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Energy Access theme results

Energy services for the poor in Eastern Africa

Sub regional technical report by AFREPREN/FWD, Kenya

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Energy Services for the Poor in Eastern Africa
Sub-Regional "Energy Access" Study of East Africa

Prepared for

"Energy Access" Working Group

Global Network on Energy for Sustainable Development

by

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Executive Summary

About 2.8 billion people or close to the half the world's population is estimated to survive on less than US$ 2 per day – the "poor" as defined by international agencies such as the IEA, World Bank, UNDP, UNEP and OECD. A key distinguishing feature of the world's poor is inadequate access to cleaner energy services. The majority of those earning less than US$ 2 per day rely on traditional biofuels to meet the bulk of their energy needs and have no access to electricity. Traditional biofuels meet the bulk of the energy needs of an estimated 2.4 billion people. Some 1.6 billion people have no access to electricity and a significant portion have limited or no access to cleaner and more modern fuels such as kerosene, LPG and natural gas.

This paper is part of a wider global study carried out under the auspices of the Global Network on Energy for Sustainable Development's "Energy Access" Working Group whose primary objective is to examine the impact of power sector reforms on the poor. It is the 3rd draft and final report for the East African sub-regional study focusing on Kenya and Uganda.

Poverty levels in the East African sub-region are very high, particularly in the rural areas. For instance, in Kenya, virtually the entire (100%)[1] rural population falls under the US$ 2 per capita per day. In urban areas (using the US$ 2 figure) about 80% of the population is poor. When the US$ 1 measure is used, the proportion of the poor remains significantly high at 80% in rural areas (World Bank, 2003) compared to only 40% for urban areas. It is for this reason that the rural population has been used as a proxy for the poor in this study.

After consideration of several reform options common to Kenya and Uganda, the amendment of the Electricity Act was selected as the most applicable option for assessment. The Electricity Act is a key reform measure as it sets out the structure and operations of the electricity sector as a whole. In addition, the Acts of both Kenya and Uganda provide some modalities, in some cases, to increase electricity access.

Only about 1% of the rural population in Kenya and Uganda have access to electricity – implying that very few of the poor are electrified. This proportion appears to have stagnated over the past 8 years. The two case studies on Kenya and Uganda demonstrate key shortfalls in the provision of electricity to the poor. First and foremost, the amended Electricity Acts of Kenya and Uganda do not sufficiently address the issue of the electrification of the poor. In both countries, reports from the utilities, Ministry of Energy and the regulatory agency make no attempt to track electrification of the poor. In Uganda, this is exacerbated by the fact that the distribution utility does not categorise its customers into rural and urban groupings. As shown in the following table, the poor are unlikely to be electrified in the foreseeable future if current trends continue:

Summary Data of the Case Studies

	KENYA						UGANDA					
	National		Urban		Rural		National		Urban		Rural	
Indicator	Pre-reform	Post-reform	Pre-reform	Post-reform	Pre-reform	Post-reform	Pre-reform	Post-reform	Pre-reform	Post-reform	Pre-reform	Post-reform
Electrification levels (%)	4.4	5.5	16.7	20.4	0.5	0.8	2.9	4.1	16.7	18.9	0.7	1.1
Electrification rates (%)	7.0	6.2	6.2	6.0	16.1	7.7	13.7	10.5	17.9	12.0	-3.3	5.4
Tariff/Cost of Electricity (USc/kWh)	4.1	7. 8	4.1	7.8	4.3	7.6	9.6	7.4	-	-	-	-
Per Household Consumption (kWh)	2,991	1,714	3,119	1,821	1,702	902	3,185	2,325	3,475	2,700	2,015	965
Per Capita Consumption (kWh/capita)	598	428	520	304	340	225	637	471	695	468	403	202

[1] Stated as 100%, as the few individuals with incomes higher than US$ 2/day constitute a tiny total that adds up to a fraction of a decimal point (effectively, a rounding error).

Notes: For Kenya, the pre-reform year considered is 1993 while the post-reform year is 2001. In the Ugandan case, the pre-reform year considered is 1996 while the post-reform year is 2002.

Sources: *Kinuthia, 2003; Okumu, 2003; Nyoike, 2002; Kyokutamba, 2002'; Engurait 2002*

Secondly, power sector reforms (in this case the amendment of the Electricity Act) show no discernable impact on the poor and, if any, it appears negative. Reforms have led to increased electricity tariffs and as a result have made electricity costly for the poor. In normal circumstances, subsidies should be provided to the poor to cushion them from the impacts of the high tariff increases triggered by reforms. However, available data on subsidies indicates that the non-poor are absorbing the bulk of the subsidies. This is well illustrated by Ugandan case whereby less than 7% of the subsidies reach the poor.

A comparison between the amended Electricity Acts of Kenya and Uganda indicates that the Ugandan one has more detailed provisions for increasing electricity access for the poor. However, none of the Acts provides new and innovative initiatives to ensure increased electrification of the poor through enhancing the autonomy of the rural electrification agencies and "ring-fencing" [2] the funds for financing electrification of the poor. Also, the Acts in their current form do not ensure the representation of the poor in the boards of rural electrification agencies.

The sequence of power sector reform measures in Kenya and Uganda appears to have been detrimental to the electrification of the poor, particularly in rural areas. In both countries, initiatives aimed at increasing rural electrification commenced at the end of the reform process. Other developing countries such as Thailand, Bangladesh and Philippines, initiated reforms well after establishing independent rural electrification agencies that ensured rapid rural electrification before the advent of market oriented sector reforms.

Reforms appear to have failed to link rural electrification to the overall objective of improving the performance of the power sector. For example, the issue of licenses and concessions is not explicitly linked to the ability of the licensee/concessionaire to increase electricity access of the poor. In addition, the newly unbundled (and privatised) distribution utilities do not appear to have rural electrification targets that are linked to future tariff adjustments.

Uganda's rural electrification target by the year 2012 is a paltry 10%. This is an extremely low target and unlikely to make a substantial difference. Data from other African countries (notably, Ghana, South Africa and Zimbabwe) demonstrate that for the same period of time (or even shorter), it is possible to achieve much higher levels of electrification.

The study tables the following recommendations to accelerate the poor's access to electricity services.

Firstly, there is the need to keep track of data on electrification of the poor. This is absolutely essential for monitoring rural electrification programmes. Utilities, Ministries of Energy and the regulatory agencies should develop databases that track the requisite electrification of (both urban and rural households categorised by income) and include the data in public domain annual reports.

Secondly, the newly established Rural Electrification Fund in Uganda as well as the proposed Rural Electrification Agency in Kenya should avoid the pitfalls of previous electrification initiatives that largely became an avenue for revenue collection for utilities with no clear link to expanded electrification of the poor. To avoid this shortfall, the autonomy of the bodies responsible for rural electrification – an important stipulation not provided for by the Electricity Acts – should be strengthened.

[2] The term "ring-fencing" refers to ensuring that funds are strictly accounted for and protected from any undue misallocation.

To ensure autonomy, the Act should be amended to ensure that the funds for financing the electrification of the poor are “ring fenced”. The Acts should also provide for the appointment of the institution’s governing board by Parliament which would strengthen the independence of the rural electrification agency. The boards of the rural electrification agencies should include representatives of the poor to ensure that their concerns are addressed.

The performance of the electrification agencies should be evaluated by the number of new connections, particularly in rural areas and among the urban poor. It should also set significantly higher rural electrification targets than the ones currently indicated. The targets should include explicit and ambitious stretch goals for the electrification of the poor.

Thirdly, it is recommended that other countries in the sub-region whose reforms are not at advanced stages (e.g Ethiopia and Tanzania) should ensure that they establish structures and mechanisms for increased rural electrification before embarking on large-scale market-oriented reforms such as privatization. Evidence from other developing countries indicates that high rural electrification levels have been achieved when rural electrification initiatives precede the privatization process.

Fourthly, reforms should adopt innovative approaches to promote increased electrification. One approach could be making electrification targets a pre-requisite for the purchase of attractive distribution rights. For example, the purchase of attractive city distribution rights can be linked to the mandatory electrification of low-income urban settlements as well as selected rural areas. This will ensure that private investors are simply not cherry-picking the most profitable portions of the electricity industry and leaving the unprofitable portion (e.g. rural electrification) to the state.

Another measure for ensuring that reforms support the electrification of the poor would be to ascertain that a significant proportion of the proceeds from license fees, concession fees and sale of utility assets directly contribute to the Rural Electrification Fund.

The study concludes by emphasising that the poor state of managerial and financial performance justified the reform of the power utilities in Kenya and Uganda. The reforms, in fact, led to better financial performance in the Ugandan utility and an improvement (albeit for a limited period) in the general technical performance in the Kenyan counterpart.

However, the reforms implemented appear not to have contributed to increasing the electricity access among the poor. If the current electrification trends remain unchanged, 99% of the current rural population are unlikely to be electrified in the foreseeable future. Only comprehensive transformation could change the situation and lead to greater electrification of the poor in Kenya and Uganda. Adoption of the above recommendations would be an important step in realizing this transformation.

List of Acronyms and Abbreviations

AFREPREN	African Energy Policy Research Network
EAPLC	East Africa Power and Light Company
ERB	Electricity Regulatory Board
GNESD	Global Network on Energy for Sustainable Development
GWh	Gigawatt hour
IEA	International Energy Agency
IPDs	Independent Power Distributors
IPPs	Independent Power Producers
KENGEN	Kenya Generating Company
KPC	Kenya Power Company
KPLC	Kenya Power and Lighting Company
KVDA	Kerio Valley Development Authority
KWh	Kilowatt hour
LPG	Liquid Petroleum Gas
LRMC	Long Run Marginal Cost
MERD	Ministry of Energy and Regional Development
MW	Megawatts
NER	National Electricity Regulator
OECD	Organization for Economic Co-Operation
PSRPS	Power Sector Restructuring and Privatization Strategy
PURC	Public Utilities Reform Commission
REA	Rural Electricity Agency
REF	Rural Electrification Fund
REFT	Rural Electrification Trust Fund
REP	Rural Electrification Program
TANESCO	Tanzania Electricity Supply Company
TARDA	Tana River Development Authority
TERI	The Energy and Resources Institute
TRDC	Tana River Development Company
UEB	Uganda Electricity Board
UEDCL	Uganda Electricity Distribution Company Limited
UEGCL	Uganda Electricity Generation Company Limited
UETCL	Uganda Electricity Transmission Company Limited
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WMS	Welfare Monitoring Survey
WG	Working Group

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1.0 BACKGROUND ON ENERGY SERVICES FOR THE POOR IN EAST AFRICA

1.1 International Setting

About 2.8 billion people or close to half of the world's population is estimated to survive on less than US$ 2 per day[3] – the "poor" as defined by international agencies such as the IEA, World Bank, UNDP, UNEP and OECD. A key distinguishing feature of the world's poor is inadequate access to cleaner energy sources. The majority of those earning less than US$ 2 per day rely on traditional biofuels to meet the bulk of their energy needs and have no access to electricity. Traditional biofuels meet the bulk of the energy needs of an estimated 2.4 billion people. Some 1.6 billion people have no access to electricity and a significant portion have limited or no access to cleaner and more modern fuels such as kerosene, LPG and natural gas.

The poor in developing countries face, inter alia, three key energy challenges:
- Reliance on biofuels that harm human health and the environment.
- Inadequate access to cleaner energy services, such as electricity, for productive purposes and institutional applications.
- Incomes that are too low (as well as limited access to appropriate financing schemes) to allow the poor to procure cleaner and more sustainable energy services, such as electricity, that are more expensive[4].

In the last two decades, developing countries have implemented a wide range of energy sector reform initiatives, which were expected to, inter alia, address some of the above concerns. Initial indications from a wide range of developing countries, however, seem to indicate that few of these reform initiatives have resulted in significant improvement in the provision of cleaner energy services to the world's poor.

What is particularly worrisome about the above challenges is the stagnation in the quality and reliability of energy services available to the poor in spite of numerous energy reform initiatives. This is particularly true of sub-Saharan Africa (and parts of Latin America & the Caribbean, Middle East and South Asia) where reliance on traditional biofuels is increasing and the proportion[5] of the people with no access to electricity continues to grow.

Some critics of energy sector reforms contend that far from reducing energy poverty, reforms (especially market oriented reforms) have contributed to the growing problem of energy poverty in many parts of the developing world. These experts argue that from the onset, energy reforms were not designed to address the energy problems of the poor but were explicitly aimed at improving efficiency, facilitating divestiture and guaranteeing future energy supply in an open globalized energy market (Wamukonya, 2003; Byrne & Mun, 2003; Fall & Wamukonya, 2003; Agbemabiese, Byrne & Bouille, 2003; Lash, 2002; Bouille, Dubrovsky & Maurer, 2002; Dubash & Rajan, 2002; Edjekumhene & Dubash, 2002).

[3] For some countries, US$ 2 per day may represent a relatively high income. For example, in Argentina, a family that currently receives US$ 240 per month (based on 4 persons each receiving US$ 2/day) is not a poor family (Bouille, 2002). This is also true of many sub-Saharan African countries where well over 90% of the population survive on less than US$ 2/day.

[4] Up-front costs of associated devices and appliances for cleaner and renewable energy options are often prohibitive for the poor.

[5] In other words, although the absolute number of people with electricity is increasing, the rate of electrification is outpaced by population growth (Radka, 2002). This is particularly true of many countries in sub-Saharan Africa where electrification rates are well below population growth rates.

1.2 Objectives of the "Energy Access" Study

The primary objective of the GNESD Working Group (WG)[6] on " Energy Access" is to examine the above issue by responding to the following two key questions:

- Have previous energy policy reforms addressed the "energy access" challenge facing the poor or have the reforms actually contributed to the growing problem of inadequate energy services for the poor in the developing world?

- Based on rigorous analysis, which are the proven and robust policy options that would lead to improved, cleaner and more sustainable energy services for the poor in developing countries?

This study on the East African region is part of a larger, world wide study on "Energy Access" organised by the Global Network on Energy for Sustainable Development (GNESD). The initial 3-month work plan of the "Energy Access" WG planned to respond to the above two key questions through the following common tasks:

- *Status*: Energy services and technologies that are currently available to the poor.
- *Energy services and technologies appropriate for the poor:* Initial identification of appropriate energy sources, services and technologies that respond to the needs of the poor and/or contribute to poverty alleviation and sustainable development.
- *Recent and planned energy policy reforms*: Quick review of past, current and planned energy policy reforms (in the power, petroleum and gas sub-sectors) and anecdotal assessment of the impact (or envisaged impact) on the poor.
- *Draft policy options*: Propose initial set of draft policy options for improving the poor's access to cleaner energy services.

On closer examination of the afore-listed tasks, the WG realized that the assignment was too broad and could result in disparate set of studies that would be difficult to compare. A very broad assignment would also pose an onerous challenge of extracting common findings and recommendations. For example, poverty issues in the power sector present very different challenges to poverty concerns in the petroleum and gas sub-sectors. Similarly, the non-commercial energy sector presents yet another set of completely different challenges.

Consequently, the initial set of sub-regional studies was limited to examining the impact of power sector reforms on the poor.

1.3 Status of the Electricity Industry in Eastern Africa[7]

The main country foci of this Eastern Africa sub-regional report are Kenya and Uganda. Before delving into the case studies in detail, the following section provides a broad overview of the Eastern African power sector.

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[6] The Centers involved in the "Energy Access" Working Group (WG) and their respective regional coverage are listed below:

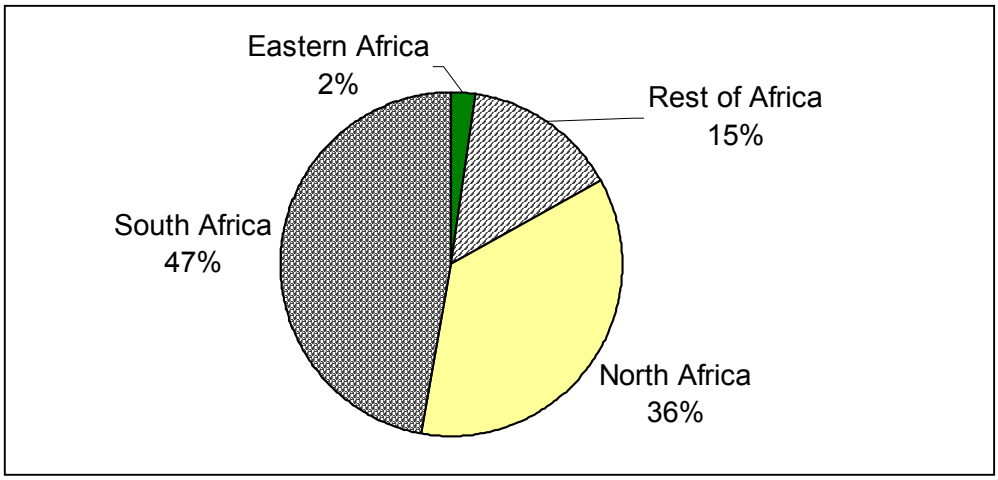
- African Energy Policy Research Network (AFREPREN/FWD) – East Africa
- Asia Institute of Technology (AIT) – South and South East Asia
- Energy and Development Research Center (EDRC) now Energy Research Centre (ERC) – Southern Africa
- Energy Research Institute (ERI) – China
- Environnement et Developpement du Tiers Monde (ENDA-TM) – West Africa
- Federal University of Rio de Janeiro (COPPE/UFRJ) – Brazil
- Fundacion Bariloche – Latin America and the Caribbean
- The Energy and Resources Institute (TERI) – South and South East Asia
- Energy Research Institute (ERI - China) – China

The "Energy Access" WG Centres are assisted by an interim-Secretariat (GNESD Secretariat) provisionally located at the UNEP Collaborating Centre on Energy and Environment in Riso, Denmark

[7] In this report, the term eastern Africa as used in this paper refers to Ethiopia, Kenya, Uganda, Mauritius and Tanzania. East Africa refers to Kenya and Uganda.

The supply segment of the electricity industry in eastern Africa is relatively small compared to other regions of the African continent. eastern Africa contributes to only 2% of the total installed capacity in the continent. By comparison, North and South Africa contribute 83% of the total installed capacity in the continent, while the rest of the countries account for 15%, as demonstrated in the following chart:

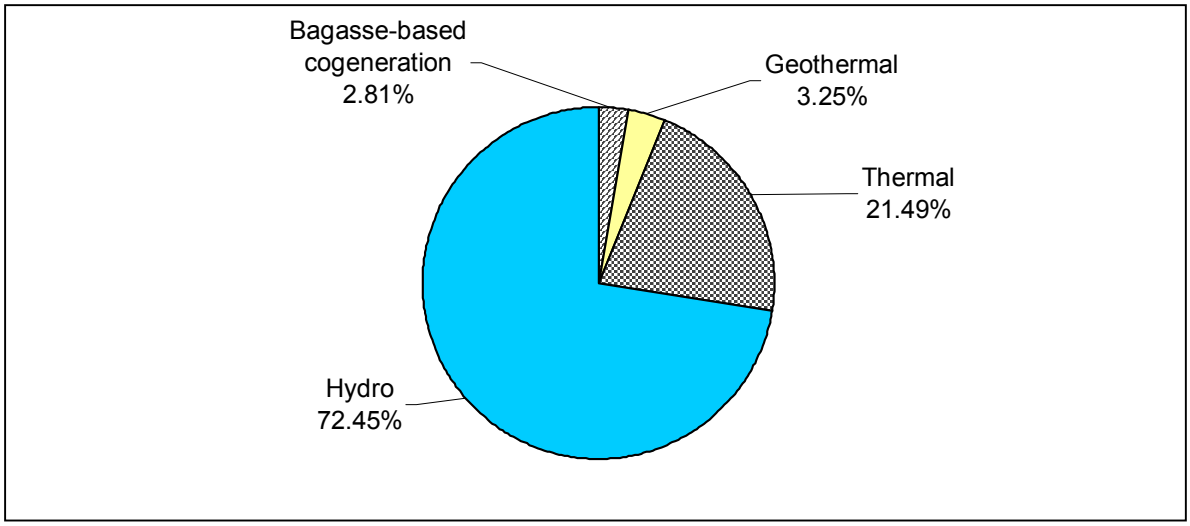
Figure 1 Share of Installed Capacity in Africa (2000).



Sources: World Bank 2003, IEA 2002.

Electricity production in eastern Africa[8] is heavily dependent on hydro, with close to 73% of the production coming from large and small hydro generating units (Figure 2). The balance is shared between thermal generating units, geothermal and bagasse based cogeneration. Co-generation capacity is mainly found in Mauritius. Geothermal energy is in its initial stages of exploitation, with only Kenya and Ethiopia having attempted to use it for electricity generation.

Figure 2 Electricity Production in Eastern Africa (2000)



Sources: Karekezi et al (eds), 2002b, AFREPREN, 2002, IEA, 2002

Electricity demand and consumption in the eastern Africa sub-region also appears to be comparatively low. A comparison with other low and middle-income regions of the world shows that the eastern African region has considerably lower levels of electricity consumption per capita (table 1):

[8] The term eastern Africa as used in this paper refers to Ethiopia, Kenya, Uganda, Mauritius and Tanzania. East Africa, in the context of this report, refers to Kenya and Uganda.

Table 1 Electricity Consumption per capita for Selected Developing Regions of the World

Region	Annual Electricity Consumption per capita (kWh) – 2000
Latin America and the Caribbean	1,528
East Asia and the Pacific	760
South Asia	323
Sub-Saharan Africa[9]	432
Eastern Africa	60

Sources: World Bank 2003, AFREPREN 2002, UEB 1999, and UNDP 2002.

Until recently, the electricity industry in eastern Africa was characterized by a monopoly structure, dominated by vertically integrated, state-owned power utilities. This is true for almost all countries, with the exception of Uganda and Kenya, which have recently unbundled their power utilities. This monopoly structure, is thought to be a large contributor to the under performance of the region's power utilities. With the exception of Mauritius, power sector institutions are mainly characterized by unreliability of power supply, low capacity utilization and availability factor, deficient maintenance, poor procurement of spare parts, and high transmission and distribution losses.

Secure and low cost supply of electricity is crucial for economic growth and social progress. However, provision of electricity in Eastern Africa, is largely confined to high and middle income groups in urban areas, as well as the formal commercial and industrial sectors. With the exception of Mauritius, the poor, who are the majority and live mostly in rural areas, have limited access to electricity.

Household electrification is low especially in rural areas, where the majority of the population resides. In eastern Africa, low electrification levels are also prevalent in urban areas. Again, with the exception of Mauritius, all eastern African countries record national electrification levels of 10% or less (table 2). This is very low when compared to other developing regions such as Asia and Latin America, where many countries record an electrification level as high as 70% (Shrestha and Kumar, 2003).

Table 2 Electrification Levels in Eastern Africa

Country	National Electrification levels (%) - 2001
Ethiopia	2
Uganda	4
Kenya	6**
Tanzania	10*
Mauritius	100

* 2002 data

** This figure only refers to the proportion of households connected to the electricity grid and may differ significantly from other sources which indicate the proportion of electrified population derived from the total number of grid electricity customers.

Sources: AFREPREN, 2002, Karekezi et al (eds), 2002b; Republic of Kenya, 2002; Okumu, 2003; Kinuthia, 2003

Mauritius uniquely high electrification levels are as a result of its early start and political commitment to rural electrification. In 1961, following a major cyclone that severely damaged the system, the Government obtained a US$ 7 million loan from the World Bank. Among other uses of loan, was an intensive electrification of villages throughout the island (Veragoo, 2003). This effort continued progressively over the years and 40 years later the entire population has

[9] The figure for sub-Saharan Africa appears to be high because it includes South Africa which, if excluded, would reduce this figure by half.

access to electricity. It is notable that it is only now after achieving 100% electrification coverage is Mauritius embarking on deeper market oriented power sector reform.

Financial performance of East African utilities is equally unsatisfactory. Development and expansion of the sector has been hampered by an inability to mobilize sufficient investment capital. With the exception of Mauritius, most public utilities have been unable to collect revenues from customers in a timely fashion, which has contributed to poor financial performance.

The need to address this poor performance of utilities has been a key driver for the far-reaching structural, legal and regulatory reforms that are being implemented in the power sector of eastern Africa sub-region. The next chapter discusses the status and trend of power sector reforms in the sub-region.

1.4 Status Of Power Sector Reforms In Eastern Africa

Compared to the other regions of the world, eastern Africa's power sector reform has been slow. With the exception of Ethiopia, the key reform measure implemented by most countries was facilitating the entry of independent power producers (IPPs) primarily to meet shortfalls in electricity generation. In addition, the majority of the countries have corporatised/commercialised their power utilities. Limited progress has been realised with respect to unbundling of vertically integrated state utilities and the establishment of independent regulatory agencies.

In overall terms, Uganda and Kenya appear to have effected the most far-reaching changes. The two countries have implemented a large number of reform measures apart from fully privatising the generation and distribution segments (table 3).

Table 3 Status of Power Sector Reforms in Eastern African Countries (2003)

Reform Measures	Mauritius	Ethiopia	Tanzania	Kenya	Uganda
Amendment of the Electricity Act		Y		Y	Y
Corporatisation/Commercialisation		Y	Y	Y	Y
Establishment of Independent Regulator				Y	Y
Restructuring (unbundling)				Y	Y
Independent Power Producers	Y		Y	Y	Y
Privatisation of Generation					Y*
Privatisation of Distribution					?

Notes:
* Concession awarded to Eskom in 2002
? As of 2003, concession agreement yet to be concluded following disagreement over concession terms between Government and proposed concessionaire (Mugarura, 2003)

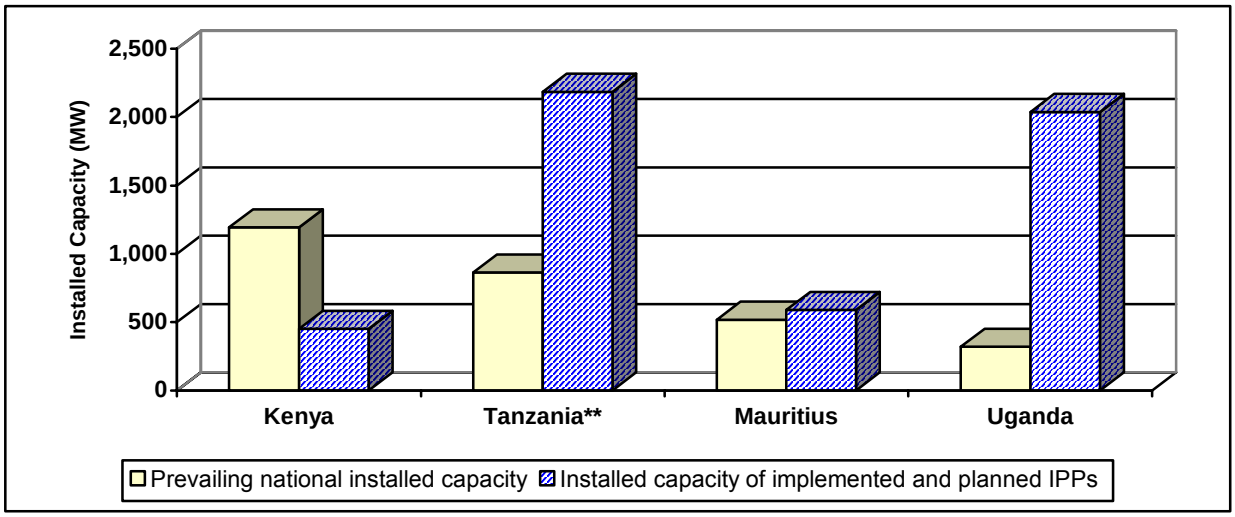
Source: Compiled by authors

Power sector reforms involving corporatisation/commercialisation of the power utilities have significantly improved the financial performance of the state-owned utilities. The introduction of new management teams has also improved the financial performance of utilities. For example, in Uganda, the former Uganda Electricity Board had for a long time made huge losses. However, a change in management led to a UShs. 4 billion[10] profit and an increase of 20% in debt collection (Bidasala, 2001) in under two years. Last year, citing the Ugandan success, the

[10] Exchange rate (2001): US$ 1 = Ushs. 1,757

Tanzanian Government hired a private company, Netgroup Ltd., to manage TANESCO[11] (the national utility in Tanzania), on a contract management basis.
Perhaps the most significant impact of power sector reform in the region is the increased involvement of IPPs. With the exception of Kenya, the capacity of IPPs (both implemented and proposed) in eastern Africa is greater than the prevailing national installed capacity (figure 3).

Figure 3 "Prevailing National Installed" Capacity Compared to IPPs for Eastern African Countries (2002)*



* There has been no IPP development in Ethiopia to date.
** Year 2001 data

Sources: Adapted from Karekezi et al (eds), 2002b; Okumu, 2003; Kinuthia, 2003; Veragoo, 2003

Many of the IPPs came into operation very recently. However, most of the IPPs are predominantly fossil fuel-based, with the exception of Mauritius, where all the IPPs include a renewable energy component (i.e. bagasse-based cogeneration) and Kenya and Uganda which have recently encouraged geothermal-based and hydro-based IPP developments, respectively.

With regard to reforming the legal and regulatory framework, only two countries - Uganda and Kenya, have established independent regulatory agencies. However, in 2001, Tanzania passed an Act of Parliament for the establishment of the Electricity and Water Utilities Regulatory Authority, which is yet to be constituted. Ethiopia established the Electricity Agency in 1997. However, unlike the Ugandan and Kenyan regulatory agencies that could be considered "independent" the Electricity Agency in Ethiopia was designed to work closely with its parent ministry, the then Ministry of Mines and Energy (Teferra, 2002).

1.5 Electricity Services for the Poor in Eastern Africa

Having provided an overview of the eastern African region, the following section sets the stage for a more detailed assessment of the two case studies of Kenya and Uganda. This section provides a snapshot of the status of electricity consumption and access in Kenya and Uganda.

Most low-income households in eastern Africa have limited access to affordable and reliable electricity services. Recent AFREPREN studies[12] indicate that the average level of access to electricity for low-income households is far below desired levels (Kyokutamba, 2003a). Consequently, low-income households tend to use other non-commercial forms of energy such

[11] TANESCO - Tanzania Electricity Supply Company
[12] The studies were carried out under the aegis of AFREPREN's Energy Services for the Urban Poor theme group

as biomass (particularly charcoal in urban areas) and kerosene, which collectively account for 90% of the energy supply of the vast majority of eastern African households.

As shown earlier (table 1), electricity consumption in the eastern Africa sub-region is low compared to other developing regions of the world. The low electricity consumption is demonstrated by the very high consumption of traditional fuels - an indication of limited use of modern energy forms. As shown in the following table (table 4), modern energy consumption in the two East African[13] countries, Kenya and Uganda, is less than 10% of that of South Africa.

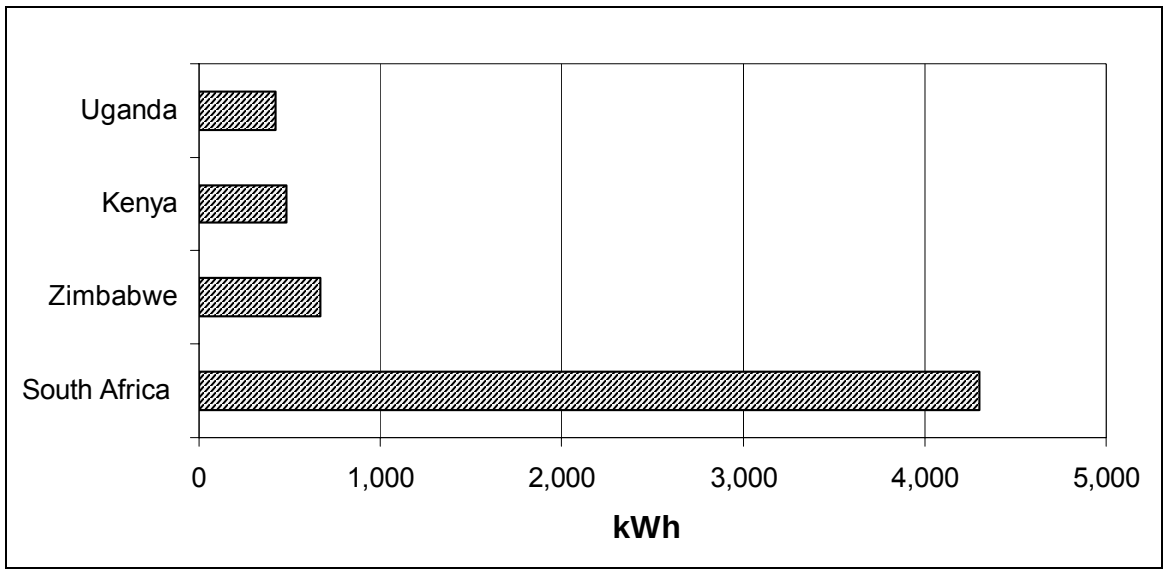
Table 4 Modern Energy Consumption per capita (kgoe)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
South Africa	1,094	1,107	1,114	1,185	1,150	1,285	1,166	1,108	1,090	1,091
Kenya	88.4	86.7	88.9	88.8	91.6	86.5	84.0	79.6	79.4	78.8
Uganda	24.0	23.0	23.0	15.5	16.2	19.0	19.5	19.9	19.8	23.7

Source: AFREPREN, 2002 ; IEA,2003 ; EIU, 1995-2003

Electricity consumption for both Kenya and Uganda, shown below (figure 4), also demonstrates extremely low consumption levels compared to South Africa and Zimbabwe:

Figure 4 Electricity Consumption per capita (kWh)[14] – Uganda, Kenya, Zimbabwe and South Africa (1999)



Sources: AFREPREN 2002, Karekezi et al (eds) 2002a ; Kinuthia, 2003

The two East African countries have remarkably fewer households connected to electricity than Zimbabwe and South Africa. The difference is particularly marked in the rural areas (table 5).

Table 5 Percentage of Households connected

	National	Urban	Rural
South Africa (2002)	68.00	80.00	50.00
Zimbabwe (1999)	39.00	80.00	18.00
Kenya (2002)	6.12	22.68	0.94
Uganda (2002)	4.10	18.90	1.10

[13] East Africa is used to refer to the region encompassing Kenya, Uganda and Tanzania from which the two country case studies (Kenya and Uganda) are drawn

[14] Electricity consumption per capita provided in this graph is derived from the division of total electricity consumption divided by the population. Otherwise, elsewhere in this report, per capita electricity consumption is derived from the electrified population only.

Sources: NER 2003, AFREPREN 2002, Karekezi et al (eds) 2002b ; Kinuthia, 2003 ; Okumu, 2003 ; Kayo, 2003 ; Dube, 2002

The low electrification levels in Uganda and Kenya seem to be due to stagnation in household connections. For example, in Kenya, an analysis of an 11-year period between 1991 and 2002 shows that electrification nationwide only increased by approximately 2 percentage points (table 6):

Table 6 Percentage of Households connected to electricity in Kenya

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
National	4.1	4.2	4.4	4.5	4.6	4.8	4.9	5.0	5.1	5.4	5.5	6.1
Urban	15.9	16.3	16.7	17.0	17.3	18.1	18.2	18.7	19.1	20.0	20.4	22.7
Rural	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9

Sources: Calculations based on data from World Bank 2001, KPLC 1992, 1997, 2001/2002; Kinuthia, 2003

Similarly, in Uganda, the stagnation in connections resulted to a dismal improvement of less than 1 percentage point over a 9-year period (table 7).

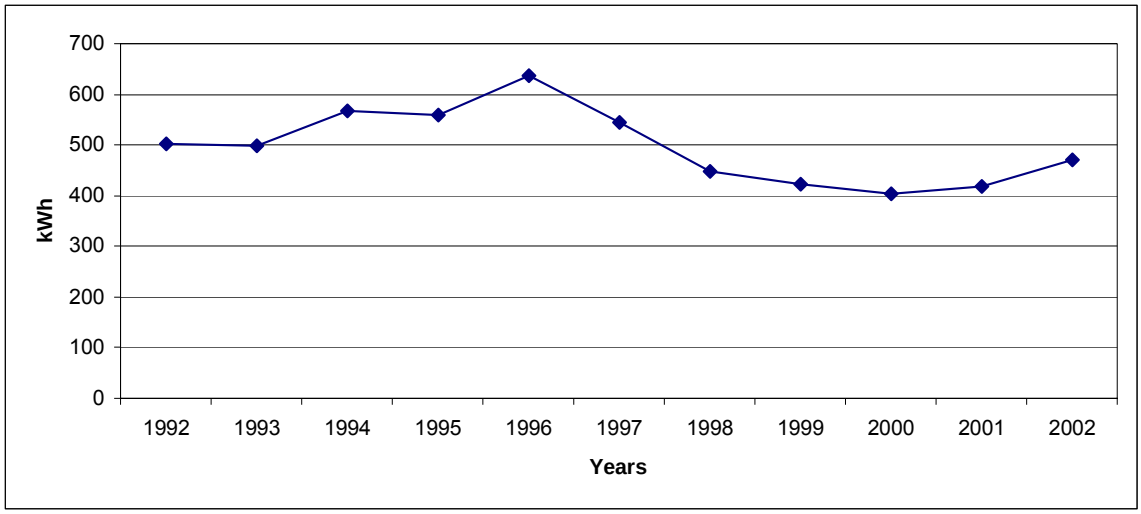
Table 7 Percentage of Households connected to electricity in Uganda

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
National	2.8	3.0	3.0	2.7	2.5	2.9	3.1	3.4	3.4	3.5	3.8	4.1
Urban	18.1	19.1	18.5	15.6	15.2	16.7	17.6	18.7	17.8	16.0	17.0	18.9
Rural	0.8	0.8	0.8	0.8	0.5	0.7	0.6	0.7	0.7	0.8	1.1	1.1

Sources: Calculations based on data from World Bank 1994, 1998/1999, 2002, 2003, Engurait 2001, Okumu, 2003.

Tables 5, 6 and 7 demonstrate that there has been no significant improvement in the percentage of households connected. In addition, as shown for Uganda in the following chart (figure 5), electricity consumption per capita has remained largely unchanged for the last seven years.

Figure 5 Electricity Consumption per capita in Uganda



Source: Okumu, 2003; World Bank, 2003; Kyokutamba 2003b

Data on electricity consumption in Kenya as a proportion of total fuel use further underlies the almost total absence of electricity use in most rural households. According to the World Bank (World Bank, 2003), electricity consumption contributes a meagre 1 % to total fuel use nationwide in Kenya. This translates to a figure of 3% in urban areas, and a nearly negligible figure of less than 1% in rural areas.

Further analysis of poverty data in Kenya shows that poor people use very little electricity for cooking and lighting. Table 8 presents the proportion of poor and non-poor households who use electricity for cooking and lighting. Both poor and non-poor households spend less than US$ 2 a month on electricity for cooking and lighting. This translates to a daily per capita expenditure on electricity of US$ 0.01[15] or USc 1, a very low figure indeed.

Table 8 Electricity Use among households in Kenya (1997)[16]

	Poor	Non-poor
Percentage using electricity as the main source of cooking fuel	0.2	1.1
Percentage using electricity as the main source of lighting	4.4	14.0
Mean monthly expenditure on electricity for cooking and lighting (US$)	0.06	1.55

Source: Republic of Kenya 2000; Kinuthia, 2003

The Ugandan energy sector is characterised by low levels of electrification, limited use of commercial energy and very low incomes. Despite having vast hydroelectric power potential, large renewable energy resources and favourable solar conditions, very few households in Uganda have access to modern energy supplies such as electricity, LPG and petroleum for household use or commercial production (Kyokutamba, 2003a).

In Uganda, poverty data demonstrates that households in urban areas, which are considered to be predominantly non-poor, spend on average a lot more than households in rural areas, who are predominantly poor. Table 9 below shows that households in urban areas spend close to US$ 2 a month on electricity, compared to less than 20 USc by rural households. On average, rural households spend about 27% of the total energy expenditure on electricity while their urban counterparts spend about 32%.

Table 9 Expenditure on Electricity in Uganda

Year	Monthly Expenditure on Electricity (US $ per household)			Monthly Expenditure on Electricity as % of Total Household Expenditure (%)			Monthly Household Electricity Expenditure as % of Total Energy Expenditure		
	Rural	Urban	National	Rural	Urban	National	Rural	Urban	National
1994	0.05	1.7	0.3	0.1	1.2	0.5	22.5	30.2	24.2
1995	0.19	1.85	0.43	0.3	1.2	0.6	22.5	30.2	24.2
1996							24.09	32.48	26.6
1997							24.09	32.48	26.6
1998							27.1	33.51	27.44
1999							27.1	33.51	27.44
2000							29.25	29.76	28.95
2001							31.1	33.4	31.2
2002							31.1	33.4	31.2

Sources: UBOS 1993/4, 1994/5; Okumu, 2003

A similar situation exists in Kenya where poverty levels are high, with the vast majority of the poor living in rural areas, and having limited access to modern energy sources such as electricity, as illustrated in the following table:

[15] Using a household size of 4.6 (national) and US$ 2 a month

[16] Data provided in the table is based on a household survey by the Kenyan statistical authority and is, therefore, taken to be the best available data set.

Table 10 Proportions of Households in Kenya Using Various Fuel Mixes (1995)[17]

Fuel Mix	Rural	Urban	National
Electricity, Kerosene and Charcoal	0.4	24.4	8.2
Electricity, LPG, Kerosene and Charcoal	0.0	10.4	3.4
Electricity, Kerosene, Charcoal and Firewood	1.5	2.3	1.8
Electricity, LPG, Kerosene, Charcoal and Firewood	0.7	2.5	1.3
Electricity, LPG and Charcoal	0.0	2.7	0.9
Electricity and Charcoal	0.0	2.7	0.9
Electricity and Kerosene	0.0	2.3	0.7
Electricity, Charcoal and Firewood	0.6	0.2	0.5
Electricity, Kerosene and Firewood	0.4	0.4	0.4
Electricity and LPG	0.0	0.4	0.1
Electricity, LPG, Charcoal and Firewood	0.1	0.2	0.1
Electricity	0.0	0.2	<0.1
Electricity, LPG and Firewood	0.0	0.2	<0.1

Source: Nyang' 1999; Ministry of Energy & Minerals, 2002

As shown in table 10, electricity consumption is largely absent in the energy mix of rural households, compared to their urban counterparts. This is confirmed by the comparison in expenditure patterns between rural and urban households. According to a household survey conducted by Nyang' in 1995, for households purchasing all their energy, those in rural areas on average spent 1.65% of household energy expenditure on electricity, while their urban counterparts spent 14.84% (Nyang', 1999). A more detailed survey conducted by the Central Bureau of Statistics in 1997 (see table below) indicate trends in expenditure similar to the aforementioned survey whereby rural expenditure levels on electricity are far below those of urban areas.

Table 11 Household Energy Expenditure in Kenya (1997)

	Urban			Rural		
	All	Poor	Non-Poor	All	Poor	Non-Poor
Monthly Average Total Household Expenditure (US $)	213.0	106.1	296.7	105.0	60.5	144.0
Monthly Average Total Expenditure on Energy (US $)	8.1	4.4	11.0	2.1	1.1	2.9
Monthly Average Expenditure on Electricity (US $)		0.3	7.4		0.01	0.5
Monthly Average Total Expenditure on Energy as % of Total Household Expenditure (%)	3.8	4.2	3.7	2.0	1.9	2.0
Monthly Average Total Expenditure on Electricity as % of Total Household Expenditure (%)	17.6	0.3	2.5	1.7	0.02	0.4
Monthly Average Total Expenditure on Electricity as % of Total Expenditure on Energy(%)		7.8	67.1		0.9	18.5

Source: Kinuthia, 2003; Ministry of Energy & Minerals, 2002

[17] Data provided in the table is based on a household survey by the author. It is, therefore, assumed to be accurate and valid.

2.0 RATIONALE AND MOTIVATION FOR THE EAST AFRICAN STUDY (KENYA AND UGANDA)

The power sectors of the East African countries (Kenya and Uganda) have in the past been dominated by monopolistic, state-owned utilities that have demonstrated poor performance over the years. With the advent of reforms, the situation is changing, as the monopolies of the past years are being dismantled to pave way for greater private investment and participation in the sector.

Reforms that have taken place in Kenya and Uganda, to date, have largely focussed on the generation component, leaving out the equally important, (if not more important) but problematic, transmission and distribution components. Much of the involvement of the private sector to date in the power sectors of both countries has been in the generation sub-sector. The transmission and distribution sectors appear to have been largely left out of the initial reform process. This is particularly true for Kenya, where generation has been opened up to private investment, while transmission and distribution remain under the former monopoly national utility, the Kenya Power and Lighting Company (KPLC). This situation could be detrimental to access of electricity to the poor, since transmission and distribution have a more direct bearing on the provision of electricity to poor communities.

Many of the reforms enacted in the East African region have been initiated on the basis of very limited empirical proof of their envisaged benefits. It is disturbing to note that, to date, there is almost no empirical evidence from other African countries (and to a certain extent, other developing countries) providing convincing evidence of the impact of power sector reform on the poor. The absence of empirical evidence is particularly worrisome when one realises that the reforms entail enormous, long term and irreversible changes to the region's electricity industry. This study is designed to address this gap by attempting to use a variety of secondary data sources to build a modest but hopefully sound empirical basis for assessing the impact of reforms on the poor.

This study proposes to examine two case studies, namely: Kenya and Uganda. The reason for choosing these two countries is that, firstly, they have roughly comparable socio-economic, demographic and energy characteristics. For instance, they face similar poverty challenges with both registering high poverty levels. These two countries are also partially interconnected (the national grids of Kenya and Uganda are closely integrated). In the petroleum sector, Kenya's refinery supplies fuels to Uganda. In addition, Uganda uses Kenya petroleum pipeline to transport her refined fuel products.

Secondly, the two countries closely co-ordinate their national economic policies primarily due to the growing trade among them as well as their membership of both the East African Community and the common market for Eastern and Southern Africa (COMESA). Policies that prove successful in one country are usually rapidly copied in the other. The countries' senior energy policy makers regularly meet to coordinate policies and undertake joint energy investment initiatives. For example, Uganda and Kenya plan to jointly finance the extension of the Kenyan pipeline to Kampala, Uganda's capital city.

Thirdly, the pace of power sector reforms in both countries significantly varies, thus providing a unique opportunity to obtain empirical evidence of contrasting impacts of power sector reform.

Lastly, there is substantial energy data and information available from AFREPREN studies previously undertaken in the two countries. Lessons learnt from this study can easily be replicated in the other eastern African countries of Tanzania and Ethiopia due to their socio-economic and demographic similarities.

3.0 METHODOLOGY

In line with the agreed common approach, this section highlights key common methodological elements adopted by this study.

- *Sub-regional perspective*: The study addresses the "Access" theme from a sub-regional perspective, and covers 2 countries (Kenya and Uganda). As mentioned earlier, the rationale for the selection of the countries is their comparability in terms of the extent of reform undertaken to date, and socio-economic/demographic characteristics.

The authors are aware that the best approach would have been to select one eastern African country that had more advanced reforms (e.g. Kenya or Uganda) and another where fewer reforms had been implemented (e.g. Tanzania, Ethiopia or Mauritius). This was also expressed by one of the external reviewers of an earlier draft of this report, arguing that (Bailis, 2003):

> *"…by stressing the strong links and similarities between the two neighbours…these could easily be seen as reasons to choose only one, rather than both of these countries. Because they are strongly linked and have similar circumstances, perhaps more could be gained by studying either Kenya or Uganda and putting the remaining effort into a less similar country such as Ethiopia or Mauritius.*
>
> *…Kenya and Uganda have implemented a large number of reforms. It may be difficult to separate the effects of the selected reform given the confounding effects of the other activities in the power sector*."

However, due to data limitations, it was difficult to adopt the proposed approach. Consequently, Kenya and Uganda were selected because they had the best data available. The next phase of this study may provide resources to extend the analysis to Ethiopia and Mauritius.

- *Focus on electricity*: The study focuses on the electricity sub-sector. The terms 'electricity sub-sector', 'electricity industry' or 'power sector' are perceived to take account of off-grid options (i.e. mini-grid systems & isolated units) including those generating electricity from renewables. This study, however, largely concentrates on the grid option[18].

- *Reliance on empirical evidence*: Attempts have been made in the past to study the impact of power sector reforms. Most of these studies have focussed on the impact of reforms on the technical and financial performance of the power utilities and, to a limited extent, on the impact of reforms on electricity tariffs. Few studies have attempted to assess the impact of reforms on the poor or provide the requisite empirical evidence. The authors of this paper are not aware of any systematic empirically based study of the impact of power sector reforms on the poor in different developing countries, which utilises a common and comparable set of impact indicators. This study is expected to partially fill this important gap. The emphasis on empirical evidence would constitute an important addition to current literature on the power sector reform/access issue.

In line with the need to emphasise empirical evidence, this study has assessed the impact of the power sector reform on the poor by analysing data and information for 4 years before and 4 years after the power sector reforms were initiated for Kenya (i.e. 1993 – 2001) and 3 years before and 3 years after the power sector reforms were initiated in Uganda (i.e. 1996 – 2002).

[18] The authors are aware of the significant number of PV solar home systems installed particularly in rural Kenya, making the country one of leading eastern and southern African countries in terms of penetration of PV systems. However, off-grid options will hopefully be addressed in a follow-up study to this one (in addition, recent evidence indicates that off-grid PV options are largely bought by the non-poor in rural areas of Kenya).

The key hindrance to the use of empirical evidence is that utilities do not compile their data according to income groups. In some cases, as in the one for Uganda, the data is also not subdivided into rural and urban categories.
- Assessment of one reform option: Because of the limited time available and the need to rely on empirical evidence, this study examines the impact of one reform option. The term 'reform' should be understood in its wider meaning to include any major changes to the institutional structure of the electricity sector aimed at improving the poor's access to electricity. More proactive state interventions or subsidies can also be perceived as 'reform options'.

The authors, however, realize that it is difficult to distinguish the effects of a single reform option from others put in place, especially where several options have been effected in a short span of time (see the following box). This is an intractable problem given the lack of adequate data (Bailis, 2003).

Box 1: Difficulties associated with assessing one reform option

At a first glance, it appears that selecting one single reform option is a wise choice. However, policy reforms are implemented developed and implemented in many different ways. The Amendment of an Electricity Act in one country may be quite different from the same process in a different country. In addition, some countries implement a series of reforms, while others implement only one or two. In cases where more than one policy reform has been implemented in the space of a few years, it will be quite difficult to distinguish the effects of a single reform from others that have been put in place. In addition, it may be that the effects observed in a given example are actually the result of the interaction of two or more policy processes (Bailis, 2003).

There are four reform options that are common to both Kenya and Uganda. The options are:

- **Vertical unbundling of the Utility** - This refers to the process of separating vertically integrated utilities into independent generation, transmission and distribution companies. This process often follows the following procedure:
    - *Vertically integrated utility:* This is the starting point whereby the power utility undertakes electricity generation, transmission and distribution.
    - *Unbundled generation, common transmission and distribution:* The generation component of the utility becomes an independent entity while transmission and distribution remains a single entity.
    - *Unbundled generation and distribution:* In addition to the generation earlier unbundled, the distribution entity is separated from transmission.
    - *Completely Vertically Unbundled:* This is a state where three entities, i.e. generation, transmission and distribution are independent companies.

- **Amendment of the Electricity Act** - This refers to a process where the National Assembly or Parliament of the country passes an amendment to the existing Act to establish new legislation governing the electricity or energy sectors. This can, for instance, remove monopoly of a state utility, a major barrier to private sector participation.

- **Privatisation of Generation** - In this case, the generation monopoly of the utility is dismantled, giving way to privately financed and operated generating units that sell power to the utility. In a few cases, the state-owned generation assets are sold to private entrepreneurs.

- **Establishment of a Regulatory body** - An autonomous body is established in accordance with legislative provisions, to oversee and regulate the activities of all players in the sector.

There exists some empirical evidence of pre- and post-reform for each of the above options that could make it possible to conduct an analysis of their impact on the poor in both Kenya and Uganda. After further consideration of the four options, the authors selected the Amendment of the Electricity Act as the most applicable reform option for assessment for this study[19]. The rationale for selection of this reform option is outlined below:

1. The Electricity Act sets out the structure and operations of the electricity sector as a whole in both countries. Consequently, the amendment of the Act is one of the primary drivers of power sector reforms and determines the direction reforms take.

   The issue of electricity access, which is the focus of this study, can be traced back to the Act. The Acts of both countries provide for, in some cases, modalities to increase access to electricity. For instance, in both Kenya and Uganda, the Electricity Acts provide for the Rural Electrification Fund (REF)[20], whose objective is to finance electrification of rural areas and any other areas that utilities may consider economically unviable. The Ugandan Electricity Act, in addition, empowers the Minister for Energy to undertake a range of critical tasks aimed at accelerating rural electrification (Republic of Uganda, 1999).

2. Since the amendments took place in the late 1990s, there is some useful pre and post reform data that can enable empirical analysis of the impact of the amendment of the Act on electricity access.

This final draft report assesses the Kenyan and Ugandan case studies. It confines itself to the grid option and does not take into account off-grid electrification initiatives (e.g. gensets and isolated PV systems[21]). Before delving into the assessment of the impact of power sector reforms on the poor, the report first reviews the extent to which the policy and regulatory framework addresses the question of "access" within the context of a reforming power sector. This is done through a review of the National Energy Policy documents; the Electricity Acts; and, Ministry of Energy reports/statements of both Kenya and Uganda.

Since the study seeks to identify the extent of impact of reforms on the poor, it is necessary to make a distinction between the poor and non-poor. One possible option is to use the lowest tariff band (for instance 0 – 50 kWh) as the proxy to distinguish the poor and the non-poor. Here, the assumption is that the customers within the 0 – 50 kWh tariff band are poor whereas those in tariff bands above it are non-poor. This study did not adopt this approach due to the unavailability of time series data in the required format. In addition, this approach would not capture the overwhelming majority poor who are not electrified.

The authors, therefore, used other proxies to distinguish the two groups. The proxy used for the poor is electricity data for rural areas. The rationale for using this proxy is that income and expenditure levels in rural areas are significantly lower than for those in urban areas. In essence, the report assumes that virtually all the inhabitants of rural areas in Kenya and Uganda are poor. The authors, however, realise that this assumption has some limitations as it effectively ignores the urban poor and ignores the fact that not all rural households are poor. In addition, it fails to recognise that the majority of the rural population with access to electricity are probably not poor (Bailis, 2003).

[19] The Kenyan Electricity Act was amended in 1997, while the Ugandan Act was amended in 1999.

[20] In Kenya, Rural Electrification dates back to 1967. The Rural Electrification Fund was initiated in 1972 and the Rural Electrification Programme was started in 1973. In Uganda, the Rural Electrification Fund was established in 2001 but full operations of the Rural Electrification Programme are yet to begin.

[21] The authors are aware of the significant number of PV solar home systems installed particularly in rural Kenya, making the country one of leading eastern and southern African countries in terms of penetration of PV systems. However, off-grid options will hopefully be addressed in a follow-up study to this one (in addition, recent evidence indicates that off-grid PV options are largely bought by the non-poor in rural areas of Kenya).

Generally in Kenya, rural area dwellers are worse-off than their urban area counterparts. This can be demonstrated by comparing the welfare of these two broad sections of the population along the parameters of expenditure, income and proportion of those living under the World Bank defined poverty thresholds of US$ 1 and US$ 2 a day per capita. The parameters confirm that rural dwellers are, on average, poorer than urban dwellers. For example, rural households spend much less than their urban counterparts. Estimates from a 1997 Welfare Monitoring Survey conducted in Kenya shows that rural areas in Kenya have a mean monthly household expenditure of approximately US$ 63.82. The absolute poverty line for rural areas used by the same survey stood at US$ 94.87[22]. This is contrasted with urban figures, where the absolute poverty line stood at US$ 147.80[23] against a mean monthly household expenditure of approximately US$ 151.56. This implies a significantly higher prevalence of poverty in rural areas, compared to urban areas where the mean household expenditure is above the absolute poverty line.

Comparing income levels between the rural and urban dwellers, the Welfare Monitoring Survey estimated average household monthly income figures for rural and urban to be approximately US$ 79.77 and US$ 191.45, respectively. As demonstrated in table 12 below, this translates to average daily per capita incomes of US$ 0.55 and US$ 1.33 for rural and urban areas, respectively.

Table 12 Expenditure and Income data comparisons for rural and urban areas in Kenya

Indicator*	**Rural**	**Urban**
Mean Monthly Household Expenditure (US$)	63.82	151.56
Absolute Poverty Line (US$)	94.87	147.80
Average Monthly Household Income (US$) - 1997	79.77	191.45
Daily Per Capita Incomes (US$) - 1997	0.55	1.33

Note: * The indicator is given in the report in Kshs. It has been converted using the exchange rate of US$ 1 = Kshs 62.68

Sources: UNDP 2001, Republic of Kenya 2000.

Taking the World Bank defined poverty threshold of US$ 1 and US$ 2 a day, the data still shows that on average, rural dwellers are poorer and fall way below the poverty line (table 13).

Table 13 Monthly household income comparisons for Kenya

Indicator	**Rural** (US $)*	**Urban** (US $)**
Monthly Household Income at US$ 1 a day per capita poverty threshold	144.00	111.00
Monthly Household Income at US$ 2 a day per capita poverty threshold	288.00	222.00
Average Monthly Household Income – 1997***	79.77	191.45

* Average household size = 4.8

** Average household size = 3.7

*** Obtained from Welfare Monitoring Survey

Sources: Republic of Kenya 2000, Kinuthia, 2003; Authors calculations

The data shows that rural dwellers, on average, fall below the poverty line for both the US$ 1 and US$ 2 a day per capita poverty threshold. The urban dwellers, on the other hand, are above the US$ 1 a day per capita poverty line. This higher poverty level in the rural areas is also confirmed by a recent UNDP report on Kenya (UNDP 2001), which showed that agriculture accounts for 90% of rural incomes in Kenya, yet contributes only 9% to total private and public sector earnings in the country. Consequently, the rural population, majority of whom are employed in agriculture, generally have relatively lower earnings.

[22] This is calculated using Adult equivalent figures and an average household size of 4.8

[23] This is calculated using Adult equivalent figures and an average household size of 3.5

Additional data from the 1997 Welfare Monitoring Survey indicates the expenditure for rural and urban areas, divided by quintiles, from the lowest expenditure (Q1) to the highest (Q5) (table 14).

Table 14 Mean Per capita Expenditure In Rural And Urban Areas By Expenditure Quintiles in Kenya:

Expenditure Quintile	Rural			Urban		
	Monthly		Daily	Monthly		Daily
	Kshs	US$	US$	Kshs	US$	US$
Q1	454.8	7.2	0.2	1,048.4	16.7	0.6
Q2	710.7	11.3	0.4	1,636.9	26.1	0.9
Q3	998.1	15.9	0.5	2,255.1	35.9	1.2
Q4	1,431.2	22.8	0.8	3,541.5	56.5	1.9
Q5	3,568.8	56.9	1.9	9,396.2	149.9	5.0
All	***1,716.4***	***27.4***	***0.9***	***4,298.6***	***68.5***	***2.3***

Source: Republic of Kenya 2000; World Bank 2003a

The data demonstrates that in rural areas, only the population in the upper quintile (20%) live above the poverty line of US$ 1 a day per capita. The lower 4 quintiles (80%) of the population in rural areas live below the US$ 1 a day threshold. Using the US$ 2 a day per capita threshold, we see that virtually all (100%) of the rural population lives below US$ 2 a day. Thus, the overwhelming majority of the rural population can be considered poor. The reverse is true for urban areas. Only the lower 2 quintiles (40%) live below the poverty line, while the remaining 3 upper quintiles (60 %) live on more than US$ 1 a day and are thus non-poor. The upper quintile (20%) is the least poor, living on an average US$ 5 a day per capita. This argument strengthens the rationale for defining poverty on the basis of rural and urban areas, the approach taken by this study.

In Uganda, a similar case can be made to justify the use of the rural urban spilt as a proxy for the poor and non-poor, respectively. The majority of Ugandans living in rural areas are poor compared to those living in urban areas. Kyokutamba 2002 contends that on average, the poor in Uganda are those with monthly household incomes of below Ushs 150,000. This translates to an average of US$ 74.93 (using an exchange rate of 2,002 Ushs to the US$). As demonstrated in table 15, over 80% of rural dwellers have incomes below this threshold compared to 50% in urban areas.

Table 15 Household Monthly Incomes in Uganda - 1999/2000

	Percentage of population			
	Rural		Urban	
Income Bracket (Ushs)	Absolute	Cumulative	Absolute	Cumulative
0 – 50,000	32	32	12	12
50,000 - 100,000	33	65	24	36
100,000 - 150,000	16	*81*	*14*	*50*
150,000 - 200,000	8	89	12	62
Over 200,000	11	100	38	100

Source: UBOS, 2001; Kyokutamba, 2003b

Taking the World Bank defined poverty threshold of US$ 1 and US$ 2 a day, the following data (table 16) shows that on average rural dwellers are poorer. Rural dwellers on average fall below the poverty line for both the US$ 1 and US$ 2 a day per capita poverty threshold. The urban dwellers, on the other hand, are above the US$ 1 a day per capita poverty line.

Table 16 Monthly household income comparisons for Uganda

Indicator	**Rural** (US $)*	**Urban** (US $)**
Monthly Household Income at US$ 1 a day per capita poverty threshold	162.00	132.00
Monthly Household Income at US$ 2 a day per capita poverty threshold	324.00	264.00
Average Monthly Household Income – 2000***	55.39	151.30

* Average household size = 5.4

** Average household size = 4.4
*** Obtained from UBOS Survey
Sources: UBOS 2001, Authors calculations

Additional data from the Uganda National Household Survey 1999/2000 indicates the expenditure for rural and urban areas, divided by quintiles, from the lowest expenditure (Q1) to the highest (Q5) (table 17).

Table 17 Mean Per capita expenditure in rural and urban areas by expenditure quintiles:

Expenditure Quintile	Rural			Urban		
	Monthly		Daily	Monthly		Daily
	Ushs	US$	US$	Ushs	US$	US$
Q1	7,718.8	4.7	0.2	17,524.3	10.7	0.4
Q2	12,717.3	7.7	0.3	30,565.5	18.6	0.6
Q3	17,409.9	10.6	0.4	45,654.5	27.8	0.9
Q4	24,052.4	14.6	0.5	70,290.1	42.7	1.4
Q5	50,929.9	31.0	1.0	170,608.3	103.7	3.5
All	***24,953.3***	***15.2***	***0.5***	***75,763.4***	***46.1***	***1.5***

Exchange rate (2000): UShs 1644.5: US$
Using 30 days: 1month
Source: UBOS, 2001; World Bank, 2003a; ADI, 2003

The data demonstrates that in rural areas, virtually the entire (100%) rural population lives below both the US$ 1 a day, and US$ 2 a day per capita thresholds. The overwhelming majority of the rural population can thus be considered poor. The reverse is true for urban areas, where only the lower 3 quintiles (60%) live below the poverty line, while the remaining 2 upper quintiles (40%) live on more than US$ 1 a day and are thus non-poor The upper quintile (20%) is the least poor, living on an average US$ 3.5 a day per capita, which is considerably higher than the US$ 2 a day threshold. Again the rationale for defining poverty on the basis of rural and urban areas, the approach taken by this study, is strengthened.

This study used the following indicators, which were analysed at national, urban and rural levels:

1. *Electrification levels* - Use of electrification levels is probably the simplest indicator of electricity access. This indicator provides an estimate of the proportion of the households that has physical access to electricity. Electrification levels should not be confused with the indicator of electrification rate that is explained separately. For this study, the indicator was derived from the number of national utility's domestic customers[24], which was obtained from annual utility reports and the utility's customer database. To derive the national household electrification levels, the total number of the utility's domestic customers is divided by the total number of households.

   To derive urban and rural household electrification levels, the same calculation was applied using data on total number of urban and rural domestic customers and the urban and rural households, respectively. As mentioned earlier, due to limited data by income groups, rural electrification is used as a proxy for electrification of the poor.

   The authors are aware of the most common technique of estimating the proportion of the households electrified whereby the total number of electricity connections (including non-domestic customers) is used. However, the aforementioned technique has a major flaw in that it does not differentiate between domestic and non-domestic connections. Consequently, it masks the real problem of access by generating higher domestic

[24] The term "domestic" customers refers to the utility customers classified as residential and is interchangeably used in this report with the term "household".

electrification levels than there actually exists. It is for this reason that this study only utilises domestic connections to estimate household electrification levels.

2. *Electrification rates* - The national electrification rate refers to the number of new domestic connections in a specific year expressed as a percentage of total domestic connections for the previous year. The rate measures the pace of electrification. This indicator is used to determine the extent to which the reform option accelerates access to electricity among the poor. The national electrification rates indicator was obtained from annual utility reports and the utility's database, which provide the number of new domestic connections both for rural and urban areas.

   Similar to the assessment of electrification levels, electrification rates are assessed at three levels, namely national, urban and rural. To derive this indicator, the increment in the number of new domestic connections for national, urban and rural areas is expressed as a percentage of the total number of domestic connections for the previous year at national, urban and rural levels, respectively. Electrification rates categorised by income group were difficult to find. However, as mentioned earlier, rural and urban electrification rates were used as proxies for electrification rates of the poor and non-poor, respectively.

3. *Electricity consumption* - Another indicator for measuring the impact of reforms on electricity access of the poor is electricity consumption levels before and after the implementation of the Electricity Act. This indicator can be criticised for its inability to meaningfully measure the impact of reforms on the poor. Electricity consumption levels can be a function of other variables such as tariff, electrical appliances used as well as the availability of electricity.

   As before, the electrification consumption was determined, first at the national level, irrespective of income and, secondly, by the proxy groups (i.e. rural and urban). At the national level, the national average per capita electricity consumption (kWh) was obtained using national utility data from which the estimates were derived by dividing the amount of domestic sector electricity consumption by the total national population connected to the grid.

   For urban and rural average per capita electricity consumption, total urban and rural electricity consumption levels obtained from utility reports and database were divided by the respective populations with direct access to the grid. To obtain household electricity consumption data, at national, urban and rural levels, the total household electricity consumption for each of the areas was divided by the total number of households in each respective area (i.e. nationwide, for urban and for rural areas).

4. *Electricity tariffs* - Electricity tariffs can be used as an indicator of the affordability of electricity for various income groups. The tariff structures in both Uganda and Kenya do not make a distinction between rural and urban customers; the tariff charged is uniform across the board. To capture a more reflective indicator of the cost of electricity, this study derived the cost using data on revenue from domestic customers and the electricity units sold to them. The total revenue for the utility from domestic customers was divided by the total units of electricity sold to arrive at a unit cost of electricity for domestic consumers.

   For both countries the cost of electricity (in the Kenyan case) and tariffs (in the Ugandan case) take into account inflation and foreign exchange losses. The inflation adjustment used was the Consumer Price Index, with the base year being the first year in the range of pre- and post-reform years (i.e. 1996 for Uganda and 1993 for Kenya).

   However, in the Kenyan case, using 1993 as the base year was likely to distort the outcome. This is because this was the year when the country plunged into an economic turmoil following the fraudulent export compensations in which the Government, through the Central Bank, lost a staggering US$ 210 million.

Consequently, in 1993 alone, exchange rates skyrocketed from Kshs 36.08 to US$ 1 in January to Kshs 68.90 to US$ 1 in December (KPMG, 1994). It is for this reason that the authors chose 1995 - a more stable year, to become the base year and hopefully provide more realistic results. To ensure foreign exchange losses were captured during the conversion of the local currencies into USc, in each year, the average exchange rate for the respective year was used.

Further assessment of tariffs was made by examining the extent to which there exists subsidies for the poor. This was done at two levels: Firstly, by assessing the existence of cross-subsidies between tariffs for rural households and their urban counterparts. This was undertaken by using the Convergence Index (Sihag, et al, 2003). The second level of subsidies assessment involved examining the level of subsidies estimated by the utilities, usually derived by comparing the operating cost and the tariff yield (referring to revenue from customers). The subsidies data obtained from the utilities was classified into two: subsidies per kWh for domestic consumers in 0 – 50 kWh tariff band; and, 51 and above kWh tariff band (assuming the 0 – 50 kWh tariff band represents the category in which the poor are found while above 51 kWh is the category for the non-poor).

5. *Expenditure on electricity* - Electricity expenditure is another measure of the impact of a reform option on the poor. Due to data limitations, the pre- and post-reform assessment of this indicator was only undertaken for the Ugandan case study. The relevant indicator used in the study was the average expenditure on electricity as a proportion of the household expenditure.

   The impact of the reform is measured by the change in the proportion of electricity expenditure. An increase in this proportion after the implementation of the Electricity Act could imply a negative impact (probably due to an increase in tariffs or other electricity-related costs), whereas a decrease could depict a positive impact (perhaps as a result of a reduction in tariffs).

   The key draw back of this indicator is that, on its own, it may not be sufficient to assess the impact of reforms on electricity expenditure. This is because other indicators such as household energy expenditure and electricity expenditure (in monetary terms) should also be examined to isolate changes in the proportion of expenditure on electricity caused by changes in the expenditure levels of other energy sources.

   In addition to empirical analysis of the data indicators outlined above, a textual analysis of the amended Electricity Acts for both countries was undertaken. This was done primarily to identify provisions for increased electricity access, and to see if the Act provides for special tariffs and subsidies for the poor.

The key sources of data and information for the study were:

- Electricity Acts
- Utility Reports
- Utility databases
- ERB annual reports
- Ministry of Energy reports
- National Energy Policy documents
- Tariff studies
- National Household Surveys
- AFREPREN research studies
- AFREPREN Energy Database
- National Development Plans
- World Bank reports
- National Development Reports
- Annual Economic Surveys

- Privatisation Reports

This study identified the principal data gap, with regard to the Kenyan and Ugandan case studies, as the absence of household energy and electricity expenditure data disaggregated by income groups. In addition, data on the electrification of the poor is very scanty. This is mainly because utilities, Ministries of Energy and the regulatory agencies do not track this data. These data limitations imply that the findings contained in this report may not be conclusive.

It is important to note that the data presented in this study may differ from that provided in other studies. This is due to methodological differences. For instance, the other studies such as the KAMFOR study[25] have used their own snap-shot survey data covering only one year. This is a different approach from the one used in this study whereby, data has been analysed and provided by experts based in the utilities in Kenya and Uganda. The data has been extracted from the utilities' databases in a time series fashion. It, therefore, has some advantages over the snap-shot surveys in that the time series data allows the detection of inconsistencies. In addition, time series allows one to link policy reforms to specific change in electricity access trends. Moreover, some of the other studies could have used different income groups and average household sizes in their assessment (e.g. KAMFOR study). Consequently, some differences in the data are expected.

[25] A study undertaken by Kamfor Company Limited (Republic of Kenya 2002) divided the country into three zones based on agricultural potential to classify income groups in rural areas. It assumed that the lower the agricultural potential of the area, the poorer it is. For urban areas, the study divided the population into 3 groups based on income levels.

4.0 ASSESSMENT OF THE IMPACT OF THE ELECTRICITY ACT ON THE POOR: KENYA CASE STUDY

4.1 Key Characteristics of the Electricity Sector

For a long time, the power sector in Kenya was dominated by a vertically integrated power utility, the Kenya Power and Lighting Company, (KPLC). KPLC was the dominant player in the generation, transmission and distribution of power in the country. Prior to 1996, there were five parastatal organisations involved in electric power generation, transmission and distribution[26]. The situation has since changed and the generation of power in the country has been partially privatised. KPLC, which is 51% Government owned, remains the sole body licensed to transmit and distribute electricity in the country. The generation segment has several players, chief among them is the state owned Kenya Generating Company (KenGen), and several IPPs.

The data provided in the following table (table 18) summarises the status and performance of the Kenyan power sector.

Table 18 Key Performance indicators in the Kenyan Power Sector (2002)

Indicator	Value
Installed Capacity (MW)	1,194.60
Electricity Generation (GWh)	4,564.00
System losses (%)	20.50
Number of Customers	593,621.00
Customers per employee ratio	92.00
Household electrification levels - National (%)*	6.12
Household electrification levels - Urban (%)*	22.68
Household electrification levels - Rural (%)*	0.94

* Refers only to the proportion of households connected to the electricity grid and may differ significantly from other sources which indicate the proportion of electrified population derived from the respective total number of grid electricity customers.

Sources: KPLC 2001 & 2002; Karekezi et al, 2002a; Kinuthia, 2003; Nyoike, 2002

4.2 Past Reforms in the Power Sector

Reforms in Kenya's power sector were undertaken largely due to pressure from the donor community that made reforms a prerequisite for development assistance to the sector. Continued poor performance of the sector was also an additional impetus for reform. As the Kenyan Government continued to seek development aid from the World Bank, additional power sector oriented conditions were introduced and these included rationalisation of the electricity sector players and electricity tariff reform.

Power sector reforms began in 1983, with the merging of the Department of Regional Development with that of Energy to form the Ministry of Energy and Regional Development (MERD). This structure was in place until 1988, when the Ministry was once again split into two; Ministry of Energy and Ministry of Regional Development, thus creating, once more, a ministerial conflict in terms of policy formulation on electric power development. The World Bank

[26] The five parastatals were:
- Kerio Valley Development Authority (KVDA)
- Tana River Development Company (TRDC)
- Kenya Power Company (KPC)
- Tana and Athi Rivers Development Authority (TARDA)
- Kenya Power and Lighting Company (KPLC)

once again called for the power sector rationalisation in order to streamline policy formulation and project development (Nyoike, 2002b).

In 1994, tariff reforms were initiated, with the first major increase aimed at realignment of consumer tariffs with LRMC, as well as introduction of an automatic fuel adjustment formula. In 1996, the tariffs were further raised to 75% of LRMC and an automatic foreign exchange formula was introduced to shield the utility from adverse exchange rate changes.

In 1996, the power generation sector was liberalised and as a result, the (four Independent Power Producers [IPPs]) entered the market. The following year (1997) the Electric Power Act was enacted, which, among other things, established the Electricity Regulatory Board, (ERB), the principle regulatory body in the sector.

In 1999, all generation assets owned by the Government were placed under a newly formed state-owned company, the Kenya Electricity Generating Company (KenGen) and transmission and distribution assets were retained by the Kenya Power and Lighting Company (KPLC). In the same year, tariffs were raised to 100% of the LRMC (Nyoike 2002b).

Table 19 below shows the installed capacity and market share of generation companies in Kenya before and after the 1997 Electricity Act was enacted:

Table 19 Installed Capacity and Market Shares of generation companies

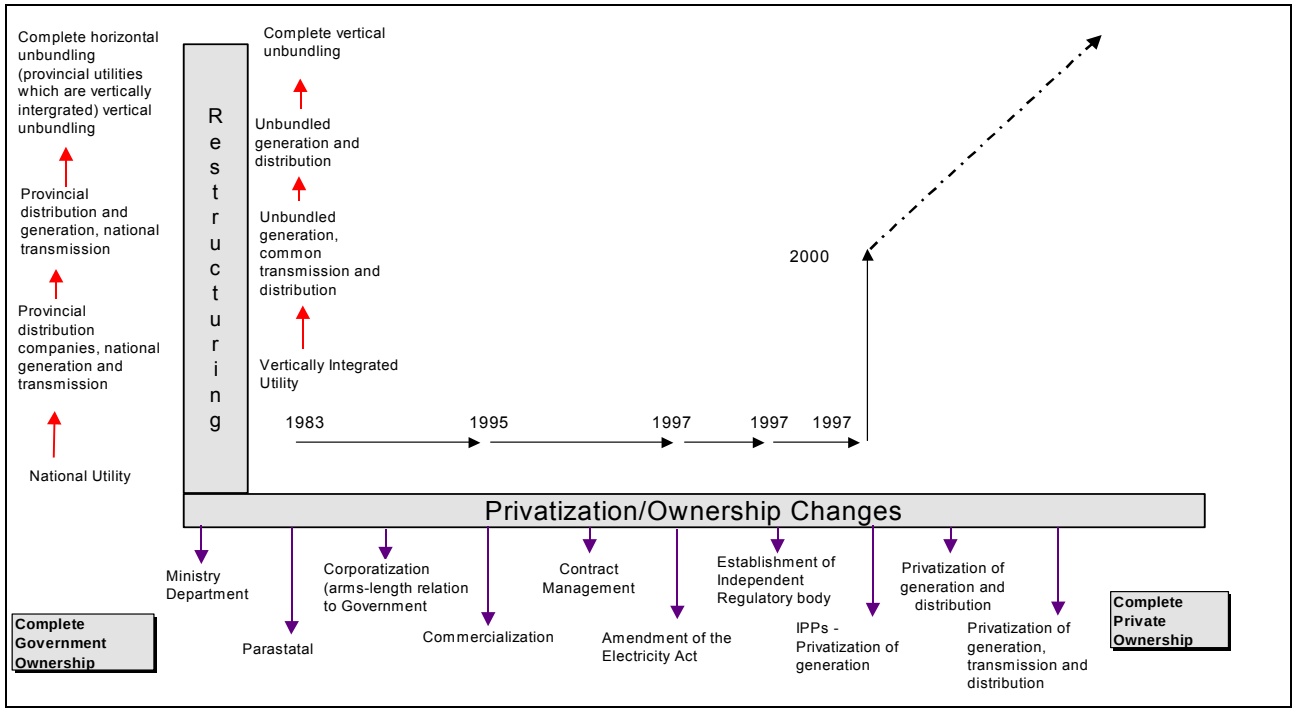
	1996		**2002**	
Company	**Installed Capacity (MW)**	**Market Share (%)**	**Installed Capacity (MW)**	**Market Share (%)**
KPLC*	774.45	94.68	-	-
KenGen*	-	-	950.50	83.56
Orpower4	-	-	13.00	1.14
Iberafrica	13.50	1.65	56.00	4.92
Westmont	30.00	3.67	43.50	3.83
Tsavo West	-	-	74.50	6.55
TOTAL	**817.95**	**100.00**	****1,137.50**	**100.00**

Sources: KPLC 1996, 2002; Nyoike, 2002

* In 1999, there was a transfer of generation assets operated by KPLC (51% state-owned utility) to KenGen (100% state-owned utility).
** This figure is exclusive of the Installed capacity for the Mumias IPP, the Rural Electrification Fund stations and the Imports from Uganda.

The following illustration (figure 6) shows the progress of reforms undertaken in Kenya's power sector to-date.

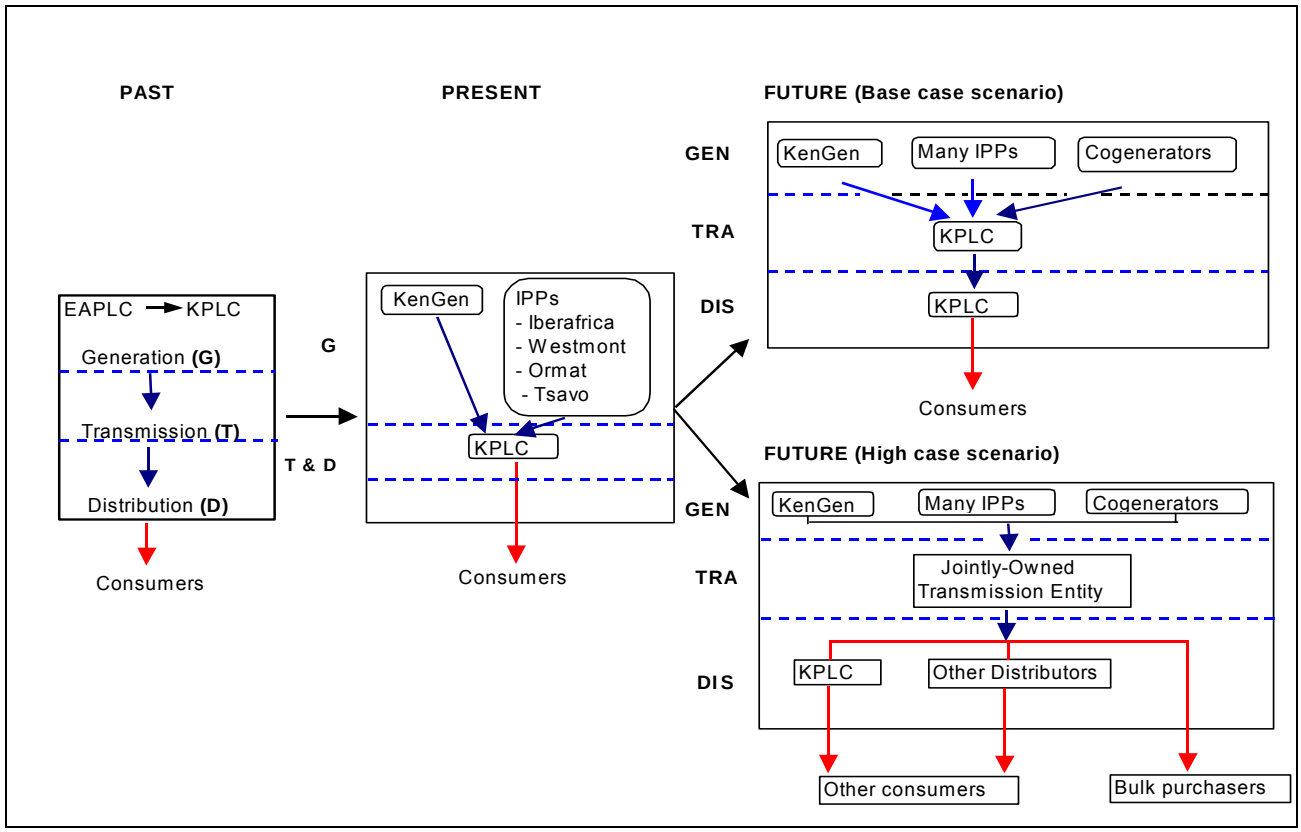
Figure 6 Reforms in Kenya's Power Sector



Source: Karekezi and Mutiso, 2000; Nyoike, 2002c

The following figure (figure 7) shows the evolution of the power sector in Kenya, and envisaged future scenarios.

Figure 7 Past, Present and Future Scenarios for the Kenyan Power Sub-sector



Source: Karekezi and Mutiso, 2000; Nyoike, 2002c.

In summary, the key highlights of the reform process in Kenya are as follows:

March, 1994: First increase of consumer tariffs to reduce difference with the LRMC and the introduction of automatic fuel adjustments to the tariff, to take into account fluctuations in fuel oil prices as well as fuel oil consumption for electricity generation.

October, 1996: Increase of tariffs to 75% of LRMC and introduction of automatic foreign exchange rate adjustments to the tariff to take into consideration foreign exchange rate fluctuations.

December, 1997: Amendment of the Electric Power Act.

June, 1998: Formal constitution of the Electricity Regulatory Board (ERB).

June, 1999: Unbundling of the state utility Kenya Power and Lighting Company Limited (KPLC) into KenGen (to take over the generation assets) and KPLC (transmission and distribution assets).

August 1999: Increase of tariffs to 100% of LRMC

4.3 Review of the Policy and Regulatory Framework in Kenya

Before presenting the key findings of the assessment of the impact of power sector reforms on the poor in Kenya, a review is provided on the extent to which the policy and regulatory framework addresses the question of "access" within the context of a reforming power sector. This is done through a review of the Draft National Energy Policy document; the Electricity Act and Ministry of Energy reports/statements.

The Draft Energy Policy

The Kenya National Energy Policy document is still in draft form and is undergoing review. In the absence of the National Energy Policy, statutory Acts such as the Electricity Act have provided the required policy direction with regard to the question of "access". However, once completed, the National Energy Policy document is expected to play a significant role in addressing the subject question.

The draft National Energy Policy articulates the Government's vision as the provision of an electricity connection to every home in the country. To achieve this vision, the draft Energy Policy outlines a number of mechanisms for implementation. These include:

- Establishing a Rural Electrification Agency as stipulated in the Electricity Act, with an arm's length relationship with the Government;
- Updating the rural electrification master plan and expanding it to include off-grid supply; and,
- Enacting transparent criteria for allocation of funds for rural electrification.

The draft Energy Policy document also addresses affordability of electricity. Whereas, it supports the formulation of cost-reflective tariffs, it also proposes duty and tax exemptions for HV conductors, transformers & switchgears to ensure that consumer prices are kept low. In addition, it recommends the retention of a lifeline tariff for the first 50 kWh charged to domestic consumers (Republic of Kenya, 2003). However, a major drawback of the aforementioned lifeline tariff is that both the poor and non-poor alike enjoy it. The draft Energy Policy is silent on specific subsidies targeting only the poor.

Ministerial Statements

In the absence of an authorized Energy Policy, the Government's commitment towards enhancing electricity access, particularly to the poor, can be gleaned from official statements of the Minister of Energy. For example, the incumbent Minister for Energy, Hon. Ochillo Ayacko, in a recent speech, underscored the importance of accelerating the pace of rural electrification with regard to socio-economic development. He indicated the Government's intention to detach the rural electrification program from the country's main utility, KPLC and to replace it with a semi-autonomous electrification agency with the aim of increasing national electrification levels to 40% (Ayacko, 2003).

There are some modest fiscal measures that the Government has already undertaken aimed at lowering the end-user cost of electricity (hence, more affordable to the poor). Examples include the removal of VAT for electricity consumption of less than 200 kWh per month for domestic customers, and more recently, a 50% reduction in the excise duty levied on fuel oil – used to produce the bulk of electricity from independent power producers (East African Standard, 2003).

The Electricity Act

A review of the Electricity Act amended in 1997, reveals that it addresses the question of "access" to some extent. It empowers the Minister of Energy to establish the Rural Electrification Programme Fund to support electrification in rural areas and other areas considered economically unviable for electrification by public electricity suppliers. Furthermore, the Minister may impose a levy of up to 5% on all electricity consumed in the country, the proceeds of which go into the Rural Electrification Programme Fund.

Unlike the Ugandan Electricity Act which explicitly stipulates the establishment of a rural electrification agency, the Kenyan one makes little mention of it. In fact, reference to rural electrification in the Kenyan Electricity Act is only mentioned in 3 paragraphs regarding the re-establishment of the Rural Electrification Programme Fund (REF) under the "Miscellaneous" section – a clear indication of limited policy interest.

In the past, rural electrification has been undertaken by KPLC, the national utility, using proceeds from the Rural Electrification Fund (REF) initially established in 1974. However, as the assessment of electrification levels and rates indicates, the utility's performance with regard to rural electrification has been dismal. In addition, in recent years, the utility has been utilising over half of the rural electrification funds to cover its operating losses instead of using it to increase access to electricity.

Consequently, a Rural Energy Taskforce (established by the Ministry of Energy), in its final report released early this year, recommends that an autonomous rural electrification body is established to take over from KPLC. Following up on this recommendation, the Minister for Energy recently announced plans for the establishment of the aforementioned rural electrification body.

At the moment, apart from the recommendation by the Taskforce that the composition is representative of the key stakeholders, the shape of the mooted electrification agency is not clear. However, the success of the board will largely depend on the degree of its autonomy with regard to managing the REF as well as planning and implementation of the Rural Electrification Programme, as recommended by the Taskforce report. In addition, representation of the poor should be included in the governance of the Board to ensure that the needs of the poor are addressed.

The major limitation of the Act is that it is explicitly not in favour of subsidies (which would, otherwise, benefit the poor). It stipulates that (Republic of Kenya, 1997:81):

"All rates or tariffs charged by a public electricity supplier for electrical energy supplied … shall not give any undue preference or be discriminatory".

4.4 Empirical Assessment of the Impact of the Electricity Act on the Poor

As mentioned earlier, this report chose the amendment of the Electricity Act as the most appropriate reform option for assessment in this study. The rationale for selecting this reform option is the fact that the issue of electricity access, which is the focus of this study, can be traced back to the Act. In addition, the Act provides the framework for management and development of the country's electricity industry.

With the exception of data on electricity expenditure, most of the data used in this case study is available in time series and has been used to assess the impact of the amendment of the Electricity Act on the poor. By observing changes in patterns of particular indicators over a period of time, the trend data provides an empirical guide for assessing the extent to which the amendment of the Act has had an impact on the poor.

As highlighted in the methodology section, the key weakness of the available time series data sets is that they do not differentiate the poor and non-poor. Consequently, the proxy used for the poor is electricity data for rural areas on the assumption that the majority of urban residents are not poor[27]. The rationale is that income levels in the rural areas are relatively lower than in urban areas (as mentioned earlier, virtually the entire (100%) rural population is under the internationally recognised US$ 2/day poverty datum).

The following section assesses the impact of the amendment of the Electricity Act on the poor before and after the amendment using the following indicators:

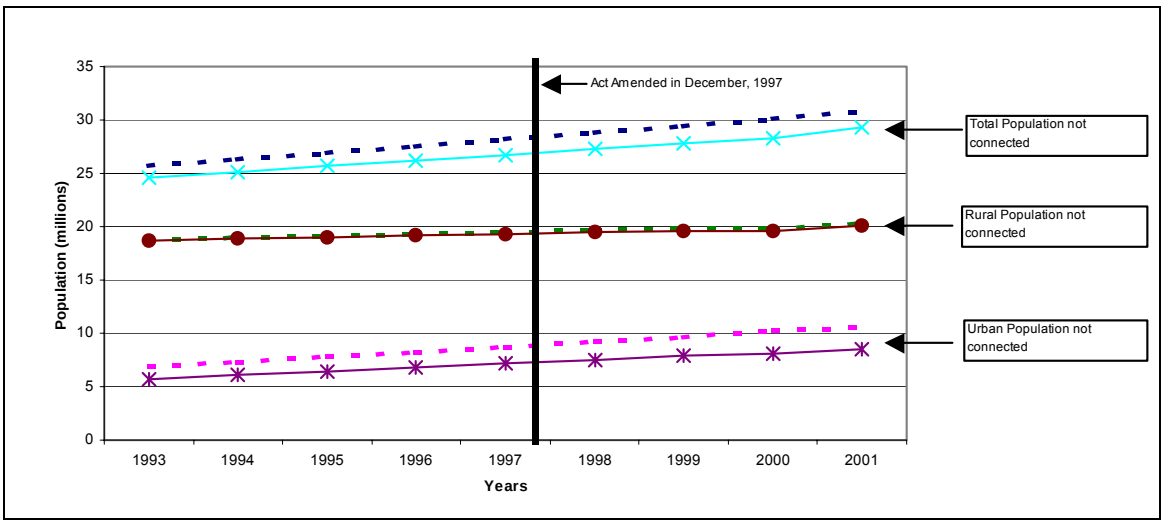
- Electrification levels
- Cost of electricity to the end-user
- Electricity consumption (at household and per capita levels).

4.4.1 Electrification Levels

Following a decade of reforming the power sector, one would expect to see a significant decrease in the population not connected to the grid electricity. This is, however, not the case in Kenya. As the graph below illustrates, the situation about ten years ago whereby almost the entire population had no access to electricity still remains to be the case today. Effectively, power sector reforms do not appear to have impacted on electrification at all.

Figure 8 Status of Population Without Access to Electricity in Kenya

[27] As mentioned earlier, this assumption has a major flaw as it ignores the urban poor.



Sources: Computed by the authors using data from World Bank (2001), KPLC (1992), (1997), (2001/2002); Kinuthia, 2003

Note: Dotted lines depict the respective total population.

The above graph (figure 8) strengthens the view shared by critics of power sector reforms that reforms have paid too much attention to IPP development and improving the financial status of the state-owned utilities (mainly to lure the IPPs and other private investors in the sector), at the expense of electrifying the country's poor.

The graph also shows that the amendment of the Electricity Act in 1997 did not reverse the continued increase in the population without access to electricity. The following table (table 20) provides the increment in the population without electricity after the Act's amendment:

Table 20 Increment in Population Without Electricity (1997 – 2001)[28]

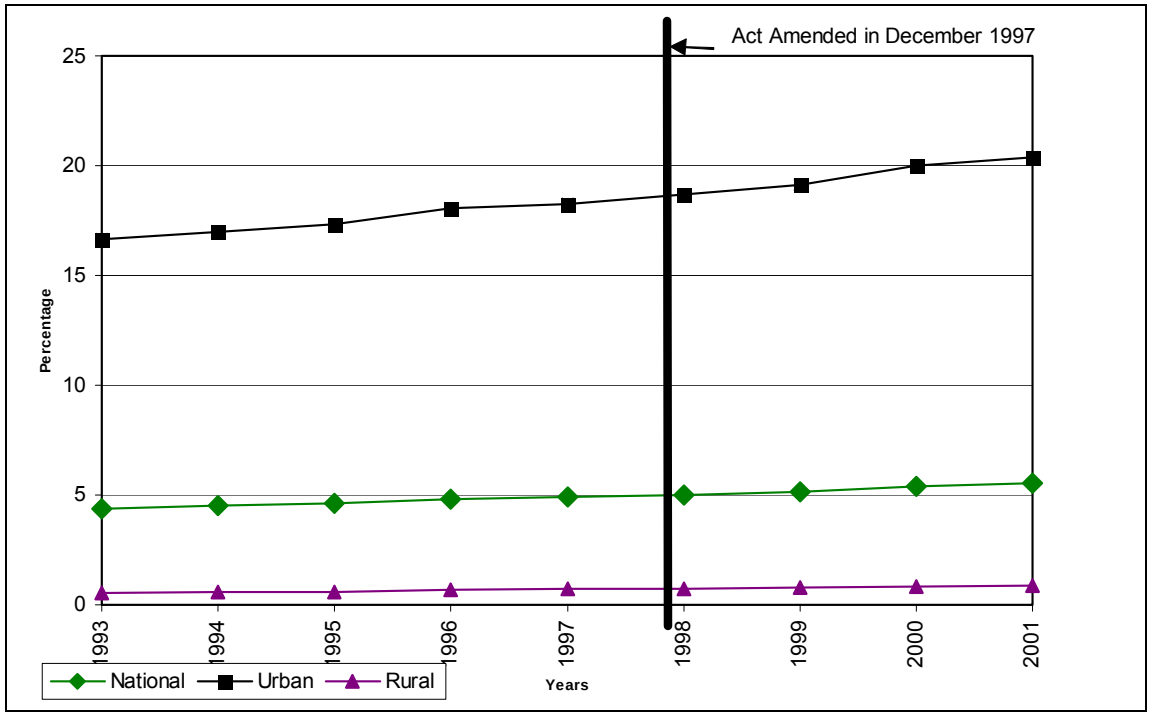
	Increment in Population Without Electricity
National	2,120,304
Urban	1,365,004
Rural	755,300

Sources: Computed by the authors using data from World Bank (2001), KPLC (1992), (1997), (2001/2002); Kinuthia, 2003

In percentage terms, pre- and post-reform electrification levels of households (national, urban and rural) have been relatively constant (figure 9). National electrification levels have only risen a miniscule 2 % over an 8-year period. Similarly, both urban and rural household electrification levels rose by an insignificant proportion during the same period. To date, 30 years after the establishment of the Rural Electrification Fund, less than 1% of the rural households have access to electricity.

[28] The increment in urban population without access to electricity appears to be higher than the rural population because the population growth rates for the period 1997 – 2001 in urban areas was higher than the rural population growth rate.

Figure 9 Households Electrification Levels in Kenya



Sources: Computed by the authors using data from World Bank (2001), KPLC (1992), (1997), (2001/2002); Kinuthia, 2003

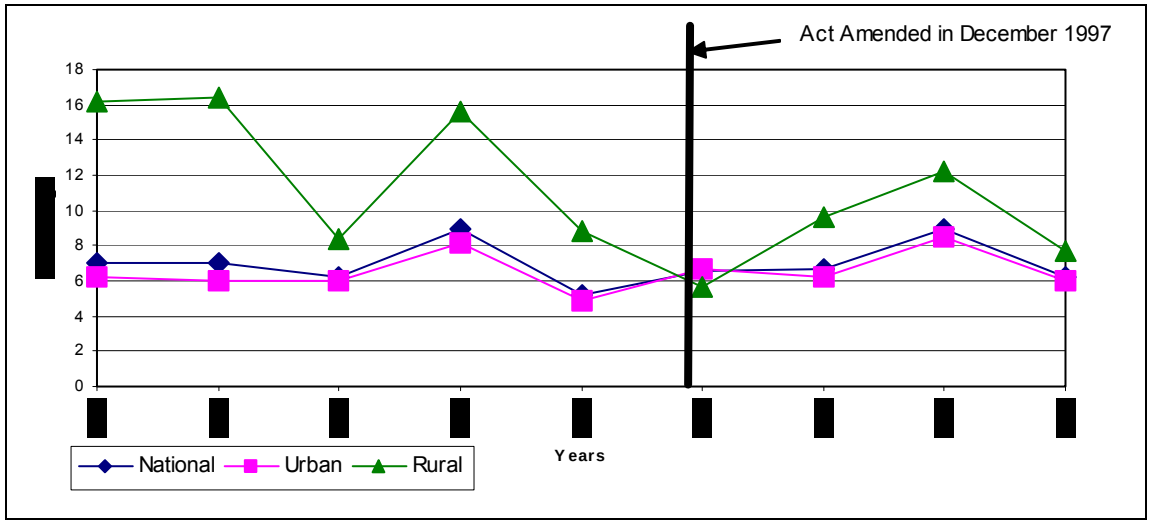
Implications for the poor: The trend in electrification levels of households (national, rural and urban) seem to indicate that the Electricity Act (amended in 1997) has not had a significant impact on electrification levels. Using the data on electrification levels of rural households as a proxy for the poor, it appears that for the foreseeable future, the poor will not have access to grid electricity.

The Electricity Act does not address this problem. The only reference made to electrification is with regard to the Rural Electrification Fund, but the Act does not provide guidance on how the rural population (who form the bulk of the population) will be electrified.

4.4.2 Electrification Rates

Figure 10 shows the trend in electrification rates at the national level as well as in rural and urban areas of Kenya:

Figure 10 Households Electrification Rates in Kenya



Sources: Computed by the authors using data from KPLC (1992), (1997), (2001/2002); Kinuthia, 2003

Overall, the household electrification rates (national, rural and urban) have been low. An interesting trend is that the national electrification rate and the urban electrification rate have been almost the same (varying between 5 – 7% for most of the years under examination). The similarity in the trend between the national and urban household electrification rates could be explained by the fact that, in absolute numbers, most of the new household connections are in urban areas, with very few in the rural areas as shown in the following table.

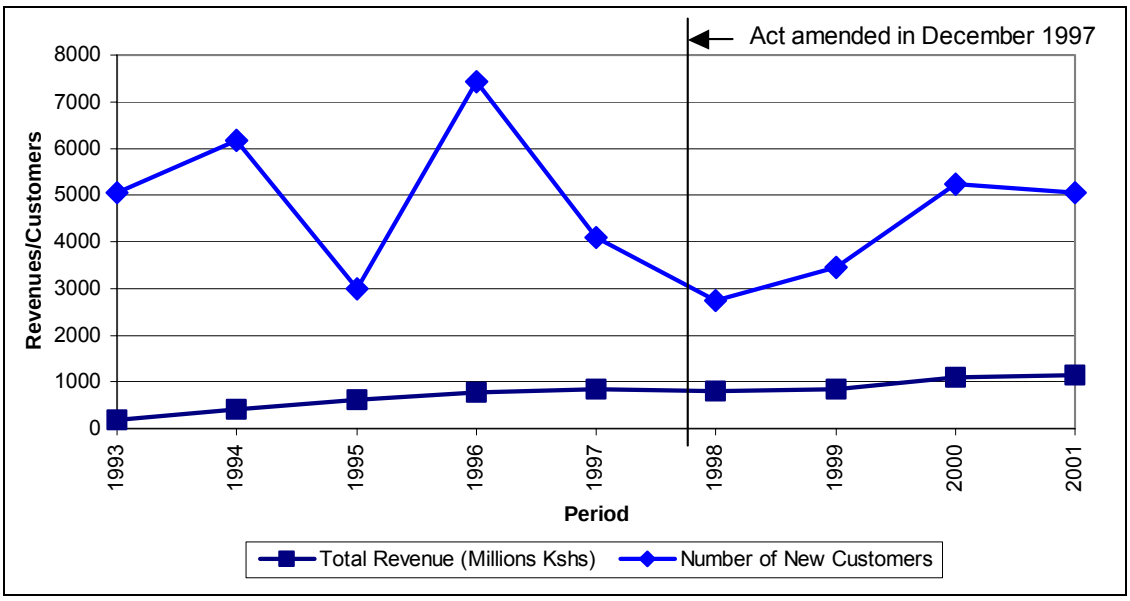
Table 21 New Household Connections

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Urban	11,729	12,179	12,697	18,480	11,827	16,997	17,155	24,640	19,054
Rural	2,775	3,283	1,942	3,951	2,564	1,784	3,238	4,477	3,156

Source: Kinuthia, 2003; KPLC, 1997, 2001/02

As shown in figure 10, during the 4 years preceding the amendment of the Act, rural electrification rates dropped dramatically from a high of 16% to a low of about 9% in 1997. Four years after the amendment of the Act, the rural household electrification rates further dropped to 8%. An assessment of the REP provides some insights into this state of affairs (figure 11):

Figure 11 Rural Electrification Fund Revenue and Number of New Rural Customers



Sources: KPLC (1997), (2001/2002), Republic of Kenya 2003.

As illustrated above, the REP has seen its revenue grow steadily from close to Kshs 200 million in 1993, to over Kshs. 1 billion in 2001. However, the number of new customers added to the programme each year has been fluctuating, but has not improved. Strangely enough, the number of new connections in 1993 when revenue was about Kshs 200 million was the same in 2001 when the REF obtained about Kshs. 1 billion, a staggering 5-fold increase in revenue. In other words, in 1993, the cost per connection was about Kshs. 38,431, while, in 2001, it rose to Kshs. 226,030. This shows that although increased funding is going into the program, there does not seem to be an increase in the number of customers added to the program each year.

Implications for the poor: The sharp decline in rural electrification rates prior and after the amendment of the Electricity Act has important implications for the poor: First, it demonstrates the declining interest on the part of Government to increasing electricity access among the poor. Secondly, the assessment of the REF illustrates its ineffectiveness and mismanagement, hence denying the poor access to electricity. Since the Act makes no explicit commitment to rural electrification targets, it is not surprising that the advent of the Act has not led to significantly higher electrification rates.

The next section examines the cost of electricity as well as consumption levels.

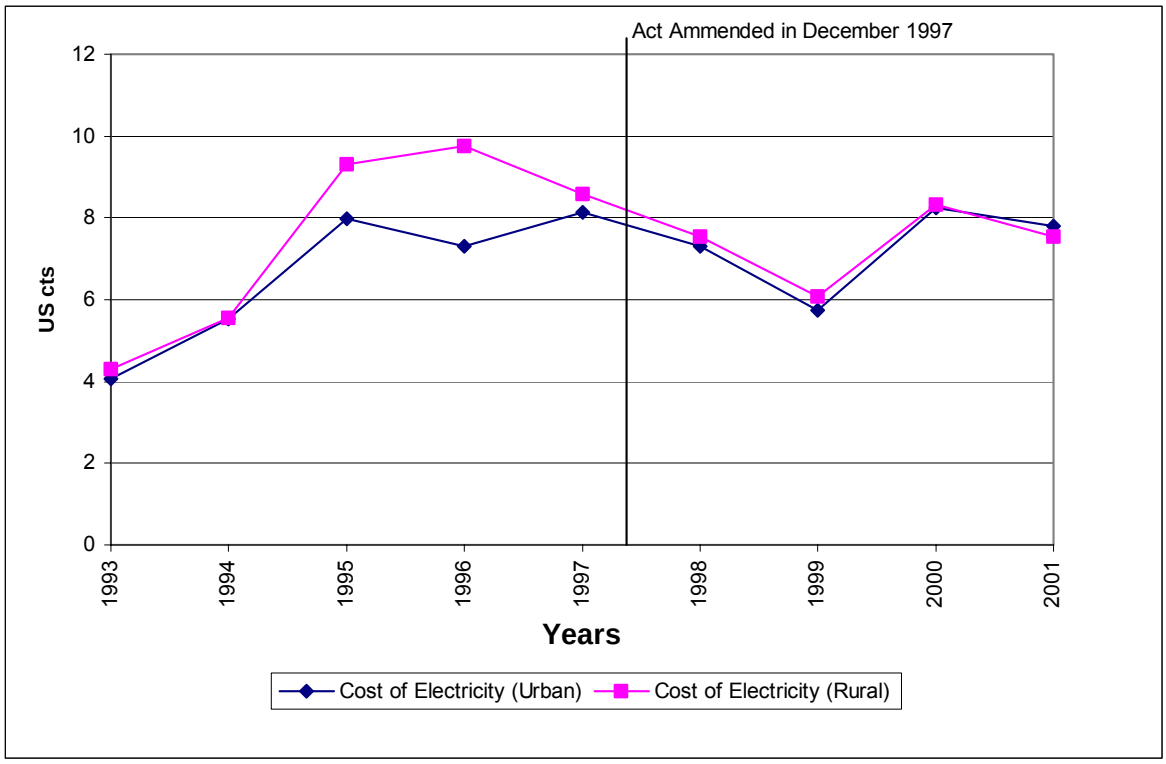
4.4.3 Average Cost of Electricity to consumers

The assessment of the impact of the amendment of the Electricity Act using electricity tariffs is undertaken at two levels. First, the cost of electricity is examined using the average cost of electricity to the consumer, rather than the average electricity tariff. The average cost captures other additional charges that consumers pay and that are not reflected in the tariff. These include fixed charges, value added tax (VAT), adjustments for foreign exchange rate fluctuations, fuel consumption (and cost) adjustments, rural electrification levy, and, a levy to finance the Electricity Regulatory Board (ERB).

The next level of assessment entails using the electricity cost data to establish the extent to which reforms have affected cross-subsidies that have traditionally existed between the non-poor and the poor (i.e. urban & rural consumers). This assessment of cross-subsidies is carried out using the Convergence Index (Sihag, et al, 2003).

Average Cost of Electricity to the consumer: The following figure (figure 12) shows the trend in end-user electricity costs per kWh over an 8-year period:

Figure 12 Cost of Electricity to the End user in Kenya[29]



Sources: Computed using data from KPLC (1992), (1997), (2001/2002); Kinuthia, 2003

The above figure depicts the trend in tariff-related reforms that took place prior to the amendment of the Electricity Act[30]. As shown, 1994 marks the year the first major tariff reform was instituted. The increase in end user costs after 1994 is largely due to the increase in tariffs - to ensure cost recovery by bringing the tariffs closer to the LRMC levels - and the introduction of the automatic adjustment formulas mentioned earlier. The tariff was gradually increased and, by August 1999 when another major tariff increase took place, the tariff was equal to the LRMC. The two adjustment formulas on fuel cost adjustment (added in 1994) and exchange rate fluctuation (added in 1996) were introduced to ensure that the tariffs were cost-reflective.

As shown in the previous graph, the increases were generally gradual with the exception of the major increase in 1994 and 1996 prior to the implementation of the Act. However, there appears to have been a dramatic increase in the cost of electricity after the amendment of the Act. This rise may have been as a result of the general tariff review effected in 1999 whereby on average, tariffs went up by about 25% (Okech and Nyoike, 2003). In overall terms, the cost of electricity has doubled when comparing the extreme ends of the pre- and post-reform period depicted in figure 12.

In part, this is due to the high operational costs incurred by KPLC (especially in rural areas) as a result of its inability to deploy innovative low cost electrification options. For example, use of single wire earth return could significantly reduce the cost of transmission lines required to transverse the long distances in rural areas. KPLC could also profitably use existing telephone poles to extend electricity to remote rural areas, a practice it has yet to adopt.

In addition, many potential electricity consumers in rural areas remain unconnected because they do not live in permanent and semi-permanent housing structures (such as houses made of quarry stone, bricks, iron sheets and timber), which is a prerequisite for connection according to

[29] The end-user cost of electricity takes into account inflation at constant 1995 prices and foreign exchange losses.

[30] As of November 1993, tariffs stood at 35% of LRMC

KPLC standards. If the minimum standards were lowered to include connections to non-permanent houses, the high transmission losses in rural areas would be minimised as a result of shorter distances between demand points. Consequently, a reduction in losses would translate into a higher revenue for the utility.

An intervention that can be made for the poor is provision of subsidies that reduce the upfront costs of connection. One of the measures would be to minimise "connection fees" and "fixed charges" through amortisation. The "fixed charges", account for a significant proportion of the electricity bill for the poor since their electricity consumption is considerably low.

Impact of Reforms on Cross-Subsidies: The primary objective of the tariff reforms was very clear – to eliminate subsidies by matching tariffs to the LRMC. This objective was met in 1999 when the tariff levels were adjusted to match the LRMC. This effectively implied the elimination of subsidies and cross-subsidies among the various consumer categories. The following assessment demonstrates two issues: First, whether reforms retained cross-subsidies; and, secondly, if retained, the level of cross-subsidies after reforms.

To determine the existence and extent of cross-subsidies the Convergence Index (CI) is used. Convergence Index is provided as follows:

$$CI = \sqrt{\{\Sigma[(ARc/ARo)-1]^2/N\}}$$

Where:
ARc = Average yield for a specific category of customers (in our case rural or urban)

ARo = Overall average yield

N = Number of categories

The CI is interpreted as follows: If the CI is zero, it implies that the average yield for each category of consumers equals the overall average yield, hence no category subsidizes another. Conversely, if the CI is above zero, it indicates the existence of cross-subsidization. Hence, the further away from zero the CI is, the higher the level of cross-subsidization.

In our analysis, there are only two categories of customers under consideration, namely the rural and the urban. Using the cost of electricity data computed using utility annual reports and database, the resulting CI is zero throughout implying no cross-subsidy between rural and urban domestic customers. This appears to be an accurate assessment given that, in Kenya, non-domestic customers of the utility (particularly manufacturing and industry) have traditionally subsidised the domestic sector, both poor and non-poor households.

Implications for the poor: The trend in the cost of electricity shows that reforms appear to have impacted negatively on the poor. A key development is the doubling in the cost of electricity when comparing the figures for 1993 and 2001. This increase, coupled with the fact that no cross-subsidies appear to exist for the poor, implies that reforms have effectively made electricity less affordable for this economically vulnerable group.

Textual analysis of the Electricity Act shows that reversing this trend may be difficult as inferred in the following excerpt from the Act (Republic of Kenya, 1997: 81):

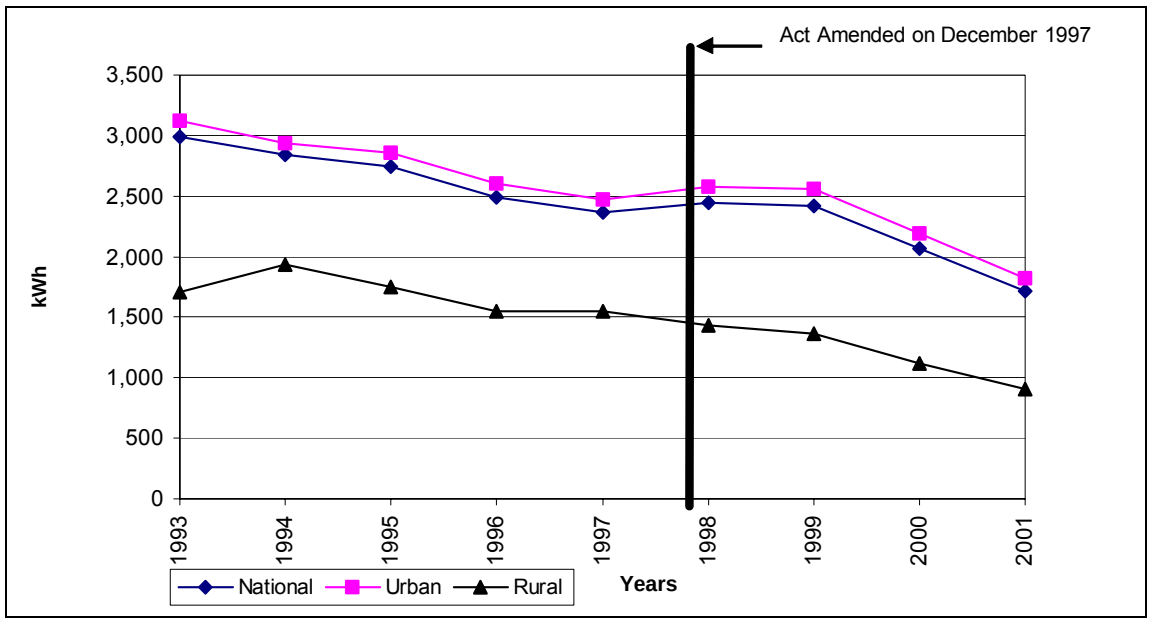
> "**All rates of tariffs charged by a public electricity supplier for electrical energy supplied … shall not give any undue preference or be discriminatory**".

Subsidised tariffs (cross-subsidies to be precise) for the poor are essentially preferential/discriminatory tariffs which are explicitly forbidden by the Act.

4.4.4 Electricity Consumption

Electricity consumption (presented as an annual average) will be assessed in two ways: on a per household basis and per capita basis. Electricity consumption per household at national, urban and rural levels have generally declined over time, but more rapidly during the post-reform period as shown in the following graph (figure 13):

Figure 13 Electricity Consumption Per Household in Kenya



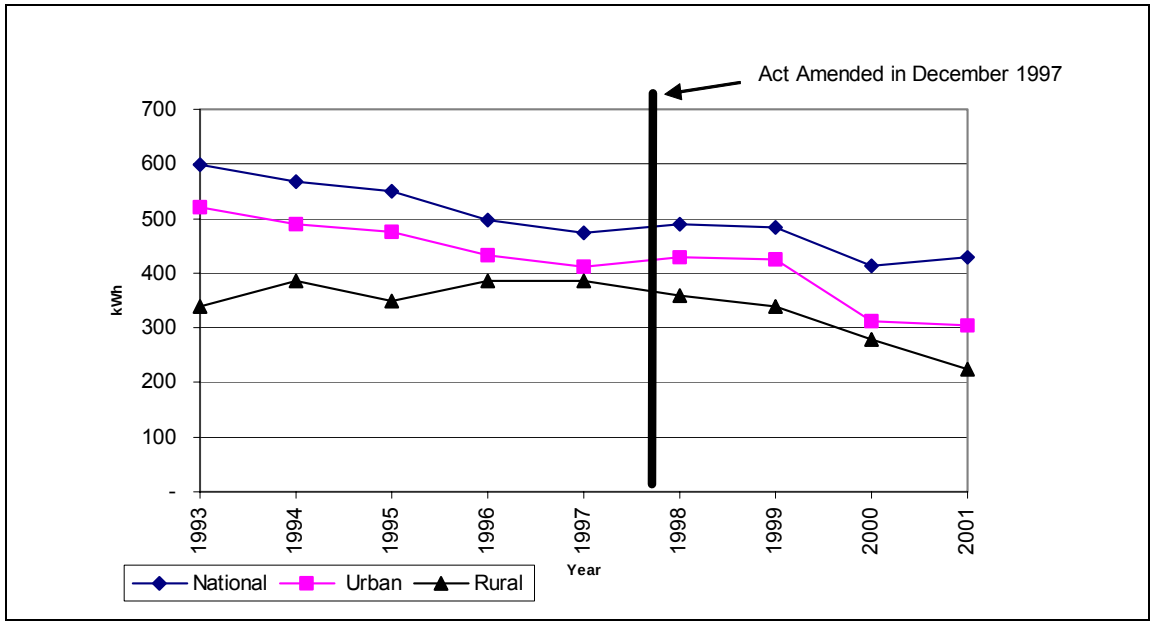
Sources: Calculated based on data from World Bank 2001, KPLC 1992, 1997, 2001/2002; Kinuthia, 2003

Electricity consumption levels for urban households dropped substantially during the period under consideration. Comparing urban electricity consumption levels of 1993 to those of the year 2001, a decline of about 40% in consumption levels occurred over the period. Its important to note that the drop in electricity consumption appears to be more significant after the implementation of the Act. It appears that the most significant decrease in electricity consumption corresponds to the steepest rise in the cost of electricity (in the years 1999 – 2001).

For the rural households, as shown in figure 13, electricity consumption levels prior to the amendment of the Act, appear to have declined with the largest drop coinciding with the 1999 – 2001 period during which the rise in the cost of electricity was one of the highest. In overall terms, electricity consumption levels have declined by almost 50% when comparing the consumption levels of 1993 and 2001.

The electricity consumption trends described above on a per household basis are consistent with electricity consumption per capita. Figure 14 shows the trend in the per capita electricity consumption levels:

Figure 14 Electricity Consumption Per Capita in Kenya



Sources: Calculated based on data from World Bank 2001, KPLC 1992, 1997, 2001/2002; Kinuthia, 2003

Implications for the poor: The deteriorating electricity consumption levels in the years after the implementation of the Act could be linked to the increased foreign exchange rate fluctuation and fuel adjustment charges (discussed earlier). These charges have, in recent years, made electricity expensive.

It is important to note that the massive load shedding experienced in 1999 and 2000, due to the drought-induced short-fall in generation capacity led to a major reduction in the electricity consumption levels countrywide. In addition, increasing electricity losses may have contributed to lower electricity sales, hence decreasing consumption levels.

4.5 Preliminary Conclusions of the Kenya Case Study

There are several important observations that emerge from the Kenyan case study:
First and foremost, data on the electrification of the poor in Kenya is inadequate. As a result, the authors had to use a proxy for the poor. This limitation, coupled with the fact that electrification of the poor is extremely low, implies that the findings contained in this report may not be conclusive.

It appears that rural electrification was relegated to the bottom of the priority list of reforms. This is confirmed by the fact that the establishment of a rural electrification agency has come at the tail end of the reform process. In fact, the creation of this agency appears to be an afterthought given that it is not a provision in the Electricity Act.

Secondly, the de facto distribution monopoly enjoyed by KPLC limits the potential of increased rural electrification. By virtue of KPLC holding distribution licenses covering most of Kenya, if not the whole of it, this implies that no other entity can establish a rural mini-grid or decentralized system without express permission of KPLC. KPLC was only recently salvaged from near bankruptcy by the State. In effect, it is likely to take a while for the utility to upgrade its overloaded distribution system before embarking on expansion of its rural electrification programme.

The knee-jerk reaction to addressing the above problem is to make additional amendments to the Act to reflect a significant commitment to electrification of the poor. However, in the Kenyan situation, such a move would be a very difficult undertaking. Kenya is in the midst of a massive constitutional amendment process, which is still ongoing. For the next 2 - 3 years, legislators are unlikely to be keen to take on small amendments to existing Acts.

Thirdly, the rate of rural electrification appears to have rapidly declined during the reform period. The prevailing rate of electrification (new connections) is insufficient to lead to any significant new electricity connections of the poor. The electrification rate appears to have been outpaced by the population growth rate. The amended Electricity Act – essentially the pillar of all power sector reforms, does not provide any new or improved mechanism for increasing electricity access to the majority of the poor.

In fact, the idea of establishing of an autonomous rural electrification agency was mooted by a Ministry of Energy taskforce in the year 2003 – somewhat as an afterthought of reform process. The proposed rural electrification agency is, however, faced with a number of limitations: Firstly, the involvement of the Ministry officials could stifle the requisite autonomy of the agency; Secondly, the proposed representation of the key stakeholders in the rural electrification agencies may not be adequate as the poor appear not to be represented; Lastly, it is unclear whether the Rural Electrification Fund will be "ring-fenced" to ensure the agency does not mismanage the fund as KPLC reportedly did.

Fourthly, the Electricity Act does not have a provision for reducing the cost of electricity to the poor, as it actively discourages any preferential electricity pricing or cross subsidies. Urban and rural customers face similar electricity charges. Clearly, there is a case for some intervention such as targeted and higher levels of subsidies to cushion the poor and to jump-start the rural electrification effort.

Close examination of the issues discussed above shows that, the future of electricity access for the poor in Kenya is bleak. The poor are effectively trapped. On one hand, there is very little effort to extend the grid to the poor. On the other hand, the poor who are electrified pay high prices for the electricity that they consume. In addition, the current institutional and legal framework provides no special incentives for subsidies and the electrification of the poor.

5.0 ASSESSMENT OF THE IMPACT OF THE ELECTRICITY ACT ON THE POOR: UGANDA CASE STUDY

5.1 Key Characteristics of the Electricity Sector

The Ugandan power sector was previously dominated by a state-owned, vertically integrated Uganda Electricity Board, UEB, which has since been unbundled into three limited liability companies, namely, the Uganda Electricity Generation Company, the Uganda Electricity Transmission Company and the Uganda Electricity Distribution Company responsible for generation, transmission and distribution, respectively. At the moment, the Ugandan Government is pursuing active negotiations with various investors, and, if concluded successfully, a marked increase in the level of private investment in the sector will be realised. So far, a concession for generation was awarded to Eskom Enterprises in 2002.

The Electricity Act of 1999 that outlines the Government's policy on electricity production, makes specific provisions for rural electrification and empowers the Minister of Energy to plan and initiate strategies that promote electricity use in the rural areas. According to Engurait, (2003), rural electrification is central to the process of power sector reform in Uganda. The Rural Electrification Fund recently established in line with provisions of the Electricity Act is expected to be instrumental in achieving equitable access to electricity throughout the country.

5.2 Past reforms in the power sector

By 1986, most of the energy sector infrastructure was run down due to poor maintenance, limited re-investment and the general effects of intermittent civil wars that had been raging in Uganda for almost 14 years. In 1987, the Ugandan Government started rehabilitating the run down electricity infrastructure and restoring it to full capacity (particularly, generation).

In 1997, the Government of Uganda developed a Strategic Plan for transforming the Ugandan power sector into a financially viable electricity industry, in order to enable it to supply reasonably priced and reliable power. This new Strategic Plan placed special emphasis on the role of competition in promoting efficiency within the power sector and on private sector participation as a key driver for enhancing the performance of the country's electricity industry.

Current key performance indicators in the Ugandan power sector are shown in the following table 22:

Table 22 Key performance indicators in the Ugandan Power Sector (2002)

Indicator	Value
Installed Capacity (MW)	318.00
Electricity Generation (GWh) - 2001	1,576.60
System losses (%)	35.00
Number of Customers	221,317.00
Customers per employee ratio	170.00
Household electrification levels - National (%)*	4.12
Household electrification levels - Urban (%)*	18.94
Household electrification levels - Rural (%)*	1.08

* This figure only refers to the proportion of households connected to the electricity grid and may differ significantly from other sources which indicate the proportion of electrified population derived from the respective total number of grid electricity customers.

Sources: AFREPREN 2002, Engurait 2003, Okumu 2003.

One of the aims of the reforms was to transform the sector into a profitable and financially viable industry with priority attention given to reducing system losses. Over the last five years the systems losses have averaged at about 36% (table 23).

Table 23 System Losses

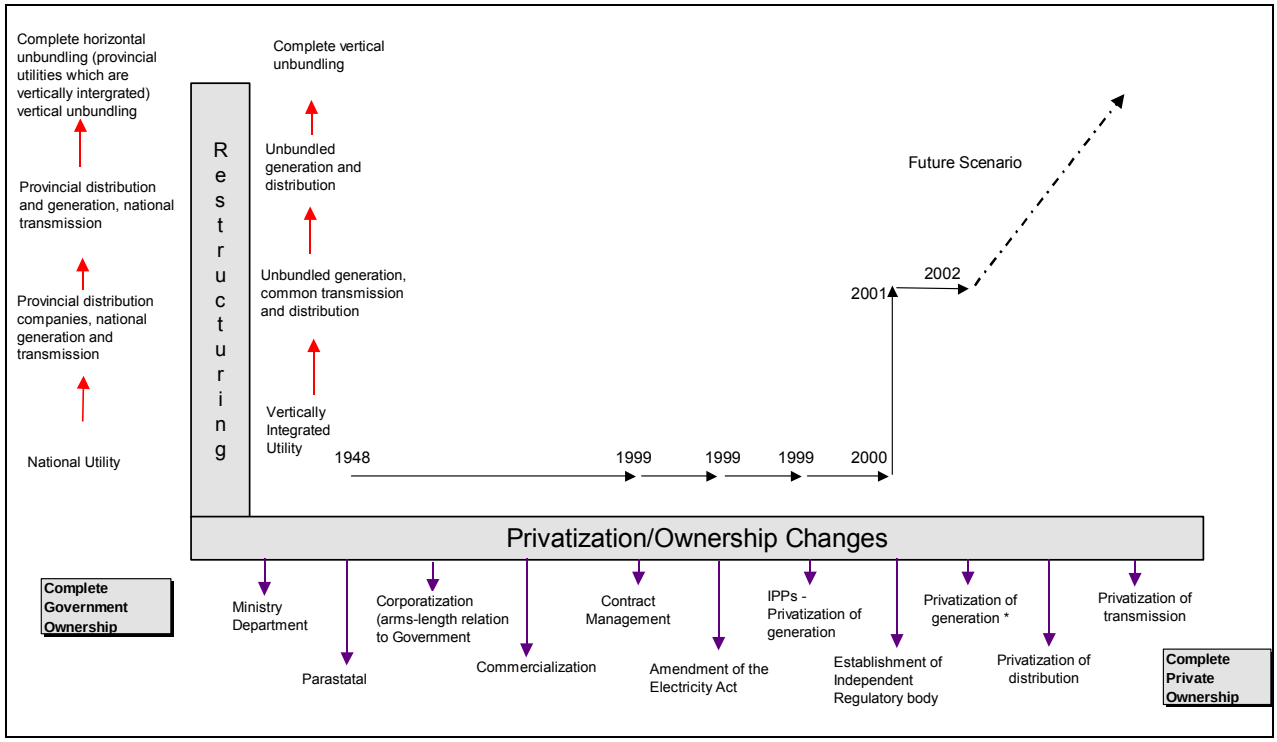
Year	1995	1996	1997	1998	1999	2000	2001	2002
System Losses	39.5%	30.8%	33.1%	34.2%	39.7%	34.4%	36.1%	35.0%

Sources: Engurait, 2001; Okumu, 2003; Kyokutamba, 2003b

The bulk of the systems losses (on average over 60%) are due to technical losses resulting from the long distances between points of production and consumption and the need for network rehabilitation. As a result of the refurbishment and rehabilitation programs and the construction of new lines, the losses are expected to decline to about 10-15% by 2010.

In 1999, a new electricity legislation was enacted, providing for the liberalisation of the power sector, the introduction of new private sector electricity infrastructure providers and the privatisation of existing assets. The legislation also provided for the establishment of an autonomous authority to regulate the electricity industry and a Rural Electrification Trust Fund (RETF) to promote increased access to electricity, particularly for the poor. Figure 15 below illustrates reforms undertaken in Uganda's power sector to date.

Figure 15 Reforms in Uganda's Power Sector



** Concession awarded to Eskom Enterprises of South Africa*

Source: Compiled by authors

In summary, the key reform milestones in Uganda are as follows:

June, 1999: Government approves the Power Sector Restructuring and Privatisation Strategy.

November, 1999: The new Electricity Act is passed.

*April, 2000***:** The Electricity Regulatory Authority becomes operational.

*March, 2001***:** UEB is unbundled and three companies created and registered, namely: The Uganda Electricity Generation Company Ltd; The Uganda Electricity Transmission Company Ltd; and, The Uganda Electricity Distribution Company Ltd (UEDCL).

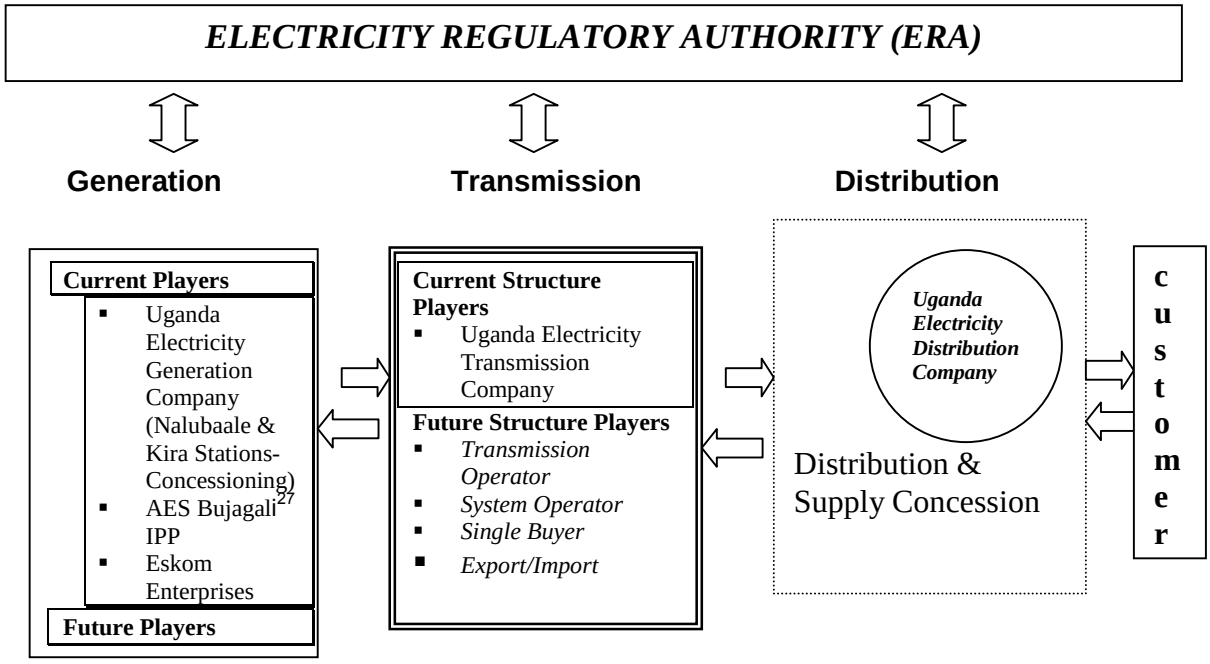
*May, 2001***:** Concessions for generation and distribution are advertised.

November, 2002: Concession for generation awarded to Eskom Enterprises.

February, 2003: Appointment of the Rural Electrification Board to oversee the Rural Electrification Trust Fund (REFT)

Prior to the reform process, the institutional structure of the power sector in Uganda was dominated by the UEB, the sole electricity utility that also doubled as a regulator. After the reforms, the entire institutional structure has been transformed (figure 16):

Figure 16 Reformed Institutional Structure of the Ugandan Power Sector



Source: Engurait, 2002

5.3 Review of the Policy and Regulatory Framework in Uganda

To set the stage for the assessment of the impact of power sector reforms on the poor in Uganda, the following discussion assesses the extent to which the question of "access" is addressed by the following key regulatory and policy instruments:

- National Energy Policy
- Electricity Act
- Rural Electrification Strategy and Plan

[31] AES has recently pulled out of the hydro-based Bujagali IPP.

National Energy Policy

Released only recently, the National Energy Policy seeks to meet, among other objectives, increased access to modern affordable and reliable energy services thus contributing to poverty eradication. The Government expects to pursue this objective through the fostering of a favourable environment for accelerating rural energy supply and access by undertaking the following (Ministry of Energy and Mineral Development, 2002: 11):

- Applying subsidies exclusively to energy investment (e.g. no subsidies for running and operational costs);
- Applying light-handed regulation to facilitate investment in rural energy projects;
- Having differentiated tariffs for different areas or projects to reflect investment and supply costs;
- Exploring schemes to assist consumers to purchase energy appliances thereby increasing the speed at which the load of new consumers matures; and
- Formulating guidelines for organising rural communities to access better provision of energy services.

The Electricity Act

Compared to the Kenya Electricity Act, the Ugandan Electricity Act places more emphasis on the question of electricity access, especially in rural areas – where the majority of the poor reside. The Act provides for the establishment of a Rural Electrification Agency.

The Electricity Act also empowers the Minister for Energy to undertake the following (Republic of Uganda, 1999):

a) Prepare and submit a sustainable and coordinated Rural Electrification Strategy and Plan for Uganda to the Cabinet for approval

b) Once each year, submit to Parliament, an annual report on the progress and achievement of the Rural Electrification Plan

c) From time to time, with the approval of Cabinet, amend the Rural Electrification Strategy and Plan.

d) Establish the Rural Electrification Fund. In so doing, the Minister shall:
- Administer the Fund in accordance with the Act,
- Develop criteria for eligibility to receive financial support from the Fund
- Define the subsidy level that will provide maximum access to electricity, and
- Carry out any other functions necessary for promoting rural electrification.

e) Determine the criteria and the appropriate level of the subsidy, taking into account,
- The rate of progress of rural electrification
- The resources available from the Fund
- The extent to which the proposed activity demonstrates support for rural development, taking into account the priorities of the local community
- The level of community and investor commitment to the proposed activity
- The extent to which the proposed activity can demonstrate technical, economic and financial viability after the initial subsidy, and
- The extent to which the proposed activity makes appropriate use of renewable energy resources.

f) Maintain a national rural electrification database to assist in the monitoring of progress and establishment of the rural electrification targets.

The Rural Electrification Strategy and Plan

The first Rural Electrification (RE) Strategy and Plan, covering the period 2001 to 2010[32], was approved by the Cabinet in February 2001. It was to be implemented in the following fashion:

- Progressive development of rural electrification schemes on a demand driven basis whereby capable sponsors can initiate and develop electrification projects.

- Participation and extensive training of the private sector, including the development and operation of isolated power supply systems (mini-grid and PV[33]).

- Creation and capacity building of the Rural Electrification Agency.

- Establishment of a Rural Electrification Board, a Rural Electrification Fund and a transparent mechanism for funds disbursement to buy down capital costs through the provision of grants and loans for rural electrification schemes.

- Institution of tariffs reflecting the cost of providing a service and allowing private capital to make a satisfactory return on the investment.

The primary objective of the RE Strategy is to reduce inequalities in access to electricity and the associated activities of social welfare, education, health and income generating opportunities. The RE Strategy aims to achieve for the year 2010 (now 2012), a rural electrification level of 10%. The Strategy builds on and extends the thinking on rural electrification set out in the Power Sector Restructuring and Privatisation Strategy (PSRPS) of June 1999. It provides the rural complement to the privatisation of the national utility, which mainly benefits urban consumers.

The RE strategy also sets up the modality for financing and electrification projects. Statutory Instrument 2001 No.75 established the Rural Electrification Fund (REF), provided for in the Electricity Act. The REF is the main instrument for achieving equitable regional distribution access to electricity. In order to make rural electrification projects commercially viable and tariffs affordable to a large number of rural communities, the Fund will be utilised to buy down investment costs, risks and information barriers to public or private rural electrification initiatives.

As from February 2003, rural electrification in Uganda became the responsibility of the Rural Electrification Trustee Board. This is a 7-member board headed by the Permanent Secretary in the Ministry of Energy. Its key role is to oversee the Rural Electrification Trust Fund. The Board's immediate objective is to implement the Energy for Rural Transformation, which is a 10-year World Bank-financed project, aimed at increasing rural electrification levels from the current 1% to 10% in 2012.

The establishment of the Rural Electrification Trustee Board is a step in the right direction. Its effectiveness in making a major difference in rural areas is, however, doubtful for several reasons.

The first reason is that the Board's autonomy is likely to be compromised by the heavy involvement of officials of the Ministry of Energy. The fact that the Ministry's Permanent Secretary heads the Board indicates the extent of the Ministry's involvement. In addition, the

[32] This year has been revised to 2012.

[33] The Government is currently implementing a solar PV pilot project through a financing mechanism that makes it possible for both PV consumers and vendors to obtain credit for solar rural electrification. This is part of a wider effort to address the low levels of access to electricity, especially in the rural areas.

provision in the Electricity Act empowering the Minister, and not the Board, to plan for rural electrification further demonstrates that the autonomy of the Board is likely to be impaired.

Secondly, the Act does not provide measures to ensure that the Board is accountable to end-users. For example, the Act is silent on to whom the Board reports to. In addition, the Act does not indicate the tenure of the individual board members. Consequently, the grounds for dismissal of the board members for non-performance do not exist.

Thirdly, there appears to be no special arrangement for ensuring the representation of the poor in the agency's governing bodies. Consequently, the interests of the poor are unlikely to be adequately represented.

Fourthly, the current targets set for rural electrification levels in 2012 appear to be too low to make a significant impact on the majority of the un-electrified population. A much higher target should be set aimed at electrifying a significant proportion of the poor, especially in the rural areas.

5.4 Empirical Assessment of the Impact of Implementation of the Electricity Act on the Poor

The key power sector reform measure to be assessed is the amendment of the Electricity Act that took place 3 years ago. It could be considered too early to assess the impacts of reforms on the poor, however, the limited available data could provide some indication of future trends.

As mentioned earlier, access to the relevant data for Uganda proved to be a difficult undertaking. For instance, rural and urban data sets – our proxy for the poor and non-poor, respectively, are not readily available, principally because the UEDCL (and its predecessor, UEB) does not categorise its data into urban and rural customers. With guidance from an expert from the UEDCL, the authors used a proxy to distinguish between rural and urban areas in Uganda. The capital city of Kampala and all major municipal centres were considered urban areas, and all other areas considered rural.

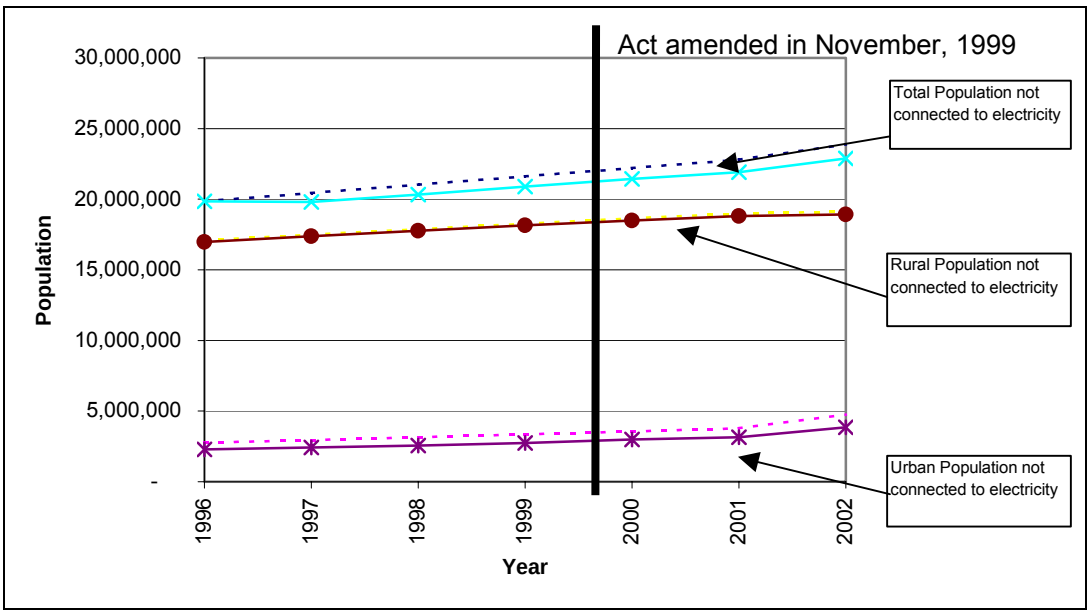
Although this approach, to some extent, may be flawed, it would not significantly affect the analysis because Uganda is the least electrified East African country with only 4% of the total population is electrified. Electrification of the poor is, therefore, extremely limited. In the rural areas, about 99% of the population has no access to electricity.

The following sections assess the impact of reforms using three indicators, namely, electrification levels, electrification rates and electricity consumption.

5.4.1 Electrification Levels

As mentioned earlier, Uganda is the least electrified country in East Africa. Using absolute numbers of those without access to electricity demonstrates the following trend illustrated in figure 17:

Figure 17 Number of People Not Connected to Electricity in Uganda



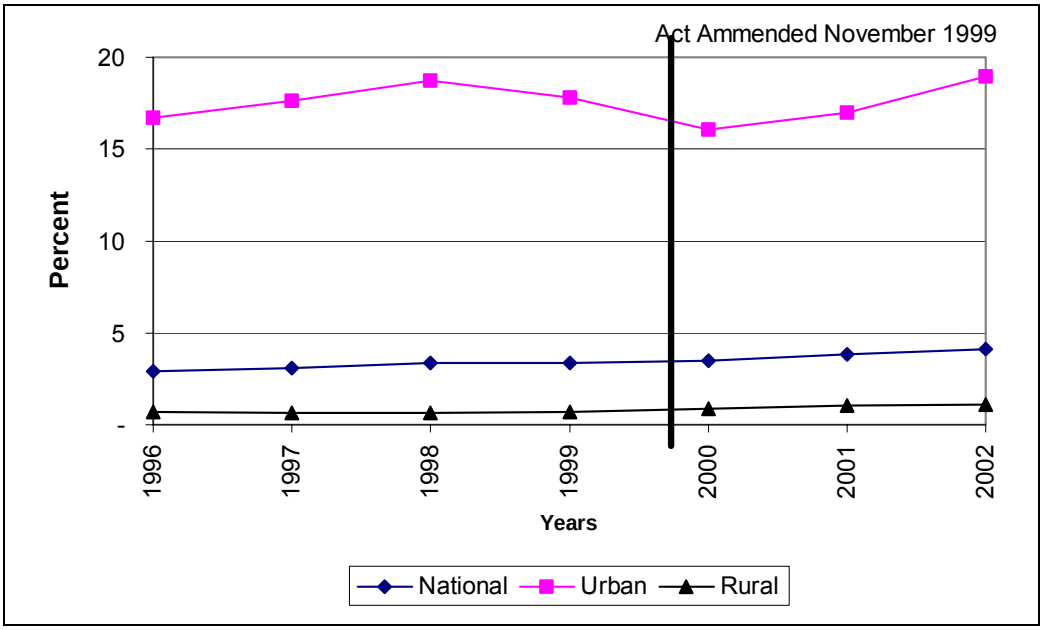
Note: The dotted lines refer to the respective population levels.

Source: Okumu, 2003; Kyokutamba 2003b; Engurait, 2001

Figure 17 shows that almost the entire rural population does not have access to electricity. A comparison between the years of 1996 and 2001 indicates a slight improvement in the status of the unelectrified population for the national and urban indicators. However, a closer examination of the graph reveals that the change at the national level is due to increase in urban areas. In the rural areas, it seems that the entire population is unelectrified, with the exception of an insignificant proportion – too small to be seen in the graph.

Household electrification levels in percentage terms, present a deceptively positive picture that shows an upward trend. Like in many other African countries, the largest share of electrification is in the urban centres (figure 18).

Figure 18 Household Electrification Levels in Uganda



Source: Okumu, 2003; Kyokutamba, 2003b; Engurait, 2001

Available data shows that a few years before implementation of the Electricity Act, there appears to have been a marginal increase in electrification levels at the national level. In 1999, national household electrification levels were about 3% and appear to have risen marginally to about 4% in 2002. This may, however, be due to the formalisation of illegal connections following "Operation Sigma" in 2001/2002[34], thus there may have been no real new connections.

Similarly, disaggregated data on rural and urban household electrification levels shows a marginal increase. For instance, urban electrification levels appear to have risen to about 19% in 1998, then dipped down to 16% in 2000, followed by an increase to slightly under 20% in 2002. In the case of rural electrification, the levels have been hovering around 0.8%, with no major increases.

Implications for the poor: The stagnant electrification levels for the poor implies that the poor have been left out as far as access to electricity is concerned.

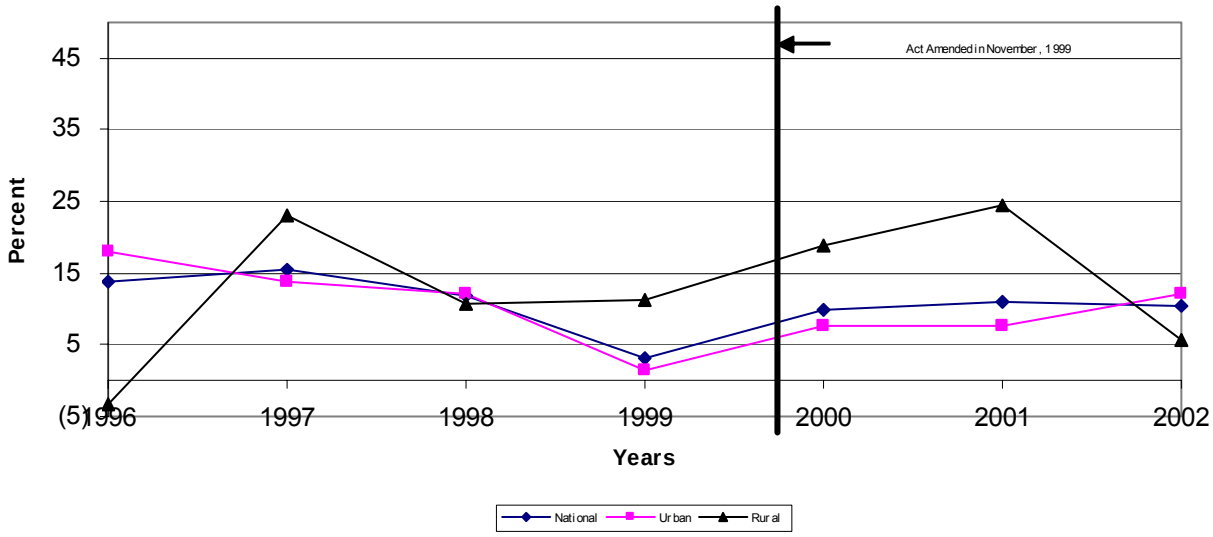
The Government of Uganda is, however, in the process of implementing the Energy for Rural Transformation Project whose objective is to increase rural electrification levels to about 10% by the year 2012 (Okumu, 2003). This target is too low given that at the end of the next 10 years, the vast majority of the poor (90%) will still have no access to electricity.

5.4.2 Electrification Rates

The household electrification rates provided in figure 19 enable us to better understand the reason for the low electrification levels shown in figure 18.

[34] This was an exercise by the utility aimed at formalizing illegal connections as well as stopping fraudulent acts such as bypassing and/or tampering of electricity meters.

Figure 19 Households Electrification Rates in Uganda



Source: Okumu, 2003; Kyokutamba, 2003b; Engurait, 2001

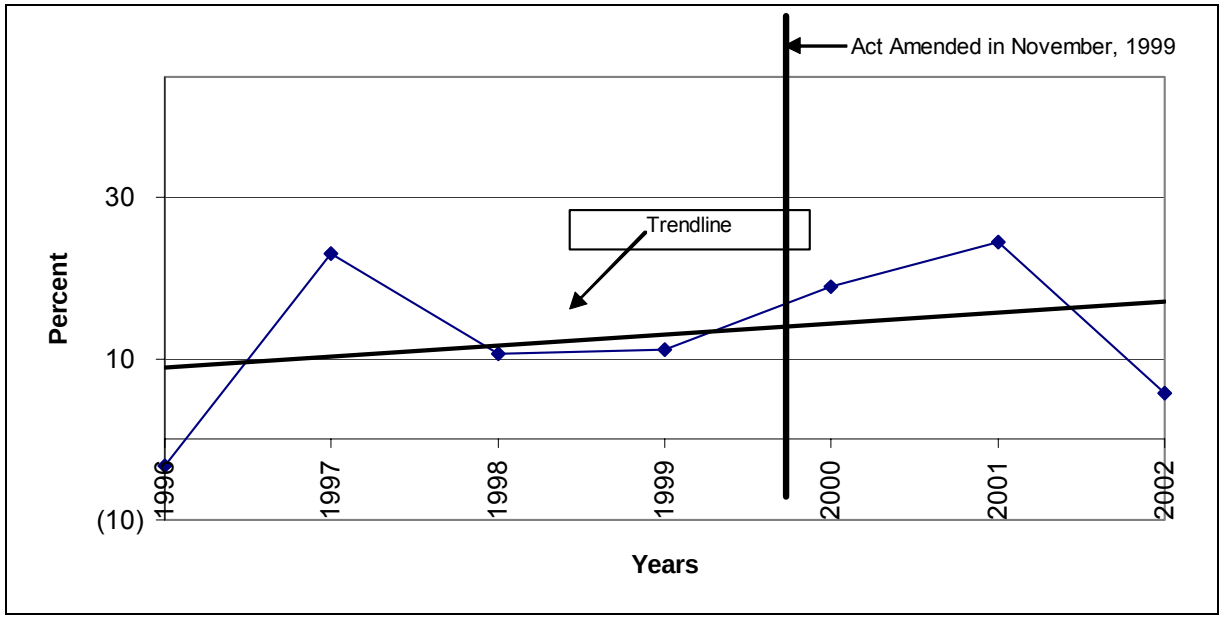
The national and urban household electrification rates prior to the amendment of the Electricity Act were generally on a downward trend. However, during the post-reform period under consideration, an increase in electrification rates was registered. Nevertheless, the post-reform rates are considerably low compared, for instance, to 1997 rates.

Rural household electrification rates recorded significant slumps in 1997 and 2002 due to operations initiated by the utility targeting illegal connections (”Operation Thunder" in 1996/1997 and "Operation Sigma" in 2001/2002). Both operations resulted in massive disconnections. In addition, tariffs were increased in 2001 (as will be demonstrated further on), leading to further disconnections for non-payment, especially in rural areas.

It is worth noting that for all the areas, the rates of electrification went up at some point after the amendment of the Act in 1999. In rural areas, the electrification rates appear to be very positive. However, this trend is distorted due to the very high fluctuations caused by massive disconnections and reconnections[35]. In addition, the modest positive trend in rural electrification is unlikely to result in significant increase in overall electrification levels of the poor due to rapid population growth (see table 24).

[35] The data available does not differentiate between reconnections and new connections. Reconnections are considered new connections (new customers).

Figure 20 Trend Analysis of the Rural Households Electrification Rates in Uganda



Source: Okumu, 2003; Kyokutamba, 2003b; Engurait, 2001

At the prevailing rural electrification rates even the Government's very modest target of 10% by 2012 will not be realized. Projections computed by the authors (see table 24) based on the realized annual average of about 16% electrification rate trend (1996 – 2002) show that by the year 2012, the Government's 10% target for rural electrification levels would not be met.

Table 24 Projected Targets for Rural Electrification Levels for 2012

	Current Status	Authors' Projections	Government Target
	2002	2012	2012
No. of Rural Households	4,008,695	5,387,351[a]	5,387,351[a]
No. of Rural Household Connections	43,098	190,124[b]	538,735
% Rural Household Connections	1.1	3.5	10

Sources: Okumu, 2003; AFREPREN/FWD, 2002.

Notes:
[a] – Projected at 3% growth rate per annum
[b] – Projected at an annual average of the realized 16% rural electrification rate for the period 1996-2002

5.4.3 Electricity Tariffs

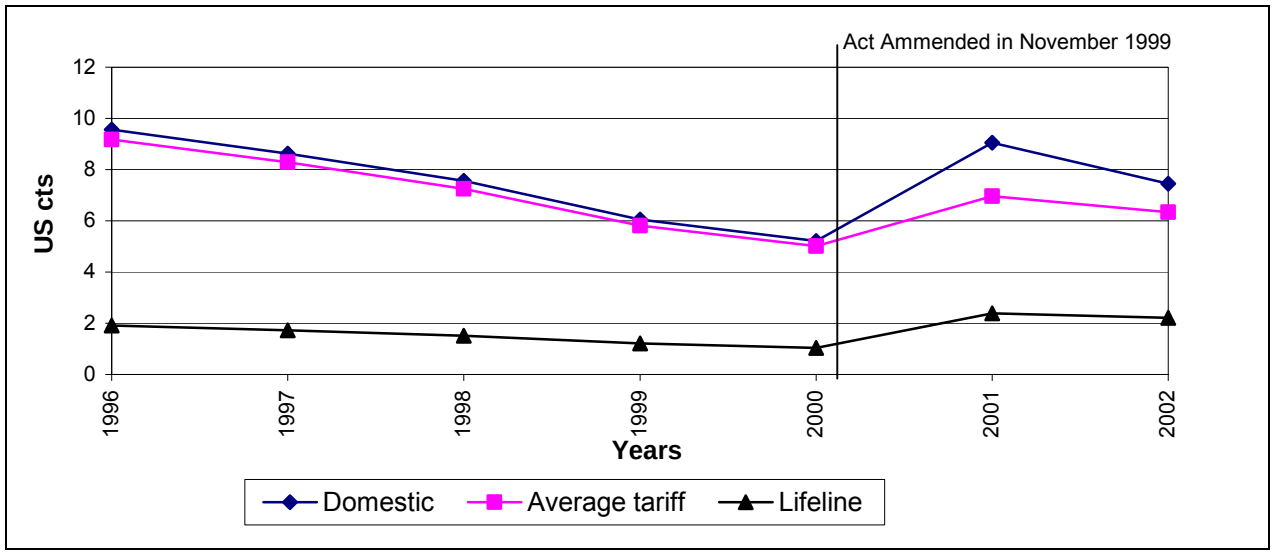
Effectively since 1993, no tariff revision had been undertaken until the year 2001. As the available data set demonstrates, the tariffs went up sharply in 2001, but reduced slightly after that. The 2001 tariff increases were initiated to ensure tariffs became cost-reflective (removing subsidies) ahead of the unbundling and subsequent privatisation of the state owned utility.

The increase in tariffs appears to coincide with the big drop in rural connections witnessed in 2001/2002[36]. This demonstrates that the mechanisms put in place to cushion the poor from adverse impacts are inadequate. Given that about 97% of the electricity is hydro-based (Okumu, 2003), current tariffs seem very high. The high tariff could be covering up the inefficiencies of the power utility.

The new tariffs led to a public outcry with numerous press reports claiming that the revised tariff levels were excessive. These were revised downward following the intervention of the country's President. In spite of the reduction, the average domestic tariff went up by 90% of the previous tariff in Uganda shilling terms. The increase in tariffs also affected the lifeline customers, who saw their tariff triple from just over USc 1 per kWh, to slightly above USc 3 per kWh (Okumu, 2003; UEDCL, 2001).

To cushion the poor from the high tariffs, two considerations were made with regard to the tariff structure for domestic consumers: First, the "fixed" or "standing" charge was not changed. Secondly, a Ug.Shs.10 per kWh (approximately USc 0.6 per kWh) was introduced in the tariff for domestic consumers of over 31 kWh and all other non-domestic tariff categories to cross-subsidise the poor (Kyokutamba, 2003a).

Figure 21 Average Domestic Tariffs[37] in Uganda (USc)



Source: Okumu, 2003; Kyokutamba, 2003b; Engurait, 2001

Until the recent tariff reviews, electricity has been sold to the domestic consumers (both poor and non-poor) at highly subsidised levels. Closer examination of the electricity subsidies reveals that the non-poor account for the bulk of the subsidies in three ways.

First and foremost, the non-poor benefit from the subsidies due to the simple fact that they form almost the entire electrified population and at the same time consume the bulk of the electricity – most of which is subsidised. Using the rural and urban household connections as our proxy for the poor and non-poor, close to 80% of the electrified household are non-poor. Similarly, the non-poor account for over 90% of the total domestic electricity consumption.

[36] "Operation Sigma" was executed during 2001/2002 and led to massive disconnections. In addition, further disconnections were made as a result of non-payment, especially in the rural areas.

[37] The tariffs are adjusted to reflect inflation at constant 1996 prices as well as foreign exchange losses.

Secondly, the billing structure for the domestic customers is such that all of them (both poor and non-poor) are charged the same amount for the first tariff band (i.e. 1 – 30 kWh for pre-2001 tariffs and 1 – 50 kWh for post-2001 tariffs). An assessment of subsidies in 1999 reveals that tariffs for the 1 – 30 kWh band, the non-poor received subsidies to the tune of about 74% per kWh compared to about 24% for the tariff bands above 31 kWh. Consequently, the non-poor pay for their first 50 units at a quarter of the expected cost.

Thirdly, a further assessment of the estimated subsidies in 1999 (see table 25) indicates that the non-poor take the lion's share.

Table 25 Estimation of Subsidies Distribution (1999)

Indicator	Value
Total amount of subsidy (Ushs)	7,725,246,270.00
Total domestic electricity consumption (kWh)	307,100,000.00
Average subsidy per unit (Ushs/kWh)	25.16
Electricity consumption by poor (kWh)	21,200,000.00
Estimated subsidy captured by poor (Ushs)	533,392,000.00
Estimated proportion of total subsidy (%)	6.90
Electricity consumption by non-poor (kWh)	285,900,000.00
Estimated subsidy captured by non-poor (Ushs)	7,193,244,000.00
Estimated proportion of total subsidy (%)	93.10

Sources: Calculations based on Kyokutamba, 2002; Okumu, 2003

An intervention that can be made for the poor is provision of subsidies that reduce the upfront costs of connection. One of the measures would be to minimise "connection fees" and "fixed charges" through amortisation. The "fixed charges", account for a significant proportion of the electricity bill for the poor since their electricity consumption is considerably low.

Apart from subsidies being an option for making electricity more affordable for the poor, improvement in the utility's technical and financial performance could lead to significant reduction in the tariffs for the poor. In the Uganda case, the utility's inefficiency in terms of high system losses and excessively long debt collection periods make electricity costly. To illustrate the extent of inefficiency, the total electricity losses alone exceed the total amount of domestic rural electricity consumption. This implies that halving the prevailing system losses could have a positive impact on the tariffs.

Similarly, any efforts to reduce the debt collection period even by a half would not only significantly enhance the financial status of the utility but could also lead to a reduction in the tariff levels for the poor. This is possible given that, in 1999, the utility declared a profit in spite of a debt collection backlog of 363 days (Kyokutamba, 2003a; Engurait, 2003b).

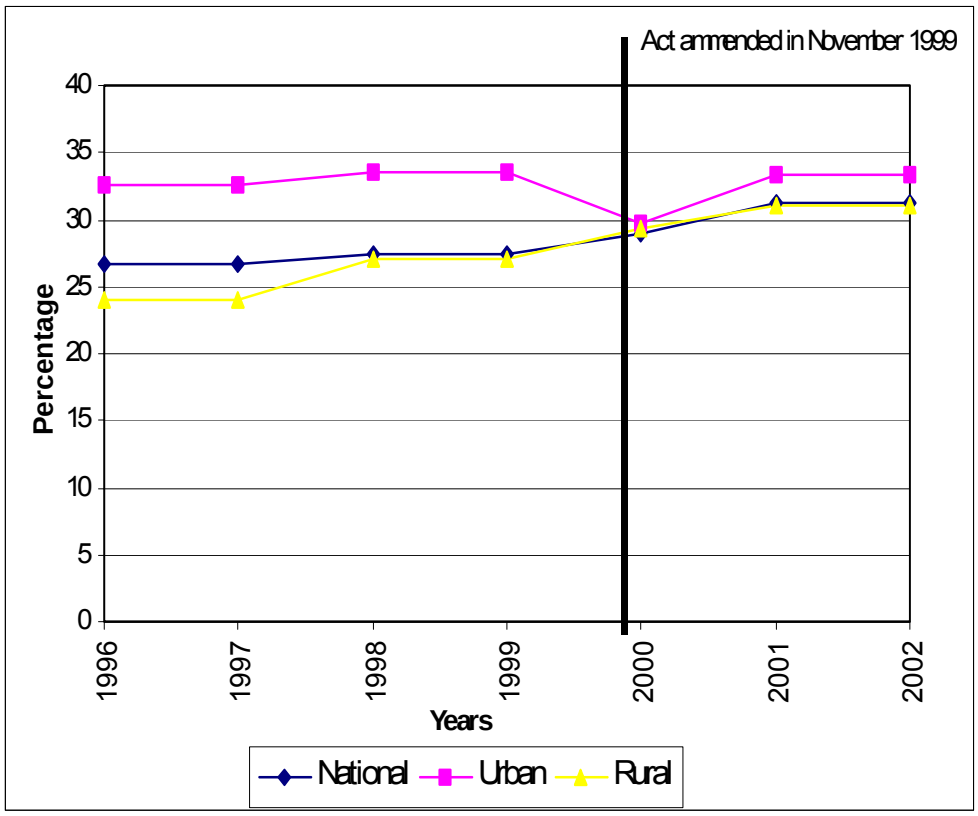
The utility could also lower the cost of electricity by adopting innovative low cost electrification options such as single wire earth return; compact ready boards and sharing the existing telephone poles. Single wire earth return is not a new technology in Uganda. It was used in the 1970s to supply electricity to parts of eastern Uganda until one of the transformers was struck by lightning. Replacement of the transformer could not take place owing to the political instability prevailing at the time (Kamese, Per. Comm., 2003).

Implications for the poor: Reforms have led to higher electricity tariffs. Although some form of subsidy mechanisms to minimise the impact on the poor have been implemented, the bulk of the subsidy (93%) is captured by the non-poor.

5.4.4 Electricity Expenditure

Having discussed tariffs and subsidies in the previous section, we now turn to assess the trends in electricity expenditure. The data provided in figure 22 below gives one an idea of household expenditure patterns in Uganda. However, it may not be sufficient to assess conclusively on the extent to which reforms have impacted on the poor's expenditure on electricity. This is because data on expenditure in monetary terms for the reform period under review was, at the time of writing, not available to the authors. Nevertheless, the available data is still useful in making tentative conclusions with regard to the impact of reforms on the poor.

Figure 22 Electricity Expenditure as a Proportion of Household Energy Expenditure



Source: Okumu, 2003; Kyokutamba, 2003b; Engurait, 2001

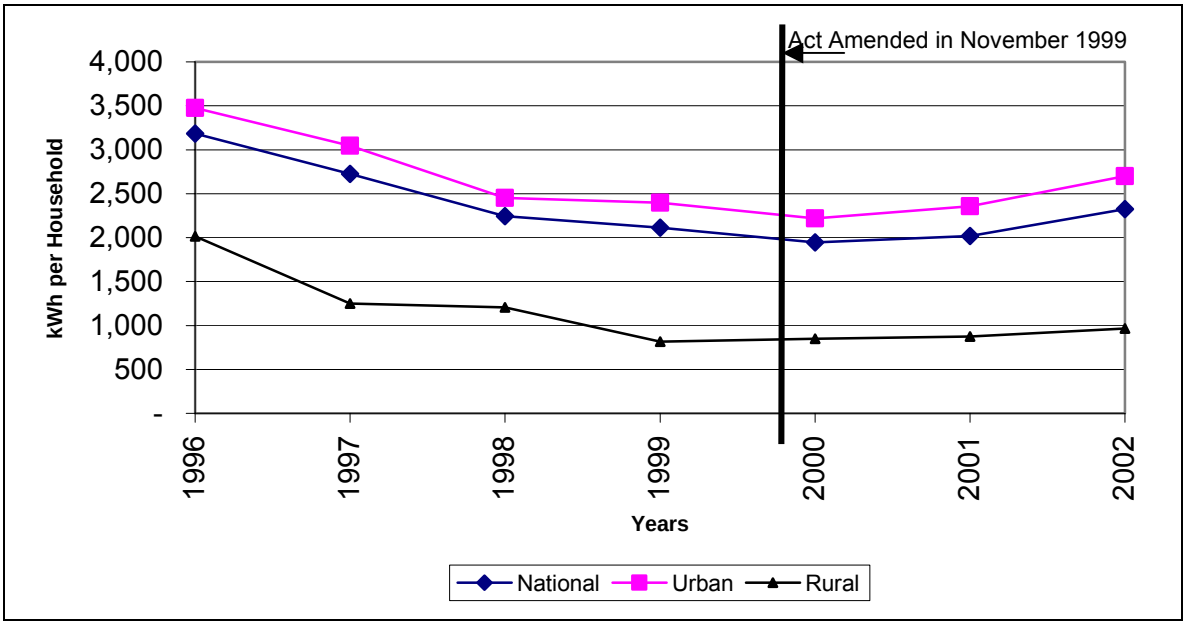
A key observation that can be made from the trends illustrated by figure 22 is that, whereas the proportions of electricity expenditure among urban households appear to have remained fairly constant, those of rural households seem to have increased significantly. Comparing the 1996 & 2002 figures, the proportions of electricity expenditure for urban households went up by a miniscule 0.9 points contrasting sharply to an increase of 7 points, in percentage terms, for rural households.

Implications for the poor: The sharp increase in the proportion of electricity expenditure in the rural areas, especially in 2001, could imply that the tariff increases in that year might have impacted negatively on the electricity expenditure among the poor. As mentioned earlier, this is, however, not conclusive given the lack of additional data critical to the analysis of expenditure patterns.

5.4.5 Electricity Consumption

Electricity consumption (presented as an annual average) will be assessed in a similar fashion to the Kenya section: on a per household and per capita basis.

Figure 23 Electricity Consumption Per Household in Uganda

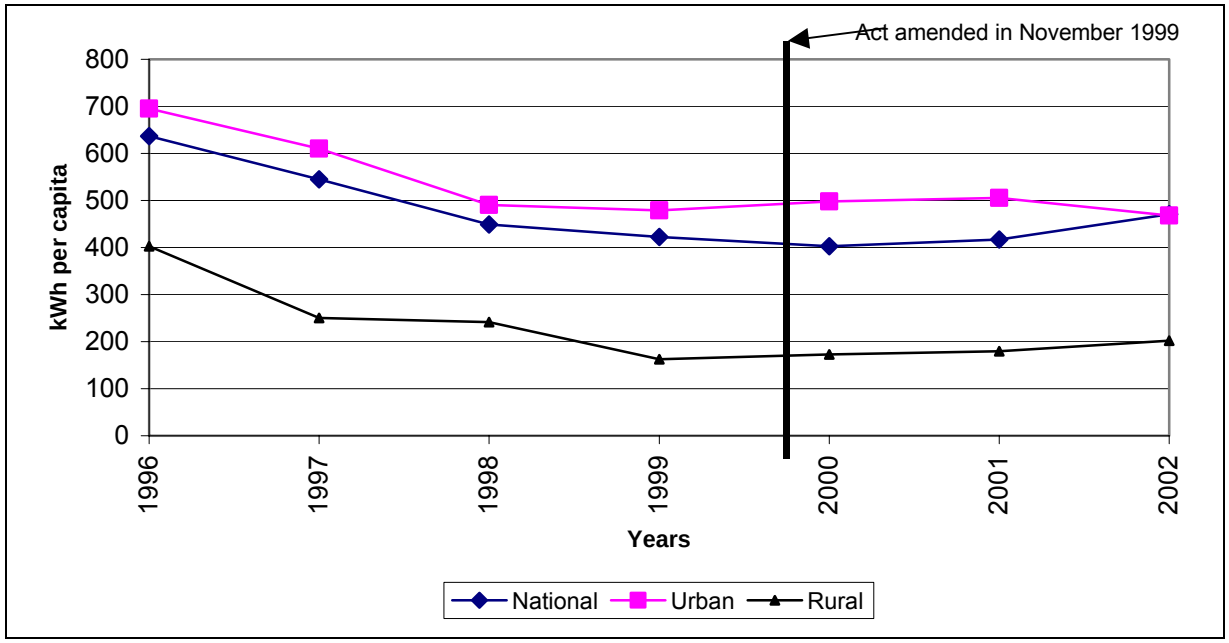


Source: Okumu, 2003; Kyokutamba, 2003b; Engurait, 2001

During the period under review, household electricity consumption has declined at all levels (national, urban and rural) until around the year 2000 when the trend appears to take an upward turn. The utility's inefficiency is partly to blame for the deterioration in consumption levels. In the last five years alone, the electricity losses have been about 34% on average – almost 3 times the nominal target for utilities in developing countries.

The electricity consumption trends described above (figure 23) on a per household basis are consistent, to a certain extent, with electricity consumption per capita. However, an important note is that between 1999 and 2002, the average urban household size was revised upwards by statistical authorities, leading to the inconsistency between the urban electricity consumption per household shown earlier, and electricity consumption per capita shown in the following graph.

Figure 24 National and Urban Electricity Consumption Per Capita in Uganda



Source: Okumu, 2003; World Bank, 2003; Kyokutamba, 2003b; Engurait, 2001

5.5 Preliminary Conclusions of the Uganda Case Study

The Uganda case study reveals a difficult situation for the rural electrification sub-sector. First of all, there is very little data on electrification of the poor. In addition, the utility does not appear to keep track of data on rural electrification. This demonstrates a clear lack of interest in the crucial issue of electricity access for the poor.

Conclusive findings are, therefore, difficult to develop without this kind of data. There is need to track and develop an adequate database on electricity and access, both in rural and urban areas. This data would be useful for the newly formed Rural Electrification Board to monitor its performance in meeting the target of 10% electrification target by 2012.

On the whole, although power sector reforms in Uganda are at an advanced stage, they appear to have been undertaken primarily to prepare the utility for privatisation and not with the objective of increasing the poor's access for electricity. In priority terms, the implementation of rural electrification provisions in the Electricity Act began after privatisation of the utility was almost finalised. On a positive note, the regulatory and policy instruments that are in place seem to provide incentives for rapid rural electrification – certainly the rhetoric is encouraging.

The Electricity Act appears to place some emphasis on rural electrification. However, it only provides for a rural electrification agency resembling the conventional rural electrification programmes which have been unsuccessful elsewhere, such as in Kenya and Zambia. For example, the Rural Electrification Board (REB) is headed by the Permanent Secretary in the Ministry of Energy and Mineral Development (MEMD). This not only limits the autonomy of the board but could also stifle its performance given that the one heading the institution provides inputs on a part-time basis. This has been considered to be a key contributor to the failure of Kenya's Rural Electrification Programme which was also headed by a Permanent Secretary from the Ministry of Energy (Ministry of Energy, 2003).

The Electricity Act also appears not to provide for "ring-fencing" of the funds allocated for rural electrification. As witnessed in the Kenyan case, lack of the appropriate protection of the Rural Electrification Fund could impair the rural electrification initiative. Another important aspect not

adequately addressed by the Act is that it does not explicitly provide for the representation of the poor on the board of the rural electrification agency.

Tariff levels during the pre-reform period have been on the rise. The levels of tariff increases have been high. The lifeline tariff meant for the poor witnessed a 3-fold increase during the tariff review of 2001. This development, coupled with the capture of the bulk of subsidies by the non-poor, does not bode well for rural electrification.

One way of lowering the cost of electricity for the poor is by using innovative low cost electrification options such as single wire earth return; compact ready boards; and sharing the existing telephone poles. As mentioned earlier, the single wire earth return technology has been successfully used before in Uganda.

6.0 KEY FINDINGS AND RECOMMENDATIONS

6.1 Key Findings

A key finding of the study is that data on the electrification of the poor is very scanty and full of gaps. In both Kenya and Uganda, reports from the utilities, Ministries of Energy and the regulatory agencies make no attempt to track electrification of the poor. In Uganda, this is exacerbated by the fact that the distribution utility does not categorise the customers into rural and urban categories[38]. It is, therefore, difficult to assess the impact of reform without access to adequate data. However, the proxies used by the study provide sufficient evidence to draw tentative conclusions and recommendations.

This study shows that the vast majority of the population still has no access to electricity (table 26).

Table 26 Summary Data of the Case Studies

	KENYA						UGANDA					
	National		Urban		Rural		National		Urban		Rural	
Indicator	Pre-reform	Post-reform	Pre-reform	Post-reform	Pre-reform	Post-reform	Pre-reform	Post-reform	Pre-reform	Post-reform	Pre-reform	Post-reform
Electrification levels (%)	4.4	5.5	16.7	20.4	0.5	0.8	2.9	4.1	16.7	18.9	0.7	1.1
Electrification rates (%)	7.0	6.2	6.2	6.0	16.1	7.7	13.7	10.5	17.9	12.0	-3.3	5.4
Tariff/Cost of Electricity (USc/kWh)	4.1	7. 8	4.1	7.8	4.3	7.6	9.6	7.4	-	-	-	-
Per Household Consumption (kWh)	2,991	1,714	3,119	1,821	1,702	902	3,185	2,325	3,475	2,700	2,015	965
Per Capita Consumption (kWh/capita)	598	428	520	304	340	225	637	471	695	468	403	202

Notes: For Kenya, the pre-reform year considered is 1993 while the post-reform year is 2001. In the Ugandan case, the pre-reform year considered is 1996 while the post-reform year is 2002.

Sources: *Kinuthia, 2003; Okumu, 2003; Nyoike, 2002; Kyokutamba, 2003b; Engurait 2001*

A comparison between the amended Electricity Acts of Kenya and Uganda indicates that the Ugandan one has more detailed provisions for increasing electricity access for the poor. However, none of the Acts provides new and innovative initiatives to ensure increased electrification of the poor through enhancing the autonomy of the rural electrification agencies and "ring-fencing" [39] the funds for financing electrification of the poor. Also, the Acts in their current form do not ensure the representation of the poor in the boards of rural electrification agencies. For example, the Ugandan Electricity Act appears to provide for a rural electrification agency resembling the conventional rural electrification programmes which have been unsuccessful in other countries, such as Kenya and Zambia.

In addition, the Rural Electrification Board in Uganda is headed by the Permanent Secretary in Ministry of Energy and Minerals Development. This could stifle its performance given that the one heading the institution provides inputs on a part-time basis. This has been considered to be a key contributor to the failure of Kenya's Rural Electrification Programme which was also headed by the Permanent Secretary, Ministry of Energy (Ministry of Energy, 2003).

The involvement of the Ministry officials in the rural electrification agencies could seriously impair the degree of their autonomy given that they will still be under the full control of their

[38] As mentioned earlier, the number of urban and rural customers is an estimate based on an expert's judgement on which distribution areas could be considered urban and rural, respectively.

[39] The term "ring-fencing" refers to ensuring that funds are strictly accounted for and protected from any undue misallocation.

respective parent Ministries. In addition, the representation of the key stakeholders in the rural electrification agencies is inadequate since the poor are not represented in the governing bodies of these agencies (proposed in the case of Kenya).

The sequence of power sector reform measures in Kenya and Uganda appears to have been detrimental to electrification of the poor, particularly in rural areas. In both countries, initiatives aimed at increasing rural electrification were started at the end of the reform process. Other developing countries such as Thailand, Bangladesh and Philippines, initiated reforms after establishing independent rural electrification agencies that ensured rapid rural electrification before the advent of market oriented sector reforms.

Reforms appear to have failed to link rural electrification to the overall strategy of improving the power sector performance. For example, the issue of licenses and concessions are not closely linked to the ability of the licensee/concessionaire to increase electricity access among the poor. In addition, the newly unbundled (and privatised) distribution utilities do not appear to have rural electrification targets that are linked to future tariff adjustments.

The proposed approach has successfully been implemented in the licensing of mobile telephone operators in Kenya. The licensing of the operators is based on, among other prerequisites, a demonstration of the firm's ability to significantly increase the number of mobile telephone connections and areas of geographical coverage. The license awarded to successful operators includes a target number of new connections and geographical coverage over a specified period. Subsequent renewal of the operator's license largely depends on the extent to which it meets the target indicated on its license (CCK, Personal Communication, 2003).

Uganda's rural electrification target for the year 2012 is a paltry 10%. This is an extremely low target and unlikely to make a significant difference. Data from other African countries shows that for the same period of time (or even shorter), it is possible to achieve much higher increases in electrification levels.

The following table (27) shows increments in national electrification levels for selected African countries within a decade or less. With the exception of Zimbabwe, the key driver for high national electrification levels was rigorous rural electrification programmes. In fact, the increase in rural electrification levels is higher than the national one. For example, in South Africa, rural electrification levels rose from 21% to 50% in seven years (1995 – 2002) indicating a nominal increase of 28% compared to 18% at the national level (NER, 2002).

Table 27 Successful National Electrification Initiatives in Selected African Countries

Country	Pre-Initiative National Electrification Levels (%)	Post-Initiative National Electrification Levels (%)	Increment (%)	No. of Years
South Africa	50 (1995)	68 (2002)	18	7
Zimbabwe	20 (1991)	39 (1999)	19	8
Ghana	15 (1991)	45 (2001)	30	10
Uganda (Rural)	**1 (2002)**	**10 (2012)**	**9**	**10**

Sources: NER, 2003; Gboney, 2001; Kayo, 2002; Eremu, 2003; Kayizzi, 2003; Dube, 2002; Okumu, 2003

Preliminary findings also indicate that reforms in Kenya and Uganda have resulted in increasing tariffs, and a reduction in cross-subsidies, in order to attract private investors. In the Kenyan case study, the tariff increases have resulted in the poor facing similar charges as the non-poor. In Uganda, the tariff increases have contributed to some disconnections among the rural poor.

Subsidies should be provided for the poor to cushion them from the impacts of the high tariff increases triggered by reforms. However, available data on subsidies in Uganda indicates that the non-poor are absorbing most of the subsidies. This is well illustrated by Ugandan case whereby less than 7% of the subsidies reach the poor.

To sum up, it is noted that the poor state of utility performance in Kenya and Uganda justified their reform. Power sector reforms are also portrayed as important poverty reduction tools in the Kenyan and Ugandan national Poverty Reduction Strategy Papers (PRSP), (IMF/IDA, 2000; Ministry of Finance and Planning, 2001). For example, the Ugandan PRSP explicitly stipulates the need for increased private investment in the electricity sector in rural areas (a key reform driver in Uganda) as a means of enhancing electricity access to the rural poor.

Although some of the reforms have had positive outcomes such as better financial performance in the Ugandan utility and an improvement (albeit for a limited period) in the general technical performance in the Kenyan counterpart, the discussion in this paper stresses that reforms have not led to significant electrification of the poor and that based on current trends, electrification for the poor is unlikely to take place in the foreseeable future. In addition, the current institutional and legal framework does not provide any special incentives for subsidies and the electrification of the poor. The poor appear to be paying higher charges (certainly not significantly lower) for electricity than the non-poor, while subsidies meant for the poor are largely captured by the non-poor. Consequently, only a comprehensive transformation could improve the situation and lead to greater electrification of the poor.

6.2 Recommendations

Firstly, there is an urgent need to establish reliable data bases on the electrification of the poor. This is absolutely essential for monitoring rural electrification programmes. The utilities, Ministries of Energy and the regulatory agencies should develop databases that tracks the electrification of both urban and rural households (categorized by income) and include the data in public domain annual reports.

Secondly, the newly established Rural Electrification Fund in Uganda as well as the proposed Rural Electrification Agency in Kenya should avoid the pitfalls of previous electrification initiatives that largely became an avenue for revenue collection for utilities with no clear link to expanded electrification of the poor. To avoid this shortfall, the autonomy of the bodies responsible for rural electrification – an important stipulation not provided for by the Electricity Acts, should be strengthened.

To ensure autonomy, the Electricity Acts should be amended to ensure that the funds for financing the electrification of the poor are “ring fenced”. The Acts should also provide for the appointment of the governing boards of rural electrification agencies by Parliament which would strengthen their independence. The boards of the rural electrification agencies should include representatives of the poor to ensure that the concerns of low-income communities are addressed.

The performance of the electrification agencies should be evaluated by the number of new connections, particularly in rural areas and among the urban poor. Significantly higher rural electrification targets than the ones currently indicated should be established. The targets should include explicit and ambitious goals for the electrification of the poor.

Thirdly, it is recommended that other countries in the sub-region whose reforms are not at advanced stages (e.g. Ethiopia and Tanzania) should ensure that they establish structures and mechanisms for increased rural electrification before embarking on large-scale privatisation reforms. Evidence from other developing countries indicates that high rural electrification levels have been achieved when rural electrification initiatives precede major market oriented reforms such as privatisation.

Fourthly, reforms should adopt innovative approaches to promote increased electrification. One approach could be making electrification targets a pre-requisite for the purchase of attractive distribution rights. For example, the purchase of attractive city distribution rights can be linked to the mandatory electrification of low-income urban settlements as well as selected low-income rural settlements. This will ensure that private investors are simply not cherry-picking the most profitable portions of the electricity industry and leaving the unprofitable portion (e.g. rural electrification) to the state.

Another approach of ensuring that reforms support the electrification of the poor would be to ascertain that a significant proportion of the proceeds from license fees, concession fees and sale of utility assets directly contribute to the Rural Electrification Fund.

Fifthly, the potential for local private investors in the provision of electricity services to the rural areas should be harnessed. However, this would require fiscal incentives (eg. tax breaks, zero duty on imported equipment) to encourage investment in rural electrification particularly in off-grid and mini-grid distribution systems.

Lastly, power sector reforms need to address the tariffs paid by the poor. An intervention that can be made for the poor is provision of subsidies that reduce the upfront costs of connection. One of the measures would be to minimise “connection fees” and “fixed charges” through amortisation. The “fixed charges”, account for a significant proportion of the electricity bill for the poor since their electricity consumption is relatively low.

Power utilities could further lower electricity tariffs for the poor by utilising least-cost electrification options. Examples of these options include provision of compact ready boards and use of single phase earth return electricity supply, which reduce the costs of cables used for internal wiring and overhead power lines. In addition, it may be possible to reduce distribution costs by allowing telephone lines and electricity lines to share support poles. Local communities can also be mobilised to reduce the cost of rural electrification.

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Appendix 1: General Socio-Economic Data

	Land Area (sq.km)	Population (million)									
YEAR		**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Kenya	580,000	25.00	25.70	26.30	26.90	27.50	28.32	28.80	29.42	30.10	30.70
Uganda	197,097	17.50	18.10	18.70	19.30	19.80	20.00	21.04	21.62	22.20	22.79

Sources: *AFREPREN, 2004; World Bank, 2003; EIU, 1995-2003*

INDICATOR	Population Growth Rate (%)									
YEAR	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Kenya	2.9	2.8	2.3	2.3	2.2	2.5	2.1	2.1	2.1	2.0
Uganda	3.6	3.4	3.3	3.2	2.5	1.0	2.9	2.8	2.7	2.6

Sources: *AFREPREN, 2004; World Bank, 2003*

INDICATOR	GDP (million US $)									
YEAR	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Kenya	8,413	8,433	8,665	9,047	9,422	9,617	9,773	9,900	9,884	9,993
Uganda	4,478	4,851	5,161	5,756	6,278	6,576	6,944	7,466	7,728	8,086

Sources: *AFREPREN, 2004; World Bank, 2003*

INDICATOR	GDP Growth Rate (%)									
YEAR	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Kenya	-1.2	0.2	2.8	4.4	4.1	2.1	1.6	1.3	-0.2	1.1
Uganda	3.4	8.3	6.4	11.5	9.1	4.7	5.6	7.5	3.5	4.6

Sources: *AFREPREN, 2004; World Bank, 2003*

INDICATOR	GNP Per Capita (US $)									
YEAR	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Kenya	330	250	240	260	320	340	350	360	360	350
Uganda	200	190	190	250	290	320	310	320	310	260

Sources: *AFREPREN, 2004; World Bank, 2003*

INDICATOR	Modern Energy Consumption Per Capita (kgoe)									
YEAR	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Kenya	88.4	86.7	88.9	88.8	91.6	86.5	84.0	79.6	79.4	78.8
Uganda	24	23	23	15.5	16.2	19.0	19.5	19.9	19.8	23.7

Sources: *AFREPREN, 2004; IEA, 2003, EIU, 1995-2003*

INDICATOR	National Debt (million US $)									
YEAR	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Kenya	6,898	7,111	7,202	7,412	6,931	6,603	6,943	6,558	6,343	5,833
Uganda	2,928	3,029	3,372	3,573	3,674	3,913	4,016	3,494	3,602	3,733

Sources: *AFREPREN, 2004; World Bank, 2003*

INDICATOR	Merchandise Exports, f.o.b. (million US $)									
YEAR	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Kenya	1,013	1,103	1,484	1,924	2,083	2,060	2,012	1,755	1,774	1,879
Uganda	172	157	254	595	590	671	458	549	439	446

Sources: *AFREPREN, 2004; World Bank, 2003*

Appendix 2: Generic Data on Urban Energy and the Urban Poor

Country	Population (millions) 2001	Urban Population as % total population 2001	Rural Population as % total population 2001	Population Growth Rate (%) (1980-2000)	GDP (Million US $) 2001	GDP Growth Rate (%) 2001	GNP Per Capita (US $) 2001
Kenya	30.7	34.3	65.7	3.0	9,993	1.2	350
Uganda	22.8	14.5	85.5	2.8	8,086	4.6	260

Sources: *AFREPREN, 2004; World Bank, 2003*

	Percentage of population below 2/3 mean national per capita income (1991-1999)	Total urban population below national poverty line (1993-1999)	Urban Pop with access to Sanitation (%) (2000)	Urban Pop with access to Safe Water (%) (2000)	Average Household size of Urban Poor	Modern Energy Consumption ('000 toe) 2001	Modern Energy Consumption per capita (kgoe) 2001
Kenya	14	29	96	87	4.5	2,418	78.8
Uganda	16	39	96	72	5.2	540	23.7

Sources: *AFREPREN, 2004; World Bank, 2003; IEA, 2003; EIU, 2003*

Appendix 3: Data Sheet on Electricity Access in Uganda

	CATEGORY	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Household Electricity Levels	National	103,919	959,568	110,808	116,518	107,518	108,502	123,341	142,324	159,202	164,222	180,234	200,217	221,317
	Urban	83,784	74,357	88,153	91,842	82,630	86,863	102,413	116,569	130,705	132,534	142,543	153,299	171,706
	Rural	20,135	21,211	22,655	25,041	24,888	21,639	20,928	25,755	28,497	31,688	37,691	46,918	49,611
Number of Domestic connections	National	84,928	92,337	104,842	109,576	100,462	94,448	115,050	126,298	141,100	145,313	160,352	179,263	199,178
	Urban	77,081	68,408	80,219	83,576	75,193	78,177	92,172	103,746	117,635	119,281	128,289	137,969	156,080
	Rural	7,847	23,929	24,623	26,000	25,269	16,271	22,878	22,552	23,465	26,032	32,063	41,294	43,098
Total Household Electricity Consumption (GWh)	National	351.7	525.6	484.8	476.4	497.5	521.5	687.0	700.6	713.2	71.6	843.0	912.8	1,086.0
	Urban	299.8	474.2	419.0	399.5	416.3	440.2	597.0	622.4	639.0	621.5	652.3	812.2	817.4
	Rural	51.9	51.4	65.8	76.9	81.2	81.3	90.0	78.2	74.2	80.1	190.7	100.6	104.0
Total Domestic Electricity Consumption (GWh)	National	196.0	270.1	263.3	272.5	285.5	264.5	366.4	344.3	316.6	307.1	311.8	361.5	463.0
	Urban	161.9	236.1	225.4	217.3	224.8	235.8	320.3	316.1	288.3	285.9	284.6	325.4	421.4
	Rural	34.1	34.0	37.9	55.2	60.7	28.7	46.1	28.2	28.3	21.2	27.2	36.1	41.6
Average Domestic Electricity tariff (Uscts)	National	3.0	5.0	5.0	7.2	10.0	10.0	10.0	8.9	8.2	7.0	6.1	11.0	8.6
	Urban	3.0	5.0	5.0	7.2	10.0	10.0	10.0	8.9	8.2	7.0	6.1	11.0	8.6
	Rural	3.0	5.0	5.0	7.2	10.0	10.0	10.0	8.9	8.2	7.0	6.1	11.0	8.6
Household Electricity Expenditure (% of total energy [fuel] expenditure)	National	21.33	21.33	24.55	24.55	24.20	24.20	26.60	28.60	27.44	27.44	28.95	31.20	31.20
	Urban	29.12	29.12	28.91	28.91	30.29	30.29	32.48	32.48	33.51	33.51	29.76	33.40	33.40
	Rural	24.50	24.50	23.39	23.39	22.57	22.57	24.09	24.09	27.10	27.10	29.25	31.10	31.10
Domestic Consumers per tariff category	0-50 kWh	41,269	43,825	45,289	47,755	49,872	52,681	55,113	57,356	61,125	63,597	66,049	77,685	78,382
	51 and above	43,659	48,512	59,553	61,821	50,590	41,767	59,937	68,942	79,975	81,716	94,303	101,578	120,796

Sources: *Okumu, 2003b; Kyokutamba, 2003b, Engurait, 2001, UEB, 2001*

Appendix 4: Data Sheet on Electricity Access in Kenya

		1993	1994	1995	1996	1997	1998	1999	2000	2001
Population	National	25,660,000	26,307,000	26,920,000	27,538,000	28,162,000	28,789,000	29,410,000	30,090,000	30,800,000
	Urban	6,910,010	7,342,381	7,783,776	8,235,840	8,697,920	9,169,307	9,649,232	10,330,000	10,530,000
	Rural	18,749,990	18,964,619	19,136,224	19,302,161	19,464,080	19,619,693	19,760,768	19,760,000	20,270,000
Household (No. of)	National	5,069,340	5,266,212	5,470,729	5,683,189	5,903,900	6,133,183	6,371,370	6,618,807	6,875,854
	Urban	1,208,376	1,255,304	1,304,055	1,354,699	1,407,310	1,461,964	1,518,740	1,577,722	1,638,994
	Rural	3,860,964	4,010,908	4,166,674	4,328,490	4,496,591	4,671,219	4,852,630	5,041,086	5,236,860
Number of Domestic Connections	National	221,327	236,789	251,428	273,859	288,250	307,031	327,424	356,541	378,751
	Urban	201,352	213,531	226,228	244,708	256,535	273,532	290,687	315,327	334,381
	Rural	19,975	23,258	25,200	29,151	31,715	33,499	36,737	41,214	44,370
Household Electrification rate	National	6.55	6.53	5.82	8.19	4.99	6.12	6.23	8.17	5.86
	Urban	5.83	5.7	5.61	7.55	4.61	6.21	5.9	7.81	5.7
	Rural	13.89	14.12	7.71	13.55	8.08	5.33	8.81	10.86	7.11
Total Household Electricity Consumption (GWh)	National	732	765	780	774	783	850	896	822	730
	Urban	628	627	646	636	633	704	743	690	609
	Rural	34	45	44	45	49	48	50	46	40
Average Cost of Electricity for Domestic Consumers (USc/kWh)	National	3.12	5.45	8.13	8.28	9.93	9.48	7.89	12.4	12.36
	Urban	3.11	5.45	7.98	7.96	9.87	9.45	7.83	12.38	12.4
	Rural	3.29	5.48	9.3	10.65	10.43	9.76	8.32	12.52	12

Sources: Kinuthia, 2003; Nyoike, 2001; KPLC, 1997, 2001/02

Appendix 5: Electricity Datasheets

UGANDA	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Exports (GWH)	154.5	150.0	283.4	262.7	283.4	194.5	150.2	169.4	158.9	173.9	251.1	145.1
Imports (GWH)	1.1	2.7	4.4	2.8	9.0	13.1	9.9	7.2	7.5	12.5	16.5	17.5
Electricity installed capacity (MW)												
Total	154.9	155.4	166.0	171.7	174.0	180.0	183.0	183.0	183.0	183.0	263.0	263.0
Hydro (Owen falls & Maziba)	151.0	151.0	163.0	169.0	172.0	178.0	181.0	181.0	181.0	181.0	261.0	261.0
Thermal - Diesel	3.9	4.4	3.0	2.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Thermal - Coal	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Thermal - Gas	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Others												
Electricity Generation (GWh)												
Total	732.9	782.6	994.3	977.9	1,018.2	1,057.8	1,130.5	1,218.5	1,233.6	1,341.7	1,539.1	1,576.6
Hydro	736.5	781.5	993.3	976.5	1,016.8	1,056.3	1,129	1,217.3	1,232.4	1,340.5	1,537.9	1,575.4
Thermal - Diesel	1.4	1.1	1.0	1.4	1.4	1.5	1.5	1.2	1.2	1.2	1.2	1.2
Thermal - Coal	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Thermal - Gas												
Others												

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Electricity sales (GWh)												
Total	518.2	652.2	768.2	739.1	739.7	715.6	827.8	869.9	864.8	876.1	1,094.1	1,057.9
Utility Data												
Number of utility employees	2,665	2,913	2,970	3,374	3,155	3,248	3,283	2,993	2,028	2,025	1,903	1,351
Number of utility customers	103,920	95,569	110,809	116,885	107,595	101,409	123,047	142,327	159,205	164,225	180,237	200,217
Number of customers per employee	39	33	37	35	34	31	37	48	79	81	95	148
Electricity generation per employee (GWh)	0.28	0.27	0.33	0.29	0.32	0.33	0.34	0.41	0.61	0.66	0.81	1.17
Electricity sales per employee (MWh)	194	224	259	219	234	220	252	291	426	433	575	783
Electricity losses (%)												
System losses	38.2	20.1	31.7	33.2	36.2	39.5	30.8	33.1	34.2	39.7	34.4	36.1
Transmission Losses												
Sub Transmission Losses												
*Revenue from sales (MILLION UG SHS)	4,426	10,117	21,956	30,038	48,311	50,411	60,176	73,855	76,040	84,644	124,231	163,688
*Revenue per employee (UG. SHS)	1,660,788	3,473,051	7,392,593	8,893,894	15,312,520	15,520,628	18,329,577	24,675,910	37,495,069	41,799,506	65,281,661	121,160,622
Debt collection period (days)		153	181	197	206	356	330	259	322	363	369	

Sources: *Okumu, 2003b; Kyokutamba, 2003b, Engurait, 2001, UEB, 2001*

ELECTRICITY DATASHEET													
KENYA	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Electricity Data													
Electricity consumption per capita (kWh)	116	117	118	120	122	122	126	128	128	126	117	104	104
Electricity installed capacity (of which):													
Total (MW)	705.6	787.8	813.8	813.8	818.0	818.0	818.0	885.2	887.2	885.7	1,048.4	1,173.1	1,193.8
Hydro plus imports (MW)	492.5	598.5	624.5	624.5	624.5	624.5	624.5	624.5	624.5	624.5	704.5	707.2	727.2
Thermal (MW)	98.0	93.0	93.0	93.0	93.0	93.0	93.0	75.5	75.5	45.5	120.5	150.5	150.5
Geo-thermal (MW)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	53.0	57.0	58.0
Gas turbines (MW)	47.9	43.5	43.5	43.5	43.5	43.5	43.5	43.5	45.5	74.0	73.5	73.5	73.5
Diesel (MW)	22.2	7.8	7.8	7.8	12.0	12.0	12.0	96.7	96.7	96.7	96.9	184.5	184.2
Wind (MW)												0.4	0.4
Electricity generation (of which):													
Total (GWh)	3,148	3,301	3,385	3,599	3,733	3,865	4,119	4,297	4,515	4,636	4,462	4,081	4563
Hydro plus imports(GWh)	2,691	2,894	3,016	3,246	3,312	3,290	3,312	3,497	3,404	3,414	2,590	1,523	2574
Thermal (GWh)	97	74	75	59	140	218	224	200	201	141	592	575	362
Geo-thermal (MWh)	336	297	272	272	261	290	390	393	366	390	383	429	480
Gas turbines (MWh)	10	21	3	2	2	47	171	174	139	206	414	309	78
Diesel (GWh)	14	14	19	20	18	20	22	33	405	485	483	1,245	1069
Electricity sales (of which):													
Total (GWh)	2,661	2,784	2,846	3,005	3,134	3,223	3,407	3,557	3,644	3,717	3,504	3,212	3,628
Households (GWh)	488	508	543	582	640	661	674	697	761	804	748	679	768
Industry/manufacturing (GWh)	1,130	1,178	1,198	1,281	1,326	1,356	1,491	1,536	1,526	1,513	1,398	1,361	1,513
Commercial (GWh)	554	585	567	564	559	569	618	657	665	680	724	609	696

Others	489	513	538	578	609	637	624	667	692	720	634	563	651
Utility Data													
Number of utility employees	10,789	10,895	10,880	10,585	10,186	8,864	8,913	8,279	7,166	7,099	7,094	6,900	6,423
Number of utility customers	265,413	287,012	307,135	329,081	351,647	370,456	406,523	426,500	452,963	472,671	505,951	537,079	593,621
Number of customers per employee	25	26	28	31	35	42	46	52	63	67	71	78	92
Electricity generation/employee (MWh/employee)	292	303	311	340	366	436	462	519	630	653	629	591	710
Electricity sales/employee (MWh/employee)	247	256	262	284	308	364	382	430	509	524	494	466	565
Plant availability factor (%)													
System losses (%)	15	15	16	15	15	16	16	16	19	19	22	21	21
Non-system Losses (%)	3.0	3.5	3.4	3.7	3.7	4.0	4.2	4.5	4.2	4.5			

Sources: Kinuthia, 2003; Nyoike, 2001; KPLC, 1997, 2001/02

Appendix 6: Power Sector Reform in Kenya and Uganda

	Status of Power Sector Reform									
	Reform Policy	**New/Amended Electricity Act**	**Regulation Agency**	**Licenses Issued**	**Access to Grid Granted**	**Contract Management**	**Private Sector Participation**	**Asset Sales of National Utility**	**Corporatisation of National Utility**	**Competition**
Kenya	Implemented	Implemented	Implemented	Implemented	Implemented	No	Implemented	Pending	Implemented	Pending
Uganda	Implemented	Implemented	Implemented	Pending	Pending	Implemented	Implemented	Pending	Implemented	Pending

Sources: *AFREPREN, 2004; Marandu & Kyokutamba (eds), 2003*

	Data on Independent Power Producers (IPPs) - 2001															
	Installed Capacity of IPPs (MW)			**Number of IPPs**			**Installed Capacity of IPPs (Operational and Forthcoming) by Fuel Used (MW)**									
Sub-Saharan Africa: ESA	**Total**	**Operational**	**Forthcoming**	**Total**	**Operational**	**Forthcoming**	**Gas**	**Diesel**	**Diesel / Gas**	**Geothermal**	**Bagasse**	**Bagasse /Coal**	**Coal**	**Hydro**	**Other**
Kenya	444.0	259.0	185.0	10	6	4		377.5		64	2.5				
Uganda	1,892.0	18.5	1,873.5	16	2	14		291.5			30.0			1,480.5	90.0

Sources: *AFREPREN, 2004; Marandu & Kyokutamba (eds), 2003; Karekezi et al (eds), 2002*

Appendix 7: Renewable Electricity Kenya and Uganda

Renewable Energy Technologies Disseminated Data And Estimated Cost					
	Estimated PV Units Disseminated	**Estimated PV Installed Capacity (kWp)**	**Estimated Cogeneration Potential (GWh)**	**Biomass as a % of Total Energy consumption (2001)**	**Cost of 50Wp PV system (US $) 2001**
Kenya	150,000	3,600	530.33	78.1	620
Uganda	3000	152	173.43	95.0	1,037

Source: AFREPREN, 2004

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