179/96
Gabon	Energy Assessment (English)	07/88	6915-GA
	Africa Gas Initiative – Gabon: Volume VI	02/01	240/01
The Gambia	Energy Assessment (English)	11/83	4743-GM
	Solar Water Heating Retrofit Project (English)	02/85	030/85
	Solar Photovoltaic Applications (English)	03/85	032/85
	Petroleum Supply Management Assistance (English)	04/85	035/85
Ghana	Energy Assessment (English)	11/86	6234-GH
	Energy Rationalization in the Industrial Sector (English)	06/88	084/88
	Sawmill Residues Utilization Study (English)	11/88	074/87
	Industrial Energy Efficiency (English)	11/92	148/92
	Corporatization of Distribution Concessions through Capitalization	12/03	272/03
Guinea	Energy Assessment (English)	11/86	6137-GUI
	Household Energy Strategy (English and French)	01/94	163/94
Guinea-Bissau	Energy Assessment (English and Portuguese)	08/84	5083-GUB
	Recommended Technical Assistance Projects (English & Portuguese)	04/85	033/85
	Management Options for the Electric Power and Water Supply Subsectors (English)	02/90	100/90
	Power and Water Institutional Restructuring (French)	04/91	118/91
Kenya	Energy Assessment (English)	05/82	3800-KE
	Power System Efficiency Study (English)	03/84	014/84
	Status Report (English)	05/84	016/84
	Coal Conversion Action Plan (English)	02/87	--

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	Solar Water Heating Study (English)	02/87	066/87
Kenya	Peri-Urban Woodfuel Development (English)	10/87	076/87
	Power Master Plan (English)	11/87	--
	Power Loss Reduction Study (English)	09/96	186/96
	Implementation Manual: Financing Mechanisms for Solar Electric Equipment	07/00	231/00
Lesotho	Energy Assessment (English)	01/84	4676-LSO
Liberia	Energy Assessment (English)	12/84	5279-LBR
	Recommended Technical Assistance Projects (English)	06/85	038/85
	Power System Efficiency Study (English)	12/87	081/87
Madagascar	Energy Assessment (English)	01/87	5700-MAG
	Power System Efficiency Study (English and French)	12/87	075/87
	Environmental Impact of Woodfuels (French)	10/95	176/95
Malawi	Energy Assessment (English)	08/82	3903-MAL
	Technical Assistance to Improve the Efficiency of Fuelwood Use in the Tobacco Industry (English)	11/83	009/83
	Status Report (English)	01/84	013/84
Mali	Energy Assessment (English and French)	11/91	8423-MLI
	Household Energy Strategy (English and French)	03/92	147/92
Islamic Republic of Mauritania	Energy Assessment (English and French)	04/85	5224-MAU
	Household Energy Strategy Study (English and French)	07/90	123/90
Mauritius	Energy Assessment (English)	12/81	3510-MAS
	Status Report (English)	10/83	008/83
	Power System Efficiency Audit (English)	05/87	070/87
	Bagasse Power Potential (English)	10/87	077/87
	Energy Sector Review (English)	12/94	3643-MAS
Mozambique	Energy Assessment (English)	01/87	6128-MOZ
	Household Electricity Utilization Study (English)	03/90	113/90
	Electricity Tariffs Study (English)	06/96	181/96
	Sample Survey of Low Voltage Electricity Customers	06/97	195/97
Namibia	Energy Assessment (English)	03/93	11320-NAM
Niger	Energy Assessment (French)	05/84	4642-NIR
	Status Report (English and French)	02/86	051/86
	Improved Stoves Project (English and French)	12/87	080/87
	Household Energy Conservation and Substitution (English and French)	01/88	082/88
Nigeria	Energy Assessment (English)	08/83	4440-UNI
	Energy Assessment (English)	07/93	11672-UNI
	Strategic Gas Plan	02/04	279/04
Rwanda	Energy Assessment (English)	06/82	3779-RW
	Status Report (English and French)	05/84	017/84
	Improved Charcoal Cookstove Strategy (English and French)	08/86	059/86
	Improved Charcoal Production Techniques (English and French)	02/87	065/87
	Energy Assessment (English and French)	07/91	8017-RW
	Commercialization of Improved Charcoal Stoves and Carbonization Techniques Mid-Term Progress Report (English and French)	12/91	141/91
SADC	SADC Regional Power Interconnection Study, Vols. I-IV (English)	12/93	-
SADCC	SADCC Regional Sector: Regional Capacity-Building Program for Energy Surveys and Policy Analysis (English)	11/91	-
Sao Tome and Principe	Energy Assessment (English)	10/85	5803-STP
Senegal	Energy Assessment (English)	07/83	4182-SE
	Status Report (English and French)	10/84	025/84

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	Industrial Energy Conservation Study (English)	05/85	037/85
Senegal	Preparatory Assistance for Donor Meeting (English and French)	04/86	056/86
	Urban Household Energy Strategy (English)	02/89	096/89
	Industrial Energy Conservation Program (English)	05/94	165/94
Seychelles	Energy Assessment (English)	01/84	4693-SEY
	Electric Power System Efficiency Study (English)	08/84	021/84
Sierra Leone	Energy Assessment (English)	10/87	6597-SL
Somalia	Energy Assessment (English)	12/85	5796-SO
Republic of South Africa	Options for the Structure and Regulation of Natural Gas Industry (English)	05/95	172/95
Sudan	Management Assistance to the Ministry of Energy and Mining	05/83	003/83
	Energy Assessment (English)	07/83	4511-SU
	Power System Efficiency Study (English)	06/84	018/84
	Status Report (English)	11/84	026/84
	Wood Energy/Forestry Feasibility (English)	07/87	073/87
Swaziland	Energy Assessment (English)	02/87	6262-SW
	Household Energy Strategy Study	10/97	198/97
Tanzania	Energy Assessment (English)	11/84	4969-TA
	Peri-Urban Woodfuels Feasibility Study (English)	08/88	086/88
	Tobacco Curing Efficiency Study (English)	05/89	102/89
	Remote Sensing and Mapping of Woodlands (English)	06/90	--
	Industrial Energy Efficiency Technical Assistance (English)	08/90	122/90
	Power Loss Reduction Volume 1: Transmission and Distribution System Technical Loss Reduction and Network Development (English)	06/98	204A/98
	Power Loss Reduction Volume 2: Reduction of Non-Technical Losses (English)	06/98	204B/98
Togo	Energy Assessment (English)	06/85	5221-TO
	Wood Recovery in the Nangbeto Lake (English and French)	04/86	055/86
	Power Efficiency Improvement (English and French)	12/87	078/87
Uganda	Energy Assessment (English)	07/83	4453-UG
	Status Report (English)	08/84	020/84
	Institutional Review of the Energy Sector (English)	01/85	029/85
	Energy Efficiency in Tobacco Curing Industry (English)	02/86	049/86
	Fuelwood/Forestry Feasibility Study (English)	03/86	053/86
	Power System Efficiency Study (English)	12/88	092/88
	Energy Efficiency Improvement in the Brick and Tile Industry (English)	02/89	097/89
	Tobacco Curing Pilot Project (English)	03/89	UNDP Terminal Report
	Energy Assessment (English)	12/96	193/96
	Rural Electrification Strategy Study	09/99	221/99
Zaire	Energy Assessment (English)	05/86	5837-ZR
Zambia	Energy Assessment (English)	01/83	4110-ZA
	Status Report (English)	08/85	039/85
	Energy Sector Institutional Review (English)	11/86	060/86
	Power Subsector Efficiency Study (English)	02/89	093/88
	Energy Strategy Study (English)	02/89	094/88
	Urban Household Energy Strategy Study (English)	08/90	121/90
Zimbabwe	Energy Assessment (English)	06/82	3765-ZIM
	Power System Efficiency Study (English)	06/83	005/83
	Status Report (English)	08/84	019/84
	Power Sector Management Assistance Project (English)	04/85	034/85

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	Power Sector Management Institution Building (English)	09/89	--
Zimbabwe	Petroleum Management Assistance (English)	12/89	109/89
	Charcoal Utilization Pre-feasibility Study (English)	06/90	119/90
	Integrated Energy Strategy Evaluation (English)	01/92	8768-ZIM
	Energy Efficiency Technical Assistance Project: Strategic Framework for a National Energy Efficiency Improvement Program (English)	04/94	--
	Capacity Building for the National Energy Efficiency Improvement Programme (NEEIP) (English)	12/94	--
	Rural Electrification Study	03/00	228/00
	EAST ASIA AND PACIFIC (EAP)		
Asia Regional	Pacific Household and Rural Energy Seminar (English)	11/90	--
China	County-Level Rural Energy Assessments (English)	05/89	101/89
	Fuelwood Forestry Preinvestment Study (English)	12/89	105/89
	Strategic Options for Power Sector Reform in China (English)	07/93	156/93
	Energy Efficiency and Pollution Control in Township and Village Enterprises (TVE) Industry (English)	11/94	168/94
	Energy for Rural Development in China: An Assessment Based on a Joint Chinese/ESMAP Study in Six Counties (English)	06/96	183/96
	Improving the Technical Efficiency of Decentralized Power Companies	09/99	222/99
	Air Pollution and Acid Rain Control: The Case of Shijiazhuang City and the Changsha Triangle Area	10/03	267/03
	Toward a Sustainable Coal Sector In China	07/04	287/04
Fiji	Energy Assessment (English)	06/83	4462-FIJ
Indonesia	Energy Assessment (English)	11/81	3543-IND
	Status Report (English)	09/84	022/84
	Power Generation Efficiency Study (English)	02/86	050/86
	Energy Efficiency in the Brick, Tile and Lime Industries (English)	04/87	067/87
	Diesel Generating Plant Efficiency Study (English)	12/88	095/88
	Urban Household Energy Strategy Study (English)	02/90	107/90
	Biomass Gasifier Preinvestment Study Vols. I & II (English)	12/90	124/90
	Prospects for Biomass Power Generation with Emphasis on Palm Oil, Sugar, Rubberwood and Plywood Residues (English)	11/94	167/94
Lao PDR	Urban Electricity Demand Assessment Study (English)	03/93	154/93
	Institutional Development for Off-Grid Electrification	06/99	215/99
Malaysia	Sabah Power System Efficiency Study (English)	03/87	068/87
	Gas Utilization Study (English)	09/91	9645-MA
Mongolia	Energy Efficiency in the Electricity and District Heating Sectors	10/01	247/01
	Improved Space Heating Stoves for Ulaanbaatar	03/02	254/02
Myanmar	Energy Assessment (English)	06/85	5416-BA
Papua New Guinea	Energy Assessment (English)	06/82	3882-PNG
	Status Report (English)	07/83	006/83
	Institutional Review in the Energy Sector (English)	10/84	023/84
	Power Tariff Study (English)	10/84	024/84
Philippines	Commercial Potential for Power Production from Agricultural Residues (English)	12/93	157/93
	Energy Conservation Study (English)	08/94	--

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Philippines	Strengthening the Non-Conventional and Rural Energy Development Program in the Philippines: A Policy Framework and Action Plan	08/01	243/01
	Rural Electrification and Development in the Philippines: Measuring the Social and Economic Benefits	05/02	255/02
Solomon Islands	Energy Assessment (English)	06/83	4404-SOL
	Energy Assessment (English)	01/92	979-SOL
South Pacific	Petroleum Transport in the South Pacific (English)	05/86	--
Thailand	Energy Assessment (English)	09/85	5793-TH
	Rural Energy Issues and Options (English)	09/85	044/85
	Accelerated Dissemination of Improved Stoves and Charcoal Kilns (English)	09/87	079/87
	Northeast Region Village Forestry and Woodfuels Preinvestment Study (English)	02/88	083/88
	Impact of Lower Oil Prices (English)	08/88	--
	Coal Development and Utilization Study (English)	10/89	--
	Why Liberalization May Stall in a Mature Power Market: A Review of the Technical and Political Economy Factors that Constrained the Electricity Sector Reform in Thailand 1998-2002	12/03	270/03
	Reducing Emissions from Motorcycles in Bangkok	10/03	275/03
Tonga	Energy Assessment (English)	06/85	5498-TON
Vanuatu	Energy Assessment (English)	06/85	5577-VA
Vietnam	Rural and Household Energy-Issues and Options (English)	01/94	161/94
	Power Sector Reform and Restructuring in Vietnam: Final Report to the Steering Committee (English and Vietnamese)	09/95	174/95
	Household Energy Technical Assistance: Improved Coal Briquetting and Commercialized Dissemination of Higher Efficiency Biomass and Coal Stoves (English)	01/96	178/96
	Petroleum Fiscal Issues and Policies for Fluctuating Oil Prices In Vietnam	02/01	236/01
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	The Electricity Law for Vietnam—Status and Policy Issues—The Socialist Republic of Vietnam	08/02	259/02
	Petroleum Sector Technical Assistance for the Revision of the Existing Legal and Regulatory Framework	12/03	269/03
Western Samoa	Energy Assessment (English)	06/85	5497-WSO

SOUTH ASIA (SAS)

Bangladesh	Energy Assessment (English)	10/82	3873-BD
	Priority Investment Program (English)	05/83	002/83
	Status Report (English)	04/84	015/84
	Power System Efficiency Study (English)	02/85	031/85
	Small Scale Uses of Gas Pre-feasibility Study (English)	12/88	--
	Reducing Emissions from Baby-Taxis in Dhaka	01/02	253/02
India	Opportunities for Commercialization of Non-conventional Energy Systems (English)	11/88	091/88
	Maharashtra Bagasse Energy Efficiency Project (English)	07/90	120/90
	Mini-Hydro Development on Irrigation Dams and Canal Drops Vols. I, II and III (English)	07/91	139/91
	WindFarm Pre-Investment Study (English)	12/92	150/92
	Power Sector Reform Seminar (English)	04/94	166/94

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	Environmental Issues in the Power Sector (English)	06/98	205/98
India	Environmental Issues in the Power Sector: Manual for Environmental Decision Making (English)	06/99	213/99
	Household Energy Strategies for Urban India: The Case of Hyderabad	06/99	214/99
	Greenhouse Gas Mitigation In the Power Sector: Case Studies From India	02/01	237/01
	Energy Strategies for Rural India: Evidence from Six States	08/02	258/02
	Household Energy, Indoor Air Pollution, and Health	11/02	261/02
	Access of the Poor to Clean Household Fuels	07/03	263/03
	The Impact of Energy on Women's Lives in Rural India	01/04	276/04
	Environmental Issues in the Power Sector: Long-Term Impacts And Policy Options for Rajasthan	10/04	292/04
	Environmental Issues in the Power Sector: Long-Term Impacts And Policy Options for Karnataka	10/04	293/04
Nepal	Energy Assessment (English)	08/83	4474-NEP
	Status Report (English)	01/85	028/84
	Energy Efficiency & Fuel Substitution in Industries (English)	06/93	158/93
Pakistan	Household Energy Assessment (English)	05/88	--
	Assessment of Photovoltaic Programs, Applications, and Markets (English)	10/89	103/89
Pakistan	National Household Energy Survey and Strategy Formulation Study: Project Terminal Report (English)	03/94	--
	Managing the Energy Transition (English)	10/94	--
	Lighting Efficiency Improvement Program Phase 1: Commercial Buildings Five Year Plan (English)	10/94	--
	Clean Fuels	10/01	246/01
Regional	Toward Cleaner Urban Air in South Asia: Tackling Transport Pollution, Understanding Sources.	03/04	281/04
Sri Lanka	Energy Assessment (English)	05/82	3792-CE
	Power System Loss Reduction Study (English)	07/83	007/83
	Status Report (English)	01/84	010/84
	Industrial Energy Conservation Study (English)	03/86	054/86
	Sustainable Transport Options for Sri Lanka: Vol. I	02/03	262/03
	Greenhouse Gas Mitigation Options in the Sri Lanka Power Sector: Vol. II	02/03	262/03
	Sri Lanka Electric Power Technology Assessment (SLEPTA): Vol. III	02/03	262/03
	Energy and Poverty Reduction: Proceedings from South Asia Practitioners Workshop How Can Modern Energy Services Contribute to Poverty Reduction? Colombo, Sri Lanka, June 2-4, 2003	11/03	268/03
	EUROPE AND CENTRAL ASIA (ECA)		
Armenia	Development of Heat Strategies for Urban Areas of Low-income Transition Economies. Urban Heating Strategy for the Republic Of Armenia. *Including a Summary of a Heating Strategy for the Kyrgyz Republic*	04/04	282/04
Bulgaria	Natural Gas Policies and Issues (English)	10/96	188/96
	Energy Environment Review	10/02	260/02
Central Asia and The Caucasus	Cleaner Transport Fuels in Central Asia and the Caucasus	08/01	242/01
Central and Eastern Europe	Power Sector Reform in Selected Countries	07/97	196/97

	Increasing the Efficiency of Heating Systems in Central and Eastern Europe and the Former Soviet Union (English and Russian)	08/00	234/00
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Kazakhstan	Natural Gas Investment Study, Volumes 1, 2 & 3	12/97	199/97
Kazakhstan & Kyrgyzstan	Opportunities for Renewable Energy Development	11/97	16855-KAZ
Poland	Energy Sector Restructuring Program Vols. I-V (English)	01/93	153/93
	Natural Gas Upstream Policy (English and Polish)	08/98	206/98
	Energy Sector Restructuring Program: Establishing the Energy Regulation Authority	10/98	208/98
Portugal	Energy Assessment (English)	04/84	4824-PO
Romania	Natural Gas Development Strategy (English)	12/96	192/96
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Slovenia	Workshop on Private Participation in the Power Sector (English)	02/99	211/99
Turkey	Energy Assessment (English)	03/83	3877-TU
	Energy and the Environment: Issues and Options Paper	04/00	229/00
	Energy and Environment Review: Synthesis Report	12/03	273/03

MIDDLE EAST AND NORTH AFRICA (MNA)

Arab Republic of Egypt	Energy Assessment (English)	10/96	189/96
	Energy Assessment (English and French)	03/84	4157-MOR
	Status Report (English and French)	01/86	048/86
Morocco	Energy Sector Institutional Development Study (English and French)	07/95	173/95
	Natural Gas Pricing Study (French)	10/98	209/98
	Gas Development Plan Phase II (French)	02/99	210/99
Syria	Energy Assessment (English)	05/86	5822-SYR
	Electric Power Efficiency Study (English)	09/88	089/88
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	Energy Efficiency Improvement in the Fertilizer Sector (English)	06/90	115/90
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	Renewable Energy Strategy Study, Volume I (French)	11/96	190A/96
	Renewable Energy Strategy Study, Volume II (French)	11/96	190B/96
Yemen	Energy Assessment (English)	12/84	4892-YAR
	Energy Investment Priorities (English)	02/87	6376-YAR
	Household Energy Strategy Study Phase I (English)	03/91	126/91

LATIN AMERICA AND THE CARIBBEAN REGION (LCR)

LCR Regional	Regional Seminar on Electric Power System Loss Reduction in the Caribbean (English)	07/89	--
	Elimination of Lead in Gasoline in Latin America and the Caribbean (English and Spanish)	04/97	194/97

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LCR Regional	Elimination of Lead in Gasoline in Latin America and the Caribbean - Status Report (English and Spanish)	12/97	200/97
	Harmonization of Fuels Specifications in Latin America and the Caribbean (English and Spanish)	06/98	203/98
	Energy and Poverty Reduction: Proceedings from the Global Village Energy Partnership (GVEP) Workshop held in Bolivia	06/05	202/05
	Power Sector Reform and the Rural Poor in Central America	12/04	297/04
	Estudio Comparativo Sobre la Distribución de la Renta Petrolera en Bolivia, Colombia, Ecuador y Perú	08/05	304/05
Bolivia	Energy Assessment (English)	04/83	4213-BO
	National Energy Plan (English)	12/87	--
	La Paz Private Power Technical Assistance (English)	11/90	111/90
	Pre-feasibility Evaluation Rural Electrification and Demand Assessment (English and Spanish)	04/91	129/91
	National Energy Plan (Spanish)	08/91	131/91
	Private Power Generation and Transmission (English)	01/92	137/91
	Natural Gas Distribution: Economics and Regulation (English)	03/92	125/92
	Natural Gas Sector Policies and Issues (English and Spanish)	12/93	164/93
	Household Rural Energy Strategy (English and Spanish)	01/94	162/94
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	Introducing Competition into the Electricity Supply Industry in Developing Countries: Lessons from Bolivia	08/00	233/00
	Final Report on Operational Activities Rural Energy and Energy Efficiency	08/00	235/00
	Oil Industry Training for Indigenous People: The Bolivian Experience (English and Spanish)	09/01	244/01
	Capacitación de Pueblos Indígenas en la Actividad Petrolera. Fase II	07/04	290/04
	Estudio Sobre Aplicaciones en Pequeña Escala de Gas Natural	07/04	291/04
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	Rural Electrification with Renewable Energy Systems in the Northeast: A Preinvestment Study	07/00	232/00
	Reducing Energy Costs in Municipal Water Supply Operations "Learning-while-doing" Energy M&T on the Brazilian Frontlines	07/03	265/03
Chile	Energy Sector Review (English)	08/88	7129-CH
Colombia	Energy Strategy Paper (English)	12/86	--
	Power Sector Restructuring (English)	11/94	169/94
Colombia	Energy Efficiency Report for the Commercial and Public Sector (English)	06/96	184/96
Costa Rica	Energy Assessment (English and Spanish)	01/84	4655-CR
	Recommended Technical Assistance Projects (English)	11/84	027/84
	Forest Residues Utilization Study (English and Spanish)	02/90	108/90
Dominican Republic	Energy Assessment (English)	05/91	8234-DO
Ecuador	Energy Assessment (Spanish)	12/85	5865-EC
	Energy Strategy Phase I (Spanish)	07/88	--
	Energy Strategy (English)	04/91	--
	Private Mini-hydropower Development Study (English)	11/92	--
	Energy Pricing Subsidies and Interfuel Substitution (English)	08/94	11798-EC
	Energy Pricing, Poverty and Social Mitigation (English)	08/94	12831-EC
Guatemala	Issues and Options in the Energy Sector (English)	09/93	12160-GU
	Health Impacts of Traditional Fuel Use	08/04	284/04

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Haiti	Energy Assessment (English and French)	06/82	3672-HA
	Status Report (English and French)	08/85	041/85
	Household Energy Strategy (English and French)	12/91	143/91
Honduras	Energy Assessment (English)	08/87	6476-HO
	Petroleum Supply Management (English)	03/91	128/91
Jamaica	Energy Assessment (English)	04/85	5466-JM
	Petroleum Procurement, Refining, and Distribution Study (English)	11/86	061/86
	Energy Efficiency Building Code Phase I (English)	03/88	--
	Energy Efficiency Standards and Labels Phase I (English)	03/88	--
Jamaica	Management Information System Phase I (English)	03/88	--
	Charcoal Production Project (English)	09/88	090/88
	FIDCO Sawmill Residues Utilization Study (English)	09/88	088/88
	Energy Sector Strategy and Investment Planning Study (English)	07/92	135/92
Mexico	Improved Charcoal Production Within Forest Management for the State of Veracruz (English and Spanish)	08/91	138/91
	Energy Efficiency Management Technical Assistance to the Comisión Nacional para el Ahorro de Energía (CONAE) (English)	04/96	180/96
	Energy Environment Review	05/01	241/01
Nicaragua	Modernizing the Fuelwood Sector in Managua and León	12/01	252/01
Panama	Power System Efficiency Study (English)	06/83	004/83
Paraguay	Energy Assessment (English)	10/84	5145-PA
	Recommended Technical Assistance Projects (English)	09/85	--
	Status Report (English and Spanish)	09/85	043/85
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	Status Report (English)	08/85	040/85
	Proposal for a Stove Dissemination Program in the Sierra (English and Spanish)	02/87	064/87
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	Study of Energy Taxation and Liberalization of the Hydrocarbons Sector (English and Spanish)	120/93	159/93
	Reform and Privatization in the Hydrocarbon Sector (English and Spanish)	07/99	216/99
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Private Financing for Community Infrastructure	05/02	256/02
Stakeholder Involvement in Options Assessment: Promoting Dialogue in Meeting Water and Energy Needs: A Sourcebook	07/03	264/03
A Review of ESMAP's Energy Efficiency Portfolio	11/03	271/03
A Review of ESMAP's Rural Energy and Renewable Energy Portfolio	04/04	280/04
ESMAP Renewable Energy and Energy Efficiency Reports 1998-2004 (CD Only)	05/04	283/04
Regulation of Associated Gas Flaring and Venting: *A Global Overview and Lessons Learned from International Experience*	08/04	285/04
ESMAP Gender in Energy Reports and Other related Information (CD Only)	11/04	288/04
ESMAP Indoor Air Pollution Reports and Other related Information (CD Only)	11/04	289/04

Energy and Poverty Reduction: Proceedings from the Global Village Energy Partnership (GVEP) Workshop on the Pre-Investment Funding. Berlin, Germany, April 23-24, 2003.	11/04	294/04
Global Village Energy Partnership (GVEP) Annual Report 2003	12/04	295/04
Energy and Poverty Reduction: Proceedings from the Global Village Energy Partnership (GVEP) Workshop on Consumer Lending and Microfinance to Expand Access to Energy Services, Manila, Philippines, May 19-21, 2004	12/04	296/04
The Impact of Higher Oil Prices on Low Income Countries And on the Poor	03/05	299/05
Advancing Bioenergy for Sustainable Development: Guideline For Policymakers and Investors	04/05	300/05
ESMAP Rural Energy Reports 1999-2005	03/05	301/05
Renewable Energy and Energy Efficiency Financing and Policy Network: Options Study and Proceedings of the International Forum	07/05	303/05
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