Power sector reform in Africa: assessing the impact on poor people

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Alix Clark played a key role in designing the project and the research methodology, and had the unenviable task of managing project partners, each of whom also faced many other commitments.

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 the appendix of this report. Margaret Winterkorn-Meikle assisted with the final editing and the executive summary.

Country case studies were undertaken by: Ishmael Edjekumhene and J. Amissah-Arthur of KITE in Ghana; Ibrahim Togola, Tom Burrell and Youssouf Sanogo in Mali; Hartmut Krugman and Ralf Tobich of Emcon in Namibia; Alix Clark and Anton Eberhard in South Africa; Hieronomi Shirima in Tanzania and May Sengendo and Mark Davis in Uganda.

Considerable challenges remain in organizing effective collaboration between African analysts, researchers and professionals such that sufficient time and resources can be devoted to producing insightful and new analyses in this important area of power sector reform and its impacts on economic development and poverty alleviation in Africa.
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Power sector reform in Africa: assessing the impact on poor people

Executive Summary

Power sector reform has been on the public agenda in Africa for over a decade. In an effort to improve the technical and financial performance of utilities, release 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.

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 social services such 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 are probably best understood through surveys and direct interviews with poor people. However, while some interviews and focus group discussions were undertaken, these country studies relied mainly on sector-wide data.

Power sector reform has conventionally begun with an initial stage of commercialisation and corporatisation of state-owned utilities followed by unbundling and the introduction of competition and private sector participation. While 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, amongst the six countries studied only Uganda has successfully unbundled its utility. Some have introduced limited competition for the market through bids for independent power producers (IPPs) or concession agreements. 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 to reform their power sectors have established independent electricity regulators.

The impact of these reforms on the poor in Africa is difficult to quantify. The challenge of this study is 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

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. On the other hand, introducing market-driven private sector participation may encourage utilities to focus on providing electricity to communities that are already proven to be profitable, and to not extend the network to poor areas.

In most of the case study countries, access to electricity has more than doubled over the past decade (Ghana, Mali, South Africa) and for other countries for which data is available, there has been a
substantial increase in access (Tanzania, Uganda), although with the exception of South Africa and Ghana it still 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 policies, programmes, and subsidies intended specially to expand access to electricity. The experience in Tanzania, for example, suggests that private participation and reforms alone have not produced dramatic increases in access. Electrification actually increased more in the period prior to Net Group’s management contract with the national utility TANESCO than after the reform was implemented. In contrast, in Namibia the private company Northern Electricity invested in new electricity connections that can account for the expansion.

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-subsidised the national electrification programme with earnings from industry and wealthier households. Since Eskom was corporatised and started paying taxes, government has funded the capital costs of new connections and the first 50 kWh/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 around 70 percent today; as many people were connected in seven years as in the previous 100.

Ghana represents a further example of the potential impact of dedicated electrification programmes and funding. Under the Self-Help Electrification Programme (SHEP), the government offered to connect communities within 20km of the existing network that could demonstrate a minimum number of interested households and provide the requisite low voltage wooden distribution poles. This programme has been so popular, particularly among smaller communities, that it had to be divided into several phases so the government can meet demand.

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 while more people are connecting to the network, poverty limits their use of electricity services and many poor households are forced to 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**

While reforms often result in improved utility performance and lower costs, 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 levels, accounting for inflation and market risks, and reducing across the board subsidies. 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 subsidised 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.

On the other hand, 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 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 (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 in technical and non-technical losses, allowed the utility to actually reduce tariffs.

Quality and Reliability of Supply

Improving the quality and reliability of electricity supply was a major factor driving some of the reform programs in Africa. Patchy service negatively impacts people’s lives by requiring them to invest in expensive back-up 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 encouraging competition and also introducing independent regulators to monitor and enforce quality standards.

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 Uganda and Mali, 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.

Reforms have also affected the quality of power in Africa through special customer service arrangements. New pre-payment 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 consumer, ultimately increasing the utility’s willingness to expand electrification to new communities.

Social Services

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, since 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

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 back-up systems) and enable new types of businesses to be built. Interviews in case study countries showed that some new businesses as a result of electrification


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**

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 as many governments continue to provide support through subsidies, lifeline tariffs, electrification funds, and deferred taxes. In Ghana, 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 corporatisation 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 that used to provide relief to commercial and domestic consumers indiscriminately for the first 100kWh of electricity now has been revised to target small domestic consumers who use less than 50kWh.

**Conclusions**

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 increase prices and not necessarily expand access to electricity, reform also provides opportunities that would not otherwise exist to improve quality and reliability, expand networks, and divert public finances to the poor and rural communities rather than big businesses.

A chief concern in introducing private participation is that it will 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 over distribution operations for the state-owned utility. By updating the customer database, improving the reliability of service, and implementing a small rural electrification levy, NE 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.

While the direct benefits to the poor in these cases may not be dramatic, they did provide opportunities for governments to implement special additional programmes with social benefits. Evidence from case study countries indicates that despite stalled reform programs, access and quality of service are improving in countries like Ghana and South Africa where the government has implemented special programmes directly geared toward rural electrification. These programmes, 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

1.1 Research objectives

The majority of people who live on the continent of Africa remain without access to electricity. And many of those that do have access experience unreliable supply or are forced to rely on expensive back-up 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.

The technical, financial and investment performance of many state-owned electricity companies has been poor. Since the 1990s new ways of organising 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 unbundled and privatised 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.

Nevertheless, while the depth and pace of reforms in Africa have not been as extensive or as rapid as many industrialised 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.

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?

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

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.

1.2 Study framework

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. The framework is summarized below:

![Project framework diagram](image)

### 1.3 Project methodology

The study documented power sector reforms in six African countries and assessed their impacts on poor people by seeking to answer the following questions related to electricity access levels and trends, price levels and trends, quality of supply, impacts of electricity access on social services and economic activity and of power sector reforms on public finances. While some data was gathered through interviews with individuals in the case study countries and focus group discussions, most information in this study was collected using sector-wide data.

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1 See Appendix 2: “Power sector reform in Africa: Assessing the impact on poor people, and influencing policy decisions: Research framework and methodology”.
Table 1: Research methodology

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<tr>
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| 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” mechanisms?  
How effective are these mechanisms proving? |
| 2  Price of electricity supply | What happens to costs of supply during and after power sector reforms?  
What happens to tariff structures and 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 impacted on household expenditure?  
How have prices changes affected fuel choice and strategies?  
How have these choices included household welfare? |
| 3  Quality of supply and customer services | Has quality of supply to households changed?  
How have these quality of supply changes impacted on fuel use and expenditure?  
Has quality of supply to businesses changed?  
How have these changes impacted on 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/education facilities to electricity?  
Have reforms improved quality of supply to health/education facilities?  
How have these changes impacted on health/education services to the poor?  
To what extent has extension of telecomms services depended on power?  
How have reforms impacted on the ability to extend telecomms 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 programmes expanded electricity access of small business?  
How have these business responded to having access?  
Have electricity services been co-ordinated 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 lead to changes in tax-take dividend payments?  
Have receipts been used to release funds for increased expenditure on social programmes? |

1.4 Case study country and partner selection

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, i.e. the extent of commercialisation, corporatisation, restructuring and unbundling in preparation for competition, private sector participation, and the nature of regulation. The study was also interested in the extent and nature of policies, regulations, tariffs, finance and institutions
orientated towards achieving widened access to electricity. Partners and institutions selected to undertake the case study research and analysis are listed below.

Table 2: Case studies

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<td>Mark Davis</td>
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<td>May Sengendo</td>
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1.5 Limitations of the research outputs

As research and analysis was being conducted, it became apparent to the team 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.
- Due to 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 sufficient 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 spelt out in the project research methodology has not been available to them.
- In some instances, it has been difficult to establish clear and unambiguous causal linkages between reform and poverty related issues. Some impacts could be ascribed to other interventions not directly related to power sector reform.

1.6 Report structure

The next section summarises the origins, nature and pace of power sector reform in the case study countries. We 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. We 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 (e.g. 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. We 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 we 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 an appendix.

2. Power sector reform in the case study countries

2.1 Overview

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 (EDM) in Mali, Nampower (previously Swawek) in Namibia, Eskom (previously Escom) in South Africa, 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”.

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.

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 with 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.

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. 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 commercialise and corporatise state-owned enterprises to achieve improved performance, sometimes through management contracts, for example in Tanzania and in Mali. Only in Uganda has generation, transmission and distribution been unbundled. In some countries, there has been an attempt to privatize or concession parts of the industry - for example EDM in Mali, the generation and distribution businesses of 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

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2 Steyn, G (2001), Governance, Finance and Investment: Decision making and risk in the electric power sector. DPhil, University of Sussex, p 67.
concession contracts, competition for the market has been limited, and competition to dispatch and sell electricity is almost non-existent.3

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

### 2.2 Reform drivers

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 to attract private investment into the sector. The second driver has been the need to improve the financial and technical performance of incumbent state-owned utilities – either through commercialization, corporatisation or rationalization/concentration initiatives or through seeking private sector participation through management contracts, concessions or divestiture.

In Ghana, the reform process was greatly accelerated when the country experienced power shortages in 1997 and 1998 that derived not simply from drought-induced reductions in hydro-electric 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.

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

Looming power shortages in Namibia and South Africa are creating new spaces 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.

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.

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

The key challenges around 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. Linked to these initiatives has been a desire to

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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, sixteen West African States are looking to establish a trading pool – the West African Power Pool (WAPP). The WAPP was established in 1999 by the Economic Community of West African States (ECOWAS). So far the project is in its planning phase.
position the distribution sector to continue expanding access to electricity – especially in rural areas. A management contract has also been proposed for the distribution company in Ghana.

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 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 pre-requisite for privatization and private investment.

2.3 The nature and pace of reform in case study countries

Ghana

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 (the latter via its subsidiary Northern Electricity Department - NED). Combined generation capacity stands at 1730MW, with two VRA hydroelectric facilities accounting for 1180MW. The Takoradi Thermal Facility was planned as a 660MW development, which was to be constructed in two blocks. The first 330MW was commissioned in 1998 and is 100 percent VRA owned. The second block (220MW of which was completed in 2000) is operated by Ghana’s first and only IPP, Takoradi International Company (TICo). It is owned 10 percent by VRA and 90 percent by CMS Energy Corporation. About a third of electricity is consumed by an aluminum smelter and another 20 percent by large bulk users such as mines. NED distributes only five percent of electricity; the remainder is distributed by the Electricity Company of Ghana (ECG), which was converted into a limited liability company in 1997.

Power sector reform commenced in 1994 with government commissioned studies and the appointment of a Power Sector Reform Committee. The urgency of reform was underlined in 1997 and 1998, when power outages began to be experienced. 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.

The structure of Ghana’s power sector is illustrated below.

Figure 2: Structure of power sector in Ghana
The Public Utilities Regulatory Commission (PURC) and the Energy Commission (EC) were established in 1997. PURC is responsible for economic regulation, primarily tariff setting; the EC is responsible for technical regulation, licensing and policy advice.

VRA has recorded a net financial loss since 1998 with the magnitude of losses increasing from each year to the next (except for year 2001). VRA’s rate of return on net fixed assets has averaged –3.3 percent since year 2000. Similarly, ECG has incurred financial losses.

In April 2003, 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 “arms 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.

New rules for the electricity market were expected to be developed in 2004. An independent Transmission System Operator was 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.

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

**Mali**

Mali’s 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. In the period following 1960, 97 percent of EDM-SA was owned by the Malian State and the remainder by Electricité de France (EDF). Privatisation was first considered in 1994. However, due to 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.

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

Thermal (diesel and gas) and hydro plant each provide about half of Mali’s power needs. Mali’s two largest hydro-electric installations are Sélingué, owned and operated by EDM, and Manantali which is owned by the *Organisation pour la mise en valeur du fleuve Senegal* (OMVS), a trust company formed between Mali, Senegal and Mauritania. OMVS has delegated responsibility for this project to a sub-trust company called *Societe de gestion de l’electricite de Manantali* (SOGEM), which in turn awarded a 15-year operation and maintenance contract to *Eskom Energie Manantali*, a subsidiary of Eskom, the South African national utility.
There are also two Sociétés des services décentralisés (SSDs) or decentralised service companies: SSD Koutiala, operated by NUON and EDF) & SSD Kayes (operated by EDF and Total). These two firms generate and distribute off-grid power (solar PV and diesel-generated thermal) in rural areas. The following diagram illustrates Mali’s electricity sector.

Figure 3: Structure of power sector in Mali

The Commission de régulation de l’eau et de l’électricité (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

The national public utility, NamPower, has primary responsibility for electricity generation, import/export and transmission, and directly supplies large customers like 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 Government’s decentralisation 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, NORED, which is jointly owned by regional councils and NamPower.

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. The diagram immediately below highlights the sector.
Namibia’s demand is met mainly by the Ruacana hydropower facility, an old coal fired plant, some diesel generators and by imports: more than 50 percent of consumption is supplied from Eskom in South Africa.

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).

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.

Prior to the formation of the 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. This caused the Government in 1996 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 is described in the text box below, as well as other more recent examples of private sector participation.
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 less than half of all customers were recorded on the customer database, explaining to a large extent previous 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 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 Government, and prepared a 5-year network development plan to ensure system integrity. A preventive maintenance programme was implemented and call-outs 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 programme. 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 due to the company’s lack of collateral (they did not own the networks) and Government’s refusal to provide guarantees. As an alternative, NE then implemented a rural electrification levy (N$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 5-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 Government did not renew NE’s contract due to pressure from NamPower, 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 Regional Electricity Distributors. 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 (OPE), a joint venture company 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 company between 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 the town of 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/expand) their local electricity reticulation systems;
- Various commercial farm electricity distribution schemes – including Saltblock Power, Osire Power, Aroab Electrical Group (AEG), and Kalahari Farming – in the business of electrification of and electricity supply management in their own commercial farming areas;
- Northern Regional Electricity Distributor (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, Kunene), as the first RED – NORED took over from NE in March 2002, under licence from the Electricity Control Board (ECB); and
- Central-North Regional Electricity Distributor (CENORED), established in 2003 by north-central Local Authorities (Otjiwarongo, Ovitotjo, Tsumeb, Otavi, Grootfontein, Khorixas and Kamanjab), Regional Councils (Ojozondjupu, Kunene, Oshikoto) and Premier Electric, as Namibia’s second RED.
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, namely generation, transmission, distribution and the single buyer within the NamPower Group. Non-regulated 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.  

With regard to the prospective IPP market, in 2001 the Single Buyer (SB) role was conferred upon NamPower by Cabinet resolution for a transitional period intended to lead to full market development. Locating the SB function within NamPower poses a potential conflict of interest as the Company is also one of the power producers and therefore could potentially exploit its monopoly position. It was, however, recognized in the absence of any other player with a sufficiently strong balance sheet to underwrite SB contractual agreements that NamPower was the best possible option. The Electricity Control Board (ECB) was established in July 2000. Although the Minister of Mines and Energy retains overall policy authority, the Board has promulgated the regulatory apparatus necessary for the rationalization of distribution, together with ring-fencing of NamPower and the SB. 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.

While the primary driver for reform, namely the need to restructure the distribution industry, has yielded some impact (albeit with only limited private sector involvement), the second driver regarding security of supply and new investment has not yet led to any concrete changes. There have been no new generating facilities 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 north-western Namibia; an 800 MW combined cycle gas turbine plant at Oranjemund in the far south, supplied by the Kudu off-shore gas field; a 15 MW hydro facility on the Okavango River in north-east and a 10 MW wind park in Luderitz. The Epupa investment seems unlikely and the Kudu project faces many hurdles.

South Africa

The South African Electricity Supply Industry (ESI) 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 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.

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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 re-integrated within NamPower.
Eskom has 24 power stations: 10 large coal-fired stations account for most of generation – mainly situated on coal mines in the north-east of the country. Africa’s only nuclear station is at Koeberg, 30 kilometres north of Cape Town, and is also owned and operated by Eskom. There is modest hydro-electric capacity on the Orange River, located on two dams, and there are two pumped storage schemes which play a critical role in meeting peak demand, as well as in system balancing and control. Municipalities own 22 small power stations and back-up gas turbines, but these now produce less than one percent of national output. Private generators produce the remaining three percent essentially for own consumption.

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

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 serviced 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 2.2 US cents/kWh and for residential customers was 5.6 US cents/kWh. Eskom average tariffs cover average costs which were approximately 2 US cents/kWh in 2003.

Reform has been a multi-staged process in RSA, yielding four major developments: establishment of an independent regulator, corporatisation of Eskom, restructuring of the distribution sector, and the preparation of tenders to attract private Independent Power Producers (IPP).

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.

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

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 Regional Electricity Distributors (REDs), with an EDI Holdings Company to manage the transition. However, 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.

One area of innovation in the distribution sector has been the granting of 6 concessions to private companies to supply off-grid (photovoltaic) 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 due to 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.

While 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 had the vision of

- “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.”

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

- **Structure of the generation industry**: Eskom is expected to retain no less than 70 percent of the existing electricity generation market, with privatisation of the remainder, with the initial aim of transferring 10 percent to black economic ownership no later than 2003;
- **Vertical unbundling**: to ensure non-discriminatory 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 multi-market model electricity market framework will ensure that transactions between 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; and

• *Regulation*: A regulatory framework will be put in place that ensures the participation of Independent Power Producers (IPPs) and the diversification of primary energy sources.

However none of these reforms has yet materialised. Currently, security of electricity supply is seen as paramount. Eskom is now expected to remain in state ownership. Private, independent power producers 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 22 June 2004 that “the state has to put security of supply above all and above competition especially”.

**Tanzania**

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 (ZSFPC). In addition to TANESCO, two IPPs, namely Independent Power Tanzania Limited (IPTL) and Songas Limited, feed the grid. There are also a number of small self generators. Power imports from neighbouring Zambia and Uganda complement internal generation capacity by supplying isolated centres near the borders. The diagram below depicts the organization of the sector.

**Figure 6: Structure of power sector in Tanzania**

![Diagram of power sector in Tanzania]

- **IPPs**: IPTL, Songas
- **TANESCO**
  - Generation (Net Group Solutions)
  - Transmission
  - Distribution
- **Imports**
- **Self generators**
- **Customers**
The country’s installed electricity generation capacity is split more or less evenly between hydro and thermal plant. IPTL is fired by heavy fuel oil while Songas is supplied by natural gas.

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

The Government of Tanzania embarked on a program for liberalizing and reforming its power sector in 1992. 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 corporatisation in the early stage of reforms. Commercialization of TANESCO was, however, in order, as the firm had been performing poorly from both a technical and financial perspective. The first step towards commercialization involved implementing tariff reforms. Between 1993-1995, average tariffs nearly doubled (in local currency).

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 privatise generation and distribution. However, despite more than a decade passing since this recommendation, TANESCO remains an integrated and publicly owned utility.

Meanwhile, repeated price hikes neither improved financial nor technical performance. Reasons for TANESCO’s persistently poor performance are attributed to inadequate revenue collection, including a significant portion owed by Government and the Zanzibar State Fuel and Power Corporation. 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 fifteen years, the utility has failed to declare dividends.

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 is now renewed for a further two years.

The management contract sought to enact a series of reforms to turn around the company financially and technically, namely: 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 August 2004, improvement had been recorded on each of the above. See text box below.

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5 Eskom of South Africa bid unsuccessfully for the contract.
The stalled unbundling of TANESCO has not, however, prevented development of IPPs. Starting in 1994, the Government reached agreement with the Independent Power Tanzania Limited (IPTL), a Malaysian-Tanzanian joint venture private company, to install 100MW of thermal capacity. With a controversy over the investment cost and associated capacity payment, which was ultimately reconciled by a multilateral agency arbiter, power only came online in January 2002.

Still the resulting capacity charge even with the reduced investment cost has been above TANESCO’s means, necessitating Government to pay US$1.5 million per month in charges.

The second major IPP is part of the 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 km pipeline, and the conversion to gas-firing of a 115MW fuel oil generating plant. As with IPTL, TANESCO has been unable to meet fully the monthly payment obligation, which amount to US$5 million for a capacity charge and US$1 million for an energy charge, from its internal cash generation (i.e. without a steep increase in tariffs). A liquidity fund equivalent to four months capacity payment has therefore been established by the Government to cushion non-payment should it occur.

The Management contractor was asked to improve sales and collections, liquidity, financial and technical performance, labour productivity and system stability, and to reduce outages. Lastly the contractor was asked to make TANESCO ready for privatization i.e. profitable so as to attract lucrative buyers. Privatisation of Tanesco has been delayed with uncertainty for 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 credit worthy and it has managed to raise a loan of $33m. $38 million in capital was spent in 2003 generated from Tanesco’s own funds.
- 93% of bills are now collected every month compared to only 67% before.
- Operating efficiency has improved: There has been an improvement in customer to employee ratio from 67 in 2001 to 97 in 2003 - came after retrenching 21% of the employees and as a result of an increase in the number of connections
- Reduced system losses from 27% to 23%.
- 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
- Increase in the number of customers from 450,947 in 2001 to 530,000 in April 2004
- Intensive training of employees – managerial, technical, safety, first aid and computer courses

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

**Box 2:**
**Private participation in distribution:**  
The case of the Net Group / TANESCO management contract

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

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The project involves establishing gas infrastructure for gas supplied by offshore and onshore wells, respectively, a 207 km pipeline, and the conversion to gas-firing of a 115MW fuel oil generating plant. As with IPTL, TANESCO has been unable to meet fully the monthly payment obligation, which amount to US$5 million for a capacity charge and US$1 million for an energy charge, from its internal cash generation (i.e. without a steep increase in tariffs). A liquidity fund equivalent to four months capacity payment has therefore been established by the Government to cushion non-payment should it occur.

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IPTL claimed that it invested US$150 million in the project, while 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$1130 million.
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, multi-sector (energy and water) regulatory agency, known as the ‘Energy and Water Regulatory Authority’ (EWURA), was passed by the 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
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 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 UEGCL and to fulfill certain investment commitments.

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 UEGCL, UEDCL’s assets are to be leased to a private entity, namely Umeme Pty Ltd, jointly owned by Gobeleq (a CDC company) and Eskom.

Other companies have the right to bid to expand the network to new areas. To date, there has been one developer who 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, with authority over all electricity undertakings in the country. The diagram immediately below illustrates the structure of the sector.

Figure 7: Structure of power sector in Uganda
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 from small hydro generators. A bagasse project is under development and has concluded a power purchase agreement with UETCL.

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 south-west of the country. The distribution system includes reticulation in the major towns. In addition, there are some isolated networks powered by diesel generators.

Households, while making up over 90 percent of the customers, account for around 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.

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, in order 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. Some 43 percent of firms surveyed had their own generators, and investment in back-up 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.

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

- Uganda Electricity Generation Company Ltd (UEGCL)
- Uganda Electricity Transmission Company Ltd (UETCL)
- Uganda Electricity Distribution Company Ltd (UEDCL)

All three companies are subject to the Companies Act. Subsequently private participation was sought in the generation and distribution companies, as described in Box 3 below.

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The reforms have also paved the way for new generating and distribution entities to enter the sector. 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 been awarded, as of 2003 to West Nile Rural Electrification Company.

The Electricity Regulatory Authority (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 as well as installation permit regulations and license fees;

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**Box 3: Privatisation though long-term-leases in Uganda**

The generation and distribution assets of UEGCL and 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, UEGCL and UEDCL will remain as 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 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, who took over operation of the assets at Nalubale and Kiira in 2003. UEGCL has an obligation to complete the on-going 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 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:

- Firstly, there are large investment obligations in the distribution concession, whereas investment obligations in generation are much smaller.
- Secondly, the generation concessionaire has a power sales agreement with UETCL, a public entity, whereas the distribution concessionaire must sell power directly to customers. Non-payment levels have been especially high in Uganda, implying considerable commercial risk.
- Thirdly, the generation concessionaire sells power to UETCL on a capacity availability basis (i.e. a “take-or-pay” style PPA). Hence, it is UETCL who takes volume risks if demand is lower than expected. The distribution concessionaire, on the other hand, is partially exposed to volume risks. While 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 feed through into higher prices and so higher levels of non-payment.
- Finally, the generation concessionaire is largely unaffected by the risks implied by expansion at Bujagali. The distribution concessionaire, on the other hand, must pay bulk supply prices to UETCL that reflect the costs of the Bujagali PPA. While regulation allows these costs to be passed through to end-consumers, there is a risk that Bujagali will result in higher end-use prices and again higher levels of non-payment.

Despite these obstacles, in early 2004 most outstanding issues were resolved and it is Globeleq has taken over UEDCL’s operations under a locally registered company named Umeme Pty Ltd.
- Issuance of licenses to 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.

From 1999 to the present, the ERA has exhibited its independence from 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 is preparing to fulfill this responsibility.

2.4 Significant reform steps

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. Tanzania planned full unbundling and privatization of Tanesco. And South Africa envisaged unbundling of Eskom, partial divestiture and the establishment of a multi-market involving a power exchange and bilateral contracts. There has been a substantial retreat from these policy pronouncements. Many governments have been loathe to fully privatize the main utility, believing national utilities continue to play a vital developmental role. And 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 SAPP members and a simulated pool inside Eskom.

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 (e.g. EDM and SOGEM in Mali and Tanesco in Tanzania currently) and also to prepare them for privatization. Private sector participation has also been explored in distribution, for example in Namibia and Ghana. Private players are also being attracted into rural concessions in Mali, Ghana, Uganda and South Africa. Privatization has occurred in the form of long-term concessions and take-overs 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, Ghana and Uganda. Namibia and South Africa hope that they will be able to attract new IPP investments.

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.

All case study countries also have special measures to promote electrification and widened access to electricity. These will be explored in more detail below.
3. Impacts of reform on electricity access levels

3.1 Electrification progress and status

In this study we define “access” 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 dramatically over the last decade. Most notably, in Ghana, South Africa, and Mali, 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.

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 20kWh per person over that period. 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. On the other hand, in Mali per capita consumption of electricity has increased from 22kWh per person in 1990 to over 34kWh in 2000 while at the same time access levels increased almost threefold.

Table 3 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 miniscule. 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, while 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: Electricity access levels in urban and rural areas

<table>
<thead>
<tr>
<th>Country</th>
<th>Overall</th>
<th>Rural</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghana</td>
<td>49</td>
<td>1</td>
<td>42</td>
</tr>
<tr>
<td>Mali</td>
<td>12</td>
<td>1</td>
<td>75</td>
</tr>
<tr>
<td>Namibia</td>
<td>34</td>
<td>12</td>
<td>85</td>
</tr>
<tr>
<td>South Africa</td>
<td>70</td>
<td>50</td>
<td>39</td>
</tr>
<tr>
<td>Tanzania</td>
<td>5</td>
<td>2</td>
<td>20</td>
</tr>
</tbody>
</table>

Ghana has made impressive progress in electrification of its northern areas – 14 percent per annum growth in connections over the past decade - as demonstrated in Figure 8.
Connection rates have also been improved significantly by the main distributor, ECG in the south. Connections have grown at around 10 percent per annum in recent years, from 456,000 in 1996 to 793,000 in 2002 (see Figure 9). Overall electricity access levels in Ghana have increased from 43 percent in 1999 to 49 percent in 2003. New connections have mainly concentrated in urban areas and have not focussed on the poor. Despite the subsidised “lifeline” tariff, many households are not able to afford electricity service, with arrears and disconnections fairly prevalent.
In Mali electrification levels have doubled in 12 years (see Figure 10), although the percentage access is still extremely low. The fall in 1999 was due to a large number of disconnections due to non-payment 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 which enabled consumers to pay their connection fees over an extended period rather than as a lump sum. As stated above, 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.

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 five 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 Government.

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

Figure 11 shows the number of new connections made by Eskom and by local government distributors.

Figure 11: Number of new electricity connections in South Africa since 1991

The number of customers in Tanzania increased at a slightly higher rate during the period when TANESCO was under a management, 2001-2004, than in the 2000-2001 period. However as shown in Figure 12 TANESCO in the pre-reform period 1997-2000 had been able to achieve similar rates.
In Uganda, approximately five percent of the population has access to electricity (see Figure 13). There are about 200,000 domestic connections in a population of some 20 million persons.

Throughout 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. Namibia aims to provide 95 percent of its urban population with electricity by 2010 and 25 percent of its rural population. Uganda aims 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. Ghana, for example, expects a doubling of demand in less than ten years; Tanzania’s demand is forecasted to grow by six percent per annum 2004-6 and 5.7 percent in 2007-15.
3.2 Role of special programmes in implementation of electrification

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 programme and/or fund. Table 4 presents the rural electrification initiatives in the various countries. Some of these programmes are relatively young and as yet have had modest impact on electrification levels, with the exception of South Africa and Ghana where significant progress has been made.

Table 4: Rural electrification initiatives and status

<table>
<thead>
<tr>
<th>Country</th>
<th>Programme</th>
<th>Approach</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Namibia</td>
<td>National Rural Electrification Programme launched in 1991 Rural Electricity Distribution Master Plan 2001</td>
<td>Capital subsidies. Initial focus on public institutions and infrastructure. Free connections to households within 50m, rest pay.</td>
<td>Ongoing. Ambitious targets</td>
</tr>
<tr>
<td>South Africa</td>
<td>National electrification program initiated by Eskom, supported by local authorities RDP targets 1994-1999 National Electrification Fund and National Integrated Electrification Programme 2000 onwards</td>
<td>Initially, Eskom cross-subsidies and Development Bank Finance for local authorities Now capital subsidies from fiscus to National Electrification Fund allocated to utilities</td>
<td>Ongoing Uncertainty around creation of Regional Electricity Distributors (REDs) is slowing electrification rate</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Rural Energy Agency and Fund</td>
<td>Promote private sector led rural electrification initiatives focussing on productive applications. Provision of capital grants.</td>
<td>Legislation drafted but not yet passed. Institutions not yet established, but first projects being prepared.</td>
</tr>
</tbody>
</table>
A number of countries initiated electrification programmes prior to power sector reforms. From 1988 onward, the government of Ghana, with the utilities, initiated a National Electrification Programme that connected all 10 regions and 110 districts of the country. To realize electrification goals, Ghana established a national electrification fund (NEF) in 1989 and as part of the implementation plan started the 30-year Self Help Electrification Programme (SHEP). Under SHEP the government directly shared connection costs with communities within 20 km 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 1700 communities. The funds used for effecting the NEF and SHEP were sourced through an electricity levy. Electrification progress has been impressive – as reported above.

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 Ministry of Mines and Energy with increasing participation by the Regional Councils. Local government has been responsible for operation and maintenance. The programme commenced 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 50m of a low-voltage line. Households within 500m could be connected, but at a cost. By 2001, the programme had electrified 400 rural settlements – but only 9,700 rural households had been connected. A Rural Electricity Distribution Master Plan (REDMP) has mapped out the remaining electrification requirements and has established prioritised 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 prioritisation 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 programme as circumstances or priorities change.

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

Mali established Agence Malienne pour le Developement de l’Energie Domestique et de l’Electrification Rurale (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 40000 consumers. Targeted subsidies are provided.

Uganda has established a Rural Electrification Agency (REA) and Fund (REF) in 2003. The REA has the responsibility to identify and promote rural electrification projects, whereas the REF provides capital subsidies and support for debt finance. The intention of the subsidy 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 4: South Africa’s grid electrification programme

The recent progress made in South Africa in electrification is probably unprecedented internationally. In 1990, about a third of the population had access to electricity. Today access levels stand at 70%. The programme as 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: 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 programme 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 (DME 2001).

Up until 2000, the entire electrification programme 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 National Electricity Regulator allocated to municipalities. Thus low-income households have not had to pay for connection costs—and these continue to be subsidised.

Nearly all of these new connections have used pre-payment technology—customers buy tokens or top-up 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 pre-wired “ready boards”—typically with a few lights and plug points.

In 2001, Eskom was corporatised, entailing that Eskom would start to pay taxes and dividends to Government, its sole shareholder, and would consequently no longer carry the main burden for the electrification programme. Government moved to secure the national electrification programme through establishing a separate National Electrification Fund in the Department of Minerals and Energy funded by National Treasury. A team was seconded from Eskom and undertakes macro-economic electrification planning. The National Integrated Electrification Programme (NIEP) Business Planning Unit makes recommendations to a National Electrification Advisory Committee (NEAC) on programme resources committed each year to the programme.

Government has stated that its goal is universal access. Over 300,000 new connections continue to be made each year.
3.3 Impacts of new entrants on access levels

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 grid.

In rural Ghana new agents such as NGOs 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 RESPRO in the Mamprusi district, and the Isofoton project in the Kpasa area. The costs for these systems have been higher in comparison with grid connected areas.

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. After 18 months of operation, SSD Koutiala had installed solar home systems for 1000 customers in 18 localities and SSD Kayes had installed 600 in four localities.

In Namibia, the Ministry 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 1000.

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 government’s commitment to future subsidies has created uncertainty about the future of this programme.

Other notable access initiatives are the electricity cooperatives in Tanzania described in Box 5.

Box 5: 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 established in 1995, 1996, 1998 and 2000 respectively. Further rural townships are looking to adopt this model.

An elected development committee consisting of a chairman, secretary, treasurer and committee members manage the power co-ops. The development committee members volunteer to manage the power supply on behalf of the coop 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 etc. 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 coop’s staff undertake all day-to-day operation and maintenance of the coop power system as well as service provision.
In Uganda, the first rural concession awarded has been to the West Nile Rural Electrification Company – owned by Investment Promotion Services, which is linked to the Aga Kahn Foundation. The company has the obligation to expand supply, including construction of local hydropower and expansion of the network. Government’s strategy is supported by the World Bank and GEF funded Energy for Rural Transformation (ERT) 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, as well as a range of technical assistance activities to the Ministry.

3.4 Effects/impacts of private sector participation on access

In Namibia a private operator, Northern Electricity (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 5 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 centres spread throughout its supply area of 120,000km², the appointment of local vendors of pre-paid electricity tokens, and a 24-hour fault reporting centre with toll-free 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 retained earnings to fund electrification.

After being awarded a management contract for TANESCO in Tanzania, NetGroup Solutions Pty of South Africa increased the number of customers from 450,947 in 2001 to 530,000 in 2004.

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.

In summary, access to electricity has expanded at a steady rate through 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 centres and infrastructural services; insufficient households have benefited. While 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 (viz, Northern Electricity in Namibia and the Tanesco management contract) have been positive for expanded access, but these experiences are neither widespread not sufficient. Finally, while 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.

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, provided concession, lease and management contracts provide clear performance objectives and incentives.
4. Impacts of reforms on prices, costs, tariffs and subsidies

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 financial performance, which is often a consequence of political control over power prices – resulting in tariff levels that are far below cost recovery levels. The desire to attract private sector capital also has an impact on price levels. Firstly, the establishment of cost-reflective prices is almost a pre-requisite to attract private sector capital (and multilateral credit). Secondly, the need to meet private sector returns on capital can have an upward pressure on price levels, if not compensated fully by efficiency gains.

For these reasons, price reform has typically been a key and initial element of the power reform process. In all our case studies, tariff reform has taken place with the intention to introduce cost-reflective prices, both in average tariff levels, and also across tariff categories, i.e. minimising the degree of cross-subsidies between customer categories. Tariffs are generally set by new, independent regulators, although where concessions have been granted (e.g. Mali and Uganda) the concession agreement often establishes the tariff regime for a number of years.

### Table 5: Establishment of regulatory institutions in case studies

<table>
<thead>
<tr>
<th>Regulatory institution</th>
<th>Uganda</th>
<th>Tanzania</th>
<th>South Africa</th>
<th>Namibia</th>
<th>Ghana</th>
<th>Mali</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy &amp; Water Utilities Regulatory Authority (EWURA)</td>
<td></td>
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<tr>
<td>National Electricity Regulator (NER)</td>
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<td>Electricity Control Board (ECB)</td>
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<tr>
<td>Public Utility Regulatory Commission (PURC)</td>
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<tr>
<td>Water and Electricity Regulatory Commission (CREE)</td>
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</tr>
</tbody>
</table>

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

### 4.1 Tariff reforms in the case-study countries

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 5 above. The experience with tariff reforms is presented in Table 6 below.
### Table 6: Summary of tariff reforms

<table>
<thead>
<tr>
<th></th>
<th>Ghana</th>
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Ghana

The reform programme in Ghana has aimed to move to fully cost-reflective prices. Since Government had subsidised 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 the period 2002-2003, 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 (described in Box 6 below).

Box 6: Lifeline tariffs in Ghana

A low block charge for small consumers to make electricity affordable for the poor had been in existence prior to 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 the 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. The 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, viz. the first 100 kWh of 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 residential consumers. This “flaw” had however turned out to be an important ally that helped make the 300% 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 the PURC currently provides for residential consumers whose consumption is no greater than 50 kWh to be charged a block amount of Cedis 19,978 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 Cedis 5,000 of this amount directly to the utilities on behalf of consumers so that the utilities only bill consumers for the balance.

Mali

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 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 Government has reacted by providing subsidies to the utility in order to buy-down the cost of power supply, bring tariffs (in 2003) back to the levels of 2000. Nevertheless, Mali still has amongst the most expensive electricity tariffs in West Africa.

Namibia

Like South Africa, much of electricity distribution is undertaken by municipalities, while wholesale power is supplied by a national utility - NamPower. The establishment of the Electricity Control Board (ECB) bought both NamPower and municipal distributors under a single regulatory authority. The ECB has a policy to price electricity at cost-reflective levels, and has introduced new methodologies to determine cost-reflectivity. Government wishes to rationalise 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 rationalise prices across regions in order to prepare for the new structure of the distribution industry. The ECB has found that most distributors’ prices are currently below full cost-reflective levels (as defined by long-run marginal costing methods), but 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. The brief experiment with a private contractor operating Northern Electricity, resulted in tariff increases consistently below inflation: i.e. the real price for consumers fell each year.

**South Africa**

Wholesale electricity prices in South Africa have declined considerably over the past decade – driven by the financial effects of over-investment 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 National Electricity Regulator (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 programme and the requirements of municipalities to cross-subsidise other services with electricity tariffs. The NER has been reasonably successful in its efforts to rationalise 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 upwards 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. Unrelated to the overall power sector reform programme, 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-subsidised by other customers.

**Tanzania**

Following a tariff review in 1993, the national utility’s (TANESCO) tariffs were increased to long-run marginal cost (LRMC) levels of around 10 US¢/kWh. In 2000/2001, Government refused 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. Government pays capacity payments directly to IPPs and so subsidises generation costs. TANESCO has also incorporated a lifeline tariff in its tariff structure. However, the threshold level for this subsidised tariff rate used to be high – 500 kWh per month, and available to several customer categories. Along with tariff reform has been a targeting of the lifeline tariff at purely domestic customers, and a reduction in the threshold level to 50 kWh.

**Uganda**

Tariffs in Uganda had not been adjusted for seven years prior to the establishment of the Electricity Regulatory Authority (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. On average, tariffs increased by 30 percent - significantly less than the accumulated inflation since the previous tariff adjustment. The reform also addressed cross-subsidisation between tariff categories. Prices to domestic customers more than doubled and prices to industrial customers actually decreased. Since this initial reform, tariffs have been adjusted annually in response to costs, and prices have now reduced by around 20 percent to a level of around 8 US¢/kWh. There has been considerable public opposition to tariff increases, and the issue was highlighted in both presidential and parliamentary
elections. In 2002, Government offered a temporary subsidy to buy-down electricity prices. Further, the ERA introduced a lifeline tariff, allowing domestic customers to purchase 30 kWh per month at a reduced rate.

Tariff reforms in the case study countries have followed a general trend of price increases followed by a 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.

4.2 The impact of tariff reforms on the poor

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

- Firstly, there are the direct effects on household disposable income, and energy-consumption patterns, arising from changes in electricity prices to these customers;
- Secondly, there is the possibility for extended access to electricity, as the improved financial position of the utility/utilities allows for more investment in network expansion;
- Thirdly, there are the effects of changes in electricity prices on the general economy, and the indirect effects this may have on job creation and wage levels;
- Fourthly, it is possible that tariff reforms may reduce the need for Government operational subsidies to the power sector, which can be re-directed towards other social expenditure.

We 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

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 towards price-reflective tariffs and this has meant periods of real price increases. For the poorest, these increases have, in many cases, been off-set by lifeline tariffs.

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.
Data from interviews indicated a fairly high price elasticity of demand at the household level (i.e. 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 domestic demand for pre-paid electricity (i.e. 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 pre-paid 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.

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 voluntarily been 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 non-payment for electricity services has also resulted in a switch to other fuels to satisfy household energy requirements.

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, interestingly, are now using energy savings lights (CFLs) in an attempt to keep electricity costs down. In 1998, the Volta River Authority imported CFLs and sold them at highly subsidised rates – many of which were then resold at higher rates in neighbouring Cote 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.

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 one percent of households there use electricity for cooking.

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 rather cut down on household expenditure. Small business owners argue that they can also pass costs on to customers, but only small increases as most of their customers are also poor. Thereafter, they must also absorb price increases themselves.

One obvious fact needs re-emphasising. The vast majority of the poor remain without access to electricity and are thus not immediately affected by electricity tariff restructuring.

**Power prices and expanded access**

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 so greater access to electricity, which would help the poor.

The Ugandan case study appears to bear this out, with evidence of significantly increased investment following tariff reforms (over 400 percent increase), and a more than doubling of the annual number of connections made. Tariff reforms in Uganda have also been viewed as essential in order to attract 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.

As in Uganda, the privatisation of the utility in Mali, EDM, has also involved a commitment to investment ($70m in electricity services in the first three years). Although the company has managed to mobilise a large part of its investment obligation, investments targeted at electrification have not materialised. In the situation where the company has been unable to mobilise all the investment resources required, it has clearly prioritised other needs over electrification. In this case, the relationship between reform, prices and investment in access has not materialised 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.

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 programme 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, so 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).

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 programme in Ghana has failed to stimulate additional investment in extending access.
A common feature of several countries has been a policy to attract new (and private) entrants into rural electrification, providing rural electrification capital subsidies as an incentive. In some cases, e.g. South Africa and Mali, this has been focussed on off-grid supply, whereas in others (e.g. Uganda, Tanzania) it includes grid-connected areas. To date, it is difficult to judge whether these policies are proving successful in attracting investment. To date Uganda has not managed to replicate the West Nile rural electrification project in other areas. Similarly, the South African off-grid concessions have yet to deliver the anticipated number of connections.

5. Impact of reforms on quality and reliability of supply

The effect of reforms on quality and reliability of supply varies amongst case study countries. Public and private investment in new capacity in Uganda and Mali have brought about significant improvements in the quality of reliability of electricity supply in both countries, and due to the introduction of new service standards 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 are yet to be restructured, quality and reliability of supply varies 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 Northern Electricity show that private sector assistance with electricity reticulation can have 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.

Our research in South Africa suggests that poor electricity households – and 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. And, they tend not to switch to other fuels and appliances, as 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 its ensuing problems. Quality and reliability of supply concerns have little effect on cooking patterns in poor households, as 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 has 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.

Utility customer service systems, including metering, billing and collection processes, vary considerably between countries, as do customer perception of these systems. Private participation in distribution results in significant changes: oftentimes they revert to pre-payment methods in an attempt to improve payment levels. This was the case in Namibia with Northern Electricity which comprehensively revamped billing methods, and with great and rapid success (see Box 8). The management contractor in Tanzania has also introduced pre-payment meters. Prepayment methods are perceived by customers differently but in most cases are gaining support as they help customers to effectively control the amount of electricity that they consume. They appear to be more readily accepted though when accompanied by customer education initiatives.
Fee for service arrangements for off-grid systems are slowly being introduced into different countries – typically Ghana, South Africa and Mali. 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.

A traditional barrier to expanded access has been the requirement of 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.

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. Younger regulators in Africa appear still to be in the throws 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.

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

Social service infrastructure, in particular, schools and (rural) clinics have tended to benefit tremendously from electrification programmes 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 and 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, sterilisation instruments, refrigerators, as well as 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 still maintain back-up diesel generators in case the electricity

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Box 8: Quality of Supply and Customer Service in Namibia

The company 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 of this was a high level of customer satisfaction, which manifested itself through high payment levels (about 99%), insignificant tampering by customers with their supplies, a rapidly expanding customer base, and high levels of consumption (in excess of 200kWh customer per month for domestic customers). Northern Electricity adapted their service approach to local condition, for example by making use of community agents for marketing and the sale of pre-paid 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 non-payment and devising mutually acceptable solutions with defaulters), which earned them a lot of credit. Northern Electricity was also the first utility to offer a 24-hour toll-free customer call service, and also hosted a radio show for customers to call in and ask questions.
supply falters or fails. Such facilities could greatly benefit from improved quality and reliability of supply by saving them the cost of maintaining expensive back-up power sources.

While the overall impact on poverty cannot be assessed, 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 South Africa, many instances were observed in this case study where community members are using clinic facilities to undertake household tasks such as ironing and cooking, as well as mobile phone charging.

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 while off-grid services are being installed and managed by private sector operators. Most times, subsidies are required to enable a sustained service.

Yet, in most instances, the electrification programmes 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 9
Electrified health clinics provide multiple electricity services
An interview example from South Africa

Sister Mlaza has worked at the Mphopomeni Clinic 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 6 permanent sisters. The clinic is located in the older part of Mphopomeni township. It is quite a large clinic, which appears to be 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, to be transparent and to show excellence in all that is done.

Mphopomeni Clinic is serviced by Eskom. The clinic does not pay for the electricity, which is managed on a credit system (i.e. post paid). It receives electricity bills and forwards them on to Grace Hospital in Pietermaritzburg from where they are paid off a budget allocated to smaller clinics. This is the procedure they follow for many of their expenses. Indeed, Sister Mlaza says that they have a 'clinic budget', which is administered for the Department of Health by Grace, and they rarely spend all of the funds available to them. Indeed, in Sister Mlaza’s office there is a brand new large colour TV waiting to be set up – for education and training – in the clinic. This TV was ordered in an attempt to spend some of these funds. Sister Mlaza is quick to note 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 meagre for the burgeoning needs.

Sister Mlaza says that there really is not much of an incentive to control the use of the clinic’s electricity. This became apparent during our conversation: the clinic was clearly being visited by a range of people coming to do their ironing, welding and other electricity consuming activities! Officially, Sister Mlaza says that they do try to control electricity usage. The lights are on for 8 hours per day, or 40 hours a week. There are outside security lights, which are left on all night. Electricity is also important for refrigerating vaccines, and some drugs. She says that they do a small amount of cooking with electricity too, but this is an infrequent activity as most times because the sisters bring lunch boxes with them each day.

According to Sister Mlaza, the quality of their electricity is good. They have no reason to complain. They do not experience power surges. If Eskom needs to cut their electricity off, they are informed before hand, and Eskom is quick to restore electricity to them when the situation has been seen to.
7. Impact of reforms on economic activity

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 programmes, making it harder to separate the influence that electricity prices have in relation to other factors.

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 forty percent since this time. However, this growth can be, at least in part, attributed to the level of suppressed demand that existed prior to 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.

In several countries, tariffs to industry have not increased as much as to other consumer groups, due to 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 our case studies, although in several cases demand growth has also been particularly strong in the domestic sector. However, it should be noted that in several cases (e.g. 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.

For businesses, it appears as though 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 have reported that industrial and commercial customers are aware of the high cost of self-generation, and hence 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.

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

The nature of small business established as a result of electrification initiatives varies. In South Africa, our research alone has identified welding, sewing, telecommunication, retail activities directly emerging from new access to electricity. 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, drinking bars, hairdressing salons, lorry parks and market points where solar street-lighting has been installed. In Ghana, tailors, seamstresses, woodworkers, metalworkers, hairdressers and other business operators were identified.

In one interesting survey in Namibia, it was found that business creation in households with grid-electricity was four-fold greater than households with off-grid, solar systems. While this finding is to be expected, given the power limitations of small PV systems, it is an important reminder that productive uses of electricity are more likely with grid-electrification.
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 South Africa and Ghana. In all three countries, it is found that small businesses need, for instance, access to micro-finance and improved road and telecommunication infrastructure, in addition to electricity.

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 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 employed by the businesses. But, they also note that there has been a notable improvement in the quality of the electricity service that they receive (due to a more stable electricity network).

In Mali and Ghana, electrification programmes are said to have somewhat stemmed rural-urban migration patterns. Indeed, it is noted in electrification policy that this pattern can only be sustained if electricity access in rural areas results in increased economic opportunity.
Box 10

An electricity supply enables businesses to be run from home

An interview example from South Africa

Mr Khumalo lives in a RDP house on the outskirts of Mphopomeni township, which is near Howick and about 1.5 hours drive to Durban. About 9 000 people live in Mphopomeni township which comprises older and/or less formal houses, and a large RDP housing estate. Mr Khumalo has lived in his home for 3 years (or since it was built) with his wife and a child.

Mr Khumalo is a welder by trade. He is the sole breadwinner. He has added a corrugated shelter and storeroom on to his two roomed home and uses this for his business. He has been in operation for one year, mainly welding security guards, gates, doors and fences for clients in the township. He travelled to Pietermaritzburg to purchase his welding equipment. He works on his own, but if he gets more work than he can handle, he employs one of his friends to help him out. Most of his friends are unemployed and confirm that they are ‘very pleased to get temporary employment’. He says that his business does not keep him occupied all of the time, and 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 buy electricity, in advance and just down the road, at the Eskom office. They purchase a card for about R10, and say that this lasts for about 3 weeks. The Khumalos do not use much electricity for cooking. They barbecue their meat outside on a grid, and use charcoal which they purchase at the Howick fuel station (about 5 kms away) for R12.95 (less than $2) per bag. This bag lasts for about three meals. They use paraffin for cooking porridge and also use a two-plate electric stove when they are more desperate.

Mr Khumalo says that he ‘would not be happy if the price of the electricity card went up’ to say R20 for 3 weeks, but that he would still buy it because he needed the service. He said, however, that he would ‘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 paraffin for cooking, and heating. He would, however, have to try to be more flexible about his business’s electricity consumption.

He says that the main costs in 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. He says that the electricity service he receives is ‘very weak’. His welding equipment (including air cooler) uses 20 Amps for each plug and he uses 3 plugs. He wished that he had a ‘stronger current’.

Mr Khumalo wishes that the government would extend him some credit so that he is able to put up a larger shelter to work under, as well as a metal sign to advertise his business. He would then be able to work with his friend who is a mechanic, and they would service mini bus taxis. He is confident that his business is going to significantly pick up when the road in front of them is tarred. Mr Khumalo also wishes that the government would not build such small RDP homes.
8. Impact of reforms on public finances

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

In the first instance, governments face a trade-off in terms of maximizing privatization receipts versus lower sale or concession values that build in investment obligations for the new operator. The Uganda concessions have favoured the latter approach.

Second, corporatised or private utilities are liable for payment of taxes (and dividends – where government continues to be a shareholder). However, governments have often waived dividend payments and have granted tax deferments. Eskom in South Africa was corporatised in 2001, but in each subsequent year government has agreed to substantial deferment of taxes and their dividend policy is flexible; government often accedes to Eskom’s requests for financing non-electricity related activities. VRA in Ghana has never paid taxes on its power operations to government, but rather reinvests any excess revenues it would others have distributed as dividends. ECG, as a limited liability company should pay taxes, but to date, it has not made sufficient profit to warrant this. On the other hand, 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 those regional councils and local authorities, who are partners in this joint venture.

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

Fourth, governments also face ongoing demands to assist poor electricity consumers. Fiscal transfers to bale 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. The South African government subsidies both capital connection costs and 50 free units a month for small consumers. 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 quantum of subsidies is now more transparent. The Malian government continues to provide tariff compensation to keep tariffs low. Governments have also established electrification funds.

The overall impact of power sector reform in Africa has probably not been to reduce dependency on public finances – but rather to make government transfers more transparent and more targeted at poor consumers.
9. Conclusions

9.1 The nature and extent of power sector reform

Many countries in Africa have planned and embarked on a set of power sector reforms. These reforms have encompassed new approaches to the organisation 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.

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

- Firstly, there has been concern with performance, at both the technical and financial level;
- Secondly, 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.

Despite this commitment to reform, in general progress has been 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 utility unbundling, nor privatisation, and competition has not featured beyond a few cases of tendering for the right to build new capacity.

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 African context; and competition is 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.

Most reform programmes, 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 so support economic growth and development. However, several countries have developed measures specifically dealing with poverty in parallel to, and not always co-ordinated 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.

9.2 Impact of reforms on access

With the notable exception of South Africa and Ghana, 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.

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 programmes in parallel to the reform program. In some cases, again notably South Africa, electrification has dominated the policy debate, and in this country efforts to promote electrification have taken precedence over other parts of the reform program.
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 vast majority of poor people still do not have access to electricity.

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 commercialised utilities face, and ensure that the subsidisation and cross-subsidisation 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.

The approaches being adopted include the establishment of special electrification funds and electrification agencies (that 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 while it holds some promise, it is proving difficult to scale-up operations to a level that will make a significant impact on access rates.

Similarly, privatisation of distribution has the potential to have a positive impact on access rates, especially if the privatisation transaction is designed to maximise investment rather than realise a financial reward for the state (as has been the strategy in Uganda). However, experience with privatised 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 new comers the right to expand the network. However, there is little evidence that this strategy is effective in attracting new entrants.

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

**9.3 Impact of reforms on prices, costs, tariffs and subsidies**

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-subsidisation in the industry.

However, several countries have found it politically difficult to sustain tariff increases, and 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.

Price reforms are intended to restore the financial viability of the industry, and 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 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 financial performance, and in these cases resources have been invested back in the business with a positive impact on access and service levels. 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.

Several tariff reform programs have incorporated measures to minimise the impact on low-income households. Typically these include lifeline tariff rates where a limited quantity of energy is available at a subsidised rate. In some cases these rates have always existed, and the tariff reform has reduced the level of subsidised consumption in order to target the subsidy more effectively. In addition, prepayment metered supplies have often proved popular with low-income households as they allow more careful control over energy expenditure.

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

9.4 Impact of reforms on quality and reliability of supply

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 fact that quality of supply to these customers improves. Indirect affects arise from the fact that commercial and industrial activities can be severely affected by poor power supply, and restoring service levels can be a key element of sustaining economic growth in the country, with implications for job creation and wages.

For many countries, the key focus and success measure of power sector reform is the ability to attract IPPs into the industry. While some countries have succeeded in establishing IPPs, as noted above, the climate for 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 due to the effect that inflation has had on existing asset values, and partly due to the cost of capital faced by private investors. Several countries have succeeded in attracting new IPP investment, but 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 would almost certainly have been shortages, with an even higher cost for the economy.

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. While few countries have privatised distribution, several have adopted management contracts in the distribution sector. Where this has occurred, the experience is that there can be significant and rapid improvements in customer service levels.
9.5 Impact of reforms on social services

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, several 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. Un-electrified communities often use electrified schools and clinics for a range of personal and business purposes.

9.6 Impact of reforms on economic activity

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 of very electricity intensive industries, industrial willingness to pay is generally fairly high, given the level of other input prices and the high cost of unserved energy. 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.

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.

Access programs can also simulate the development of informal and small-scale enterprises. Experience is that electrification does stimulate commercial activities, although not always to the degree claimed prior to the fact. Electrification projects that prioritise 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.

9.7 Impact of reforms on public finances

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.

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.

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

There is a trade-off between maximisation of privatisation receipts versus the level of investment obligations. Uganda, for example, has opted to maximise investment in the structure of its distribution privatisation transaction, and this should prove to have considerable benefit for expansion of distribution services.

Lastly, it is clear that electrification itself cannot be fully financed by the utility business itself, particularly rural electrification. Governments in general expect 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.

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 (mainly to support access programs), and there is greater transparency in the allocation of resources.

10. Recommendations

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 our recommendations do not focus on how to do electrification better. Our recommendations focus on improving the design and implementation of power sector reform such that poor people benefit. Given country specific differences, it is difficult to proscribe recommendations that apply in a general context. However, our 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 summarised below.

- **Design plausible and realistic programs**: Power sector reform ambitions need to be realistic, both in scope and content. 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 not always compatible with IPP development. Privatisation of distribution faces several hurdles due to higher risks and limited interest in the investor community. Management contracts can be easier to implement with considerable benefit for customer service levels and financial performance. While several countries view this as a short-term measure prior to privatisation, 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**: Making new physical electricity connections for households is not enough to ensure that people enjoy the benefits of electricity. Electricity has to be affordable and the quality and reliability of supply and customer service need to be adequate. 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 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**: The largest direct impact of reforms on poverty will come from improving access to electricity. Commercialisation of the industry can undermine incentives to promote access; hence special mechanisms need to be employed. A clear national electrification policy is needed with ambitious electrification targets, 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), consolidated in a national electrification
fund, linked to the electrification planning and fund allocation process. Transparency and accountability in the allocation of these funds is crucial, as there are far too many instances where funds have either been diverted or allocated politically to favoured constituencies. There are few examples in Africa where these capital subsidies for electrification are awarded on a competitive basis (as is done, for example, in Chile). In such a system, utilities requiring the least-cost capital subsidies receive preferential allocation of funds – 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 together with good commercial practices can create an environment where utilities are able and willing to re-invest in network expansion.

- **Encourage replicable electrification projects**: 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 programmes with distribution utilities rather than project-based ventures.

- **Mitigate negative impacts of price reforms on the poor**: Establishing and maintaining cost-reflective prices are essential in order to restore financial performance and to 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 our case studies show, are in almost all cases necessary. These need to set at levels that are affordable for poor households, yet also sustainable for the electricity supply industry or government. 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 (e.g. 50 kWh per month) or they could be targeted to consumers who accept current-limited supplies or are on pre-paid metering systems, provided these are proxies for poverty. Public education programmes are important for informing poor households about eligibility for social tariffs.

- **Ensure that reforms improve the quality and reliability of supply**: A significant indirect impact on poverty comes from improving the reliability of supply and so enabling economic growth. Firms that face frequent power interruptions or have to invest in costly and duplicate back-up systems, struggle to be competitive. The availability of reliable and secure electricity supplies is a pre-condition 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 in power sector reform**: The focus of power sector reform is understandably on the main grid utilities. Rural electrification using off-grid or remote mini-grids is often neglected and confusion arises around grid versus off-grid planning, concession areas, etc. Power sector reform generally opens space for private sector participation. Legislation should create clear rules for off-grid or mini-grid concessions, which should preferably be awarded on a competitive basis. There also need to be equitable arrangements around capital subsidies and lifeline tariffs for grid and off-grid or mini-grid systems.

- **Build pro-poor regulatory capacity**: 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 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.

Our study has shown that expanded access to affordable and reliable electricity supplies to poor people is possible as the power sector is reformed in Africa. These possibilities will be much enhanced if the above recommendations are fulfilled.
APPENDIX A
COUNTRY CASE STUDIES
Ghana

Country Overview
Ghana, with a per capita annual income of $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 a population growth rate of 2.8 per cent per annum, 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, Cote d’Ivoire, Mali, and Togo. Almost two-thirds of Ghana’s 20 million inhabitants reside outside of cities, though as with most developing countries this figure is shrinking rapidly.

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.

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, and 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.

Ghana has experienced a sharp currency devaluation since 1998 – a change from 2,345 Cedis 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
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 - NED). VRA does not, however, maintain a monopoly. Takoradi International Company (TICo), owned 10 percent by VRA and 90 percent by CMS Energy Corporation, has recently made inroads into generation. The Electricity Company of Ghana (ECG) in another player in the distribution sector. Efforts are also being made to exploit Ghana’s solar 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. All but one of the main players – TICo - are state-owned. Immediately below is an overview of the sector.

RESPRO, a joint GEF and GoG programme, operates in nine districts and serves 1,800 households, local water pumping stations and community buildings. The Spanish Government’s Solar Project meanwhile serves ten communities in the Kpasa area. Two additional projects include New Energy of Tamale, and an Isofoton project also in the Kpasa area.
The Public Utilities Regulatory Commission (PURC) is responsible for economic regulation, primarily tariff setting, and the Energy Commission (EC) is responsible for technical regulation, licensing and policy advice.

The Volta Lake feeds two hydroelectric facilities (1180 MW) owned and operated by the VRA while imported crude oil is responsible for supplying the Takoradi Thermal Facility (550 MW). Takoradi comprises a 330MW block, commissioned in 1998 and owned and operated by VRA, plus 220MW commissioned in 2000 and owned by TICo.

Total consumption in 2002 was 7,750 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 kWh – significantly higher than in neighbouring countries. Transmission and distribution losses are estimated at 15 percent.

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

**Electricity**

Approximately 50 percent of all Ghanaians have access to electricity, which is almost exclusively used for lighting, with less than one percent of the Ghanaian population relying on electricity for cooking.

Electrification efforts were intensified from 1987, under the Government’s National Electrification Programme (NEP). At that time, electricity access was estimated at only 20 percent. At that time, grid supply covered only a third of the country’s land area; out of a total of ten regions, four were not connected to the national grid. The focus of power sector policy at this time was first and foremost to extend the grid and increase access (in contrast to later reforms from 1997-1998 which had the main goal of increased competition).

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10 Takoradi Thermal Facility is expected to have a total capacity of 660 MW; however, to date only 550 MW have been completed.
Starting in 1987, the utilities, with the support of Government, obtained concessionary financing from several multilateral and bilateral donors to extend the 161kV high voltage back-bone of the network to all regional centers. In addition, sub-transmission lines were constructed to reach each of the 110 districts in the country and all communities within approximately 20 km of these lines. As a result, more than five hundred 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.

Among the most successful programs for advancing the NEP was the Self-Help Electrification Program (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 underway, and a fourth phase is in the planning stages. Other important initiatives that were 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 (as detailed in footnote 2). In addition to donor aid and direct Government assistance, the National Electrification Fund, which was funded from a one percent levy on electricity tariffs, went a long way in supporting SHEP and other programmes.

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

**Drivers for Reform**

Ghana’s power sector reform, originated in 1994 with Government commissioned studies and the appointment of a Power Sector Reform Committee. The reform process, that commenced 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, Government was eager to open the sector to private investors in order to reduce the public financing burden. Lastly, 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**

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

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.

The reform programme has the following goals:
• **Independent regulators**: to oversee licensing and competition and operational rules, thereby ensuring participants of impartiality and non-interference by 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;
• **Contestable market**: to provide for capacity expansion through competitive bidding;

The primary outcomes to date have been:
• the establishment in 1997 of two new regulatory agencies, namely PURC and EC;
• the adjustment of tariffs, including the lifeline tariff, by the PURC, as well as publication of tariff-setting guidelines; and
• the commencement of operations in 2000 of TICo, the country’s first, and only, IPP.

The small size of the distribution industry has been a structural impediment to the implementation of the reform as earlier conceived. The aluminium 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 five percent of total energy consumption in Ghana. Government recognises 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.

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 disconnect with the needs on the ground.

In April 2003, Cabinet approved a revised strategy and schedule for the reform of the power sector that is to be undertaken over a five-year period extending to 2008. 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 “arms 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.

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.

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

Although significant changes have taken place since the launch of reforms in 1997-1998, namely the creation of the PURC and the establishment of Ghana’s first IPP, these changes fall short of meeting the larger power needs of most Ghanaians, assessed in this section.

Access

In the period coinciding with power sector reform, access rates have indeed 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 programme such as SHEP, RESPRO and Solar Project from the late 1980s.

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 either due to inability to pay for the purchase of appliances or the services consumed.

Since tariffs do not cover average costs, there is little incentive for distributors to engage in rural electrification, as 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.

Energy Service Companies (ESCos), 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 NGOs 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, RESPRO in the Mamprusi district and Isofoton project in the Kpasa area. The costs for these systems have been higher than for grid-supplied electricity due to higher capital costs of off-grid systems as well as to 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.
Prices have vacillated significantly since the start of power sector reform. Average nominal residential tariffs have risen from approximately Cedis 75 per kWh in 1998 to just less than Cedis 800 per kWh in 2003. Bulk tariffs have been increasing in a similar fashion from about Cedis 40 in 1998 to 425 in 2003. This ten-fold increase is much more than a function of inflation, which has been growing at annual average rates 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 earlier, 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 of 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 cedis 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 (as compared to Government’s eight percent target).

While nominal prices as mentioned above have increased, real prices, denominated in US currency, have meanwhile 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, as highlighted in Section II, have been running deficits since 1999.
To mitigate the impact of the price increase on the poor, the PURC has been revising the structure of the lifeline tariff. In 1997 when the 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, i.e. the first 100 kWh of every consumer was billed at the lifeline rate. As a result, the proportion of energy sales at the subsidised rate was very large and the burden of funding the subsidy fell disproportionately on industrial consumers and a few high residential consumers. The PURC has, since 1998, revised its implementation to address this. The lifeline tariff set by the PURC currently provides for residential consumers whose consumption is no greater than 50 kWh to be charged a block amount of Cedis 19,978 per month (or approximately Cedis 400 per kWh) which is equivalent to about US $ 2.00. Currently a quarter of domestic consumers qualify for the subsidy.

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

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 many consumers are reducing consumption by conserving energy and switching to kerosene. In many cases, households have completely switched to other fuels.

**Conclusions**

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.
The access challenges are three-fold: extending the electrification programme to smaller and more remote communities; ensuring the sustainability of the currently financially unviable operations, and keeping tariffs affordable. The essential trade-off 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 un-served 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.

Ghana has been caught between a rock and a hard place. Until macro-economic stability is restored, it will not be easy or even possible to have a successful electricity supply industry. Even with 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, both from lifeline tariffs but also because tariffs have not kept up with costs. The core challenge remains of attracting new investment, ensuring financially viability, while at the same time promoting widened access to affordable electricity services.
Country Overview
Mali is ranked 192\textsuperscript{nd} worldwide in terms of gross national income (GNI) purchasing power parity, placing it on par with Mozambique, Nigeria, Zambia and Tajikistan, but well behind most of its immediate neighbours (Mauritania, Algeria, Burkina Faso, Cote d’Ivoire, Guinea, 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.

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 Cote d’Ivoire, through which most of the Country’s trade traditionally has transited.

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 five 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.

Fossil fuel imports weigh heavily on Mali as 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 five 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 traditional sources such as firewood, charcoal and agriculture residues. The balance is mostly oil products (eight percent).

Mali Power Sector
The power sector is dominated by \textit{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. EDM-SA is owned by SAUR International/ Industrial Promotion Service-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.

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 the remainder by solar PV, which is a mere 0.46 percent
(0.85 MW) of installed capacity. While installed capacity is split nearly evenly between thermal and hydro, Mali’s hydropower facilities produced 73 percent of total supply in 2003.

Mali’s two largest hydro-electric installations are: Sélingué with a capacity of 44 MW and annual production of 180 GWh, owned and operated by EDM; 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, Senegal and Mauritania is owned by the Organisation pour la mise en valeur du fleuve Senegal (OMVS), a trust company formed between the three countries. OMVS has delegated responsibility for this project to a sub-trust company called Societe de gestion de l’electricite 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.

In addition to EDM-SA and the GoM, there are two Sociétés des services décentralisés (SSDs) or decentralised service companies: SSD Koutiala, operated by NUON and Electricité de France-EDF & SSD Kayes (operated by EDF and Total). These two firms generate and distribute off-grid power (solar PV and diesel-generated thermal) in rural areas. The following diagram maps Mali’s electricity sector.

The Commission de régulation de l’eau et de l’électricité (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. Finally, CREE is expected to arbitrate conflicts between service providers and consumers and generally to defend consumers' interests.

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

While Mali’s total energy consumption in 2002 of 429.6 GWh implies an annual per capita consumption of 40.3 kWh, 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. More revealing is 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. Industrials 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 non-technical losses appear to be high (27 percent) if electricity production is contrasted with recorded consumption.

In a departure from 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 sub-region. Domestic tariffs are around US$0.2 /kWh.

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

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

Electrification

In 2002, about 12 percent of the Malian population had access to electricity (for the rural population the figure was less than one percent and 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 three percent of the rural population (those living in areas with easy access to the electric grid system).

Until 2003, the only government agency that focused on energy in the rural areas was the Domestic Energies Strategy (DES) for traditional energies. However, DES did not promote modern energy services, including electricity, but concentrated instead on wood and charcoal. The largest government-led programme to support modern energy services in rural areas emerged in 2003: Household Energy & Universal Rural Access (HEURA) is a US$ 53 million programme spanning five years and funded by the GoM & the GEF with a loan from the World Bank and support from UNDP. The objectives of HEURA are:

- acceleration of use of modern energy in rural & peri-urban areas for increased productivity of Small and Medium Enterprises (SMEs) and improvement of health and education centers and living standards;
- promotion of community-based woodland management to reduce non-sustainable pressure on natural resources and to 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 favourable environment for investment in order to facilitate increased private
sector participation in the delivery of decentralised energy services in rural and peri-urban areas.

*Agence Malienne pour le développement de l’énergie domestique et de l’électrification Rurale* (AMADER) has since been created by the GoM to manage the HEURA programme. 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 peri-urban area;
- Provision of 135 schools and 100 health centers with access to electricity;
- Installation of 500 solar PV systems for community use; and
- Installation of 10 000 individual solar home systems.

**Drivers for Power Sector Reform**

The primary driver for reform has been the poor condition of the state-owned power facilities in Mali. This situation was exacerbated in 1998-1999 when droughts in Mali led to reduced power production at Selingue (at the time the largest hydro facility in the country). Meanwhile, the existing thermal facilities were unable to make up the load due to their degenerating condition. The drop in production caused significant power cuts, which ultimately led to plans to liberalise the industry and privatize EDM.

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

**Description of Power Sector Reform**

Privatization of EDM, which was characterized as a Mixed Investment Company with 97 percent of the capital held by the Malian State and the remainder by Electricité de France since 1960, was first considered in 1994. However, due to 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, in 1995 EDM delegated its management to an external body composed of SAUR International, Hydro-Quebec International, Electricité de France International and CRC SOGEMA.

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

In 2000, the Government of Mali made EDM shares available to private investors. The amount of private capital in the company increased significantly from FCFA 2.5 billion (US$ 4.7 million) to FCFA 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, as noted earlier. The stated objective of the arrangement, as documented in a concession contract signed between the GoM and EDM-SA on 21 November 2000, is to ensure the quality of the electricity service.

The contract covers 97 localities in Mali, and stipulates that EDM-SA will make investments totaling US$ 345 million over the twenty years of the concession. For the first three years following the privatisation, EDM 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).

In its 2001 five-year investment plan, 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 to extend the system to distribute the new power to other areas;
- work towards the interconnection of the energy system with Côte d’Ivoire and to examine all other alternatives in order to help the country deal with the increasing internal demand, and to 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:
  - un-electrified parts of zones already considered to be electrified (e.g. many parts of Bamako);
  - new isolated centres;
  - 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.

Along with the above-noted goals, EDM-SA has stated its commitment to increase the total number of electricity customers, including access to electricity by rural populations.

The creation of CREE in 2000 provided the regulatory apparatus to launch the privatization of EDM as well as the overall liberalization of the sector. According to Ordinance n° 00-021/P-RM of 15 March 2000 and its Decree of application n° 00-185/P-RM of 14 April 2000, the opening of the electricity sector is dependent upon 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 (GoM, municipalities, operators and CREE). Within this new regulatory context, all public electricity service is subject to a concession, permission or a license for a clearly defined area.

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**

**Access**

Access to electricity has increased over the reform period—from a mere seven percent of the population in 1995 to 12 percent as of 2002. However, access rates of rural dwellers remained at one percent while urban dwellers rose from 24 percent to 42 percent. During this time, there were 52,632 new subscribers, for a total of 118,806, i.e., a growth of more than 80 percent over the period or an average of nine percent per year. Growth of subscribers was highest between 2001-2002 (30.57 percent).
There was a more rapid increase in connections in 2001-2002 which coincides with two distinct developments. In December 2000, the Manantali Power Plant came on line, making more power available to the grid. The GoM together with 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 up over the subsequent 5 to 8 months (as opposed to the traditional EDM scheme, which required new customers to pay 100 percent of the fee upfront).

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/income test to potential customers. The firms operate on a fee-for-service model, with their smallest systems consisting of a 25-Wp solar panel and regulator with 2 lamps and around 5 hours of operation per day for a fee of US$7.3 per month.

Access rates are also expected to increase with the inception of the HEURA programme, which targets 40 000 new off-grid electricity connections in the rural and peri-urban area by 2008.

Meanwhile, EDM-SA’s ambitious investment targets so far have not been realized, with the exception of 2001. As a result, the GoM has continued to intervene in the sector, mobilizing support from development partners to extend the grid.

Prices
Since the beginning of the reform process, nominal tariffs first increased and then declined in 2002/3. In 1995, the household social tariff11 for those using 51-100kWh/month was FCFA 82 per kWh (US$0.15). In 2002, the same user was paying FCFA 103 (US$0.19), an increase of about 25 percent. The rise was even more pronounced for the household normal tariff for those using 51-100kWh/month; this grew from FCFA 82 per kWh (US$0.15) in 1995 to FCFA 128 (US$0.24) in 2002, or an increase of 60 percent. Connection fees have increased from about US$115 to about US$150.

In the second half of 2002, however, due to 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 GoM transferred FCFA 18 billion (US$ 33.8 million) to EDM-SA. In 2001 alone, the cost to the GoM was estimated at $10 million.

### HOUSEHOLD ELECTRICITY TARIFFS FROM 1985 TO 2003, CFA/KWH

<table>
<thead>
<tr>
<th>Tariffs and tariff categories</th>
<th>Date of effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social tariff (meters 2 cables 5A)</td>
<td>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</td>
</tr>
<tr>
<td>Band 1 : 0-50kWh/month</td>
<td>58 58 58 64 64 65 67 66 64</td>
</tr>
</tbody>
</table>

11 The (household) social tariff is defined as a 2 meter cable and 5A current limit.
If the above data were adjusted for inflation, real electricity prices have actually fallen slightly between 1995 and 2002.

At the same time, it is clear that increased access was subsidised by GoM and multilateral and bilateral funding agencies, i.e., EDM-SA was not required to foot the bill for the extended access program in 2001-2002. Furthermore, in 2001 power from the Manantali facility became available, which was significantly cheaper than power produced in Mali’s thermal plants. Thus, EDM-SA switched from sourcing nearly 50 percent of its supply from thermal to supplying just 27 percent, bringing down overall costs for EDM-SA. In addition, as noted in Section II, Mali’s tariffs are higher than those of any of its neighbors in the sub-region, including other landlocked countries like Niger and Burkina Faso, which also import fuel. Since EDM-SA has started from a relatively high base, the argument of EDM-SA to seek cost reflective pricing has met significant public resistance. In the absence of 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.

As regards tariffs charged by the SSDs, the cheapest installation is FCFA 3,881 for no more than 26 kWh a month, implying FCFA 149/kWh at best. This stands in contrast to the social tariff, which, as of 2003 was FCFA 64 per kWh for up to 50 kWh/month. Although no price record is available for the SSDs, the current SSD tariffs are therefore more than double those of the lowest social tariffs. This price differential apparently could be reduced in part if the VAT exemption that applies to the social tariff were extended to the SSDs.

**Conclusions**

The Government of Mali (GoM) has sought to disengage from the power sector – first through the EDM management contract of 1995-1998, and subsequently through the partial privatization of EDM. The operation of Manantali was contracted out to Eskom. At present, however, the GoM continues to be heavily involved in the sector through the large transfers it makes to EDM-SA for tariff compensation (US$ 33.8 million between 2001 and 2003). The long-term effects of this involvement are not clear, but surely there will be a toll from such intervention as new players contemplate entering an environment where price distortions appear to be built in.

Furthermore, although two SSDs have begun supplying to rural areas, EDM-SA is not subject to competition within its concession of 97 localities. The Company, as in the pre-reform era,
enjoys a monopolistic status. Although the 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 GoM.

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**

Namibia ranks 89th worldwide in terms of per capita gross national income (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 population growth rate at 3.1 percent per annum is, however, among the continent’s highest. Furthermore, although 68 percent of the country’s population is currently residing in rural areas, the five percent growth per annum of urban populations is also among the highest in Africa.

Since gaining independence in 1990 from South Africa, Namibia has operated as a parliamentary democracy. Namibia’s 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 $3.5 billion, with real GDP growth averaging three percent per year, between 1994 and 2002. Meanwhile, aid as a percentage of GNI has remained largely constant since 1997 at four percent, in line with Kenya.

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

**Namibia’s Power Sector**

The national public utility, NamPower, has primary responsibility for electricity generation, import/export and transmission, and directly supplies large customers like 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 Government’s decentralisation 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, NORED, which is jointly owned by regional councils and NamPower.
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. The diagram immediately below highlights the sector.

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, namely: Ruacana, a 240 MW hydropower facility on the Kunene River along its northern border with Angola; Van Eck, a 120 MW coal plant in the capital city Windhoek; and Paratus, a 24 MW diesel plant in the coastal city of Walvis Bay. More than 50 percent of consumption is supplied from Eskom in South Africa, via two transmission lines with a combined capacity of 700 MW. An isolated network is also supplied by imports from ZESCO in Zambia via a 3 MW connection (supplying an isolated network). Namibia exports small amounts of electricity to cross-border regions in Botswana and Angola.

Although the 120,000 domestic users constitute 91 percent of all customers, domestic consumption accounts for 45 percent of total demand. There are 1150 industrial and mining users who account for 26 percent of demand. The balance is made up by 10,000 commercial users.

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 2.7 to 10.5 US¢/kWh.

NamPower is profitable. It’s financial strength results primarily from its return on financial assets (it’s return on fixed assets is rather low).
Electrification

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 Government.

The existing electrification levels are largely the result of state-led efforts originating shortly after independence in 1991. Of all efforts, the largest has been the rural electrification programme, sponsored by Ministry of Mines and Energy (MME), with participation from Ministry of Regional and Local Government and Housing (MRLGH) and Regional Councils and Local Authorities. Initially the rural electrification programme aimed to connect all main rural centres 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.

With regard to electrification efforts in peri-urban areas, these have been headed by 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.

At its inception, funding for electrification came primarily from donors (principally the Norwegian Government and GTZ), with the balance being made up by Government subsidies. Currently, the programme is almost entirely funded by annual budgetary allocations from 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.

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, a third of which have been funded through a Government administered revolving solar home fund. In the future, however, 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.

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

Drivers for Reform

Namibia’s reforms have been four-fold: the first phase focused on the rural electrification programme 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. It is the second and third phases of this reform process that constitute the focus of the analysis, both here and in subsequent sections.

The major driver for reform was Namibia’s distribution sector, which lacked both resources and capacity to deliver and extend and acceptable level of services. With the rural electrification programme, initiated in 1991, primary responsibility for distribution resided with 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 an interim period.

A second driver, prompting reform measures, was Namibia’s dependence on foreign sources of electricity (as noted earlier, over 50 percent is imported). Government therefore sought to create an industry model that would be conducive to attracting new investment into power generation. Cabinet has approved a Single-Buyer model that aims to create a level-playing field for new investors.

**Description of Power Sector Reform**

While 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 etched out, namely: social upliftment, effective governance, economic competitiveness and efficiency, security of supply and sustainability.

The three main initiatives adopted to realize these goals were as follows:
- Distribution re-structuring, including outsourcing planning and implementation of the rural electrification programme to the private sector
- Electricity Control Board establishment
- NamPower’s re-structuring and the Single Buyer Market Structure (SBMS)

The pioneering distribution restructuring project began in 1996 and involved a private company, Northern Electricity (NE), 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 Government’s account).

During a complete meter audit that NE conducted immediately after take-over from Government, it was found that less than half of all customers were recorded on 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 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 Government, and commissioned a 5-year network development plan to ensure system integrity. A preventive maintenance programme was implemented and call-outs were attended to promptly. The company worked closely with NamPower in restoring power after an outage (most of which were found to occur on NamPower’s system).

NE 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 programme. However, these two initiatives were unable to satisfy the demand for electrification, and therefore 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 due to the company’s lack of collateral (they did not own the networks) and Government’s refusal to provide guarantees. As an alternative, NE then implemented a rural
electrification levy (N$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 5-year term.

NE 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 NE. The company also sponsored local sporting, educational and social events.

Despite its apparent success, the NE experiment came to an end in 2002 due to pressure from NamPower, MRLGH and local authorities—all of whom sought to extend their influence over an increasingly profitable and productive activity. Government also aimed to establish four Regional Electricity Distributors (REDS): one covering the entire northern regions, 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/May 2002 to expedite the processes. Ringfencing of the municipal electricity businesses is currently underway in all regions. The MME has provided a strong directive that all REDs shall be established and operational by July 2004 when the distribution and supply licences are up for renewal.

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

There are a number of developments underway in the distribution sector:

- Oshakati Premier Electric (OPE), a joint venture company formed by the Oshakati Town Council and Premier Electric in 2000, responsible for electricity supply in the town of Oshakati;
- Similar to OPE, Premier Electric has joined forces with the Otavi Town Council to improve electricity supply in that town;
- Rehobo Electricity, a joint venture company between 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 the town of 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/expand) their local electricity reticulation systems;
- Various commercial farm electricity distribution schemes – including Saltblock Power, Osire Power, Aroab Electrical Group (AEG), and Kalahari Farming – in the business of electrification of and electricity supply management in their own commercial farming areas;
- Northern Regional Electricity Distributor (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, Kunene), as the first RED – NORED took over
from Northern Electricity in March 2002, under licence from the Electricity Control Board (ECB); and

- 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, Oshikoto) and Premier Electric, as Namibia’s second RED.

Apart from the redesign and restructuring of distribution, the reform process has involved an evolution within NamPower since 2000. The new structure adopted consists of four regulated business units, namely generation, transmission, distribution and the single buyer within the NamPower Group. Non-regulated 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.\(^\text{12}\)

With regard to the Single Buyer Market Structure, in 2001 the Single Buyer (SB) role was conferred upon NamPower by Cabinet resolution for a transitional period intended to lead to full market development. Locating the SB function within NamPower poses a potential conflict of interest as the Company is also one of the power producers and therefore could potentially exploit its monopoly position. It was, however, recognized in the absence of any other player with a sufficiently strong balance sheet to underwrite SB contractual agreements that NamPower was 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.

The establishment of the Electricity Control Board (ECB) in July 2000 has facilitated many of the above-noted 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, together 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.

While the primary driver for reform, namely the need to restructure the distribution industry, has yielded some impact (albeit with restricted private sector involvement), the second driver regarding security of supply has not yet led to any concrete changes. There have been no new generating facilities 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 north-western Namibia; an 800 MW combined cycle gas turbine plant at Oranjemund in the far south, supplied by the Kudu off-shore gas field; a 15 MW hydro facility on the Okavango River in north-east and a 10 MW wind park in Luderitz. The Epupa investment seems unlikely and the Kudu project faces many serious hurdles.

\(^{12}\) 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 re-integrated within NamPower.
Impact of Reform

Access

Access has increased over the reform period, most notably in the rural areas where the majority of the population resides. In 1997, between eight and nine 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 high growth of urban populations, there has been significant electrification activity in urban areas.

The most well documented statistics regarding access relate to Northern Electricity (NE). Under NE’s programme, approximately 10,000 new users were connected (from 5,000 to 15,000) during the period 1996-2002. NE’s experiment in distribution is being emulated by other areas, albeit with somewhat curtailed private sector involvement, e.g. OPE, Reho, Selco, AEG, NORED, CENORED. While not yet documented, it is expected that these initiatives will also register an increase in access.

In addition, a series of off-grid initiatives, have led to increased access in rural areas, as profiled in the box immediately below.

<table>
<thead>
<tr>
<th>Programme/Project</th>
<th>Since</th>
<th>Installed Systems to date</th>
<th>Stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Power! programme</td>
<td>1996</td>
<td>620</td>
<td>MME, PE, Local suppliers, solar technicians</td>
</tr>
<tr>
<td>Fee-for-service programme</td>
<td>2002</td>
<td>98</td>
<td>MME, PE, SunTechnics/ Alemdar</td>
</tr>
<tr>
<td>Solar Electrification of Lianshulu and Spitzkoppe (SELS) project</td>
<td>2000</td>
<td>140 (Indian) +48 (Namibian)</td>
<td>MME, Indian Government, Solar Technicians</td>
</tr>
<tr>
<td>Uupindi Pilot Battery Charging Station</td>
<td>1999</td>
<td>148</td>
<td>MME, UNAM, MRCC, SunTechnics/Alemdar</td>
</tr>
</tbody>
</table>

Note: Reproduced from (Emcon, 2003).

It is important to note, however, that while the Government has either been 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, has not increased 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 re-investment by the privately operated NE, which saw a three-fold increase in electrification in its area of operation.

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 5-year off-grid electrification programme, reaching 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 annum, but, even assuming funding is forthcoming there is doubt as to whether local industry and government could execute and administer such a vast programme.

Meanwhile an UNDP-GEF initiative on the removal of barriers to renewable energy technology promotion and use in Namibia, which is about to get underway, projects the
installation of about 6,800 solar home systems over a 5-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.

Prices
As indicated in the figures below, 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 favourable bilateral contract with Eskom which has allowed it to keep power production from the expensive coal-fired van Eck plant to a minimum.

For an analysis of retail tariffs, data is limited to the experience of Northern Electric and its successor NORED. When NE 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 three percent). Small business energy charges, previously the same as those for domestic users, were increased by N$0.3/kWh (average seven percent). With 8-10 percent annual inflation, NE’s nominal price increases from 1996-2002 of less than five percent per year for pre-paid customers and six percent for post-paid customers, amounted to a decrease in real retail tariffs.

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 the figure below. It should be noted that NE paid only a nominal lease for the assets it operated, and was also exempt from certain of NamPower’s charges.

NORED, NE’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 post-paid supplies and N$0.57/kWh for pre-paid supplies. As these tariffs exclude any rural electrification and community development levies, the increase since NORED’s take-over has been 18.3 percent for post-paid supplies and 19.2 percent for pre-paid supplies. This reflects the fact that NORED, unlike NE, 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 lease fee) as subsidy by local authorities.

NE’s involvement in the sector, as highlighted above, led to an absolute reduction in tariffs. Given the fact that NE, 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 Government is committed to providing as articulated in the REDMP, for the next 20 years.

Furthermore, under the RED concept the introduction of uniform tariffs and harmonised customer categories implies cross-subsidies from centres with a high customer density to remote low density areas, as cost-reflectivity is approached from an aggregate rather than a
localised perspective. Also, cross-subsidisation 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.

Cross-subsidization has been practically implemented in NORED’s most recent tariff increases where care was taken to avoid large increases in prepayment tariffs even though calculations indicated them to be far below cost reflective levels. Some municipalities (e.g. Swakopmund) have capacity-limited pre-paid supplies which have a lower tariff, specifically targeted at low-income households. This is a de facto subsidisation since the cost of providing this lower capacity supply is the same as a larger capacity pre-paid supply. The capacity limitation is a way of containing the subsidy to low-income households, while also containing the cost of network development.

**Conclusions**

At first glance, Namibia’s power sector appears to reflect a move towards competition. The existence of a Single Buyer Market Structure implies the prospect of multiple generating sources. The emerging Regional Electricity Distributors (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 Electricity Control Board (ECB) should indicate independent regulation of the sector.

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 still to demonstrate that it can compete with other power generation investments in the region. As regards the REDs, these distributors are indeed evolving, but have simultaneously crowded out meaningful private-player participation, as illustrated in 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 embodies neither competition nor significant private sector participation.

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/when the Kudu project materialises. The challenge for the ECB will be to mitigate price increases through squeezing further efficiencies out of NamPower and the newly formed REDs. Expanded electrification and affordable electricity prices will be more difficult in coming years.
SOUTH AFRICA

Country Overview
With 45 million inhabitants, South Africa’s gross national income (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 the fact 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” while 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 UNDP’s Human Development Index, whereas black South Africa would rank 123rd, just above Congo. Among the most pressing challenges faced by South Africa today is the prevalence of HIV/AIDS; a 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.

South Africa’s economy has evolved, from the end of the 19th century, from being based on agriculture, then mainly mining and currently services, which today contribute approximately 60 percent of GNP. Mining and industry contributes 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 one per cent of GNI.

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 miniscule. A small off-shore gas deposit is also converted to synthetic liquid fuel. Hydro-electric potential is limited. South Africa also produces uranium as a by-product of gold mining. The majority of the rural population still utilizes fuelwood.

RSA Power Sector
The South African Electricity Supply Industry (ESI) 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 and it supplies about half of electricity directly to customers. The remainder of electricity distribution is undertaken by about 188 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.
93 percent of electricity is generated from coal; nuclear energy accounts for five percent, bagasse, hydro and emergency gas turbines make up the remaining two 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.

Eskom has 24 power stations: 10 large coal fired stations dominate – most of them situated on coal mines in the north-east of the country. Africa’s only nuclear station is at Koeberg, 30 kilometres north of Cape Town, and is also owned and operated by Eskom. There is modest hydro-electric capacity on the Orange River, located on two dams, and there are two pumped storage schemes which play a critical role in meeting peak demand, as well as in system balancing and control. Municipalities own 22 small power stations and back-up gas turbines, but these now produce less than one percent of national output. Private generators produce the remaining three percent, essentially for own consumption.

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

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

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 serviced 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 2.2 US cents/kWh.
and for residential customers was 5.6 US cents/kWh. Eskom average tariffs cover average costs which were approximately 2 US cents/kWh in 2003

**Electrification**

As of 2002, approximately 68 percent of the population or 30.8 million people had access to electricity in South Africa. In rural areas this figure amounted to 50 percent; whereas 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.

Eskom, in anticipation of the shift to political democracy, and sitting 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.

The ANC came into government 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 over 4 million, representing an increase in access from about a third of the population to about 70 percent.

Up until year 2000, almost all of the electrification programme 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 allocated to municipalities. This funding was primarily sourced through cross-subsidies from other customer categories. In addition to Eskom’s effort, the Development Bank of Southern Africa made funds available to municipalities, some of whom also utilised their own resources. In 2001, Government took over funding of electrification through establishing a separate National Electrification Fund (NEF) in the Department of Minerals and Energy (DME) funded by National Treasury.

Since the mid 1990s it has been national policy that a portion of the capital cost of connections should be subsidised, and that households should pay only nominal connection fees. In practice, the subsidy has extended to the entire cost of connection as 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 programme 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 a third of these estimates.

According to government policy released in 2003, local governments should identify poor electricity users who have a record in consuming less than 150 kWh of electricity monthly. These households qualify for a free allocation of 50kWh 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/or ironing for a poor household. Some municipalities are now finding that there are more qualifying households than funds available from central government, and must therefore re-evaluate qualification criteria. Eskom estimates that 56 per cent 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.

Nearly all of these new connections have used pre-payment technology – customers buy tokens or top-up electronic cards to activate their electricity dispenser. Many connections involve informal houses (shacks) and use pre-wired “ready boards” – typically with a few lights and plug points.
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 macro-economic 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, who 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 subsequently informed.

In addition to grid electrification, the DME is also responsible for an off-grid electrification programme. 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. Off-grid service providers are encouraged to improve poor rural households’ access to a range of fuels such as gas or paraffin, in addition to solar home systems and mini-grid systems.

The off-grid electrification programme is subsidised by Government. Over a five year period, companies have access to a subsidy of R3,500 per system installed. Depending on individual cost structures of concessionaires, this amount should pay for around 80 per cent of the cost of the system. Concession companies are expected by Government to contribute the remainder of the finances required to install a system.

By late 2002, the off-grid concessions programme had progressed slowly, largely due to policy and administrative hurdles as well as the time and cost to establish the infrastructure required to operate effectively. Programme momentum has since picked up, with just over 16,000 solar home system accounts active by the end of 2003. 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 programme will be able to install 300,000 solar home systems in contribution reducing this backlog (with grid connections accounting for the balance). This means roughly that each of the six concession companies will need to install around 50,000 systems over five years, and 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 1 August 2003, subsidies were restricted to 300 installations per concessionaire per month, and in January 2004, concession companies were informed that until a full programme review had been completed and until further notice, no new installations would be subsidised. Government, concerned that the programme is not targeting the most needy and is also not achieving anticipated outcomes, is currently in negotiation with the off-grid concession companies about the future of the programme.

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 programmes have been piloted to reduce electricity consumption and to make monthly bills more affordable, including efforts to promote compact florescent lamps (CFLs) for households (implemented by the organization Bonesa) and basic consumer awareness and education programmes implemented by Eskom. To date, however, none of the residential programmes appear to have had a significant impact. The National Electricity Regulator 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 on licensed distributors to “advertise on their electricity bills tips and measures that customers should adopt to reduce their consumption of electricity”. As regards IECs, the Minister of Minerals and Energy has initiated an effort to develop hybrid mini-grid systems, which deliver, in addition to solar services, a variety of energy carriers, water

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13 At the time of writing, a sixth concession was being negotiated.
purification and telecommunication services to rural households. These centres are being established as local community co-operatives and are providing sales outlets for energy products such as petrol, diesel, paraffin, gas, and (energy efficient) appliances. DME has entered into public-private partnerships in the establishment of these IECs at a cost of about R3 million (over US$400,000) per centre. To date, two IECs have been set up – in Eshane (KwaZulu Natal Province) and Kgalakgadi (Northern Cape Province). Currently, these centres 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. 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

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. There was a perceived need for consolidation of electricity distributors in order to improve financial viability and technical performance, and to position the sector to mount an accelerated electrification drive.

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, focussing on the corporatisation of these entities, emphasising the role of the state as shareholder, clarifying tax obligations and establishing performance contracts.

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 over-invested 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 question of whether or not Eskom should build the next power station, and what the appropriate industry and market structure should be to encourage least-cost investments.

Description of Power Sector Reform

Reform has been a multi-staged process in RSA, 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 Independent Power Producers (IPP).

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.

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.

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 Regional Electricity Distributors (REDs), with an EDI Holdings Company to manage the transition. However, 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.

While 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 had the vision of

- “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.”

- 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 - epitomized in the state-controlled programmes for nuclear power, the synthetic fuels program, and Eskom’s over-investment in generation capacity.

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

- **Structure of the generation industry**: Eskom is expected to retain no less than 70 percent of the existing electricity generation market, with privatisation of the remainder, with the initial aim of transferring 10 percent to black economic ownership no later than 2003;

- **Vertical unbundling**: to ensure non-discriminatory 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 multi-market model electricity market framework will ensure that transactions between 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; and

- **Regulation**: A regulatory framework will be put in place that ensures the participation of Independent Power Producers (IPPs) and the diversification of primary energy sources.

However none of these reforms has yet materialised. 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, independent power producers will only be invited to bid for a small proportion 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 22 June 2004 that “the state has to put security of supply above all and above competition especially”.

**Impact of Power Sector Reform**

**Access**

In the decade 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 by local government. The proportion of South Africans with access to electricity has increased from just over one-third to 70%.

![Cumulative connections chart](image)

Eskom and local authorities initially funded these connections themselves through cross-subsidies. In 1996, an agreement was reached between government, the NER and Eskom, that Eskom would be required, for five years, to make an amount of R300 million per annum 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. The end of this five year agreement co-incided in 2001 with a change in Eskom’s tax status. For the first time, Eskom was required to pay taxes and dividends and stopped subsidizing the costs of new connections. However, cross-subsidies on the energy and operating costs for low-income consumers continued.

From 2001 the capital costs of new connections for low-income households has been funded from National Treasury. Funds are transferred to the National Electrification Fund, managed by the DME, and then channelled to Eskom and local government.

Eskom achieved its RDP targets by 1999 (one year ahead of schedule) with an investment of R7.5 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 farm-worker dwellings) during this period. Further, Eskom has managed to achieve significant cost savings over time: average costs of connections have dropped by 60 per cent since 1994 despite the increasing rural focus of electrification.

South Africa has not yet implemented privatisation or competition in its electricity supply industry. Power sector reform has been restricted to commercialisation and corporatisation of Eskom, including the requirement to pay taxes and dividends to the state. The most obvious impact of these reforms on access programmes has been Eskom’s termination of internal financing of new connections for low-income households and instead relying on grants from Government. The effect of these new arrangements has been to make electrification funding transparent. It also allows Government to weigh electrification needs versus other demands on the fiscus 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.

The timely establishment of the NEF has allowed for a relatively smooth transition to these new funding arrangements. While there has been a fall-off in the number of new connections made by Eskom, 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.

Eskom and municipalities remain responsible for grid-electrification. Prevailing legislation defines local government in most instances as the “Service Authority” within its boundaries while Eskom, in some areas, is the “Service Provider”. In the future, the REDs will be the responsible “Service Providers”. 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.

The off-grid electrification programme, however, provides an example of private sector participation in a public-private partnership to promote increased electricity access. By the end of 2003, Government had provided about R60 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 programme, and there is still a difficult relationship between 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.

Programmes to extend access to electricity have largely occurred independently of other elements of power sector reform. This is true for the initiatives in free basic electricity, capital subsidies for an expanded national electrification programme, the integrated energy centres and other energy stores by off-grid service providers, and the piloting of hybrid mini-grid systems.

However, there are a number of areas where power sector reforms have impacted on access programmes. For example, the corporatisation of Eskom necessitated the establishment of a National Electrification Fund. 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, 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. Government appears committed to ensuring that electrification effort continues and has set universal access as the ultimate goal.

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 programme. This arrangement has the potential to improve the co-ordination and planning of electrification and removes the problem of Eskom having resources to electrify, but not access to un-electrified urban areas. However, there is a risk that the transition will increase costs and introduce delays and other barriers to implementation.

Finally, the National Electricity Regulator makes mention in its draft energy efficiency policy of 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, which 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 programmes for poor people. Again, this fund could not be attributed to an element of electricity reforms, but rather a spin-off programme resulting from the NER’s mission to establish itself as a credible and “world class” electricity regulator.
Prices

Eskom’s average prices are reflective of average costs, on a historical basis. Eskom’s costs and prices peaked, in real terms, in 1978 and 1983, and since then have steadily declined. These real price reductions have been primarily the result of lower finance costs as Eskom has not had to order new power plant since the 1980s due to surplus capacity. Consequently, Eskom’s debt to equity ratio has fallen 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 has also had the effect of increasing efficiencies and lowering costs. Regulation has also contributed to lower prices in recent years since the NER has consistently awarded lower price increases than those applied for by Eskom. Nevertheless, if long-term price trends are examined, it will be noted 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.

The trend in municipal electricity prices has generally followed Eskom prices – although large variations exist due to the different cost drivers and electricity levies applied in 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. Electricity tariffs for low-income users are currently around 6 US cents/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.

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-subsidisation for low-income consumers. Within Eskom, these cross-subsidies currently exceed R1 billion (US$150 million) per annum. The DME has mandated the NER to determine what levels of cross-subsidisation should remain.

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 great majority of low-income customers are on a single energy tariff with pre-payment meters. As mentioned in Section III, the
first 50 units consumed each month are available free-of-charge, thereafter consumption is charged at a fixed rate.
Research interviews denoted a high price elasticity of demand at the household level (i.e. price changes have a significant impact on how electricity and other fuels are used within the home). When electricity becomes more expensive, principle alternatives are wood, paraffin and coal (for heating, ironing, 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 communication media. But as oil and paraffin prices increase, reverse substitution is also possible.
A recent analysis of data from the 2000 national Income and Expenditure Survey indicates that domestic demand for pre-paid 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 pre-paid electricity will result in a significant fall in electricity consumption.
The income elasticity of demand for pre-paid 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. 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 pre-payment card increases there is nothing that they can do. Generally this means that electricity usage in the home, or other household expenses, are cut in order to absorb increased electricity costs for business activities.

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 is yet to undergo the reforms that are planned, and 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.

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 recite instances of power failures resulting from electrical storms. Furthermore, all interviewees mentioned lack of satisfaction with the ‘strength of the local substation’. Time taken to restore power seems to depend on whether Eskom or municipalities are involved, with Eskom responding quicker to call-outs than municipalities.

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 pre-payment 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 that these new pre-paid 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.
- Non-payment 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 needed help to establish an achievable payment plan to do so. They argue that their service providers do not help them to do this, but rather say that if customers want to be re-connected, they should pay at least half of the outstanding bill. Poor electricity customers are
asking to see the human face of the utility: at least for a utility representative to work with them to establish a plan for repayment that is realistic.

**Improved secondary services:** South Africa’s post-apartheid electrification programme has also included a component to increase electricity access to schools and clinics in remote areas of the country. The table below provides data on the number of schools connected under this programme.

**Schools connected from 1994 to 2002**

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</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>77</td>
<td>188</td>
<td>260</td>
<td>38</td>
<td>95</td>
<td>0</td>
<td>28</td>
<td>19</td>
<td>45</td>
<td>750</td>
</tr>
<tr>
<td>Rural</td>
<td>485</td>
<td>802</td>
<td>768</td>
<td>511</td>
<td>856</td>
<td>486</td>
<td>383</td>
<td>313</td>
<td>936</td>
<td>5 540</td>
</tr>
<tr>
<td>Non-grid</td>
<td>0</td>
<td>57</td>
<td>988</td>
<td>196</td>
<td>103</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 347</td>
</tr>
<tr>
<td>Total</td>
<td>562</td>
<td>1 047</td>
<td>2 016</td>
<td>745</td>
<td>1 054</td>
<td>489</td>
<td>411</td>
<td>332</td>
<td>981</td>
<td>7 637</td>
</tr>
</tbody>
</table>

*Source: NER Lighting Up South Africa*

As of 2002, agreement was reached that all electrification projects involving schools and clinics would be funded through the National Electrification Programme and the DME. These new school and clinic connections are the direct result of the Government’s electrification programme, and not specifically the result of other electricity reforms.

People residing in the locality of these clinics (and some schools) also use available electricity for charging cell phones, ironing, welding, cooking etc. 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 have not been used for some time.

**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 the Table below.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>No of SMME companies utilised in the electrification process</td>
<td>460</td>
<td>558</td>
<td>1 018</td>
</tr>
<tr>
<td>Amount of money paid to SMME companies utilised in the electrification process</td>
<td>R120 m</td>
<td>R139 m</td>
<td>R259 m</td>
</tr>
<tr>
<td>Number of BEE companies utilised in the electrification process</td>
<td>104</td>
<td>96</td>
<td>200</td>
</tr>
<tr>
<td>Amount of money paid to BEE companies utilised in the electrification process</td>
<td>R55 m</td>
<td>R42 m</td>
<td>R97 m</td>
</tr>
<tr>
<td>Number of jobs created through the electrification process</td>
<td>3 233</td>
<td>3 132</td>
<td>6 365</td>
</tr>
</tbody>
</table>

*Source: Lighting up South Africa 2002. NER*

**Public sector finance:** The only significant privatisation receipt has been Johannesburg’s sale of 50 percent of its Kelvin power station to AES for R225 million plus commitments on capital, environmental and social expenditure. AES subsequently sold their stake to CDC Globeleq. While the City of Johannesburg received the benefit of much needed capital and maintenance expenditure to improve the performance of Kelvin, 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.
The corporatisation of Eskom has resulted in tax and dividend receipts since 2001. These are shown in the table below – as well as the fiscal allocations to the National Electrification Fund.

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eskom tax (including deferred tax)</td>
<td>1454</td>
<td>1211</td>
<td>1727</td>
<td>1859</td>
</tr>
<tr>
<td>Eskom dividends</td>
<td>549</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiscal allocation to electrification</td>
<td>1027</td>
<td>909.6</td>
<td>950</td>
<td>1039.6</td>
</tr>
</tbody>
</table>

Source: Eskom Annual reports, DME Annual Reports

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

**Conclusions**

Initiatives such as the South African National Integrated Electrification Programme, distribution of free basic electricity, residential energy efficiency programmes and Integrated Energy Centres – 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. Various of these programmes have a history that precedes the reform years: the grid electrification programme commenced in the early 1990s and has made remarkable progress in the last decade in increasing electricity access. Residential energy efficiency programmes have been implemented by Eskom and some municipalities since the mid 1990s. National rollout of free basic electricity, establishment of IECs and the off-grid electrification programme are more recent. None of these programmes can be regarded as core to the current steps being undertaken to reform of the distribution industry, although the implementation of each will be affected by distribution restructuring.

It is therefore difficult to establish direct impacts of reform measures on access programmes and on poverty. While the modest reform step of corporatizing Eskom had the effect of Eskom stopping its subsidisation of connection costs for poor customers, Government has allocated a high proportion of its tax receipts to the National Electrification Fund that continues to subsidise these connection costs. This experience is important as 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 programme 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.

The electrification programme 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 programme was clearly driven by the unique challenges that South Africa faced in overcoming the legacy of apartheid inequity. Yet there are lessons from this programme 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 programme 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 Government’s social goals, even when the electricity industry is unbundled and possibly privatized.

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 micro-business owners to absorb. Low-income electricity customers have access to 50 units per month of free electricity. Their electricity tariffs are also cross-subsidised by large users.

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 black-outs are now being experienced by some customers.

Broadly, various conclusions can be reached:

- South African electricity reforms have not progressed sufficiently to draw strong conclusions on their impacts on poor electricity customers
- However, the South African Government has prioritised programmes to widen access and affordability of electricity. The funding of these programmes 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 impacting negatively on the reliability and quality of supply.
- Private sector participation has been instrumental in the area of off-grid electrification. Experience indicates that for further/future private sector involvement to be encouraged a multi-year governmental policy framework outlining institutional roles and funding must be established.
TANZANIA

Country Overview
With gross national income (GNI) per capita of US$290, Tanzania ranks 206th worldwide in terms of GNI purchasing power parity (PPP). The country falls behind all of its neighbours, namely Kenya, Uganda, Rwanda, Burundi, Democratic Republic of Congo, Zambia and Mozambique with regard to PPP 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 neighbours. While 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), there is measurable success in improving literacy. In 1990, 63 percent of the total adult population was recorded as literate; this figure has increased to 77 percent in 2002. Another significant improvement relates to access to clean water (68 percent in 2000 vs. 38 percent in 1992). Tanzania’s population, which has been growing at a rate of about 2.9 percent per year (from 1980-2002), currently stands at 35 million, with more than a third (34 percent) residing in urban areas. Urbanisation levels have doubled since 1980.

Gaining independence in 1961, Tanzania united with Zanzibar in 1964 forming 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. While Zanzibar’s electoral process has been tainted by political violence, mainland Tanzania remains relatively stable.

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

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

Tanzania’s Power Sector
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 (ZSFPC). In addition to TANESCO, two IPPs, namely Independent Power Tanzania Limited (IPTL) and Songas Limited, feed the grid. There are also a number of small self generators. Power imports from neighbouring Zambia and Uganda complement internal generation capacity by supplying isolated centres near the borders. The diagram below depicts the organization of the sector.
The country’s installed electricity generation capacity is about 1000MW, with 560 MW hydropower and the remaining capacity supplied by thermal plants. IPTL owns a 100 MW plant fired by heavy fuel oil while Songas Ltd owns a 115 MW gas turbine. The small self-generators feed surplus electricity into the grid – Kiwira coal-mine - 6MW and TANWAT - 2.3MW.

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 while 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 about 2,658 km of 220kV transmission lines, 1,420 km of 132kV lines and about 378 km of 66kV lines.

The country’s peak demand in 2003 was around 506 MW and 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.

In 2001 total system losses were about 23 percent (technical seven percent, non-technical 16 percent), while in 2002 total system losses were 19 percent (technical five percent, non-technical 14 percent). Loss reduction programs currently underway are expected to further reduce system losses to 16 percent in 2005.

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

**Electrification**

Approximately 10 percent of the population has access to electricity. It is estimated that about 39 percent of urban population has access as compared to only two percent of the rural population.
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 this time, national policy did not prioritise projects by financial viability. Projects were supported primarily by public funds, including donor funds, with subsidies flowing to TANESCO from Government, local authorities and large consumers. The power sector reforms of 1992 altered this non-economic approach to electrification, by prioritising projects based on their relative economic merits. Areas with agro-based industries and communities that were within an economic break-even distance from the interconnected grid were prioritised.

Since 2003, further reforms in rural electrification are being 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.

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. Meanwhile, a number of rural townships are exploring the possibility of establishing power cooperatives.

The power cooperatives are organized as follows. 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 collections 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.

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, which is the result of private participation. Like REA and REF, WVES is not yet under implementation, but plans are significantly developed. 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 International Development Association (IDA) credit.

**Drivers for Reform**

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 Government’s decision to reform and privatize corporations involved in the provision of infrastructure services, such as water, electricity, transport (air, water and road), telecommunication, etc.
**Description of Reform**


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, as the firm had been performing poorly from both a technical and financial perspective. The first step towards commercialization involved implementing tariff reforms. Between 1993-1995, average tariffs nearly doubled (in local currency).

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 privatise generation and distribution. However, despite more than a decade passing since this recommendation, TANESCO remains to be unbundled and is still in public ownership.

Meanwhile, repeated price hikes neither improved financial nor technical performance. Reasons for TANESCO’s persistently poor performance are attributed to inadequate revenue collection, including a significant portion owed by 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 hydro during dry years. In addition to high commercial losses, the utility has also experienced fairly high technical losses.

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 is now renewed for a further two years.

The management contract sought to enact a series of reforms to turn around the company financially and technically, namely: 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 August 2004, improvement had been recorded on each of the above, with the following notable achievements:

- 93 percent of bills 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; and TANESCO currently has cash in the bank;
- $38 million capital was spent in 2003 generated from TANESCO’s own funds;
- TANESCO is now credit worthy and has borrowed $33m.

The stalled unbundling of TANESCO has not, however, prevented development of IPPs. Starting in 1994, the Government reached agreement with the Independent Power Tanzania Limited (IPTL), a Malaysian-Tanzanian joint venture private company, to install 100MW of thermal capacity. With a controversy over the investment cost and associated capacity payment, which was ultimately reconciled by a multilateral agency arbiter, power only came

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14 Eskom of South Africa bid unsuccessfully for the contract.
online in January 2002. Still the resulting capacity charge even with the reduced investment cost has been above TANESCO’s means, necessitating Government to pay US$1.5 million per month in charges.

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 km pipeline, and the conversion to gas-firing of a 115MW fuel oil generating plant. The project is expected to reduce foreign expenditure on fuel by US$42 million from 2005. As with IPTL, TANESCO has been unable to meet fully the monthly payment obligation, which amount to US$5 million for a capacity charge and US$1 million for an energy charge, from its internal cash generation (i.e. without a steep increase in tariffs). A liquidity fund equivalent to four months capacity payment has therefore been established by the Government to cushion non-payment should it occur.

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, multi-sector (energy and water) regulatory agency, known as the ‘Energy and Water Regulatory Authority’ (EWURA), was passed by the parliament. EWURA’s mandate is expected to include licensing, tariff quality, environment, consumer protection and dispute resolution. EWURA is expected to be established in 2004 or 2005.

**Impacts of the Power Sector Reform**

**Access**

The proportion of the population with access to electricity grew from seven percent to 10 percent over the reform period 1993-2002. In the period since Net Group Solutions has assumed management of TANESCO, electricity connections have continued to expand - from 450,947 in 2001 to 530,000 in 2004. However, the rate of growth, namely 17 percent, over the period 2001-2004 is less than the 19 percent growth recorded in the period 1998-2001, implying no major change in access since the management contract. Taken altogether, while reforms did not stop access programmes, they have not as of yet led to a dramatic increase. However, prior to the award of the management contract, TANESCO was clearly not financially viable, questioning the sustainability of its access programme.

Among the reasons provided for this relatively limited growth is Government’s own failure to honour its electricity bills. Non-payment forced TANESCO to operate under huge debts until 2002, as noted in Section II, which carried heavy interest rates 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 be based on economic and financial viability. The absence of such projects may have inhibited growth. Previously, as noted in Section III, electricity investments were politically influenced, meaning that the utility was forced to implement non-viable projects.

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

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15 IPTL claimed that it invested US$150 million in the project, while 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$1130 million.
power for distribution. As mentioned earlier there are two main IPPs with total installed capacity of around 220MW. Meanwhile, the outstanding needs are primarily in the distribution segment which remains part of TANESCO.

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 the local population in the neighbourhood. For instance the 9MW surplus capacity from Geita (40 MW) power could be distributed through suitable mechanisms to benefit the local population. Further the 220 kV line, which has been 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. It goes without saying that 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 subsidised by the REF.

Over the course of the reform (from 1993-2002), 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.

It is expected that the REA and REF may alter this slow rate of growth in access. Meanwhile the energy cooperatives, also noted in Section III 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.

**Price**

Prices have increased during the reform period, with average retail tariffs increasing from 18.38 Tanzanian Shillings (TS) in 1992 (6.5 US¢/kWh) to 80 TS in 2001 (9.2 US¢/kWh), for an average annual increase in TS of 20 percent.\(^\text{16}\) Meanwhile bulk supply tariffs have increased from 9.3 TS in 1992 (1.2 US¢/kWh) to 52.45 TS (6 US¢/kWh), for an average annual increase in TS of just over 25 percent. The steepest rise in retail tariffs were recorded between 1992 and 1993 when average TS prices jumped 76 percent; while bulk tariffs registered their largest increase between 1993 and 1994 with a rise of 77 percent.

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 80 TS. Bulk supply tariffs would, however, be a mere 40 TS or just 60 percent of their 2001 values. The real cost of generation has increased, due in part to the increased reliance on thermal power, and has not been passed on fully to consumers from 1992-2001.

While 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, the utility was only partly successful at tariff adjustments.\(^\text{17}\) TANESCO did succeed in reducing tariff categories from ten to five and with this began to reduce cross subsidization. In the latter half of the reform, though, regular biannual increases in the tariffs almost ceased as the Government was reluctant to provoke further dissent, particularly from industrial consumers, tariffs for which were already among the highest in the region.

\(^{16}\) US$ prices are based here on historical exchange rates.

\(^{17}\) According to its existing license, TANESCO is permitted to increase its tariffs by up to 5% biannually, while the Minister of Energy and Minerals in consultation with the Ministry of Finance is allowed to raise tariffs by an additional 10%; any excess of this has to be approved by the cabinet.
In addition to tariffs, TANESCO’s efforts at altering connection costs, which have been highly subsidised, have been curtailed by Government. In May 2001, with the Ministry of Energy and Mineral’s approval, TANESCO raised the service line connection charges from US$ 103.3 to US$ 161.8 (about 57 percent) for a single–phase connection, and from US$ 206.5 to US$ 670.1 (about 224 percent) for a three-phase 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 electricity. Within one month, the increases were reversed by Parliament with no additional means provided to TANESCO to service new connections.

During the period of the initial Net Group Solutions management contract between 2002 and 2004 average TS prices 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 eight percent in real terms. Net Group made additional adjustments in an attempt to reduce cross-subsidization between industrial and residential consumers.

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, 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.  

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 as compared to 1,700 MWh and 900 MWh for 2002 and 2003, respectively.

As regards 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.

In addition to the change in 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 pre-paid meter vending, however, creates new opportunities.

Finally, with regard to public finances, the reforms have not brought about the intended changes. Rather than freeing up funds for other sectors, the reforms have led to an increase in government transfers. This increase, as noted in Section V, is Government’s contribution to the IPTL capacity charge. In 2002, Government paid approximately US$1.5 million a month for a total of US$18 million. For the entire 20-years period for this PPA, the Government will

\(^{18}\) An attempt to reduce subsidy levels to 50 kWh in 2002 was met with fierce opposition and Government subsequently intervened, reversing the subsidy cut.
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. On the other hand, the improved financial position of TANESCO has meant that it is less reliant on government.

**Conclusions**

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 together with the promise of a new regulatory authority. The management contract establishing Net Group Solutions at the helm of TANESCO has also led to vast improvements, particularly in the company’s financial position.

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, Government has seen its contribution to the sector increase with the reforms due to high capacity charges required by IPTL. However, if TANESCO had invested in 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, twelve years after the inception of reform.

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. Already electrification cooperatives are 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 going forward.
UGANDA

Country Overview
With Gross National Income (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 has been growing annually at about three percent. Meanwhile, life expectancy has been decreasing: 47 years in 1990 compared with 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.

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

Over the past decade, Uganda has experienced rapid economic growth; in the past five years, growth has averaged six to seven percent per annum. This growth has contributed in part to increased urbanization, with the urban population growing from nine 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.

Uganda has hydro-electric 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
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 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 UEGCL, UEDCL’s assets are to be leased to a private entity, namely Umeme Pty Ltd, jointly owned by CDC Gobeleq and Eskom. The take-over date is set for 1 November 2004, when UEDCL will cease to operate the distribution system. Other companies have the right to bid to expand the network to new areas. To date, there has been one developer who 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. The diagram immediately below illustrates the structure of the sector.
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 have an installed capacity of 200 MW by February 2005 (actual output will be a function of lake levels). In addition, there is approximately 17 MW of independent generation connected to the grid, primarily from small hydro generators: at Maziba (2 MW); at 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 and which can only be built 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 power purchase agreement with UETCL.

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 south-west of the country. Meanwhile, the distribution system contains assets at 33 kV and below, and includes reticulation in the major towns. In addition, there are some isolated networks powered by diesel generators. These are located in the West Nile region in the north-west of the country (Arua, Nebbi, Moyo, and Adjumani), and the Karamoja (Moroto) region in the north-east. The 33kV network also supplies the border town Katuna in northern Rwanda and imports from Rwanda at the extreme south-west in Kisoro.

Annual production is approximately 1600 GWh, with 25-30 percent lost in transmission and distribution. Annual consumption stands at 1100 GWh, with another 200-250 GWh exported, primarily to Kenya (90 percent), with the remainder going to Tanzania. Annual demand growth is estimated at approximately 25-30 MW or eight percent per year. Households, while making up over 90 percent of the customers, account for around 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.

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<td></td>
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<td>Street Lighting</td>
<td>347</td>
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<tr>
<td>Total</td>
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Source: UEDCL 2003

Average retail tariffs today stand at approximately US$0.08 per kWh, with households paying just above US$0.09 per kWh.

**Electrification**

Currently, approximately five percent of the population has access to electricity. There are about 200,000 domestic connections in a population of some 25 million persons. Increasing access to electricity is a core objective of Government’s energy policy. While urban electrification should be furthered by the investment obligations of the distribution concessionaire, there are special challenges in providing supply to rural areas.

Government’s strategy, outlined in the document “Rural Electrification Strategy and Plan, 2001” is to promote private 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.

A Rural Electrification Agency (REA) and a Rural Electrification Fund (REF) were established in 2003 – the REA has the responsibility to identify and promote rural electrification projects, whereas the REF provides capital subsidies and support for debt finance. The intention of the subsidy 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.

The target set out in the 2001 strategy is to increase rural access from two 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 (WNRERCO) – 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.
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 REF, 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**

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, in order 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.\(^{19}\) Some 43 percent of firms surveyed had their own generators, and investment in back-up 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**

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

- Uganda Electricity Generation Company Ltd (UEGCL)
- Uganda Electricity Transmission Company Ltd (UETCL)
- Uganda Electricity Distribution Company Ltd (UEDCL)

All three companies are subject to the Companies Act. Meanwhile, the privatization of the generation and distribution assets of UEGCL and UEDCL is underway. 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, UEGCL and UEDCL will remain as 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 repayments), and not to extract rent for Government.

The generation concession has been awarded to Eskom, who took over operation of the assets at Nalubale and Kiira in 2003. UEGCL has an obligation to complete the on-going 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 concession 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 concession, whereas investment obligations in generation are much smaller.
- The generation concessionaire has a power sales agreement with UETCL, a public entity, whereas the distribution concessionaire must sell power directly to

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customers. Non-payment levels have been especially high in Uganda, implying considerable commercial risk.

- The generation concessionaire sells power to UETCL on a capacity availability basis (i.e. a “take-or-pay” style PPA). Hence, it is UETCL who takes volume risks if demand is lower than expected, as well as hydrological risks. The distribution concessionaire, on the other hand, is partially exposed to volume risks. While 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 feed through into higher prices and so higher levels of non-payment.

- Finally, the generation concessionaire is largely unaffected by the risks implied by generation expansion. The distribution concessionaire, on the other hand, must pay bulk supply prices to UETCL that reflect the costs of purchasing power from the new station. While regulation allows these costs to be passed through to end-consumers, there is a risk that new capacity will result in higher end-use prices and again higher levels of non-payment.

Despite these obstacles, in early 2004 most outstanding issues were resolved and it is expected that CDC Globeleq and Eskom will take over UEDCL’s operations in November 2004 under Umeme Pty Ltd, a locally registered company.

The reforms have also paved the way for new generating and distribution entities to enter the sector. Today, as noted earlier, 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 has also been awarded, as of 2003 to West Nile Rural Electrification Company.

The Electricity Regulatory Authority (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 as well as installation permit regulations and license fees;

- **Issuance of licenses**: to UEGCL, UETCL, UEDCL, Eskom Uganda and independent companies (Kasese Cobalt, Kilembe Mines, West Nile Rural Electrification Company Ltd);

- **Annual price reviews** of submissions made by each of the companies, including public hearings, which has led to radical tariff reform.

From 1999 to the present, the ERA has exhibited its independence from 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 is preparing to fulfill this responsibility.
Impacts of the Power Sector Reform

Access

With a target of national access set by 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 five 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, UEB made about 11,000 new connections per annum. Subsequent to this, UEDCL has more than doubled this rate to 25,500 new customers per year, as evidenced below.

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

In addition to the increased rate of access, there has been improved access to 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, as follows:

- World Bank IDA loan of $33 million made in 2000 for construction and rehabilitation on the Kiira and Nalubale dams together with technical assistance to UEB;
- World Bank IDA loan of US$62 million made in 2001 for continued expansion at Kiira;
- 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.
Much of this early support was contingent on sector reform, namely the liberalization of the sector, followed by corporatization and eventual privatization of assets.

In addition to public finance, capital is expected to be invested by the private concessionaires. The generation concession itself is not, however, expected to involve large-scale investment. Obligations relate to investments in substations at both Nalubale and Kiïra, and are expected to be in the order of $6 to 7 million to be made in the first four years of the twenty-year concession.

The distribution concession, on the other hand, involves considerable investment obligations in both the rehabilitation of the existing network, as well as expansion of the network and connection of new customers. Government’s initial requirements for the concessionaire were to invest a minimum of nearly $60 million over the first four years of the concession, largely for rehabilitation of the existing network. There is also an obligation to connect at least 15,000 customers per annum in the first four years, and 25,000 new connections per year from year five onwards. The obligations of the distribution concessionnaire 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 five percent to six 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 (short-term) and system expansion (medium-term) is significant and could well approach US$150–200 million over a ten-year period.

Finally, 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 after AES, in 2003, pulled out after seven years of project development. Prior to 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, after a dramatic decline in its own stock price since 2001, which coincided with the bankruptcy of Enron and a general trend of OECD-based companies to withdraw from developing country IPP development. Now that AES has withdrawn, Government and the World Bank are seeking to secure a new investor in the project, possibly in a public-private partnership with Government. The main challenges, particularly in attracting new private investment are the perceived country risk in Uganda; the lack of appetite within multinationals post-Enron 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 project, if it is to be implemented at all, will have to rely on a considerable degree of public financing. Further, the competing Karuma project still hopes to be developed ahead of Bujagali and this could well occur.

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 around 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.

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20 The increase in new connections after four years is 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, Government has stressed the importance of the concessionaire preparing the network for expansion, particularly since failure to significantly increase sales will make it difficult to honour the power sales agreement underpinning Bujagali.
that are 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 in the order of 110 MW, of which only a portion could be reasonably be expected to be realized in the medium term. Hence, in a situation where annual demand growth is in the order of 25-30 MW, it will be difficult to rely only on small-scale projects to meet future demand.

As regards isolated grid development, experience has been mixed concerning access to capital. The sole example at this stage is WNRECO, with 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, and not the Bank of Uganda nor the ERT program. Consequently, commercial banks have been reluctant to make the loan without some form of guarantee, either from WNRECO’s parent company, or some other form of risk guarantee.

**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 a period of seven years, despite the effects of inflation eroding the real level of tariffs.

Based on work undertaken by Government’s privatization transaction advisors, 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 Advisors, and adopted by ERA, that allocated costs to each customer category, and so structured tariffs across the groups.

The result was a new tariff schedule, introduced in 2001, that both increased the average level of tariffs and rebalanced tariffs between 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 shilling terms) for all customer groups was 30 percent, largely reflecting an inflation catch-up given the seven year period where no tariff increases had been made. However, the average domestic tariff went from 88 to 194 sh/kWh (US$0.11) - an increase of 120 percent. This increase was considerably higher than for industrial customers where the increase (in shilling terms) was 39 percent and six percent for low-voltage and high-voltage industrial consumers respectively. The graph immediately below compares tariffs in 2000 and 2001, expressed in nominal US$ (the increases are lower than in shilling terms due to currency devaluation).
Tariff reforms introduced by ERA in 2001

With the tariff reform introduced in a single increase, there was notable negative public reaction, as well as critical response from politicians. Significant non-payment followed. Still, the ERA did not adjust prices. Government responded by offering tariff relief targeted at domestic customers, limited to early 2003. This was incorporated into a revised tariff, and ERA also introduced a “lifeline tariff” in the domestic tariff category, by providing the first 30 kWh consumed per month at a low rate (50 shillings/kWh – US$0.025/kWh. The under-recovery was made up by a small surcharge on all other customers, although in the tariff schedule for 2004, the recovery is confined to a surcharge applied only to the domestic tariff.

Since the initial price increases, retail tariffs have declined, with domestic tariffs at just over US$0.9, down from US$0.11 and the average of all tariffs at US$0.08. 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 as noted in the previous section.

At the same time, a household survey identified that households were fairly sensitive to electricity costs, with several opting to switch to other fuels (woodfuel and paraffin) as an alternative to electricity. However, the reason for switching was not only an increase in price, but also a response to UEDCL’s tougher stance with regard to electricity theft and non-payment as well as concerns with reliability. It should also be reiterated in this context that household access in Uganda is less than five percent, implying 95 percent of the population is unaffected by the direct effects of power price increases. For these 95 percent, the increased

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

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 reduce. In the medium-term, major changes are anticipated as new generation facilities come online. Existing bulk tariffs are approximately US$0.01 per kWh; in contrast, the cost of new generation facilities are estimated at about US$0.06 per kWh - regardless of whether facilities are small or large scale hydropower plants. The effect on tariffs will occur with or without private sector participation, and is 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, Government together with ERA have instituted a tariff leveling mechanism, with the intention of over-recovering costs in the period leading up to the next large power station, then using the surplus to smooth out any sharp peaks in power prices that may arise.

Other impacts

In addition to access and price, quality of supply has improved with the reforms. In 1999 as much as six percent of total demand was load shed. This has now been reduced to less than one 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.

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

Finally, with regard to public finances, tariff reforms have enabled a reallocation of Government expenditure away from the power sector. The exact impacts of this reallocation are difficult to quantify, as funds in Government budgets are fungible and inflows cannot be traced to specific expenditures. However, since Uganda has a high priority placed on poverty alleviation expenditures, it can be taken that any additional resources made available to Government will have a positive impact on the poor.

Conclusions

Uganda’s power sector reform has brought about drastic changes to the industry since 1999, with the privatization of generation and distribution assets. 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 have improved, as investors witness the country’s commitment to reform. 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.

The reforms have ushered in a new price regime, which, while vastly 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 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.

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
The University of Cape Town has been appointed by ESMAP to undertake the project “Power sector reform in Africa: assessing the impact on poor people, and influencing policy decisions”. 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 to disseminate research findings to policy makers. The project will be implemented in collaboration with research partners in a selection of African countries. The research approach to be adopted is case study based, with a series of studies being undertaken across various African countries. This document presents the research framework and methodology which case study partners are requested to adhere to.

Research framework
The purpose of the research framework is to outline a common foundation upon which the research and analysis will be 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
Over the last decade or so, African governments have been implementing a range of power sector reforms. These reforms have mainly included commercialisation, corporatisation and privatisation 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 industrialised 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.

Power sector reforms currently being implemented in many African countries may not be impacting positively on Africa’s poor people. In many cases, African bureaucrats, politicians, and researchers are questioning the reform process and why they are not making a contribution to Africa’s core energy sector developmental objective of increasing poor people’s access to electricity.

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;
Through drawing best practice, suggest innovative ways of ensuring that power sector reforms improve poor people's livelihoods.

We recognise that 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). Our objective is that this project becomes positioned to influence reform agendas as they are designed and implemented.

In order to achieve its main objectives, this project will seek to understand the most appropriate power sector contexts in which both access and efficiency improvements can be achieved. In particular, this project will try 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 programmes.

Specific objectives of this project are:

- To generate materials that will assist Africa’s senior energy decision-makers in making informed decisions around power sector reform, with particular emphasis on having positive impact on Africa’s poor;
- To provide opportunity for key African energy research institutions to develop sustainable capacity in this area;
- To create contact- and/or on-line training and learning material for Africa’s regulators, bureaucrats and other interested groups, in the area of power sector reform, and the social, environmental and economic implications thereof.

**Project structure, activities and outputs**

Project activities, approach and outputs are as follows:

<table>
<thead>
<tr>
<th>Activities</th>
<th>Approach and purpose</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 1&amp;2: Developing a methodology and research framework for case study partners.</td>
<td>The purpose of the research framework and methodology will be to provide guidance to case study partners in conducting their research and analysis for this project. Current debates and research questions will be outlined. Guidelines in drafting country reports, as well as requirements of case study partners will be defined.</td>
<td>This document</td>
</tr>
<tr>
<td>Activity 3: Undertaking case study research and analysis according to research framework and methodology</td>
<td>Each case study partner will be responsible for using the research framework and methodology as defined in Activity 1&amp;2. Case study reports based on outcomes of this task will be written by each case study partner. Case study partners will also be responsible for country specific analysis, once the methodology has been implemented. This aspect of the project will also generate country specific recommendations on achieving both efficiency and access improvements through electricity sector reforms.</td>
<td>Seven case study reports, each to be peer reviewed. See research framework and methodology framework in the main text of this document for guidelines on content. Guidelines on report format are in Appendix B.</td>
</tr>
<tr>
<td>Activity 4: Analysing case studies and presenting</td>
<td>Case studies will be analysed specifically (see Activity 3 above), and generally. Common themes and conclusions</td>
<td>A synthesis report, to be peer reviewed.</td>
</tr>
</tbody>
</table>
recommendations to policymakers  
emerging from all of the case studies will be 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 will be used to influence reform debates and agendas, as well as form the basis of material utilised.

<table>
<thead>
<tr>
<th>Activity 5: Initiating and undertaking a series of outreach and advocacy activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>This activity, which will be financed separately from the rest of the project, will commence once the above activities are completed.</td>
</tr>
</tbody>
</table>

Table 1: Project structure, activities and outputs

This document concerns Activities 1 and 2.

Guidelines on key research concepts

To ensure excellent quality 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 listed below.

Electricity reform (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 follows in Figure 1 and 2.
Trends in ownership changes are illustrated in Figure 2 below.

**Figure 2: The ownership dimensions of electricity industries in transition**  
*Source: Adapted from Hunt & Shuttleworth (1996).*

Drawing from a wealth of experience in implementing electricity reforms in both industrialised and developing countries, theorists are nowadays viewing power sector reform differently. Commercialisation, corporatisation and privatisation initiatives, as well as those undertaken in preparation for competition continue to be regarded as key elements (rather than steps) of reform. And, 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 – sometimes successfully, and other times not – been adopted.

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, Government is owner, regulator and manager, although sometimes different ‘nameplates’ are assigned to the different roles. The industry is viewed as an element of governments “infrastructure”.

- **Commercialisation** involves government relinquishment of direct management interference in the enterprise, in favour of more independent management and a focus on financial viability and profitability. This involves a change in behaviour rather than organisation. It normally involves adoption of commercial accounting practices, economic tariffs, and an effort to separate the core business from other activities.

- **Corporatisation 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.

- **Private sector involvement** results from a move from a government corporation to a privately involve 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, which represents the shareholders. These companies tend to be regulated by an independent regulator. Please note that private sector participation might not necessarily be achieved through a privatisation initiative, as implied about. Alternative models include private investment in system expansion, with existing assets remaining under Govt ownership. Typical examples are IPP development. Another example involves concessions, where assets remain under public ownership, but are leased to private sector with associated investment obligations.

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

**‘Access’ programmes**

Electricity access programmes include a variety of public or private sector-initiated programmes that seek to bring about access to an energy service derived from electricity. These can be grid- or off-grid based programmes, and may or may not be subsidised by government (or other) at various stages in the electricity supply chain, or cross-subsidised by other electricity customers.

In line with common day practice in Africa, it is expected that an important focus of the research and analysis of this project will be on subsidised or non-subsidised grid-based programmes, research partners should also include discussion and analysis of off-grid (or non-grid) initiatives when undertaking the impact assessment.
‘Poverty’ and the ‘poor’

It should be noted that 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 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 one that this research seeks to adopt. Thus research outcomes will not necessarily make any statement of the impact that electricity reforms are having on ‘poverty’.

For more information on this topic see: Vivien Foster on “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.

Different levels of poverty

This research must take 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, while others are not. The latter category of people rely on traditional fuels to satisfy their household energy needs. Our 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 categorise these impacts according to specific level of poverty.

Further reading

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

Research methodology

Introduction

Our project team has devoted a considerable amount of effort towards understanding how best to measure the impacts of power sector reform on Africa’s poor. We have considered a wide range of methodologies including input analyses measuring the productivities of utilities and output-related methodologies measuring price and programmes, to direct poverty impact assessments based on household surveys. We have had to decide on
whether this project warrants a rigorous quantitative analysis, or whether a qualitative study would be more appropriate. We have chosen to conduct this study in a more qualitative way, making use of interviews and data collection. Where possible, we will not conduct formal household surveys but will rely on existing studies and survey data coupled with rapid appraisal techniques. Where data and surveys are found to not exist, we will employ non-survey techniques including discussion or focus groups, interviews and other PRA type approaches, and will treat outcomes as illustrative i.e. providing anecdotal evidence to illustrate what is found elsewhere. In the light of the fact that this area generally tends to be under-researched, we are of the opinion that interviews with people running businesses and informal generating activities are likely to be useful. We have chosen this approach above a quantitative study on the basis that it may be too difficult to establish causality between reforms and impact on Africa if a purely “macro-analytical” or “top-down” approach is applied, and that data requisite for a macro-economic analysis is likely to be unavailable.

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

Factors that influence detection of causal relationships
The detection of these relationships is difficult due to 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. The issue of time delays is of particular significance since, 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 anticipate that the
research will be able to discern certain trends, and that these will inform the conclusions drawn.

**Measurement of impacts and outcomes**
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 will focus on measurement of impacts, with the nature of outcomes detected with a lower degree of confidence.

**Generalising research findings**
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. On the one hand, we hope that this problem is minimized by the fact that the countries forming the focus of this research share a similar context. While there will certainly be differences, often marked, between countries, there are also strong similarities which should make the generalization of findings somewhat easier. Secondly, by choosing a reasonably large number of case studies, cross-referencing and “triangulation” will assist in identifying findings that are generalisable and those that are not. In this sense, the comparative analysis of the case studies forms an important element of the research method employed. Nevertheless, glib generalization is a dangerous pitfall and one that the project will aim to avoid through caution in the drafting of recommendations and conclusions.

**Research themes**
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 4 and briefly described below.

**Price of electricity services**
Reforms will almost certainly affect the price of power to end-users. In fact, often one of the first reforms to implement is price reform. There are two aspects that 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 is 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 cost of supply increases. While these cost increases may be efficient from an economic point of view, e.g. reflecting country and market risks in the cost of capital, or improving the quality of infrastructure, they can lead to cost increases.

- **Moves towards cost reflectivity:** Price reforms in Africa may increase prices in an attempt to “catch up” with inflation during a period when prices were suppressed due to 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 trade-off between the social benefits of low prices and the benefits of extended access.

- Reform programmes might include special targeted tariffs for the poor to mitigate the price increases associated with a move to cost-reflectivity and in order to make electricity more affordable for the poor.

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; and
- the fuel-switching and conservation strategies that households may employ.

<table>
<thead>
<tr>
<th>Power sector reforms</th>
<th>Impacts</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of electricity</td>
<td>Effects on household expenditure; changes to energy use strategies</td>
<td></td>
</tr>
<tr>
<td>Access to electricity</td>
<td>As above; access to new appliances &amp; services; perception of well-being</td>
<td></td>
</tr>
<tr>
<td>Quality of services</td>
<td>Changes to energy use strategies; improved business confidence</td>
<td></td>
</tr>
<tr>
<td>Improved social services</td>
<td>Health and education benefits; improved local administration</td>
<td></td>
</tr>
<tr>
<td>Economic development</td>
<td>Increased investment; business development in rural areas; job creation;</td>
<td></td>
</tr>
<tr>
<td>Benefits on public finances</td>
<td>Debt reduction; release funds for other priorities; reduced country risk</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4 Impacts and outcomes of power sector reform**

**Access to electricity**
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 what 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:** Further, 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.

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 utilise electricity, and the income generating activities which may be enabled by having access.

**Quality of supply and service provision**

Many African electricity industries provide a poor level of supply quality, 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 around billing/pre-payment, connection fees, 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 back-up systems (e.g. diesel generators).

- **Improved quality of supply and service to businesses** may both reduce the costs of supply to these businesses as well as 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, as these businesses are typically large employers among poorer households.

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

**Improved social services**

Social services, in particular health and education, make use of electricity where available. The quality of these services depends, to some extent, on the availability and quality of electricity supply. Reforms may impact on both these issues, i.e. access and quality, and hence impact on service provision to poor households. For the purposes of this study, we will look 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 internet in schools. A related question is whether scholars have access to good quality lighting at home and school for study purposes.

- **Telecommunications:** The extension of telecommunication services may be influenced by the availability and quality of electricity supply. While the benefits of improved access to communication should not be attributed to electricity reforms, the
The complementary nature of physical infrastructure should be recognized and identified where it exists.

**Stimulation of economic development**

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. While 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.

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

- Firstly, improved quality of supply (albeit offset by price changes) may reduce input costs to existing businesses, particularly if back-up supply options can be avoided (see above section on improved quality of supply);
- Secondly, extended access to electricity may allow new (small and other) business enterprises to emerge and enable existing businesses to benefit from the use of electrical equipment;
- Thirdly, where a reliable electricity supply is provided in conjunction 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 as commercialised utilities tend to outsource non-core functions (to SMMEs and other business enterprises).

**Public sector finances**

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 Government. Reforms are intended to place utilities on a commercial footing, and should impact on Government finances in two ways:

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

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 programme of poverty alleviation activities, then any positive fiscal effects can be assumed to generate positive poverty relief effects.

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 macro-economic framework can do much to reduce country risk. Microeconomic reforms, such as power sector liberalization, can contribute to this process.
Research approach
The research will be based on a set of seven country case studies as specified in this document.

Reform topics to be investigated
Selection of case studies will be chosen to pursue different power sector reform strategies or elements of reform. The intention is to identify specific areas of reform and to attempt to trace the effects of such reforms on the poor. The elements of reform that will be explored will include:
- Commercialisation (including performance contracts);
- Corporatisation (including clarification of shareholding, taxes and dividends)
- Restructuring for competition (including IPPs and unbundling)
- Private sector participation (including management contracts, concessions, privatisation and new investment);
- Establishment of new regulatory institutions;
- New electrification funding mechanisms.

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

<table>
<thead>
<tr>
<th>Reform initiative</th>
<th>Prices</th>
<th>Access to electricity</th>
<th>Quality of supply</th>
<th>Improved social services</th>
<th>Economic development</th>
<th>Public finances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercialisation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Corporatisation</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Restructuring for competition</td>
<td>✓</td>
<td>✓</td>
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<td></td>
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<tr>
<td>Private sector participation</td>
<td>✓</td>
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<td>New regulatory systems</td>
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<td></td>
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<tr>
<td>Electrification funding</td>
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<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
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</tr>
</tbody>
</table>

Table 2: Reform topics and linkages to the poor

Research hypotheses
Table 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.
Commercialisation
Efforts to commercialise the sector, encouraging commercial behaviour, is often a first step in the reform process. This type of reform can impact on the poor in the following manner:

- 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 to poor households.
- Commercialisation could lead to greater financial viability and more resources could be made available to maintain an acceptable level of supply.

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

Corporatisation
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 impact on prices, access and quality of supply. Corporatisation clarifies the role of the state as shareholder and shareholder compact could include commercialization targets. On the other hand, it could also include targets for widened access. Corporatisation can also lead to a change in public finances as these new institutions are required to pay taxes and dividends (often exempt) before, and are required to raise finances from the markets rather than from Government.

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 is undertaken to structure the electricity market for future competition. The unbundling also facilitates the commercialization and corporatisation process through the ring-fencing of accounts and the clarification of purpose of the various entities.

Privatisation 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 privatisation receipts, and indirectly from relieving the public sector of the investment burden), thereby releasing public sector resources for social and poverty reduction programmes.
- On the one hand, private capital may increase industry costs by incorporating country and sector risks into the costs of capital. On the other, privatisation 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.
Privatisation 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 through utilising new technologies.

Lastly, 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.

**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 impact on 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 maximise social and economic benefits.
- Regulators are also concerned with the quality of supply.

**New electrification 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 (e.g. 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:

- First and foremost, they should increase access to electricity by providing dedicated finance for network expansion, and perhaps also cross-subsidisation of tariffs.
- Secondly, they will provide finance for connecting public service institutions (schools, clinics etc) to an electricity supply.
- Thirdly, the promotion of electrification will stimulate the development of small and informal businesses in areas where service is provided.

**Identification of case study countries**
Identification of case studies has been undertaken through the following process. Firstly 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 a set of criteria as identified in Table 3 below. Terms of reference have been drafted for each of these case studies.

<table>
<thead>
<tr>
<th>Southern and Eastern Africa</th>
<th>Reform progress</th>
<th>Relevant aspects of reform</th>
<th>Research partner</th>
<th>Other key contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. South Africa</td>
<td>Commercialisation and corporatisation complete, restructurbing for competition including</td>
<td>Grid and off-grid electrification programme, history behind</td>
<td>Alix Clark and Anton Eberhard (Graduate)</td>
<td>Numerous contacts in National Electricity Regulator, Eskom</td>
</tr>
<tr>
<td></td>
<td>Licensing of new IPPs, extensive grid programme built into distribution reform, private concessions to extend rural access, regulatory framework being established for new contexts, electrification fund established.</td>
<td>Electrification fund and poverty tariff.</td>
<td>School of Business, UCT).</td>
<td>and Department of Minerals and Energy and Department of Public Enterprises</td>
</tr>
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</tr>
<tr>
<td>2. Namibia</td>
<td>Commercialisation and corporatisation of Nampower, rationalization of distribution, rural electrification company, establishment of independent regulator</td>
<td>Rural electrification programme and plans, distribution industry restructuring, establishment of an electricity regulator.</td>
<td>Ralf Tobich, EMCON</td>
<td>Siseho Simasiku, CEO, Electricity Control Board Paulinus Shilumba, Electricity Control Board Folbe Jacobs, Nampower, Mark Davis for work with Sadelec on Nampower restructuring</td>
</tr>
<tr>
<td>3. Uganda</td>
<td>Full unbundling, beginning of privatization</td>
<td>Impacts of unbundling and privatization, special arrangements for rural electrification</td>
<td>May Sengendo, East African Energy Technology Development Network Mark Davis</td>
<td>Econ and NVE work supporting restructuring Emmanuel Nyirinkindi (Director, Electricity Reform Unit)</td>
</tr>
<tr>
<td>4. Tanzania</td>
<td>Moves towards Commercialisation, management contact, IPPs and new investment</td>
<td>Management contract, and move towards electrification fund</td>
<td>Hieromini Shirima, Planning Economist, Tanesco</td>
<td></td>
</tr>
</tbody>
</table>

**North and West Africa**

<table>
<thead>
<tr>
<th>5. Senegal</th>
<th>Two attempts at privatization, establishment of a regulatory authority.</th>
<th>Privatisation experience, rural electrification institutional arrangements (independent body to administer)</th>
<th>Youba Soukona and Fatima Denton, ENDA-TM</th>
<th>Alione Fall, Chairman Power Sector Regulatory Commission</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Cote d'Ivoire</td>
<td>Large-scale privatization, new wave of reform.</td>
<td></td>
<td>M'Gebra M'Guessan, Econoler International</td>
<td>Joseph ASSI Bénié, Director General, Autorite Nationale De Regulation Du Secteur De L'Electricite (ANARE) Various contacts in the Ministry for Energy and</td>
</tr>
</tbody>
</table>
Case study research methodology

Case study research partners are requested to cover all of the research questions as outlined in Section 4.1 and Table 4. It is anticipated that some of these research questions will be more applicable and relevant than others. Where experience is particularly interesting, case study research partners are requested to delve more deeply into these areas when reporting on research outcomes and conclusions. As noted Table 5 and in Appendix B, case study research partners may consider achieving this through a series of ‘boxes’ that are embedded within the text and present relevant details. It is further anticipated that this type of material will be particularly instrumental in assisting the team in developing our understanding of each research hypothesis presented in Section 3.4.2.

Case study research questions

The table below identifies a set of research questions relevant to each research theme outlined in Section 3.3. These questions are designed to provide material that will assist in understanding the research hypotheses presented in Section 0.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sub-topic</th>
<th>Research questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to electricity</td>
<td>Access via existing utilities</td>
<td>Do incumbents invest more in electrification during and after reforms? 1</td>
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<tr>
<td></td>
<td></td>
<td>What are the factors that drive investment decision making during and after reforms? 2</td>
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<td></td>
<td>Access via new agents</td>
<td>Do new agents emerge that invest in access to electricity? 3</td>
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<td>To what extent do these new agents engage in energy services to the poor? 4</td>
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<td></td>
<td>What mechanisms, if any, are in place to enable new agents in the market? 5</td>
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<td></td>
<td>Access via special mechanisms</td>
<td>Do reforms include the establishment of any special “access” mechanisms? 6</td>
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<tr>
<td></td>
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<td>How effective are these mechanisms proving? 7</td>
</tr>
<tr>
<td>Price of electricity supply</td>
<td>Impact on household income</td>
<td>What happens to costs of supply after power reforms? 8</td>
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<td></td>
<td></td>
<td>What happens to tariff structures and moves to cost-reflectivity?</td>
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<td></td>
<td></td>
<td>Are new, targeted, transparent subsidies put in place?</td>
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<td></td>
<td>What price changes have resulted from power sector reforms?</td>
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<td></td>
<td></td>
<td>How have these changes impacted on household expenditure? 9</td>
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<td></td>
<td>Response to price changes</td>
<td>How have price changes affected fuel choice and strategies? 10</td>
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<td></td>
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<td>How do these choices influence household welfare? 11</td>
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<tr>
<td>Quality of</td>
<td>Supply to households</td>
<td>Has quality of supply to households changed? 12</td>
</tr>
<tr>
<td>Research theme</td>
<td>Research questions related to research theme.</td>
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<td>-------------------------</td>
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<tr>
<td>Supply and customer services</td>
<td>How have these changes impacts on fuel use &amp; expenditure?</td>
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<td></td>
<td>Has quality of supply to businesses changed?</td>
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<td></td>
<td>How have these changes impacts on fuel use &amp; expenditure?</td>
<td></td>
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<tr>
<td>Customer service procedures (marketing, applications, connection fees, billing)</td>
<td>Do utility systems fit poor households income patterns and other needs?</td>
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<tr>
<td>Improved secondary services</td>
<td>Health/education</td>
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<td></td>
<td>Have reforms improved access of health/education facilities to electricity?</td>
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<tr>
<td></td>
<td>Have reforms improved quality of supply to health/education facilities?</td>
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<td></td>
<td>How have these changes impacted on health/education services to the poor?</td>
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<tr>
<td>Telecommunications</td>
<td>To what extent has extension of telecomms services depended on power?</td>
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<td></td>
<td>How have reforms impacted on the ability to extend telecomms services?</td>
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<tr>
<td>Economic development</td>
<td>Input costs to businesses</td>
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<td></td>
<td>How have energy costs of businesses been influenced?</td>
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<td></td>
<td>How has this influenced employment &amp; expansion?</td>
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<tr>
<td>Access of businesses to power</td>
<td>Have electrification programmes expanded access of small business?</td>
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<tr>
<td></td>
<td>How have these businesses responded to having access?</td>
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<tr>
<td>Integrated infrastructure</td>
<td>Have electricity services been co-ordinated with other infrastructure?</td>
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<td></td>
<td>Have these practices led to clusters of economic activity emerging?</td>
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<tr>
<td>Utility investment</td>
<td>Have utility investment levels increased?</td>
<td></td>
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<tr>
<td></td>
<td>Has utility outsourcing stimulated business development?</td>
<td></td>
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<tr>
<td>Public sector finance</td>
<td>Utility subsidies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Have reforms affected subsidy payments to utilities?</td>
<td></td>
</tr>
<tr>
<td>Utility taxes/dividends</td>
<td>Have reforms led to changes in tax-take and dividend payment?</td>
<td></td>
</tr>
<tr>
<td>Privatisation receipts</td>
<td>Have receipts been used to release funds for increased expenditure on social programmes?</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 Research questions related to research theme.

**Research methods**

Case studies will attempt to cover all the research themes and questions outlined above. Further, each case study will begin with a review of the reforms that have been implemented and will identify the key features of these reforms (see Appendix B). This review will assist in selecting the research questions that warrant further or more in-depth investigation. Special emphasis will be 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 envisaged to investigate the questions are presented below. The third column provides guidelines on reporting format and content.
<table>
<thead>
<tr>
<th>Research questions</th>
<th>Research method</th>
<th>Reporting requirements and guidelines for case study research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theme: Access to electricity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1</strong> Do incumbents invest more in electrification during and after reforms?</td>
<td>Government and regulatory policy documents, legislation, regulatory framework (pre and during reforms)</td>
<td>Detailed description of pre-reform policy, regulatory, institutional and financing instruments (baseline information) (approx ½ page discussion). Documentary description of policy, regulatory, institutional and financing instruments pre- and during reforms (approx ½ page discussion). Presentation and discussion of time series and other investment data and information (from pre- and during reform periods), leading to an overall assessment of investment trends and progress made (approx ½ page discussion including data on % urban/rural electrification each year, % total electrification each year, US$ (2000) spent each year). Data and information source, and view on credibility thereof.</td>
</tr>
<tr>
<td><strong>2</strong> What are the factors that are likely to drive investment decision-making during and after reforms?</td>
<td>Interviews with utility executives, government officials and regulatory authorities</td>
<td>Assessed view on drivers for investment pre- and during reforms (approx ½ page discussion with drivers at different levels (financial, policy, institutional etc.). Assessment on why reforms do or do not impact on utility electrification investment (approx ½ page discussion). Information and data source, and view on credibility thereof.</td>
</tr>
<tr>
<td><strong>3</strong> Do new agents emerge that invest in access to electricity?</td>
<td>Overview of new energy businesses Investment data Interviews with Govt officials &amp; relevant associations</td>
<td>Description of new businesses, or discussion on reasons for lack of new businesses (approx ½ page discussion) Naming of information/data sources</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>4</th>
<th>To what extent do these new agents engage in energy services to the poor?</th>
<th>Interviews with executives of relevant businesses</th>
<th>Data on new access investments (progress and future potential) (US$ (2000) per connection, total US$ (2000) invested per year) Description of barriers inhibiting investment, or success factors (approx. ¼ page discussion, with possible box text with examples) Assessment of new energy businesses' potential to increase electricity access for the poor (approx. ¼ page discussion) Discussion on why/how new businesses are able to emerge (approx. ¼ page discussion, with examples) Information and data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>What mechanisms, if any, are in place to enable new agents in the market?</td>
<td>Government policy documents, regulatory framework Interviews with executives of relevant businesses, regulatory authority</td>
<td>Detailed description of pre-reform and reform-introduced policy, regulatory, institutional and financing mechanisms (approx. ¼ page discussion). Information sources</td>
</tr>
<tr>
<td>6</td>
<td>Do reforms include the establishment of any special “access” mechanisms?</td>
<td>Interviews with responsible officials</td>
<td>Detailed description of policy, regulatory, institutional and financing mechanisms brought about by the reform process (approx. ½ page discussion) Discussion on barriers (at different levels) and future prospects (approx. ¼ page discussion, with examples where relevant) Information and data sources</td>
</tr>
<tr>
<td>7</td>
<td>How effective are these mechanisms proving?</td>
<td>Collection of financial data Interviews with utility executives</td>
<td>Data on actual investments in new access initiatives (versus planned/expected investments) (discussion/table including US$ (2000) investment per year, rural, urban and total, % new electrification investment) Assessment of new energy businesses' potential to increase electricity access for the poor (approx. ½ page discussion) Data and information sources</td>
</tr>
<tr>
<td><strong>Theme: Price of electricity supply</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>8a</td>
<td>What happens to costs of supply during and after power sector reforms?</td>
<td>Collection of price data (pre-reform onwards) Interviews with regulatory authorities and utility executives</td>
<td>Presentation of relevant price data, including assumptions behind data generation ($/kWh, $/kW, and other assumptions) Analysis of price data, leading to an overall assessment of impact (approx. ¼ page discussion) Information and data sources, and view on credibility thereof</td>
</tr>
<tr>
<td>8b</td>
<td>What happens to tariff structures and moves to cost reflectivity?</td>
<td>Presentation of pre-reform and onwards tariff structures <em>(table format and short discussion)</em>. Commentary on extent of, and plans for, cost reflectivity and illustration of impacts/implications of moving towards cost reflectivity <em>(approx. ¼ page discussion, including discussion on % deviation if possible)</em>. Information sources</td>
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<tr>
<td>8c</td>
<td>Are new targeted, transparent subsidies put in place by reforms?</td>
<td>Commentary on debates and outcomes around subsidies in general and in particular, subsidies for the poor <em>(approx. ¼ page discussion, including extent/nature of subsidies, level of social tariff kWh)</em>. Information sources</td>
<td></td>
</tr>
<tr>
<td>8d</td>
<td>What price changes have resulted from power sector reforms?</td>
<td>Presentation of price change trends <em>(table format, $/kWh, % change)</em>. Commentary on prices before and during reforms, as well as anticipated post-reform price trends <em>(short discussion)</em>. Commentary on extent to which prices changes can be linked to power sector reforms <em>(short discussion, showing strong/weak linkages)</em>. Information sources</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>How have these changes impacted on household expenditure?</td>
<td>Description of household expenditure impacts (for example, relative estimation of expenditure in fulfillment of household needs pre- and during reforms). Broad estimation of price elasticity of household demand for electricity versus other expenditure items <em>(high, low price elasticity of demand)</em>. Discussion (anecdotal) of reasons for given impact on household expenditure levels <em>(approx. 2 page discussion, with possible box text for detailed case study material)</em>. Information sources and research/interview methodology</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>How have price changes affected fuel choice and strategies?</td>
<td>Description of fuel use choices and strategies pre- and during reforms. Anecdotal understanding of impact on fuel choices <em>(approx. 1 page discussion, with possible box text for detailed case study material)</em>. Information sources and research methodology</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>How do these choices influence household welfare?</td>
<td>Description of influence on household's general state of well-being (approx. ½ page discussion, using indicators such as income, environmental impact, health, education)</td>
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<td>----</td>
<td>--------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>A</td>
<td><strong>Theme: Quality of supply and customer services</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Has quality of supply to households changed?</td>
<td>Anecdote-based description of supply reliability and customer services pre- and during reforms (approx. ¼ page discussion, using indicators such as number of power cuts, level of customer services etc., with possible box text for detailed case study material). Information sources</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>How have these quality of supply changes impacted on fuel use &amp; expenditure?</td>
<td>Anecdote-based description of impacts of above changes on fuel use &amp; expenditure (approx. ¼ page discussion, with possible box text for detailed case study material) Information sources</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Has quality of supply to businesses changed?</td>
<td>Commentary on reliability of supply, and customer services to small business before and during reforms (approx ½ page discussion including information on N0 hours power cuts per month, nature of interface between utility and customer, services offered etc.)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>How have these changes impacted on fuel use &amp; small business expenditure?</td>
<td>Anecdote-based description of fuel use choices and expenditure patterns of a range of small business (rural and urban) pre- and during electricity reforms (approx ½ page discussion, with possible box text for detailed case study material) Information sources</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Do utility systems fit poor households income patterns and other needs?</td>
<td>Detailed description of pre- and during reform utility systems and services for poor electricity customers (approx. ½ page discussion, using indicators such as (marketing, applications, connection and re-connection fees, billing, complaints, additional services etc.) Assessment of effectiveness of utility systems for the poor (short discussion) Information sources</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Theme: Improved secondary services</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 17 | Have reforms improved access of health/education facilities to electricity? | Description of electricity access programmes to schools and clinics before and during reforms \( (approx \quad \frac{1}{4} \text{page discussion}) \)  
Presentation of new plans to increase the electricity access of schools and clinics  
Schools and clinics electrification investment and time series data pre-reform and thereafter \( (\text{table format. } N^\circ \text{ of new urban/rural/total connections, } \% \text{ urban/rural/total electrified, } US\$ (2000) \text{ invested each year}) \)  
Analysis of data leading to an assessment of overall impact \( (\text{short discussion}) \)  
View on whether reforms can justifiably be linked to aforementioned access impacts \( (\text{short discussion}) \)  
Sources of data/information, and assessment of credibility thereof \( (\text{short discussion}) \) | Interviews with officials at health and educational departments  
Visits to selected health & education facilities to interview staff  
Interviews with electric utility staff  
Collection of relevant investment and time-series data | |
| 18 | Have reforms improved quality of supply to health/education facilities? | Description of supply reliability, customer services to schools and clinics \( (approx. \quad \frac{1}{4} \text{page discussion including } N^\circ \text{ of supply interruptions per month, nature of interface with utility, change in utility services and approach}) \) | Customer focus groups | |
| 19 | How have these changes impacted on health/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 \( (approx. \quad \frac{1}{2} \text{page short discussion, with possible box text on detailed case study material}) \).  
Sources of information, location based | | |
| 20 | To what extent has extension of telecomms services depended on power? | Description of structure/dynamics of telecomms services \( (approx. \quad \frac{1}{4} \text{page discussion}) \)  
Discussion on linkages between telecomms services to poor people and the electricity industry (urban and rural) \( (approx. \quad \frac{1}{4} \text{page discussion}) \)  
Information sources, location based | Interviews with telecomms personnel.  
Interviews with electricity utility staff, and energy company personnel, where relevant | |
| 21 | How have reforms impacted on the ability to extend telecomms services? | Assessment, through specific examples of impact of reforms on telecomms services for the poor \( (approx. \quad \frac{1}{2} \text{page discussion, with possible box text for detailed examples}) \).  
Information sources, location based | Customer focus groups | |

**Theme: Economic development**
<p>| 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/proprietors of businesses Collection of relevant price data | Presentation of pre- and during reform tariffs/special packages for small business, leading to a general assessment of reform impact on small business (table format for data, approx 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 (approx ¼ page discussion). Information and data sources |
| 23 | How has this influenced employment &amp; expansion? | Discussion, through specific examples, of impacts of changing energy costs/subsidies on employment and opportunities for business growth (approx 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 programmes expanded electricity access of small business? | Discussion, through specific examples and experiences, on whether general or small business targeted electrification programmes 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 programmes have expanded electricity access for small businesses (approx 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 on whether businesses are able to take reform opportunities/benefits up (approx ½ discussion, including barriers and success factors). Discussion on small business’ perception of the appropriateness of electric utility solutions for small businesses (approx ¼ page discussion). Discussion, through specific examples, on whether reform time electrification programmes and changing energy costs have contributed to business expansion and employment of existing small businesses and establishment of new small business? (approx 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 co-ordinated with other infrastructure? | Discussion, through specific examples, on the linkages, pre- and during reform, of electricity and other service delivery and infrastructure development (approx ¼ page discussion with possible box text for detailed examples). Information sources |
| 27 | Have these practices led to clusters of economic activity emerging? | Overview of infrastructure developments Interviews with business managers in utility companies Presentation of pre-reform and reform time economic activity, as well as prospects for local economic development and activity (approx ½ page discussion) Presentation of specific examples/case studies which 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 (approx ½ pages 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. |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Methodology</th>
<th>Research Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have utility investment levels increased?</td>
<td>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.</td>
<td>28</td>
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<tr>
<td>Has utility outsourcing stimulated small business development?</td>
<td>Collection of investment data Interview with utility managers Interviews at sub-contracted forms Discussion, through specific examples on nature, type and extent of utility-outsourced services pre- and during reforms as well as future outlook, barriers and/or best practices for outsourcing (approx. ½ page discussion with examples). View on which income/market sector benefits from utility outsourcing, including an assessment of extent to which outsourcing affects on poor and or disadvantaged individuals/communities/enterprises (short discussion). Information and data sources.</td>
<td>29</td>
</tr>
<tr>
<td>Have reforms affected subsidy payments to utilities?</td>
<td>Collection of financial data from utilities Government policy documents, and regulatory frameworks Presentation of pre-reform and reform time financial and economic data with discussion of analysis thereof (approx. ½ page discussion with data and information on policy choices). Information and data sources.</td>
<td>30</td>
</tr>
<tr>
<td>Have reforms led to changes in tax-take and dividend payments?</td>
<td>Presentation of pre-reform and reform time relevant financial data with analysis thereof (short discussion with table format for data). Discussion of impact on access programmes if changes have occurred in this area (approx. ¼ page discussion). Information and data sources.</td>
<td>31</td>
</tr>
<tr>
<td>Have receipts been used to release funds for increased expenditure on social programmes?</td>
<td>Analysis of changes in public accounts arising from privatization programmes? Interviews with government officials (treasury departments) Discussion on whether privatization initiatives have resulted in increased spending on other social programmes (approx. ½ page discussion, with possible box text presenting detailed examples). Information and data sources.</td>
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</table>

Table 5 Research methods related to each research question

Please note:
- Column 3 gives some expectation of the types of answers required of case study partners. Case study partners are however requested to respond to these research questions in a manner, which is relevant to case study material. In other words, case study partners should answer all questions, but lay emphasis on those more relevant than others.
• It is the general expectation of this research that case study partners substantiate all responses given to research questions. In some cases this will be possible through the collection of published data. In other cases, this will come from interviews with relevant roleplayers in the electricity industry.

• It is also the project management’s expectations that the reports that are received from case study authors are standalone or self contained documents in the sense that they do not just seek to routinely answer research questions as specified, but provide publishable, well structured and logically ordered material.

• Where it is suggested in column 3 that box text is possibly given, the intention is to create opportunity for the case study partners to provide detailed materials on specific and relevant issues. We regard this as being an important aspect of this research. We anticipate that this approach will go someway towards avoiding the dangers of making generalizations that are not always applicable.

• Finally, it is important that case study partners seek to understand the impacts of reforms according to the specific reform initiative (i.e. commercialization, corporatisation, 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).