

**INTERSESSIONAL PANEL OF THE UNITED NATIONS COMMISSION  
ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT (CSTD)**

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Contribution of Uganda

to the CSTD 2017-18 priority theme on ‘The role of science, technology and innovation to increase substantially the share of renewable energy by 2030’

**DISCLAIMER: The views presented here are the contributors' and do not necessarily reflect the views and position of the United Nations or the United Nations Conference on Trade and Development.**

1. What are the national policies (renewable energy Strategies, regulations, standards, fiscal measures, financial incentives, etc.) in place that encourage renewable energy projects or aim at increasing the share of renewable energy in Uganda's energy mix?

- The Energy Policy for Uganda 2002
- The Renewable Energy Policy for Uganda 2007, which is currently under review;
- The Biomass Energy Strategy by MEMD of 2014;
- The RE Investment guide of 2012 by MEMD, GIZ
- Scaling up Renewable Energy Program Uganda 2015
- The SE4ALL action Agenda for Uganda 2015 by MEMD
- Energy week (awareness program) by MEMD for all players
- Rural electrification strategy and plan 2013 to 2022; REA can fund CAPEX up to 70% for mini-grids
- Electricity Regulatory Authority (ERA) procedures on acquisition of permits and licences
- National Environment Management Authority (NEMA) procedures on EIAs and permits
- DWRM procedures on hydro projects
- Uganda Electricity Credit Capitalisation Company (UECCC) and the banks receiving guarantees from them on enhancing access to finance
- Subsidies and tax waivers eg on solar by URA, MEMD
- UBOS household surveys and renewable energy resource mapping
- Uganda National Bureau of Standards (UNBS) standards and affiliated certified renewable energy labs like CREEC.
- The recently launched (June 2016) Centre of Excellence for the East African Centre for Renewable Energy and Energy Efficiency that is hosted in Uganda due its RE profile through what CREEC and other organisations have so far achieved. It is located at CEDAT and it is coordinating regional efforts initially funded by UNIDO, the Austrian government and other funders will join.

2. Who are the main actors in the renewable energy sector and what are the linkages between them? Please provide any documentation, references, web addresses or reports on the cited policy measures

See attached list for some actors and other documents attached.

3. Can you share success stories of renewable energy projects in your country or region? How do you ensure the sustainability of the project, and scale or replicate it? In your answer please include information on the following: location, time period of implementation/starting date, main actors, beneficiaries, funding, technology and innovation used, issues addressed, stage of implementation, sustainability, etc. Do you have any documentation, references, web addresses or reports on the specific examples cited? If yes, please share it with us

There has been demonstration of the potential of small-scale renewables and energy efficiency in increasing energy access. But the government has other success

stories for bigger RE Projects for grid connection like the solar generation from Tororo and Soroti and Biomass from the sugar factories.

The project below is a pico hydro power plant of upto 5 KW.

Location, Rwenzori Mountaineering Services (RMS) , Kasese district

Time period of implementation/starting date, 2 years/2011

Main actors: PSFU, CREEC, RMS, vocational institutes, ERT funding from WB

Beneficiaries, RMS tourism facility and neighbours

Funding, ERT phase II and co-financing by RMS

Technology and innovation used, pico hydro turbine manufactured in the region at the University of Dar es salaam, mechanical lab, Tanzania

Issues addressed, renewable energy for productive use to replace the expensive diesel genset previously used. Increasing access to electricity for the tourists to power their gadgets.

Stage of implementation, completed

Sustainability. Increased number of tourists per month, the pico hydro plant is also a tourist attraction in itself. RMS contributed up to 40% co-financing so there is ownership. Savings from the replacement of diesel with an RE source and diversification of services through charging services. Training was done for diploma level engineers from vocational institutions to operate and maintain the systems. They are a resource for such systems.

Through this initial demonstration, the WB through PSFU has tendered out 6 other small hydro plants to be installed with sustainability models on ownership, management and service delivery.

**The Republic of Uganda**  
**Ministry of Energy and Mineral Development**

**THE ENERGY POLICY FOR UGANDA**

**THE POLICY GOAL IS TO MEET THE ENERGY  
NEEDS OF UGANDA'S POPULATION FOR  
SOCIAL AND ECONOMIC DEVELOPMENT IN AN  
ENVIRONMENTALLY SUSTAINABLE MANNER**

September 2002

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## FOREWORD

The 1995 Constitution of the Republic of Uganda provides the mandate to establish an appropriate energy policy when it states: “The State shall promote and implement energy policies that will ensure that people’s basic needs and those of environmental preservation are met”. This constitutional requirement makes it incumbent upon Government to formulate an energy policy that will not only sustain the impressive economic growth of the last decade or so but also ensure widespread access to affordable modern energy services for improving the living standards of all the people in Uganda.

Maintaining the current growth and, ultimately, achieving sustainable development is a challenge that calls for long term strategic planning. Energy planning and development is a key input in the overall strategic planning cycle. In the past, this important linkage could not be adequately addressed since the energy sector lacked a comprehensive, integrated policy framework. The sector was driven by annual ministerial policy statements accompanying the budget. This holistic energy policy will go a long way in laying the foundation for the country’s development.

In formulating this policy, we have considered the main characteristics of the energy sector in Uganda and its linkages with the rest of the economy and the international scene. These characteristics include the following aspects:

- Uganda has abundant energy resources, especially hydrological and other renewable resources, yet there is widespread energy poverty all over the country. There is an urgent need to develop the resources and improve energy supply.
- Planning for modern energy supply, especially electricity has been limited mainly to urban and semi-urban areas. A

paradigm shift in energy planning is required to achieve equitable modern energy distribution.

- An inadequate and inefficient power supply system, arising from stunted generation capacity growth, a poor transmission and distribution infrastructure and poor utility commercial practices, has been prevalent. The sub-sector badly needs large investments and prudent utility practices.
- Sustainable development is difficult to achieve as it is incompatible with economic poverty that is prevalent in the country. Therefore, Government has the challenge of expanding access to affordable, reliable and adequate energy supplies to address the poverty issues.
- Energy development and environmental damage are intricately related. The policy recognizes the need to mitigate both the physical and social environmental impacts created by energy development, especially hydropower.
- The energy sector is directly linked to the other sectors of the economy, providing their life-blood. The sector is a major contributor to Government revenues and decisions taken in the sector have a direct bearing on the performance of the other sectors. The policy framework provides for harmonisation with the policies of the other sectors of the economy as well as the decision making process on either side.
- In the current environment of globalisation the policy must be compatible with international trends, whether regional or global. In particular, the policy provides for a conducive environment to attract private finance and encourage energy trade and other aspects of partnerships. This is particularly required as the energy sector is currently constrained by inadequate financing.



- There are institutional and legal weaknesses, especially in the areas of the downstream petroleum industry, renewable energy, energy conservation/efficiency and atomic energy applications. There is need for continued sector reform to incorporate the regulation of the above sub-sectors.

The approach used in formulating the policy involved a detailed analysis of the sector issues from both the supply and demand perspectives. Policy objectives and strategies have been developed for the supply sub-sectors, i.e. power, petroleum, biomass and new renewable energy. The same has been done for the major demand side sectors, i.e. households and institutions, industry and commerce, transport and agriculture. This detailed approach in setting policy objectives and strategies will help to define action plans in a more focused manner.

With the above background, the main policy goal in the energy sector has been set as: **“To meet the energy needs of Uganda’s population for social and economic development in an environmentally sustainable manner”**.

The production of the policy document was a consultative process involving members of staff of the Ministry of Energy and Mineral Development and other stakeholders in Government, development partners (e.g. World Bank, NORAD, SIDA, JICA) and the private sector who provided very valuable comments.

This policy framework provides Government’s vision for increased and improved modern energy supply for sustainable economic development as well as improving the quality of life of the Ugandan population. To translate it into reality an indicative short and medium term action plan has been developed and appended. Enormous resources will be required to implement this action plan. It is, therefore, now incumbent upon all those Government agencies that have a stake in this matter to work together to realise this vision.

I am grateful to the German Technical Cooperation (GTZ) for the technical assistance provided to the Government of Uganda to facilitate the preparation of this policy. On the Government side, I wish to pay special tribute to the following people whose ideas and contributions were the basis for formulating this policy: Mr. F.A. Kabagambe-Kaliisa - Permanent Secretary, Mr. Godfrey R. Turyahikayo - Commissioner for Energy, Mr. R.J. Kashambuzi – Commissioner for Petroleum Exploration and Production, Mr. Ben Twodo – Assistant Commissioner for Petroleum Supply, Mr. Godfrey Ndawula - Assistant Commissioner for New and Renewable Sources of Energy, Eng. Paul Mubiru - Assistant Commissioner for Energy Efficiency, Mr. Henry Bidasala - Senior Energy Officer (Electric Power), Mr. E. Rubondo – Assistant Commissioner Petroleum Exploration and Production, Mr. F. Tukwasibwe - Head of Planning Unit, Mr. G. Bahati – Coordinator, Geothermal project. Mr. H. Dusabe – Legal Consultant and Mr. Kaggwa – Tax Policy Department, Ministry of Finance, Planning and Economic Development, for their unreserved efforts in the formulation of this policy. Mr. Philippe Simonis, the GTZ Energy Advisor provided valuable backstopping support to the team.

Syda N. M. Bbumba (Mrs.)

**MINISTER OF ENERGY AND MINERAL DEVELOPMENT**

## **PART 1: BACKGROUND**

### **1.1 INTRODUCTION**

#### **1.1.1 The Need for an Energy Policy**

Uganda's Energy Sector has hitherto been driven by annual ministerial policy statements on the budget. Yet the importance of the energy sector in the economy requires that a long-term planning approach for energy development be adopted. In particular, the liberalisation of the energy sector, in line with the overall macro-economic policies, requires that clear, long-term policy guidelines be in place to encourage project development and harmonise sector activities. In this context the energy policy needs to make institutions support private sector growth as elaborated by the Government in the "Medium-Term Competitive Strategy for the Private Sector (2000-2005)".

Furthermore, going by the definition of energy poverty as "the absence of sufficient choice in accessing adequate, affordable, reliable, quality, safe, and environmentally benign energy services to support economic and human development", it is apparent that there exists energy poverty at all levels in Uganda, particularly at household level in the rural areas. Evidence of this energy poverty can be found in the low levels of consumption of modern energy forms (electricity and petroleum products), the inadequacy and poor quality of electricity services and the dominant reliance

on woodfuel sources. Yet, all modern economies are energy dependent. This means that if economic prosperity has to be achieved and sustained and living standards for the majority of Ugandans improved, a paradigm shift in policy and planning for energy supply and consumption is necessary. In the past energy planning has emphasised the addressing of supply side issues, especially for the commercial sources of energy, and not demand side issues. This approach has tended to favour the urban population, which is the major user of commercial fuels, while marginalising the energy needs of the majority of the population, which lives in rural areas and depends mainly on biomass. The rural areas also contain the largest proportion of the poor population. Therefore, recognising the role the energy supply improvement in the rural areas is likely to play in poverty eradication, it is necessary that energy for rural areas be brought into the realm of national energy planning.

The need for an appropriate energy policy is also recognised by the Constitution of the Republic of Uganda which states: “The State shall promote and implement energy policies that will ensure that people’s basic needs and those of environmental preservation are met”. The Energy Policy should, therefore, support Government’s Poverty Eradication Action Plan (PEAP), which sets the goal of reducing the incidence of poverty in Uganda. To this extent, the PEAP has already recognised energy as having a direct impact on poverty alleviation. Therefore, the need for a National Energy Policy exists not only as a Constitutional requirement

but also for the facilitation of Government's major programmes like PEAP, Plan for Modernisation of Agriculture (PMA), decentralisation and the liberalised economic environment.

### **1.1.2 Energy Policy Context**

The Energy Policy objectives for Uganda have been formulated in the context of the following settings:

- The existing economic, social and environmental policies;
- The nature and linkages of the energy sector with other sectors; and
- International and regional linkages of the sector.

Uganda has achieved strong economic growth averaging about 6% per annum as well as macro-economic stability over the last decade, owing largely to the implementation of an ambitious programme of macro-economic adjustment and structural reforms. However, this performance can only be sustained by increased investments and creation of employment opportunities which, in turn, can only be realised with adequate supplies of energy. Despite the good economic performance, about 35% of the population still live below the poverty line.

The energy policy recognises linkages between the energy sector and the other sectors. In particular policies on the economy, environment, water resources, agriculture, forestry, industry, health, transport, education, decentralisation and land use have to be taken into consideration.

The energy sector has bigger environmental impacts than most other economic sectors. Hence, energy investments are subjected to greater environmental scrutiny today than ever before. Energy policies should, therefore, aim at mitigating these impacts. A sustainable energy policy is one which integrates economic, social and environmental objectives in a way that improves the well being of the current generation whilst safeguarding the welfare of future generations.

The Energy Policy for Uganda must also seek compatibility with the global and regional energy policies. Local policy developments must acknowledge international and regional energy trends, especially in areas of energy investment, pricing and global impacts. The involvement of private finance in the energy sector is becoming increasingly important world over. Therefore, Government needs to create an energy policy that attracts investments, while ensuring the achievement of overall national policy objectives. On an international perspective, Uganda completed an inventory of its greenhouse gas emissions to meet its commitments as a signatory to the United Nations

Climate Change Convention (UNCCC). As a result, a lot of efforts are underway to develop projects which are able to benefit from the Global Environment Facility and the Clean Development Mechanism. The Government will reinforce its capacities in this area during the next years.

Within the regional context the New Partnership for Africa's Development (NEPAD) offers the greatest opportunity for integrating Africa's energy systems (e.g. planning, interconnected grids and cross-border oil pipelines) to enhance energy trade, thus optimising the development and use of resources and providing cost-effective energy services. Within the East African sub-region Uganda is currently spearheading the NEPAD efforts, recognising the opportunity therein to increase exports of Uganda's relatively cheap hydro-electricity and being able to source and import comparatively cheap energy supplies from wherever they exist within the region. The Energy Policy must, therefore, contribute to the NEPAD initiative by supporting faster development of Uganda's hydropower resources through private sector investments, development of interconnections, cross-border infrastructure to facilitate energy trade and sharing of information on petroleum resources and exploration and the development and use of new renewable energy resources.

A key undertaking so far, in line with the NEPAD initiative, is the development of the East African Energy Master Plan. The plan will address energy trade, exchange of information

and experiences and joint promotion of petroleum exploration, among others.

## **1.2 THE ENERGY SECTOR IN UGANDA**

### **1.2.1 General**

The Energy Sector is one of the key sectors in the Ugandan economy. On one side the sector provides a major contribution to the Treasury resources (e.g. fuel taxes, VAT on electricity, levy on transmission bulk purchases of electricity, license fees and royalties) and foreign exchange earnings (power exports). On the other side significant public investment has been injected into the sector, particularly in the area of electricity supply. Following liberalisation, the power sub-sector is now attracting the largest private sector investments in the country. Therefore, the sector is not only a vital input into other sectors, but also promises to be a large source of employment for Ugandans.

The Ministry of Energy and Mineral Development (MEMD) is responsible for the sector, dealing specifically with energy policy formulation, implementation and monitoring.

The energy sector in Uganda comprises the following supply sub-sectors:

- i) Power;**
- ii) Petroleum;**
- iii) New and Renewable Sources of Energy; and**
- iv) Atomic Energy.**



### **1.2.2 Power Sub-sector**

The power sub-sector covers electricity generation, transmission and distribution including rural electrification. In 1999, following approval by Cabinet of the Power Sector Reform and Privatisation Strategy and enactment of a new electricity law (The Electricity Act, 1999), the Electricity Regulatory Authority (ERA) was established to regulate the industry. Thus, while the MEMD is responsible for policy the ERA regulates the industry independently of the Ministry. The Uganda Electricity Board (UEB), the national utility company lost its monopoly in the sector by this enactment.

As part of the liberalisation process, UEB has been unbundled to create different business entities for generation, transmission and distribution known as Uganda Electricity Generation Company Limited (UEGCL), Uganda Electricity Transmission Company Limited (UETCL) and Uganda Electricity Distribution Company Limited (UEDCL) respectively. Generation and distribution businesses will be leased out to private operators on long-term concession while transmission will remain a public function in the medium term. Under a concession arrangement the existing assets will remain in public ownership, whilst the right to operate the assets and invest in their expansion will be let to an experienced private sector power company. New generation capacities will be developed as Independent Power Producer (IPP) projects.

The hydroelectric power potential of Uganda is high and estimated at over 2,000 MW, mainly along the River Nile. Current exploitation is about 317 MW, of which 300 MW is on the River Nile and generated by the Uganda Electricity Generation Company Limited. Kilembe Mines Ltd., Kasese Cobalt Company Ltd and others generate a total of 17 MW. Two major independent power producers, AES Nile Power and Norpak Power Company are in various stages of setting up large power plants. Their combined capacities will be 450 MW when completed.

Uganda's electrification rate is very low, with grid access of only 5% for the whole country and less than 2% in rural areas. This means that only 200,000 customers are connected to the grid with an annual growth rate estimated between 5.5 and 7.5%. Another 1% of the population provides itself with electricity using diesel and petrol gensets, car batteries and solar PV systems. Electricity is consumed by the residential (55%), the commercial (24%) and the industrial (20%) sectors and for street lighting (1%). Recognising the need and importance of accelerating access to rural areas, a new Rural Electrification Strategy and Plan was adopted by Cabinet in February 2001.

In terms of network infrastructure development, there is a total of 1,115 km of 132 kV high voltage transmission lines and 54 km of 66 kV in the country. The distribution facilities include 3,258 km of 33 kV lines, 3,443 km of 11 kV lines and

6,496 km of low voltage lines. This network provides power to only 33 of the 54 districts in the country.

UETCL has export contract obligations to neighbouring countries as follows: Kenya (30 MW), Tanzania (9 MW) and Rwanda (5 MW). However, the 30 MW to Kenya is supplied only during off-peak hours and only 9 MW and 5 MW exports go to Tanzania and Rwanda respectively. However, arrangements have been finalised for Uganda to export firm capacity of 50 MW to Kenya from 2006 after the commissioning of the Bujagali Project.

The electricity tariffs which had been last adjusted in 1993 along the lines of long-run marginal cost of supply were recently reviewed to reflect the current economic cost of supply effective June 2001. This will help to attract private sector participation in the electricity supply operations.

### **1.2.3 Petroleum Sub-sector**

The petroleum sub-sector covers both upstream and downstream industries. The upstream industry deals with exploration, development and eventual production of petroleum while the downstream covers transportation (of both crude and refined products), refining, storage, distribution and marketing of petroleum products.

The Petroleum (Exploration and Production) Act of 1985 and the Petroleum (Exploration and Production) (Conduct of Exploration Operations) Regulations of 1993 regulate upstream activities. The downstream industry is governed

by the Petroleum Act of 1964 and several Regulations made there under.

### *The upstream industry*

Petroleum production has not yet been established in Uganda, but the hydrocarbon generation capacity in the Rift valley basins is very evident. The most prospective part for petroleum exploitation in the country is the Albertine Graben located in the Western Rift Valley area of Western Uganda. Gravity and magnetic surveys carried out across the graben indicate sediment thickness in excess of 4 kilometres in some parts of the graben. Seismic data recently acquired in Semliki basin (Exploration Area 3) not only confirmed these sediment structures but it also identified drillable structures in this basin. Further confirmation of the petroleum potential of this area is evidenced by the numerous oil seepages that are distributed along the graben and the good source and reservoir rocks that outcrop in many parts of the graben.

Government has made efforts to attract investment in petroleum exploration and production by acquiring geological and geophysical data in the graben. Exploration Area 3 has been licensed to a consortium of Heritage Oil and Gas Limited of the United Kingdom and Energy Africa of South Africa. A Production Sharing Agreement (PSA) has been signed with the companies. Exploratory drilling in this area is expected to commence during 2002. Exploration Area 2 (Northern Lake Albert) was recently licenced to Hardman

Resources N.L. of Australia and Energy Africa of South Africa. Government continues to promote the other unlicensed areas.

### *The downstream industry*

Uganda imports all its petroleum products requirements from abroad since there is no local production. About 85% of Uganda's petroleum imports are routed through Kenya with only 15% coming through Tanzania.

The costs of transportation of the products from the seaports (Mombasa and Dar es Salaam) are high. Because of this problem, Government is promoting the extension of the Kenya pipeline to Uganda. The possibility of building a 10-12 inch diameter 1,450 km pipeline through Tanzania to Uganda is also being examined.

One of the most significant problems in the industry is smuggling of petroleum products into the country from the neighbouring countries. In an effort to curb smuggling and adulteration of products, Government introduced compulsory biocode marking of all officially imported petroleum products in 2000.

Consumption of petroleum in Uganda currently stands at 550,000 m<sup>3</sup> per annum and is low compared to those of her neighbours Kenya and Tanzania. Consumption of petroleum

grew at an average of 14% per annum between 1993 and 1996, then slowed down to about 6% per annum since 1997.

The petroleum import bill is now of the order of US\$ 160 million per year. This constitutes about 8% of total national imports and represents slightly above 20% of total export earnings.

Petroleum product prices in Uganda were deregulated in 1994. Pump prices are high. Since liberalisation was introduced, pump prices have risen in nominal terms by nearly 67% (though decreased in real terms by between 8.6% and 13.7%). Deregulation has stimulated investment in the industry.

After liberalisation Government divested its 50% interest in three oil companies. From 1997 Government also opened up the sector for new marketing companies to join.

There are 20 licensed oil-marketing companies in Uganda of which 15 are in operation. There is no national oil company. However Government maintains fuel reserves at Jinja for strategic purposes. Government is offering temporary storage accommodation at its Jinja Storage Tanks as an incentive to the newly licensed oil companies to encourage competition.

The existing legal framework for managing and regulating the downstream petroleum sub-sector is out-dated and

requires complete upgrading. A review of the legal framework has been undertaken and proposals for a new Petroleum Supply Law and Regulations have been prepared. Under the proposed law, a new licensing and regulatory regime and an advisory committee of experts will be set up and national safety and environmental standards will be prepared. This will be harmonised with similar standards within the East African Community Member States.

#### **1.2.4 New and Renewable Sources of Energy Sub-sector**

Uganda is richly endowed with a variety of renewable energy resources which include plentiful woody and non-woody biomass, solar, wind, geothermal and hydrological resources. Presently, with the exception of biomass, only a meagre fraction of the country's renewable energy potential is exploited. It is estimated that other renewable sources of energy, excluding large hydropower, contribute less than 2% of Uganda's total energy consumption.

##### **Biomass**

Biomass (firewood, charcoal and crop residues) plays a very significant role in Uganda's energy supply. It constitutes over 90% of total energy consumption in the country. It provides almost all the energy used to meet basic needs of cooking and water heating in rural and most urban households, institutions and commercial buildings. Biomass is the main source of energy for rural industries. Trading in biomass energy, especially charcoal contributes to the

economy in terms of rural incomes, tax revenue and employment. It saves foreign exchange, employs 20,000 people and generates US\$ 36 billion (US\$ 20m) per year in rural incomes. Fuelwood requirements have contributed to the degradation of forests as wood reserves are depleted at a rapid rate in many regions. Charcoal consumption increases at a rate close to that of urban population (6% per annum). Charcoal is generally produced on non-state land.

Biomass (bagasse from sugar processing industry) is also used to produce electricity and steam (cogeneration).

Most of the traditional energy technologies (wood and charcoal stoves and charcoal production kilns) currently used in Uganda are inefficient. Several initiatives to conserve biomass resources have been undertaken by Government and the private sector, including NGOs. They include the promotion of improved stoves, as well as afforestation. However, the impact of these efforts is still limited.

### Solar

Uganda is endowed with plenty of sunshine giving solar radiation of about 4-5 kWh/m<sup>2</sup>/day. This level of insolation is quite favourable for all solar technology applications. Solar energy applications in Uganda include solar photovoltaic (PV), water heating, cooling and crop drying.

PV systems are generally required for applications where modest power needs exist mainly in areas that are not served by the grid. They provide power for lighting,



telecommunications, vaccine and blood refrigeration, and for playing radio and television in such areas. This technology has also proven to be very successful in providing energy services to very inaccessible areas such as on islands and mountainous areas where the national grid cannot be expected to extend its services in the foreseeable future.

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 from banks for solar rural electrification. The application of solar water heating is still very limited.

### Wind Energy

The average wind speed in Uganda is about 3 metres per second. In flatter areas especially around Lake Victoria and the Karamoja region as well as tops of hilly areas, the speed may go as high as 6 meters per second and above. This wind regime is good enough to support wind technology applications in the country. However, these wind speeds have been recorded at low heights for purposes of predicting weather. No measurements have been made at appropriate heights (over 10 m) for wind turbine design. A programme to that effect is being initiated under assistance from the African Development Bank and several private sector initiatives.

### Geothermal Energy

Although geothermal energy exploitation has not been established in Uganda, there is evidence of the existence of the resource. Potential geothermal resources are estimated at about 450 MW in the Ugandan Rift Valley System. Apart from basic studies on the geological and geo-chemical characteristics of several thermal anomalies, no detailed studies have been carried out to establish the economic resource potential.

### Small (mini and micro) Hydropower

The country has numerous mini- and micro-hydropower sites which can be developed to supply isolated areas or feed into the national grid. A study has been carried out on nine potential sites to rank them for development.

## **1.2.5 Atomic Energy Sub-sector**

Atomic energy use in Uganda is limited and is applied mainly in the agricultural and the health sectors. Atomic energy uses must be regulated in order to protect the public and the environment from dangers arising out of improper practices and uses of ionising radiation.

Atomic energy matters are regulated by the Atomic Energy Decree No.12 of 1972. The Decree established an Atomic Energy Control Board. However, the Board was never constituted. The absence of an effective legal and

institutional framework responsible for regulating atomic energy matters has affected the operations in the sub-sector and is likely to affect the flow of technical assistance from prospective development partners.

Under the on-going Public Service Reform Programme, it is proposed to establish a National Radiation Protection Commission under the MEMD.

### **1.3 ENERGY CONSERVATION**

#### **1.3.1 General**

There is significant potential for energy efficiency (EE) through improved use in households, industry, commercial buildings and the transport sector. Since expenditure on energy constitutes a large proportion of the country's GDP and a particularly large proportion of poor household expenditure, it is necessary to emphasise the effective and efficient use of energy. Fuel substitution is important to reduce the negative impact of the use of some fuels on the environment and to reduce the cost of energy services. For instance, substitution in the use of woodfuel with LPG will reduce deforestation.

The major sectors for energy conservation are the following:

- **Transport;**
- **Industry and Commerce;**
- **Households and institutions; and**
- **Agriculture.**

### **1.3.2 Transport**

The transport sector is the main consumer of petroleum products accounting for 8% of total imports. Lack of mass transport systems, poor mechanical conditions of vehicles and bad roads are some of the major factors affecting efficiency in the transport sector. Gaseous emissions from vehicles also constitute a significant portion of pollutants in towns and greenhouse gas emissions. Most of the public use mini buses (14-seater) for their transportation. These vehicles are mainly imported as second hand. Over the last ten years, there has been a tremendous increase in the number of vehicles. A few buses (70-seater) are used for long journeys. Efficiency in the railways is also low due to inadequate maintenance and poor condition of the rolling stock and the rails.

### **1.3.3 Industry and Commercial Buildings**

Efficiency of energy usage is low in most factories in Uganda. A number of factories operate below rated capacity, hence lowering overall efficiency. Some factories use old inefficient technologies (e.g. old boilers for tea drying). Efficiency in industries (tobacco curing, fish smoking, brick & tile making and lime production) in Uganda is low compared to other countries and has an adverse impact on forest cover.

Up to now activities on energy conservation have been limited to preliminary energy audits done by the MEMD in industries and commercial buildings (hotels) as well as efforts to increase awareness among all stakeholders.

#### **1.3.4 Households and Institutions**

Woodfuel, which represents the bulk of domestic fuel in Uganda, is burnt in inefficient traditional stoves. Improved stoves and kilns and substitution fuels (LPG, kerosene) for cooking are not extensively spread due to their cost, lack of awareness and other different socio-economic barriers.

Half the urban households use electricity for lighting (using inefficient incandescent lamps) whereas the majority of rural households use kerosene, which is more expensive. Water boiling is mostly done on electric coils. Other appliances used (refrigerators, deep freezers, air conditioners, etc.) are old and mostly bought second hand and are, therefore, inefficient.

#### **1.3.5 Agriculture**

Although agriculture is the main stay of Uganda's economy, the sector's fuel consumption is negligible because of the largely non-mechanical nature of the sector. Therefore, energy consumption in agriculture is not usually accounted for in the national energy balance of Uganda. However, agro-processing industries use a fairly substantial amount of fuel, including fuelwood and heavy diesel. This is normally

accounted for under the industry sector. Negligible amounts of diesel are used on the various automated farms. Fertiliser (another form of energy) usage is minimal in Uganda.

However, with the recent adoption of the Plan for Modernisation of Agriculture, it is anticipated that energy will play a major role not only in the processing industry but also on the modernised farms.

## **PART 2: KEY ISSUES IN THE ENERGY SECTOR**

In order to evolve relevant policies for the energy sector, it is important to first delineate the key issues that affect the supply and consumption/demand of energy in the country.

### **2.1 BROAD SECTOR ISSUES**

The broad sectoral issues are as follows:

2.1.1 Inadequacies within Government institutions to plan for and monitor the sector and carry out appropriate research and development (R & D) due to:

- Understaffing in key areas;
- Budgetary constraints; and
- Lack of appropriate curricula in energy studies at institutions of higher learning.

2.1.2 Inefficient supply and use of energy resources due to the neglect of the sector during the country's years of economic and political turmoil.

2.1.3 Inadequate co-ordination and information sharing among the various projects, government institutions and the private sector.

2.1.4 Inadequate information on energy supply and demand as well as the country's resource potential.

2.1.5 Lack of appropriate mechanisms to enable modern and efficient energy services to be accessed by the rural population.

## **2.2 SUB-SECTOR ISSUES**

Within the various subsectors, the key issues are as follows:

### **2.2.1 Power Sub-sector**

- i) Inadequate public financing to develop electricity supply projects to match growing demand. The Government prefers to maximise private investment in infrastructure in order to allocate more resources to the social sector.
- ii) High subsidy cost of the power sector arising from its inability to service its long-term debt.
- iii) Low quality of electricity supply and customer service.
- iv) High technical and non-technical losses.
- v) Very low electricity coverage throughout the country, especially in the rural areas.
- vi) Lack of information on the cumulative environmental and social impacts arising from cascading power generating stations along the Nile River.



- vii) Inefficient commercial operations including:
  - lack of an accurate customer database;
  - inadequate systems and controls for meter reading;  
and
  - high accounts receivable.
  
- viii) High Electricity tariffs due to the past very low or no investment in power generation and distribution coupled with a very low operational efficiency.

### **2.2.2 Petroleum Sub-sector**

#### *a) Upstream Industry*

- i) Limited public resources available for investment resulting in:
  - ineffective promotional campaigns; and
  - inability to acquire seismic data in the exploration areas which are not yet licensed to oil companies.
- ii) Low investment in the upstream sub-sector by oil companies.

#### *b) Downstream Industry*

- i) Inadequate institutional and legal framework to regulate the petroleum supply industry, resulting in lack of competition and transparency.
- ii) Significant smuggling of petroleum products along the borders.

- iii) Low storage private capacity compared to national requirements.
- iv) Lack of quality control of the oil products, posing an increasing hazard to public health and the environment.
- v) High transport costs and high margins by oil companies.

### **2.2.3 New and Renewable Sources of Energy**

- i) Inefficient production and use of biomass energy resulting in adverse effects on the environment and the health of biomass energy users, especially in rural households.
- ii) Low public awareness about the efficacy and potency of renewable energy technologies (RETs): even if people are aware of RETs, their real potential and technical limits and constraints are generally underestimated.
- iii) Underdeveloped markets in RETs equipment and services because of high initial investment costs and lack of financial capacity to cover the initial investment.
- iv) Lack of mechanisms to monitor standards and ensure quality control of RETs: the poor quality of some technologies available on the market reduces their lifetime and damages the image of RETs.

- v) Inadequate financing mechanisms and other incentives to facilitate investment, communication, promotion and dissemination of RETs.
- vi) Inadequate data available on the potential of indigenous renewable energy sources (geothermal, solar, wind, mini and micro hydro, etc).

#### **2.2.4 Atomic Energy**

- i) Absence of a formal institutional and legislative framework for regulating atomic energy activities.
- ii) Budgetary constraints that have negatively affected:
  - Uganda's contributions to the International Atomic Energy Agency (IAEA), thus lowering the country's bargaining power; and
  - co-ordination of activities.
- iii) Lack of public awareness about the usefulness of nuclear radiation techniques in the economy.

### **2.3 ENERGY CONSERVATION ISSUES**

#### **2.3.1 General**

- i) Insufficient awareness among energy end-users about energy conservation possibilities and practices, thus

hampering investment in demand side management measures.

- ii) Lack of incentives, including financing mechanisms to invest in modern, efficient technologies and practices.
- iii) Lack of specialised and skilled manpower in energy management.

### **2.3.2 Industry**

- i) Dominance of old energy-inefficient technologies and lack of replacement parts.
- ii) Lack of proper instrumentation in a number of plants.
- iii) Poor housekeeping by most industries.
- iv) Lack of awareness, skilled manpower and appropriate financing mechanisms in the area of energy management.

### **2.3.3 Transport**

- i) Dominance of old fleet of vehicles that are energy inefficient, resulting in increased pollution.
- ii) Poor maintenance culture.

- iii) Inadequate mass transit system, resulting in increased traffic congestion during peak hours and energy consumption per passenger.
- iv) Bad road infrastructure coupled with low road maintenance.

#### **2.3.4 Agriculture**

- (i) Over dependence on human and animal energy.
- (ii) Lack of data on energy consumption in agriculture.
- (iii) Lack of incentives to introduce mechanised farming to smallholder agricultural producers.

#### **2.3.5 Households and institutions**

- i) Low efficiency of technologies in use, including woodfuel stoves, lights and other appliances.
- ii) Insufficient incentives to introduce fuel/technology substitution, e.g. electricity for kerosene and woodfuel, LPG for woodfuel, solar water heaters for electric water heaters and woodfuel, fluorescent lamps for incandescent lamps, etc.
- iii) Lack of information about improved energy technologies and efficient practices.

- iv) Socio-economic and health burdens occasioned on rural women in the collection and use of firewood.

## **PART 3: MAIN POLICY GOAL AND BROAD OBJECTIVES**

The key issues identified define the current situation in Uganda's energy sector. They cover a wide range of challenges, mainly of socio-economic, technical and environmental nature. The National Energy Policy should, therefore, provide a sound basis for addressing these challenges through elaborate strategies and plans that are in conformity with the overall national-economic policy.

### **3.1 THE MAIN POLICY GOAL**

The main policy goal in the energy sector is:

**To meet the energy needs of the Ugandan population for social and economic development in an environmentally sustainable manner.**

### **3.2 BROAD OBJECTIVES**

Specifically, the energy policy seeks to meet the following broad objectives:

**Objective 1 - To establish the availability, potential and demand of the various energy resources in the country**

**To meet this objective, Government shall:**

- Prepare a database on all the available energy resources and energy consumption patterns in order to:
  - (i) have a long term perspective of the options for demand/supply matching; and
  - (ii) package information on potential projects for investment.
  
- Build the necessary local capacity to acquire the required data and assess and evaluate the resources.

**Objective 2 - To increase access to modern affordable and reliable energy services as a contribution to poverty eradication**

**To achieve this objective the Government shall:**

- Attract private capital and management in the energy sector.
- Promote competition between energy service providers.
- Promote the development of markets in energy technologies and services.
- Put in place a conducive environment to accelerate rural energy supply and access by:
  - (i) applying subsidies exclusively on capital investment;
  - (ii) applying light-handed regulation to facilitate investment in rural energy projects;



- (iii) having differentiated tariffs for different areas or projects to reflect investment and supply costs;
  - (iv) exploring schemes to assist consumers to purchase appliances thereby increasing the speed at which the load of new consumers matures; and
  - (v) formulation of guidelines on organising rural communities to enable them access better provision of energy services.
- Intensify provision of consumer information, education and technical advice in the use and conservation of energy.
  - Work with financial institutions to establish sustainable financing mechanisms for energy programmes.

**Objective 3 - To improve energy governance and administration**

In order for the energy sector to operate efficiently and play its role in the socio-economic development of the country, Government will strengthen and streamline energy sector administration and governance. To achieve the above objective government shall:

- clarify the roles and functions of the various institutions involved in the energy sector increasing the role of the private sector and other NGO's and communities;
- create a transparent legal and regulatory framework for the sector;
- build capacity at the national and local levels for better formulation and implementation of energy policies and programmes;

- build the capacity of regulatory agencies to provide even-handed and predictable regulation;
- develop incentives to retain local human resource for the energy sector; and
- involve all stakeholders in the formulation of new policies in the energy sector.

#### **Objective 4 - To stimulate economic development**

Government will ensure that energy plays a central role in the economic development of the country and in the region. In order to achieve the above objective Government will adopt the following strategies:

- Encourage competition within the energy markets to achieve efficiency.
- Attract investments in energy services provision by providing appropriate incentives.
- Ensure energy supply security and reliability.
- Promote energy trade within the region.

#### **Objective 5 - To manage energy-related environmental impacts**

Government will ensure that environmental considerations are given priority by energy suppliers and users to protect the environment and put in place a monitoring mechanism to evaluate compliance with established environmental protection guidelines.

To meet the above objective, Government shall:

- promote the use of alternative sources of energy and technologies which are environmentally friendly;
- sensitise energy suppliers and users about the environmental issues associated with energy;
- work towards the establishment and acceptance of broad targets for the reduction of energy-related emissions that are harmful to the environment and energy users;
- promote efficient utilisation of energy resources; and
- strengthen the environment-monitoring unit in the energy sector.

### **3.3 REGULATION PRINCIPLES FOR THE ENERGY SECTOR**

With the liberalisation of the economy it is pertinent that energy sector decisions ensure appropriate energy supply and use. Open and competitive markets are fundamental to achieving an efficient and sustainable energy sector. Well functioning markets are generally the most efficient means of allocation of resources. However, where markets are imperfect, energy prices may not accurately reflect the full social cost and energy suppliers may not choose the most efficient options. In such cases, Government intervention may be warranted.

Competitive energy markets need sophisticated regulatory regimes. In Uganda, while the energy sector has been liberalised, legislative and regulatory gaps still exist, resulting into unfair practices by the players. This calls for government intervention to ensure fair play, protect consumers, ensure

the financial viability of private investments, promote competition and collect information.

There are two distinct types of regulation, namely, economic regulation and competition regulation. The first mode of regulation is now applied to the power sub-sector and the other applies to the petroleum supply sub-sector.

### **Power Sub-sector**

The new regulatory system for the power Sub-sector is based on UEB unbundling, private concession for generation and distribution, and “single buyer” model. It is conceived to give confidence to both private sector participants and consumers that the new power system will function under an agreed and transparent set of rules and procedures. Regulation is through the new Electricity Regulatory Authority – an independent industry-specific regulatory body – whose powers are defined under the Electricity Act, 1999. The main functions of the Authority are to issue licences and prescribe licence fees, to establish a tariff structure, and to develop and enforce codes of conduct, performance and quality standards.

### **Petroleum Sub-sector**

Until 1994, Government had rigorously regulated access to foreign exchange, import licensing and pump prices. The new regulatory framework aims to monitor the sub-sector to reinforce and promote competition among the players. Principles of an open and competitive market will be

established and regulated by the Ministry of Energy and Mineral Development. A general law on fair trade and antitrust will be put in place to complete this legal framework. The industry will be regulated through an effective monitoring system instead of controlling prices. Private initiatives and investments will be promoted and protected against discretionary interference, discrimination or favouritism by the authorities. A general petroleum fee will support the establishment of the effective regulatory system.

### **Energy Efficiency and Renewable Energy Sub-sectors**

During the short term these sub-sectors will not be specifically regulated. The necessity to establish an energy efficiency law will be analysed taking in account the experience of other countries on this matter. The Government is determined to put in place a regulatory system which is consistent with the existing industry and market structures. In the mean time, emphasis will be put on awareness, quality control and standards.

### **Atomic Energy and Ionizing Radiation**

While atomic energy/ionising radiation has proven positive applications, the negative effects arising from reckless and unprofessional uses in disregard of the established safety standards calls for an effective legal and institutional framework to regulate the activities and practices in the sub-sector. The need for a regulatory framework takes into account the requirements of the existing international legal

treaties and standards. The new law proposing the establishment of the Atomic Energy Council (AEC) as the regulatory organ is to be enacted. This Council will issue licenses and regulations, conduct inspections and take action as is necessary.

## **PART 4: DEMAND AND SUPPLY SIDE OBJECTIVES AND STRATEGIES**

### **4.1 DEMAND SIDE**

#### **4.1.1 Households and Institutions**

**Objective: To provide affordable energy services for households and community based services including water supply and sanitation, health, education, public lighting and communication in order to improve the social welfare of the rural population.**

**Specific Objectives:**

- To achieve a sustainable level of energy security for low income households so as to reduce poverty at household level.
- To improve the efficiency in the use of biomass resources, recognising that biomass will remain a dominant source of energy, especially in the rural areas, for the foreseeable future.
- To specifically target provision of energy to productive activities such as home-based industries in order to directly raise household incomes.
- To sensitise women on energy source and technology choices in order to reduce the labour and health burdens associated with biomass energy use.

## **Strategies:**

- (a) Household and community energy services will be a priority in the poverty eradication programme. Energy will be recognized as one of the basic needs of the population, especially the poor.
- (b) A comprehensive Household Energy Plan, which adequately addresses issues related to shortages and inefficient use of biomass and affordability of modern energy services, will be developed.
- (c) Household energy policy and projects will be linked more closely to other sectors like agriculture, forestry, water and sanitation, health, education, transport, industry and telecommunications.
- (d) The adoption of energy demand management in middle and high-income households and the implementation of energy conservation measures in institutional buildings and in Government departments will be emphasized.
- (e) Incentives will be created to make electricity and other modern fuels more easily accessible in rural areas.

### **4.1.2 Industry and Commerce**

**Objective: To introduce energy efficiency measures for Industry and Commerce taking into account the acknowledged potential for improvements that can result in both financial and environmental benefits for the country, thus**



**making Ugandan industry more internationally competitive.**

**Strategies:**

- (a) Training and other incentives will be given to the industry and commerce sectors in order for them to adopt more efficient energy end-use technologies.
- (b) Where appropriate, the use of cleaner fuels will be promoted, environmental performance auditing enforced, and the internalisation of environmental costs promoted.
- (c) Co-ordination between institutions concerned with energy, industry and environmental issues will be improved.
- (d) Financial incentives for energy efficiency, e.g. the introduction of “time-use” electricity tariffs, will be developed.

**4.1.3 Transport**

**Objective: To promote optimum and efficient utilisation of petroleum fuels and substitution.**

**Specific Objectives:**

- To highlight the importance of transport energy and put in place actions to develop a more energy efficient transport system.

- To reduce environmental pollution and associated health problems.

**Strategies:**

- (a) Government will formulate fiscal and transport policies to promote energy conservation and efficiency.
- (b) The feasibility of introducing measures for pollution control will be explored, including:
  - using environmentally friendly fossil fuels e.g. unleaded gasoline, low sulphur diesel; and
  - importation of more efficient vehicles.
- (c) Incentives will be created in order to promote mass transport systems so that the proliferation of individual vehicles is reduced.
- (d) Opportunities for using alternative fuels, e.g. ethanol, methanol and biodiesel will be researched into.

#### **4.1.4 Agriculture**

**Objective: To increase the use of modern energy in agriculture as a component of the "Plan for Modernisation of Agriculture: Eradicating Poverty in Uganda".**

**Strategies:**

- (a) The population will be encouraged to implement modest mechanisation that focuses on providing access to energy

services, which help to raise the productivity of labor-intensive agriculture.

- (b) The PMA will be specifically supported through capacity building, information and awareness campaigns and provision of facilities to finance energy services for rural agro-processing.

## **4.2 SUPPLY SIDE**

### **4.2.1 Power Sub-sector**

**Objective: To strengthen, enlarge and make efficient power supply in order to enable the provision of adequate and reliable energy to meet national economic and social development needs.**

**Specific Objectives:**

- To make the power sub-sector financially viable and able to perform without subsidies from the Government budget.
- To increase the sector's efficiency and improve the sector's commercial performance.
- To meet the growing demand for electricity at national and regional level and increase area coverage.
- To attract private capital and entrepreneurs.
- To integrate environmental impact assessment in all electricity supply projects.

### **Strategies:**

- (a) Increase competition in the sector, operate and expand the existing system at minimum cost and price electricity to reflect the marginal cost of supply in order to achieve efficiency.
- (b) Create incentives to attract private sector investment including, wherever relevant and appropriate, access to loans on concessionary terms, financial instruments, government guarantees. and “smart subsidies” (or grants) for infrastructure investment.
- (c) Implement the power sector reform strategy so that UEB’s distribution and generation businesses are privatised in order to attract capital to refurbish the system and better management to improve on operation efficiency.
- (d) Build the capacity of the ERA to provide even-handed and predictable electricity sector regulation.
- (e) Put in place and build the capacity of the Electricity Disputes Tribunal which is central to dispute resolution in the power sector.
- (f) Implement the Rural Electrification Strategy and Plan along the following lines:
  - 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).

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

#### **4.2.2 Petroleum Sub-sector**

##### **Objective:**

- i) **Upstream:** To establish the petroleum potential of the country and to promote its exploitation.
- ii) **Downstream:** To ensure an adequate, reliable and affordable supply of quality petroleum products for all sectors of the economy at internationally competitive and fair prices within appropriate health, safety and environmental standards.

##### **General Strategies:**

- (a) Create conducive conditions for attracting more investors in both the upstream and downstream sub-sectors.

- (b) Develop a mitigation plan to reduce environmental hazards in all oil operations.

**Specific Strategies:**

□ **Upstream:**

- (c) Facilitate the acquisition of geological and geophysical data for assessing the petroleum potential of the country.
- (d) Promote investment in petroleum exploration and production by packaging and disseminating preliminary exploration data.
- (e) Build capacity and maintain an efficient institution to monitor and regulate petroleum exploration and development.

○ **Downstream:**

- (f) Adopt and implement the new Petroleum Legal Framework (Petroleum Act, regulations and anti-trust laws) involving:
- the establishment of an appropriate institutional framework (Department of Petroleum Supplies and the Technical Petroleum Committee);
  - the establishment of an open and competitive market;
  - the implementation of a monitoring system for the petroleum industry;
  - the establishment of a transparent and efficient system of issuing permits for construction and licences for operation of petroleum supply installations;

- the adoption and adaptation of international standards and codes of practice; and
  - the institution of a general petroleum fee on petroleum sales for sustainability of the sub-sector activities.
- (g) Ensure security of supply of imported petroleum products by:
- maintaining at least two supply routes; and
  - keeping appropriate levels of strategic stocks based on an assessment of the risk of supply disruption.
- (h) Improve transportation and storage of products by:
- promoting the development of the Eldoret - Kampala pipeline extension project; and
  - improving management and safety measures of the national strategic reserves.
- (i) Implement quality-monitoring systems including equipped mobile inspection teams.

#### **4.2.3 Biomass and Other Renewable Energy Sub-sector**

**Objective: To develop the use of renewable energy resources for both small and large-scale applications.**

**Strategies:**

- (a) Support the dissemination of biomass and other Renewable Energy Technologies (RETs) to increase their positive impact on the energy balance and the environment.

- (b) Facilitate adequate financing schemes for RETs by establishing sustainable financing mechanisms to make them more accessible.
- (c) Ensure that RET producers and importers ascribe to certified performance and technical standards.
- (d) Include renewable energy and energy efficiency in the curricula of schools, polytechnics, vocational training centres and other institutions of education.
- (e) Promote geothermal energy development and exploration. Geothermal energy can be utilised to supply base-load electricity and provision of direct heat.
- (f) Support efforts to develop biomass resources in agreement with the Uganda Forestry Policy and the National Forest Plan.

#### **4.2.4 Atomic Energy and Ionizing Radiation**

**Objective: To enhance peaceful applications of atomic energy/ionizing radiation in the various sectors in the country through adoption and adaptation of international basic safety standards and related Treaties, Conventions, Agreements and Protocols.**

**Strategies:**

- (a) Adopt and implement the new Atomic Energy Legal Framework (Atomic Energy Act, Atomic Energy Council,



Public Health, Safety and Environmental Protection regime).

- (b) Adopt and implement the regulatory framework for ionising radiation (radiation protection laws, occupational, medical and public exposure control, emergency preparedness and response capabilities).
- (c) Build capacity and develop management and professional skills on radiation protection and safety aspects.
- (d) Draw up medium and long term national plans on nuclear energy applications.
- (e) Establish an appropriate laboratory to enhance quality assurance and control programmes.

## **PART 5. SHORT- AND MEDIUM-TERM POLICY PRIORITY ACTIONS.**

Several policy actions will be implemented in order to achieve the broad and specific objectives of this energy policy. The details are indicated in Annex 1.

Strategic interventions required to move forward the policy priority actions are indicated alongside the proposed actions.

The total financial resources required to implement the strategic interventions are of the order of UShs. 3,230 billion or US\$ 1.84 billion. It is estimated that 68% of these resources will come from direct private investment while 32% have to be obtained from the public sector either through Government resources or from development partners (e.g. Multilateral and bilateral cooperation, Global Environment Facility, Clean Development Mechanism). In particular, Government will strive to take advantage of these environmental agencies by emphasizing the development of renewable energy resources.

For the same period the expected sector revenues are of the order of UShs 4,078 billion or US\$ 2.3 billion and include fuel taxes, electricity taxes (IPPs), VAT on electricity sales, petroleum fee and power exports. More revenues are expected from petroleum production and UETCL and UEGCL concession fees.

## **PART 6: CONCLUSION: Investing in the Future**

Energy is the life-blood of development. Energy supply is part of the poverty eradication process. The present Energy Policy for Uganda will allow the population to meet one of its basic needs in a sustainable manner.

The Policy will focus on:

- developing positive linkages between the energy sector, poverty alleviation and economic growth;
- integrating the objective of environmental sustainability into all energy initiatives;
- demand side management and energy efficiency;
- developing an energy resource base and dissemination of key information;
- promoting private participation and the development of competitive markets in energy technology and services; and
- developing, where necessary, appropriate regulatory frameworks and capacity.

The Policy will be the basis for progressively expanding investment in modern energy production, petroleum exploration and development, rural electrification, the supply of well priced petroleum products, and for increasing the efficiency of energy use in all sectors from the household consuming biomass for cooking to the big industries and the transport sector.

The technicalities of the energy policy are important, but more so are the social dimensions. The building of human resources is paramount to the effective utilisation of energy and the ensuing benefits.

Significant resources of the order of US\$ 3,230 billion are required to implement the key policy actions in the short and medium terms. Of this amount over US\$ 400 million is intended for rural electrification which will have a direct positive impact on poverty alleviation and modernisation of agriculture.

The Ministry of Energy and Mineral Development is dedicated to the economic, social and environmentally sustainable development of the Ugandan energy sector. In pursuit of this goal, the Ministry seeks to prioritise the policies contained in this paper and translate those priorities into strategies. The Ministry is committed to develop concrete plans to activate these policy strategies, and will undertake specific activities to ultimately make these plans a reality with the support of all the people and institutions of Uganda.

**ANNEX 1 : Short and Medium (0 – 10 Years) Term Policy Priorities**

PRIORITY POLICY ACTION	STRATEGIC INTERVENTION	REQUIRED FINANCIAL RESOURCES	FUNDS ALREADY COMMITTED	SOURCE OF FUNDING	TIMING	OTHER COMMENTS
1) INCREASE POWER GENERATION	1) COMPLETE THE OWEN FALLS EXTENSION PROJECT (KIIRA POWER PLANT)	US\$ 84 MILLION	US\$ 84 MILLION	<ul style="list-style-type: none"> <li>• INTERNATIONAL DEVELOPMENT ASSOCIATION (IDA)</li> <li>• NORAD/NDF</li> <li>• GOU</li> </ul>	2002 – 2004	PUBLIC SECTOR INVESTMENT
	2) CONSTRUCT TWO HYDROELECTRIC POWER PLANTS	US\$ 950 MILLION	US\$ 350 MILLION	<ul style="list-style-type: none"> <li>• SPONSORS' EQUITY AND LOANS</li> <li>• GOU: US\$ 30 MILLION</li> </ul>	2002 – 2008	PRIVATE SECTOR INVESTMENT WITH GOVERNMENT SUPPORT
2) DIVERSIFY POWER GENERATION SOURCES TO ENSURE SECURITY OF SUPPLY	1) DEVELOP SELECTED RENEWABLE ENERGY PROJECTS e.g. KAKIRA SUGAR CO-GENERATION, SMALL AND MINI-HYDROS	US\$ 117 MILLION	US\$ 25.4 MILLION	<ul style="list-style-type: none"> <li>• PRIVATE EQUITY, GRANTS AND LOANS.</li> <li>• GOU: US\$ 3.5 MILLION</li> </ul>	2002 - 2012	GOU SUPPORT REQUIRED
3) INCREASE ACCESS TO MODERN ENERGY IN RURAL AREAS	1) IMPLEMENT THE RURAL ELECTRIFICATION PROGRAMME BY GRID EXTENSION, DEVELOPMENT OF ISOLATED GRIDS AND DISSEMINATION OF SOLAR PHOTOVOLTAIC SYSTEMS	US\$ 322 MILLION	US\$ 35.87 MILLION	<ul style="list-style-type: none"> <li>• IDA, GEF, BILATERAL DONORS</li> <li>• GOU: US\$ 22 MILLION</li> </ul>	2002 – 2012	MAINLY PUBLIC SECTOR PROJECTS WITH A GROWING PRIVATE CONTRIBUTION
4) INCREASE OPERATIONAL EFFICIENCY IN THE UTILITY COMPANIES AND CONNECT MORE CUSTOMERS TO THE GRID	1) CONCESSION OUT UEB GENERATION, DISTRIBUTION BUSINESS AND INVEST IN THE REFURBISHMENT OF THE DISTRIBUTION NETWORK	US\$ 84 MILLION	0	PRIVATE SECTOR CONCESSION HOLDER EQUITY AND LOANS	2002 – 2007	REQUIRES GOVERNMENT SUPPORT TO MANAGE CERTAIN RISKS
	2) EXPAND THE TRANSMISSION NETWORK	US\$ 100 MILLION	0	GOU UETC LTD DONOR FUNDS	2002 - 2007	PUBLIC INVESTMENT WITH CONCESSIONAL FINANCES

PRIORITY POLICY ACTION	STRATEGIC INTERVENTION	REQUIRED FINANCIAL RESOURCES	FUNDS ALREADY COMMITTED	SOURCE OF FUNDING	TIMING	OTHER COMMENTS
5) DETERMINE THE POTENTIAL OF THE COUNTRY	1) CARRY OUT EXPLORATION DRILLING IN SEMLIKI BASIN	US\$ 10 MILLION	US\$ 10 MILLION	PRIVATE SECTOR CAPITAL	2002 - 2003	ADDITIONAL BUDGET AND PROGRAM WILL DEPEND ON THE NATURE OF THE OIL DISCOVERY MADE
	2) CARRY OUT SEISMIC SURVEY OF LAKE ALBERT AREA	US\$ 3 MILLION	US\$ 3 MILLION	PRIVATE SECTOR CAPITAL	2002 - 2003	TO BE FOLLOWED BY DRILLING OPERATIONS
	3) ACQUIRE MORE GEOLOGICAL & GEOPHYSICAL DATA IN THE UNLICENSED AREAS	US\$ 1.4 MILLION	0	GOU/MEMD	2002 - 2005	DATA OBTAINED WILL AID INVESTMENT PROMOTION
	4) MONITOR EXPLORATION PROGRAMME OF THE LICENCES	US\$ 1.4 MILLION	US\$ 0.33 MILLION	GOU	2002 – 2005	
6) CREATE A COMPETITIVE PETROLEUM SUPPLY MARKET IN THE COUNTRY	1) ESTABLISH AND RUN A PETROLEUM MONITORING SYSTEM BASED ON THE NEW PETROLEUM ACT	US\$ 5 MILLION	US\$ 1 MILLION	GOU: US\$ 4 MILLION IDA: US\$ 1 MILLION	2002 - 2012	IDA FUNDS WILL BE AVAILABLE ONCE THE ENABLING LEGISLATION IS ENACTED
	2) PROMOTE AND DEVELOP THE PIPELINE EXTENSION FROM ELDORET TO KAMPALA	US\$ 100 MILLION	US\$ 5 MILLION	PRIVATE CAPITAL GOK GOU: US\$ 5 MILLION	2002 – 2007	COMMITMENT OF THE KEY PLAYERS IN THE SUPPLY CHAIN REQUIRED
	3) IMPROVE THE MANAGEMENT AND SAFETY OF THE NATIONAL STRATEGIC RESERVES	US\$ 6 MILLION	US\$ 3.6 MILLION	GOU	2002 – 2005	CONSTRUCTION OF THE FIRE FIGHTING EQUIPMENT STARTED IN 2001
	4) BUILD ADDITIONAL STRATEGIC PETROLEUM PRODUCTS RESERVES	US\$ 30 MILLION	0	GOU	2004 - 2012	GOU INTERESTED TO ASSOCIATE PRIVATE INVESTORS

PRIORITY POLICY ACTION	STRATEGIC INTERVENTION	REQUIRED FINANCIAL RESOURCES	FUNDS ALREADY COMMITTED	SOURCE OF FUNDING	TIMING	OTHER COMMENTS
7) PROMOTE THE USE OF RENEWABLE ENERGY AND EFFICIENT TECHNOLOGIES	1) EVALUATE RENEWABLE ENERGY RESOURCES	US\$ 3.2 MILLION	US\$ 2.5 MILLION	ADB IDA/GEF GOU	2002 – 2005	STUDY LAUNCHED IN 2002
	2) PROMOTE THROUGH AWARENESS AND CAPACITY BUILDING RENEWABLE ENERGY AND ENERGY EFFICIENT TECHNOLOGIES	US\$ 6 MILLION	US\$ 4 MILLION	GOU IDA/GEF GTZ	2002 - 2005	PUBLIC SECTOR INVESTMENT
8) MANAGE ENERGY RELATED ENVIRONMENTAL IMPACT	1) MONITOR THE IMPLEMENTATION OF ENVIRONMENTAL IMPACT ASSESSMENT OF ENERGY INVESTMENTS (E.G. LARGE HYDROPOWER DAMS, PETROLEUM EXPLORATION)	US\$ 10 MILLION	0	IDA GOU	2002 – 2012	GOU INSTITUTIONAL SUPPORT
	2) NEGOTIATE FOR BENEFITS ACCRUING OUT OF THE KYOTO PROTOCOL	US\$ 3.9 MILLION	US\$ 3.9 MILLION	PROTOTYPE CARBON FUND (PCF)	2002 - 2012	EMISSIONS CERTIFICATES WILL BE ESTABLISHED
9) IMPROVING ENERGY GOVERNANCE AND ADMINISTRATION	1) BUILD CAPACITY OF THE REGULATORY AGENCIES: ENERGY DEPARTMENT; ELECTRICITY REGULATORY AUTHORITY; ELECTRICITY TRIBUNAL; DEPARTMENT OF PETROLEUM SUPPLIES; PETROLEUM EXPLORATION AND PRODUCTION DPT, ATOMIC ENERGY COUNCIL.	US\$ 8 MILLION	US\$ 4 MILLION	GOU DONOR AGENCIES (IDA, NORAD, GTZ, IAEA)	2002 - 2009	OPERATIONAL COSTS FOR THESE INSTITUTIONS ARE NOT COVERED
	2) ESTABLISH A REGULATORY FRAMEWORK ON ATOMIC ENERGY/IONIZING RADIATION					





## **REQUIRED SECTOR INVESTMENTS (2000 – 2012)**

<b>TOTAL INVESTMENT FUNDS IN THE SHORT TO MEDIUM TERM:</b>	<b>US\$</b>	<b>1,844,900,000</b>
PRIVATE SECTOR INVESTMENT	: US\$	1,259,000,000 (68 %)
PUBLIC SECTOR INVESTMENT	: US\$	585,900,000 (32 %)
<b>TOTAL FUNDS ALREADY COMMITTED</b>	<b>: US\$</b>	<b>532,600,000</b>
PRIVATE SECTOR CONTRIBUTION	: US\$	363,000,000 (68 %)
PUBLIC SECTOR CONTRIBUTION	: US\$	169,600,000 (32 %)
<b>TOTAL FUNDS REQUIRED</b>	<b>: US\$</b>	<b>1,312,300,000</b>
PRIVATE SECTOR REQUIREMENT	: US\$	896,000,000 (68 %)
PUBLIC SECTOR REQUIREMENT	: US\$	416,300,000 (32 %)

## **EXPECTED SECTOR REVENUES (2002 – 2012)**

### **(i) Quantifiable Revenues**

<b>TAX REVENUES</b>		
FUEL TAXES	: US\$	1,511,000,000
ELECTRICITY TAXES (IPPs)	: US\$	278,000,000
VAT ON ELECTRICITY SALES (17%)	: US\$	262,000,000
<b>NON-TAX REVENUES</b>		
PETROLEUM SUPPLY FEE	: US\$	33,500,000
POWER EXPORT REVENUES	: US\$	246,000,000
<b>REVENUES EXPECTED</b>	<b>: US\$</b>	<b>2,330,500,000</b>

### **(ii) Revenues which cannot be quantified at the moment**

PETROLEUM PRODUCTION  
CONCESSION FEES

## ANNEX 2: Acronyms

<b>ADB</b>	<b>African Development Bank</b>
<b>CDM</b>	<b>Clean Development Mechanism</b>
<b>CPF</b>	<b>Carbon Prototype Fund</b>
<b>EA</b>	<b>Exploration Areas</b>
<b>EAC</b>	<b>East African Community</b>
<b>EE</b>	<b>Energy Efficiency</b>
<b>ERA</b>	<b>Electricity Regulatory Authority</b>
<b>ERD</b>	<b>Energy Resources Department</b>
<b>GDP</b>	<b>Gross Domestic Product</b>
<b>GEF</b>	<b>Global Environment Facility</b>
<b>GHG</b>	<b>Greenhouse Gases</b>
<b>GOK</b>	<b>Government of Kenya</b>
<b>GOU</b>	<b>Government of Uganda</b>
<b>GSMD</b>	<b>Geological Survey and Mines Department</b>
<b>GTZ</b>	<b>Gesellschaft für Technische Zusammenarbeit</b>
<b>HV</b>	<b>High Voltage</b>
<b>IAEA</b>	<b>International Atomic Energy Agency</b>
<b>IDA</b>	<b>International Development Agency</b>
<b>IPP</b>	<b>Independent Power Producer</b>
<b>LPG</b>	<b>Liquefied Petroleum Gas</b>
<b>MEMD</b>	<b>Ministry of Energy and Mineral Development</b>
<b>MFPED</b>	<b>Ministry of Finance, Planning and Economic Development</b>
<b>MTCS</b>	<b>Medium-Term Competitive Strategy</b>
<b>MWLE</b>	<b>Ministry of Water, Land and Environment</b>
<b>Mio t</b>	<b>Million of tons</b>
<b>NEMA</b>	<b>National Environment Management Authority</b>
<b>NGO</b>	<b>Non Governmental Organisation</b>
<b>NORAD</b>	<b>Norwegian Development Agency</b>
<b>NRSE</b>	<b>New and Renewable Sources of Energy</b>
<b>OF</b>	<b>Owen Falls</b>
<b>OFE</b>	<b>Owen Falls Extension</b>
<b>PEAP</b>	<b>Poverty Eradication Action Plan</b>
<b>PEPD</b>	<b>Petroleum Exploration and Production Department</b>
<b>PPA</b>	<b>Power Purchase Agreement</b>
<b>PSA</b>	<b>Production Sharing Agreement</b>
<b>PV</b>	<b>Photovoltaic</b>
<b>R&amp;D</b>	<b>Research and Development</b>
<b>RE</b>	<b>Renewable Energy</b>
<b>RET</b>	<b>Renewable Energy Technologies</b>
<b>Toe</b>	<b>Ton of Oil Equivalent</b>
<b>UEB</b>	<b>Uganda Electricity Board</b>
<b>UEDCL</b>	<b>Uganda Electricity Distribution Company Limited</b>
<b>UEGCL</b>	<b>Uganda Electricity Generation Company Limited</b>
<b>UETCL</b>	<b>Uganda Electricity Transmission Company Limited</b>

<b>UMA</b>	<b>Uganda Manufacturers Association</b>
<b>UNCCC</b>	<b>United Nations Climate Change Convention</b>
<b>UPE</b>	<b>Universal Primary Education</b>
<b>UREA</b>	<b>Uganda Renewable Energy Association</b>
<b>URU</b>	<b>Utility Reform Unit</b>
<b>UShs</b>	<b>Uganda Shilling (1 US\$ = 1,750 UShs in March 2002)</b>
<b>VAT</b>	<b>Value Added Tax</b>

# **THE RENEWABLE ENERGY POLICY FOR UGANDA**

*Government's Policy Vision* for Renewable Energy is:

**To make modern renewable energy a substantial part of the national energy consumption.**

*The Overall Policy Goal* is:

**To increase the use of modern renewable energy, from the current 4% to 61% of the total energy consumption by the year 2017.**

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## LIST OF ACRONYMS

<b>ADB</b>	African Development Bank
<b>CBO</b>	Community Based Organisation
<b>CDM</b>	Clean Development Mechanism
<b>CIREPS</b>	Community Initiated Rural Electrification Projects
<b>CPF</b>	Carbon Prototype Fund
<b>CSF</b>	Credit Support Facility
<b>EA</b>	Exploration Areas
<b>EAC</b>	East African Community
<b>EE</b>	Energy Efficiency
<b>ERA</b>	Electricity Regulatory Authority
<b>ERD</b>	Energy Resources Department
<b>GDP</b>	Gross Domestic Product
<b>GEF</b>	Global Environment Facility
<b>GHG</b>	Greenhouse Gases
<b>GOK</b>	Government of Kenya
<b>GOU</b>	Government of Uganda
<b>GSMD</b>	Geological Survey and Mines Department
<b>GTZ</b>	Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation)
<b>HV</b>	High Voltage
<b>IAEA</b>	International Atomic Energy Agency
<b>IDA</b>	International Development Agency
<b>IPP</b>	Independent Power Producer

<b>LIREPS</b>	Locally Initiated Rural Electrification Projects
<b>LPG</b>	Liquefied Petroleum Gas
<b>MDGs</b>	Millenium Development Goals
<b>MEMD</b>	Ministry of Energy and Mineral Development
<b>MFPED</b>	Ministry of Finance, Planning and Economic Development
<b>MTCS</b>	Medium-Term Competitive Strategy
<b>MWE</b>	Ministry of Water and Environment
<b>Miot</b>	Million of Tons
<b>NEMA</b>	National Environment Management Authority
<b>NGO</b>	Non Governmental Organization
<b>NORAD</b>	Norwegian Development Agency
<b>NRSE</b>	New and Renewable Sources of Energy
<b>PEAP</b>	Poverty Eradication Action Plan
<b>PEPD</b>	Petroleum Exploration and Production Department
<b>PPA</b>	Power Purchase Agreement
<b>PREPS</b>	Priority Rural Electrification Projects
<b>PSA</b>	Production Sharing Agreement
<b>PV</b>	Photovoltaic
<b>R&amp;D</b>	Research and Development
<b>RE</b>	Renewable Energy
<b>REA</b>	Rural Electrification Agency
<b>REB</b>	Rural Electrification Board
<b>REF</b>	Rural Electrification Fund
<b>RET</b>	Renewable Energy Technologies
<b>Toe</b>	Ton of Oil Equivalent



<b>UEB</b>	Uganda Electricity Board
<b>UEDCL</b>	Uganda Electricity Distribution Company Limited
<b>UEGCL</b>	Uganda Electricity Generation Company Limited
<b>UETCL</b>	Uganda Electricity Transmission Company Limited
<b>UIA</b>	Uganda Investment Authority
<b>UMA</b>	Uganda Manufacturers Association
<b>UNCCC</b>	United Nations Climate Change Convention
<b>UPE</b>	Universal Primary Education
<b>UREA</b>	Uganda Renewable Energy Association
<b>URU</b>	Utility Reform Unit
<b>USSIA</b>	Uganda Small Scale Industries Association
<b>UShs</b>	Uganda Shilling (1 US\$ = 1,605 UShs in June 2007)
<b>VAT</b>	Value Added Tax

## FOREWORD

### ***i) Introduction***

The Energy Policy for Uganda which was approved by Cabinet and published in September 2002 laid down Government's commitment to the development and utilization of renewable energy resources and technologies. This Renewable Energy Policy document, which was approved by Cabinet on the 29<sup>th</sup> March 2007, therefore reinforces that commitment.

The implementation of the policy objectives will positively respond to the various policy instruments and programmes, which address poverty, catalyze industrialization and protect the environment. These include; the Uganda Constitution 1995, the Poverty Eradication and Action Plan, the Millennium Development Goals, the Electricity Act 1999, the National Environment Act 1995, the Programme for the Modernization of Agriculture and the Kyoto Protocol.

The following stakeholders should take particular interest in the provisions of this Policy: Project Sponsors; Consultants; Contractors; Manufacturers; Equipment Dealers; Training and Research Institutions; Media Houses; Central Government Ministries; Local Governments; Parastatals; Civil Society Organisations; Financial Institutions and Development Partners.

The overall objective of the Renewable Energy Policy is to diversify the energy supply sources and technologies in the country. In particular, the policy goal is to increase the use of modern renewable energy from the current 4% to 61% of the total energy consumption by the year 2017. In this respect, the following key areas have therefore been addressed.

### ***ii) Small Renewable Energy Power Investment***

The current situation is that feed in tariffs and power purchase agreements are negotiated, on a case by case basis. This increases transaction time, costs and leads to low investor turn out. Furthermore, the current feed – in - tariffs are low, because project sponsors expected some subsidy. With the removal of subsidies, the tariffs will be higher. By publishing the feed in tariffs and having a standardized power purchase agreement, the business environment is made more predictable and thus transaction costs will be reduced and investments should increase. This measure will apply to hydro power schemes, cogeneration plants and is already being implemented. This will increase the accessibility of electrical power to middle income households and spur economic development.

### **iii) Solar Energy Technologies**

Solar energy technologies have high upfront costs and there is no regulation that obligates urban developers to invest in solar energy technologies. By implementing this policy, both medium income households and owners of residential and commercial buildings in urban areas, will be encouraged to invest in solar technologies. This measure will require legislation for urban and local authorities to implement.

### **iv) Biofuels**

This policy lays out specific modalities for the development and production of bio fuels. The industry has had no facility to test and monitor standards. Furthermore, petroleum companies were not obligated to blend bio fuels. By providing fiscal incentives to bio fuels producers and establishing a testing facility at the Uganda National Bureau of Standards (UNBS), bio fuels production is expected to increase significantly. This will be further accelerated by legislation, which will obligate petroleum companies to blend fossil fuels with at least up to 20% bio fuels. These bio fuels will be used mainly, in the transport sector and for power generation.

### **v) Biomass Energy Development and Utilization**

Previously, there were no specific incentives for the growing of energy crops. There is still limited use of efficient wood fuel, charcoal stoves and biogas in households, institutions and industries. Charcoal production and transportation is not properly regulated and the disposal of biomass waste by burning, without extracting the energy content, is a common practice countrywide. The provision of incentives for the growing of energy crops will contribute to reforestation and sustainable use of biomass.

The reduced consumption of both wood and charcoal through the use of the energy efficient stoves and especially for the low income, households will greatly reduce on endemic health diseases caused by indoor pollution. More importantly, it will further reduce the rate of deforestation.

This Policy provides for the increased use of biogas, which will improve both energy supply and sanitation, in low and middle income rural households. In addition the Policy provides for the enactment of the legislation to control open burning or disposal of biomass wastes, without extracting the energy content of the biomass. This measure will increase the energy available for use and reduce further deforestation.

### **vi) Sustainability**

In order to sustain the development of renewable energy and technologies in general, Government will:-

- *continue with the acquisition and dissemination of technical data and avail the data and general information to the public in order to create awareness on consumption options and investment opportunities;*
- *create a Renewable Energy Department and an Energy Efficiency and Conservation Department in the Ministry of Energy and Mineral Development;*
- *establish a National Energy Committee at the National Level and District Energy Committees and District Energy Offices at the Local Governments;*
- *promote research and development and strengthen local manufacturing capacity in renewable energy technologies;*
- *strengthen the newly adopted financing mechanism like the Credit Support Facility and Smart Subsidies which are intended to scale up investments in renewable energy and rural electrification; and*
- *in principle, put in place appropriate legislation to operationalise some of the new policy measures which inter alia include (a) the feed in tariffs, (b) biofuels production and blending, (c) adoption of alternative technologies (e.g. solar water heating), (d) regulation of charcoal production and transportation, (e) fiscal and financial incentives for renewable energy investment, (f) the institutional framework and (g) environment protection.*

### **vii) Consultations**

Various studies have been undertaken and consultations held with a wide range of stakeholders to develop the Renewable Energy Policy for Uganda. These included the private sector, consultants, project developers and Non Governmental Organizations both locally and internationally. A Technical Team, to move the policy formulation process was appointed and had the opportunity to review renewable energy policies of USA, European Union, Brazil, India, South Africa, Kenya, Tanzania, Nigeria, Swaziland among others. The knowledge gained has now been incorporated into this Policy Document.

The following Ministries and Institutions were consulted and they actively participated in the policy formulation; the Ministry of Water and Environment, the Ministry of Local Government, the Ministry of Justice and Constitutional Affairs, the Ministry of Lands and Urban Development, the Ministry of Finance, Planning and Economic Development, the Ministry of Agriculture, Animal Industry and Fisheries, the National Environment Management Authority, the National Forestry Authority

and the Uganda National Bureau of Standards, the Electricity Regulatory Authority, the Uganda Electricity Transmission Company Limited, among others.

#### ***viii) Conclusion***

In conclusion, I wish to pay special tribute for the guidance I received from His Excellency President Yoweri Kaguta Museveni, President of the Republic of Uganda and Colleagues in Cabinet during the policy formulation process; and my Colleagues in the Ministry, Hon. Simon D'Ujanga, Minister of State for Energy and Hon. Dr. Kamanda Bataringaya, Minister of State for Mineral Development, for offering the necessary advice. I wish specifically to thank the Technical Team, which spearheaded the overall policy formulation and compilation process and was headed by the Permanent Secretary, Mr. F.A. Kabagambe–Kaliisa, with the following key officials: the Coordination Manager, Energy for Rural Transformation Programme, Eng. Dr. Albert Rugumayo; the Executive Director, Rural Electrification Agency, Mr. Godfrey Turyahikayo; the Commissioner of Energy Resources Department, Eng. Paul Mubiru; Assistant Commissioner NRSE, Mr. Godfrey Ndawula; Monitoring and Evaluation Manager REA, Eng. Moses Murengezi; Principal Energy Officer NRSE, Mr. Elsam Turyahabwe; Manager, Economic Regulation ERA Mr. Benon Mutambi;; Assistant Commissioner Meteorology Department, Mr Micheal Nkalubo; Environmental Economist NEMA, Mr. Ronald Kaggwa; Forestry Officer NFA, Mr. Obed Tugumisirize; Operations Planning Engineer UETCL, Ms. Ziria Tibalwa and the GTZ Energy Advisor, Mr. Phillipe Simonis.

I am equally grateful to the World Bank who in partnership with the Government of Uganda facilitated the development of this Policy through the Energy for Rural Transformation Programme.

# **THE RENEWABLE ENERGY POLICY**

## **EXECUTIVE SUMMARY**

### **Renewable Energy Policy Context**

1. The National Energy Policy, published in 2002, spelt out Government's commitment to the development and use of renewable energy resources for both small and large scale applications. Therefore, this Renewable Energy Policy is a concretization of this commitment, setting out Government's policy vision, goals, principles and objectives for promoting sustainable utilization of renewable energy in Uganda.
2. While Uganda has an endowment of a variety of renewable energy resources, only large hydro resources along the Nile have been developed to some extent to provide electricity through a national grid. The other resources that have remained largely untapped include small hydro, biomass, solar, wind and geothermal sources.
3. Biomass, which supplies over 90% of the country's energy requirements, has continued to be used in its traditional form, largely as firewood and crop residues. Petroleum products, wholly imported, and the limited hydropower plants, provide the balance of modern energy requirements.

### **The Need for the Renewable Energy Policy**

4. Although the need to develop an elaborate Renewable Energy Policy is rooted in the recognition that a number of renewable energy technologies have become commercially viable and therefore, need to be brought into the national energy

supply mix, it has also been reinforced by four major challenges the Government has faced in meeting the energy needs of its people.

5. The first challenge is the unprecedented electricity supply deficit on the national grid due to the fall in Lake Victoria water levels as a result of a prolonged drought. This has necessitated the installation of 100 MW of emergency thermal diesel generation, to be followed by another 100 MW, to bridge the gap which is very expensive.
6. The second challenge is the escalating oil prices on the international market, which impose a heavy burden on the economy and constrains the individual consumers' budgets.
7. The third challenge is to make electricity accessible to the rural population, through grid extension and mini-grids, considering that the level of electrification is very low.<sup>1</sup> This calls for alternative approaches to support rural transformation and meet the Millennium Development Goals. Small scale renewable energy generation using mini / micro / pico hydros, PV systems, wind power and biomass can provide the necessary supply.
8. The fourth challenge is the fulfilment of Government's commitment on greenhouse gas emissions reductions, under the Kyoto Protocol and contribute to the global fight against climate change. In particular, Government would want to provide the necessary framework for private sector investors in renewable energy projects to benefit from the available facilities in emissions trading.

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<sup>1</sup> 9% countrywide and 3% in rural areas

9. The above challenges have prompted Government to consider a faster and more comprehensive way of introducing renewable energy sources, as alternatives or supplements to the conventional sources.

### **The Effect of this Policy**

10. The overall effect of this Renewable Energy Policy will be to diversify the energy supply sources and mechanisms. This is of strategic importance because it promotes energy security and independence. The other effects are explained below.
11. In the first instance, the presence of distributed generation, whether grid connected or for independent grids (stand alone) from renewable energy sources, other than large hydros, minimizes the risk of overdependence on one source, which may suffer natural or other catastrophes as has been seen with the effect of drought, on the levels of Lake Victoria.
12. Secondly, the continually rising cost of oil on the international market has contributed greatly to the commercial viability of bio-fuels, like ethanol, methanol, biogas and bio-diesel. Whole or partial substitution of petroleum products with locally produced bio-fuels, reduces the burden on the economy caused by imported fuels and therefore, moves the country towards energy security and independence.
13. Thirdly, the Policy enables renewable energy technologies to be incorporated into the national energy conservation programme. For instance, widespread installation of compact fluorescent lighting and solar water heating in residential, industrial and commercial buildings can create significant energy savings, and therefore encouraging optimal utilization of our energy resources.



## **Renewable Energy Resources**

14. Renewable sources of energy are those sources that are replenished continuously by natural processes. This includes solar energy, hydropower, biomass, wind and geothermal among others. In this Policy, as done in many other national energy policies, peat and wastes are also considered as renewable sources of energy.
  
15. *Modern Renewable Energy* means renewable energy resources that are transformed into modern energy services like electricity, which can be generated from water power, wind power, solar energy, geothermal energy and biomass cogeneration. It also refers to clean fuels derived from renewable energy resources like biogas, ethanol, methanol, hydrogen or solar water heating as well as biomass utilized in efficient biomass technologies, like improved charcoal stoves and improved firewood stoves.
  
16. Uganda is richly endowed with renewable energy resources for energy production and the provision of energy services. The total estimated electrical power potential is about 5300 MW. These resources however, remain largely unexploited, mainly due to the perceived technical and financial risks.

## **Why Renewable Energy?**

17. The ever increasing cost of fossil fuels makes them too expensive for developing countries.
  
18. Fossil fuels have an uncertain future. Experts show that if the world continues to consume energy at the current rate, the non renewable sources will be exhausted in the near future.
  - Oil is expected to last for only 40 more years.
  - Natural gas can be available for the next 70 years.

- Coal may be available for the next 280 years.

19. Emissions from coal and fossil fuels are responsible for global warming and climate change.

### **Barriers to Renewable Energy Development**

20. In order for Government to meet its commitment to promote the development and utilization of renewable energy, a number of barriers will have to be addressed. The key areas to consider are:

#### **a) Renewable Energy Specific Issues:**

1. Most renewable energy technologies have much higher upfront investment costs, compared to other conventional energy options.
2. Legal and institutional frameworks to support new renewable energy investments are still inadequate.
3. There is limited technical and institutional capacity in the public and private sectors, to implement and manage renewable energy investments.
4. Financing mechanisms to support investments in renewable energy projects and to address the affordability of consumers are either inappropriate or inadequate.
5. There is limited awareness of the availability, benefits and opportunities of renewable energy within the public domain.
6. Biomass energy resources are utilized inefficiently and therefore, unsustainably.
7. There are inadequate standards and quality assurance for most RETs.
8. There is insufficient information and data on renewable energy resources availability and technologies.

## **b) Cross-Cutting Issues**

1. Inadequate integrated resource planning. This type of planning integrates supply planning considerations with demand side constraints and environmental planning considerations.
2. Inadequate attention to training, research and development, and technological transfer in the energy sector.
3. Inadequate integration of energy issues in the policies and regulatory instruments of non-energy sectors.
4. Many energy activities, which include production, transportation and utilization, are carried out without paying sufficient attention to their implications on environmental sustainability.
5. Inadequate utilization of the instruments of regional and international cooperation, to support investments in renewable energy.
6. Insufficient stakeholder participation in the planning and implementation of energy projects.

## **Policy Vision, Goal, Principles and Objectives**

21. *Government's Policy Vision* for Renewable Energy is:

**To make modern renewable energy a substantial part of the national energy consumption.**

22. *The Overall Policy Goal* is:

**To increase the use of modern renewable energy, from the current 4% to 61% of the total energy consumption by the year 2017.**

23. *The Key Principles* on which this Policy is based are:

- i. Energy is essential for poverty eradication, regional equity and socio-economic development.
- ii. Reliability, efficiency and sustainability are essential in the successful deployment of renewable energy technologies.
- iii. Renewable energy enhances energy diversity, security and independence.

- iv. Public-private partnerships will form the basic mechanism for renewable energy investments.
- v. Energy pricing will be based on full economic, social and environmental costs, taking into account the affordability and social good.
- vi. The avoided cost principle will be used for determining feed in tariffs.
- vii. The gender dimension will be integrated in renewable energy planning and management.
- viii. It is necessary to enhance stakeholder participation, including Government, the private sector and communities.
- ix. It is necessary to enhance market competitiveness of renewable energy technologies.
- x. It is necessary to ensure the sustainable supply and utilization of energy resources.

### **Policy Objectives**

24. In order to achieve the Policy Vision and Goal, the following supporting objectives will be pursued:
- i. Maintain and improve the responsiveness of the legal and institutional framework to promote renewable energy investments.
  - ii. Establish an appropriate financing and fiscal policy framework for RET investments.
  - iii. Mainstream poverty eradication, equitable distribution and gender issues in renewable energy strategies.
  - iv. Acquire and disseminate information in order to raise public awareness and attract investments in renewable energy sources and technologies.
  - v. Promote research and development, international cooperation, technology transfer and adoption of standards in renewable energy technologies.
  - vi. Utilize biomass energy efficiently, so as to contribute to the management of the resource in a sustainable manner.
  - vii. Promote the sustainable production and utilization of biofuels.
  - viii. Promote the conversion of municipal and industrial waste to energy.

## Strategies

25. Various strategies have been elaborated to realize the policy objectives.

Policy Objective	Strategies
<p>1) Maintain and improve the responsiveness of the legal and institutional framework to promote renewable energy investments.</p>	<ol style="list-style-type: none"> <li>1. Publish a standardized Power-Purchase Agreement (PPA) with feed-in-tariffs.</li> <li>2. Put in place legislation and regulations to promote appropriate use of RETs in other sectors.</li> <li>3. Develop appropriate regulations for grid connections and wheeling of electricity generated from renewable energy.</li> <li>4. Establish a National Energy Committee.</li> <li>5. Establish a decentralized coordination framework to support the promotion of renewable energy investments at the lowest level.</li> <li>6. Create both a Renewable Energy Department and an Energy Efficiency and Conservation Department at the Ministry of Energy and Mineral Development ,</li> <li>7. Attract qualified personnel into the sector so as to support Renewable Energy Investments.</li> <li>8. Integrate energy issues into non-energy sector policies and planning for sustainable energy service provision.</li> <li>9. Introduce a Sector-Wide Approach (SWAP) in energy planning and implementation.</li> </ol>
<p>2) Establish an appropriate financing and fiscal policy framework for RET investments.</p>	<ol style="list-style-type: none"> <li>1. Implement, through public-private partnerships (PPP), innovative financing mechanisms, including targeted subsidies.</li> <li>2. Introduce fiscal measures that favor renewable energy investments.</li> <li>3. Implement innovative risk mitigation mechanisms and credit enhancement instruments.</li> <li>4. Enhance social service provision through grant financing of renewable energy projects.</li> <li>5. Develop financing schemes adapted to local needs, traditions, and experiences.</li> <li>6. Take advantage of the Clean Development Mechanism, Emission Trading and Joint Implementation Programmes under the Kyoto Protocol.</li> </ol>

Policy Objective	Strategies
	7. Determine the feed-in-tariffs for renewable energy projects periodically.
3) Mainstream poverty eradication, equitable distribution, social services and gender issues in renewable energy strategies.	<ol style="list-style-type: none"> <li>1. Study the linkages and mechanisms between poverty eradication, gender, and renewable energy.</li> <li>2. Sensitize stakeholders on the linkages between gender, poverty and renewable energy.</li> <li>3. Implement a comprehensive integrated renewable energy, gender sensitive, poverty alleviation plan.</li> <li>4. Reinforce the gender related benefits of renewable energy in PEAP.</li> <li>5. Mainstream HIV/AIDS issues in renewable energy plans, projects and activities.</li> </ol>
4) Acquire and disseminate information in order to raise public awareness and attract investments in renewable energy sources and technologies.	<ol style="list-style-type: none"> <li>1. Continuously acquire data on the renewable energy resource availability.</li> <li>2. Develop the capacity to process this data</li> <li>3. Develop and promote knowledge and exchange of information on renewable energy to all stakeholders.</li> <li>4. Promote and stimulate renewable energy and energy efficiency markets through information dissemination.</li> <li>5. Incorporate renewable energy education into the curricula of educational institutions at all levels.</li> <li>6. Develop and implement a comprehensive capacity building programme for the Renewable Energy Sub-sector.</li> </ol>
5) Promote research and development, international cooperation, technology transfer and adoption and standards in renewable energy technologies.	<ol style="list-style-type: none"> <li>1. Promote appropriate R and D and local manufacturing capability in renewable energy technologies.</li> <li>2. Allocate funds for R and D in Renewable Energy Technologies.</li> <li>3. Set up a Research and Development Division under the Renewable Energy Department to liaise with other institutions on R and D in RETs.</li> <li>4. Support the research initiatives in tertiary institutions and among other stakeholders.</li> <li>5. Develop and adapt RET standards and certification processes.</li> <li>6. Identify and enhance mechanisms to gain from</li> </ol>

Policy Objective	Strategies
	technology skills transfer and from international experience.
6) Utilize biomass energy efficiently so as to contribute to the management of the resource in a sustainable manner.	<ol style="list-style-type: none"> <li>1. Promote, in collaboration with NFA and MAAIF, the growing of energy crops.</li> <li>2. Provide incentives for farmers to establish commercial <i>woodlots</i>.</li> <li>3. Integrate biomass energy production and efficient utilization and its impacts on climate and health into the formal education system.</li> <li>4. Licence charcoal production and transportation and encourage commercial production in an efficient and sustainable manner.</li> <li>5. Promote the production and use of biogas at both household levels and large/industrial scale. Scale up household biogas units to 100,000 by 2017.</li> <li>6. Scale-up the adoption of efficient charcoal fuel stoves from 20,000 currently to 2,500,000 households by 2017.</li> <li>7. Increase the adoption of efficient fuelwood stoves from 170,000 currently to 4,000,000 by 2017.</li> <li>8. Promote interfuel/intertechnology substitution in households, commercial buildings and industry.</li> <li>9. Promote efficiency in intensive wood burning industries.</li> <li>10. Promote biomass fired cogeneration in industries and institutions.</li> <li>11. Offer training opportunities for “<i>Jua Kali</i>” artisans for manufacture, installation and maintenance of efficient cook stoves.</li> <li>12. License encroached national forest reserves to investors.</li> </ol>
7) Promote the sustainable production and utilization of biofuels	<ol style="list-style-type: none"> <li>1. Develop appropriate legislation for the use of biofuels.</li> <li>2. Adopt appropriate international standards for the manufacture and blending of biofuels with petroleum fuels.</li> <li>3. License companies to blend up to 20% biofuels into gasoline and diesel.</li> <li>4. Provide financial incentives for the production of biofuels.</li> <li>5. Set up a biofuels standard testing facility at the UNBS for testing and monitoring purposes.</li> <li>6. Monitor the standards of biofuels producers</li> </ol>

Policy Objective	Strategies
	7. Sensitize the public and stakeholders on the use of the biofuels. 8. Facilitate research on biofuels.
8) Promote the conversion of municipal and industrial waste to energy	1. Provide incentives for the conversion of wastes to energy. 2. Put in place fiscal measures that will discourage open burning or disposal of wastes without extracting their energy content.

### Policy Actions

26. The strategies to achieve the policy objectives have been translated into policy actions in the form of *specific programmes* as indicated below:-

#### (i) Power Generation Programme

This programme will support public and private sector investments in renewable energy generation and consists of two approaches; one for large hydropower schemes and one for small power schemes.

##### a) Large Hydropower Schemes

Sites will be tendered out according to the provisions of the Electricity Act, 1999 Sections 29 and 32. The developer will also arrange an appropriate financing package. Tariffs will be determined through negotiations, on a case by case basis.

##### b) Small Power Schemes

Basic studies of the various resources and sites will be carried out followed by promotion and tendering to the private sector, followed by their development. This will cover mini hydropower schemes, biomass cogeneration, wind power, peat, geothermal and solar thermal electric and limited to 20 MW installed capacity per plant. The feed-in- tariffs, for renewable electricity are presented in Annex 2. These will be reviewed periodically.

#### (ii) Rural and Urban-poor Electricity Access Programme



Electricity access to rural populations and the urban poor require special packages to make connections and services affordable. The programme will enhance the on-going procedures for community schemes, where the cost of connection to the community is subsidized. It will also support the development of independent grids supplied by micro and pico hydros and biomass gasifiers to be managed by communities and solar PV systems in dispersed remote settlements. The programme will prioritize supporting electrification for productive uses and key social services.

**(iii) Modern Energy Services Programme**

This programme will support renewable energy technologies such as improved wood fuel and charcoal, stoves, solar PV and solar water heaters. It will also incorporate the dissemination of biogas, liquefied petroleum gas (LPG) and kerosene for cooking as substitutes for wood energy.

**(iv) Biofuels Programme**

This programme will support investments in the production and use of ethanol, biodiesel, methanol and biogas. Specifically, all dealers in petroleum products will be obligated to blend fossil fuels with biofuels up to 20%, as appropriate.

**(v) Energy Efficiency Programme**

The programme seeks to implement the Energy Efficiency Strategy. The Government will promote efficient utilization of renewable energy resources, through the activities described in the *Energy Efficiency Strategy for Uganda*. The necessary legal instruments will also be put in place.

(vi) **Wastes for Energy Programme**

This will cover the conversion of waste to energy through direct combustion, gasification or biological conversion to biogas.

**Institutional Framework**

27. The overall responsibility for this policy lies with the Ministry of Energy and Mineral Development. The Ministry will oversee and coordinate the implementation of this policy by various stakeholders and will ensure the effectiveness of these activities. Within the Ministry, a Renewable Energy Department is being created to specifically focus on the promotion of RE and RETs and an Energy Efficiency and Conservation Department is being created to spearhead the promotion of Energy Efficiency and Conservation..

28. The other main stakeholders include the Electricity Regulatory Authority (ERA), the Rural Electrification Agency (REA), which is the secretariat of the Rural Electrification Board (REB), the Uganda Electricity Transmission Company (UETCL), the Uganda Electricity Distribution Company (UEDCL) and UMEME the concessionaire, the Uganda Electricity Generation Company (UEGCL), the Uganda National Bureau of Standards (UNBS), the National Environment Management Agency (NEMA) and the Directorate of Water Development (DWD).

29. Other stakeholders include; the Private Sector Foundation Uganda (PSFU), the Uganda Investment Authority (UIA), the Uganda Manufacturers Association (UMA), the Uganda Renewable Energy Association (UREA) and the Uganda Small Scale Industries Association (USSIA).

30. Other Government ministries participating are the Ministry of Finance, Planning and Economic Development, Ministry of Health, Ministry of Education and Sports, Ministry of Water and Environment, National Forestry Authority and Ministry of Agriculture, Animal Industries and Fisheries.

31. A special financial mechanism has been instituted to facilitate rural electrification and renewable energy investments. This is the Credit Support Facility (CSF) known as the *Uganda Energy Capitalisation Trust*. Participating Financial Institutions (PFIs) will include Commercial Banks, Development Banks and Microfinance Institutions.

### **The Financial Implications.**

32. The total financial resources required to implement the strategic interventions are of the order of US\$ 6,500 billion or US\$ 3.5 billion over the next ten years. It is estimated that 86% of these resources will come from direct private investment, while 14% have to be obtained from the Public Sector, either through Government resources or from Development Partners.

<b>PROGRAMMES</b>	<b>BASELINE</b>	<b>CUMULATIVE TARGETS</b>	
		<b>2012</b>	<b>2017</b>
<b>1) Power Generation</b>	<b>2007</b>	<b>2012</b>	<b>2017</b>
Hydropower plants (large) (MW installed)	380	830	1200
Hydropower plants (mini and micro) (MW installed)	17	50	85
Cogeneration (MW installed)	15	35	60
Geothermal (MW installed)	0	25	45
Municipal Waste (MW installed)	0	15	30
<b>2) Rural Electrification and Urban Access</b>	<b>2007</b>	<b>2012</b>	<b>2017</b>
Electrified households through PREPS/LIREPS and CIREPS	250,000	375,000	625,000
<b>3) Modern Energy Services for Households</b>	<b>2007</b>	<b>2012</b>	<b>2017</b>
Improved woodstoves (No)	170,000	500,000	4,000,000
Improved charcoal stoves (No)	30,000	100,000	250,000
Institutional stoves (No)	450	1,500	5,000
Baking Ovens (No)	60	250	1,000
Kilns (lime, charcoal, brick...) (No)	10	30	100
Household Biogas (No)	500	30,000	100,000
Solar Home Systems (kWp)	200	400	700
Fruit driers (No)	3	1000	2000
<b>4) Biofuels (Ethanol, Biodiesel) (m<sup>3</sup>/a)</b>	<b>2007</b>	<b>2012</b>	<b>2017</b>
	0	720,000	2,160,000
<b>5) Energy Efficiency</b>	<b>2007</b>	<b>2012</b>	<b>2017</b>
Solar water heaters (m <sup>2</sup> installed)	2,000	6,000	30,000
Energy savers (No)	1,000,000	2,000,000	4,000,000
Industrial energy audits implemented (No)	20	70	300
Energy efficient equipment for industries implemented (No)	15	50	250

# **1. INTRODUCTION**

## **1.1 The Need for a Renewable Energy Policy**

This Policy on Renewable Energy reinforces the Government's overall policy on energy set out in the *Energy Policy for Uganda 2002*, whereby Government has spelt out a commitment to the development and use of renewable energy resources for both small and large scale applications.

This Policy is based on the need to address the challenges observed, while implementing the Energy Policy in general and the Power Sector Reform in particular; as well as those threats posed by the increasing energy prices, environmental degradation, climate change, as well as Government's commitment to poverty and gender responsive energy actions. Furthermore, implementation of the Renewable Energy Policy will result in the disposition of Uganda's commitments at the Bonn Conference on Renewable Energy in 2004.

This Policy sets out Government's vision, strategic goals, principles, objectives and targets for promoting and implementing renewable energy investments in Uganda. The Policy Framework provides a basis for the formulation of planning, implementation and monitoring of renewable energy programmes, as well as projects that respond to the needs and priorities of the population at various levels of the economy.

## **1.2 The Overall Context**

The Government of Uganda has taken a conscious effort to develop renewable energy resources as an integral part of the country's energy future. The promotion of renewable energy is specifically included in the Government's Rural Electrification Strategy and Plan (RESP) (2001 – 2010) as one of the most important objectives of the strategy. The most vivid step forward has been the inclusion of *the development of renewable energy (excluding large hydropower) to increase power generation* as a key indicator of achieving rural transformation in the 10-year Energy for Rural Transformation (ERT) Programme.

Considering that electrification access in Uganda is still very low, standing at approximately 9% nationally and 3% in rural areas, electrification of most parts of the country through grid extension in the near future is still a far cry. It is, therefore, within this context that Government is promoting the decentralized (distributed), off-grid electricity supply model for remote areas. In most of these cases the required electricity needs will be met by the deployment of locally available renewable energy sources of small hydro, solar energy, wind and biomass resources. The focus on decentralized supply systems is also more likely to achieve the objective of equitable regional distribution access to electricity, than if only the grid solution was pursued.

Currently, Uganda is experiencing an unprecedented electricity deficit of about 165 MW, resulting into massive load shedding every night, due to the prolonged drought, inadequate investment in least cost generation capacity and a relatively high load growth. This has forced the country to resort to the installation of very expensive thermal generation, while awaiting the construction and commissioning of the 250 MW Bujagali and 150 -200 MW Karuma projects. As one of the strategies to bridge the deficit and also for long term diversification of generation sources, Government has decided to accelerate the development of grid connected small renewable energy generation projects to reinforce the grid. This effort is being supported by the establishment of a **Standardized Power Purchase Agreement (PPA)** and a **Feed-in Tariff**, which are part of this Renewable Energy Policy framework, to help expedite transactions.

Apart from promoting accelerated power generation from renewable energy, the Energy Policy for Uganda (2002) has, among its objectives, emphasized the development, adoption and utilization of other modern fuels and technologies, including those based on renewable energy sources, in order to achieve the objectives of emission reduction, protection of the environment and energy conservation. Furthermore, the escalating prices of fossil fuels on the world market make it imperative for Government to promote the development and utilization of renewable energy resources and the associated technologies. These include biomass fuels like ethanol, biodiesel, biogas and methanol; modern biomass technologies like efficient stoves and kilns and solar water heating. The Renewable Energy Policy, is therefore, an elaboration of how Government

will develop the necessary initiatives to create a demand for a wide range of renewable energy services.

The commitment of Government to develop the use of renewable energy sources is clearly aimed at creating the means of socio-economic development, especially by transforming the rural areas. The implementation of the policy's objectives will, therefore positively respond to the various legal and policy instruments and programmes, which Government has put in place to address poverty issues, catalyze industrialization and protect the environment. Apart from the Energy Policy for Uganda, these instruments and programmes include the following:

- **The Uganda Constitution 1995.** The provisions on equitable development (Article IX), the stimulation of agricultural and industrial growth (Article XI) and promotion of energy policies for meeting people's energy needs in an environmentally friendly manner (Article XI) provides the necessary mandate.
- Meeting the objectives of the **Poverty Eradication Action Plan (PEAP)** and, on a larger scale, achieving the **Millennium Development Goals**.
- **The Electricity Act 1999**, which set the legal framework for reforms in the Power Sub-sector and the Rural Electrification Strategy and Plan, the regulatory framework for power generation from small renewable energy sources and the establishment of the Rural Electrification Fund.
- **The National Environment Statute (1995)**, which obligates all energy projects to undergo an Environmental Impact Assessment (EIA) as a condition for licensing or implementation.
- **The Plan for Modernization of Agriculture (PMA)**, which has one of its main outcomes as "increased access to and use of electricity" to support on-and off-farm economic activities.
- **The Prosperity for All (Bonna Baggagawale) Government Policy (2006)**, which addresses elevating standards of living through developing the economy in areas of micro-finance, marketing, production and processing. In order to achieve this, there is need to also address the energy issue, which is one of the driving forces.

- Uganda's ratification of the **Kyoto Protocol**, which provides incentives for investors in renewable energy technologies for the abatement of carbon missions.

### 1.3 Electrical Energy Demand

In Uganda, like in any other country, the Energy Sector plays a central role in the economy. Energy is the engine for economic growth and development, and a vital input into all the productive and social sectors of the economy. Recent forecasts as contained in the East African Power Master Plan, have been updated by UETCL to reflect the actual MW and GWh in generation and have estimated the yearly growth in demand for electricity to be at 7-9 percent as shown in Table 1.1, which confirms that increased investments in renewable energy projects are required to respond to the growth in demand.

**Table 1.1 The Revised Net Generation Forecasts**

Year	Energy (GWh)			Peak Demand (MW)		
	Low	Medium	High	Low	Medium	High
2001	1,437	1,437	1,437	270	270	270
2002	1,695	1,506	1,544	274	283	289
2003	1,767	1,767	1,767	308	308	308
2004	1,843	1,843	1,843	317	317	317
2005	1,767	1,684	1,849	279	317	345
2006	1,968	2,025	2,057	380	380	380
2010	2,320	2,674	2,896	442	498	528
2015	2,850	3,785	4,442	535	697	796
2020	3,501	5,359	6,813	647	976	1,200
2025	4,300	7,586	10,449	783	1,367	1,809
2002-25	4.28%	7.20%	8.93%	3.88%	6.97%	8.56%

Source: Uganda Electricity Transmission Company Ltd 2006



## **1.4 The Consultative Process**

The Ministry of Energy and Mineral Development has been engaged for a number of years in the process of developing the Renewable Energy Policy. Various studies have been undertaken and discussions, meetings and workshops have been held with a wide range of stakeholders. The stakeholders included: the Private Sector, NGOs, CBOs, Service Providers, Consultants, Contractors, Developers, and Investors in cogeneration, small scale power producers and promoters of biofuels and our Development Partners. The key Government Institutions involved were the Ministry of Finance, Planning and Economic Development, the Ministry of Water, Lands and Environment, the Ministry of Lands, Housing and Urban Development, the Ministry of Trade, Tourism and Industry, the Electricity Regulatory Authority, the Uganda Investment Authority, the Meteorology Department, the National Forestry Authority, the National Environment Management Authority, the Uganda Electricity Transmission Company, the Rural Electrification Agency who constituted the Task Force to finalize this Policy Document.

## **2. RENEWABLE ENERGY RESOURCES AND APPLICATIONS**

### **2.1 What is Renewable Energy?**

Renewable sources of energy are those sources that are replenished continuously by natural processes. This includes solar energy, hydropower, biomass, wind and geothermal as well as organic wastes.

Non-renewable energy are energy sources that are not renewable and hence get depleted with time. These include the conventional fossil fuels such as coal, oil and natural gas.

*Modern Renewable Energy* means renewable energy resources that are transformed into modern energy services like electricity, which can be generated from water power, wind power, solar energy, geothermal energy and biomass cogeneration. It also refers to clean fuels derived from renewable energy resources like biogas, ethanol, methanol, hydrogen, biodiesel or solar water heating. In the context of this Policy, modern biomass technology and includes energy efficient technologies, like improved charcoal and firewood stoves for both domestic and institutional applications.

Renewable electricity can be generated from wind power, wave, tidal, solar photo voltaic (PV), concentrated solar, hydropower, geothermal and biomass (firewood or agricultural residues). Renewable energy sources produce no carbon dioxide at all or, in the case of biomass, produce only the carbon dioxide they have already absorbed from the atmosphere when growing, and hence renewable. Solar energy can be used directly to heat water, hence, reducing the demand by electrical water heaters.

### **2.1.1 Why Renewable Energy?**

Throughout the world, concerted efforts are being made to make renewable energy replace non-renewable energy sources in the future. The driving forces for investments in renewable energy are:

1. The ever increasing cost of fossil fuels makes them too expensive for developing countries
2. Fossil fuels have an uncertain future. Experts show that if the world continues to consume energy at the current rate, the non renewable sources will be exhausted in the near future.
  - The oil fields already discovered hold over 1 billion barrels of oil. If no more oil were to be found and we carried on using oil at existing rates, then the reserves would last for less than 40 years. Although more oil fields are being discovered, the future of oil is bleak.
  - The global proven gas reserve was estimated to be 176 trillion cubic meters by the end of 2003. The Russian Federation had the largest share of the reserve with almost 27%. Global natural gas consumption in 2004 was 2311.3 Mtoe. At this consumption rate, it is estimated that the reserve will be exhausted in less than 70 years.
  - The proven global coal reserve was estimated to be 984,453 million tonnes by the end of 2003. The USA had the largest share of the global reserves (25.4%) followed by Russia (15.9%), China (11.6%) and India with 8.6%. In the year 2004, the World's coal consumption was 2775.8 Mtoe representing 0.28% of the estimated reserves. At this rate of consumption, it is estimated that the global reserve can last for only the next 250 years.

- Emissions from coal and fossil fuels are responsible for global warming and climate change.

## 2.2 The Renewable Energy Resource Base

Uganda has considerable renewable energy resources for energy production and the provision of energy services, yet they remain unexploited, largely due to the perceived technical and financial risks. These resources include: biomass, geothermal, large scale hydro, mini/micro/pico hydro, wind and solar energy. However, with the exception of biomass, whose contribution is very significant, the remaining renewable sources (including large hydros), contribute about 5% of the country's total energy consumption. This limits the scope and productivity of economic activities, that can be undertaken in any part of the country. Thus it is imperative that the use of these abundant resources should be enhanced.

Recently completed studies gave the potential as indicated in Table 2.1. However, more site specific data is available for the actual development of the resources.

**Table: 2.1. The Renewable Energy Power Potential**

<b>Energy Source</b>	<b>Estimated Electrical Potential (MW)</b>
Hydro	2,000
Mini-hydro	200
Solar	200
Biomass	1650
Geothermal	450
Peat	800
Wind	-
<b>Total</b>	<b>5300</b>

*Source: Alternative Energy Sources Assessment Report, 2004, National Biomass Assessment Study 2003*

### **2.2.1 Biomass**

Biomass is any organic matter that is available on a renewable basis mainly through photosynthesis. In the energy context, biomass means products consisting of any whole or part of a vegetable matter from agriculture or forestry, which can be used as a fuel for the purpose of recovering its energy content. Biomass includes firewood, shrubs, grasses, forest wastes and agro-industrial residues. Examples are bagasse, husks, trash from sugar, oil milling, grain milling, etc.

In the context of this Policy, biomass will also include organic municipal and industrial wastes like paper wastes, old clothes, polythene, spent grains in breweries, animal wastes, abattoir wastes and sewage sludge, which can be used as sources of energy.

Sometimes these are used as energy sources, but often inefficiently. There is a large potential for improving usage efficiencies in the agro-industry. Applications could be for electricity generation, fuel for vehicles and for furnace oil substitution. Table 2.2 shows the estimated power generation potentials from agro-residues and illustrates their residues. Crop residues and agro-industrial residues including husks, bagasse and oil residues, play a very significant role in Uganda's energy supply.

Biomass contributes over 90% of the total energy consumed in the country and provides almost all the energy used to meet basic energy needs for cooking and water heating in rural areas, most urban households, institutions, and commercial buildings. Biomass is the main source of energy for rural industries. Limited availability of electricity and high prices of petroleum products, constitute barriers to a reduction in the demand for biomass. Trading in biomass especially charcoal contributes to the rural economy, in terms of rural incomes, tax revenue and employment.

Fuel wood requirements have contributed to the degradation of forests as wood reserves are depleted at a rapid rate in many regions. Charcoal consumption increases at a rate close to the urban growth rate of 6% per annum.

Most of the traditional biomass energy technologies; which include wood and charcoal stoves, ovens and kilns used in Uganda are inefficient. Several initiatives to conserve biomass resources undertaken by Government and the private sector, including NGOs, have started to have a significant impact and should be further supported. Some pilot projects to produce biogas from wastes (animal dung and human wastes) or gas and

electricity from gasification also offer good opportunities. Biomass distribution countrywide is as shown in Fig 2.1

**Table 2.2 Energy Production Potential from Agro-residues.**

<b>Biomass Type</b>	<b>Annual Production (‘000 tons/yr)</b>	<b>MW e average</b>
Bagasse	590	
Bagasse Surplus, (available immediately)	3x25-50	67
Rice husks	25-30	16
Rice straw	45-55	30
Sunflower hulls	17	20
Cotton seed hulls	+ 50 (being developed)	1
Tobacco dust	2-4	2
Maize cobs	234	139
Coffee husks	160	95
Groundnut shells	63	37
	<b>Total</b>	<b>407</b>

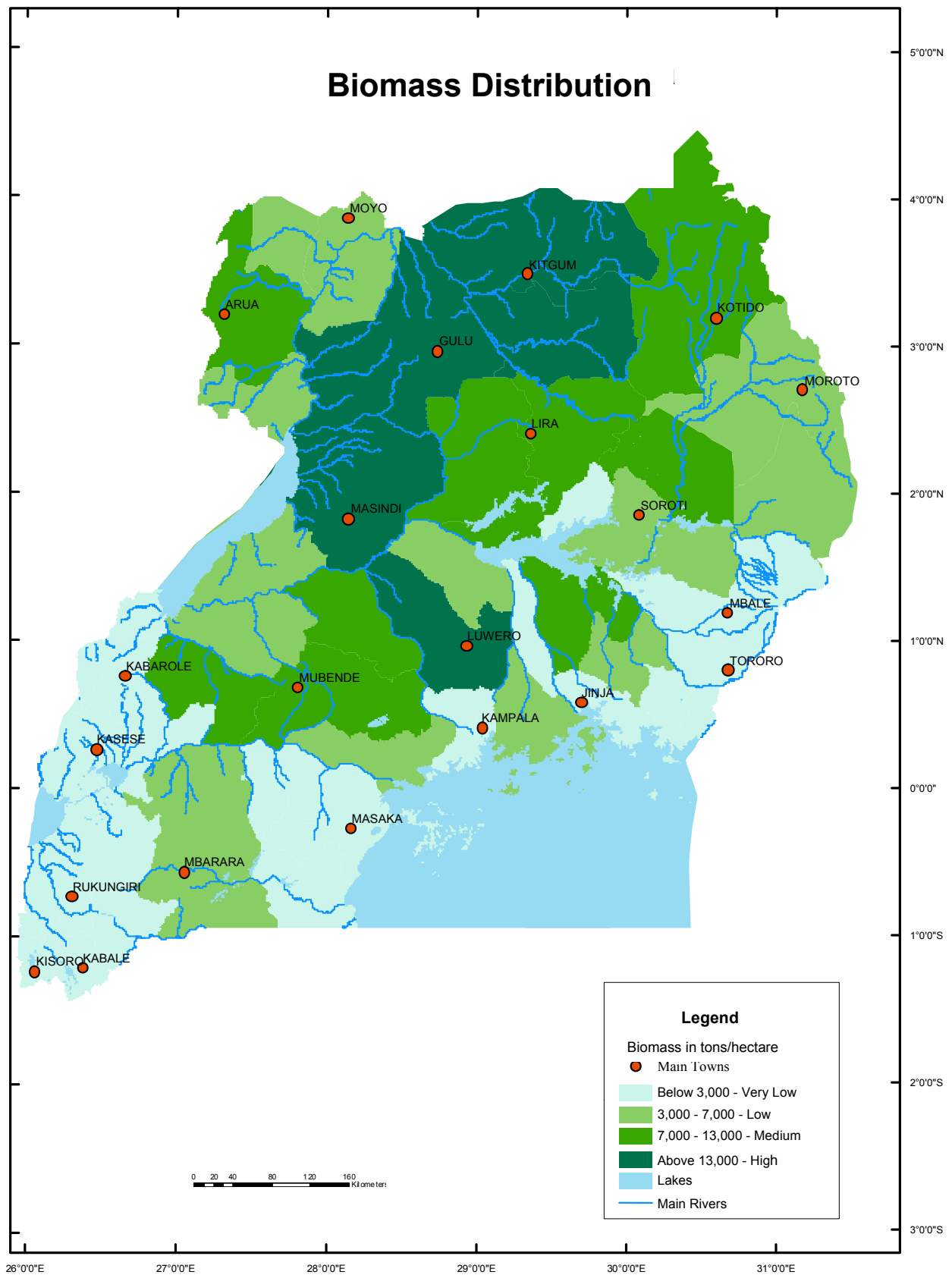


Fig 2.1 Biomass Distribution

The per capita consumption is 680 Kg/yr and 240 Kg/yr for firewood and 4 Kg and 120 Kg for charcoal for rural and urban areas respectively. Total biomass (firewood and wood for charcoal) demand for households (year 2006) was 22.2 million tons per year. Cottage industries account for about 20% of total biomass use, adding a further 5.5 million tons and bringing the total biomass demand to about 27.7 million tons countrywide as shown in Table 2.3.

**Table 2. 3: Woody Biomass Demand by Region (tons/year) 2006**

<i>Region</i>	<i>Households</i>	<i>Cottages</i>	<i>Total</i>
Central	6,515,210	1,628,810	8,144,020
Eastern	5,382,940	1,345,740	6,728,680
Western	5,305,470	1,326,370	6,631,840
Northern	5,023,170	1,255,790	6,278,960
<i>Total</i>	<i>22,226,790</i>	<i>5,556,710</i>	<i>27,783,500</i>

Although biomass is traditionally used in its traditional solid mass (charcoal, wood, agricultural residues), its energy resource can also be exploited in non traditional firms mentioned below using various technologies.

### **2.2.1.1 Biogas**

Biogas is 55-70% methane (CH<sub>4</sub>) with varying amounts of carbon dioxide (CO<sub>2</sub>) as the chief constituents. It also has traces of hydrogen sulphide (H<sub>2</sub>S), ammonia (NH<sub>3</sub>), oxygen, hydrogen (H<sub>2</sub>) and water vapour (H<sub>2</sub>O), depending upon feed materials and other conditions. The feed materials are usually animal and human waste.

Biogas is a zero-waste technology. The products of biogas plants, like biogas and digested slurry, can be utilized economically for cooking and as manure for agriculture and horticulture. Biogas is a non-poisonous and non-toxic gas, which when mixed with air, burns with a blue flame and has no soot or any offensive smell. The slurry is rich in nitrogen, phosphorous, potassium and humus material. It has good applications in agriculture and horticulture. Methane burns very well, therefore biogas can be used as a substitute of kerosene, charcoal and firewood. It is one of the renewable sources of energy, which are popular in rural areas and can successfully meet the cooking and lighting energy needs of families. Since its main raw materials are both animals and



human wastes, when they are burned there will be an improvement in household sanitation. It is economical and environmentally friendly, because of less need to cut trees.

Since 1980 when biogas technology was first introduced, there have been several initiatives, which have involved private individuals, NGOs, Government and Development Partners. These have included pilot demonstrations and capacity building. It is estimated there are about 500 functioning biogas plants in the country at present and over 250,000 zero grazing farming households. These define the extent of the potential for small household biogas digesters in the country. In addition, commercial dairy farmers and piggeries could support several thousand larger biogas plants to cater for their own thermal and electricity needs. There is need to develop this resource further and explore many opportunities, which exist.

### **2.2.1.2 Biofuels for Transport**

Biofuels such as *Ethanol and biodiesel* are derived from agricultural crops, while *Methanol* is derived from condensing smoke during wood distillation process. Ethanol and biodiesel can be blended with or directly substitute for gasoline and diesel, respectively. The use of biofuels would reduce toxic air emissions, greenhouse gas buildup and dependence on imported oil, while supporting agriculture and rural economies.

In Uganda, ethanol is being produced on a small scale by sugar manufacturers as a by product from the molasses and several small cottage industries from cereals and fruits. Biodiesels are a product of fatty acids (like vegetable oils or animal fat) and alcohols like ethanol. Vegetable oils can be produced locally, from jatropha, hemp, sunflower, soya bean, groundnuts, castor plant and palm oil.

It is estimated that in the year 2010 Uganda will import and consume 360 million litres of diesel and 385 million litres of gasoline. If this fuel could be blended with environmentally friendly locally produced biofuel, *Methyl Alcohol* (25% for gasoline and 60% diesel), it would require a total of 312 million litres of *Methyl Alcohol*, a product from timber locally grown by the rural population. In terms of impact on environment, if a total of 312 million litres of petroleum products are replaced by *Methyl Alcohol*, this will replace nearly one million tons of CO<sub>2</sub> emission in the country.

### **2.2.1.3 Biomass Cogeneration**

Combined heat and power (CHP) systems also known as *cogeneration*, generate electricity, mechanical energy and thermal energy in a single or integrated system. This contrasts with common practice in this country, where electricity is generated at a central

power plant and on-site heating and cooling equipment, is used to meet non-electric energy requirements. The thermal energy recovered in a cogeneration system can be used for heating in industry or buildings. Because cogeneration captures the heat that would otherwise be rejected in traditional separate generation of electric or mechanical energy, the total efficiency of these integrated systems is much greater than for separate systems.

Currently three factories in Uganda, namely; Kakira Sugar Works Ltd, Kinyara Sugar Works Ltd and Sugar Corporation of Uganda Ltd, are doing cogeneration with a total electricity generation of over 10 MW. Furthermore, all systems requiring both electrical and thermal energy like cement and iron production, tea processing among others, have the potential of employing modern cogeneration technologies.

#### **2.2.1.4 Pyrolysis Oil**

This is relatively new technology and can be used by agro-industries to turn their residues into valuable liquid fuel. Applications are in boiler and furnace fuel, replacing HFO, but also as fuel for thermal power plants.

This technology enables owners of residues to turn their bulky wastes into a tradable energy commodity. It also enables end-users to employ relatively inexpensive combustion systems instead of solid fuel boilers or burners.

### **2.2.1.5 Wastes to Energy**

Municipal waste in Uganda is generally composed of wet carbon and nitrogen rich materials that include: organic waste from households, agro industrial waste (slaughter houses, food industry) and agro waste: manure and straw. There is a vast amount of municipal waste (both solid and sewage effluents) that is currently not being utilized for energy production. The capital city, Kampala, alone produces an estimated 430,000 tones of solid wastes annually. Other municipalities and towns also generate considerable amounts of waste, but do not have in place proper waste management plans. Over 70% of the municipal solid waste is vegetable matter (mainly food residues). The current practice is either to burn these wastes in the open air or dump them in landfills with no extraction of their energy contents. This does not only result in a waste of energy, but also causes environmental risks, as the burning is not controlled and the landfills are poorly managed.

This combustible waste matter can be used for electricity generation. The non-combustible organic matter can be digested to produce biogas. The large quantity of sewage, can also be effectively used to generate biogas. Biogas can be used as domestic fuel, fuel for vehicles, and power generation.

These materials can be converted into biogas for cooking and lighting at the domestic level, whereas commercial dairies and piggeries at the industrial level, can generate biogas, to be used by gas turbine to generate electricity and heat in cogeneration technology.

The slurry that comes out of the digester is rich in nitrogen, phosphorous, potassium and humus and can be used to replace imported fertilizers and increase agricultural productivity on farms.

In addition to municipal wastes, there are vast quantities of industrial wastes like spent grains in the breweries and used boxes, which can all be used for power generation

### **2.2.2 Peat**

Though not really a renewable energy resource, in this Policy it is considered under renewable energy resources, as is done in some countries. It is estimated that the total area of *peatlands* in Uganda is about 4,000 km<sup>2</sup>, while the average thickness of peat deposits is about 1.5 metres. The total peat volume is estimated to be 6,000 million cubic

metres. According to the laboratory analyses, the dry bulk density is on average 100 kg/m<sup>3</sup> and the net calorific value 17 GJ/tonne.

The estimated theoretical peat volume represents about 250 Mtoe (million tonnes of oil equivalent). Taking into consideration, the varying quality of peat and the *Wetland Policy of Uganda*, as well as the possibility of using conventional peat production methods, about 10% could probably be used for power production. The available stock of peat resources, would therefore, be adequate for the generation capacity of about 800 MW for the next 50 years. However, because of the dispersed nature of the available fuel peat resources, peat generation units, could be small (typically less than 20 MW) and dispersed mainly to Western and South-Western Uganda, where the desired resource characteristics are better than in other regions.

### **2.2.3 Hydropower**

The large-scale hydropower potential along the River Nile has been estimated at about 2,000 MW including six potential major hydropower sites: Bujagali 250 MW, Kalagala 450 MW, Karuma (Kamdini) 150 MW, Ayago North 300 MW, Ayago South 250 MW and Murchison Falls 600 MW. Bujagali and Karuma sites have been significantly studied and are being developed on a Public Private Partnership (PPP) basis to generate electricity in the medium term.

#### **2.2.3.1 Bujagali**

Following the withdrawal of AES, Industrial Promotion Services (IPS) of Kenya and Sithe Global were selected to develop the Bujagali Project. Project agreements were signed in December 2005. Due diligence and environmental updates were carried out and the construction commenced in June 2007. Completion is expected in early 2010 bringing on board an extra 250 MW.

#### **2.2.3.2 Karuma**

This is a 150-200 MW project. Government is currently holding discussions with the initial developer Norpak Power Ltd to develop the project as a public-private partnership. SN Power has declared its intention to join the project.

#### **2.2.3.3 Mini-Hydropower Sites**

More than 60 mini hydropower sites with a total potential of about 210 MW have been identified through different studies in Uganda. Some of the sites can be developed for isolated grids; others as energy supply to the grid and the remainder of the sites were

assessed to be less relevant to the energy supply for environmental and power market reasons. Figs 2.2 and 2.3 show the large hydropower and mini hydro sites countrywide, respectively. The detailed list is provided in the Annex 3, Table A3.1 shows the Non Nile Mini/Micro Hydro Sites and Table A3.2 gives the Large Hydro Nile Sites

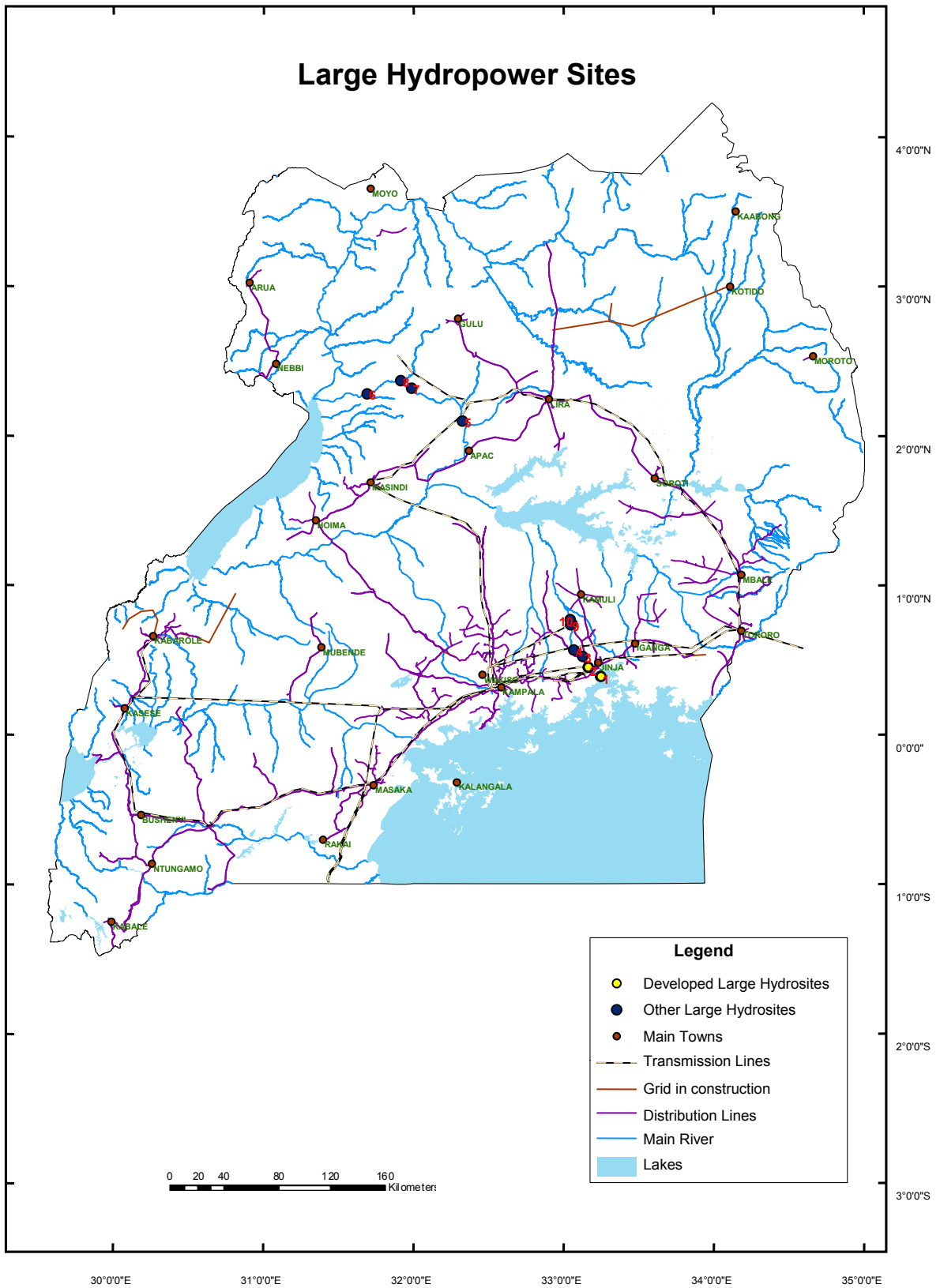


Fig 2.2 Large Hydro power Sites

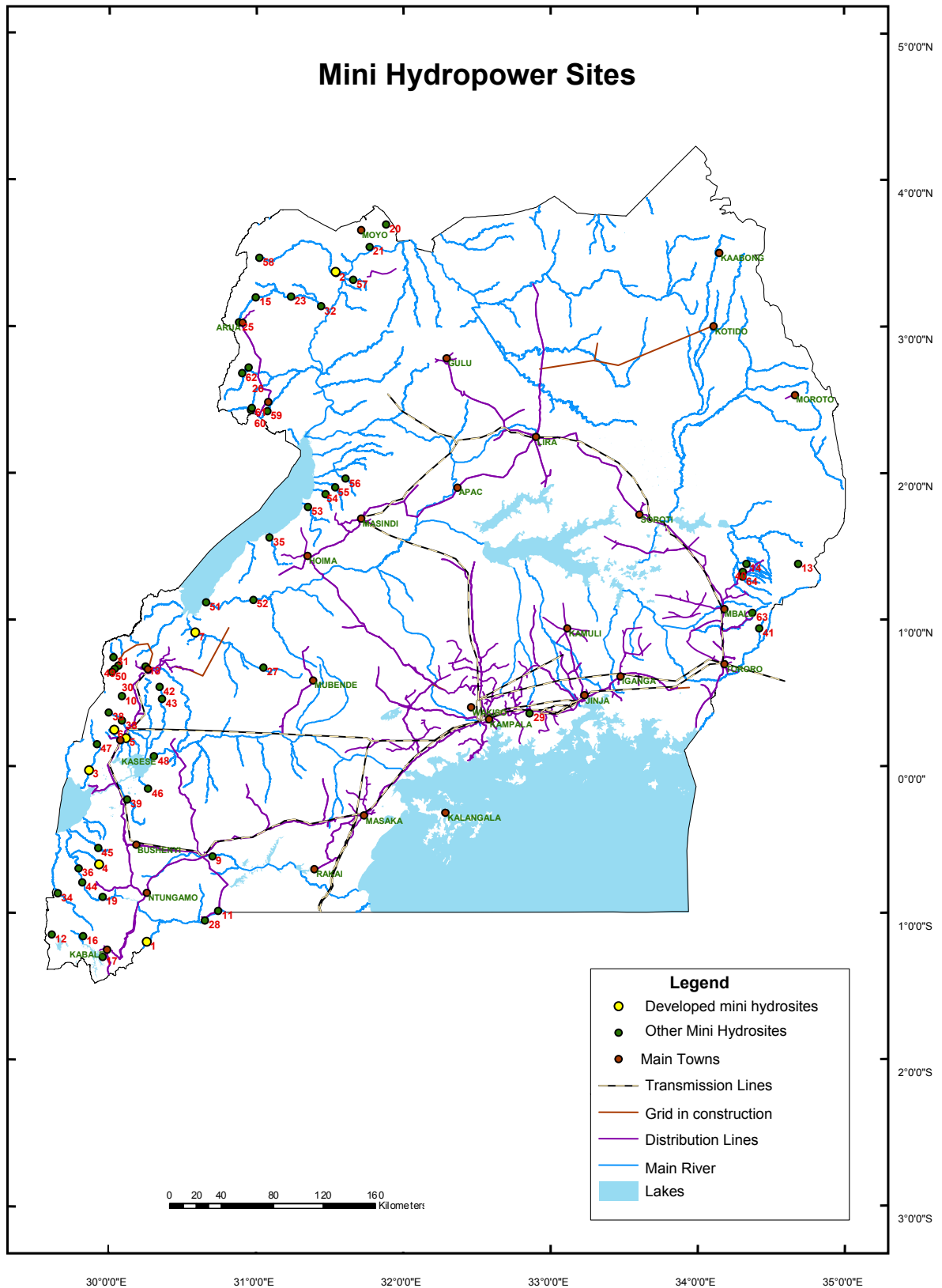


Fig 2.3 Mini Hydropower Sites

#### **2.2.4 Geothermal**

Geothermal energy is one of the possible alternative renewable energy sources in Uganda, which will supplement other sources of energy. Its major advantages are that it is environmentally friendly and multidisciplinary in uses, since it can support various development activities ranging from production to processing of raw materials, like minerals and agricultural produce.

Geothermal investigations in Uganda have so far identified three potential areas for detailed exploration. They are all situated in western Uganda, in the western branch of the East African Rift Valley. The three potential areas are Katwe-Kikorongo, Buranga and Kibiro. Based on recent assessments, they have all been ranked as potential targets for geothermal development. The total geothermal energy potential is estimated at 450 MW.

Current efforts by Government are focused on developing the above three areas to a pre-feasibility stage, which would pave way for availing required data for feasibility study. The pre-feasibility study will involve drilling of deep exploration wells, which will provide information on reservoir temperature, fluid chemistry and other petrophysical parameters. The current study results indicate that the temperature level varies between 150 C° and 200 C°.

Further studies are being carried out countrywide to generate further potential geothermal sites. These geothermal areas will then be ranked. Fig 2.4 shows the geothermal sites of Uganda.



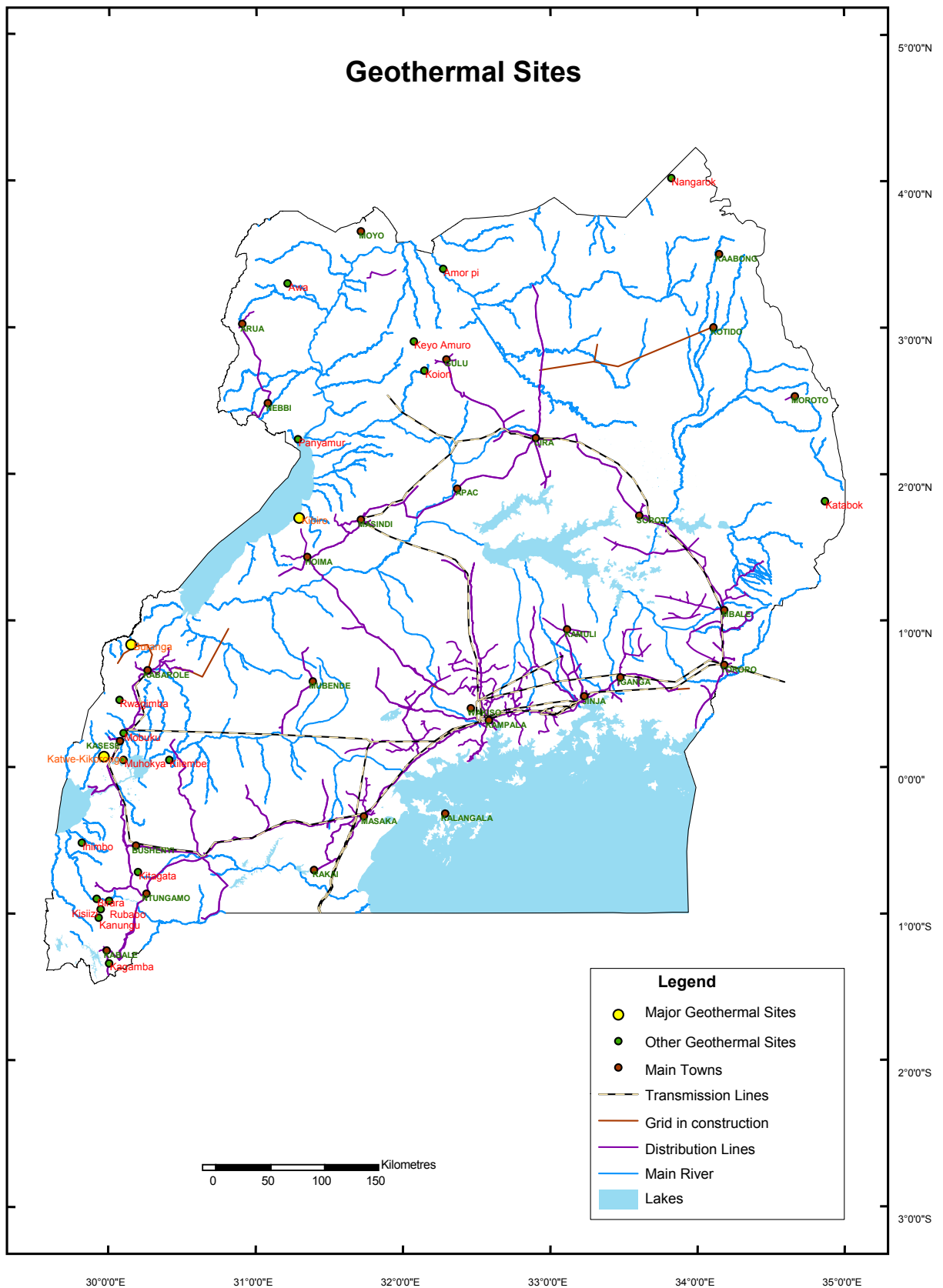


Fig 2.4 Geothermal Sites

### **2.2.5 Solar**

Existing solar data clearly show that the solar energy resource in Uganda is high throughout the year. The mean solar radiation is 5.1 kWh/m<sup>2</sup> per day, on a horizontal surface. This level of insolation is quite favorable, for the application of a number of solar technologies. These include:

- i) solar water heating; and
- ii) solar photovoltaic systems for supply of basic electricity in rural institutions and households as well as areas not connected to the grid.

The total new installed photovoltaic capacity annually is estimated at 200 kWp for households, institutions and commercial use.

Solar thermal has a great potential in the form of solar water heaters in electrified areas. Today electricity is most often used for water heating, in spite of the fact that it will in many cases be cheaper for the consumer to use solar energy. Furthermore, small solar water heaters are relevant for remote areas, where hot water is needed like in rural clinics and tourism areas, to provide a cheap, reliable and environmentally friendly, source of energy.

Solar technology can also be used for power generation, however, the prohibitive costs make it less favorable than other sources of power generation. Fig 2.5 shows the availability of solar energy countrywide.

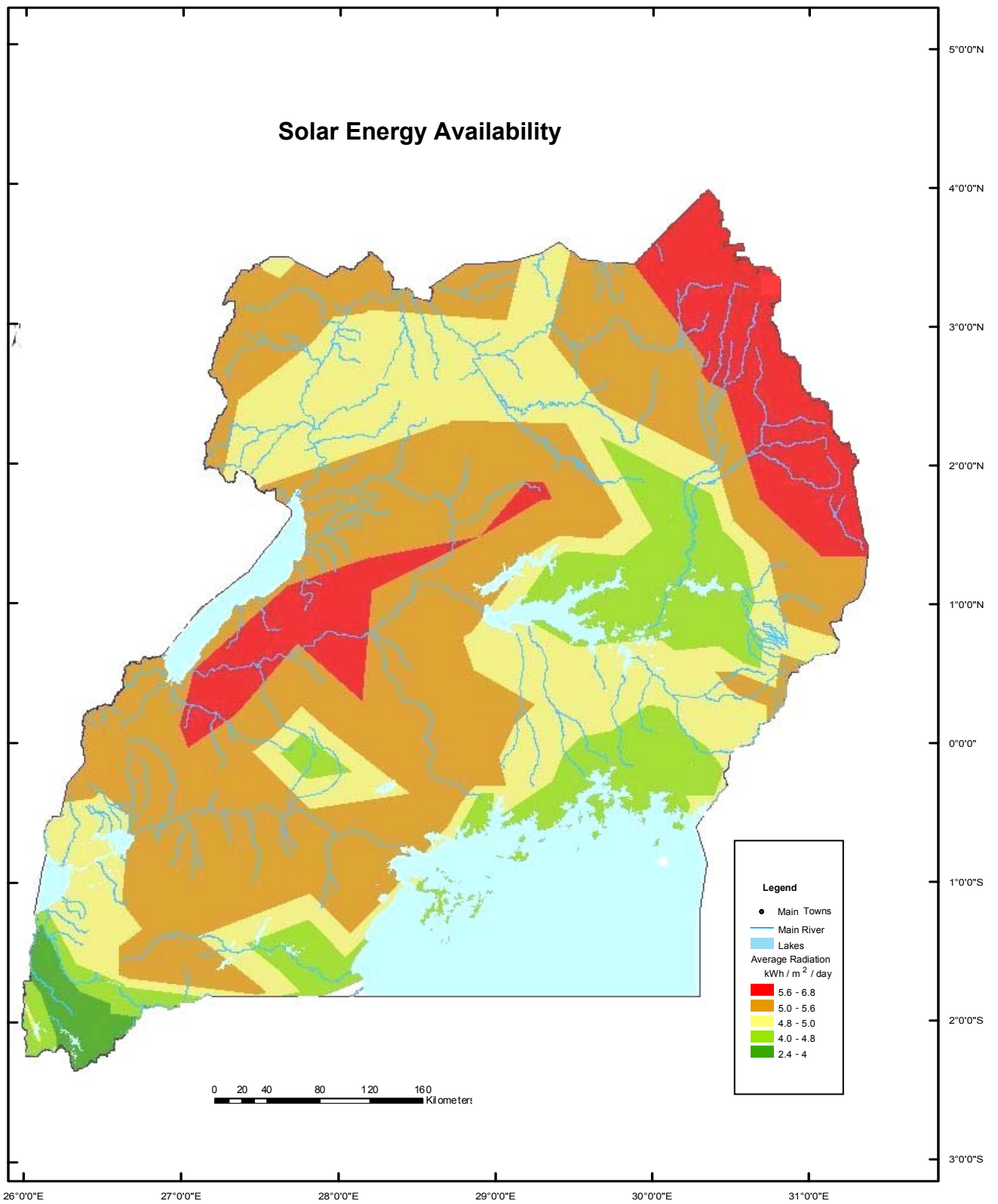


Fig 2.5 Solar Energy Availability

### **2.2.6 Wind**

Wind speed is moderate in most areas of Uganda. The average wind speeds in low heights (less than 10 m) generally range from 2 m/s to about 4 m/s. In some areas with complex terrain, the wind may speed up due to slopes of hills and escapements and tunneling effects. Based on wind data collected by the Meteorology Department, it was concluded that the wind energy resource in Uganda, is sufficient for small scale electricity generation and for special applications, such as water pumping mainly in the Karamoja region. More recently, low speed turbines have been developed and they have proved effective for power generation.

Recent studies also confirm that electricity generation through wind is feasible, especially for small industries or in rural areas where targets for a mill range from 2.5 kW to 10 kW. Fig 2.6 shows the availability of wind energy countrywide.

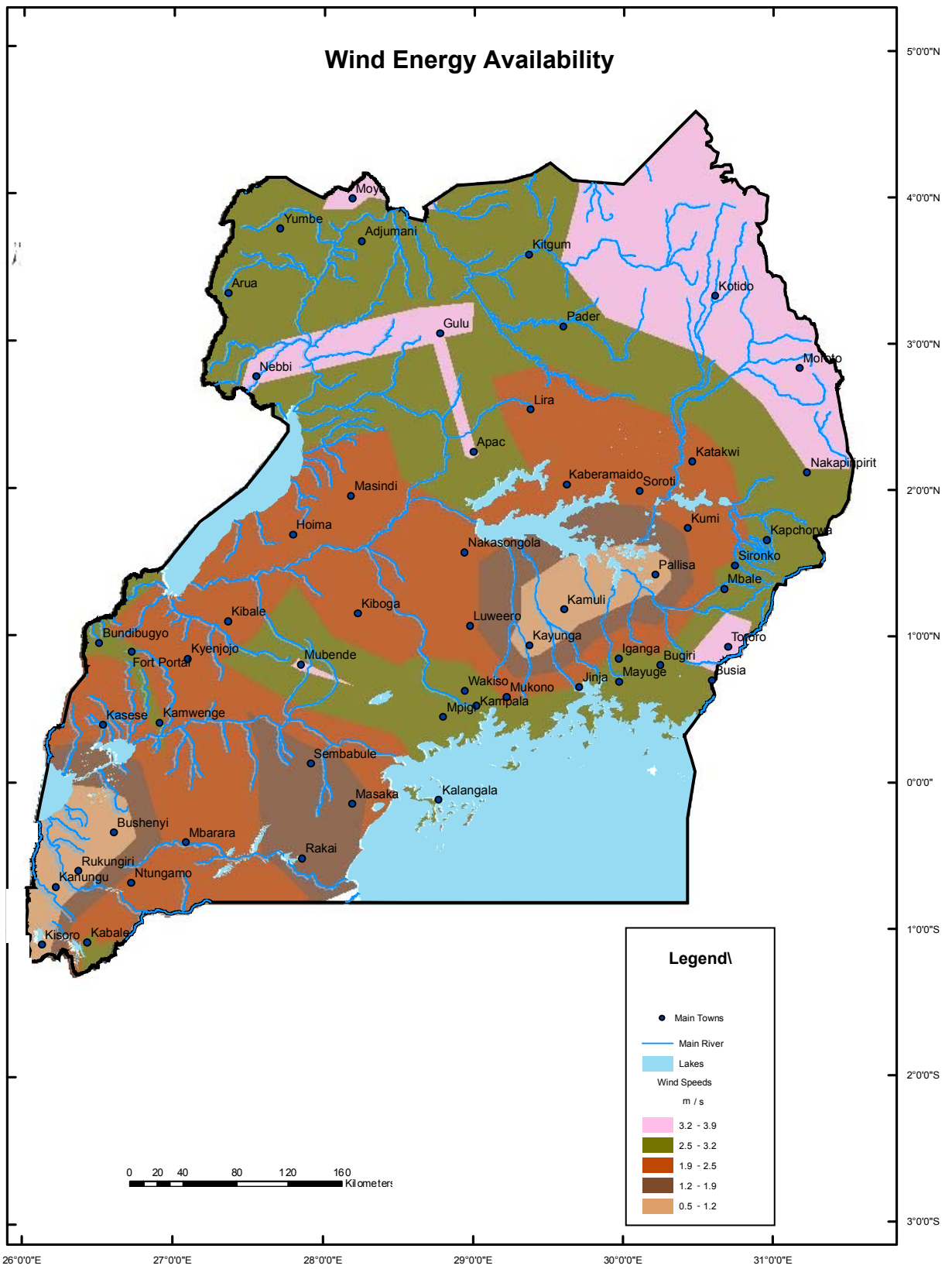


Fig 2.6 Wind Energy Availability

### 2.2.7 Other Renewable Energy Technologies

There are other renewable energy technologies like the *fuel cell technology*, which are yet to be explored for use in Uganda.

Fuel cell technology is a modern renewable technology that is an alternative source of generating energy for rural areas. A fuel cell combines hydrogen and oxygen to produce electricity, heat and water. As a result, there is almost no pollution from fuel cells. The performance is based on a reaction between hydrogen and oxygen through a Proton Exchange Membrane (PEM). The reaction produces both electric and thermal energy that can be used to power a house or an entire town/village.

Fuel cells are promising technologies for use as a source of heat and electricity for rural communities, buildings and as an electrical power source for electric motors propelling vehicles. The biggest disadvantage of fuel cells is their high relative costs and the high energy input required for production. However, it is predicted that fuel cells will offer significant cost advantages over traditional energy solutions in the not-too-distant future.

## 2.3 Barriers to Renewable Energy Development

The various barriers preventing steady growth for renewable energy resources development and utilization in Uganda are as follows:

- i. **High Upfront Costs:** High upfront costs of investment in Renewable Energy Technologies (RETs) result in many of them not being cost-competitive. For example, unit costs for investing in the various renewable energy technologies is: solar PV US\$12,000-15,000 per KW; solar water heating US\$810-1,500 per KW; small hydros US\$2,500-5,000 per KW.
- ii. **Inadequate Legal and Institutional Framework:** There has for a long time been a lack of a standard procedure and legal instruments for new renewable energy investments. There are several institutions involved in RET development and the procedure is not well defined.
- iii. **Limited Technical and Institutional Capacity:** There is limited technical and institutional capacity in both the public and private sector to implement and manage renewable energy investments. For instance, in the rural areas, there are few public and private sector personnel involved in the energy business. Lack of skills by public and private actors to address the roles, needs and decision making differences for women and men, hinders increased participation and benefits, which would have resulted from appropriate renewable energy interventions.

- iv. **Lack of Financing Mechanisms:** There is a lack of appropriate financing mechanisms to facilitate the development and promotion of RETs. Commercial Banks currently are not providing long term lending required for RETs. Because renewable energy technologies still have high upfront costs, consumers find them unaffordable. Mechanisms for consumer financing to address this problem are still inadequate.
- v. **Underdeveloped Market:** The market for RETs and after sale delivery services is underdeveloped especially in solar technologies.
- vi. **Lack of Awareness:** There is limited awareness of the importance of renewable energy among the stakeholders, and lack of recognition of women as key participants in technology use and innovations.
- vii. **Unsustainable use of Biomass:** Currently there is inefficient use of biomass and lack of replenishment. There is indiscriminate cutting of trees and little use of more efficient technologies, such as improved cook stoves and gasification.
- viii. **Lack of Standards and Quality Assurance:** There are lack of adequate standards and mechanisms to monitor and ensure quality of RETs. For instance, there are different solar technologies on the market and the general public is not aware of their effectiveness.
- ix. **Lack of Sufficient Data on Resource Base:** Although several studies have been conducted on the resource base, this information has not been appropriately stored for retrieval or processed, especially for wind, solar and geothermal energy.
- x. **Lack of Integrated Resource Planning:** Integrated resource planning takes into account supply and demand side constraints and environmental planning considerations. While Uganda's energy planning system has concentrated mainly on the supply side, it has not integrated renewable energy sources such as the bio-fuels (ethanol, bio-diesel, methane and methanol) as substitutes for fossil fuels and small hydropower development as an integral component of hydro power planning.
- xi. **Inadequate Attention to Research and Development (R&D):** There is lack of focus on R&D in the Energy Sector and no apparent budget is provided to institutions of higher learning to specifically conduct R&D. No systems have been put in place either for international cooperation in R&D to easily accelerate technology transfer.
- xii. **Limited Stakeholder Involvement:** There has been limited stakeholder participation in the planning and implementation of renewable energy projects. This

has led to poor sustainability of investments. Furthermore, with the Power Sector Reform, the need for the holistic programme development and management, involving the various bodies in the Power Sector, is even more desirable.



### **3. THE POLICY VISION, GOAL, PRINCIPLES, OBJECTIVES, STRATEGIES AND TARGETS**

#### **3.1 The Policy Vision**

The Overall Government Policy Vision for the role of Renewable Energy in the national energy economy is: ***To make modern renewable energy a substantial part of the national energy consumption.***

#### **3.2 The Policy Goal**

The Overall Renewable Energy Policy Goal is: ***To increase the use of modern renewable energy, from the current 4% to 61% of the total energy consumption by the year 2017.***

#### **3.3 The Key Policy Principles**

The Policy principles are the fundamental premises that Government will use to apply, develop and test policy and subsequent actions, including decision making, legislation and enforcement. The key principles for renewable energy development are:

##### **1. Energy and Development**

Energy services such as lighting, heating, cooking, motive power, mechanical transport and telecommunication are essential for socio-economic development, since they yield social benefits, create employment and generate income. These issues are at the core of poverty eradication and national development. For renewable energy to remain relevant, the policies adopted must propel it to a level, where it provides services that will facilitate the achievement of national development goals.

##### **2. Reliability, Efficiency and Sustainability**

The deployment of renewable energy technologies should be done in such a way that they provide reliable and efficient services to consumers. This will bring confidence within consumers regarding RETs, thus enhancing the sustainability of their market.

### **3. Energy Diversity, Security and Independence**

The support for renewable energy development and use should be seen as a deliberate effort to achieve energy supply diversity, which will enhance energy security. This will also increase Uganda's energy independence through reduced foreign oil imports.

### **4. Public-Private Partnerships**

Government is expected to provide a conducive policy legal and regulatory environment for the private sector to be attracted to invest in renewable energy development. The framework for this environment should contain, among other things, such incentives as guarantees or risk hedging mechanisms, tax rebates, subsidies, favorable power purchase/pricing terms, forex exchange conversion terms among others. However, the policy framework should also allow for Government's pro-active implementation of desirable projects, which may not have attracted the private sector upfront. The private sector can then be brought on board for management and operations of the project. Depending on the circumstances of the project, the private sector could be a profit oriented company, a cooperative, a community, or an NGO.

### **5. Full Cost Accounting**

Pricing policies will be based on full economic, social and environmental costs and benefits of policies, plans, programs, projects and activities of energy production and utilization.

### **6. Avoided Cost Energy Pricing**

With regard to electricity generated from renewable energy sources, the use of the avoided cost principle for the feed-in-tariffs will be critical to make renewable energy generation competitive, with generation from conventional energy sources.

### **7. The Gender Dimension**

Women will need to play a special role in the provision and management of energy sources, since they are the most affected by inadequate energy supplies. The difference in interests, needs and priorities that women have compared to those of men will be recognized in planning, implementation and monitoring of renewable energy projects. Energy technologies and services will be designed and disseminated in ways that take into consideration the difference in tasks and roles

within the household, participation in decision making, prioritization of energy needs and how to cope in situations, where there is a lack of energy options. Appropriate policy mechanisms will be provided as part of the enabling environment.

### **8. Stakeholder Participation and the Poor**

Government and project developers should foster community participation in renewable energy projects and strive to promote knowledge of and greater acceptance by the public of prospective renewable energy projects that are appropriate for their location. This involvement should start at an early stage in the planning process. These developments should take into account the socio-economic set up of the concerned community, including the needs of the poor. The development of the renewable energy resources should lead to employment creation and poverty alleviation.

### **9. Market Competitiveness**

The high upfront costs of investment in RETs make them uncompetitive in the market. The Policy will enhance the penetration of renewable energy in the market.

### **10. Environmental Sustainability**

The environmental sustainability of energy supply and consumption, including from renewable sources, should be enhanced to reduce environmental impacts in terms of land use, greenhouse gases and health hazards. While it is generally accepted that renewable energy is environmentally friendly, its production must conform to acceptable environmental standards.

## **3.4 The Policy Objectives**

In order to achieve the Policy Vision and Goal, Government will endeavour to implement the following objectives:

- i) Develop, implement, maintain and continuously improve the legal and institutional framework that responds to the prevailing conditions, in order to maintain interest in renewable energy investments.
- ii) Establish an appropriate financing and fiscal policy framework that will attract more investments in Renewable Energy Technologies.
- iii) Mainstream gender and poverty issues in renewable energy development strategies to improve the socio-economic well being of women and the poor in general.

- iv) Disseminate information and raise public awareness on the benefits and opportunities of renewable energy technologies and build capacities in appropriate institutions.
- v) Promote Research and Development, technology transfer, international co-operation and adoption of standards in RETs.
- vi) Manage the biomass resource base in a sustainable manner.
- vii) Promote the use of biofuels.
- viii) Promote the conversion of municipal and industrial wastes to energy.

## 3.5 The Strategies

### 3.5.1 Legal and Institutional Framework

To maintain and improve the responsiveness of the legal and institutional framework to facilitate renewable energy investments, Government will:-

1. Publish of a **Standardized Power Purchase Agreement with Feed-in Tariffs** for renewable energy generation projects of up to 20 MW installed capacity.
2. Put in place legislation and regulations to promote the use of renewable energy and Renewable Energy Technologies all sectors. In particular, Urban Authorities will be obligated to incorporate solar water heating in building plans and local authorities will be encouraged to secure agricultural land for energy farming to produce biofuels.
3. Develop appropriate regulations for grid connections and wheeling of electricity generated from renewable energy.
4. Introduce a Sector-Wide Approach (SWAP) in energy planning and implementation.
5. Establish a National Energy Committee with representatives from stakeholders to provide strategic policy guidance to the Sector.
6. Establish a decentralized coordination at District Local Government levels to support the promotion of renewable energy investments at the lowest level.
7. Create both Renewable Energy and Energy Efficiency and Conservation Departments, at the Ministry of Energy and Mineral Development.

8. Attract qualified personnel into the sector so as to support Renewable Energy Investments.
9. Integrate energy issues into non-energy sector policies and planning for sustainable energy service provision.

## **Targets**

The target for the first four strategies is by mid 2007. The targets for the remaining strategies are by the end of 2007.

### **3.5.2 Financing and Fiscal Policy**

In order to establish an appropriate financing and fiscal policy to attract more investments and enable RETs to penetrate different markets, Government will pursue the following strategies:-

1. Implement, through public private partnerships (PPP), innovative financing mechanisms, including targeted subsidies to stimulate the market penetration of renewable energy technologies. Where subsidies are to be provided, they will be determined in a transparent manner and published.
2. Introduce specific regimes that favor renewable energy. These will include preferential tax treatment, tax exemption and accelerated depreciation. Adapt taxation of conventional energy and fuels in view of the impact on the market for renewables.
3. Implement innovative risk mitigation mechanisms and credit enhancement instruments, to provide comfort to project lenders and developers.
4. Enhance social service provision in health, water supply and education sectors through grant financing of renewable energy projects, especially as a part of rural development programmes.
5. Develop financing schemes adapted to local needs and traditions, such as revolving funds, to enable market development for small, appropriate renewable energy technologies for rural development, such as household solar PV systems.
6. Gain from the different opportunities offered by the mechanisms linked to the Kyoto Protocol, Clean Development Mechanism, Emission Trading, Joint Implementation Programmes and the Carbon Credits Scheme.

7. Ensure periodic determination of feed-in tariffs, which will apply to all developers of renewable energy projects that sell power to the grid.

### **Targets**

The targets for the first two strategies are by the end of 2008. However, based on the experience gained through implementation, the risk mitigation and financing mechanisms will be reviewed. The target for the third and fourth strategy will be by the end of 2007. The targets for the fifth, sixth and seventh strategy is by the end of 2007.

### **3.5.3 Poverty Eradication, Equitable Distribution, Social Services and Gender .**

To promote mechanisms that enhance the capacity of public and private energy service providers to develop and deploy appropriate gender responsive renewable energy technologies, especially those that help to ease the household burden on women, the *girl child* and those that improve their economic status, Government will:

1. Carry out a comprehensive study to determine the linkages and mechanisms between poverty eradication, gender, and renewable energy.
2. Sensitize stakeholders in the public sector, private sector, microfinance institutions, training institutions, NGOs, CBOs on the linkages between gender, renewable energy and poverty and specify their different roles in promoting the synergies.
3. Implement a comprehensive integrated renewable energy, gender sensitive, poverty alleviation plan with the stakeholders and appropriate technologies.
4. Reinforce the gender related benefits of renewable energy in PEAP.
5. Mainstream HIV/AIDS issues during planning, development and implementation of RE projects and activities.

### **Targets**

The targets for all the strategies is by the end of 2007.

### **3.5.4 Data Acquisition, Information Dissemination and Capacity Building**

To raise public awareness on the benefits and opportunities of renewable energy technologies, Government will:

1. Continuously acquire data on the renewable energy resource availability.

2. Develop capacity to process and retrieve this data by establishing an Energy Data Bank
3. Develop and promote knowledge and exchange of information on renewable energy to all stakeholders including the Private Sector, Local Governments and Government institutions right to the lowest level.
4. Promote and stimulate the renewable energy technology and energy efficiency markets, through the dissemination of information regarding the economic, social and environmental benefits of renewable energy technologies.
5. Incorporate renewable energy technology into the primary, secondary and tertiary curriculum.
6. Develop and implement a comprehensive capacity building programme for the RE sub sector.

### **Targets**

The targets for the first two strategies are by mid 2007 and the targets for the remaining, strategies are by the end of 2007. Information, awareness and capacity building is a continuous activity.

### **3.5.5 Promote Research and Development, International Co-operation, Technology Transfer and Adoption of Standards in RETs**

To promote mechanisms for international co-operation in research and development, technology transfer and appropriate standards, Government will:-

1. Promote appropriate R and D and local manufacturing capability, in renewable energy technologies. By advocating and supporting collaboration with researchers and developers in industrialized and other developing nations.
2. Allocate adequate funding towards R and D initiatives.
3. Set up a Research and Development Division under the Renewable Energy Department to coordinate R and D programmes in RETs.
4. Support the research initiatives in tertiary institutions.
5. Develop or adapt standards which govern the design, installation and performance of renewable energy systems and put in place certification processes, to verify that the systems meet these standards.

6. Identify and enhance appropriate mechanisms to gain from technology skills transfer and to benefit from international experience.
7. Promote the implementation of appropriate standard guidelines and codes of practice for sustainable use of renewable energy.
8. Develop standards which govern the design, installation and performance of renewable RETs.
9. Monitor the ongoing R&D programmes and identify additional investigations and demonstration projects that would assist in the development and optimization of renewable energy systems.
10. Identify appropriate public private partnerships for the promotion of renewable energy technology and development.

### **Targets**

The targets for all these strategies is by the end of 2007

### **3.5.6 Biomass Resource Base Management**

To manage the biomass resource base in a sustainable manner, Government will:

1. Promote in collaboration with NFA and MAAIF the growing of energy crops including fast maturing trees by the private sector for production of feedstock and bio-diesel. MEMD will liaise with the National Forestry Authority and stakeholders to develop a comprehensive reforestation plan that addresses the energy requirements for biomass users.
2. Provide incentives for farmers to establish commercial woodlot plantations, including peri-urban plantations.
3. Integrate biomass energy production and efficient utilization and its impacts on climate and health, into the formal education system.
4. License charcoal production and transportation and encourage its commercial production in an efficient and sustainable manner.
5. Promote biogas production and use for small and large scale applications. Increase the number of household/institutional biogas plants from around 500 at present to 100,000 by 2017.
6. Increase the rate of adoption of efficient charcoal stoves from 20,000 currently, to 2,500,000 by 2017 in urban areas.



7. Increase the rate of adoption of efficient fuel wood stoves from 170,000 currently, to 500,000 by 2012 and 4,000,000 by 2017.
8. Promote inter-fuel substitution in households and industry by creating and maintaining appropriate taxation systems.
9. Promote efficiency in the intensive wood burning industries, e.g. tea factories, brick kilns, bakeries among others.
10. Promote biomass fired cogeneration in industries and institutions.
11. Offer training opportunities for *Jua kali* artisans at the village level for the manufacture, installation and maintenance of efficient cooking stoves.
12. License the encroached national forest reserves, to investors (community-based or private) for sustainable energy production.

### **Targets**

The targets for the first five strategies are by the end of 2007. The targets for the sixth and seventh strategy are as indicated. The targets for the eighth, ninth and tenth strategies are by the end of 2007. The targets of the eleventh and twelfth strategies are by mid 2008.

### **3.5.7 Biofuels Promotion and Production**

In order to encourage the use of biofuels in the country and especially, in the transport sector, Government will:

1. Develop appropriate legislation for the use of biofuels.
2. Adopt appropriate international standards for the blending and manufacture of biofuels. In this respect, the Ministry will work together with the Uganda National Bureau of Standards and the Ministry of Works and Transport.
3. License companies through the Commissioner, Petroleum Supplies to blend 20% biofuels into all gasoline fuels and diesel.
4. Provide financial incentives for the production of biofuels. These will include: i) subsidies to the farmers of vegetable oil, ii) the removal of taxes on biofuels, iii) a five year tax free importation of machinery and equipment (from licensed manufacturers, who have a patent).
5. Set up a biofuels standard testing facility at the Uganda National Bureau of Standards.

6. Monitor the standards of biofuels producers together with the Uganda National Bureau of Standards.
7. Sensitize the public and stakeholders on the use of biofuels.
8. Facilitate research on the use of biofuels in liaison with the appropriate tertiary institutions.

### **Targets**

The targets for the first four strategies are by the end of 2007. The target for the fifth and sixth is by end of 2008. The target for the seventh strategy is by end of 2007. The target for the last strategy is by end of 2008.

### **3.5.8 Wastes to Energy**

To promote the conversion of municipal and industrial waste to energy, Government will:

1. Provide incentives for the conversion of wastes to energy.
2. Put in place fiscal measures that will discourage open burning or disposal of wastes without extracting their energy content.

### **Targets**

The targets for both strategies is by the end of 2007

## **3.6 The Main Targets**

The main targets of the Renewable Energy Policy are summarized under the five programmes indicated in Table 3.1

**Table 3.1 The Main Targets**

	<b>PROGRAMMES</b>	<b>BASELINE</b>	<b>CUMULATIVE TARGETS</b>	
<b>1.</b>	<b><i>Power Generation</i></b>	<b>2007</b>	<b>2012</b>	<b>2017</b>
	Hydropower plants (large) (MW installed)	380	830	1200
	Hydropower plants (mini and micro) (MW installed)	17	70	100
	Cogeneration (MW installed)	15	35	60
	Geothermal (MW installed)	0	25	45
	Municipal Waste (MW installed)	0	15	30
<b>2.</b>	<b><i>Rural Electrification and Urban Access</i></b>	<b>2007</b>	<b>2012</b>	<b>2017</b>
	Electrified households through PREPS/LIREPS and CIREPS	250,000	375,000	625,000
<b>3.</b>	<b><i>Modern Energy Services for Households</i></b>	<b>2007</b>	<b>2012</b>	<b>2017</b>
	Improved woodstoves (No)	170,000	500,000	4,000,000
	Improved charcoal stoves (No)	30,000	100,000	250,000
	Institutional stoves (No)	450	1,500	5,000
	Baking Ovens (No)	60	250	1,000
	Kilns (lime, charcoal, brick...) (No)	10	30	100
	Household/institutional biogas plants (No)	500	30,000	100,000
	Solar Home Systems (kWp)	200	400	700
	Fruit driers (No)	3	1000	2000
<b>4.</b>	<b><i>Biofuels</i></b> (Ethanol, Biodiesel, Biogas) (m <sup>3</sup> /a)	0	720,000	2,160,000
<b>5.</b>	<b><i>Energy Efficiency</i></b>	<b>2007</b>	<b>2012</b>	<b>2017</b>
	Solar water heaters (m <sup>2</sup> installed)	2,000	6,000	30,000
	Energy savers (No)	1,000,000	2,000,000	4,000,000
	Industrial energy audits implemented (No)	20	70	300
	Energy efficient equipment for industries implemented (No)	15	50	250

## 4. POLICY ACTIONS

In order to achieve the goals, objectives and targets of the Renewable Energy Policy, five main programmes will be implemented.

### 4.1 Power Generation Programme

Under this programme, there will be two approaches of project realization. The first will deal with *large hydropower schemes* and the second will deal with *small power schemes*.

#### i) Large-scale Power Projects

These sites will be tendered out to prospective developers. After the selection, the prospective developer will acquire a license from the Electricity Regulatory Authority to carry out feasibility studies and designs. Once these are approved, the developer will arrange an appropriate financing package that will facilitate the implementation of the scheme. Public Private Partnerships will be encouraged and the tariffs will be negotiated on a case by case basis.

#### ii) Small-scale Power Projects

This will cover small hydropower plants (less than 20MW), biomass, co-generation, geothermal energy, wind power, solar thermal electric power and other sources. Projects in a number of these renewable energy areas are already underway. The programme will include basic studies on identified resources, promotion or tendering of sites to the private sector and development of projects by the private sector. Public private partnerships will be encouraged. According to the Electricity Act 1999, UETCL will determine and publish the feed in tariffs after approval by ERA.

##### a) ***Biomass-fired Cogeneration:***

Biomass-fired cogeneration will be supported in isolated communities with good biomass reserves, industries with large amounts of combustible wastes as well as industries that require both heat and electricity. These include the sugar, wood, tea, food and beverages, vegetable oil, rice and fish smoking industries.

##### b) ***Wind Power:***

Wind power technology shall be promoted for power generation, water pumping and other applications.

##### c) ***Peat:***

This will include licensing of companies to extract peat. Distributed peat-fired cogeneration will be promoted in industries and isolated towns.

d) **Geothermal:**

This will include tendering of geothermal sites, supporting feasibility studies,

e) **Solar:**

This covers solar PV systems as well as solar thermal electric power schemes that are grid connected or connected to mini-grids.

### iii) **Legal and Institutional Framework**

For this programme to work, Government will take the following actions:

- a) Provide to the private sector project developers who want to feed power into the grid a **Standardized Power Purchase Agreement**. The significance of this type of PPA is that it makes the business predictable by removing market uncertainty, facilitates negotiations between the developer and dramatically cuts down the transaction costs. This will also help to attract a larger number of investors in renewable energy generation. Experiences in other countries where this instrument has been used bear these facts out. The *Standard Power Purchase Agreement (PPA)* is shown in *Annex 1*.
- b) Establish a **Feed-in-Tariff**, based on the principle of avoided cost pricing, in accordance with the provisions of the Electricity Act 1999. The tariff should be able to translate into a cash revenue that will not require the investor to resort to a capital subsidy. The Feed-in-Tariff will be part of the Standardized PPA. The feed-in tariff will be structured to differentiate between peak, shoulder and off-peak prices to reflect the higher value of power in the peak period and between short- to medium-term prices and long-term prices, to reflect the higher risk of load shedding in the short to medium-term. The structure for 2007 is shown in *Annex 2*. In terms of price levels, the following principles shall apply:
  - i. *Prices should provide a weighted average price equivalent to the cost of new base load hydropower capacity in Uganda, adjusted for transmission losses.*
  - ii. *In the short to medium term, prices should be based on the estimated marginal costs of production.*
- c) Wheeling of power over third party networks, will be charged in accordance with rates set and published by ERA.

- d) Subsidies will be extended to projects which generate power only under the following circumstances:
- i. In the case where a grid-embedded project also sells power to consumers in the local area, a subsidy per connection will be given.
  - ii. Mini-grids, i.e. where generation and distribution are combined in remote areas from the main grid. In both this and the case above, the subsidy payment will be in line with the subsidy criteria established by REA.
- e) Ensure that all Government authorities, who are supposed to provide the various consents (including permits, licenses, approvals, etc) give them in a well coordinated and expeditious manner.
- f) Provide comfort to the private sector investors by using either of the two existing financial instruments to hedge their long term borrowing from local financial institutions. These instruments are the Refinance Facility at the Bank of Uganda and the Credit Support Facility (CSF) (a Public Trust entity). The detailed operational modalities of these instruments can be accessed from the various legal documents that established them.
- g) Harmonize the institutional roles in the development of renewable energy projects. The details are contained in *Annex 1*.

## **4.2 Rural and Urban-Poor Electrification Access Programme**

The rural electrification programme has hitherto focused on unserved rural consumers both within and outside the UMEME footprint. However, future projects should be extended to the urban poor, especially in peri-urban areas, since their conditions are not any different from those living in rural areas. The essence of this action is that all poor people, regardless of where they live, should be facilitated to engage in productive activities and also receive decent social services such as health, education and water supply as a deliberate effort in support of the attainment of the MDGs.

Government actions on this programme will include the following:

- a) Match the development of small renewable energy generation capacity to the corresponding extension of electricity to rural and urban-poor connections. This linkage is justified specifically in the context of the design of the ERT Programme, which integrates rural electrification with the development of small renewable

energy. The plans for these connections will be incorporated in the ongoing activities, which include the planning of Priority Rural Electrification Projects (PREPS), the Locally/Community Initiated Rural Electrification Projects (LIREPS/CIREPS) and the extension of grid electricity to agricultural enterprises.

- b) Using the Indicative Rural Electrification Master Plan (IREMP), identify and carry out feasibility studies on micro/mini hydro sites and other sources to provide power to mini-grids in remote areas, either managed by communities/cooperatives or local entrepreneurs. In particular, this grid-independent approach has the potential to provide electricity to more rural consumers than relying on grid extensions, during periods of capacity constraint on the grid
- c) Through the National Energy Committee (NEC), MEMD will coordinate and monitor cross-sectoral energy activities, especially those initiated under the ERT, to ensure that the plans for energy services implemented by the sectoral ministries become sustainable. The main sectors include health, education, water supply and agriculture.
- d) Detail the light regulatory framework provided for under the Electricity Act and the necessary institutional framework for the promotion of decentralized schemes, the majority of, which are likely to be based on renewable energy generation. The framework will include the procedure for licensing/registration, tariff structure (specifics depending on case by case) and management and operation. The management of these schemes is likely to be done by local rural communities or local entrepreneurs.

### **4.3 Modern Energy Services Programme**

This programme will involve the promotion of renewable energy based energy technology for households, institutions, commercial buildings and small scale industries. In particular, these services will be for cooking, lighting, motive power and ICT. While LPG is not a renewable energy source, it will also be promoted as an integrated part of the programme, since it is a modern and relatively clean fuel, similar to modern renewable energy. Specifically, technologies under this programme will cover solar PV systems, biomass gasifiers, solar water heaters, efficient woodfuel stoves, LPG appliances and energy saving bulbs. Efforts to promote solar PV technology are already under implementation within the ERT Programme, while the wood fuel stoves project has been on-going under GTZ. However, MEMD will identify the various stakeholders that can

make this happen and spearhead its design as a comprehensive, integrated programme. The actions are summarized in Table 4.1. Government will undertake the following actions:

- a) An energy needs assessment, of selected districts in each of the four regions of the country. Initial data will be acquired from the District Population Offices, UNBS, NFA, MAAIF, MEMD and NGOs and CBOs operating in the different districts. This data will be augmented by additional surveys. For the more urbanized districts, data will be obtained from the town or municipal offices. The data obtained will be analyzed to specify the current energy demand in relation to the supply by the various technologies and the affordability of upgrading their supply.
- b) The Directorate of Energy Development will designate specific officers to manage a cluster of districts before District Energy Offices are instituted under the District Local Governments. They will work with the LCs, NGOs, CBOs, the Private Sector, MFIs to develop an implementation plan.
- c) The promotion of the programme will be at the District Level with participation of the District Community Development Officer, District Water Officer, District Environment Officer, District Education Officer and District Director, Medical Services. These officers will work with the District Leaders and sensitize households through the LC system. Schools, training institutions, health centers will be also sensitized.
- d) At the District Level a District Energy Committee (DEC) will be established with the District Energy Officer as chairperson. It will include representatives of key social sectors that require energy. These are the District Water Officer, the District Education Officer, the District Director of Medical Services and the District Agricultural Officer. At the Sub county Level (LC3), a Local Energy Committee (LEC) will also be established. The LEC will manage the planning, implementation, operation and maintenance of energy projects. This will include the selection of the most appropriate energy supply technology, taking into account affordability, willingness to pay, efficiency and sustainability. At the Village Level, a Village Energy Committee (VEC) will be established. The representation on both the LEC and VEC will be gender sensitive.
- e) There will be grants and revolving funds provided to the beneficiaries. The microfinance institutions will provide loans both to households and to institutions who would like to purchase solar PV systems and biogas digesters. They will also provide loans to potential dealers in solar equipment and liquid petroleum gas (LPG).



The NGOs, CBOs USSIA, PSFU will provide grants to artisans to start making the improved wood stoves, charcoal stoves, kilns, biogas digesters and improving their charcoal business.

- f) The PSFU, UREA and USSIA will spearhead capacity building for local artisans to acquire technological and entrepreneurial skills to manage businesses in or wood stoves, charcoal stoves and charcoal production. These will be identified through the LC system.

The training of technicians in solar pv technology will continue with support from MEMD and the Private Sector Foundation Uganda.

**Table 4.1 Modern Energy Services Programme: Main Components**

Sub-Programme	Proposed Activity	Policy Measures	Responsible Entities
1. <b>Data Collection and Analysis:</b> Supply and Demand	Publication of available results Data integration		UNBS, MEMD
2. <b>Charcoal</b> Production	Promote Technology Disseminate improved Technology Train Entrepreneurs/Artisans	Introduction of a sustainable licensing and taxation system for transport production and transport	MEMD, Forestry Dept, Media NGO, PMA
Charcoal Stoves	Awareness Campaigns Quality Control and standards Promote Technology Train Artisans/Entrepreneurs		MEMD, Media, Forestry Dept., NGO, PMA, artisans
3. <b>Woodstoves</b> Households	Awareness Campaigns Training of Trainers Promote Technology Monitoring and quality control		MEMD, NGO, Media, Forestry Dept, NGO, PMA, artisans
Institutions (schools, prisons )	Awareness Campaigns in institutions Promote Technology Quality Control/Standards Microcredits		MEMD, NGO, Media Tertiary Inst., MFIs
4. <b>Kilns</b> (lime, bricks, tobacco curing,	Dissemination of information		MEMD, NGO, Forestry Dpt, PMA
5. <b>Substitution</b> LPG Kerosene Biogas, Ethanol	Dissemination of information  Quality control, training of masons, business support to biogas companies	Tax reduction on LPG  Reduction of VAT and other taxes for biogas construction	MEMD, Oil companies, NGO
6. <b>Co-ordination</b>	Monitoring and Evaluation		MEMD (demand side) Forestry Dept. (supply side)

#### **4.4 Biofuels Programme**

This will cover production of ethanol, biodiesels, methanol (gasification) and biogas. Initiatives have been undertaken in the past in all these biofuels, but without the necessary thrust to make them an integral part of the country's energy supply mix. Uganda has the potential to produce substantial amounts of biodiesel from a variety of oil seed crops, which are either already grown for oil extraction or growing wild. The Ministry envisages that Uganda will be able to cut its diesel and gasoline imports by 10,000 tons a year from 2007 as a result of supporting biodiesel and ethanol production, through a package of policy and regulatory measures. Considering the current trend in the price of oil on the world market, MEMD will have to move fast to put this programme in place. Under this programme, Government will take the following actions:

- a) Appropriate legislation for the use of biofuels will be put in place. This will specify, who is eligible for a licence to blend and sell biofuels, the licensing authority, the minimum standards of the biofuels. The licencing authority will be the Commissioner Petroleum Supplies. Standards will be developed together with the Uganda National Bureau of Standards. The UNBS will have a biofuels testing facility set up. Together with the Ministry, they will be responsible for monitoring the standards of biofuels.
- b) MEMD with stakeholders will promote the use of biofuels through sensitization of the stakeholders. The key stakeholders involved will include the Private Sector Foundation Uganda, the Uganda Manufacturers Association, NGOs CBOs and the oil companies. The promotion will include, radio, TV and the print media.
- c) MEMD with Ministry of Agriculture Animal Industry and Fisheries, the Ministry of Water and Environment and stakeholders, will develop a comprehensive strategy for the increased production of vegetable oil and ethanol. This strategy will be implemented with the support of the Private Sector Foundation, Uganda Manufacturers Association, Uganda Seed Company, NGOs and CBOs. This will include subsidies to the farmers of all forms of vegetable oil. With recommendations from MEMD, the Ministry of Finance, Planning and Economic Development, will remove taxes from the

biofuels and give a tax holiday for the importation of machinery and equipment from licensed manufacturers.

#### **4.5 Wastes to Energy Programme**

This will cover the conversion of waste to energy through direct combustion, gasification or biological conversion to biogas and therefore wastes will become part of the energy resource base. To foster this development, MEMD will work with municipal authorities and industries that generate lots of waste in developing this potential.

- a) A survey of the amount and type of waste will be carried out in the various municipalities to determine the type of technology and the associated costs that are required, with the help of consultants.
- b) The promoters will access financial support from Development Banks, Commercial Banks and MFIs and the Credit Support Facility.
- c) Appropriate incentives shall be put in place to promote the conversion of waste to energy. This could be through the Credit Support Facility (CSF), tax waivers, etc. On the other hand, regulations that will discourage open burning or disposal of wastes without extracting their energy content will also be put in place.

#### **4.6 Energy Efficiency Programme**

The Energy Efficiency Programme will implement the overall *Energy Efficiency Strategy for Uganda*, which has the following objectives:

- i. Highlighting the energy efficiency baselines for Uganda.
- ii. Defining energy efficiency targets for Uganda.
- iii. Recommending energy efficiency strategy activities.
- iv. Setting up an energy efficiency implementation plan.
- v. Setting up a framework for energy efficiency improvement and for continuous promotion of energy efficiency in Uganda.

With the objective of improving the energy efficiency in all sectors of the Ugandan

economy in a sustainable manner, *the Energy Efficiency Strategy for Uganda* is based on three pillars or areas of intervention, namely

- Education and Training,
- Information, and
- Financial Support and Motivation Programmes.

The Government of Uganda will engage in individual activities and programmes for each of these areas, targeting the different sectors of the Ugandan economy. Where applicable and required, legislative provisions will be undertaken for the implementation of the activities and programmes.

In order to achieve the goals, objectives and targets of the Energy Efficiency Strategy, specific programmes will be implemented for the relevant sectors of the Ugandan economy. These are:

- *Households and Institutions* – households in the rural and urban areas, governmental institutions including schools, hospitals, universities, ministries and all kinds of administration buildings
- *Industry and Commerce* – large industry as well as small and medium enterprises, hotels, banks, private offices and small commerce
- *Transport* – private motorized transport, public transport, freight transport as well as transport infrastructure
- *Power Generation, Transmission and Distribution* –this will be done through the public utilities of UEGCL, UETCL and UEDCL together with their concessionaires.

The responsibilities for the implementation of this Strategy rest mainly with Government organizations, but will also be shared in some cases with private organizations.

The Ministry of Energy and Mineral Development will have lead responsibility within the National Government through the new Energy Efficiency and Conservation Department, for developing and implementing the Energy Efficiency Strategy.

Other Government bodies that will assist in implementing the various elements of the Strategy include:

*The Ministry of Finance, Planning and Economic Development*, will be responsible for making any changes in rates of company or individual tax and in VAT and import duties;

*The Ministry of Works and Transport*, will be responsible for taking direct action with respect to energy efficiency in the Transport Sector assisted on technical matters, by the Energy Efficiency and Conservation Department.

*The Ministry of Education and Sports*, will be directly responsible for introducing curricula changes to emphasize energy efficiency at all levels of education and assisted by the Energy Efficiency and Conservation Department.

*The Ministry of Lands, Housing and Urban Development*, will be directly involved with the introduction and monitoring for compliance with new energy efficient building codes;

*The Ministry of Tourism, Trade and Industry*, will participate in aspects of the strategy relevant to industrial plants.

*The Ministry of Local Government* will facilitate the participation of municipalities and other appropriate local jurisdictions.

*The Ministry of Water and Environment and NEMA* will facilitate the development of appropriate legislation to support the strategy.

Other main stakeholders will include UMA, PSFU, USSIA, industrial enterprises, industry associations, transport companies, owners of school buildings, hospitals and commercial centers, financial organizations, equipment manufacturers and similar organizations.

## **4.7 Impact of Proposed Actions**

The impact of implementing the proposed actions has been evaluated.

The impact of introducing Improved Biomass Energy Technologies (BETs) is shown in Table 4.2. The progressive savings in terms of biomass by 2017 is nearly equivalent to the current biomass demand for the entire country, which is at approximately, 27,784,000 tons per annum. (c. f Table 2.3)

Table: 4.3

## Impacts of Proposed Actions

Programmes	Savings in form of Biomass (Tonnes )		
	2007	2012	2017
<i>(1) Modern Energy Services for Households</i>			
a) Improved woodstoves	2,380,000	9,520,000	23,380,000
b) Improved charcoal stoves	96,000	320,000	790,000
c) Institutional stoves	10,800	36,000	120,000
d) Baking Ovens	4,860	20,250	81,000
e) Kilns (lime, charcoal, brick...)	4,500	13,500	45,000
f) Household Biogas	1,000	60,000	200,000
<b>Total Biomass Savings</b>	<b>2,870,500</b>	<b>11,221,000</b>	<b>27,825,000</b>
<i>(2) Energy Efficiency and Conservation</i>	<b>Capacity MW saved</b>		
	2007	2012	2017
a) Solar PV installed	0.092	0.184	0.322
b) Solar water heaters (m <sup>2</sup> installed)	1.4	4.2	21.00
c) Energy Savers (CFL)	30.00	48.00	49.00
d) Capacity saving	1.94	6.63	26.72
e) Industrial energy audits implemented	15.00	41.48	65.62
f) Energy efficient equipment for industries implemented			
<b>Total capacity saving (MW)</b>	<b>16.94</b>	<b>48.11</b>	<b>92.34</b>

## **5 INSTITUTIONAL FRAMEWORK**

### **5.1 Ministry of Energy and Mineral Development**

The overall responsibility for this policy lies with the Ministry of Energy and Mineral Development (MEMD). The Ministry will oversee and coordinate the implementation of this policy by various stakeholders and will ensure the effectiveness of these activities.

Within the ministry, a Renewable Energy Department is being created to specifically focus on the promotion of RE and RETs. MEMD shall also work with municipal authorities and industries that generate lots of waste in developing the potential.

The functions of the Department are:

- i) To identify new sources of energy to be developed in Uganda
- ii) To collect and process the information concerning renewable energy resources.
- iii) To carry out pre-feasibility and pre-investment studies of the various sources and sites.
- iv) To mobilize technical assistance and funding for the development of the sources.
- v) To develop and review renewable energy policies.
- vi) To promote and develop appropriate renewable energy technologies.
- vii) To provide technical support to local governments and other stakeholders.
- viii) To supervise projects in renewable energy.
- ix) To adopt standards and codes of practice for renewable energy technologies.
- x) To facilitate the transfer of renewable energy technology.

Since renewable energy and energy efficiency are being implemented in a holistic and integrated manner, it is necessary to strengthen the energy efficiency and



conservation functions of the Ministry, by the creation of an Energy Efficiency and Conservation Department.

The main functions of the new Department will be:

- i) To regularly collect, analyze and interpret data on the status of energy efficiency and conservation throughout the country.
- ii) To develop strategies and programmes to improve energy efficiency and conservation.
- iii) To implement and monitor programmes that intend to improve energy efficiency and conservation.
- iv) To recommend and develop standards that can be used to improve energy efficiency and conservation.
- v) To coordinate and conduct research on the measures to improve energy efficiency and conservation.
- vi) To provide advice and technical guidance to energy users on the best practices of energy efficiency and conservation.
- vii) To provide technical advice to other Government Departments, Local Governments, the Private Sector and other stakeholders on energy efficiency and conservation.
- viii) To disseminate information on energy efficiency and conservation to the public and translate this into local languages.

Furthermore, a National Energy Committee will be established to provide strategic policy guidance to the Sector.

## **5.2 Other Stakeholders**

The other main stakeholders include the Electricity Regulatory Authority (ERA), which sets the tariffs and issues licenses for studies, generation and distribution, according to the Electricity Act 1999. The Rural Electrification Agency (REA) is the secretariat of the Rural Electrification Board (REB), which manages the Rural Electrification Fund (REF). The REF provides subsidies to support rural electrification projects. The Uganda Electricity Transmission Company (UETCL) is the System Operator and owns the transmission mains of above 33KV on behalf of Government. The Uganda Electricity Distribution Company (UEDCL) is the owner

of the electricity distribution network, which is being managed by UMEME, the concessionaire. Investments by Government will belong to UEDCL. The Uganda Electricity Generation Company (UEGCL) is the owner the Kiira and Nalubaale Power stations at Owen Falls, which have now been concessioned to Eskom Globeq to manage them.

The Uganda National Bureau of Standards (UNBS) is responsible for developing and monitoring standards for renewable energy technologies in addition to biofuels technology. The National Environment Management Agency (NEMA) is responsible for regulating the impact of renewable investments on the environment, through instruments like environment impact assessment (EIA). The Directorate of Water Development (DWD) is responsible for issuing permits for water extraction for hydropower schemes.

The Private Sector Foundation (PSFU) is a body that brings together private companies will assist in project development. The Uganda Investment Authority (UIA) provides both foreign and local investors with licenses for investment. Other bodies, which will participate in implementing this Policy are the Uganda Manufacturers Association (UMA), which is a body that brings together key users of renewable energy and potential manufacturers of the equipment; the Uganda Renewable Energy Association (UREA), which brings together companies, NGOs and CBOs that are implementing renewable energy projects. The Uganda Small Scale Industries Association (USSIA) will also participate through its members. The Media Houses, which include the radio, print and TV will also participate in the sensitization campaigns.

Other Government ministries involved in the provision of renewable energy technologies for social services are the Ministry of Health, Ministry of Finance, Planning and Economic Development, Ministry of Education and Sports, Ministry of Water and Environment, National Forestry Authority, Ministry of Agriculture, Animal Industries and Fisheries, Ministry of Local Government, the District Local Governments and the Municipalities.

Special financial mechanisms have been instituted to facilitate rural electrification and renewable energy investments. This includes the Credit Support Facility (CSF) known as the *Uganda Energy Capitalization Trust* that has been instituted to provide partial guarantees for private sector borrowing from the local financial

markets to develop projects. Participating Financial Institutions (PFIs) will include Commercial Banks, Development Banks and Microfinance Institutions (MFIs).

## **6 FINANCIAL IMPLICATIONS**

### **6.1 Short- and Medium-Term Policy Priority Actions**

Several RE Policy actions will be implemented in order to achieve the broad and specific objectives of this RE Policy. The details are indicated in Table 6.1. Strategic interventions required to move forward the RE policy priority actions are indicated along the proposed actions.

The total financial resources required to implement the strategic interventions are of the order of UShs 6,500 billion or US\$ 3.5 billion over the next ten years. It is estimated that 86% of these resources will come from direct private investment, while 14% have to be obtained from the public sector either through Government resources or from development partners (e.g. Multilateral and Bilateral cooperation, Global Environment Facility, Clean Development Mechanism). In particular, Government will strive to take advantage of these environmental agencies by emphasizing the development of renewable energy resources. Table 6.2 gives a summary of this.

Table 6.1 Short and Medium (0 – 10 Years) Term RE Policy Priorities (2007 - 2017)

PRIORITY ACTION	POLICY	STRATEGIC INTERVENTION	REQUIRED FINANCIAL RESOURCES	FUNDS ALREADY COMMITTED	SOURCE OF FUNDING	OTHER COMMENTS
Modern Services Programme	Energy	1) Dissemination of improved biomass technologies	US\$ 23.7 M US\$30 M for biogas plants	US\$ 6 M	Germany: US\$ 3 M GoU: US\$ 3 M Others: to be identified US\$ 17.7 M +US\$30 M	PUBLIC SECTOR INVESTMENT USERS WILL INVEST ADDITIONAL US\$30 MILLION FOR 100,000 BIOGAS PLANTS
		2) Dissemination of Solar Home Systems	US\$ 9.8 M	US\$ 6 M	IDA: US\$ 2 M GEF: US\$ 2 M Germany: US\$ 1 M GoU: US\$ 1 M	PUBLIC/PRIVATE SECTOR INVESTMENT WITH GOVERNMENT SUPPORT
		3) Update Evaluation of RE Resources	US\$ 3.2 M	US\$ 1 M	ADB: US\$ 1 M IDA/GEF: US\$ 0 M GOU: US\$ 0 M	FIRST STUDY LAUNCHED IN 2002
Renewable Power	Energy for Generation	DEVELOP SELECTED			PRIVATE EQUITY, GRANTS AND LOANS.	

Programme	RENEWABLE ENERGY PROJECTS: Large Hydros Small and Mini-Hydros Co-Generation Geothermal	US\$ 1270 M  US\$ 204 M US\$ 50 M US\$ 300 M	US\$ M  US\$ 13 M US\$ 10 M US\$ 0 M	GOU: US\$ 30 M  World Bank US\$16.5 M Private Sector US\$6.5 M	
Renewable Energy to Expand Electricity Access	HV/LV SWER	US\$ 1,375 M US\$ 275 M	US\$ 10 M	IDA, GEF, BILATERAL DONORS GOU: US\$ ... M SIDA US\$ 10 M	MAINLY PUBLIC SECTOR PROJECTS WITH A GROWING PRIVATE CONTRIBUTION
Energy Efficiency and Biofuels Programme	Energy Efficiency  Biofuels	US\$ 25.6 M  US\$ 18 M	0  0	Private Investors EQUITY AND LOANS  GOU Private investors	REQUIRES GOVERNMENT SUPPORT TO MANAGE CERTAIN RISKS
Institutional Strengthening		US\$ 6M	0		

Table 6.2: REQUIRED SECTOR INVESTMENTS (2006 – 2016)

TOTAL INVESTMENT FUNDS IN THE SHORT TO MEDIUM TERM:	US\$3,560 M
<b>PRIVATE SECTOR INVESTMENT</b>	<b>: US\$ 2,160 M</b>
<b>PUBLIC SECTOR INVESTMENT</b>	<b>: US\$ 1,400 M</b>
TOTAL FUNDS ALREADY COMMITTED	: US\$ 76.0 M
<b>PRIVATE SECTOR CONTRIBUTION</b>	<b>: US\$ 6.5 M</b>
<b>PUBLIC SECTOR CONTRIBUTION</b>	<b>: US\$ 69.5 M</b>
TOTAL FUNDS REQUIRED	: US\$ 3,484 M
<b>PRIVATE SECTOR REQUIREMENT</b>	<b>: US\$ 2,154 M</b>
<b>PUBLIC SECTOR REQUIREMENT</b>	<b>: US\$ 1,330 M</b>

# ANNEXES

## Annex 1 POWER PURCHASE AGREEMENT

### AGREEMENT

For

### THE PURCHASE AND SALE OF ELECTRICITY

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## **THIS POWER PURCHASE AGREEMENT**

is made on the . day of .. 200\_

### **BETWEEN**

The [XXX COMPANY LIMITED] of P.O. Box [XXX], KAMPALA (hereinafter referred to as "GENCO" which expression shall where the context so admits include its successors in title and assignees) of the one part;

### **AND**

The UGANDA ELECTRICITY TRANSMISSION COMPANY LIMITED, of P.O. Box 7625, KAMPALA (hereinafter referred to as "UETCL" which expression shall where the context so admits include its successors in title and assignees) of the other part;

### **WHEREAS:**

GENCO is empowered under Licence No. [XXX] issued by the Electricity Regulatory Authority under the Electricity Act Chapter 145 of the Laws of Uganda to engage in the business of generation of electrical energy;

UETCL is empowered and legally authorised under Licence No. [XXXX] to purchase electrical energy;

GENCO is desirous of selling electrical energy to UETCL, and UETCL desires to purchase electrical energy from GENCO

### **NOW THEREFORE THIS CONTRACT WITNESSETH** as follows: -

#### Definitions and Interpretation

##### Definitions

In this Agreement, unless the context otherwise requires, the following words and phrases shall have the meanings given to them below:

"Act": means the Electricity Act Chapter 145 of the Laws of Uganda, as may be amended from time to time.

"Agreement": means this Power Purchase Agreement as it may be amended from time to time.

"Annual Contract Volume": means the volume of energy estimated by GENCO to be delivered to UETCL in the relevant Contract Year.

"Arbitrator": means an arbitrator appointed in accordance with the dispute resolution procedure set out in Clause 0.

"Authorisation": means any approval, consent, licence, permit, authorisation or other permission granted or to be granted by a Government Authority required for the enforcement of rights or performance of obligations under this Agreement by a Party;

"Authorised Person": means, in the case of the GENCO or UETCL, the person nominated from time to time to represent the GENCO or UETCL;

"Billing Period Invoice": means a monthly invoice from GENCO to UETCL setting forth payments due in accordance with Clause 0;

"Business Day": means any Day of the week other than a Saturday or Sunday, or public holiday in Uganda;

“Change in Law”: means the occurrence of any of the following after the execution of this Agreement:

The enactment of a new Ugandan law;

The repeal or modification or re-enactment of any existing Ugandan law;

The commencement of any Ugandan law which has not yet entered into effect;

A change in the interpretation or application of any Ugandan law by any Governmental Authority having direct authority for its interpretation or application;

e) The imposition by a Governmental Authority of a requirement for any Authorisation which did not exist at the date of this Agreement;

which establishes a material increase or material reduction in revenue as a consequence of any requirement for the design, construction, financing, ownership, operation or maintenance of the Project that is materially more restrictive than the most restrictive requirements (i) in effect as of the date of this Agreement (ii) specified in any connection with such application for any Authorisation.

“Check Meter” – means any of the check meters owned, operated and maintained by GENCO at the Interconnection Points to check the Metered Energy. The Check Meter is more specifically identified and described in Schedules 1 and 4.

“Commercial Operation Date”: means the date when GENCO commences delivery of Energy to UETCL.

“Consequential Loss”: means all losses, costs and financial harm not directly (whether or not foreseeable) resulting from any breach by a Party of its obligations hereunder.

“Contract Year”: means the period from 1st January in any year until and including 31st December in the same year, provided: -

The first Contract Year shall be for a period from the Commercial Operation Date until and including the next following 31 December;

The last Contract Year shall be the period from 1st January of the year this Agreement is terminated or expires and including the date on which this Agreement is terminated or expires.

“Day” or “day”: means a period of twenty-four (24) Hours beginning at 0000 Hours on a day and ending at 2400 Hours on that day.

“Dispatch Instruction”: means an instruction given by UETCL to dispatch the generating station forming part of the Project.

“Dispatch Schedule”: means a schedule showing the amount of Energy expected to be dispatched for each hour from the GENCO power station.

“Effective Date”: means the date on which the last of the Conditions Precedents set out under Clause 0 has been satisfied.

“Emergency Conditions”: mean conditions giving rise to an emergency as defined in the Grid Code.

“Energy Charge”: means the amount due to GENCO from UETCL for the delivery of Metered Energy, as more particularly described in Schedule 3.

“Energy”: means electrical energy measured in MWh delivered by GENCO to UETCL.

“ERA”: means the Electricity Regulatory Authority of Uganda established under the Act.

“Event of Default” means an event constituting grounds on which a Party may terminate this Agreement, as set out in Clause 0.

“Financial Close”: means the date on which the initial disbursement is made by the Lenders.

“Force Majeure Event”: means an event constituting Force Majeure as defined under Clause 0.

“GENCO System”: means the electric power network, the lines, equipment and associated protective devices, safety and communication equipment owned by GENCO.

“GENCO” means the XXX Company Limited.

“Governmental Authority”: means any department, authority, instrumentality, agency or other relevant entity from which an Authorisation is to be obtained from time to time and any authority, body or other person having jurisdiction under the Laws of Uganda with respect to GENCO or the Project.

“Grid Code”: means the Electricity (Primary Grid Code) Regulations of 2003, as may be amended from time to time.

“Hour”: means each continuous period of sixty (60) minutes commencing with the first minute of each of the twenty-four (24) denominated hours in any Day;

“IEC Standards”: means the relevant standards published by the International Electro technical Commission of No. 3, Rue de Varembe, P.O. Box 131, CH-1211 Geneva, Switzerland.

“Interconnection Point”: means the location where the GENCO System interconnects with the Umeme System, as shown in Schedule 1.

“Interest Rate”: means the rate of LIBOR plus [one and a half per cent (1.5%)] per annum.

“Invoice Dispute Notice”: shall have the meaning ascribed thereto in Sub-clause 0.

“kV”: means kilovolts or 1,000 volts.

“kW”: means a kilowatt or 1,000 watts.

“kWh”: means one (1) kilowatt hour or one unit.

“Laws of Uganda”: means the laws of Uganda and all orders, rules, regulations and decrees, judgments and notifications made pursuant thereto as such laws, orders, rules, regulations, decrees, judgments and notifications may be modified, vacated or amended from time to time.

“Legal Requirement”: means any requirements established under any statute, law, regulation or other legislation, or any decree, order or directive emanating from any Governmental Authority of the Republic of Uganda, in respect to GENCO and UETCL;

“Lender”: means the banks and other financial institutions party to the financing agreements to the Project.

“LIBOR” means the London Inter-Bank Offered Rate of interest for three-month deposits of Euro-Dollars displayed on page “LIBOR01” of the Reuters Money Rates Service (or any other page that replaces “LIBOR01” for the purpose of displaying the British Bankers Association (“BBA”) interest settlement rates for such deposits of Euro-Dollars in the London Inter-Bank market) on the date of determination, or in the event that the Reuters Money Rates Service, or any successor thereto, no longer provides such information, such other service as may be agreed by the Buyer and the Seller that provides the BBA interest settlement rates for such deposits of Euro-Dollars in the London Inter-Bank market and any other information previously provided on the page “LIBOR01”.

“Liquidated Damages” means payments determined in accordance with Sub-clause 0.

“Main Meter”: means main meter and associated metering equipment owned, operated and maintained by GENCO at the Interconnection Point and used to measure and record Metered Energy and input at the Interconnection Point. The Main Meter is more particularly identified and described in Schedules 1 and 4.

“Metered Energy”: is comprised of the Peak Metered Energy, the Shoulder Metered Energy and the Off-Peak Metered Energy (expressed in MWh), as recorded by the Main Meter or the Check Meter or estimated and computed in accordance with Schedule 2.

“Metering System”: means the Main Meter and the Check Meter and all associated equipment.

“Month”: means a calendar month.

“Monthly Exchange Rate” shall have the meaning ascribed thereto in Schedule 3.

“MW”: means a megawatt or 1000 kilowatts or 1,000,000 watts.

“MWh”: means one (1) megawatt hour.

“Notice of Intent to Terminate” shall have the meaning ascribed thereto in Sub-clause 0.

“Off-Peak Block” means the set of Hours as defined in Schedule 2.

“Off-Peak Energy Charge” means the Energy Charge for the Off-Peak Metered Energy as determined in accordance with Schedule 3.

“Off-Peak Metered Energy” means the energy delivered to UETCL by GENCO at the Interconnection Point in the Off-Peak Block as recorded by the Metering System in accordance with Schedule 2.

“Party”: means any of the signatories to this Agreement and “Parties” shall mean all of them.

“Peak Block” means the set of Hours as defined in Schedule 2.

“Peak Energy Charge” means the Energy Charge for the Peak Metered Energy as determined in accordance with Schedule 3.

“Peak Metered Energy” means the energy delivered to UETCL by GENCO at the Interconnection Point in the Peak Block as recorded by the Metering System in accordance with Schedule 2.

“Power Factor”: means the cosine of an angle whose tangent is a ratio of reactive power to active power.

“Project”: means the development, design, construction, ownership, operation and maintenance of the power station and associated electricity distribution infrastructure.

“Prudent Operating Practice”: means generally accepted industry operating and maintenance practices.

“SCADA” means Supervisory Control And Data Acquisition, in the context of this Agreement being a system capable of remotely retrieving data recorded by the Metering System.

“Schedules”: means the schedules attached to this Agreement and forming an integral part of this Agreement.

“Shoulder Block” means the set of Hours as defined in Schedule 2.

“Shoulder Energy Charge” means the Energy Charge for the Shoulder Metered Energy as determined in accordance with Schedule 3.

“Shoulder Metered Energy” means the energy delivered to UETCL by GENCO at the Interconnection Point in the Shoulder Block as recorded by the Metering System in accordance with Schedule 2.

“Supply Period”: means the period commencing on the first Commercial Operations Date and concluding on the expiration of the Term or the earlier termination of this Agreement.

“Term” has the meaning ascribed thereto in Clause 0.

“Termination Notice” shall have the meaning ascribed thereto in Sub-clause 0.

“Tribunal” means the panel of arbitrators as established in accordance with Clause 0.

“UETCL System” means the electric high voltage transmission system, including but not limited to all transmission lines and equipment, transformers and associated equipment, relay and switching equipment and protective devices and safety and communications equipment owned and/or operated by UETCL and required for the performance by UETCL of its obligations under this Agreement.

“UETCL” means the Uganda Electricity Transmission Company Limited

“UG Shilling”: means the currency that is the legal tender of the Republic of Uganda.

“Umeme System”: means the 33kV distribution system including but not limited to all distribution lines and equipment, transformers and associated equipment, relay and switching equipment and protective devices and safety and communications equipment owned and/or operated by Umeme.

“Umeme” means the company registered in Uganda in this name or its successor.

“US Dollars” or “US \$”: the lawful currency of the United States of America.

#### Interpretation

In this Agreement:

References in the singular shall include references in the plural and vice versa, and words denoting natural persons shall include corporations and any other legal entity and vice versa;

References to the word “including” are to be construed without limitation;

Except to the extent that the context requires reference to a particular Clause, Sub-clause or Schedule shall be references to that Clause, Sub-clause or Schedule in or to this Agreement;

Except to the extent that the context requires any reference to “this Agreement” or any other agreement or document is a reference to it as amended, supplemented or notated from time to time and includes a reference to any document which amends, is supplemental to, notates, or is entered into, made or given pursuant to or in accordance with any terms to it;

The headings and paragraph numbers are inserted for convenience only and are to be ignored for the purposes of construction;

Calculations carried out pursuant to this Agreement will be rounded to two (2) decimal places.

The language of negotiation of this Agreement has been English, this Agreement is executed in English, and this English text shall prevail for the purposes of determining the intention of the Parties and in any construction of this Agreement.

## Conditions Precedent and Term of Agreement

### Conditions Precedent

This Agreement shall come into full force and effect on the Effective Date upon: -

This Agreement being approved by ERA; and

Financial Closure of the Project.

### **Term of Agreement**

This Agreement shall continue in full force and effect for [15] years following the Commercial Operation Date, provided that this term may be extended or reduced in accordance with the terms of this Agreement (the "Term")

The Term shall be extended automatically by the aggregate number of Days that all Force Majeure Events, where declared by either Party, were in existence during the Term. During such extensions, the terms of this Agreement shall continue with full force and effect.

Unless this Agreement has been terminated prior to such date, not later than two (2) years prior to the end of the Term, at the request of either Party, GENCO and UETCL shall enter into good faith negotiations to establish the terms and conditions under which this Agreement may be extended or renewed.

### **Delivery of Energy**

#### Interconnection

GENCO will build a metered interconnection to the distribution network operated by UMEME at the Interconnection Point as shown in Schedule 1 to this Agreement.

The Interconnection Point shall be the point at which GENCO delivers Energy to UETCL and the point at which UETCL accepts Energy from GENCO.

GENCO will ensure that its interconnection arrangements and agreements are in accordance with Section 11 and Section 25 of the Grid Code.

#### Dispatch of generating facilities

GENCO will provide to UETCL the Dispatch Schedule for its generating facilities in a format and frequency as may reasonably be requested by UETCL.

In accordance with the information provided under clause 0, GENCO will have the right to independently operate the generating facilities and deliver Energy to the Interconnection Point, subject to Sub-clause 0.

Under Emergency Conditions, including situations where UETCL is obliged to load shed in such a way that influences the operations of GENCO, GENCO will dispatch the generating facilities in accordance to Dispatch Instructions provided by UETCL.

### **Quality of Supply**

GENCO shall deliver Energy in accordance with the quality of supply standards of Sections 8 and 11 of the Grid Code as they apply to embedded generation, excepting any standards that the ERA may have provided exemption from.

### **Metering**

#### Meter installation and sealing

GENCO shall install, own and maintain the Main and Check Meters at the Interconnection Point.

The Main and Check Meters shall have the functional capability to determine the Metered Energy quantities as set out in Schedule 2 to this Agreement.



GENCO undertakes to provide to UETCL access to the Main and Check Meters for the installation of any SCADA monitoring equipment that UETCL may at their expense install.

The Metering System shall be jointly sealed. Each party shall own its seals. These seals shall be broken only jointly by GENCO and UETCL. A Party shall give at least twenty-four (24) hours advance notice to the other Party of the breaking of seals on any part of the Metering System. If the other Party when served with the notice does not appear, the Party wishing to break the seals may proceed but shall provide signed explanation to the other Party within forty-eight (48) hours of such breaking of the seals.

The seals shall not be removed by any of the Parties without consent of the other Party, which consent shall not be unreasonably withheld by a Party. Both Parties undertake not to tamper or otherwise interfere with any part of the Metering System in any way.

### **Meter Reading**

The Main and Check Meters shall be read monthly by GENCO in accordance with Schedule 2.

The monthly meter readings shall be used to determine the monthly Metered Energy quantities in accordance with Schedule 2.

### **Meter Testing**

GENCO shall initially test the Main and Check Meters at the Interconnection Point for accuracy in accordance with Schedule 4 at least fifteen (15) days prior to either delivering or receiving Energy through such Interconnection Point.

GENCO shall have the Main and Check Meters tested in accordance with the requirements of Schedule 4 and, if necessary, re-calibrated at least once every twenty-four Months or whenever either Party has reason to believe that the equipment is no longer performing within the standards of accuracy prescribed and has given notice to the other Party of such concern. GENCO shall on reasonable notice to UETCL arrange a suitable date for the Main or Check Meters to be tested. Testing and re-calibration shall be carried out in the presence of both Parties' duly Authorised Person or Persons appointed in writing.

After completion of any testing in accordance with Sub-clause 0, GENCO shall prepare and promptly submit to UETCL a statement which shall be a record of the results of the testing, and the extent to which the Meters were performing outside the limits of accuracy prescribed under Schedule 4;

The Metered Energy supplied by GENCO to UETCL shall be measured using readings of the Main Meter unless such meter is found to be malfunctioning or performing outside the limits of accuracy specified in Schedule 4. In such event, the procedure specified in Schedule 2 shall be used to determine the Metered Energy.

If, at any time, it is determined by the Parties, as a consequence of a test or as is otherwise manifest, that the Main Meter or Check Meter should be replaced, then GENCO shall replace the Main Meter or Check Meter as the case may be.

### **Sale and Purchase of Energy**

#### **Delivery and Purchase of Energy**

Not later than 60 Days prior to the first Day of any Contract Year GENCO shall notify UETCL of the Annual Contract Volume for the following Contract Year, which shall not be greater than [XXX] GWh.

With effect from the Commercial Operation Date and subject to and in accordance with this Agreement:

GENCO shall each Contract Year during the Supply Period deliver Energy to UETCL at the Interconnection Point; and

UETCL shall each Contract Year during the Supply Period accept Energy delivered by GENCO and shall pay GENCO the charges ascertained and calculated in accordance with this Agreement.

The quantities of Energy sold and purchased under this Agreement shall be metered in accordance with Clause 0 and determined in accordance with Schedule 2 to this Agreement.

### **Invoices for Energy Delivered**

UETCL shall pay GENCO:

The Energy Charge for Metered Energy delivered to UETCL at the Interconnection Point determined in accordance with Schedule 3 to this Agreement; and

Any Liquidated Damages as determined in accordance with Sub-clause 0; and

an amount equal to the Value Added Tax as legally imposed upon GENCO by any Governmental Authority in Uganda and which are due and payable by GENCO on sales of Energy.

Subsequent to the Commercial Operation Date, GENCO shall prepare and submit to UETCL an invoice no later than the [10th] Day of each Month following any Month during which Metered Energy is supplied to UETCL, and that invoice (the "Billing Period Invoice") showing all intermediate calculations shall state:

the Metered Energy quantities, comprising the Energy delivered by GENCO to UETCL, determined in accordance with Schedule 2 to this Agreement;

the Energy Charge, determined in accordance with Schedule 3 to this Agreement;

any other sums payable by UETCL to GENCO under this Agreement then due.

The Billing Period Invoice shall be sent to UETCL initially by facsimile or email followed by a hard copy.

### **Method of Payment**

UETCL shall make payment in UG Shillings, not later than [sixty (60) Days] following the delivery of the Billing Period Invoice, by direct bank transfer to a nominated bank account notified to UETCL by GENCO in such invoice.

Subject to Sub-clause 0, GENCO shall be entitled, without prejudice to any other right, relief or remedy, to receive interest on any payment properly due to it, and not made within the time for such payment at the Interest Rate computed from the due date of the invoice.

### **Disputed Payments**

If any sum or part of any sum stated in a Billing Period Invoice or other invoice (as the case may be), is in good faith disputed by UETCL, then UETCL shall:

Promptly issue to the other GENCO a written notice ("Invoice Dispute Notice") specifying exactly what it is disputing within the invoice and thereafter pay any undisputed sum in accordance with Sub-clause 0.

Pay such amount as is agreed or determined payable in respect of the disputed sum within sixty (60) days of -

i) the date on which the Parties resolve the disputed sum; or

ii) the date of determination if the Parties fail to reach agreement, and the matter has been referred for arbitration in accordance with Clause 0.

Unless it is so determined that payment should be made in accordance with Clause 0, when making payment of the amount agreed or determined, pay interest on that amount at the Interest Rate divided by twelve compounded monthly, from and including the due date of the Billing Period Invoice or any other invoice (as the case may be) up to but excluding the date of payment.

If UETCL disputes any amount specified in any Billing Period Invoice presented by GENCO more than three (3) times in any period of nine (9) consecutive Months, and to the extent that the disputes are found to be valid by GENCO or by an Arbitrator, then the Parties shall meet at the request of either Party to discuss and resolve the causes of the persistent billing errors.

If UETCL disputes any amount specified in any Billing Period Invoice presented by the GENCO more than three (3) times in any period of nine (9) months and such disputes are found to be invalid by GENCO or by an Arbitrator, then UETCL shall be liable to pay all the direct costs incurred by GENCO which may accrue as a result of such disputed Billing Period Invoice.

#### **No Set-off**

All payment by UETCL to GENCO under this Agreement shall be made without deduction or withholding (except to the extent required by law) on account of any other amount, whether by way of set-off or otherwise, unless deductible under the express provisions of this Agreement or pursuant to a valid Court Order, provided that nothing in Sub-clause 0 shall prevent GENCO from bringing an action in respect of any contractual dispute.

#### **Liquidated Damages**

If GENCO is prevented from delivering Energy to UETCL as a result of a failure of the UETCL System, UETCL shall pay GENCO Liquidated Damages; Provided that Liquidated Damages shall not be payable where the failure of the UETCL is due to scheduled maintenance.

For the purpose of this Agreement, failure of the UETCL System due to scheduled maintenance shall be limited to [872] hours per Contract Year.

Liquidated Damages for a Month payable by UETCL shall be determined as the average Energy Charge of the preceding three Billing Period Invoices, divided by seven hundred and thirty (730), multiplied by the number of Hours in the Month that the GENCO was unable to delivery Energy to UETCL as a result of a failure of the UETCL System.

The Target Availability for GENCO is [ninety five percent (95%)].

Availability of the GENCO generator in any year shall be determined as the ratio of the hours during the year when the generator was available to generate to the potential number of operating hours. The potential number of operating hours shall be the number of hours in the year less the number of hours during which the generator was not available due to hydrological constraints.

If the availability of the GENCO generator is below the Target Availability in any calendar year; GENCO shall pay UETCL Liquidated Damages.

Liquidated Damages payable by GENCO shall be calculated as the product of the lost output due to availability below the Target Availability and the average Energy Charge of the preceding twelve Billing Period Invoices divided by seven hundred and thirty (730).

## Undertakings and Warranties of the Parties

### Undertakings of each Party

Each Party undertakes that

it shall comply with all the applicable Legal Requirements, and

will hold and maintain in good order and validity, and renew and comply with, all Authorisations required for the performance of their obligations under this Agreement.

### Warranties of each Party

Each Party represents and warrants that

It is a limited liability company duly organized and validly existing under the laws of Uganda and has all requisite legal power and authority to execute this Agreement and to carry out the terms, conditions and provisions herein contained;

All Authorisations required for the execution, delivery and performance by it of this Agreement and the transactions contemplated herein have been taken and are in full force and effect, or have been applied for through the due process required by the relevant Governmental Authority;

This Agreement constitutes its valid, legal and binding obligations, enforceable in accordance with the terms hereof except where the enforceability may be limited by applicable laws affecting creditors' rights generally;

There are no actions, suits or proceedings pending or, to its knowledge, threatened, against or affecting it before any court or administrative body or arbitral tribunal that might materially adversely affect its ability to meet and carry out its obligations under this Agreement;

The execution, delivery and performance of this Agreement have been duly authorised by all requisite corporate action, and will not contravene any provision of, or constitute a default under any other agreement or instrument to which it is a party or by which its property may be bound; and

It has all necessary legal power and authority to perform its obligations under this Agreement.

## **Insurance and Taxes**

Each Party shall take out and maintain adequate insurance cover as are customary, desirable and consistent with Prudent Operating Practice and Legal Requirements.

Each Party shall furnish to the other copies of insurance policies effecting the insurance referred to in this Sub-clause 0 and from time to time, any Party may request the other Party to provide proof that all relevant premiums have been paid and that the relevant policy or policies remain in existence.

Each party shall be responsible for payment of royalties, taxes, fees, or assessments levied against its property, leasehold rights or other assets or profits by any Governmental Authority as may be provided for by the Laws of Uganda, and shall settle such levies without attempting to recover them from the other Party except through the Energy Charges determined in accordance with Schedule 3.

## **Force Majeure**

### Definition of Force Majeure

For the purposes of this Agreement "Force Majeure" means any event or circumstance which affects a Party and which is not within the reasonable control (directly or indirectly) of such Party (acting in accordance with Prudent Operating

Practice) and which results in or causes such Party to fail to perform any obligation under this Agreement;

Events or circumstances which, subject as aforesaid, may constitute Force Majeure shall include but shall not be limited to: -

an act of war whether declared or undeclared, invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot, insurrection, civil commotion, political act or campaign of terrorism, sabotage or vandalism;

strikes, works to rule or go-slows that extend beyond the facilities of either Party, are widespread or nationwide, or that are of a political nature;

an epidemic or plague that extend beyond the affected Party's organization and are widespread or nationwide;

a Change in Law;

an act of God including but not limited to fire, earthquakes, volcanic activities, flood, storms, drought, landslide, cyclone or typhoons, tornados or other unforeseen event;

an explosion or chemical contamination;

an act or omission of any contractor or supplier of UETCL or GENCO which would have been a Force Majeure Event had the contractor or supplier been a party to this Agreement; and

a failure of the UETCL System or of the GENCO System caused by an event that would constitute Force Majeure for the purposes of this Agreement.

Events or circumstances which may constitute Force Majeure shall not include: -

lack of funds due to any commercial, economic or financial reason such as, but not limited to, a Party's inability to make a profit or achieve a satisfactory rate of return due to the provisions of this Agreement or changes in market conditions (although the inability to use available funds, due to any reason set out in Sub-clause 0 above, shall be regarded as Force Majeure);

late delivery of machinery or other materials or a delay in the performance by any contractor or supplier (except where such late delivery or delay is itself attributable to a Force Majeure Event);

normal wear and tear or random flaws in materials and equipment or breakdown in equipment;

hazards, including but not limited to lightning or the growth of trees, which can be reasonably anticipated in normal utility operations and planned for as part of Prudent Operating Practice.

### **In case of an event of Force Majeure**

If a Party ("the affected Party") is prevented from or delayed in performing an obligation hereunder by reason of Force Majeure the affected Party shall:

be relieved from the requirement to perform that obligation;

promptly notify the other Party of the occurrences of the event within ninety six (96) hours giving full particulars and satisfactory evidence in support of its claim; and in the event of a break down of communication rendering it not reasonably practicable to give notice of Force Majeure within the period specified above, the Party claiming Force Majeure may give such notice as soon as possible, but not later than twenty four (24) hours of reinstatement of communication; and

use all reasonable endeavours to overcome the consequences of the event and where the Force Majeure Event has been eliminated or no longer affects a Party, the

obligations in this Agreement shall recommence forthwith, and the applicable period for the performance of the obligation shall be extended by a period equal to the duration of the Force Majeure Event.

The declaration of Force Majeure shall not relieve any Party from the requirement to make any payment when due.

If either Party is prevented, hindered or delayed in the performance of material obligations under this Agreement by reason of Force Majeure occurring after the Commercial Operation Date, then provided the affected Party has complied with its obligations under this Clause 0, the Term shall be extended by a period in time equal to the period during which the affected Party was so prevented, hindered or delayed, in accordance with Clause 0.

## **Termination**

### *Event of Default*

Each of the following events shall be a GENCO Event of Default which, if not cured within the time permitted in this Clause shall give rise to the right on the part of UETCL to terminate this agreement:

Failure by GENCO to achieve the Commercial Operation Date within [two (2) years] from the date of this Agreement or as otherwise agreed between the Parties;

Assignment by GENCO of this agreement to a third party in violation of the approval requirements of Sub-clause 0;

Any material breach by GENCO of this Agreement which is not remedied within one hundred and eighty (180) days following notice by UETCL stating that a material breach of this Agreement has occurred and identifying the breach in question;

The filing of a petition of bankruptcy of GENCO.

Each of the following shall be UETCL Event of Default which, if not cured within the time permitted shall give rise to the right on the part of GENCO to terminate this agreement:

Failure by UETCL to make a payment in full of any amount due to GENCO under this Agreement within one hundred and eighty (180) days of its due date, or failure to pay a disputed amount within one hundred and twenty (120) days of resolution of the dispute;

Assignment by UETCL of this agreement to a third party in violation of the approval requirements of Sub-clause 0;

Any material breach by UETCL of this Agreement which is not remedied within one hundred and eighty (180) days following notice by GENCO stating that a material breach of this Agreement has occurred and identifying the breach in question;

*The filing of a petition of bankruptcy of UETCL.*

The provisions of this Clause 0 shall be the sole and exclusive grounds on which the Parties may terminate this Agreement save for a circumstance of Force Majeure that has occurred and shall continue for a period of one hundred and eighty two (182) days from the issue of the notice of occurrence of Force Majeure Event by the Party, then, any Party shall be entitled to serve upon the other twenty-eight (28) days' notice to terminate this Agreement. If at expiry of such period of twenty-eight (28) days Force Majeure shall still continue this Agreement shall terminate.

### *Termination Notices*

Upon occurrence of a UETCL Event of Default or a GENCO Event of Default, as the case may be, that is not cured within the applicable period (if any) for cure, the non-

defaulting party may, at its option, initiate termination of this Agreement by delivering a written notice (“Notice of Intent to Terminate”) of its intent to terminate this Agreement to the defaulting party. The Notice of Intent to Terminate shall specify in reasonable detail the UETCL Event of Default or the GENCO Event of Default, as the case may be, giving rise to the Notice of Intent to Terminate.

Following the giving of a Notice of Intent to Terminate, the Parties shall consult for a period of forty five (45) days in case of a failure by either party to make payments or provide security when due, and ninety (90) days with respect to any other Event of Default (or such longer period as the Parties mutually may agree), as to what steps shall be taken with a view to mitigating the consequences of the relevant event taking into account all prevailing circumstances. During the period following delivery of the Notice of Intent to Terminate, the party in default may continue to undertake efforts to cure the default, and if the default is cured at anytime prior to the delivery of a Termination Notice in accordance with Sub-clause 0, then the non-defaulting Party shall have no right terminate this Agreement in respect of such cured default.

Upon expiration of the consultation period described in Sub-clause 0, if any, and unless the Parties shall have otherwise agreed or unless the UETCL Event of Default or GENCO Event of Default giving rise to the Notice of Intent to Terminate shall have been remedied the Party having given the Notice of Intent to Terminate may terminate this Agreement by delivering a Termination Notice to the other Party, whereupon this Agreement shall immediately terminate.

#### *Payments in the Event of Termination*

Any Party shall be liable to and shall indemnify the other Parties for the loss or damage directly and foreseeable suffered by the other Parties as a result of termination of this Agreement due to that Party’s Event of Default. Provided that the loss or damage suffered by either Party, if disputed by the other Party, shall have been determined by an Arbitrator in accordance with the dispute resolution procedure under Clause 0. Provided further that the loss determined by the Arbitrator does not exceed [US\$ 500,000] in any given year.

#### *Antecedent Rights*

The termination of this Agreement shall be without limitation of or prejudice to any other relief, remedy or antecedent right of either Party under or in connection with this Agreement.

#### **Survival**

In the event of the termination of this Agreement then for a period of two (2) years following termination the provisions of this Agreement:

as they relate to the payment of any sum due or any sum which may become payable by one Party to the other;

as they relate to confidentiality; and

as they relate to the disputes resolution procedure under Clause 0;

shall survive termination and continue to have effect in the terms of this Agreement (save in respect of any continuing arbitration commenced prior to the lapse of such two (2) year period this Agreement shall survive solely in respect of the matter in arbitration).

#### **Limitation of Liability**

Subject to Sub-clause 0 and Sub-clause 0 neither UETCL nor GENCO shall be liable to the other for the other’s Consequential Loss.

Nothing in this Sub-clause 0 shall relieve either Party from any express obligation under this Agreement to make a payment to the other Party when due including the payment of Liquidated Damages pursuant to Sub-clause 0.

## **Confidentiality**

### *General Restriction*

Subject to the exceptions provided in Sub-clause 0, neither of the Parties to this Agreement shall, at any time, whether before or after the termination of this Agreement, without the prior consent of the other Party, divulge or suffer or permit its officers, employees, agents or contractors to divulge to any person (other than to any of its or their respective officers or employees who require the same to enable them properly to carry out their duties or to its or their respective banks or financiers of the Parties) any of the contents of this Agreement or any commercially confidential information relating to the negotiations concerning the same which may come to a Party's knowledge in the course of such negotiations concerning the operations, contracts, commercial or financial arrangements or affairs of the other Party.

### **Exceptions**

The restrictions imposed by Sub-clause 0 shall not apply to the disclosure of any information: -

which now or hereafter comes into the public domain otherwise than as a result of a breach of this Agreement or the undertaking of confidentiality;

which is obtainable with no more than reasonable diligence from sources other than the Parties hereto;

which is required by law or appropriate regulatory/ constitutional authority to be disclosed to any person who is authorized by law to receive the same;

which is on or comes into the possession of the receiving Party prior to the aforesaid publication or disclosure and which was or is not obtained under any obligation of confidentiality;

which was or is obtained from a third party who is free to divulge the same and which was or is not obtained under any obligation of confidentiality.

A Party may disclose the confidential information subject to obtaining confidential undertakings to keep the same confidential in terms not less strict than those imposed under this Agreement to:

a court, Arbitrator or administrative tribunal in the course of proceedings before the court, Arbitrator or tribunal to which the disclosing Party is a Party;

Appropriate agencies or Ministries of the Government of Uganda.

the lenders or to any consultants, banks, financiers or advisers to the disclosing Party (including their respective managements and Board of Directors), or

any recognized exchange upon which the share capital of the Party making the disclosure is proposed to be from time to time listed or dealt in; and

any insurers of either Party.

## **Dispute Resolution**

### *Mutual Discussion*

If any dispute or difference of any kind whatsoever shall arise between the Parties in connection with or arising out of this Agreement, the Parties shall attempt to amicably settle such dispute in the first instance within thirty (30) days or within an agreed time frame by mutual discussion.



Upon completion of such thirty (30) day period, or such additional period as may be agreed, either Party may request that the dispute be settled in accordance with Sub-clause 0.

*Arbitration (International option)*

All and any disputes or differences arising out of or in connection with this Agreement, which are not first resolved amicably between the Parties in accordance with Sub-clause 0, shall be finally settled by arbitration in accordance with the Arbitration Rules of the United Nations Commission on International Trade Law (“the UNCITRAL Rules”) as at present in force.

Unless the parties agree differently, the following shall apply. The number of arbitrators comprising the Tribunal shall be three. Appointing authority according to article 6 in the UNCITRAL rules shall be the President for the time being of the London Court of International Arbitration. The place of arbitration shall be Kampala, Uganda. The language of arbitration and any award shall be rendered in English. The rights and obligations of the Board and the Company shall be determined in accordance with Ugandan Law. The arbitration proceedings shall be conducted in accordance with the laws of the venue where the arbitration proceedings shall be held.

The decision of the Tribunal shall be final and binding upon the Parties and shall not be subject to appeal.

In all matters not expressly provided for in the UNCITRAL Arbitration Rules, the Tribunal shall act in accordance with the spirit of the UNCITRAL Arbitration Rules.

*Arbitration (Ugandan option)*

All and any disputes or differences arising out of or in connection with this Agreement, which are not first resolved amicably between the Parties in accordance with Sub-clause 0, shall be finally settled by arbitration in accordance with the Arbitration and Reconciliation Act Chapter 4 of the laws of Uganda.

Unless the parties agree differently, the following shall apply. The number of arbitrators comprising the Tribunal shall be three. The place of arbitration shall be Kampala, Uganda. The language of arbitration and any award shall be rendered in English. The rights and obligations of the Board and the Company shall be determined in accordance with Ugandan Law. The arbitration proceedings shall be conducted in accordance with the laws of the venue where the arbitration proceedings shall be held.

The decision of the Tribunal shall be final and binding upon the Parties and shall not be subject to appeal.

In all matters not expressly provided for in the Arbitration and Reconciliation Act, the Tribunal shall act in accordance with the spirit of the Arbitration and Reconciliation Act.

**Miscellaneous Provisions**

*Notices*

Except for communication in accordance with operating and dispatch procedures, any certificates, notices or written instructions to be given under this Agreement shall be served by sending the same by post, courier, facsimile or leaving the same at the following addresses and marked for the attention of the persons specified in this Sub-clause 0:

If to GENCO

For the Attention of: The Company Secretary  
XXX Company Limited

Postal address: PO Box XXX, Kampala, Uganda

Physical address: XXX

Telephone: XXX

Facsimile No. XXX

Email: XXX

If to UETCL

For the Attention of: The Managing Director  
Uganda Electricity Transmission Company Limited

Postal address: PO Box 7625, Kampala, Uganda

Physical address: Plot 29/33 Amber House, Kampala Road, Kampala, Uganda

Telephone: +256 41 233 433/5

Facsimile No. +256 41 341 789

Email: Transco@uetcl.com

Any Party may change its nominated address/addresses or facsimile number by prior notice to the other Parties. Notices given by registered post shall be effective upon the earlier of (i) actual receipt, and (ii) seven (7) Days after mailing. Notices given by leaving them with the addressee shall only be valid if the addressee or a responsible officer of the addressee acknowledges receipt in writing. Notices given by facsimile shall be deemed to have been received where there is confirmation of uninterrupted transmission by a transmission report and where there has been no telephonic communication by the recipient to the sender (to be confirmed in writing) that the facsimile has not been received in legible form:

by 1500 Hours on the Day of sending if sent on a Business Day between 0900 Hours and 1500 Hours; and

by 1000 Hours on the next following Business Day if sent after 1500 Hours on a Business Day but before 0900 Hours on the next Business Day.

### **Amendments**

This Agreement may only be amended or varied by the written agreement of each Party.

### **Waiver**

No waiver or failure by a Party to insist on the strict performance of this Agreement or to act in respect of the default or defaults of the other party and no acceptance of payment or performance during the continuance of any such default or defaults shall preclude any right, relief or remedy under or in connection with this Agreement available to the non defaulting Party and may not be relied on by the defaulting Party as a consent to that default or those defaults or its or their repetition.

### **Successors**

This Agreement shall bind and endure to the benefit of the Parties and their respective successors and permitted assigns.

### **Assignment, Transfer of Interest and Changes in Ownership**

Neither Party may assign or otherwise transfer all or any of its rights, benefits or obligations hereunder without the other Party's prior written consent, provided such

consent is not to be unreasonably withheld or delayed, if the Party seeking assignment can satisfy the other Party of such proposed assignee's financial, technical and legal status and ability to observe and perform this Agreement, Provided however that the Party wishing to assign has given notice to that effect to the other Party and such notice shall have given sufficient information to show the status and ability of the proposed assignee to carry out the terms of this Agreement.

No assignment pursuant to this Sub-clause 0 shall have effect unless and until the assigning Party has:

procured the proposed assignee to covenant directly with the other Party in a form reasonably satisfactory to such Party to observe and perform all the terms and conditions of this Agreement;

and has provided to the other Party a certified copy of the assignment (excluding consideration paid or payable for such assignment).

Notwithstanding the foregoing provisions, for the purpose of financing the Project, it is expressly acknowledged that GENCO intends to obtain such financing for the Project from Lenders, GENCO may assign to, or grant a security interest in favour of, the Lenders of all of its rights and interests under or pursuant to this Agreement. GENCO shall notify UETCL of the creation of such security over its rights and interests under this Agreement at least 30 days prior to the execution of any such assignment or security interest.

#### *Severability*

If any provision or part of a provision of this Agreement or its application to any party is invalid or cannot be enforced, then all other provisions of this Agreement will be construed, insofar as possible, to be valid and enforceable or in manner which enables them to continue to have full force and effect, and the invalid or unenforceable part shall be severed from this Agreement with a view to maintaining, to the fullest extent possible, the validity and enforceability of all other provisions of this Agreement.

If for any reason whatsoever any provision of this Agreement is or becomes invalid, illegal or unenforceable, or is declared by any court of competent jurisdiction or any Governmental Authority to be invalid, illegal or unenforceable or if such Governmental Authority:

refuses or formally indicates an intention to refuse authorization of, or exemption to, any of the provisions of or arrangements contained in this Agreement (in the case of a refusal either by way of outright refusal or by way of requirement that this Agreement be amended or any of its provisions be deleted or that a party give an undertaking or accept a condition as to future conduct); or

formally indicates that to continue to operate any provisions of this Agreement may expose the Parties to sanctions under any law, order, enactment or regulation, or requests any Party to give undertakings or to accept conditions as to future conduct in order that such Party may not be subject to such sanctions; then in all cases, whether initially or at the end of any earlier period or periods of exemption, the Parties will negotiate in good faith with a view to agreeing one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions which substitute provisions are satisfactory to all relevant Competent Authorities and produce as nearly as is practicable in all the circumstances the appropriate balance of the commercial interests of the Parties.

### *No Partnership*

This Agreement shall not be interpreted or construed to create an association, joint venture, agency relationship or partnership between the Parties or to impose any partnership or agency obligation or liability upon either Party. No Party shall have any right, power or authority to enter into any agreement or undertaking for, or to act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, any other Party.

### **Further Assurance**

Each Party agrees to execute and deliver all such further instruments and do and perform all such further acts and things as shall be necessary for the carrying out of the provisions of this Agreement.

### **Entirety of Agreement**

This Agreement constitutes the entire agreement between the Parties in relation to the sale and purchase of Energy at the Interconnection Point and all prior representations, negotiations and undertakings shall be excluded from any construction of this Agreement.

### Counterparts

This Agreement shall be executed in three counterparts by the Parties hereto and when executed and delivered all the counterparts shall together constitute one and the same instrument.

### **Sovereign Immunity**

If any Party may in any jurisdiction claim for itself or its assets or revenues immunity from suit, execution, attachment (whether in aid of execution, before judgment or otherwise) or other legal process and if in any such jurisdiction there may be attributed to it or its assets or revenues such immunity (whether or not claims), then that party agrees not to claim and irrevocably waives such immunity to the full extent permitted by the laws of such jurisdiction.

### **Governing Law**

This Agreement shall be governed by and construed in accordance with the Laws of Uganda.

IN WITNESS whereof the Parties or their duly authorized representative have executed this Agreement on the day, month and year first above mentioned.

The Common Seal of THE XXX COMPANY LIMITED is hereto affixed in the presence of:

MANAGING DIRECTOR

COMPANY SECRETARY

The Common Seal of THE UGANDA ELECTRICITY TRANSMISSION COMPANY LIMITED is hereunto affixed in the presence of:

MANAGING DIRECTOR

COMPANY SECRETARY

## **SCHEDULE 1: Interconnection Facilities**

Map showing location of generation facilities and location of Interconnection Point.

Single line diagrams of the Interconnection Point at including the Main Meter, and Check Meter and showing the location of the Metering Point in each case.

## **SCHEDULE 2: DETERMINATION OF METERED QUANTITIES**

### **Reading of Meters**

The Main Meter and the Check Meters at the Interconnection Point, shall be read at 12:00 on the first Day of each successive Month (or such other Day as may be mutually agreed upon by the Parties). GENCO shall read the Main and Check Meters during normal business hours and shall notify UETCL at least forty-eight (48) hours in advance of the time of reading in order to afford UETCL the opportunity to be present during the reading. GENCO shall provide a copy of the readings to UETCL either by fax, courier or other appropriate means, and shall keep a log of the readings at the Interconnection Point and in the GENCO offices.

The readings of the Main Meter shall be used in the preparation of all invoices unless the Main Meter was not in service for a portion of the Month in question as a result of maintenance, repairs or testing, or is otherwise known to be inaccurate or functioning improperly. In such event, the following procedures will be followed in the stated order:

The readings of the Check meter shall be utilised to calculate the correct Metered Energy quantities, unless a test of such Check Meter as required by either Party, reveals that the Check Meter is inaccurate by more than two-tenths of a percent ( $\pm 0.2\%$ ), or is otherwise functioning improperly.

If the Check Meter is found to be inaccurate by more than two-tenths of a percent ( $\pm 0.2\%$ ) or is otherwise functioning improperly, then GENCO and UETCL shall jointly prepare an estimate of the correct reading on the basis of all available information and such guidelines as may have been agreed to for the handling of such matters;

In the event that the readings of either the Main or Check meter have been relied upon for the preparation of invoices and such meter is subsequently found to have been inaccurate or otherwise functioning improperly, the invoices which relied upon the erroneous meter shall be corrected for the inaccurate readings by reference to a meter whose readings were known to be accurate within plus or minus two-tenths of one percent ( $\pm 0.2\%$ ) for the period during which the meter was inaccurate, if such period can be determined. In the event no there is no alternative meter whose reading can be relied upon, the erroneous readings shall be corrected by the error in excess of two-tenths of one percent ( $\pm 0.2\%$ ) determined by testing of the erroneous meter. If the period of inaccuracy cannot be accurately determined, it shall be deemed to be half the period between the date the meter was found to be inaccurate and the date of the last meter reading accepted by the Parties as accurate, or three months, whichever is the shorter period. In no event, however, shall any such adjustment be made for any period prior to the date on which the subject meter was last tested and found to be accurate within plus or minus two-tenths of one percent ( $\pm 0.2\%$ ) and not otherwise functioning improperly.

### **Determination of Energy Quantities**

The meter readings shall be used to determine the following monthly energy quantities:

The Peak Metered Energy for the month will be the increase in meter reading for the Peak Block since the meter reading of the previous month;

The Shoulder Metered Energy for the month will be the increase in meter reading for the Shoulder Block since the meter reading of the previous month;

The Off-Peak Metered Energy for the month will be the increase in meter reading for the Off-Peak Block since the meter reading of the previous month.

### **Definition of TOU Blocks**

The Peak Block shall be between 18:00 and 23:00 every day of the week.

The Shoulder Block shall be between 05:00 and 18:00 every day of the week.

The Off-Peak Block shall be between 23:00 and 05:00 every day of the week.



## SCHEDULE 3: DETERMINATION OF PAYMENTS

### Energy Prices

Energy prices are expressed in US Dollar per MWh and are specified for three time-of-use blocks as defined in Schedule 2, and for two periods, each period being a set of Years. The set of power prices are shown below.

	Period 1: XXX to XXX	Period 2: XXX to XXX
Peak Price		
Shoulder Price		
Off-peak Price		

### Exchange rate

The exchange rate to be used for determination of the monthly Energy Charge (the "Monthly Exchange rate") shall be the average of the official buying and selling exchange rate of the US Dollar to the UG Shilling posted by the Bank of Uganda on the last working day of the month.

### Energy Charge

The Peak energy charge shall be calculated as the product of the prevailing Peak Price in US Dollars per MWh and the Peak Metered Energy for the month in MWh.

The Shoulder energy charge shall be calculated as the product of the prevailing Shoulder Price in US Dollars per MWh and the Shoulder Metered Energy for the month in MWh.

The Off-peak Energy Charge shall be calculated as the product of the prevailing Off-peak Price in US Dollars per MWh and the Off-peak Metered Energy for the month in MWh.

The Energy Charge for a specific Month shall be calculated as the equivalent in UG Shillings of the sum of the Peak Energy Charge, the Shoulder Energy Charge and the Off-Peak Energy Charge for that Month; multiplied by the Monthly Exchange rate for that Month.

## **SCHEDULE 4: METER SPECIFICATIONS**

### **Metering System Requirements**

The Main/Check meter system to be installed, owned and maintained by GENCO at the Interconnection Point shall each consist of a single set of three current transformers and potential transformers feeding both a primary and a backup three phase four wire metering instrument. The system shall be designed such that the overall error of the installation, (including instrument transformers, wiring, and metering instruments) shall be no greater than 0.5% for power flows through the metering installation between 600kW and 20000kW. Both the Main and Check Meters shall be selected to have rated error no greater than 0.2% over the equivalent load range. Both Main and Check Meters shall be electronic time of use (TOU) meters which accumulate data separately for at least three time blocks with programmable beginning and ending times and holiday/weekend discrimination. Each meter shall be capable of separately accumulating and presenting on the register display the following data for the Peak Block, Shoulder Block and Off-Peak Block:

Net kWh from the GENCO system

Net kVAh from the GENCO system

The metering system shall be described clearly in appropriate drawings to be provided to both Parties. The current and voltage transformers will measure current and voltage as near as practicable to point at which the Interconnection Facility connects with the Umeme distribution system, as shown in Schedule 1. Both the Main and Check Meters shall be installed in weatherproof enclosures which shall include test switches and shorting blocks to allow removal of either meter instrument without taking the other out of service. The Main and Check Meters may be installed in a single enclosure or in separate enclosures, but the enclosure shall be so arranged that both meters can be read without disturbing the seals on the enclosure(s).

### **Testing**

All testing and calibration of the Main and Check Meter instruments shall be carried out by qualified personnel using test equipment with a rated error of 0.1% or better, and which has been calibrated according to a procedure and against instruments traceable to a national standard within the preceding forty eight (48) months. Meters shall be tested at full rated test current, and at 10% of full rated test current at power factors of 50% lag, 50% lead and 100%. A written test report shall be prepared for all tests showing the calibration history of the test instruments, the as-found, and as-left conditions of the Main and Check Meters which shall be supplied to both Parties.

Current and voltage transformers shall be tested for ratio and phase angle errors following manufacture at an accredited testing station. Test certificates issued by the testing station will be issued independently to both parties

### **Instruments**

All instruments shall be of the flush mounting type and shall be fitted with non-reflecting glass according to the relevant IEC Standards.

All instruments and apparatus shall be capable of carrying their full load currents without undue heating. They shall not be damaged by the passage of fault currents within the rating of the associated switchgear through the primaries of their corresponding instrument transformers. All instruments and apparatus shall be back connected, and all cases shall be earthed. Means shall be provided for zero adjustment of instruments without dismantling.

All voltage circuits to instruments shall be protected by a fuse/MCB in each unearthed phase of the circuit placed as close as practicable to the instrument transformer

terminals, or where instruments are direct-connected, as close as practicable to the main connection. All power factor indicators shall have the star point of their current coils brought out to a separate terminal, which shall be connected to the star point of the instrument transformer secondary windings.

**Instrument scales shall be submitted for the approval of UETCL.**

**Integrating Meters**

**Power losses:** The losses in each voltage and current circuits shall be measured under reference conditions to prove compliance with Tables IV and V of IEC Standard 60521.

**Heating and Dielectric Tests:** Tests shall be carried out to establish compliance with the requirements of Sub-clauses 6.4 and 6.5 of IEC Standard 60521.

**Accuracy:** Under the conditions set out in IEC Standard 60521 and after having been energized for the appropriate period stated therein, the meters shall be listed to establish that the actual percentage error values fall within the limits as set out in Schedule 2. The mean temperature coefficient shall be determined for the reference temperature and shall be within the limits set out in IEC Standard 60521.

**Starting and running with no-load:** The rotor shall start and continue to run at current values corresponding to 0.4% of basic current and shall complete at least one revolution at this current value. With no current in the current coil(s) and when energized at any voltage between 80% and 110% of the reference voltage, the rotor shall not make a complete revolution within one hour.

**Insulation test:** The meters shall be tested at a voltage of 2 kV for a period of one minute between all live terminals and earth.

The kWh meters shall be of square or rectangular form and shall be installed in the cubicles mutually agreed upon. The method of mounting of the meters on the panels shall be the same as for the usual instruments. The form of the meters shall be flush with the face. They shall be programmable solid-state or electronic type and of 0.2 accuracy class and be supplied with a MD indicators and a contact for submitting impulses to the SCADA system.

The kWh integrating meters shall comply with the requirements of IEC Standard 60521 Class 0.2 meters unless otherwise approved by UETCL. These meters should be read direct without multiplying factors for kWh and maximum demand indicators and shall be provided with a means of transmitting readings to the System Control Centre.

**Annex 2****FEED IN TARIFFS**

Feed-in tariff schedule for renewable energy generators of less than 20 MW  
(US¢/kWh) i) Hydropower

	<i>Years 1 - 6</i>	<i>Years 7 - 20</i>	<i>Simple Weighted Average</i>
Peak	12.0	9.00	9.90
Shoulder	6.40	5.40	5.70
Off-peak	4.00	1.50	2.25
Average	7.20	5.33	5.89

ii) Cogeneration with Bagasse

	<i>Years 1 - 6</i>	<i>Years 6 - 15</i>	<i>Simple Weighted Average</i>
Peak	12.00	8.00	9.60
Shoulder	6.00	4.50	5.10
Off-peak	4.10	4.00	4.04
Average	7.03	5.25	5.96

### Annex 3 HYDRO POWER SITES IN UGANDA

Table A3.1 Non-Nile (Mini/Micro) Sites Refer to Fig 2.3

No	NAME	DISTRICT	STATUS	INSTALLED (MW)	POTENTIAL (MW)
1	Maziba	Kabale	Out of operation-needs rehabilitation	1.00	1.00
2	Kuluva	Moyo	In operation feeding Kuluva Hospital	0.12	1.00
3	Kagando	Kasese	In operation feeding Kagando Hospital	0.06	1.00
4	Kisiizi	Rukungiri	In operation at 60 kW Expansion to 600 kW is in progress and to be complete in December 2007	0.06	0.3
5	Mobuku I	Kasese	Operated by Kilembe mines. Supplies Kilembe and feeds into the main grid	5.40	5.40
6	Mobuku III	Kasese	Operated by Kasese Cobalt co and feeds into the main grid	10.50	10.50
7	Muzizi	Kibale / Kabarole	Developer sn power invest AS Permit granted Nov/Dec 2004 for 12 months Feasibility study still going on	0	20.00
8	Warugo	Bushenyi	Pre feasibility study carried out by UNIDO	0	3.5
9	Rwizi	Mbarara	Pre investment studies carried out	0	0.50
10	Kakaka	Kabarole	Feasibility studies carried out by SWECO. Eco Power has applied for permit.	0	7.20

No	NAME	DISTRICT	STATUS	INSTALLED (MW)	POTENTIAL (MW)
11	Nshungyezi	Mbarara	Electricity Distribution Management (Namibia) has permit to develop the site.	0	20.00
12	Nyamabuye	Kisoro	Developer is the Uganda Sustainable Energy Company Limited (USEC). Permit granted in Feb 2005. Feasibility study was conducted by Norplan. USEC is yet to start on pre-investment study	0	2.20
13	Siti	Kapchorwa	Developer Mt. Elgon Power Company. Permit issued in July 2002 and extended until September 2004	0	3.30
14	Sipi	Kapchorwa	Developer Mt. Elgon Power Company. Permit Issued in July 2002 and extended until September 2004	0	2.50
15	Anyau / Olewa	Arua	WENRECO has exclusive rights to the site through the West Nile license	0	1.50
16	Haisesero	Kabale	Estimate	0	1.00
17	Kitumba	Kabale	Estimate	0	0.20
18	Mpanga	Kabarole	Estimate	0	0.40
19	Nyakibale	Rukungiri	Estimate	0	0.10
20	Leya	Moyo	Estimate	0	0.12

No	NAME	DISTRICT	STATUS	INSTALLED (MW)	POTENTIAL (MW)
21	Amua	Moyo	Estimate	0	0.18
23	Mvepi	Arua	Estimate	0	2.40
25	Ela	Arua	Estimate	0	1.50
26	Agoi	Arua	Estimate	0	0.35
27	Ngusse	Kibale	Estimate	0	0.40
28	Kikagati	Mbarara	Old power plant used to operate at 1 MW China Shang Sheng Industrial Company to rebuild and expand plant to 20 MW Permit granted on 29 <sup>th</sup> July 2005 for 12 months	0	20.00
29	Sezibwa	Mukono	Estimate	0	0.50
30	Tokwe	Bundibugyo	Developer, Uganda Energy for Rural Development, UERD	0	0.10
31	Mgiita	Bundibugyo	Estimate	0	0.15
32	Miria Adua	Arua	Estimate	0	0.10
34	Ishasha	Rukungiri	Feasibility studies carried out by tele consult Eco Power has applied for a permit and is carrying out preinvestment studies	0	6.5
35	Buseruka	Hoima	Feasibility studies done by Hydromax. 12 months of the permit granted effective 1 <sup>st</sup>	0	10.00

No	NAME	DISTRICT	STATUS	INSTALLED (MW)	POTENTIAL (MW)
			August 2005		
36	Nengo Ridge	Kanungu/Rukungiri	Developer SN Power Invest AS Permit granted Nov / Dec 2004 for 12 months	0	7.50
37	Bugoye	Kasese	Developer SN power invest AS Permit granted Nov / Dec 2004 for 12 months	0	11.00
38	Mobuku II	Kasese	Developer SN power Invest AS Permit granted Nov / Dec 2004 for 12 months	0	13.00
39	Kyambura	Bushenyi	Prefeasibility studies being carried out by Eco Power	0	0.00
40	Muyembe Sirinutyo	Sironko	Developer Mt.Elgon Power Company. Permit issued July 2002 and extended until expiry in September 2004	0	2.60
41	Ririma	Kapchorwa	Developer Mt. Elgon Power Company. Permit issued July 2002 and extended until expiry in September 2004	0	1.20
42	Mahoma	Kamwenge/Kabarole	Developer Uganda Energy for Rural Development. Permit granted in Nov / Dec for 12 months	0	3.00
43	Rwebijoka	Kabarole	Developer Uganda Energy for Rural Development Permit granted in Nov / December for 12 months	0	1.00



No	NAME	DISTRICT	STATUS	INSTALLED (MW)	POTENTIAL (MW)
44	Mitano	Kanungu/Rukungiri	Estimate	0	2.50
45	Rwempungu	Bushenyi	Estimate	0	2.30
46	Cresta	Ibanda	Estimate	0	2.00
47	Rwenzori	Kasese	Estimate	0	3.00
48	Mpanga Escarpment	Kamwenge	Estimate	0	14.00
49	Rwigo	Bundibugyo	Estimate	0	0.00
50	Nyahuka	Bundibugyo	Estimate	0	0.70
51	Nkussi Escarpment	Hoima/Kibaale	Estimate	0	11.00
52	Nkussi at Pachwa	Hoima/Kibaale	Estimate	0	0.38
53	Waki	Hoima/Masindi	Developer SN Power Invest AS Permit granted Nov / Dec 2004 for 12 month Feasibility study by Norplan	0	5.00
54	Sonso	Masindi	Estimate	0	1.40
55	Waisoke	Masindi	Estimate	0	1.70
56	Izizi	Masindi	Estimate	0	1.60
57	Esia	Adjumani	Developer Adjumani Rural Electrification Company.	0	1.00

No	NAME	DISTRICT	STATUS	INSTALLED (MW)	POTENTIAL (MW)
58	Kochi	Koboko	Estimate	0	0.91
59	Nyarwodo I	Nebbi	Estimate	0	0.00
60	Nyagak I	Nebbi	Feasibility study completed and ready for development. WENRECO was awarded concession in March 2003 Conducting a Resettlement Action Plan (RAP) Construction expected to begin Jan 2007	0	3.50
61	Nyagak II	Nebbi	Estimate	0	3.00
62	Ora	Arua	Estimate	0	0.90
63	Manafwa	Manafwa	Estimate	0	0.75
64	Simu	Sironko	Estimate	0	2.60

**Table A3.2 Sites along the Nile (Large Hydro Sites) Refer to Fig 2.2**

No	Site	Location	Installed Capacity (MW)	Potential Capacity (MW)	Status
1	Nalubale (Owen Falls Dam)	Jinja	180	180	In operation
2	Kiira (Owen Falls Extension)	Jinja	200	200	In operation
3	Bujagali	Jinja	0	320	IPS Consortium has started construction.
4	Kalagala	Jinja	0	350	Feasibility study complete
5	Karuma	Masindi/Apac	0	200	Feasibility study complete. NORPAK Power Ltd to develop site
6	Ayago South	Gulu/Masindi	0	234	Preliminary studies available
7	Ayago North	Gulu/Masindi	0	304	Preliminary studies available
8	Murchison	Gulu/Masindi	0	642	Preliminary studies available but has adverse environmental effects
9	Isimba	Kamuli	0	87	Estimate
10	Bugumira	Kamuli	0	109	Estimate

## Annex 4 PROJECT DEVELOPMENT

Table A4.1 Process and Coordination Mechanisms for PREPS and LIREPS/ CIREPS

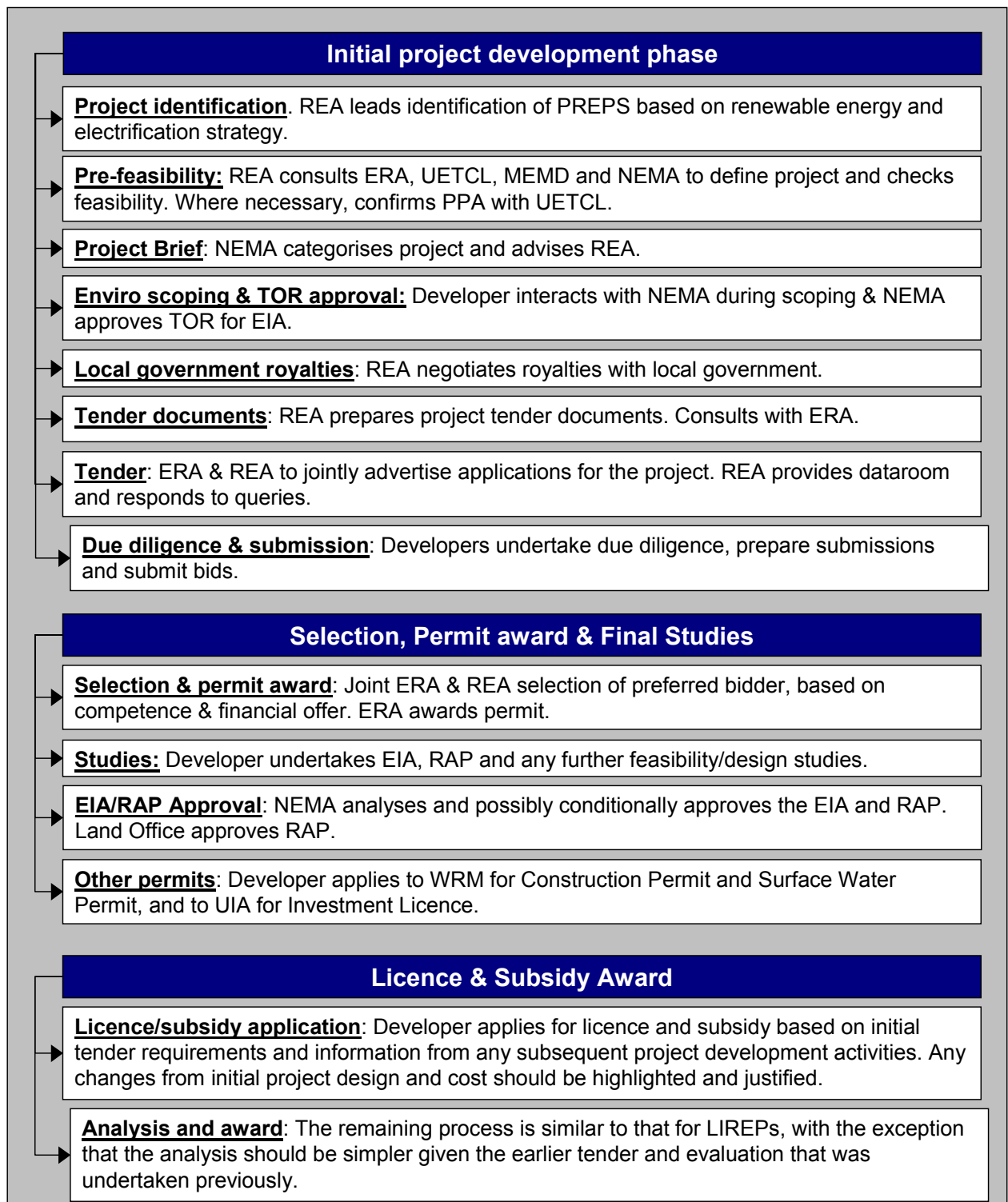
PHASE	PREPS	LIREPS/CIREPS
Initiation	REA leads identification of PREPS with a minimum involvement of ERA.	Local, foreign Developer or communities identifies the project and analyses the commercial feasibility of the project
Project development process	<p>The project is tendered to potential bidders, and the successful bidder is awarded a permit by ERA to finalise the project preparation.</p> <p>REA consults ERA, UETCL, MEMD, NEMA and other authorities in preparing the project documentation and doing early feasibility studies.</p> <p>Interaction with UETCL should confirm inter-connection options, impact on load flow, and whether any amendments to the pro-forma PPA are required.</p>	<p>The developer contacts ERA and signs a Memorandum of Understanding (MoU) with MEMD.</p> <p>The developer consults REA, UETCL, NEMA and other authorities in preparing their project documentation.</p> <p>Interaction with UETCL should confirm inter-connection options, impact on load flow, and whether any amendments to the pro-forma PPA are required.</p>
EIA/RAP and	REA jointly	The developer submits an

<p>other permits</p> <p><i>Project Brief</i></p> <p><i>Scoping and TOR approval</i></p> <p><i>EIA</i></p> <p><i>Feasibility study</i></p> <p><i>Project design</i></p>	<p>submits a project brief to NEMA for an initial reaction.</p> <p>REA prepares the scoping study and submits it to NEMA, including TOR for the EIA that will be undertaken.</p> <p>REA initiates negotiations with local government regarding royalties, as required in the Act.</p> <p><i>Tender documents:</i> REA prepares the documentation needed for the tender and consults with ERA as appropriate.</p> <p><i>Tender:</i> REA and ERA jointly issue an invitation to submit proposals.</p> <p><i>Due diligence and submission:</i> Bidders complete their due diligence and prepare their submissions based on the terms of the tender.</p> <p>ERA and REA take a joint</p>	<p>application to ERA for a permit to undertake the necessary project development. ERA copies the permit application to REA for information purposes.</p> <p>The developer prepares the scoping study and submits it to NEMA, including TOR for the EIA that will be undertaken. NEMA screens projects with no significant impact, which do not require an EIA, and projects for which mitigation measures can be easily identified either directly or through an Environmental Impact Review (EIR).</p> <p>The developer initiates negotiations with local government regarding royalties, as provided in the Act.</p> <p>NEMA must approve an Environmental Impact Assessment (EIA) and a Resettlement Action Plan (RAP) before ERA can issue a licence for the project. NEMA reviews the studies and, if approved, issues a certificate of approval for the project. RAP valuation and registration of properties is submitted to NEMA who in turn forwards it to the Chief Government Valuer at the Land Office. The Land Office must approve the valuation and registration of properties before NEMA can approve the RAP.</p>
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	<p>appraisal of the bids and the preferred bidder is awarded a permit by ERA.</p>	<p>WRM processes applications for a Construction Permit and a Surface Water Abstraction Permit while Uganda Investment Authority processes the application for an Investment Licence.</p> <p>Once a permit is awarded, developers may apply to ERT-BUDS for support in performing feasibility and environmental impact studies. The ERT-BUDS arm of the Private Sector Foundation will process the application, and if successful, arrange for payment of a grant.</p>
<p>License and subsidy application (<i>under 0.5 MW, no licence is required; between 0.5 and 2 MW, the developer may apply to ERA for exemption</i>)</p>	<p>The selected bidder completes the necessary application forms for the licence and subsidy, and submits these to ERA and REA respectively.</p>	<p>The developer negotiates amendments to the pro-forma PPA with UETCL, and a draft of the final PPA is prepared and initiated.</p> <p>For projects larger than 2 MW, the developer submits a licence and subsidy application, containing the same information in the same format.</p> <p>The ERA and REA undertake jointly a due-diligence study of the application.</p> <p>The REB considers the subsidy award by evaluating the application against its own subsidy criteria.</p> <p>The decisions (rejection; acceptance with or</p>

		<p>without conditions; request to resubmit) are communicated to the applicant by ERA for licence and REA for subsidy.</p> <p>UETCL Board confirms the PPA and it is signed; REA and developer finalise the subsidy contract; and ERA issues the licence.</p>
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The process of implementing the PREPS is summarized in Fig A4.1.





### **Figure A4.1 Implementation of the PREPS**

Figures A4.2 and A4.3 show a timeline for the overall development of LIREPS and PREPS respectively. ERA must make a decision on the permit within 30 days from when they received comments. After the license application has been made, ERA is again obliged by the Electricity Act to make a public notice and to receive comments from the public. The final licence decision must have been made within 180 days from receiving the application. Table A4.2 summarizes the different documents required for project processing and approval

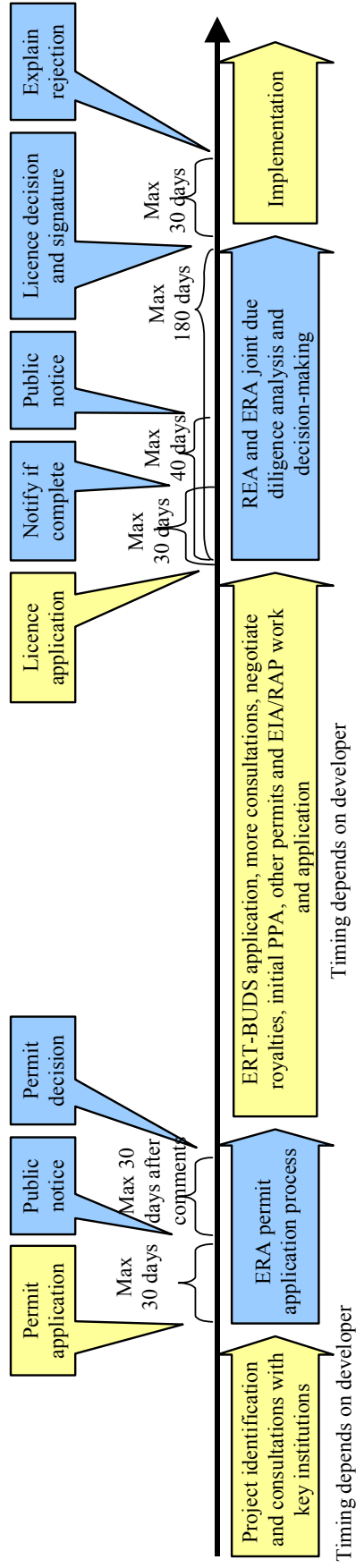


Figure A4.2 Simplified Timeline for LIREPS Development Process

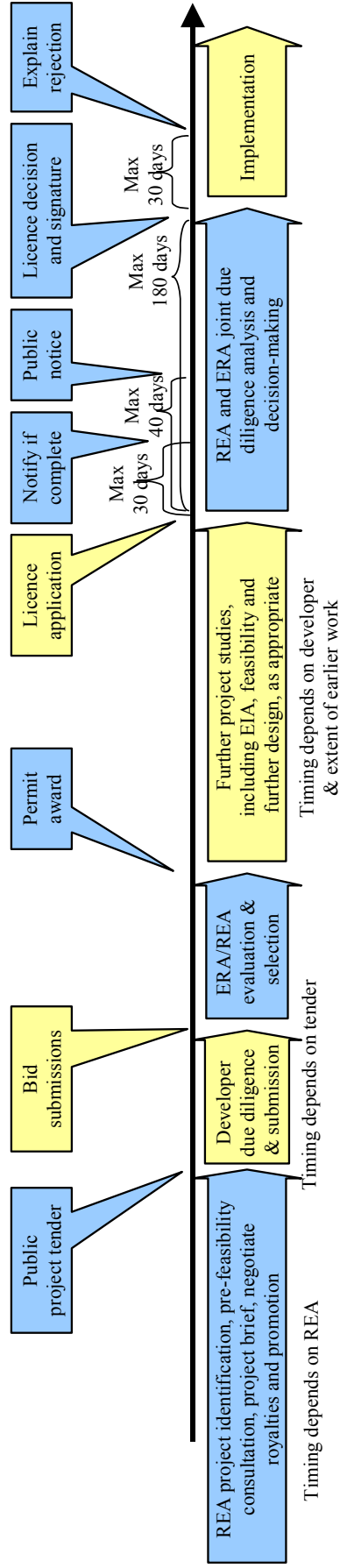


Figure A4.3 Simplified Timelines for PREPS Development

#### **Table A4.2 Documents Required for Project Processing and Approval**

1. Proforma Memorandum of Understanding
2. Proforma Power Purchase Agreement
3. Proforma Subsidy Contract
4. Proforma Interconnection and Wheeling Agreements
5. Application Form for Permit
6. Application Form for License and Subsidy
7. Application Form for Cost Sharing
8. Application Form for surface water permit and construction permit from DWD
9. Application Form for Investment License for UIA
10. Requirements for an Environment Impact Assessment Brief
11. Environmental and Social Management Framework for Renewable Energy Investments in Uganda.

**The Government of the Republic  
of Uganda**

**Rural Electrification  
Strategy and Plan**

**Covering the Period 2013-2022**

**September 2012**

**Ministry of Energy and Mineral  
Development**

## **EXECUTIVE SUMMARY**

This document presents the Government's Rural Electrification Strategy and Plan (RESP) for the ten-year period 2013-2022. This is the second comprehensive RESP, following the one which was published in 2001 covering the period 2001-2010 (but whose official expiry time is 2012 due to delayed implementation).

The RESP was developed in a consultative process with the rural electrification program's principal stakeholders to identify corrective measures for improving the performance of the sector, focusing on measures to accelerate electricity access while ensuring program efficiency and sustainability.

Rural electrification is an integral component of the Government's overall policy and program to promote national economic and social development and integration. Currently, less than 5% of the rural population has electricity service. This level of electrification is an impediment to the achievement of the desired transformation. The RESP 2013 – 2022, therefore, has been designed to achieve a much faster acceleration of national geographical coverage and consumer access than hitherto. The design has also taken cognizance of the UN initiative on modern energy access for all which obligates all governments to ensure the availability of clean and affordable modern energy in all homes by 2030. This includes the provision of cleaner, more efficient technologies for cooking and lighting in households.

Consequently, the **overall objective of the RESP 2013-2022** is:

**“To position the electrification development program on a path that will progressively advance towards achievement of universal electrification by the year 2040, consistent with the existing policy of the Government, while ensuring the displacement of kerosene lighting in all rural Ugandan homes by 2030”.**

During this 10-year planning period, the Government's strategy is to **achieve a rural electrification access of 22%** (i.e. consumers who will be utilizing electricity in their homes, businesses or institutions) by 2022 from the current level of about 5%. A robust enabling environment will need to be created during this period to establish the necessary springboard for achieving the ambitious goals for the years 2030 and 2040.

### ***Applying Lessons Learned***

The new strategy employs a modified approach for rural electrification development based on a coherent scheme to aggregate the market for rural electricity service expansion under a simplified set of implementing mechanisms. A decision to centralize rural electrification planning and program management underpins this new strategy, in order to reduce complexity and eliminate overlapping roles.

The new strategy focuses on orchestrating resources and stakeholders to operate in a number of scaled-up service territories for which long-term electrification service business plans shall be developed, implemented and monitored against annually-determined rural electrification investment and service connection targets.

The private sector, including electricity service providers and supporting services providers, shall continue to play important roles. However, the Government shall proactively plan and enable the program's implementation, while mitigating commercial risks and related inhibiting barriers that prevented the private sector from fulfilling its responsibilities under the previous strategy.

Importantly, the beneficiary population, as the most motivated stakeholder group in rural electrification development, will be given a more robust role in achieving the aims of this new RESP. This will involve setting local priorities, managing demand aggregation and consumer outreach and, wherever possible, managing and operating the schemes as cooperatives.

Accordingly, the impetus for rural electrification investment will be more demand-driven, relieving the private sector providers of excessive risk-taking responsibility in the scheme, which proved unworkable. It is the Government's responsibility to assume this burden, specifically the Rural Electrification Agency as the centralized authority for planning and implementing the resource requirements of the program, working with the beneficiaries and partnering private-sector actors to ensure that they are adequately supplied with the resources and competencies to implement the Government's rural electrification strategy and program plan.

Long-term program sustainability means developing internal mechanisms for financing and assuring that all other major functional requirements of rural electricity service and rural utility sustenance can, in time, be addressed independently of government support. Capital expenditures should be provided under a system of capital recovery wherein the resources are recaptured by the Rural Electrification Fund (REF) for reinvestment in the future.

RE program financing will also address the issue of customer service connections and house wiring which puts the majority of rural households beyond the economic reach of the electricity service program. The provision of financial support in this direction will help to jump-start the process of electrification-driven rural economic development.

### ***Program Implementing Policies and Structures***

Programmatic and policy adjustment measures that will be applied in carrying out the RESP 2013-2022 are summarized as follows:

**1. The Government will assume greater responsibility for planning, financing and overall management of the rural electrification sector.**

In this respect, Government will absorb the major commercial and financial risk for rural electrification development and, by so doing, remove a critical obstacle to the rapid advancement of investment in the sector.

**2. RE shall be implemented on a model of scaled, multi-technology electricity service territories comprising the entire rural territory of the country.**

This model shall be the basis for all rural electrification planning, project

development and planning, electricity service concessions, financing, supervision and support. This policy is to increase the commercial viability of rural electrification investments in a shorter timeframe, paving the way for the ordered in-flows of capital financing in a rational and sequenced pattern.

**3. Planning and management for all rural electrification sector programs and investment resources will be centralized in the REA.**

The rationale is to ensure better coordination and eschew disaggregation of rural electrification planning and implementation, which impeded scale and compromised coordination and efficient use of funding resources. REA shall be reconstituted as an autonomous entity of the Government, along with granting of sufficient policy and administrative decision-making authority to the Rural Electrification Board to guide and oversee the REA. Similarly, all rural electrification funding resources will be consolidated in the Rural Electrification Fund, under the fiduciary authority of the REB and the administrative management of the REA.

**4. Rural electrification services and infrastructure shall be managed by duly licensed non-governmental concession holders.**

While this similar to the current scheme, there will be assistance to reduce concession holders' commercial risk in developing demand and performing their planning responsibilities. Under their concession licenses, these operators will be responsible for ensuring that service is offered widely on an "area coverage" basis to all eligible applicants in their service territories according to service territory expansion plans that are developed and regularly updated with REA's direct involvement as the basis for receiving REF financing support. Such licensing shall include, but not necessarily be limited to, privately-owned and cooperatively-owned operators under conditions that permit, but do not require, the incorporation of local electricity services commercialization agents acting in concert with the licensed operators of the distribution systems.

**5. Off-grid electrification services comprising energy service technologies not dependent on the national grid shall, preferably, be planned, offered and furnished to eligible consumers in the service territories in tandem with on-grid electrification services.**

These include islanded community-based mini-grids and solar PV systems. The solar PV program may be implemented as REA-sanctioned projects proposed by solar PV providers or under customer aggregation schemes facilitated or owned by the on-grid service providers and directly financed by REA to improve program planning and implementation scale.

**6. Capital financing for infrastructure development for electric distribution-based investment shall be furnished under a system of long-term leasing and financing contracts with the electric distribution licensees.**

The financing will cover both the capital cost of the distribution infrastructure construction and the major cost of consumer service connections, in order to lower the financial barrier to widespread household service connections. Off-grid photovoltaic electrification investment may be financed under a combination of REA grants and microfinance agencies lending directly to consumers or directly by REA under tripartite financing agreements with the on-grid service providers and solar PV companies.

**7. The cost of wholesale power to rural concession licensees may be discounted on a needs-test basis in order to make on-grid rural electricity service more affordable.**

Otherwise, electricity pricing shall be determined and approved by the ERA according to the operating costs of each licensed concession holder including system operating and administrative expenses, approved capital expenditure recovery through a depreciation allowance, financing costs and/or an established rate of capital return corresponding to investments made by licensees.

**8. Investment in small distributed power generation facilities as local sources of supply will be given increased priority and enhanced support.**

This investment has the potential to mitigate potential bottlenecks in rural electrification expansion caused by power supply limitations on the national transmission network. Under circumstances such that the central grid cannot sufficiently meet the power demand of the rural service providers, in such case special rules and regulations will be provided concerning licensing power projects and wholesale power contracting to allow rural electric service providers to purchase directly from such facilities or to engage directly in small-scale power investment for their own consumption needs.

**9. New emphasis will be given to building organizational and professional competencies through technical assistance and training.**

This will be provided by REA working with its partnering agencies. Such support shall extend to rural service providers as to government and private sector participants in the rural electrification program.

These new policy reforms will lead the reorientation of the sector over the term of the RESP and are intended to put the nation's rural electrification program on a path to achieving electric service coverage throughout the country by the year 2040.



### ***Linking RESP Goal Achievement to Improved Planning and Monitoring***

The rural electricity access goals and milestones of the RESP are based on the long-range service territory plans and financial forecasts for the service territories, under a logical, sequential allocation of investment and capacity-building resources. The 22% rural electrification penetration rate by 2022 will be met by the following specific electricity service expansion goals:-

1. On-grid services will be expanded to provide approximately 1.28 million new service connections.
2. Off-grid services are to be increased by approximately 140,000 additional installations of solar PV systems and mini-grid distribution service connections.

This means that approximately 1.42 million new rural consumers will have access to electricity, making a total of approximately 1.6 million rural electric services (current rural access is approximately 180, 000 consumers).

Achievement toward these 10-year goals will be routinely planned and monitored under comprehensive annual rural electrification plans developed by the REA and adopted by the REB, which will consist of the aggregated service territory electrification expansion programs as a function of approving loans for both on-grid and off-grid investments, together with other elements of the overall rural electrification development program addressing service provider monitoring and support, power supply planning considerations, end-use promotion and technological improvements. These annual plans will serve as the basis for acquiring needed funding increments, identifying and remedying supply-chain constraints and bottlenecks and informing program stakeholders of progress and problems that may then be dealt with in a coherent and timely fashion so that the RESP goals are in fact accomplished.

### ***Strategy Implementation Provisions and Financing Resources Required***

The associated capital expenditure funding requirement to achieve these results is estimated to be US\$920 million. Funding resources for capacity building, technical assistance and training is estimated to be US\$10 million. Adding an estimated US\$30 million for other costs, including meeting the supplementary financing needs of the service providers for working capital, consumer financing assistance for the customer portion of the cost of service connection fees, house-wiring and purchases of appliances and productive electricity-use equipment, and upstream development costs of a more aggressive rural power generation program puts the **global funding target for the RESP 2013-2022 at approximately US\$950 million.**

Commencing with the promulgation of enabling framework elements pertaining to the new legal and regulatory construct for the RE sector, REA's re-constitution as an autonomous agency and its organizational reforms, the RESP will be implemented throughout its 10-year term. Off-grid electrification development based primarily on the current target market approach for solar electrification development, as may be modified to draw solar PV services more directly under REA's service territory concession planning and service provider customer service model to gain program implementation and cost efficiencies, will continue unabated during the RESP performance period. **On-grid electrification development will require an initial transition period of up to three years, as the service territory plans and concession**

**award and license process is implemented.** During this transition period, REA will procure interim system operators for projects that are financed and built in service territories for which permanent service providers have not yet been installed.

## **List of Terms and Acronyms**

**ERA** – Electricity Regulatory Authority

**GIS** – Geographic information system

**GOU** – Government of Uganda

**MEMD** – Ministry of Energy and Mineral Development

**MFPEd** – Ministry of Finance, Planning and Economic Development

**Minister** – Minister of Energy and Mineral Development

**MW** - Megawatt

**PV** – Photo-voltaic

**PVTMA** – Photo-voltaic Target Market Approach

**PSFU** – Private Sector Foundation of Uganda

**RE** – Rural Electrification

**REA** – Rural Electrification Agency

**REB** – Rural Electrification Board

**REF** – Rural Electrification Fund

**RESP** – Rural Electrification Strategy and Plan

**SHS** – Solar home system

**UECCCL** – Uganda Energy Credit Capitalization Company, Ltd.

**UETCL** – Uganda Electricity Transmission Company, Ltd.

## **1.0 INTRODUCTION**

This document presents the Rural Electrification Strategy and Plan (RESP) of the Government of Uganda (GOU) covering the period of 2013-2022. The RESP succeeds and modifies the first RESP covering the period 2001-2010, which demonstrated important lessons on how the rural electricity sector must function in the future to effectively serve the expectations of the rural population of the country. Weaknesses and bottlenecks in the previous program framework are identified and opportunities to strengthen the current implementing scheme are fully exploited. This RESP states the general policy of the GOU and the principles that will underlie strategy to ensure its success. The primary implementing elements of the approach are defined, drawing upon the lessons of experience to date, including important reforms that are needed in the enabling and institutional framework. The RESP states the overarching rural energy access goals for the effective period of the strategy, together with the estimated funding resources which are to be furnished for its achievement.

This new strategy was formulated following a comprehensive review of the results of the foregoing rural electrification (RE) development period, assisted by advisory experts and drawing from successful experiences in other parts of the world with rural electrification development.

### **1.1 Background and Lessons Learned**

Rural electrification constitutes a critical part of the GOU's long-range program to eradicate rural poverty and to foster opportunities for rural Ugandans in every part of the national territory to prosper. Providing widespread rural-area access to electricity –

- (a) Stimulates rural employment diversification, and draws value-adding enterprises to rural areas in order to improve farmers' terms of trade and income levels;
- (b) Enhances food security for the entire population;
- (c) Creates the opportunity for rural citizens to join with the urban population in enjoying electrification's many modernizations and lifestyle benefits; and,
- (d) Contributes significantly to enabling rural people to participate more broadly and fully in national economic and social development and in harvesting its fruits.

In order to realize these aims, first and foremost, rural electrification shall henceforth be promoted and carried out under a model that rests on the fundamental idea of harnessing the motivation of rural communities and beneficiary populations to the machinery of providing electricity service in rural areas. A key lesson of successful electrification experience around the world is that large-scale yet sustainable rural electrification, with high penetration rates and strong commercial performance, can occur when rural people can act in their own behalf under a disciplined implementing scheme. The Government's program priority shall be to render available all necessary opportunity for the rural population to acquire these capacities under an accessible program of support.

This is but one of many conclusions that were derived from a systematic analysis of the past ten years' rural electrification experience in Uganda that was conducted at the end of the first RESP.

## **1.2 Lessons Learned**

Previously, rural electrification investment sponsorship was offered to private investors and entrepreneurs to lead rural energy service development as part of the Government's policy of decentralization and privatization of the energy sector. However little entrepreneur-led electrification investment actually occurred, as this policy proved to have placed excessive faith on the motivation of capacities of private sponsors to undertake risk and perform this role. To fill the void, Government stepped in with a more direct approach to funding and implementing rural electrification, with improved results in terms of investment flows, but other impediments including a very low rate of consumer service connection have become evident and that must be addressed. The new strategy was formulated from an understanding of lessons learned from the first RESP and from analysis of other constraints in the current program model.

### *1.2.1 Accelerate rural electrification development by adjusting the model*

The simple fact is that the underlying economics of investing in electricity infrastructure in areas where people are poor and industrial development has not taken root bears considerable financial and commercial risk. The original model created a mismatch of short-term profit interest in a business that takes decades to develop. It is rather the other way around – government must lead, use patient and low-cost capital financing, build the initial organizational and infrastructure capacities for electricity services, promote electrification-related economic development and supportive measures to spur rural modernization and income growth. Thereafter it becomes feasible for private investors and commercial financing to take over.

### *1.2.2 Address underlying RE business risk with appropriate solutions*

The previous ten years' experience highlighted the key risk factors in RE that served to inhibit rapid expansion. In particular, the issue centers on reducing commercial risk. Needed are new approaches for:

- (a) Effective marketing of consumer electricity service to aggregate and build demand.
- (b) In particular, lowering barriers to rapid accumulation of customers and to increasing energy use in productive activities.
- (c) Enforcing discipline at the RE “cash register” – commercialization functions, including policing electricity and materials theft.

Local models such as cooperatives, if correctly developed and supervised, give the beneficiary populations and consumers direct responsibility for these things. The peer interest principle can work wonderfully in terms of making sure people are treated fairly and the service providers and customers alike live by the same rules. This has been proven in other rural electrification cases worldwide. However, it is important that such entities are run as businesses and see themselves as being liable for their own financial survival. This is accomplished in how they are constituted, supported and supervised.

### *1.2.3 Ensure that operational and program scale is feasible*

Accelerating the pace of electrification means achieving program economic, commercial and administrative scale as soon as possible. This issue of economic scale applies to:

- (a) The size of the service territories and the operating enterprises.

- (b) Rendering the consumer/demand aggregation function to market both on-grid and off-grid services and sales on an “area-coverage” principle.
- (c) Formulating resource allocation and administrative systems -capital financing, in particular, but also procurement – so that they are scalable and cost efficient.

The current set of rural electrification providers are struggling because they are too small. They are given the areas that are predominantly domestic and do not have the ability to balance this rural household customership with more developed service areas. Under the current arrangement, it will take many years for these service areas to be viable, and in the interim, the costs felt by the consumers will be unaffordable and the consequent need for operating subsidy will extend far into the future. In short, the rural service territories must be sufficiently large to generate revenue levels as needed to meet service providers’ financial cost requirements including cost of capital investment financing.

#### *1.2.4 Centralize planning and management for the RE sector and simplify program implementation*

The current RE program is being implemented in a disaggregated manner with many players acting in overlapping and insufficiently coordinated roles. This flowed from the original “demand-response” model that assumed government would not need to plan and orchestrate RE development, but merely top-up the capital needs of private sponsors, who would do all the planning and implementation management. Rethinking the model means re-ordering the way the sector is planned and resources are allocated. The best and only way, from experience, is to centralize authority in the lead entity responsible for the RE sector.

Rural electrification planning and policy decisions should be divided between senior-level authority to ensure that electrification is carried out in harmony with the broader scope of national economic and social development planning and that the rural aspect of the nation’s electricity infrastructure development is adequately coordinated with the other power sector functions and entities. The RE sector must be managed in a coherent planning and development framework covering:

- (a) Allocation decisions for resources and administration of capital funding and accounts.
- (b) Planning for projects including design to facilitate, among other aims, standardization of all construction and installations under a more comprehensive method based on the sequenced expansion of the service territories as a function of the service provider’s long-range plan.
- (c) Program financing and capital resource management and fiduciary controls.
- (d) Construction management and also procurement so as to obtain scale economies and facilitate standardization of all equipment and materials.
- (e) The development, support and supervision of the implementing entities – the service providers, both for on-grid and off-grid – but also in working closely with the various other stake-holding partners who have important roles in building capacities, regulating electricity service provision, and furnishing complementary financial and other sector development support.
- (f) Contracting with, and technical guidance to, the private sector “services” providers –

contractors for engineering, construction, solar PV installations, and related RE sector support services.

All of these RE sector functions should be planned, approved and monitored under a comprehensive, annual RE plan. In effect, the annual plans would be the vehicle for implementing the RESP in a logical and comprehensive way, and for monitoring the progress of RESP goal achievement on a routine basis.

### *1.2.5 Plan for long-term program sustainability*

The RE system as it has evolved to date is complex and not disposed to adequate planning and coordination of resources. It also implies an indefinite term of providing subsidy. Long-term program sustainability means developing internal mechanisms for financing and assuring that all other major functional requirements of rural electricity service and rural utility sustenance can, in time, be addressed independently of government support. The key features of the strategy and plan for the coming ten-year period should guarantee that the program is put on a path to self-sustaining viability:

- (a) Technical standards and materials specifications for RE distribution construction should be reviewed and adjusted to incorporate design efficiencies to reduce cost and facilitate operational reliability and extended life-spans, to be reviewed and updated with new “best practices” on an on-going basis.
- (b) Capital expenditures should be provided under a system of capital recovery wherein the resources are recaptured by the Rural Electrification Fund (REF) for reinvestment in the future. This will gradually diminish the requirement for government appropriations and for the wholesale rate charge to fund electrification.
- (c) Financial support to the service providers should be enhanced from the current system of initial capital investment to include financing for the on-going requirements of the service providers – working capital for start-up and financing for system “backfill” where access already exists, and for distribution system replacements and capacity upgrades.
- (d) RE program financing support must extend to end-use promotion and other forms of consumer financial assistance, particularly the lower-income households, in order to jump-start the process of electrification-driven rural economic development.
- (e) To relieve the government of having perpetual responsibility for the RE sector, the strategy should anticipate the development of, among and by the service providers as a group, privately owned and managed common-services entities to supplement publicly-provided assistance in aspects of materials procurement, financing, engineering and other specialized services, and power supply.
- (f) Adequate technical assistance and advisory support should be included in the plan to assist the primary stakeholders to adapt to new program mechanisms, train personnel, particularly the service providers and particularly the cooperatives, and develop the required program management and business administrative culture.

In presenting a new strategy and model for future rural electrification development, the government does not abandon its original belief that the private sector must play important roles in carrying out its rural electrification development program. This RESP affords full opportunity to private-sector actors to furnish the necessary management, operational and industrial support and other essential functions needed to achieve a rapid rate of rural electrification development, and also to capitalize on the successes that have been achieved in the past ten years, without taking any backward steps.

## **2.0 STATEMENT OF RURAL ELECTRIFICATION POLICY AND PRIORITIES**

Rural electrification is an integral component of the Government's overall policy and program to promote national economic and social development and integration. Currently, less than 5% of the rural population has electricity service. The RESP represents a comprehensive program to achieve universal electricity access by the year 2040, and addresses impediments that have thwarted the achievement of the goals established in the previous strategy and plan. It also takes cognizance of the UN initiative on modern energy access for all which obligates all governments to ensure the availability of clean and affordable modern energy in all homes by 2030. This includes the provision of cleaner, more efficient technologies for cooking and lighting in households.

### **2.1 Enhanced Rural Electrification Operating Systems**

The revised program policy and approach establishes new and simplified implementing structures to:

- (a) organize the rural energy services market in order to achieve scale and commercial viability as rapidly as possible;
- (b) facilitate the sustainable flow of capital financing to rural electrification and rural energy service infrastructure, as well as to overcome economic barriers to rural consumers in accessing such infrastructure;
- (c) empower rural electrification planning and implementing entities with appropriate authority and accountability to conduct their roles under adequately understood and transparent mechanisms;
- (d) ensure that sufficient capacity-building support for all stakeholders is provided in order to quickly adapt to the roles that they must play in a business-like fashion; and
- (e) reduce barriers inhibiting widespread electricity service provision in rural areas.

### **2.2 Underlying Principles of Sound Rural Electrification Development**

The rural electrification program defined in this new strategy shall be achieved by adhering to the following set of fundamental rural electrification program policies and principles.

#### **2.2.1 *Economic and commercial soundness and sustainability***

Rural electrification as with all public infrastructure development must be market-oriented and demand-driven, founded on the economic needs of the population and economy. Economic and commercial principles of economic scale, linking investment with financial performance criteria, and orienting services to meet needs will guide the general management and allocation of rural electrification

investment resources, with particular emphasis on assuring that the beneficiary communities and operating entities responsible to them for electricity and energy services are charged with the necessary authorities and capacities to render rural energy service provision to be fundamentally oriented to responding effectively to long-term rural development needs as to the satisfaction of consumers' expectations.

### *2.2.2 Social and regional equity*

An associated objective of the strategy is to ensure that rural electrification is widely accessible to the entire rural population, as part of the Government's objective to reduce poverty and deliver community and social services to the public. Entities responsible for implementing the strategy will assure that rural consumers are fairly treated and that assistance is equitably accessible to less advantaged rural regions.

### *2.2.3 Least-cost service*

Implementing policies and practices for extending service should fundamentally take into account the aim of offering electricity service to rural consumers at the lowest possible cost. This principle applies to technological selection and related efficiencies, the selection of service providers and determining allowable costs in tariffs, RE program administrative and operational best-practices to obtain scale economies, obtaining least-cost power supply, and setting and enforcing operating standards and compliance thresholds that optimize operational efficiency.

### *2.2.4 Program cohesiveness, coordination and simplicity*

In order to accelerate the pace of rural energy service access in rural areas, the strategy and program design must be coordinated under a cohesive planning and implementation framework. The implementing mechanism and processes must be oriented to take full advantage of scale economies and eschew the disaggregated methods that have proven administratively burdensome and costly.

### *2.2.5 Good governance and transparency*

The entities engaged in managing and implementing the strategy shall be oriented and reconstituted so as to foster and support an efficient, market-based rural electrification sector, employing appropriate and rigorously applied policies, rules and procedures in fulfilling their obligations to merit the confidence of all program stakeholders, funding sponsors, and the beneficiary populations.

### *2.2.6 Efficiency in program implementing structures and processes*

The responsible implementing institutions will operate as enabling rather than implementing agents and will be aligned to conform to this principle. The primary agency for achieving the aims of the RESP will focus on the development of effectively scaled service providers, charged with meeting economic, technical and operational standards that assure effective use of resources and good business practices, including the principle of cost recovery.

### *2.2.7 Organizational competencies*

The implementing framework of the RESP will be only as good as its empowered organizations, managers and personnel are competent and diligent in performing their duties. Therefore, emphasis will be given to strengthening organizational competencies with the support of timely, qualified expert assistance



and by providing training to directors, managers and technical personnel in the prescribed operating policies and procedures for all stake-holding entities.

### 3.0 OBJECTIVES OF THE RESP 2013-2022

The overall objective of the RESP is:

*“To position the electrification development program on a path that will progressively advance towards achievement of universal electrification by the year 2040, consistent with the existing policy of the Government, while ensuring the displacement of kerosene lighting in all rural Ugandan homes by 2030”.*

To accomplish this overall aim, the RESP adopts the following measurable objectives, divided into two basic sets of time-bound program results.

#### 3.1 Rural Electricity Investment and Access Objectives

The revised model for rural electrification development will be executed in a coordinated program of on-grid and off-grid electrification services. The basis for both types of program investment and services will be the formulation of scaled electricity service territories, administered by the Rural Electrification Agency (REA) through electric service providers (ESPs) for both forms of services, with the support of program implementation partners. Implementing measures to address changes in the enabling and program implementation systems are presented as a set of conforming objectives in the second part of this summary of the RESP’s objectives and further defined in the sections below.

##### 3.1.1 Rural electricity access baseline

An assessment of rural electricity access at the close of the first RESP determined that less than 5% of the rural population had electricity service, as contrasted with the RESP’s goal of achieving 10%. In the future, the Government’s rural electrification access objectives will be closely monitored on an annual basis as part of a comprehensive planning procedure, to include a routine appraisal of the effectiveness of program implementing systems and processes to correct weaknesses and to identify impediments to expanding access together with solutions to such impediments.

RE program investment and the corresponding rural energy service objectives of the RESP covering the period 2013-2022 are defined below.

##### 3.1.2 On-grid electricity service expansion

A reconfiguration of the rural electrification sector into thirteen (13) commercially-scaled service territories underlies much of the reform provisions discussed in this document<sup>1</sup>. Establishing these territories with permanent service providers will be an important early milestone objective of the RESP and prerequisite to delivering capital investment in-flows for system construction.

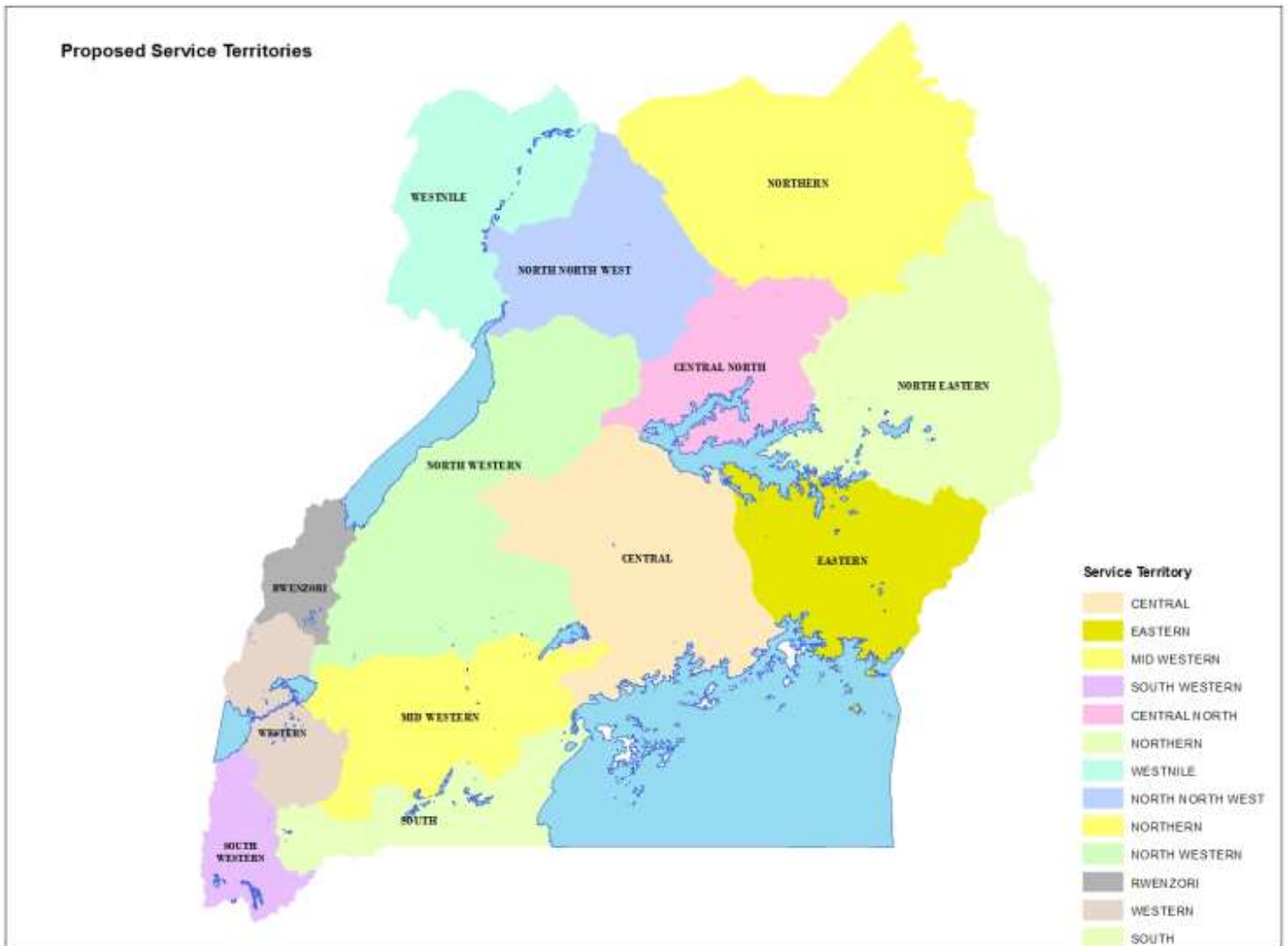
Investment targets are derived from 10-year business plans for each of the service territory concessions in GIS-based and managed construction programs. Fig. 1 presents the geographical configuration of these rural service territories, contiguously arranged around Umeme’s current distribution footprint and

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<sup>1</sup> This excludes the rural areas of the present Umeme electric distribution service footprint, however the estimates for rural access stated herein include customers in these areas, except as noted.

covering the entire territory of the country. The associated number of new consumer services from these planning estimates is 1,276,500 connections, including the rural areas of Umeme's service territory.

**Fig. 1. New rural service territories**



### 3.1.3 Off-grid electricity service expansion

Off-grid electricity services comprise several types of electricity services based on renewable energy technologies, primarily solar photo-voltaic systems, and investment in islanded min-distribution systems drawing electricity supply from decentralized power generation facilities.

The total number of service connections including solar PV installations for the 10-year RESP period is 138,500 from solar PV home systems (SHS) and mini-grids.

### **3.1.4 Access Goal**

**The access targets estimated above are equivalent to an overall access level of 22% of the rural population in 2022.** On-grid and off-grid service expansion goal achievement to meet these targets will be monitored and measured on an annual basis, segregated by service territory, as a function of a rigorous new REA planning framework and routine.

## **3.2 Enabling System Objectives**

Commencing in the first year, several reforms and adjustments to the general RE program model will be addressed to realign the enabling systems and implementing mechanisms necessary to achieve the acceleration of service expansion and to meet the stated access targets of the new ten-year plan. The programmatic adjustments will be phased-in over a period of approximately three years so that by 2016, a new and simplified model of service delivery will be established. The chief implementation objectives of the new RESP are as follows:

1. Modification and enactment of pertinent legislation and policy implementing provisions relating to legal definitions, institutional policies and structures, and organizational procedures and rules required to enable the RESP's new rural electrification development model.
2. Revision and implementation of a new RE marketing and management systems based on the continued and long-term development of service territories, together with ESP capacity building, oversight, and financing of periodic construction program investments.
3. Development, approval and adoption of improved RE sector planning procedures, together with service provider monitoring and performance benchmarking.
4. Adjustment and promulgation of modified rural electric distribution, electricity marketing and retailing concession systems and rules.
5. Formulation and adoption of design and construction standards for economically efficient rural electric distribution development.
6. Establishment and implementation of REA debt financing and similar long-term contracting mechanisms and procedures with electricity service providers, capital accounts management and loan administration systems.
7. Implementation of transition provisions and arrangements, including procedures for adapting current and on-going programs and project investments into the new model.

These RESP enabling system objectives and their particular implementation measures are further defined and elaborated in the following five sections.

## **4 REORIENTATION OF THE RE MARKET AND IMPLEMENTING SCHEME**

While there were several important accomplishments during the term of the first RESP, including the establishment and development of the REF and its administrative systems, the initial development of a diverse Ugandan electric service development industry including growing the number of solar PV companies from a handful in 2000 to over 30 by 2010, the RESP's access expansion targets were not met. The new strategy and plan adjusts the problems encountered and installs improved implementation

approaches for planning, financing and implementing rural electrification investment programs.

#### **4.1 Results of the RESP 2001-2010 and Required Reforms**

The RESP for 2001-2010 did not meet expectations. The plan anticipated growing rural electricity access ten-fold, from the then-estimated 1% percent in rural population access to 10%. However the actual result was to increase rural access by less than 5% percent. Over 400 grid extension projects, large and small, were undertaken but with consumer service connections rates often well below planned levels. Whereas the goal of the RESP was to connect 400,000 new consumers only a fraction of this number was achieved. Of 80,000 projected solar PV installations, 7,000 were actually installed under government-sponsored projects.

Several factors account for these disappointing results, including a failure to educate the rural population of the benefits of electricity and inadequate marketing by service providers, the high cost of service connection to rural households, the lack of interest on the part of electric distribution utilities and solar PV suppliers to enter the rural market, and especially in time lost in testing the original concept of the REF to support private initiatives. Only three such projects were taken on by private investors, with a total increase in consumer service of some 3,500 customers. The Government therefore resolved to step in and undertake direct investment in rural service extension, which yielded moderately improved results, but the program must now be put on a footing to accelerate the pace of RE access expansion.

#### **4.2 Revising the RE Scheme to Accelerate Electricity Access**

Based on the lessons learned from the past and from program successes in other countries, the Government's strategy has been modified to implement rural electrification investments on a larger scale, to simplify implementing structures and streamline processes, and adopt other measures that will permit a more rapid rate of access growth in rural areas. Policy measures that will be applied in carrying out the RESP 2013-2022 are summarized in the following subsections.

##### **4.2.4 Centralized RE sector planning and management**

In order to improve coherency in the sector and to eliminate overlap and diffusion in how the strategy is implemented, all direct responsibility for rural electrification program planning and management will be centralized under REA. REA will be re-constituted to act as a more autonomous, specialized government authority under the overall supervision of the Minister of Energy and Mineral Development (MEMD). The REA board (Rural Electrification Board, REB) shall assume enhanced fiduciary authority and responsibility for directing the REA program and will be responsible for supervising REA management. REB will further be responsible for reporting on REA performance to MEMD. For its part, the REF will be restored to its original purpose as the consolidated repository for all Government-sponsored and donor-provided RE investment financing, operating as a revolving fund.

REA shall adopt a set of standardized procedures for all major functions. Such procedures will apply to how sector planning is carried out, distribution system projects are designed, evaluated and approved, electrification system construction, equipment, materials, and support services are procured, project financing and capital expenditure accounting is conducted, service providers are developed, supervised and monitored to assure efficiency compliance with REA operating procedures, and program evaluation and results monitoring is routinely performed.

REA will conduct its newly defined role in a business-like manner and shall be so constituted to operate

efficiently and evolve into a financially self-sufficient and independent entity. It will manage itself to maintain a tightly controlled and professionally competent staff and will employ out-sourcing and partnering arrangements for carrying out the majority of its implementing functions, including engineering design, distribution system construction and off-grid installations, electric system operations and services, and capacity building and training support. Through its reporting responsibilities with the MEMD, REA will maintain closely coordinated planning relationships with the Ministry of Finance, Planning and Economic Development (MOFPED) for investment funds acquisition, planning and coordination with other functional entities of the power sector including the Uganda Electricity Transmission Company, Ltd. (UETCL) and the Electricity Regulatory Authority (ERA), and planning coordination with other ministries and agencies of Government responsible for local government affairs and rural and agricultural development.

#### *4.2.2. Rural electric service territories*

REA shall plan and implement the strategy on the new model of scaled, multi-technology electricity service territories that shall be the basis for all rural electrification planning, project development and planning, financing, service provider supervision and support. This policy is designed to ensure that commercial viability of rural electrification investment may be assured and achieved, paving the way for the orderly in-flows of larger increments of RE capital investment financing on a rational, accelerated and sequenced pattern.

This new approach will not only allow for improved investment scale but will be implemented with a view to aggregating demand for electricity services under a more deliberate consumer outreach and marketing scheme. Related elements of the new strategy are designed to lower household financial barriers to receiving service connections and link marketing for on-grid services directly with off-grid electrification services such as solar PV.

Since the service territory electrification expansion programs will be carried out simultaneously, electrification growth will occur evenly throughout the country as a robust, national program. It is expected that, by the end of the 10-year planning period, the major backbone distribution system will extend throughout each service territory. Over time, as local economic and income growth follows the path of electric distribution expansion, an increasing number of households will gradually be able to meet the eligibility criteria to receive service.

#### *4.2.4 Electricity service concessions*

RE infrastructure operations shall be performed by private service providers that will be duly licensed to perform the expansion programs and be responsible for ensuring that service is offered widely to all eligible applicants in their service territory concessions according to service territory expansion plans that are established, approved and regularly updated as the basis for receiving financing support. Such service providers shall include, but not necessarily be limited to, privately-owned distribution companies and electric cooperatives, under conditions that may permit the incorporation of electricity and rural energy services demand aggregators working in concert with the licensed operators of the electric distribution systems. The potential need and role for demand aggregators may become apparent where the licensed on-grid service providers are lagging in meeting the indicated area coverage requirements of their license and service territory development plans, or as a function of promoting off-grid services in tandem with on-grid services.

Electric distribution concessions will be awarded in a competitive selection process conducted by REA. In any service territory for which no qualified bid is received, REA may directly undertake to establish and develop a new service provider using an electric cooperative model. A comprehensive methodology will be developed for this purpose, starting with the appointment of a core management team to form the cooperative, recruit members, and build and train staff drawing from the local labor market.

The service territory licensees will be required to provide electricity service on an “area coverage” basis to ensure that all rural residents who meet eligibility requirements will have the opportunity to receive service. Each service provider will develop a long-term service territory expansion plan, as the basis for adding new investments every 2-to-3 years, so the access goals will be implicitly defined and managed on a progressive basis within the planning framework. Where extension of the distribution network is not feasible, off-grid electrification programs will be designed and aggressively marketed.

#### *4.2.4 Off-grid electricity services*

Off-grid electrification services, comprising energy service technologies not dependent on the national grid shall be offered and furnished to eligible consumers in the service territories in tandem with on-grid electrification services, including solar PV installations and islanded community electrification projects.

REA’s PV Target Market Program (PVTMA) will serve as the central component of the off-grid electrification program, modified, as may be successfully tested, to permit PV installations to be marketed and implemented in tandem with on-grid electrification expansion in the service territories under the long-range service territory expansion plans. Several models for this program may be tested, including incorporating solar PV electrification in the service expansion programs of the on-grid service providers, acting either as demand aggregators – possibly with the facilitative role of local agents of the service providers – or as the service providers themselves. In either of these alternative approaches, solar PV companies are responsible for implementing the program as contractors selected and contracted by REA.

Looking to the Government’s policy aim of universal electrification and recognizing the practical limitations of extending formal electricity services including SHS to rural households that are beyond the economic reach of such service options, REA shall also undertake an aggressive program that will render low-cost mobile solar PV devices accessible to every rural Ugandan family within the next 20 years.

#### *4.2.4 Capital expenditure financing and other financial support*

Capital financing for infrastructure development for electric distribution-based investment shall be furnished under a system of long-term debt financing with electric distribution licensees, initially in the form of REA leases with the service providers that are convertible to loans once the service providers demonstrate professional utility competencies and compliance with the terms of their concession awards and licenses. The debt financing shall cover both the cost of the distribution infrastructure construction and the majority of the cost of consumer service connections. The financial obligations of the service providers shall provide for long-term capital repayment at affordable financial cost, with appropriate payment deferral allowance to permit the licensees to achieve operational and financial stability, determined by REA on a needs-test basis. Initial capital financing for system construction may therefore include a grant component should it be determined that such enhanced financial support is required to render the service providers financially viable.

Off-grid electrification financing may take several forms, including the prevailing model of the PVTMA including grant funding by REA for a portion of the installation cost and the balance through medium-term

loans offered by microfinance agencies. In the event that a modified approach that incorporates solar PV electrification as part of the on-grid electrification expansion program, the debt portion will similarly be financed by REA in medium-term low-cost loans to the service providers whether they are the solar companies or the on-grid service territory concession-holders.

In addition, other financing support shall be in the form of start-up and working capital to allow the service providers to acquire the necessary administrative and operational facilities and personnel, as may be the case, financing for the customer's portion of service connection fees and house-wiring, as well as additional financing to address such future and on-going capital expenditure in system replacements and distribution system upgrades, and service densification in already-served areas.

#### *4.2.4 Tariff-setting and administration*

Electricity pricing shall be determined and approved by the ERA according to the costs of electricity service provision, including operating and administrative expenses of the licensed service providers, depreciation allowance, financing charges and/or an established rate of capital return corresponding to investments made by licensees, however the initial on-grid system construction will be financed by REA in a combination of grants and long-term low-cost debt financing. Distribution operations and electricity commercialization costs will be determined on a cost-of-service basis however concession applicants may propose additional fees. Wholesale power costs including transmission and wheeling charges passed through to customers at the ERA-determined rates based on wholesale power purchase contracts, however latitude is provided to permit wholesale power cost subsidies for the economically weaker service territories, as a social equity measure, on a needs-determined basis.

Capital recovery, in order to ensure the long-term sustainability of REA financing, shall be a fundamental aim. Where capital expenditure financing is provided in the form of loans or leases, service providers will be granted tariffs sufficient to pay loan principal and interest or the equivalent cost under leases.

Consistent with the Government's policy emphasis to enhance opportunities for beneficiary populations to serve their own electrification interests and needs, the consumer-ownership model for service provision, which implicitly means greater motivation in obtaining better and more widespread service and local economic development opportunity than in obtaining profit from electricity services, shall be used to benchmark the competitive cost of service concessions in the licensing process.

#### *4.2.7 Power supply*

Power shortages and carrying capacity limitations on national grid are a continuing risk factor in accelerating the expansion of on-grid electricity service in rural areas. To alleviate this present and future constraint, REA, coordinating with ERA and partnering agencies, will undertake an aggressive program of investment in local rural power generation facilities for serving energy to rural electric service providers. This will include increase direct support for upstream power project site evaluation and feasibility studies and also modification to regulatory provisions to facilitate direct power supply contracting with local rural service providers among other measures to promote greater rural power supply investment.

#### *4.2.8 End-use promotion and consumer services*

To ensure the robust and dynamic economic and social impact of RE investments, agricultural modernization and new employment creation in rural areas, provision shall be made for coordinating RE development with complementary programs to promote electricity use in economically productive

activities. In particular, the REF will contain a special financing account to support, through its regular financing relationships with the electricity service providers, consumer credit and productive uses investment financing.

#### **4.2.9 Capacity-building support**

Expert advisory support shall be provided for ESPs and financed through REA to ensure that the RE program and the implementing organizations receive the support that will facilitate capacity building to achieve the core competencies and knowledgeable required for high functioning rural electric utilities. The capacity building shall be extended to the program management and support entities as well as the service providers and private-sector participants providing professional and industrial services.

### **4.3 Key Assumptions**

Heretofore, the Government's rural electrification strategy fundamentally relied on the willingness and capacity of private entrepreneurs to sponsor, plan, and implement RE services. The underachievement of the previous plan is largely attributed to the failure of significant private sector participation in financing and implementation of rural electric service. Henceforth, the strategy has been adjusted to match stakeholder roles and responsibilities with their basic interests and skill-sets and reduce the dependency of program success on factors that cannot be controlled – such as mobilization of private capital into inherently high risk rural energy markets. Critical assumptions of the 2013-2022 RESP include the following:

- (a) The strategy's implementing structures and reforms shall be undertaken on in a timely fashion and program stakeholders adapt successfully to their roles with adequate organizational and competency development.
- (b) There will be a robust response from the private and cooperative sectors in offering proposals for service territory concessions.
- (c) The planned power supply expansion program, including power generation and transmission infrastructure, shall be expanded in coordination with RESP needs in such a fashion so as to meet growing rural electricity demand.
- (d) Donor agencies commit to the new strategy and help to provide the needed capital expenditure funding and capacity-building support to implement the strategy successfully.



## **5 THE ENABLING AND PROGRAM ADMINISTRATIVE FRAMEWORKS**

As part of the strategy's implementation plan, a number of actions pertaining to the legal, regulatory and administrative frameworks will be taken in order that the RE implementing scheme conforms effectively to the new strategic direction of the Government's program and policy.

### **5.1 Statutory and Regulatory Reforms**

#### **5.1.1 *The Electricity Act***

The Electricity Act of 1999 shall be amended to reconstitute the REF as an integral part of the REA as an autonomous authority of the Government, subject to the general fiduciary oversight and direction of the REB. The newly defined REA will be under the general policy supervision of the Minister of Electricity.

In addition, the amended Act shall establish a new definition for rural electricity and energy services and further establish that rural electric service concessions will encompass geographically defined, permanent service territories for which on-grid and off-grid electricity services shall be authorized and licensed by the ERA. The Act shall moreover authorize ERA to exempt qualified rural electricity service providers from the 5% rural electrification levy on wholesale power sales as an option for reducing rural consumers' tariffs. It shall further establish rules for REA financing of consumer service connections as part of its capital expenditure financing support to rural service providers, and provide special rules relating to the licensing and sale of rural power generating plants that are dedicated to supplying electrical energy to the rural electric service providers.

#### **5.1.2 *The REA Statutory Instrument***

Following the revisions to the Law, the Statutory Instrument pertaining to the formulation of the REA will be amended to reconstitute the REA as an autonomous authority of the Government. Its provisions define the governance structures and administrative authorities of the REB; establish its reporting responsibilities to the Minister of Electricity; elaborate the responsibilities of the REA in respect to RE sector planning, financing, capital expenditure accounting, and program management for on-grid and off-grid electrification services; provide for special assistance programs in support of rural electric service providers including other forms of financing support and for purposes of promoting productive uses and economic development relating to electrification; and otherwise broadly define the authorities, responsibilities, and organizational structures, policies and procedures of the REA.

#### **5.1.3 *The regulatory framework***

The regulatory model and rules shall be modified to accommodate the corresponding changes in the definitions of rural service territories and concessions, including new requirements governing service providers pertaining to service connections, off-grid services and consumer services such as the right to market and finance productive uses. Tariff-making policy and procedures pertaining to the financing of service providers' capital expenditures and enforcement of service providers' responsibilities to extend electricity service on the "area coverage" rule shall be included in a revised regulatory framework. The role and contracting provisions relating to rural power generation facilities shall also be addressed in the ERA regulatory framework governing rural service territories and service providers.

Critical policy principles for the implementing regulatory framework include assuring least-cost service to rural customers and competition. The latter principle is provided for in assuring the development of a

number of competent and motivated service providers to avoid a monopolistic character in the rural electric utility industry. The first of these principles shall be underwritten by favoring least-cost solutions and implementing methodologies, together with targeted subsidies based on demonstrated need. REA and ERA authorities shall include the right of intervention with service providers, in the case of demonstrated non-compliance with the terms of their licenses, including cancelation of their concessions for egregious and protracted non-compliance.

## **5.2 RE Program Policies and Administrative Provisions**

### **5.2.1 Governance policies and systems**

The implementation provisions of this RESP are to establish clearly defined structures, policies and procedures that, as a whole, render the RE program efficient, transparent, and well-governed as a function of rigorous and faithful compliance by the relevant agencies with their prescribed roles and responsibilities, according to such structures, policies and procedures.

As a more autonomous entity broadly responsible for RE sector management and implementation, the REA and its governing board will acquire a more comprehensive level of fiduciary responsibility and accountability. The REB shall have the authority to define and determine the REA's operating policies including its own operating systems and rules so as to perform its oversight responsibilities in a judicious manner. REA's management and professional staff shall be accountable to the REB for consistently complying REA operating systems and procedures as they relate to program planning and project selection and design. Among its particular responsibilities, the REB shall use its authority to shield the REA investment program and process from undue external influence, while undertaking to assure that its decisions and actions effectively reflect the policies of the Government.

### **5.2.2 RE planning and coordination**

Overall responsibility for rural electrification policy and planning as a function of Government development policy and national planning, as represented by this RESP, is the purview of the MEMD. The Rural Electrification Board will be accountable to the MEMD for overall and day-to-day monitoring, reporting, and general liaison with the REA, as to other entities of the Government with functional responsibilities affecting RE.

Direct and comprehensive responsibility for rural electrification sector planning and management will be vested with the REA. REA's planning framework will be in the form of a rural electrification plan prepared and presented on an annual basis. The annual planning process shall be prepared by REA and presented to REB for final approval. REA annual plans shall be approved as the basis for all REA actions pertaining to, *inter alia* –

1. Service provider establishment, support, or intervention, as proposed by REA management;
2. On-grid construction project financing to service providers
3. Interventions and sanctions in the event of non-compliance service providers;
4. Off-grid project investments;
5. Annual REA budgetary and staffing plans;

6. Any or all remedial actions as required, whether at the statutory, policy or administrative levels, to correct or otherwise improve the functional systems or procedures of the RE implementing scheme and structure.

Approved REB annual plans will be presented to the MEMD as a routine matter of reporting, together with any recommendations by the REB pertaining to remedial actions requiring the Minister's action.

### *5.2.3 Service territory definition and concessions*

The service territories shall be geographically defined to include all areas, as of the date of approval of this RESP, that lie outside of the licensed distribution territory of Umeme, defined as being the geographic area within 1 kilometer of its existing distribution network on this date. This basic rural service territory alignment has been configured to provide for a prudent, minimum foundation of consumership and electricity sales in each of the 13 territories so to support the financial revenue requirements of the licensed concession holders.

REA shall have the authority to modify, adjust, merge other otherwise alter the number and geographical dimensions of the service territories as it deems optimal and appropriate to assure the integrity and financial sustainability of the territories and of the program at large, and so as to be consistent with the legal definition of rural electricity service.

Service territory concession awards shall be made by REA on the basis of a competitive selection process to determine the applicant having the lowest cost of consumer service provision while meeting or exceeding REA-prescribed organizational, financial and technical qualifications and eligibility requirements as well as demonstrated capability and commitment to the "area coverage" principle of multi-technology electricity service. Licenses for the selected applicants shall be granted by ERA upon its inspection of the concession selectee's compliance with licensing requirements and after a period of public notification and comment on ERA's intention to so grant a license.

REA shall prepare detailed, long-range plans for the electricity service expansion for each service territory as the basis for conducting the concession award process, taking into account both on-grid and off-grid electricity services. Off-grid services, including solar PV and other household-scale electricity service devices and islanded mini-grids drawing supply from small distributed power generation facilities, shall be programmed and monitored by REA by service territory, both to facilitate REA planning and results measuring and monitoring, and to facilitate the integration of off-grid services with the service territory concessions, as REA may determine is feasible and most effective to accelerate RE access.

### *5.2.4 Program financing and funds administration*

The REF shall serve as the unique funds repository for all official program rural electrification financing, including receipts from the 5% charge on wholesale power; contributions from the Government's annual appropriations or from other Government sources; grants and loans received from donor agencies; contributions-in-aid-of-construction provided by, or on behalf of, rural communities; and REA service provider financing re-flows.

Eligible uses of REF investment funding resources shall include:

1. Capital expenditure financing for new rural electric distribution construction;

2. Financing to service providers for distribution system upgrades and replacements;
3. Financing for consumer service connections, either as part of new distribution construction or from existing distribution systems;
4. Financing for off-grid electrification projects and installations;
5. Financing to promote consumer electricity end-use equipment and agricultural modernizations and value-adding facilities as may be determined eligible by the policies of the REA;
6. Funding of REA's administrative and operating expenses; and
7. Other rural energy development consistent with REA's financing policies and as may be approved by the REB.

As a long-term program sustainability measure, it shall be the principal aim of the REA to employ a financing system that will over time allow the REF to acquire the character of a revolving fund, in order to reduce its dependency on Government appropriations and donor agency support.

Government-provided RE subsidies shall be provided in the terms of its financing agreements with service providers, to include grants covering a portion of capital investment and/or discounts and deferrals of principal repayment obligations in loans and leases, as demonstrated in service territory development plans and financial projections reflecting the relative economic and demographic characteristics of individual service territories. Supplementary financing support in the form of grants for certain purposes such as for working capital and consumer financing assistance may also be included in REA service provider financing agreements approved by the REB.

In general, the REA system of capital expenditure financing and accounting shall be transparent and ordered by the individual service territories, and shall be segregated by an on-grid construction account, an off-grid construction account, and the REA's internal operating account. REA's operating and administrative expenses shall over time be covered by transfers of REF operating margins from the first two of the two construction accounts to the REA operations account. Otherwise, the structure and administrative processes of the REF shall be determined by the policies approved by the REB and, as appropriate, by any special stipulations of RE funding agreements executed by the Government with donor agencies. As a matter of general policy, REA procurement and accounting shall follow the prevailing laws and regulations.

Notwithstanding this policy, administrative systems and processes shall be prescribed by the REB and administered by the REA so as to permit optimization of resource use through application of economies of scale, and also administrative efficiency through outsourcing of services and materials supply to private contractors.

### ***5.2.5 Rural power supply***

All REA-implemented RE program expansion and project development shall be subject to adequate planning and appropriate sequencing so as to assure that sufficient power supply, including generation and transmission capacities, will be available to meet the estimated demand arising from new RE investment. To facilitate this policy, each service territory plan will consider the power supply implications of the

investments that are proposed. REA shall include as part of its annual planning and reporting to MEDM such measures as are required of UETCL regarding necessary investments in power supply and transmission facilities. Dispatching issues related to temporal or seasonal capacity shortfalls will be included in the REA annual planning process in an effort to minimize the impact of power curtailments on rural service providers, should capacity shortfalls occur.

Notwithstanding the prevailing legal or policy imperatives regarding the rights and responsibilities of other power supply authorities and agencies, REA shall be responsible, in concert with the Uganda Energy Credit Capitalization Company, Ltd. (UECCL), for supporting the development of private investment in rural power facilities, including rural power generating facilities and transmission assets, as necessary to meet the local power supply needs of the rural service territories, under conditions where deficiencies in the capacity requirements on the interconnected transmission and distribution grid may exist. Furthermore, ERA shall be required to approve and license such new rural power generating facilities of up to 20 MW in capacity, as REA deems necessary, and that are dedicated and contracted directly between rural electric service providers and the investment sponsors and operators of such facilities. As part of this policy, licensed service providers shall be authorized to invest in, and operate, power generation facilities whose output capacities combined do not exceed their demand requirements are dedicated solely to their own energy and power demand use.

## **6.0 ORGANIZATIONAL AND FUNCTIONAL STRENGTHENING MEASURES**

### **6.1 REA Organization, Planning and Program Management**

The REB and its constituent elements, the REF, and the REA shall be organized to operate as a financially and administratively independent authority based on principles of transparency and good governance.

The REB shall be the supreme decision-taking body of the REA and shall meet no less than on a monthly basis. All program investment and financing decisions shall be vested with the REB following a set of board-approved policies laying out detailed processes and procedures for program planning and evaluation, financing and funds accounting, and service provider development, support and supervision. The REB's responsibilities, membership, structure and procedures shall be defined in the Law and its Statutory Instrument, including authority to establish subcommittees and related delegation of decision authority. The REB shall have the responsibility of recruiting and supervising the Executive Director (ED), who shall be accountable to the board for all management and operational decisions, including recruiting and supervisory authority for all REA personnel.

Following the general determination of the REA's operating systems defined in the board policies, the REA shall operate on the basis of detailed procedures and methods governing all functional activities including program planning; project analysis, design, and selection; REA investment financing and capital accounts management including quarterly presentation of REA's financial statements and REF balance sheet to the REB; service provider development, support and performance monitoring; human resources administration and REA budget formulation; and RE program evaluation and impacts monitoring, among other functions such a REA's public information processes and end-use promotion. Annually, the ED shall prepare for board consideration a comprehensive annual rural electrification plan as the basis for approving REA investments, actions relating to service provider formation, capacity-building measures and sanctioning, as required, and other remedial actions including modification of REA processes and procedures as may be indicated. The annual plan will clearly document the progressive development of RE service expansion against the 10-year goals and targets established in the RESP, and will be furnished to the Minister and to other stake-holding entities.

## **6.2 Service Provider Development, Support and Performance Supervision**

REA's program strategy shall fundamentally shift from its past focus on project development to planning and supporting electric distribution and energy services providers in each service territory to be commercially scaled and programmed as financially operational robust businesses. No project approved for financing by the REB shall negatively impact this general principle. Service providers shall be held responsible for meeting the planned service access targets of REA-planned and financed system improvements as the primary basis for determining the suspension or revocation of concession licenses by the ERA, as may be stipulated by REA.

REA shall employ a service provider reporting model that requires all recipients of REF financing support to furnish, on a monthly basis, detailed operating and financial statistics that will serve as the basis for performing key performance indicator analysis for evaluating and benchmarking the operating performance of service providers.

REA shall have the primary responsibility for the development, formation and operational support and monitoring of service providers. Under partnering arrangements with other RE program stakeholders, including the PSFU and cooperative sector agencies of the Government, REA shall include in its procedures and annual plans provision for furnishing financial support for capacity building and training that is provided by its partners.

## **6.3 RE Design Standards and Construction Implementation**

REA shall adopt technical standards for all RE construction design including component equipment and materials specifications, as well as standardized procedures for electric distribution construction planning, service provider organization, operating processes including their operational reporting formats and procedures and related REA performance monitoring. These standardized systems are to be established to take all possible advantage of cost efficiency in electric distribution design, useful life extension of constructed systems and installations, and therefore lowering life-cycle costs of RE investments. Such standardization is also intended to facilitate administrative and cost efficiencies in REA procurement methods and materials management.

Adopting internationally-recognized "best practices" for RE construction planning, REA's format and procedure for electric distribution development shall form the basis for planning the build-out of the electrification infrastructure in the service territories to be consistent with the progressive and sequenced expansion of area-coverage, based on standardized technical, economic and financial criteria for optimizing construction project design and selection. This new and more technologically sophisticated model of program planning shall also provide for the planning and financing of off-grid installations and projects in order to maximize service coverage.

REA shall have adequate personnel and facilities, including the establishment of field offices, as may be determined by the REB, to carry out its responsibilities for RE construction management and service provider support and supervision. REA shall employ, under its procurement procedures, private sector contractors for project design and construction implementation, as for installation of off-grid services. Rural power projects shall be implemented under the current licensing procedure of the ERA by qualified project sponsors.

## **6.4 Organizational Capacity and Competencies Development**

Adequate funding for technical assistance and training shall be included in the RESP financing plan and in the annual RE plans for building REA's professional capacities and for developing the required skills in REA's partners and contractors. A primary aim of REA's long-term development program for service providers should be the progressive formation of service providers' skills and organizational capacities to allow them to absorb, over time, functional responsibilities for system planning and program financing and procurement management. As part of REA's long-term development program, appropriate strategies should be developed by REA and approved by the REB to support the eventual privatization of RE development under the self-determining auspices of the service providers.

## **7.0 IMPLEMENTATION AND FINANCING PLAN**

The principal elements of the RESP's goal achievement sequence covers implementation of the enabling systems and organizational reforms, completion of the service territory plans and installment of the permanent concession holders, rapid mobilization of the PVTMA with appropriate modifications to its implementation on a more aggregated basis, and implementation of construction financing in each of the service expansion components.

The RESP's implementation and financial planning elements are summarized in the tables on pages 25, 26 and 28.

The RESP's implementation will occur throughout the period of plan, commencing with the formulation of the detailed structure of the service territory and concession system and the various enabling provisions relating to the policy and legal construct and institutional and organizational development elements of the RESP.

The on-grid electrification program is dependent on the formulation of detailed service territory plans and scheduling of construction projects. As service territory concessions are awarded and licenses issued by ERA, including service territory concessions that are awarded by REA to incumbent ESPs on the basis of "predominant capability," distribution construction financing to the appointed ESPs shall be executed under new lease agreements and advisory and training assistance shall commence. During the transition period for completing all of the 13 service territory plans and concession awards, a process requiring up to three years, REA shall continue to finance and construct project extensions from its current inventory of electrification projects. REA shall obtain a general temporary distribution system operations and sales license from ERA that incrementally covers newly constructed distribution assets for which interim system operators shall be retained by REA under contract.

Table 2 summarizes the costs and general sequencing of the RESP's service expansion program by component, with the associated annual increases of service connections and the resulting growth of the rural electric service penetration rate. Upon completing the 13 service territory plans, the estimates for the construction program may be more accurately defined.

Table 1. RESP Implementation sequence

ID	Task Name	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10											
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2		
1	<b>TASK 1: Development of Legal and Regulatory Enabling Systems</b>	[Gantt bars for Task 1]																			
2	Enactment of legislative amendments	[Gantt bar]																			
3	Modify service territory/ concession regulatory policy and license scheme	[Gantt bar]																			
4	Develop and promulgate new REA incorporation documents	[Gantt bar]																			
5	Adopt new electric cooperative by-laws	[Gantt bar]																			
<b>Task 2: Reform of REA structures</b>		[Gantt bars for Task 2]																			
7	Develop REA Board policies	[Gantt bar]																			
8	Establish Board committees	[Gantt bar]																			
9	Draft critical-path RE operating procedures	[Gantt bar]																			
10	Develop first Annual RE plan	[Gantt bar]																			
11	Conduct first annual national rural electrification stakeholders conference	[Gantt bar]																			
12	<b>TASK 3: Establishment of Service Territories and ESPs</b>	[Gantt bars for Task 3]																			
13	Develop service territory concessions	[Gantt bar]																			
14	Develop construction work plans	[Gantt bar]																			
15	Finalize service territory boundaries	[Gantt bar]																			
16	Complete service territory master plans	[Gantt bar]																			
17	Carry out concession solicitation award procedure	[Gantt bar]																			
18	Promulgate ESP concession licenses	[Gantt bar]																			
19	Develop/execute power purchase and interconnection agreements	[Gantt bar]																			
20	Develop/execute ESP financing agreements/leases	[Gantt bar]																			
21	Ongoing ESP construction financing	[Gantt bar]																			
22	Carry out ESP support and advisory activities	[Gantt bar]																			
<b>TASK 4: Program Transition</b>		[Gantt bars for Task 4]																			
24	Formulate transition plan	[Gantt bar]																			
25	Implement transition plan	[Gantt bar]																			
26	Implement interim distribution operator contracts	[Gantt bar]																			
<b>Off Grid Electrification and Other Tasks</b>		[Gantt bars for Off Grid]																			
27	Continue on-grid distribution construction	[Gantt bar]																			
28	Develop public information campaign	[Gantt bar]																			
29	Revise REA's engineering design and construction standards	[Gantt bar]																			
30	Develop rural power development program	[Gantt bar]																			
31	Implement PV/TMA	[Gantt bar]																			
32	Develop/execute Solar PV Program Modifications	[Gantt bar]																			
33	Continue development and implementation of mini-grid projects	[Gantt bar]																			
34	Formulate and implement RE monitoring and evaluation methodology	[Gantt bar]																			
35		[Gantt bar]																			

Project: UAREP Gantt  
Date: Thu 5/17/12

Task

Spot

Progress

Milestone

Summary

Project Summary

External Tasks

External Milestone

Deadline

↓



Rural Electrification Strategy and Plan 2013-2022

Table 2. RESP service expansion plan

Service Territory	Year											Totals
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
	<b>On-Grid Construction Programme</b>											
Rwenzori	\$ 1,396,000	2,515,000	4,506,000	2,939,000	1,662,000	1,757,000	1,856,000	1,960,000	2,069,000	2,182,000	22,842,000	
Central	\$ 2,641,000	4,832,000	8,655,000	5,645,000	3,193,000	3,376,000	3,566,000	3,765,000	3,974,000	4,191,000	43,838,000	
Eastern	\$ 5,049,000	9,236,000	16,543,000	10,790,000	6,104,000	6,452,000	6,816,000	7,197,000	7,595,000	8,011,000	83,793,000	
North Western	\$ 1,655,000	3,027,000	5,421,000	3,536,000	2,000,000	2,114,000	2,234,000	2,358,000	2,489,000	2,625,000	27,459,000	
South Western	\$ 1,250,000	2,323,000	3,998,000	2,608,000	1,457,000	1,559,000	1,647,000	1,739,000	1,836,000	1,936,000	20,353,000	
Western	\$ 2,542,000	4,594,000	8,226,000	5,366,000	3,036,000	3,209,000	3,390,000	3,579,000	3,777,000	3,985,000	41,706,000	
Central North	\$ 1,311,000	2,398,000	4,925,000	2,801,000	1,585,000	1,675,000	1,770,000	1,868,000	1,972,000	2,080,000	21,755,000	
Mid-Western	\$ 903,000	1,651,000	2,958,000	1,929,000	1,091,000	1,153,000	1,219,000	1,287,000	1,358,000	1,432,000	14,981,000	
North Western	\$ 5,498,000	9,976,000	17,868,000	11,654,000	6,593,000	6,969,000	7,362,000	7,773,000	8,203,000	8,653,000	90,549,000	
North Eastern	\$ 1,898,000	3,422,000	6,129,000	3,998,000	2,262,000	2,391,000	2,525,000	2,667,000	2,814,000	2,968,000	31,074,000	
Northern	\$ 924,000	1,652,000	2,959,000	1,930,000	1,092,000	1,154,000	1,219,000	1,287,000	1,358,000	1,433,000	15,008,000	
South	\$ 1,872,000	3,398,000	6,096,000	3,969,000	2,245,000	2,734,000	2,507,000	2,648,000	2,794,000	2,947,000	31,210,000	
West Nile	\$ 1,840,000	3,194,000	5,721,000	3,731,000	2,111,000	2,231,000	2,357,000	2,490,000	2,626,000	2,770,000	29,071,000	
Densification	\$ 10,000,000	25,000,000	40,750,000	51,500,000	52,000,000	52,000,000	63,000,000	33,000,000	33,000,000	33,000,000	393,250,000	
Totals	\$ 38,779,000	77,218,000	134,757,000	112,396,000	86,431,000	88,774,000	101,468,000	73,618,000	75,865,000	78,213,000	866,889,000	
	<b>Mini-Grid Construction Program</b>											
	\$ 500,000	500,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	8,500,000	
	\$ 2,750,000	2,750,000	3,250,000	3,250,000	3,250,000	3,250,000	6,175,000	6,175,000	7,000,000	7,000,000	44,850,000	
	\$ 42,029,000	80,468,000	137,877,000	116,646,000	90,681,000	93,024,000	108,643,000	80,793,000	83,865,000	86,213,000	920,239,000	
	50,000	120,000	200,000	180,000	155,000	210,000	220,000	90,000	90,000	100,000		
	3.97%	5.99%	9.28%	12.03%	14.20%	17.10%	19.97%	20.71%	21.38%	22.14%		
	<b>Total Investment Cost</b>											
	<b>Solar PV Program</b>											
	<b>New Rural Services</b>											

The global cost of implementing the RESP is USD\$951.6 million, summarized in Table 3 and segregated into three general categories:

1. On-Grid Electrification Financing, totaling \$866.5 million, as the estimated capital cost of electric distribution system construction and customer densification, by service territory, including consumer densification within Umeme's service area;
2. Off-Grid Electrification Financing, totaling \$55.4 million, comprising the solar PV program associated with the installation of 130,000 new solar home systems throughout the 13 service territories, the capital cost of islanded mini-grid projects estimated to add 8,500 new service connections, and the cost of pre-investment support for advancing the development of larger distributed power generation facilities directly serving the power supply requirements of the on-grid electrification service providers. Achieving the solar PV program target relies on the implementation method employed by REA, which in turn depends on the success of testing new models. Doubling the level of SHS installations from the current annual pace of 10,000, as indicated in Table 2, assumes some level of improvement will be obtained, and this estimate of the expansion program may be overly conservative.
3. Other Costs, totaling \$29.7 million, including long-term technical assistance and training program costs during the RESP period, the cost of ESP working capital grants to support start-up costs and ESP customer financing program assistance relating to service connection fees, house-wiring and the purchase cost of electricity-using appliances and productive uses equipment. It is estimated that, during the RESP period, initially 10% of the customers served by the grid and mini-grids will be eligible for such financing at an average financing amount of \$120.

**Table 3. Global RESP financing requirements**

<b>Funding Components</b>		<b>Funding Amounts (USD Millions)</b>
<b>1</b>	<b>On-Grid Electrification Financing</b>	
a.	Rwenzori	\$22.8
b.	Central	\$43.8
c.	Eastern	\$83.8
d.	North Western	\$27.5
e.	South Western	\$20.3
f.	Western	\$41.7
g.	Central North	\$21.8
h.	Mid-Western	\$15.0
i.	North Western	\$90.5
k.	North Eastern	\$31.1
l.	Northern	\$15.0
n.	South	\$31.2
o.	West Nile	\$29.1
p.	Densification (primarily Umeme)	\$393.3
	<b>Sub- Total</b>	<b>\$866.5</b>
<b>2</b>	<b>Off -Grid Electrification Financing</b>	
a.	Solar PV(PVTMA)	\$44.9
c.	Mini-grid projects	\$8.5
c.	Rural power development	\$2.0
	<b>Sub-Total</b>	<b>\$55.4</b>
<b>3</b>	<b>Other</b>	
a.	ESP start-up grants	\$2.5
b.	Customer financing assistance	\$17.2
c.	Technical assistance	\$5.0
d.	Training	\$5.0
	<b>Sub-Total</b>	<b>\$29.7</b>
	<b>Total</b>	<b>\$951.6</b>

Not included in this funding plan is the cost of power generation investments, which shall be supported by the UECCCL and private capital sources, contributions-in-aid-of-construction for on-grid electrification projects that are added to REA-approved ESP construction financing, supplementary REA financing to ESPs for electric distribution system replacements and upgrades that are projected to be needed in future years beyond the term of the RESP, and the cost of REA operations which exceed the level of internal REF funds realized from construction account financing reflows. The latter cost will be provided from appropriations requests submitted annually by REA to the MOFPED.



# **SCALING-UP RENEWABLE ENERGY PROGRAM INVESTMENT PLAN**

**OCTOBER 2015**

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## ACRONYMS

<b>AfDB</b>	African Development Bank	<b>NEMA</b>	National Environment Management Authority
<b>BST</b>	Bulk Supply Tariff	<b>NGO</b>	Non-Governmental Organization
<b>CIF</b>	Climate Investment Funds	<b>MoWE</b>	Ministry of Water & Environment
<b>ERA</b>	Electricity Regulatory Authority	<b>O&amp;M</b>	Operation & Maintenance
<b>ERT</b>	Energy for Rural Transformation	<b>PACMECS</b>	Pader Abim Community Multipurpose Electricity Cooperative Society
<b>EU</b>	European Union	<b>PPA</b>	Power Purchase Agreement
<b>GDP</b>	Gross Domestic Product	<b>PPP</b>	Public-Private Partnership
<b>GET FIT</b>	Global Energy Transfer for Feed-in-Tariffs	<b>PREEEP</b>	Promotion of Renewable Energy and Energy Efficiency Program
<b>GHG</b>	Greenhouse Gas	<b>PRG</b>	Partial Risk Guarantee
<b>GIZ</b>	Deutsche Gesellschaft für Internationale Zusammenarbeit	<b>PSC</b>	Project Steering Committee
<b>GoU</b>	Government of Uganda	<b>PV</b>	Photo Voltaic
<b>GRD</b>	Geothermal Resource Department	<b>R&amp;D</b>	Research and Development
<b>HPP</b>	Hydro Power Project	<b>RAP</b>	Resettlement Action Plan
<b>ICEIDA</b>	Icelandic International Development Agency	<b>RE</b>	Renewable Energy
<b>ICS</b>	Institutional Cook Stoves	<b>REA</b>	Rural Electrification Agency
<b>IFC</b>	International Finance Corporation	<b>REB</b>	Rural Electrification Board
<b>IP</b>	Investment Plan	<b>REF</b>	Rural Electrification Fund
<b>IPP</b>	Independent Power Producer	<b>REFIT</b>	Renewable Energy Feed in Tariff
<b>JICA</b>	Japan International Cooperation Agency	<b>RESP</b>	Rural Electrification Strategy & Plan
<b>KfW</b>	Kreditanstalt für Wiederaufbau	<b>RETF</b>	Rural Electrification Trust Fund
<b>KRECS</b>	Kyegegwa Rural Electricity Co-operative Society	<b>SCOUL</b>	Sugar Corporation of Uganda Ltd
<b>KSW</b>	Kakira Sugar Works	<b>SREP</b>	Scaling-Up Renewable Energy Program
<b>KSWL</b>	Kinyara Sugar Works Ltd	<b>UECCC</b>	Uganda Energy Credit Capitalization Company
<b>M&amp;E</b>	Monitoring & Evaluation	<b>UEDCL</b>	Uganda Electricity Distribution Company Ltd
<b>MDB</b>	Multilateral Development Bank	<b>UEGCL</b>	Uganda Electricity Generation Company Ltd
<b>MEMD</b>	Ministry of Energy & Mineral Development	<b>UETCL</b>	Uganda Electricity Transmission Company Ltd
<b>MEPI</b>	Multidimensional Energy Poverty Index	<b>UNDP</b>	United Nations Development Program
<b>MoES</b>	Ministry of Education and Sports	<b>UNEP</b>	United Nations Environment Program
<b>MoFPED</b>	Ministry of Finance, Planning and Economic Development	<b>WB</b>	World Bank
<b>MoJCA</b>	Ministry of Justice and Constitutional Affairs	<b>WBG</b>	World Bank Group
<b>MoLHUD</b>	Ministry of Lands, Housing & Urban Development	<b>WENRECO</b>	West Nile Rural Electrification Company
<b>NAMA</b>	Nationally Appropriate Mitigation Actions		
<b>NDP</b>	National Development Plan		



## EXECUTIVE SUMMARY

It is widely known that Climate change will increase the frequency and intensity of extreme weather events such as droughts, floods, landslides and heat waves. In Uganda, the events of the past few years clearly illustrate the magnitude of the problem. The frequency of droughts has increased with 8 severe droughts being experienced between 1991 and 2006. These droughts have resulted in lowering of the water table, leading to drying of boreholes and had an extremely negative impact in the power sector in the country due to its high reliance on hydro resources to generate the much needed electricity in the country.

Temperature rise has significantly impacted health and agriculture outputs. For example, in the country's highlands which were previously malaria-free, are now invaded by the disease. This has an immense economic and social cost to the country.

Uganda contributes relatively little to the global greenhouse gases emissions with an estimated 0.1 tons per capita in 2011. Despite that negligible figure, the country as a member of the United Nations Framework Convention on Climate Change is committed to integrate climate change in its development planning by pursuing a more sustainable development path in general and to increase investment in renewables in particular. This will be beneficial to the Ugandans and will lead to better diversified energy mix in the country that is less prone to droughts.

### Energy Sector

Electricity will be critical for Uganda to attain the growth trajectory and socio-economic transformation it needs through better access to education and health care, improved quality of life and improved personal security. At an average annual growth rate of about 3.4% (6<sup>th</sup> highest in the world) the Uganda's population has increased rapidly from about 26 million in 2002 to around 34.9 million in 2014. However, the overall household access to electricity is one of the lowest in Africa at about 14%. Limited access to electricity and the high cost of this service has affected Uganda's economic growth and development as well as social well-being.

Electricity demand grows at an estimated annual average of 9% since 2005 with peak domestic demand in 2014 reaching 508 MW for a total installed capacity of 852 MW. Following a severe drought in 2006 that resulted in a national power crisis, the Government of Uganda had no choice other than install thermal generation and to expand the generation capacity by installing even more hydro power plants such as Nalubale (180MW), Kiira (200MW) and Bujagali (250MW).

The expansion of generation and transmission infrastructure will continue playing a key role in national strategies with the objective of addressing challenges faced by the energy sector and to stimulate industrial growth and to simulate the creation of more productive jobs.

At the same time, the country recognizes that the solution for remote and isolated areas for which connection to the main grid is prohibitively expensive, will be off-grid solutions and mini-grid systems to meet electricity needs of the country and to support Uganda meeting its SE4All targets by 2030.

## Renewable Energy

The Renewable Energy Policy of Uganda was approved in 2007. Its main objective was to promote and support greater private sector engagement in power generation from renewable energy technologies by providing fixed tariff levels based on the levelized cost of production for a guaranteed period of time.

The key principles on which the policy is based are:

- Maintain and improve the responsiveness of the legal and institutional framework to promote renewable energy investments
- Establish an appropriate financing and fiscal policy framework for renewable energy investments
- Mainstream poverty eradication, equitable distribution and gender issues in renewable energy strategies
- Acquire and disseminate information in order to raise public awareness and attract investments in renewable energy sources and technologies
- Promote research and development, international cooperation, technology transfer and adoption of standards in renewable energy technologies
- Utilize biomass energy efficiently so as to contribute to the management of the resources in a sustainable manner
- Promote the sustainable productions and utilization of biofuels
- Promote the conversion of municipal and industrial waste to energy
- Utilize biomass energy efficiently so as to contribute to the management of the resources in a sustainable manner
- Promote the conversion of municipal and industrial waste to energy

This policy and the unbundling of the sector imposed by the Electricity Act 1999 as well as the country's Renewable Energy Feed-in Tariff Program have played a key role in attracting private sector investments into the renewables space and allowing the release of limited financial resources to other sectors and areas of the economy.

## Constraints to Renewable Energy Deployment

In spite of a strong policy commitment and the willingness to develop other sources of renewables in the country, investment has been limited in technologies other than hydro for which the country has created overdependence. Uganda is committed to diversify its energy mix and to accelerate access to modern services of energy for rural and isolated areas. There are a significant number of opportunities to develop technologies such as solar PV, Wind and Geothermal in the country and SREP support could be instrumental in addressing existent barriers for these technologies.

The main constraints include:-

- Inadequate regulatory, legal and institutional framework for on-grid solar PV, wind and geothermal generation.
- Inadequate licensing for geothermal resource exploration.
- Challenging investment climate that affects commercial banks and their ability to finance these technologies.
- Lack of sufficient renewable resource availability data for wind and geothermal.

- Insufficient experience in the deployment of technologies other than hydro

## SREP Program Description

The SREP will assist the Government of Uganda in meeting the country's targets set in the UN's SE4ALL Action Agenda 2015, namely by:-

- promoting an increase in access to modern energy services for over 98% of the population and,
- helping to double the share of renewables in the energy mix.

These goals are both linked to the targets set in the Uganda's Vision 2040.

The SREP will build on previous and on-going national efforts in the sector. In addition to investment capital, it will provide technical assistance and capacity building that will reinforce the know-how, skills and competences of national institutions and players in the sector with a view to ensure effective implementation of the policies and strategies that incentivize the deployment of renewables across the country.

Following an inclusive and consultative process that involved different types of stakeholders in Uganda (e.g. development partners, civil society organizations and private sector representatives), the Government of Uganda is requesting SREP support for the three highest ranked options analysed.

The table below provides a quick summary of the envisaged projects in the country.

Project	SREP Allocation (in USD million)	Lead MDB	Beneficiary
130MW Geothermal Project	33.8	AfDB/IFC	GRD
Solar PV Off-grid Mini-grid and Solar PV Net Metering	9.4	AfDB	RED/REA
Wind Assessment & 2x10MW Pilot Wind Farms	6.8	AfDB	RED
<b>Total</b>	<b>50.0</b>		

## Expected Impacts of SREP

The main expected impacts of the SREP in Uganda include:-

1. A minimum direct contribution of 151 MW of installed capacity of renewable technologies (non-hydro) in the country's energy mix by supporting the deployment of investments in geothermal, solar PV net-metering, mini-grids and wind power.
2. An increase in the annual energy output of 125.4 GWh per year.
3. Lead to an annual decrease in greenhouse gas emission of 163.000 tons CO<sub>2</sub>e per year once SREP projects are operational.
4. Lead to a total investment of USD 455 million in the power sector associated with the SREP projects.

5. Development of two nascent generation technologies in the country (e.g. geothermal and wind). Geothermal has the potential to provide reliable base-load to the power system in the country. In addition to the transformational impact in the sector, there will be many social, economic and environmental positive spill-over effects if the country is successful in developing this source of energy.
6. Expand the expertise and know-how of the country in relation to renewable technologies.
7. Lead to better economic and social prospects in isolated areas that do not benefit from access to modern and productive energy services.

The SREP program is poised to provide Uganda with a great opportunity to initiate a transformative change in its Energy Sector that has the potential to lead to a reduction in the country's dependence on hydro. This will make the country more prone to the negative impacts of climate change.

In addition, it will help Uganda achieving its development goals in a sustainable manner while meeting the objective of SREP of scaling-up renewable energy solutions that lead to an increase in access and economic opportunities.

## 1.0 INTRODUCTION

Uganda is a landlocked country located in Eastern Africa that borders the countries of Democratic Republic of the Congo, Kenya, Rwanda, South Sudan, and Tanzania. The terrain is mostly plateau with a rim of mountains and a south eastern shore of Lake Victoria. The country has a total area of 241,550.7 square kilometres and a total population of 34.9 million. Of the total population, over 70% live in rural areas with an important proportion living in scattered and remote areas.

Uganda was among the first Sub-Saharan African countries to embark on liberalization and pro-market policies in the late 1980s. These led to real Gross Domestic Product (GDP) growth averaging 7% per year between the 1990s and the 2000s. Since 2006 and onwards, the country witnessed more economic volatility and GDP growth slowed to an average of just about 5%. This growth was driven by post-war recovery and reconstruction and since the early 1990s by comprehensive macroeconomic and structural reforms.

The economy is forecast to grow at a rate of approximately 5.6% in FY14/15, and could maintain an upward trajectory into the near future, as oil investments and the large infrastructure program boost construction activities. The agricultural sector, which employs the bulk of the labour force, is unlikely to achieve high rates of growth due to supply-side constraints.

Sectoral shifts accompanied the economic growth over the past two decades. According to recently rebased GDP numbers, the service sector contributes the most value addition and agriculture's contribution has been declining. Between 1990 and 2014, agriculture's contribution to GDP fell from 55% to 25%. The contribution of services increased from 31% to 46% with telecommunications, wholesale and retail trade contributing the most. The boom in construction raised the contribution of that sector to 13% while manufacturing played a smaller role. Industrial sector growth has been helped with better availability of electricity at lower prices and activity arising from public sector road construction.

When the National Resistance Movement led by Yoweri Museveni took power in 1986, the government started to focus on restructuring the economy through pro-market reforms and increasing the legitimacy of public institutions through political liberalization. However, a civil war in Northern Uganda dampened economic activity and deepening poverty in the region until 2005. Since then there have been no major security incidents and economic activity has resumed in Northern Uganda and most internally displaced persons have returned to their land.

Uganda has made important progress towards meeting the Millennium Development Goals (MDGs), especially with respect to income, poverty, promoting gender equality and women empowerment, reducing child mortality, ensuring environmental sustainability and developing a global partnership for development. The two decades of strong economic growth with poverty reducing from 56% in 1992-93 to 19.7% by 2012-13, thus surpassing the 2015 MDG target of halving the poverty rate. However, Uganda remains a poor country. Despite declining poverty rates, the absolute number of poor has decreased due to high population growth with Uganda's population doubling since 1990. Moreover, the poverty line is low and many remain poor and vulnerable to poverty. Inequality is high by international standards which could undermine the achievements in growth and poverty reduction. A key challenge to accelerating progress towards middle income status and promote shared prosperity is to raise productivity in sectors where most people are employed or move people from low to higher productive activities.

The country's development is guided by Uganda's Vision 2040 which aims at transforming Uganda from an agrarian society to a modern and prosperous country within 30 years through increasing electricity access to 80% by 2040 from a current level of 14% by investing in least cost power generation, promotion of renewable energy and energy efficiency in addition to strengthening and expanding the transmission and distribution infrastructure. The diffused nature of the rural communities justifies, to a large extent, the need to consider a decentralised energy approach as an important cost effective option for meeting energy requirements in those areas. While the rural population remains equally important, the urban population is growing rapidly. This calls for equal attention to be paid to a rapidly growing energy demand in urban areas.

## 1.1 Energy Sector Overview

Electricity will remain critical for Uganda to attain the growth trajectory and socio-economic transformation through better access to education and health care, improved quality of life at household level, better efficiency and service delivery from enterprises, and improved personal security. At an average annual growth rate of about 3.4% (sixth highest in the world) the Uganda's population has increased rapidly, from about 26 million in 2002 to around 34.9 million in 2014. However, the overall household access to electricity is one of the lowest in Africa at about 14% at the national level and about 7% in rural areas. Limited access to electricity and the high cost of electricity services has affected delivery of social services, constrained the development of small-scale industrial and commercial enterprises, and adversely affected the large-scale industrial and commercial investments in the country.

The recent increase in electricity generation through the commissioning of the Bujagali Hydropower Plant in 2012 and the continued strengthening of the transmission and distribution network have lowered the cost of electricity and have improved power supply reliability in the country. However, with the fast-growing demand for electricity - about 9% per annum - Uganda will need to harness its abundant natural resources more efficiently to provide reliable, cost-effective electricity to support its fast growing economy and improve the social welfare of its citizens.

Major electricity sector reforms have redefined the role of the government in the electricity sector as enabler for private investments in the sector. The Government of Uganda (GoU) approved a power sector reform strategy in 1999 that called for developing Uganda's hydro power resources through Independent Power Producers (IPPs) and adopting a commercially-oriented approach to increase power access and improve performance. The main functions of the government became to:-

- (i) create an enabling environment for private investment in the sector by levelling the playing field for private sector participants
- (ii) establish a regulatory framework that supported private sector development
- (iii) facilitate the setting of cost reflective tariffs and
- (iv) develop a transparent subsidy transfer and financing mechanism.

As a consequence, Uganda has progressively advanced in restructuring the sector and has established a number of new entities. To implement the power sector reform strategy, the GoU passed the 1999 Electricity Act and established an independent Electricity Regulatory Authority (ERA) in 2000 to regulate all sector activities. The GoU also unbundled the vertically integrated Uganda Electricity Board, which had been established in 1948 into power



generation, transmission, and distribution companies in 2001. A Rural Electrification Board (REB) was established in 2001 to oversee the implementation of rural electrification activities.

The unbundled sector adopted the “single buyer” model where the transmission operator is the sole buyer and wholesaler of electricity while the private sector plays significant roles in power generation and distribution. Most of the fixed assets along the electricity supply chain are owned by three public enterprises: (i) the Uganda Electricity Generation Company Limited (UEGCL) for power generation, the Uganda Electricity Transmission Company Limited (UETCL) for power transmission, and the Uganda Electricity Distribution Company Limited (UEDCL) for power distribution. The UETCL is the single off-taker of electricity from the government-owned generation companies, IPPs, and Small Private Power Producers (SPPPs) that are connected to the main electricity network. In turn, the UETCL sells electricity to the distribution companies at the Bulk Supply Tariff (BST), which is in principle uniformly applied to the distribution companies (with marginal difference in adjustment formula). To introduce private sector efficiencies into management and operation, the UEGCL's Kiira and Nalubaale hydropower plants were leased to Eskom (Uganda) Limited in 2002 and the UEDCL's distribution assets in the major load centers were leased to Umeme in 2005. All other distribution assets in the non-Umeme concession areas covering some parts of the country were constructed by the REA and contracted out to seven other electricity distribution Service Providers for operations and maintenance on a commercial basis. Currently, there is no provision in the tariff to cater for the recovery of depreciation expenses of the distribution lines owned by public companies.

### 1.1.1 Electricity Supply and Demand

Electricity demand has grown at an annual average of 9% since 2005 with peak domestic demand in 2014 reaching 508 MW. The country has been relatively successful in attracting private investment in the sector to meet the demand. Installed power generation capacity increased from about 300 MW in 2002 to 852 MW through private investment, including Bujagali (hydro, 250MW) commissioned in August 2012 and other two standby Heavy Fuel Oil plants.

Several tariff adjustments and associated revisions to the tariff-setting formula have considerably improved the sector's financial viability. The retail tariffs are set by the ERA based on revenue requirements of the generation, transmission, and distribution companies and the terms of various contracts with the private generation and distribution companies. The basic principle is that the sector is expected to be financially viable and that each generation, transmission, and distribution companies meets the performance targets specified in the respective licenses. There have been several adjustments to the retail tariff in the past, including an average increase of 48% in January 2012, when the GoU phased out the subsidy that had kept the retail tariff below the costs. The ERA approved a multi-year tariff with quarterly automatic adjustments for fluctuations in fuel costs, exchange rates, and inflation in 2014. The key subsidy element in the supply chain is the UETCL's capacity payments for stand-by thermal power plants, which amounted to USD 23 million in 2014, and was funded by the GoU.

The energy balance for Uganda is heavily dominated by biomass which contributes approximately 90%<sup>1</sup> of the total consumable energy in Uganda. The majority of the

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<sup>1</sup> MEMD, Statistical Abstract, 2013

population relies on biomass in the form of firewood and charcoal as a primary source of cooking fuel. Other sources of primary energy in Uganda's energy mix are petroleum products and electricity accounting for 1.4% of the total. The different sources of energy in Uganda's energy balance are presented in Table 1.

**TABLE 1: UGANDA'S ENERGY BALANCE<sup>2</sup>**

Source of Energy	Contribution (in %)
Biomass (fuel wood)	78.6
Biomass (charcoal)	5.6
Biomass (residues)	4.7
Petroleum Products	9.7
Electricity	1.4
<b>Total</b>	<b>100.0</b>

Electricity is generated mainly from hydropower, but also from bagasse co-generation and thermal diesel. Hydropower accounts for 82% of all electricity generated in the country. As of the end of 2014 the total installed capacity stood at 855.75MW as at end of 2014.

**TABLE 2: DISTRIBUTION OF ELECTRICITY GENERATION SOURCES**

Electricity Generation Source	Contribution (%)
Large Hydro	73.6
Small Hydro	7.8
Bagasse Cogeneration	14.0
Thermal	4.6
<b>Total</b>	<b>100.0</b>

Access to electricity in Uganda remains low both by global and regional standards, and it is constraining the achievement of national social and economic development objectives. The overall access to electricity is estimated at approximately 14.9%<sup>3</sup> nationally and only seven percent in rural areas. As a consequence, Uganda has a low per capita electricity consumption which, at 80 kWh/year, is far below its peers, Kenya at 155 kWh/year and Ghana at 300 kWh/year, and is not comparable to industrialized economies such as South Africa at 4,694 kWh/year, or the Republic of Korea at 8,502 kWh/year. This is constraining the effort to accelerate economic development and improve people's livelihoods, as exemplified by the country's low performance of service delivery in health and education, which limits the achievement of national socio-economic objectives.

The heavy reliance on hydroelectricity led to a power shortage in 2006 due to a severe regional drought that greatly reduced the water levels leading a production gap of nearly one half of demand<sup>4</sup>. Learning from this lesson, the GoU strategy shifted towards expansion through diversification of renewable energies into the energy mix. In the short run, thermal power plants were introduced which provided electricity at a high tariff that necessitated

<sup>2</sup> Source: MEMD, Statistical Abstract, 2013

<sup>3</sup> UBOS, Rural Electrification Survey, 2012

<sup>4</sup> IMF 2006 Article IV Consultation with Uganda;  
<https://www.imf.org/external/np/sec/pn/2007/pn0708.htm>

subsidies from the GoU. This was not sustainable as it cost the economy over 1,122 billion Shillings (USD 320 million) for the period 2006 – 2010<sup>5</sup>.

In order to increase the National Grid Electrification rate, the GoU emphasis is on grid densification, grid extension and also investments on demand and supply side management.

### 1.1.2 Electricity Generation

Investments in renewable energy and pursuing improvements in energy efficiency measures are underway. Due to international treaties and hydrological restrictions, only 470 MW of the current installed capacity is available from large hydropower plants. At the current estimated demand growth of 9%, generation shortages are expected to return in 2016 and continue until new hydroelectric generation facilities are commissioned. In the interim, the GoU is promoting the development of small hydro power plants and other renewable energy resources (such as solar PV, geothermal, and biomass). In addition, energy efficiency measures are pursued the country, including the time-of-use electricity pricing, installation of solar water heaters, and power factor correction equipment among commercial and industrial electricity users.

Table 3 below provides information on the installed electricity generation capacity as of 2014.

The National Vision 2040 estimates that Uganda will require an installed capacity of 41,738MW<sup>6</sup> by 2040, a very tall order which will most likely be reviewed downwards. Nevertheless, the GoU is undertaking various projects to increase its generation capacity with the most notable ones being the ongoing projects of Karuma (600MW), Isimba (183MW) and 125MW from different renewable energy sources under the Global Energy Transfer for Feed-in-Tariffs (GETFIT) program. Projected generation assets per technology until 2020 are presented in Figure 1.

TABLE 3: INSTALLED ELECTRICITY GENERATION CAPACITY AS OF 2014

Station	No. of Units	Unit Capacity (MW)	Installed capacity (MW)	Date Commissioned
<b>HYDRO</b>				
Bujagali	5	50	250	2012
Kiira	5	40	200	2000
Nalubaale	10	18	180	1954
Kilembe mines (Mubuku I)			5	
Bugoye-Tronder	2	7.2	14.4	2009
Kasese cobalt (Mubuku III)	3	3.3	10	1998
Mpanga	3	6	18	2011
Ishasha	2	3.2	6.5	2011
Buseruka Kabalega-Hydromax	3	3	9	2013
*Nyagak I – WENRECo: Nyagak I	2	1.75	3.5	2012

<sup>5</sup> Performance of the Uganda Power Sector, May 2010

<sup>6</sup> Uganda National Vision 2040

Station	No. of Units	Unit Capacity (MW)	Installed capacity (MW)	Date Commissioned
<b>Sub Total</b>			<b>696.4</b>	
<b>THERMAL</b>				
Namanve-Jacobson	7	7.285	50.995	2008
Electro-Maxx-Tororo			68.2	2010
* UEDCL - Kalangala			0.64	
<b>Sub Total</b>			<b>119.835</b>	
<b>Co-Generation using Bagasse</b>				
**Kakira sugar works	3	16	50	2008
**Kinyara sugar Ltd	3	2.5	7.5	2009
<b>Sub Total</b>			<b>39.5</b>	
<b>Total</b>			<b>855.735</b>	

Source: Electricity Regulatory Authority (ERA) ESI Database

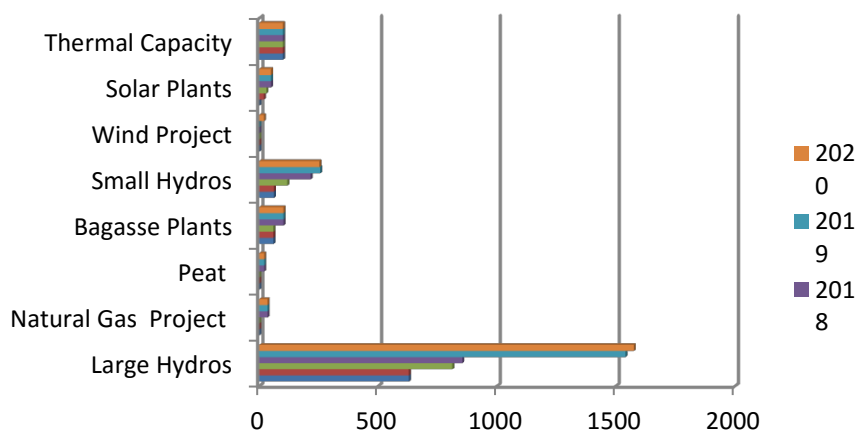
\* Off-grid plants

\*\* Plants have higher total installed capacities but for sugar manufacturing

From Figure 1 below, one can see that Uganda's generation mix will continue to be dominated by hydro power plants. Of significance to note is that these projections are void of geothermal, which if supported by SREP could slowly contribute to a change in the status quo and lead to a decrease on the dependence of hydrological resources that are highly exposed to the negative impacts of climate change.

After the recognition of the fact that the electricity consumption in Uganda is critically low and yet electricity is a necessity for development of primary growth sector, the GoU policy shifted towards access to modern energy services. This shift is clearly reflected in the Rural Electrification Strategy and Plan 2013-2022. Increasing electricity access can only be achieved if there is a sufficient and abundant supply of electricity and a robust interconnection and distribution network.

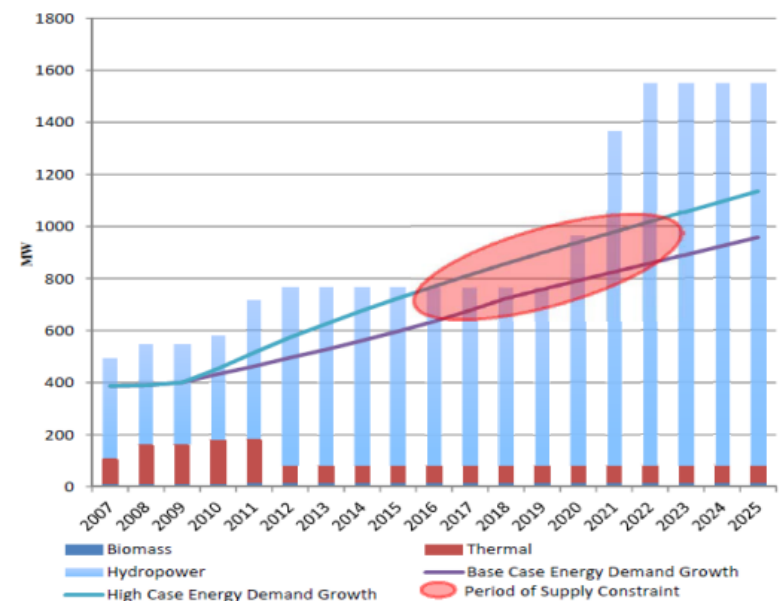
FIGURE 1: PLANNED GENERATION PROJECTIONS IN MW (2015-2020)



Source: ERA

Significant investment is required at every level of the electricity supply chain to secure adequate and reliable supply of electricity. At the current pace of growth, peak demand for electricity is expected to surpass the current available generation capacity by 2016. See Figure 2. The generation capacity shortfall is expected to remain until one of the planned large hydropower plants is commissioned. As an additional effort to avoid shortages and reliance on expensive thermal power plants, the GoU through the GETFIT program is promoting the development of small private power producers that can be commissioned faster and could be developed simultaneously without imposing financial and managerial burden on the GoU.

**FIGURE 2: DEMAND SUPPLY BALANCE (SOURCE UETCL)**



Source: UETCL

### 1.1.3 Electricity Transmission and Distribution Network

The transmission and interconnection infrastructure in Uganda is managed and operated by UETCL. By the end of 2014, the national grid infrastructure included 600km of 220kV lines, 5,680km of 132kV lines and 140km of 66kV lines<sup>7</sup>. On top of the existing infrastructure, UETCL is currently undertaking 8 national projects of different voltage capacities that will improve the quality of power supply and increase grid infrastructure by 1025.5km for 132kV transmission lines and by 601km for 220kV transmission line<sup>8</sup>.

The transmission network has expanded from 1,165 km in 2003 to 1,627 km in 2014. Transmission losses were 3.4% in 2014 (see Table 4). In the distribution sub-sector, energy purchase from the UETCL in 2014 totalled 3,171 GWh of which Umeme accounted for over 93 percent (2,950 GWh) and 221 GWh were purchased by other Service Providers. After years of inadequate maintenance and under-investment that caused the distribution network to deteriorate and electricity losses to reach nearly 40% in 2005, losses in the Umeme service areas were reduced to 21.3% in 2014 and the bills collection improved from 80% to 100 %.

<sup>7</sup> ERA ESI Database

<sup>8</sup> MEMD, Joint Sector Review Undertakings, 2014

The number of customers connected to the national grid has increased at over 50,000 per annum since 2009, and reached 613,000 in 2013.

**TABLE 4: UETCL TRANSMISSION LOSSES 2007-2014**

Year	Purchases (MWh)	Sales (MWh)	Losses (MWh)	Losses (in %)
2007	1,893,237	1,824,671	68,566	3.62%
2008	2,048,895	2,016,930	31,965	1.56%
2009	2,295,074	2,233,508	61,566	2.68%
2010	2,485,500	2,412,604	72,896	2.93%
2011	2,581,007	2,498,212	82,795	3.21%
2012	2,856,853	2,744,147	112,706	3.95%
2013	3,038,619	2,934,436	104,183	3.43%
2014	3,255,418	3,098,353	157,065	4.82%

Source: MEMD, Statistical Abstract, 2014

With most countries in the East and Central African region embarking on huge electricity generation projects, there have been steps taken towards the formation of an East African Power Pool. The power pool will foster energy security and enable Uganda to trade power with neighbouring countries. In preparation for this, UETCL is undertaking three interconnection projects<sup>9</sup>.

Expanding generation and transmission infrastructure is among one of the GoU's strategies to address challenges faced by the sector.

**TABLE 5: ONGOING INTERCONNECTION PROJECTS**

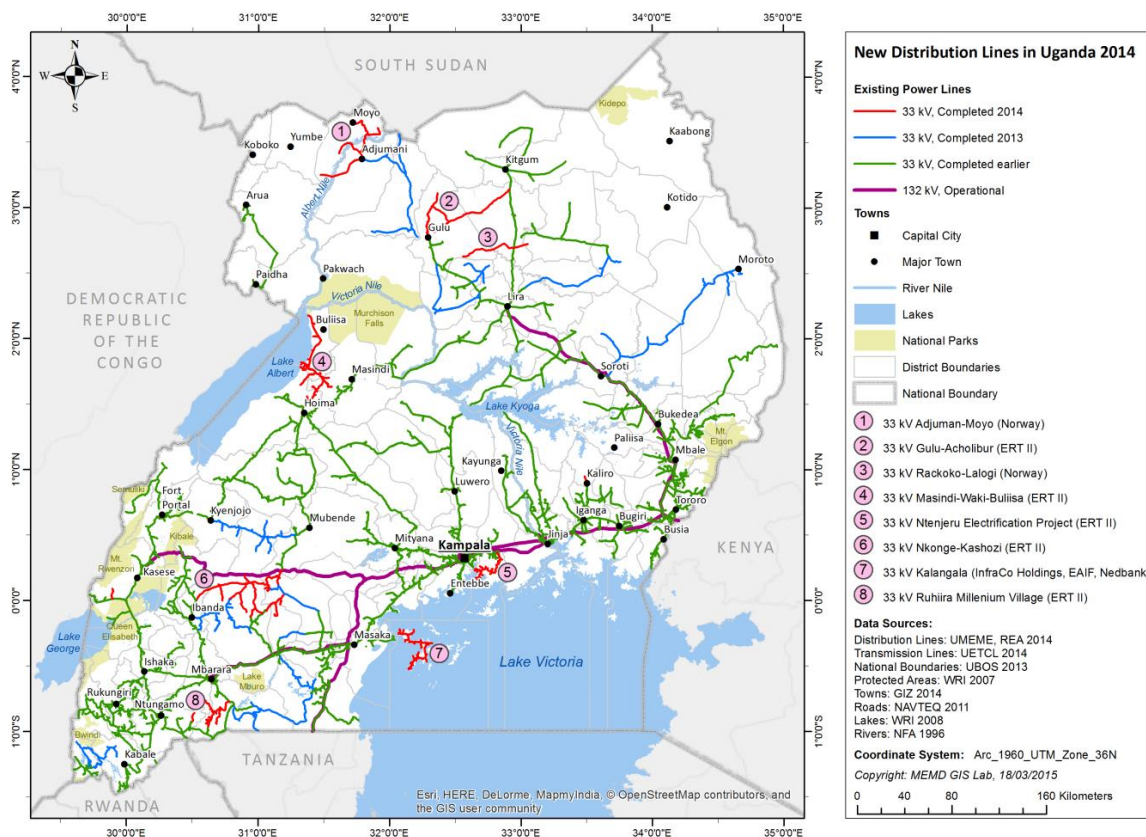
From	To	Type/ Length	Capacity MW	Comments
Uganda	Kenya	220kV 2 circuits 254km	300	Runs from Lessos substation in Kenya to Bujagali substation in Uganda passing through Tororo substation, duplicating the existing 132kV
Uganda	Rwanda	220kV 2 circuits 172km	250	Runs from Mbarara substation to Mirama (Uganda border) to Birembo in Kigali, Rwanda
Uganda	DRC	220kV 2 circuits	250	Runs from Nkenda substation to Mpondwe (Uganda border) to Beni in DRC

The distribution network with voltages of 33kV and below is dually managed by Uganda Electricity Distribution Company Limited (UEDCL) and Rural Electrification Agency (REA) on behalf of the GoU. Uganda currently has 14 service territories with nine being managed under concession by Umeme, FerdSult, KREKS, BECS, PACMECS, KIL and WENRECO while the

<sup>9</sup> Extracted from the Master Plan, East African Power Pool

remaining five are managed by UEDCL under a management contract with REA. The distribution line network across the country as by 2014 is presented in Figure 3.

FIGURE 3: UGANDA TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE



### 1.1.4 Electricity Tariffs

ERA is in charge of regulating sales of electricity, its utilization, imports and exports, as well as licensing in the sector. In addition it is responsible for setting and regularly updating electricity tariffs. ERA has regulations relating to the process of tariff calculation, both the level and structure, and these are set out in the Electricity (Tariff Code) Regulations, 2003. The current tariff regime applies a rate of return regulation commonly known as a cost of service regulation, such that the cost of revenue to be earned should be equal to the cost to supply electricity plus a fair return.

As previously stated, the only relevant subsidy element in the supply chain at the moment is the UETCL's capacity payments for stand-by thermal power plants, which amounted to USD 23 million in 2014, and was funded by the GoU. These thermal power plants are only dispatched as last resort to ensure the system's reliability.

For grid-connected consumers, electricity tariffs are set at three different levels, starting with: (i) the Generation Tariff<sup>10</sup> / Feed-in-Tariff (FIT) levied by UETCL, (ii) the BST levied by UETCL, and (iii) the end user tariffs which are levied by the distributors directly to the end consumers.

<sup>10</sup> The prices between the generation company and UETCL are negotiated between themselves in the form of a Power Purchase Agreement which is subject to oversight and approval by ERA

Generation tariffs depend on both capacity and energy payments. For large hydro power plants such as Nalubale (180MW), Kiira (200MW) and Bujagali (250MW), UETCL pays a capacity charge per unit (kW). The capacity charge is determined annually but adjusted quarterly for changes in tested capacity, inflation and exchange rate fluctuations. For the thermal power plants like Jacobsen-Namanve and ElectroMaxx-Tororo, UETCL pays a capacity charge which is meant to recover the capital cost of the project, operation and maintenance costs and an energy charge which is aimed at the recovery of the operations and maintenance costs as well as fuel costs. The weighted average generation tariffs including both energy and capacity payments are presented in Table 6.

**TABLE 6: WEIGHTED AVERAGE GENERATION TARIFF**

Generation Source	Installed Capacity (MW)	Tariff (Shs/kWh)	Tariff (US cents/kWh)
Eskom (U) Limited	380	29	1.1
Bujagali Energy Limited	250	315	12.1
Mini- Hydros	63	229	8.8
Co- Generation	30	211	9.5
Thermals	100	611	25.4
<b>Weighted average generation tariff</b>	<b>823</b>	<b>219.9</b>	<b>8.4</b>

Source: ERA, 2015

The BST is the cost per kWh charged by UETCL to all distribution companies that are connected to the grid. The BST is reflective of the cost of power acquisition and transmission costs which means that it is based on the revenue requirement of UETCL which includes operation and maintenance costs, the net power purchase costs and allowance for debt service costs. The BST has three structures: (i) peak, (ii) shoulder, and (iii) off-peak.

ERA has classified the end user consumers into five categories as per the table below<sup>11</sup>.

**TABLE 7: ELECTRICITY TARIFFS PER CATEGORIES**

Category	Voltage	Time Differentiated <sup>12</sup>	Comments
Domestic	240V single phase	No	Residential houses, shops and kiosks
Commercial	415V	Yes	Small commercial consumers with a load not exceeding 100Amp
Medium scale industries	415V	Yes	Medium scale industries with maximum demand of 500kVA
Large scale industries	11kV/33kV	Yes	Large scale industries with demand ranging from 500kVA but not exceeding

The time of use periods for the end user tariffs are peak (18:00 – 24:00hrs), shoulder (06:00 – 18:00hrs) and off peak (24:00 – 06:00hrs) with end user tariffs being higher for peak, and lowest for off peak. The only category of end user consumers with no time differentiated tariffs has been the domestic user.

<sup>11</sup> Extracted from ERA, Tariff Setting Guide, 2007 (Pages 13-18)

<sup>12</sup> To ensure energy efficiency, the tariffs are time differentiated under different time of use periods.



It should also be noted that the end-user tariffs for off-grid distributors are different from the end-user tariffs for on-grid distributors. An off-grid distributor like WENRECO charges nominally higher tariffs than an on-grid distributor like Umeme. The tariff rates for both on grid and off grid distributors are regulated and approved by ERA.

### 1.1.5 Electricity Feed-in Tariffs

The Renewable Energy Feed in Tariff (REFIT) was introduced under the Renewable Energy Policy, 2007. Its main objective was to promote and support greater private sector engagement in power generation from renewable energy technologies by providing a fixed tariff based on the levelized cost of production for a guaranteed period of time.

In the context of REFIT, renewable energy is defined as electricity which can be generated from energy resources such as water power, wind power, solar energy, geothermal energy, biogas and landfill gas combustion, and biomass cogeneration.

The REFIT Phase 1 ran from 2007-2009 but due to the limited uptake of private developers, the REFIT was reviewed in 2010 leading to the establishment of REFIT Phase 2. Overall, the perception from private investors was that the tariff levels under the REFIT as published by ERA were insufficient to cover the levelized costs of the proposed technologies. Table 8 provides a summary of these tariffs.

**TABLE 8: FEED-IN-TARIFFS APPLICABLE FOR 2013 - 2016**

Technology	Tariff (US\$/kWh)	O&M %age	Cumulative Capacity Limits (MW)				Payment Period (Years)
			2013	2014	2015	2016	
Hydro (9 >= 20 MW)	0.079	7.61%	30	90	135	180	20
Hydro (1 >= 8MW)	Linear tariff	7.24%	30	75	105	135	20
Hydro (500kW >= 1MW)	0.109	7.08%	1	2	2.5	5.5	20
Bagasse	0.081	22.65%	30	70	95	120	20
Biomass	0.103	16.23%	5	15	25	45	20
Biogas	0.115	19.23%	5	15	25	45	20
Landfill gas	0.089	19.71%	0	10	20	40	20
Geothermal	0.077	4.29%	10	30	50	75	20
Wind	0.124	6.34%	25	75	100	150	20

Source: ERA, 2013

Because FIT tariffs were insufficient to render a number of projects under preparation bankable and allow them to reach financial close due to low rates of return, the GoU in cooperation with some development partners have put in place the GETFIT Program Uganda. A program developed to provide additional payments per kWh, above and beyond the regulated REFIT tariffs. The main purpose of the GETFIT was to fast-track a portfolio of up to 15 small-scale renewable energy generation projects (1MW-20MW) promoted by private developers with a total installed capacity of roughly 125MW.

Due to exchange rates volatility and relatively small rates of return that were achievable with REFIT, the increased engagement of private developers in the exploitation of renewable technologies through this framework was not achieved because tariffs were perceived by private sector investors as insufficient. The GETFIT was therefore designed and put in place to leverage private sector investment in renewable generation infrastructure. It was first launched in 2013 and a third round for up to 20MW Solar PV will start in 2016. Table 9 provides the additional premium paid under phase I of the GETFIT program.

TABLE 9: GETFIT PREMIUM PAYMENTS UNDER FIRST REQUEST FOR PROPOSALS

Technology	Current REFIT Tariff (US\$/kWh)	GET FIT Premium (US\$/kWh)
Hydro (9>=<=20 MW)	0.079	0.02
Hydro (1 ><=9MW) *	0.082 - 0.092	0.02
Bagasse	0.081	0.01
Biomass	0.103	0.01

Source: ERA, 2013.

The GETFIT program is supported by Governments of Uganda, Norway, United Kingdom and Germany, in addition to the European Union and the World Bank (WB). The pre-defined target of the GETFIT program was to have 170MW of installed capacity of RE from hydro, biogas and biomass by 2018 as a top-up on the REFIT for hydro, biogas and biomass. According to the GETFIT Premium Payment Mechanism, the selected private developer would qualify for 50% of the total GETFIT premium on Commercial Operation Date and the other 50% paid over the course of the first five years of operation.

An additional component of Solar PV was added to the GETFIT program in 2014, funded by the EU. The GETFIT Solar facility involved a reverse tender approach where ERA determined USD 0.11 per kWh and GETFIT would offer the gap payments to the tariffs tendered by the successful bidders. Two firms were successful with each operating 2x5MWp plants in Tororo and 2x5MWp Soroti.

After two rounds of proposals, 128MW of renewable technologies were approved for funding and are at different stages of development. Table 20 includes a representation of the installed capacities from each renewable energy technology under GETFIT.

TABLE 10: GETFIT INSTALLED CAPACITIES BY TECHNOLOGY

Renewable Energy	Capacity (MW)
Hydropower <sup>13</sup>	80.2
Biomass	1
Bagasse	26.9
Solar PV	20
<b>Total</b>	<b>128.1</b>

One of the main challenges identified during the course of implementation of the GETFIT program was critical grid bottlenecks. It became imperative to ensure adequate

<sup>13</sup> Not exceeding 20MW, each

interconnection and power evacuation for several projects in the GETFIT portfolio. A study commissioned by the GETFIT program identified the critical grid areas as being the Mbale-Bulambuli 132kV 60km transmission line and two substations, the Opuyo substation, reinforcement of 33kV distribution networks in Kasese and Fort Portal, and Nkenda substation. The decision to undertake this study was informed by deemed energy experiences from the Hydromaxx Kabalega 9MW power plant that could not operate at full capacity due to a lack of interconnection infrastructure to evacuate power to load centres.

With the successful completion of GETFIT portfolio by 2018, the GETFIT program has the potential to be replicated in other African countries with the ultimate goal of stimulating private sector investment in the renewable energy space, especially in economies where the tariffs are not favourable and the terms and conditions of debt financing are not attractive.

### 1.1.6 Rural Electrification

The Second Rural Electrification Strategy and Plan (RESP-2) covering the period 2013-2022, sets a guideline that mandates REA to increase electricity access in rural households from an estimated 7% in 2012 to 26% by 2022.

It is widely perceived that public sector involvement is key to facilitate rural electricity access. It is not uncommon to see rural electrification activities requiring public financial support because they are not financially viable on their own. In sparsely populated rural areas, revenues from households are often insufficient to recover the capital expenditures especially during initial years.

The results of economic and financial analyses of on-grid electrification under the proposed project similarly suggest that the activities in rural electrification, while economically viable, are not financially viable when capital expenditures are included. However, the revenues from electricity sales are sufficient to recover the operating expenses. For this reason, it has become clear that the public sector had to engage in rural electrification.

At the start of the decade, the Rural Electrification Strategy and Plan 2001-2010 targeted to achieve an access rural electrification rate of 10%, with 400,000 new customers having access to modern energy services and 80,000 solar PV systems installed by 2010. With the larger percentage of the population residing in rural areas, the importance of rural electrification in stimulating rural employment diversification, enhancing food security, reducing inequalities caused by unbalanced access to electricity could not be overstated.

In all these shortcomings, many successes were achieved, notable among them are:

- i. Over 8,000km of medium voltage lines (33kV and 11kV) and 4,000km of low voltage lines constructed and commissioned
- ii. 31 District Headquarters connected to the main grid
- iii. Two private companies and three cooperatives awarded operation and maintenance concessions in seven areas outside Umeme areas
- iv. The use of pre-paid metering in all areas where REA has awarded concessions
- v. Introduction of ready boards to ease connection of poorer households to electricity
- vi. Supported renewable energy development (small hydro 37.3MW and cogeneration 21MW)
- vii. Developed a program to encourage off-grid solar power by use of PV Targeted Market Approach (PVTMA) by providing direct subsidies to consumers through

cooperation with shortlisted private solar companies and registered financial institutions. Over 18,000<sup>14</sup> solar PV installations were achieved.

- viii. Developed and sustained pioneer User Based Energy Cooperative under SIDA support currently in operation in districts of Pader-Abim-Agago (PACMECS) and Bundibugyo-Ntoroko (BECS).

In 2010, the rural electrification rate was approximately 4% well short of the target of 10%, a big shortfall on the expectation of the Rural Electrification Strategy & Plan (RESP) 2001 – 2010. Several factors accounted for the failure in meeting the target, including a failure to educate the rural population of the benefits of electricity and inadequate marketing by service providers, the high cost of service connection to rural households, the lack of interest on the part of electric distribution utilities and inexistence of solar PV suppliers to enter the rural market. Nevertheless, three projects were taken on by private investors that led to a total increase in consumer serviced of some 3,500. The GoU has therefore resolved to step in and undertake direct investment in rural service extension, which yielded moderately improved results, but the program must now be put on a footing to accelerate the pace of renewable access expansion.

#### **Box 1: Lessons learnt from RESP 2001-2010**

"Previously, rural electrification investment sponsorship was offered to private investors and entrepreneurs to lead rural energy service development as part of the Government's policy of decentralization and privatization of the energy sector. However little entrepreneur-led electrification investment actually occurred, as this policy proved to have placed excessive faith on the motivation of capacities of private sponsors to undertake risk and perform this role. To fill the void, Government stepped in with a more direct approach to funding and implementing rural electrification, with improved results in terms of investment flows, but other impediments including a very low rate of consumer service connection have become evident and that must be addressed. The new strategy was formulated from an understanding of lessons learned from the first RESP and from analysis of other constraints in the current program model."

Source: Adapted from RESP 2013-2022, Lessons Learned Page 2

### **Gender Inclusiveness in the Energy Sector**

The Constitution of Uganda guarantees equality of women and men and empowerment of women to participate in development through affirmative action. A National Gender Policy and a National Action Plan were formulated to support the constitutional provisions in this regard, with gender mainstreaming high on GoU's agenda.

The National Gender Policy seeks to institutionalize gender as a key concept in development work in all sectors and line ministries. The Policy recognizes that while both women and men play equal economic roles in Uganda, women bear the brunt of domestic tasks in addition to agricultural and other productive work. Women work considerably longer hours but tend to be poorer than men in poverty determinants due to a number of gender disparities. While impressive progress has been made in education, gender inequalities remain and need to be continuously addressed by policy.

Limited access and use of energy are cited in the Uganda National Development Plan (NDP) for 2010/11-2014/15 as significantly slowing down the country's economic and social

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<sup>14</sup> 7,000 solar PV installations made under GoU sponsored projects

transformation. The Plan advocates accelerating access to and consumption of electricity nationwide by investing in least cost power generation and promoting renewable energy applications in rural areas. The labour and health impacts of biomass energy use by women are mentioned in the Uganda Energy Policy (2002). Integration of the gender dimension is included in the policy objectives and strategies of the Renewable Energy Policy (2007).

The current structure of energy consumption in Uganda accounts for much of the gender disparity with nearly 95% of total primary energy consumption due to cooking with biomass fuels, and, women are invariably the ones who carry out this task in households, constantly required to collect it. Inhalation of smoke and other emissions in indoor use increases the risks for respiratory diseases. Provision of electricity, while beneficial to women in other ways, is not likely to reduce the current reliance on biomass stoves. However, promotion of more efficient stove designs that reduce fuel needs and cut down smoke and other emissions could be an effective approach to this problem.

Provision of modern renewable technologies in rural areas - such as solar PV for lighting and powering communication devices - contributes significantly to the well-being of women who normally perform indoor chores. Substitution of kerosene lamps with clean PV powered LED lights directly improves women's health by reducing indoor pollution.

Providing rural households with minimal electricity supply for lighting, such as solar home systems, addresses another burden unequally shared by women: indoor pollution from the use of traditional kerosene lamps and consequent health impacts. Access to electricity for other economic and social purposes reduces the drudgery experienced daily by women and elevates their well-being.

The impact of rural electrification programs on women is well-documented, ranging from time savings, employment and education, to safety and maternal health. The key is to engage rural electrification programs in gender issues in all phases of planning and implementation: (i) at the institutional level in employment practice and human resource policies, and (ii) at the construction level through connection with social institutions and energy information campaigns targeting women; and at implementation level, by targeting both genders in a designed social intermediation process.

## 2.0 NATIONAL ENERGY POLICY AND INSTITUTIONAL FRAMEWORK

### 2.1 National Policy and Vision

Since 2002, Uganda's economy has consistently grown at an average rate of 7% per annum and has built sufficient momentum for take-off. In order to consolidate and accelerate this growth process, the GoU has approved in 2007 the Comprehensive National Development Planning Framework (CNDPF) which provides for a 30 year vision to be implemented in three 10-year plans, six 5-year National Development Plans (NDPs), Sector Investment Plans (SIPs), Local Government Development Plans (LGDPs), and Annual Work plans and Budgets.

Consequently, Cabinet approved the National Vision Statement, "*A Transformed Ugandan Society from a Peasant to a Modern and Prosperous Country within 30 years*". The National Planning Authority in consultation with other government institutions and other stakeholders then developed a Uganda Vision 2040 to operationalize the Vision Statement, building on the progress that has been made in addressing the strategic bottlenecks that have constrained Uganda's socio-economic development since the independence, including: (i) weak private sector, (ii) underdeveloped human resources, (iii) inadequate infrastructure, (iv) small market, (v) lack of industrialization, (vi) underdeveloped services sector, and (vii) underdevelopment of agriculture.

In relation to the energy sector, the key target set out in the Uganda Vision 2040 is to increase electricity per capita consumption to 3,668kWh by 2040. To achieve this target, the national grid access rate should increase to 80% with total installed generation capacity reaching to 41,738MW.

#### 2.1.1 Energy Policy and Strategy Framework

The guiding policy governing the overall energy sector in Uganda is the Energy Policy for Uganda 2002, with the goal of "*meeting the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner.*" However, there exist other specific policies, legal and statutory instruments and strategies targeted towards promotion and sustainable use of particular technologies such as:

- i. Electricity Act, 1999: Provided for the establishment of an Electricity Regulatory Authority and the liberalisation and unbundling of the electricity sector.
- ii. Renewable Energy Policy, 2007: Aims at increasing the use of modern renewable energy from the current 4% to 61% of total energy consumption by 2017.
- iii. Atomic Energy Act, 2008: Regulates the peaceful application of ionising radiation and for the establishment of the Atomic Energy Council.
- iv. Biomass Energy Strategy, 2013: Propose rational and implementable approaches to manage the biomass energy sector.
- v. Rural Electrification Strategy and Plan 2013-2022: To position the electrification development program on a path that will progressively advance towards achievement of universal electrification by the year 2040, consistent with the existing policy of the Government, while ensuring the displacement of kerosene lighting in all rural Ugandan homes by 2030.

The Energy Policy dictates that priority investments in the energy sector must take into account the National Vision 2040. The SSIP not only identifies challenges in the sector but also highlights the opportunities and how these will be harnessed. It provides a roadmap to guide

government, private sector, development partners, and key stakeholders to make public interventions that will help meet objectives of the sector. The key interventions proposed by the SSIP in the medium term are;

- a. Increase in generation capacity through construction of Karuma HPP (600MW), Isimba HPP (183MW) and commissioning of GETFIT portfolio of projects.
- b. Reinforcement of the transmission infrastructure through construction of various transmission lines of 220kV and 132kV voltages.
- c. Enhancing rural electrification through implementation of ERT Phase II and III and Implementation of the Rural Electrification Strategy and Plan 2013 – 2022 and promote public awareness and interest in rural electrification issues;
- d. Make adequate investments in new and renewable energy technologies such as biogas, gasification, biofuels, improved stoves and use of solar energy;
- e. Government shall study and initiate the peaceful application of atomic and nuclear energy; and,
- f. Government shall encourage investments in programmes aimed at efficient energy use and conservation of energy for sustainable development and a healthier environment.

## 2.1.2 SE4All

The SE4All initiative, launched in September 2011 by the UN Secretary General Ban Ki Moon, is strongly linked with the sustainable development agenda of the Developing World. It has three goals: (i) providing universal access to modern energy services, (ii) doubling the global rate of improvement in energy efficiency, and (iii) doubling the share of renewable energy in the global energy mix by 2030.

Uganda's SE4ALL initiative was officially launched on Wednesday 10<sup>th</sup> September 2014 with Uganda as one of the 14 fast movers in Africa that validated its Action Agenda and set its quantitative indicators for the three goals that are presented in Table 11.

TABLE 11: SE4ALL UGANDA GOALS WITH SET TARGETS

Objective 1: Universal access to modern energy services		Objective 2: Doubling global rate of improvement in energy efficiency	Objective 3: Doubling share of renewable energy in the global energy mix	
Percentage of population with electricity access	Percentage of population with access to modern cooking solutions	Reduce national wood consumption by 40% and improve energy efficiency of power users by minimum 20%, target 15% grid distribution losses	Renewable Energy share in total final energy consumption	
			Power	Thermal
>98%	>99%	>99%	>90%	36%

Source: Uganda SE4ALL Action Agenda - 2015

In the most recent SE4ALL Action Agenda, the Uganda SE4ALL Secretariat is proposing a list of actions/programmes that will help the country achieving the above 3 goals by 2030 (see table above). In this framework, the 2015 SREP program is planning to finance the development of a list of selected renewable energy projects accordingly.

The envisaged targeted technologies by SREP are discussed further later in the document but fall directly into the list of activities/programmes suggested in the Uganda's SE4All Action Agenda.

In a country in which generation is dominated by hydropower, the SE4ALL action agenda proposes to diversify the country's sources of energy in order to limit its dependence on hydropower advocating for the development and deployment of more diversified renewable energy technologies by 2030.

The percentages presented in the previous table represent SE4ALL target levels to be achieved by 2030.

All SREP projects will have the potential to contribute directly or indirectly to the targets set by SE4ALL in the following aspects:

- Access: Geothermal and the solar PV components, off-grid and on-grid net metering, are set to increase generation of electricity to the tune of a combined 280MW in a span of 5-7 years, a handsome increase on the existing installed generation capacity of 855.75MW as at end of 2014
- Share of renewables in the energy mix: This will no doubt increase substantially through introduction of hitherto untapped and sizeable geothermal and Solar PV, that was at very low levels until the upcoming GETFIT 20MW on-grid tender.

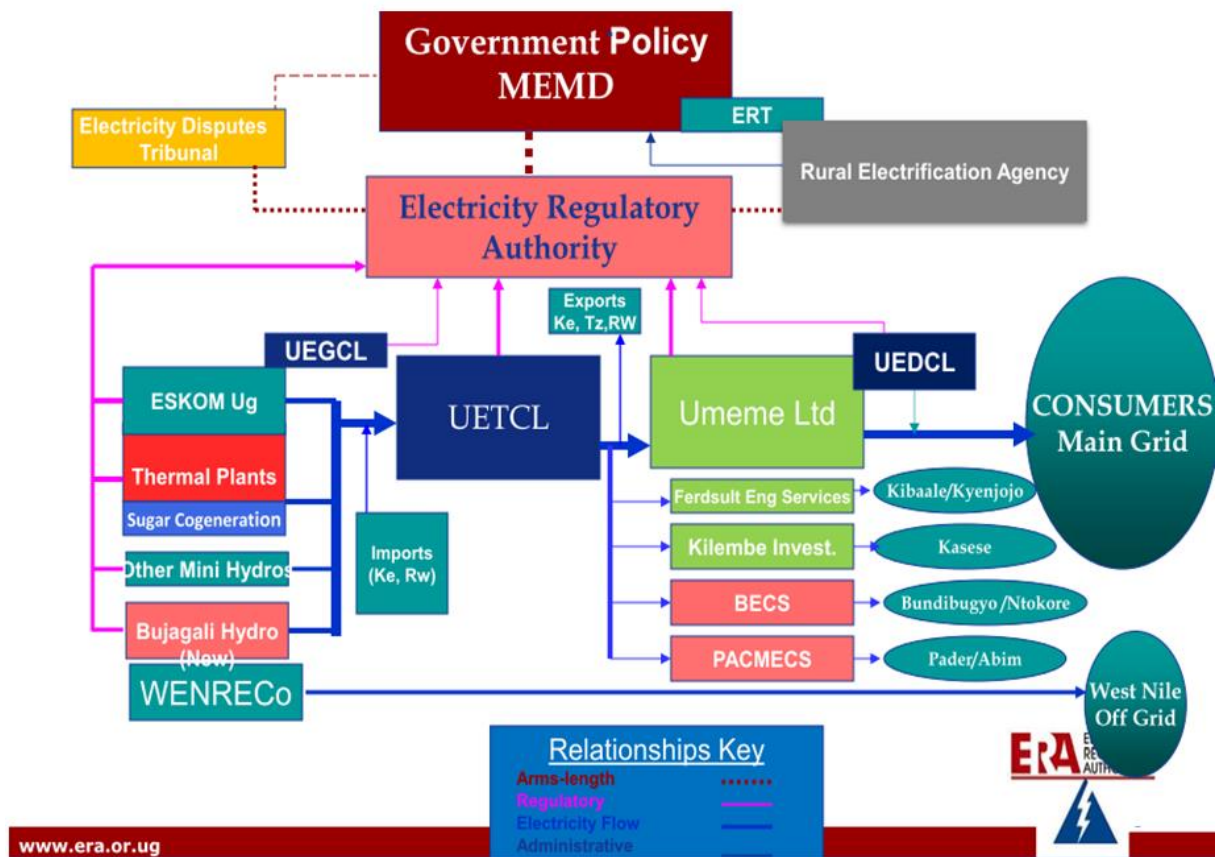
### 2.1.3 Institutional Framework

Figure 5 presented below shows the hierarchy of the electricity sub-sector institutional framework.

MEMD as the line ministry is at the apex of the figure with ERA following in the hierarchy. ERA assumes responsibility for UEGCL, UETCL, UEDCL that are in charge of generation, transmission and distribution respectively, along with all off-grid generators, IPPs and related companies. Under UEGCL are the generation concession holders (e.g. ESKOM). UEDCL on the other hand is in charge of distribution concession holders (Umeme holding the main grid) and other related energy cooperatives.



FIGURE 4: ORGANOGRAM OF ENERGY ENTITIES UNDER MEMD



Source: ERA

### 2.1.4 National Institutions

**Ministry of Energy and Mineral Development (MEMD):** The entity responsible for energy and mineral resources in Uganda. It plays the role of policy supervisor and oversight in the energy and mineral sector. The mandate of the MEMD is to “Establish, promote the development, strategically manage and safeguard the rational and sustainable exploitation and utilisation of energy and mineral resources for social and economic”.

**Electricity Regulatory Authority (ERA):** A Statutory Body established in the year 2000 in accordance with the Electricity Act 1999 to regulate the generation, transmission, distribution, sale, export and import of electrical energy in Uganda, and to guide the liberalization of the electricity industry, manage licensing, rates, safety and other matters concerning the electricity industry. ERA’s mandate is to supervise all licensed companies within the electricity sector to ensure they comply with the Electricity Act 1999 and Regulations thereto, and to safeguard all stakeholders’ often competing interests. In performing its functions, ERA ensures that electricity companies comply with the conditions of their licenses and protects the interests of electricity consumers in respect of: (i) the prices, charges and other terms of supply of electricity, (ii) and the quality, efficiency, continuity and reliability of the supply services.

**Uganda Electricity Generation Company Ltd (UEGCL):** A limited liability company incorporated in 2001 and fully-owned by the GoU. UEGCL’s key role is to carry on the business of electric power generation and sale within Uganda or for export to neighbouring countries. In addition it builds, operates and maintains a number of electricity Generation

power plants, monitors the operation and maintenance of its concessioned assets, provides technical support as and when required by the GoU through MEMD.

Uganda Electricity Transmission Company Ltd (UETCL). Under the single buyer model, UETCL owns and operates the High Voltage Transmission Grid, coordinates the power supply system to achieve balance between supply and demand, dispatches generation facilities, negotiates all bulk power purchase agreements, and manages power exports and imports.

Uganda Electricity Distribution Company Ltd (UEDCL). Owns and manages assets consisting of substations and voltage networks, land and buildings, tools and equipment and other assets, monitors compliance to Lease and Assignment Agreement, operates and maintains off-grid stations in Moyo, Adjumani and Moroto until their divestiture, manages a pole treatment plant and supervises completion of the Rural Electrification Schemes that were under construction before the transfer of business to Umeme.

Rural Electrification Agency (REA). It operationalizes the government's rural electrification function under a public-private partnership framework. It functions as the secretariat of the Rural Electrification Board which carries out the rural electrification responsibilities, as per Electricity Act of 1999. It is mandated to facilitate the goal of achieving a rural electrification rate of at-least 22% by the year 2022.

Umeme. Umeme is the largest electricity distribution company in Uganda. It is mandated to: (i) operate, maintain, upgrade and expand the distribution network, (ii) retail electricity to its customers, and (iii) to improve efficiency within the electricity distribution system. It's listed on the Uganda Securities Exchange and on the Nairobi Securities Exchange (NSE). Investec Asset Management is the majority shareholder after a second issue in 2014.

### **2.1.5 Role of Private Sector**

The liberalization of the energy sector through the 1999 Electricity Act paved the way for public sector participation in different activities, in particular development of small hydro sites. The creation of ERA and its mandate to promote the development of REs further created a framework through which the public sector could participate. In that regard, ERA is mandated to undertake preliminary resource assessment and invite interested investors to pursue their development. This marked a turning point in RE sub-sector development, bringing on board technologies that had not been touched and more activity for those that existed like hydro.

Independent Power Producers. IPP investments in Uganda have taken two forms: (i) purely private sector-led project, or (ii) a Public-Private Partnership (PPP). Some of the notable private projects include Bujagali HPP (250 MW), Kabalega HPP (9MW), Bugoye HPP (13MW), Kakira Cogeneration from bagasse (52MW) and the entire GETFIT portfolio. The noteworthy PPP is Nyagak 1 (3.5MW), a partnership between the GoU and WENRECo which also holds the license to distribute power in the West Nile region that has not yet been connected to the grid.

Concession Holders of Generation Assets. These are private firms that manage generation assets under concession agreement. Currently only one private firm Eskom is managing the hydropower plants of Kiira and Nalubaale under a concession agreement.

Umeme. This is the largest distribution company in Uganda and was the first company to operate the distribution network in Uganda. UMEME holds a concession to operate, maintain, upgrade and expand the distribution network, retail electricity to its customers and to

improve efficiency within the electricity distribution system. The Umeme concession runs till 2022.

License Holders for Service Territories. Currently there are 8 companies and cooperatives holding licenses to distribute power within the prescribed service territories. As aforementioned, UEDCL is managing four service territories under a management contract.

### 2.1.6 Role of Development Partners

Many development partners have handsomely contributed to the development of the energy sector in Uganda. In a brief summary, these interventions are listed hereunder:

- i. European Union: Expanding Sustainable Energy Markets through Microfinance-Energy Enterprise; efficient stoves among rural households in Northern Uganda; West Nile Grid Extension; Output Based Aid (OBA); access to energy services in rural and peri-urban areas in northern Uganda; scaling-up rural electrification using innovative solar photovoltaic (PV) distribution models; rural electrification project in Western and Southern parts of Uganda; Masaka-Mbarara T-line; Mbale-Bulambuli 132kV Transmission Line; GET FIT; scaling up access to modern electricity services on a regional scale in rural Sub-Saharan Africa by means of a fee for service business model; and, support to the SE4ALL Secretariat at MEMD
- ii. France: Hoima-Nkenda T-line and 2 substations; Masaka-Mbarara T-line; Muzizi HPP;; and, Rural Electrification Project.
- i. Germany – KfW: Maziba HPP; Nyagak I HPP; Nyagak III HPP; West Nile Grid Extension; Kampala-Entebbe Transmission Line; and, Mbale-Bulambuli Transmission Line.
- iii. Germany – GIZ: Solar PV for social Institutions; Clean Cooking; Grid extension - Western Uganda; Grid extension- Northern Uganda; Quality Management System; Energy mainstreaming in DLGs; small scale off-grid projects; policy review; market structure development; energy audits; advisory and capacity building; and, Climate Finance.
- iv. Japan: Preparatory Survey on Ayago Hydropower Project; Rural Electrification Project Phase 3; Bujagali Interconnection Project; and, Interconnection of Electric Grids of NEL Countries Project (NELSAP).
- v. Norway: UETCL - Statnett twinning-phase III; Construction of Hoima - Fort Portal - Nkenda t-line; Hoima - Kafu t-line study; Mirama - Kikagati - Nsongezi t-line study; Construction of 2 rural electricity distribution and connection subsidy; construction of 6 rural distribution projects; GET FIT; and, NELSAP Uganda - DRC t-line study
- vi. United Nations Development Program (UNDP): Enabling environment for sustainable land management (SLM) to overcome land degradation in the cattle corridor of Uganda project; improving policies and strategies for environment, natural resources and climate risk management; addressing barriers to the adoption of improved charcoal production technologies and related sustainable land management practices through an integrated approach project; Strengthening Sustainable Environment and Natural Resource Management, Climate Change Adaptation and Mitigation in Uganda project; and, Low Emission Capacity Building Project.
- vii. United States of America: Environmental Management for the Oil Sector; Power Africa Regional Transaction Advisor; Power Africa Geothermal Advisor; Kalangala Infrastructure Services; Development Credit Authority; and, East Africa Regional Regulatory Partnership.
- viii. Iceland: ICEIDA is assisting Uganda at the United Nations University Geothermal Training Program in Reykjavik through a six month specialized training. ICEIDA is sponsoring a geothermal exploration short course in Niavasha, Kenya together with Geothermal Development Company and KenGen of Kenya. ICEIDA is also supporting UNEP-ARGeo

in maintaining and updating the African Geothermal Inventory Database and is partnering the WB to extend USD 700,000 for geothermal development under the ERT3. Finally, ICEIDA is supporting Uganda to prepare a full application for a grant from the Geothermal Risk Management Facility.

- ix. World Bank: Following ERT 1 and 2, the WB is now finalizing the ERT 3 program that will provide up to USD 300 million that will be implemented as per the following two key activities:
  - i. On-grid Electricity Access and Associated Connections: to include grid extension and associated connections, grid intensification and associated connections, household connections from existing distribution lines, and an implementation support program for on-grid energy access.
  - ii. Off-grid Electricity Access: to include dissemination of institutional Solar PV systems, business development program for rural access, financial intermediation program for rural access, and quality assurance program for Solar market development.
  - iii. Institutional Strengthening and Impacts Monitoring: to include an institutional strengthening program for geothermal development.
- x. African Development Bank: approved recently a US\$121 million loan and grant to help Uganda's government improve access to electricity for rural households, businesses and public institutions to ultimately improve the livelihoods, economic opportunities and access to social services in rural communities. The project will build about 1,147 km of medium voltage and 808 km of low voltage distribution networks and provide last-mile connections to the grid for over 58,206 rural households, 5,320 rural business centers and 1,474 rural public institutions (schools, health centers and administration offices). In addition, it will support the scaling-up of "inclusive and green" connections by supplying and installing ready-boards for those who cannot afford household wiring and allowing households to pay connection charges in installments to intensify connections for more than 99,000 new customers near the existing grid in electrified rural and urban areas.

A request was also extended to UNDP to assist with development of a Solar Master Plan.

Development partners work closely with GoU in co-funding and implementing programmes ranging from building infrastructure, TA and in this case energy, from all perspectives. They meet and agree on the distribution of the target activities between themselves, thereby providing support to development across various sectors in the economy. Details are attached under Annex 7.

### **2.1.7 Role of Financial Sector in Financing Renewables**

The financial sector in Uganda is competitive but so far it has failed to engage considerably in financing renewable energy technologies in the country. In fact, factors such as high interest rates, exchange rates volatility and inflation have hindered the capacity of local commercial banks to provide long-term financing beyond a certain period that is adequate for the deployment of these technologies. Furthermore, there is a disconnect between the financing needs of capital intensive IPPs and the products available in the market as limited recourse and non-recourse financing schemes are inexistent due to unavailability of longer tenors required to finance such projects.

Consequently, in the short-term, the country and its private sector will continue relying on international flows of financing to ensure the development of renewable energy technologies, namely from SREP. It is expected that as the sector evolves and track record is

created this reality may change. SREP can play a catalytic role by allocating a significant amount of resources to technologies that have little track record in country but that can generate revenues and be self-sustainable in the future.

## 3.0 RENEWABLE ENERGY SECTOR

### 3.1 Renewable Energy Potential: Overview of Issues

Uganda is endowed with abundant renewable energy resources which are fairly distributed throughout the country. These include: (i) hydro, (ii) biomass, (iii) solar, (iv) geothermal, and (v) wind. The energy resource potential of the country includes large hydro (2000MW), mini-hydro (200MW), geothermal (450MW), 460 million tonnes of biomass standing stock with a sustainable annual yield of 50 million tons, 5.1 kWh/m<sup>2</sup> of solar energy. Much of the potentials for renewables have so far not been exploited.

This endowment of renewable energy resources has the potential to help the country diversify its energy mix by making the system less exposed to climate vulnerabilities affecting its hydro resources and meeting a considerable share of its energy needs. The GoU is committed to the sustainable development of renewable energies in the country to address energy access issues, contribute to the fight against climate change, resolve environmental problems and create sustainable green jobs.

If one assumes that large hydro power plants account for renewables, the issue for Uganda is clearly not a lack in the total quantity of renewables in its overall energy mix but rather directly linked to other aspects of the energy supply and utilization structure. Consequently, any plan to scale-up renewable energy use, other than large-hydro, in Uganda should be guided by three key considerations: (i) the need to diversify large-scale electricity supply sources to renewables other than hydro, (ii) the need to expand grid-connected power supply to the provision of modern energy services to remote, off-grid households and businesses, and (iii) the need to address entrenched biomass utilization and household energy issues.

SREP has the potential to support the GoU in embarking in this scale-up in a sustainable manner. Various renewable energy options that could be considered for SREP support in Uganda are discussed below. Due to the important diversification objective, large and small-scale hydros have been excluded from SREP. It is recognized, however, that in order to address the looming large-scale power deficits in the short term, quickly implementable least cost approaches, including small hydro projects, will need to be carried out by the GoU in parallel to projects and technologies to be supported by SREP.

#### 3.1.1 Geothermal

The geothermal potential is estimated at 450MW in three areas of Katwe, Buranga and Kibiro, on the western boundary of the country because of their volcanic and tectonic features that indicate a powerful heat source and high permeability. Geothermal technology is the most viable diversification alternative to large hydro power in Uganda since it can deliver large-scale, base-load power at relatively low cost, stemming from its 24 hour availability (high capacity factor).

Efforts to develop this resource are still at an early stage with the GoU playing the main role in its development. Work undertaken over the last 20 years have included: (i) geochemical and geological investigation in Katwe, Buranga and Kibiro (1993 – 1994), (ii) isotope hydrology studies (1999 – 2007), (iii) geological, geochemical and first geophysical surveys in Katwe (2004), and (iv) detailed geological, geochemical and geophysical survey (2005 – 2007) and isotope hydrology studies on Buranga (2009-2011). In addition, airborne geophysical surveys have been carried out over 80% of the country while Transient Electro Magnetic studies to measure conductivity of subsurface rocks have been conducted in selected areas over the period 2004-2011. For these various activities, the GoU obtained financial support from a wide spectrum of donors, including Iceland (ICEIDA), UNDP, OPEC, IAEA, AfDB and Germany.

The Japan International Cooperation Agency (JICA) funded geochemical surveys, remote sensing (Landsat, Aster and SRTM) and environment studies in Uganda in 2013.

The Kibiro site has reached the most advanced stages of surface exploration and therefore it has its geothermal model. Temperatures are high enough for electricity production and for direct use in industry and agriculture (200-220°C).

The main barriers to geothermal power development as widely known in the international literature are the long gestation period of geothermal projects (5-10 years from site exploration to power plant commissioning) as well as the capital intensiveness and high risks involved in the exploration phase. In Uganda, the legal and regulatory framework for geothermal power is yet to be developed. Potential SREP funding for geothermal energy would be key to finalize some of the still required surface studies and could eventually mitigate some of the exploratory risks and pave the way for transformation through private investment in this important resource and by supporting the development of the much needed legal and regulatory framework.

### **3.1.2 Solar PV On-grid**

Although the 2007 Renewable Energy Policy introduced a tariff rate at USD 0.362 per kWh (for systems below 2 MWp), Solar PV was removed from the REFIT program after a tariff revision had identified that the drop in solar PV system prices was deemed to have made large-scale, grid-connected solar PV plants competitive without subsidies. This led to a greater focus within the GoU on tendering and soliciting bids from private investors to develop grid-connected solar PV power plants. To meet this demand, the so-called GETFIT program established a special window for support through an auction process for grid-connected solar PV. Under this reverse bidding process, selected developers will receive a premium payment to bridge the gap between a predetermined tariff set by the ERA and their offer.

Under the GETFIT program, two grid-connected solar PV projects have been awarded, one for 2x5 MW solar plants in Tororo and another for 2x5 MW plants in Soroti that secured GETFIT support in the current program. The question is whether Uganda should go for even larger grid-connected solar PV projects, given that International module prices are at an all-time low.

In general, grid-connected solar PV power generation is a simpler technology to be constructed and commissioned when compared to geothermal or wind. A solar PV power plant is modular and can be easily constructed and operated. The lead time for project realization is short and the resource data requirement is not stringent. If no energy storage is included, the levelized cost of this technology can reach grid parity. If storage batteries are included in order to add capacity to the system - and not just energy - the cost would be much higher and the overall economics adversely affected. With the involvement of GETFIT in the aforementioned projects, which will contribute to over time addressing barriers common to this technology, the GoU is of the view that SREP would have a little role to play in the scale-up of on-grid solar PV.

### **3.1.3 Solar PV Off-grid**

The GoU has been actively promoting the use of solar PV to provide basic electricity services to remote populations through the World Bank-financed Solar PV Targeted Market Initiative - subsidized private sector implemented program. Some 18,000 solar home systems and solar lanterns have been disseminated thus far. Solar PV systems have also been installed in rural schools, health centres and other social institutions. Under the World Bank's Energy for Rural Transformation (ERT) 3, an additional 30,000 systems are targeted to be installed over a period of ten years. While the solar PV systems themselves have been technically proficient, the optimal business model for a sustainable program is still being sought.

There is less experience in Uganda with Solar PV mini and micro-grids, which are small centralized solar PV systems serving several households and small businesses. Two pilot projects in this category are being carried out in Western Uganda financed largely by the GoU and bilateral donors. The 5 kWp project in Kasese by a Danish company is currently operational and benefiting 94 customers. The charge is a monthly bill of UGX 5,000 (about USD 1.5) for 1 bulb, and, UGX 7,000 (USD 2) for 2 bulbs. The micro-grid project at Kyenjojo by the University of Southampton is for 13.5kWp and is still under construction. The experience with these two pilot projects, particularly with subsidy and cost recovery schemes poses a good example for rural electrification planners and policy makers.

Despite their high cost, solar home systems and isolated solar PV mini and micro-grids are undoubtedly still the least cost solution for providing basic electricity services in the most remote areas, including Ugandan islands in the Lake Victoria.

### **3.1.4 Wind Power**

Wind speeds across the country is generally understood have been estimated to be low on the whole, with more promising sites in the areas of Kabale, on Lake Nalubaale islands and in Karamoja. This region is widely considered as one of the windiest locations in Uganda. Even though detailed feasibility studies have not been undertaken so far, preliminary assessments have shown that there could be potential for medium-scale generation of electricity.

Recently, the MEMD has procured wind measurement equipment which is being installed at high altitudes in the Napak and Kotido districts of the Karamoja region. The objective is to collect consistent and relevant wind data to determine the best delivery method for this technology in the region.

The GoU plans to implement a systematic wind mapping program, starting at areas that are considered endowed with the resource. If the wind potential is proved to be sufficient for commercial on-grid generation, then wind technologies can become an important large-scale diversification option for the country.

### **3.1.5 Biomass**

Biomass contributes over 90% of the total energy consumed in the country and provides almost all the energy used to meet basic energy needs for cooking and water heating in rural areas, most urban households, institutions, and commercial buildings. Biomass is the main source of energy for rural industries.

Limited availability of electricity and high prices of petroleum products, constitute barriers to a reduction in the demand for biomass. Trade in biomass especially charcoal is a large contributor to the rural economy.

The per capita consumption of firewood in rural and urban areas is 680kg/yr and 240kg/yr respectively. Per capita charcoal consumption is 4kg and 120kg in rural and urban areas respectively. Current charcoal consumption in Uganda is estimated at 580,000 tons per annum – the biomass equivalent is about 6 million tons of wood, based on the conversion efficiency of 10% for the charcoal kilns in use.

Biomass feedstock utilized for conversion to energy can range from rural sources, such as bagasse from sugar processing and manure from livestock, to urban sources, such as landfill gas or municipal solid wastes. The main barriers hindering the development of this resource are the high start-up costs, feedstock composition and supply risks.

While the GoU believes that biomass will continue playing a key role in the country's energy mix, the strategy moving into the future is to sensitize people to the importance of preserving forests and to provide access to modern productive energy services.



### 3.1.6 Biogas

Since 2009, SNV has provided support to Uganda's biogas efforts under the Africa Biogas Partnership Program that targets the construction of 70,000 biogas digesters in 6 African countries, including Uganda, benefiting about half a million people.

With this support, Uganda has carried out a multi-pronged approach to the promotion of biogas utilization in the country. The scope of activities covers not only the construction of digesters in rural areas but also the training of construction companies and individual masons, implementers, financial institutions and Non-government Organizations (NGOs). By the end of 2013, a total of 2,085 biogas systems had been constructed. Almost all are for on-site cooking and lighting, with only a few instances of electricity generation for domestic and institutional users.

GoU through MEMD has piloted a project constructing bio latrines in 10 schools across the country for cooking purposes which will be expanded. Institutions such as schools are known to use significant quantities of firewood which negatively impact the forest assets of the country.

The challenges faced in promoting wider use of biogas in Uganda include the high upfront costs for installing a digester, thus becoming unaffordable to many households in spite of significant subsidies. In addition, limited accesses to affordable financing coupled with high interest rates have affected marketing efforts. A major constraint to more widespread adoption in Uganda, as in many other countries, is the reduced number of families who own a sufficient number of livestock to support the operation of a domestic digester.

## 4.0 LEGAL AND REGULATORY FRAMEWORK FOR THE PROMOTION OF RENEWABLES

### 4.1 Renewable Energy Policy 2007

The Renewable Energy Policy 2007 aims at providing a framework to increase in significant proportions the contribution of renewable energy in the energy mix.

The Renewable Energy Policy main features include:

- Introduction of FIT
- Standardization of PPA
- Obligation of fossil fuels companies to mix products with biofuels up to 20%
- Tax incentives on renewable energy technologies

The key principles on which the policy is based are:

- Maintain and improve the responsiveness of the legal and institutional framework to promote renewable energy investments.
- Establish an appropriate financing and fiscal policy framework for renewable energy investments
- Mainstream poverty eradication, equitable distribution and gender issues in renewable energy strategies
- Acquire and disseminate information in order to raise public awareness and attract investments in renewable energy sources and technologies
- Promote research and development, international cooperation, technology transfer and adoption of standards in renewable energy technologies
- Utilize biomass energy efficiently, so as to contribute to the management of the resources in a sustainable manner
- Promote the sustainable productions and utilization of biofuels
- Promote the conversion of municipal and industrial waste to energy

#### 4.1.1 Matrix of Barriers to the Development of Renewables and Mitigation Measures

The main barriers affecting the scale-up of renewable energies in Uganda are presented in table 12 below. The response measures taken to date are also discussed.

TABLE 12: BARRIERS AND MEASURES TAKEN

Barrier	Mitigation Measure
<b>Technical / Skills</b>	
Insufficient data on availability of renewable energy resources	MEMD is currently installing two wind masts in the Karamoja region, the most promising area for commercial wind power generation in the country. SREP is expected to reinforce these efforts. In addition, some of the geothermal sites identified still require further surface tests to provide more guidance on the best exploratory options.  SREP resources will be key in determining potential for both wind and to certain extent geothermal, in areas where surface studies are still lacking.
Lack of proven track record for some renewable energy technologies	By being transformation, SREP will help demonstrating the viability of new technologies in the country.

Lack of enabling environment for private sector participation	Uganda has made significant improvements over the years with regards to enabling environment for private sector participation in the sector. The country has in many occasions set an example of other African countries. The advisory component associated with the solar PV net-metering and the geothermal will be key in ensuring that proper enabling environment is in place for the scale-up of these technologies.
<b>Financial</b>	
Perceived investor risk related to renewable energy sector in Uganda	<p>Since the unbundling of the electricity as preconized by the Electricity Act in 1999 that Uganda has been successful in improving the risk-return profile in the sector (with the exception of geothermal). This has attracted considerable private investment into the generation of electricity.</p> <p>The GoU recognizes that developing geothermal under the same schemes that were used to scale-up the deployment of IPPs in the country has failed due to the significant risk associated with exploration drilling. The strategy forward is to replicate other successful examples in the region such as Kenya, where the public sector takes the exploration risk and then bids out the generation to private sector.</p>
High up-front cost of renewable energy technologies	These apply mainly to geothermal and wind. The GoU expects to utilize SREP highly concessional funds in the most effective manner by putting in place market creation activities to further develop geothermal and wind in the country. In terms of Solar PV, the GETFIT program is already playing a significant role in addressing this barrier.
Inadequate financing	The GoU expects that over time appropriate financing mechanisms will appear as financial markets continue developing and track record for new technologies is created.
<b>Environmental</b>	
Hydro resources highly exposed to the adverse effects of climate change	Following the supply energy crisis in 2006, MEMD recognizes that it is imperative to diversify away from hydro. Geothermal is the renewable technology with more potential to address this issue in the long-run.



## 5.0 CONTRIBUTION OF SREP TO NATIONAL ENERGY ROADMAP

SREP is expected to contribute to the achievement of the Renewable Energy Policy 2007 by increasing access to electricity as well as to improve an energy mix that is highly dependent on hydro power and possibly to discontinue the current existing thermal generation in the country. The majority of the Ugandan population lives in rural areas for which electrification will in many cases take years to arrive. In many cases, the difficulty and uneconomical prospects of electrifying the areas through the national grid will mean that these areas will never be electrified. This is the case with islands around Lake Victoria. Renewable energy-based electrification options are strongly being pursued as the way forward for these isolated areas.

These challenges can be perceived as a significant barrier to the country's goals set in the SE4All Action Agenda which proposes to reach 99% of energy access by 2030. Development partners such as the WB are supporting the GoU through the Energy for Rural Transformation Project in Support of the Third Phase of the Energy for Rural Transformation Program (ERT-III). The MEMD is leveraging resources and lessons from existing initiatives to develop the required frameworks in order to accelerate rural electrification using renewable energy despite financial constraints. In line with above, SREP support will directly contribute to meet the SE4All objectives by 2030.

In line with SREP's development objectives, the proposed projects for Uganda fit in well as briefly demonstrated below:

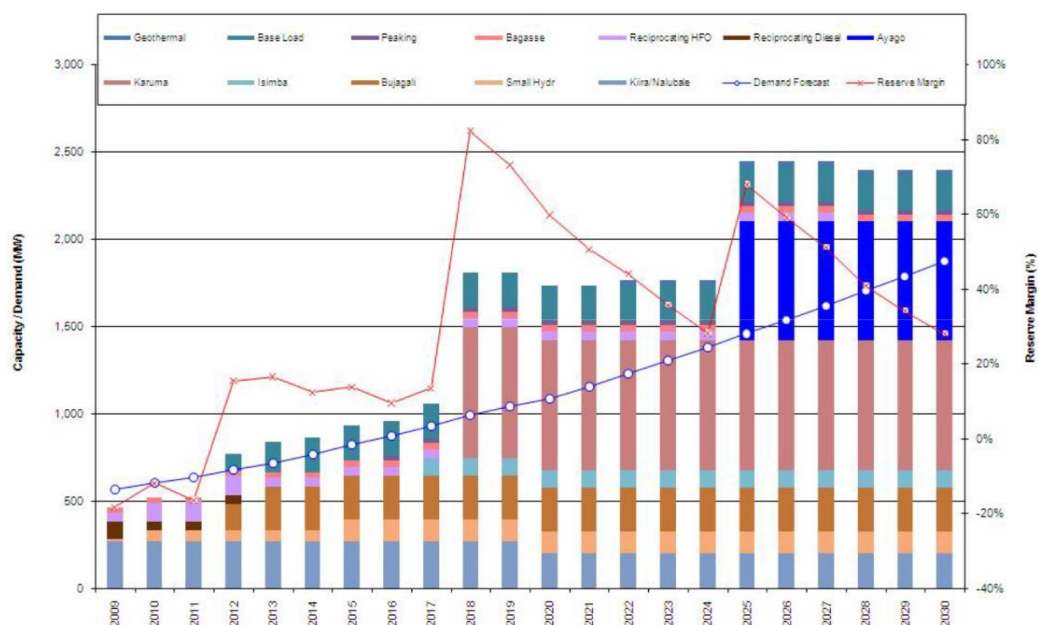
- Increasing Capacity: geothermal and solar off-grid very much meet this consideration, with a combined expectation of 280MW in some 7 – 10 years.
- Increased access to renewables: against a current electricity installed capacity of 855.8 (end of 2014), solar and geothermal, which are not currently part of the energy mix; stand to up-scale by about 33% of total current installed capacity upon completion.
- Low Emission Development: all three technologies – geothermal, solar PV and wind are ideal for low emissions development.
- Affordability and competitiveness: once exploratory drilling proves successful, geothermal may represent one of the most competitive sources of renewable electricity generation, even if compared against large hydro.
- Productive use of energy: base load and reliable power emanating from geothermal, will help overcome the current dire industrial development energy needs.
- Environmental impact: all environmental and social issues related to any project will be closely identified, mitigated and monitored in line with national and MDBs' rules
- Leveraging resources: for every dollar of SREP spent, an extra USD 8 are anticipated to be implemented as co-financing.
- Gender: all projects propose to involve women through all stages of project development and operation.
- Co-benefits of renewable energy scale up: improve resilience of the sector due to a decrease on hydro dependence, boost rural living standards and improvement on health conditions.

According to the Uganda Power Sector Investment Plan that was concluded in 2011, the least cost future capacity to supply growing demand comes predominantly from hydro generation capacity. After looking carefully at the generation plan for the country, some important factors should be highlighted. These include:

- The contribution of thermal plants is expected to remain high until 2017.
- By 2015 all the existing capacity is expected to be utilised to the maximum and new capacity is required to supply some of the growing demand. Due to the lead times required for large hydro developments, new small hydro stations are expected provide the capacity (60MW) required.
- The Isimba hydro project is expected to come online by 2017 to meet new demand
- The Karuma hydro project is expected to come online by 2018 to meet new demand
- With the introduction of the Karuma plant the reserve margin is anticipated to increase to above 80% and remains above 25% until 2024. This will decrease dependence on the existing thermal units from 2018 onwards
- In 2022 new base load capacity is required to serve the base case energy demand forecast. The least cost option is expected to be geothermal

Figure 5 hereunder presents the least cost generation development plan for Uganda.

**FIGURE 5: LEAST COST GENERATION DEVELOPMENT PLAN**



Source: Renewable Energy Investment Guide, Kingdom of The Netherlands/GIZ, 2012

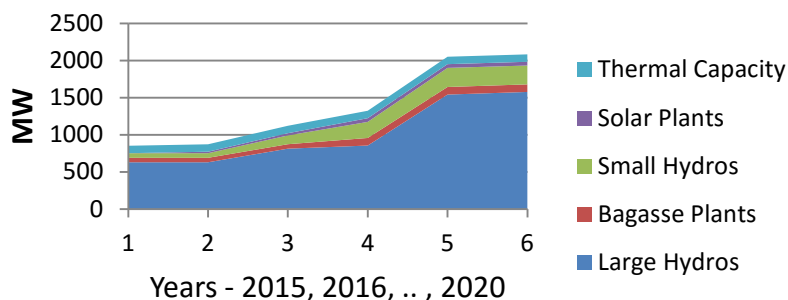
Under its base case scenario in terms of demand forecast, total energy sales were projected to grow on average by 6.8% per year from 2008 to 2030. This represented a growth in energy sales from 1 800GWh in 2008 to 7 679GWh in 2030. For the high case scenario, the energy sales were forecast to grow to 13 101GWh by 2030 which presented an average annual growth rate of 9.2%. For the low case, the energy sales are forecast to grow to 3 873GWh by 2030 which present an average annual growth rate of 3.8%. For the Vision 2035, the energy sales are forecast to grow to 17 877GWh by 2030 which present an average annual growth rate of 10.8%.

Under the base case scenario, the peak demand is forecasted to grow from 528MW in 2008 to 1,873MW in 2030. This represents an average annual growth rate of 5.9%. For the high case, the peak demand is forecast to grow to 2,722MW by 2030; an average annual growth rate of 7.9%.

The figure below demonstrates the continuing dominant role of hydro. This technology is set to dominate electricity generation in the short-term (large hydro at 74%, all hydro at 79%) by

far. By 2017, solar that was expected to take second position at 12% share will only get a boost of only 20MW from two on-grid projects recently awarded.

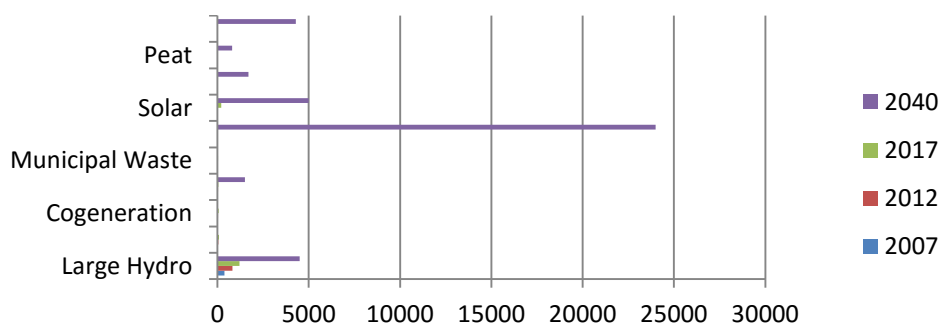
FIGURE 6: PROJECTED GENERATIONS BY TECHNOLOGY (2015 – 2020)



Source: Era, 2015

Most recently, the Vision 2040 foresees Uganda transforming from a peasantry to an industrialized and largely urban society through attaining high levels of electricity use as a form of modern energy, with highly ambitious projections that are unlikely to be met mainly in terms of nuclear. Figure 7 below demonstrates this.

FIGURE 7: ELECTRICITY GENERATION BY SOURCES, 2007 - 2040



The Ugandan Geothermal Resource Department is of the view that there is a total of 130MW to be developed at a first stage in two of the most promising geothermal sites in the country.. If the development of the resource is successful, as a nascent source of energy in the country, geothermal is poised to play an increasing and extremely important role in the development of the sector not only in Uganda but also in the region where other SREP pilot-countries are already benefiting from concessional resources (e.g. Tanzania, Kenya and Ethiopia). With the introduction of geothermal energy the share of thermal and hydro energy in the mix is likely to be reduced over time. Should the extraction of oil take off, the GoU expects a lowering effect on the end-user tariffs since the levelized costs of geothermal energy is smaller than for example large-hydro. These factors, in combination with extending electrification infrastructure to isolated areas will lead to an increase in access to energy and contribute to higher living standards of the poor, not to mention the potential boost to industrialization and economic growth.

### 5.1 Prioritization of Strategic Investment Areas

A consultative and participatory process involving relevant stakeholders under the leadership of the GoU, represented by MEMD, with the support of the MDBs, helped confirming the

selection of the priority renewable technologies to be considered by SREP. During a Technical Mission held in June 2015, the MEMD and MDBs undertook a detailed and transparent process cutting across all SREP criteria and National criteria relevant to prioritize a number of technologies. The results of such exercise were presented to the interested stakeholders during the Joint Mission on a two-stage approach and were generally endorsed by them. The process took into account this preparatory work, challenges, barriers, opportunities, as well as the conclusions of several technical consultations and various meetings with stakeholders. Annex 3 provides detailed information on these consultations.

The first set of criteria used relates to the SREP, which include:

- Increased installed capacity from renewable energy sources
- Increased access to energy through renewable energy sources
- Low Emission Development
- Affordability and competitiveness of renewable sources
- Productive use of energy
- Economic, social and environmental development impact
- Economic and financial viability
- Leveraging additional resources
- Gender mainstreaming
- Co-benefits of renewable energy scale up

The second set of criteria included those relevant to the national policies and ambitions. These are:

- New potential areas for renewables to diversify energy mix
- Increases capacity for technology transfer
- Contribution to employment creation

Against this background, other important factors were considered such as the identification of geothermal as a priority to the country and continued involvement of private sector in the development of generation infrastructure in a transparent and above all competitive manner. These were reflected in the Expressions of Interest submitted by Uganda that was central for the selection of the country as a SREP pilot-country

The scores provided in Table 13 below were presented to and cleared by representatives from the private sector, civil society organizations and NGOs, developments partners and MDBs. The table aims at presenting the results of the exercise and how these rank when compared to others. Annex 4 provides the results of the exercise, evaluation and rankings in a detailed fashion.

TABLE 13: SCORING SUMMARY

	Geothermal	Solar PV - Off-grid	Solar PV - Net-Metering	Wind	ICS	Hydro (<10MW)	Municipal Solid Waste	Biogas
<b>SREP Criteria</b>								
Increased installed capacity from renewable energy sources	3	2	2	1	0	1	1	1
Increased access to energy through renewable energy sources	3	3	2	1	2	1	2	3
Low Emission Development	3	3	3	3	2	3	2	2



Affordability and competitiveness of renewable sources	3	1	1	1	3	2	1	2
Productive use of energy	3	3	2	2	0	3	2	1
Economic, social and environmental development impact	3	3	2	3	2	3	2	2
Economic and financial viability	3	2	2	2	3	3	2	2
Leveraging additional resources	3	2	3	3	3	2	2	2
Gender	2	2	2	1	3	1	1	3
Co-benefits of renewable energy scale up	2	3	3	2	3	2	3	2
<b>National Criteria</b>								
New potential areas for RE to diversify energy mix	3	3	3	3	0	0	2	2
Increases capacity for technology transfer	3	2	2	2	0	0	0	0
Contributes to employment creation	2	3	1	1	2	1	2	2
<b>Total Score</b>	<b>36</b>	<b>32</b>	<b>28</b>	<b>25</b>	<b>23</b>	<b>22</b>	<b>22</b>	<b>24</b>
<b>Ranking</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>6</b>	<b>7</b>	<b>7</b>	<b>5</b>

### 5.1.1 Priority Areas and Projects

It emerged that the following technologies should constitute the priority projects for SREP intervention:

- Geothermal
- Solar PV off-grid
- Solar PV on-grid net-metering
- Wind

These were discussed and validated by the Stakeholders Consultations and Workshop carried during the Joint Mission. At that time, MEMD provided detailed answers to important issues raised by some stakeholders. These were documents and are part of Annex 4.

Following these consultations, the GoU in cooperation with MDBs, worked with a view to find an effective way to structure project transactions around the above technologies that are both realistic in its targets and in the delivery timelines. As a consequence of this exercise, SREP support is sought for the following three projects:

1. Development of 130MW of Geothermal Power in Uganda
2. Off-grid Electrification Development Program for Island Communities on Lake Victoria and Pilot-Project on small-scale Solar PV Rooftop for Electricity Generation using Net-Metering
3. Wind Resource Map Assessment, Feasibility Studies and Pilot Wind Farms

All these projects have attached technical assistance and advisory components that will greatly contribute to a sound preparation of these projects. More details can be found in the Project Concept Notes that are part of Annex 1.

## 5.1.2 Program Description

Taking stock of Uganda's energy sector in the overall country situation and the screening of the various renewable energy options that were summarized and presented in the previous sections of this Investment Plan, the GoU has decided on the final structure of the SREP. This section presents in more detail the investment projects, roles and contributions of different stakeholders and the institutional arrangements for program implementation.

TABLE 14: SREP UGANDA OVERVIEW

Project	SREP Allocation (in USD million)	Lead MDB	Beneficiary
Geothermal	33.8	AfDB/IFC	GRD
Solar PV Off-grid Mini-grid and Net Metering	9.4	AfDB	RED/REA
Wind Assessment & Pilot Wind Farms	6.8	AfDB	RED
<b>Total</b>	<b>50.0</b>		

## 5.1.3 Objectives of the SREP Program

The SREP will be highly catalytic in supporting the GoU in meeting the country's targets set in the UN's SE4ALL. These objectives are well aligned with targets set out for the energy sector in the Uganda's Vision 40 and already mentioned earlier in the document.

The SREP will build on previous and on-going national efforts in the sector and provide technical assistance and capacity building that will reinforce the capacity of national institutions and players in the sector to ensure effective implementation of the policies, strategies that incentivize the deployment of renewables across the country.

The program will replicate innovative approaches that have proven successful in other SREP pilot-countries building on the experience in the scaling-up of renewable energies in Uganda.

In accordance with SREP modalities, the goals set in the Investment Plan will be achieved through an integrated approach that includes both investments in renewable energies and capacity building for a multitude of stakeholders. The promotion of private sector involvement in the sector will continue to be a priority as these will play a key role in power generation for the proposed geothermal project and will be key in scaling-up net metering and wind technologies beyond the pilot proposals that SREP will initially support. In addition, the program will support the consolidation of the sector regulatory framework and promote gender equality and inclusiveness.

The integrated program approach assumes that transformation change is only made possible by improving energy market conditions and financing, as well as improving further the enabling environment in order to continue mobilizing private sector investors. These conditions are needed to ensure replication and scaling-up of investments in renewables.

## 5.1.4 Expected Impacts of SREP program

The main expected impacts of the SREP in Uganda include:

8. A minimum direct contribution of 151 MW of installed capacity of renewable technologies (non-hydro) in the country's energy mix by supporting the deployment of investments in geothermal, solar PV net-metering, mini-grids and wind power.
9. An increase in the annual energy output of 125.4 GWh per year.
10. Lead to an annual decrease in greenhouse gas emission of 163.000 tons CO<sub>2</sub>e per year once SREP projects are operational.
11. Lead to a total investment of USD 455 million in the power sector associated with the SREP projects.
12. Development of two nascent generation technologies in the country (e.g. geothermal and wind). Geothermal has the potential to provide reliable base-load to the power system in the country. In addition to the transformational impact in the sector, there will be many social, economic and environment positive spill over effects if the country is successful in developing this source of energy.
13. Expand the expertise and know-how in the country in relation to renewable technologies.
14. Lead to better economic and social prospects in isolated areas that do not benefit from access to modern and productive energy services.

### **5.1.5 SREP Program Description**

The Uganda SREP Investment Plan encompasses the three projects highlighted hereunder. Annex I includes detailed concept notes for each one of the projects.

#### **Project 1: Development of 130MW of Geothermal in Uganda**

Geothermal development is characterized by heavy costs in early stages of development but if its resource is proven it can represent a base-load source of electricity at relatively low cost. The Eastern Africa region is known to harness this resource in abundance, with potential stretching from Tanzania through Kenya, Ethiopia and Uganda.

In Uganda, geothermal exploration is at pre-feasibility stage, with a total potential estimated at 450MW in the three areas of Kibiro, Katwe-Kikorongo, Panyimur and Buranga.

With SREP funding, the GoU will aim at finalizing pre-drilling activities and proceed with the exploration drilling at two of the most promising sites with the objectives of confirming the resource available, undertake development of the fields and ultimately tender out in a competitive manner generation to the private sector. These activities have the potential to change the energy sector in the country and attract investment from other sources in the long-run to scale-up beyond the proposed 130MW.

#### **Project 2: Off-grid Electrification Development Program for Island Communities on Lake Victoria and Pilot-Project on small-scale Solar PV Rooftop for Electricity Generation using Net-Metering**

In view of the very low level of electrification in the country, especially in isolated areas, the Rural Electrification Strategy & Plan 2013 – 2022 seeks to increase access to 26% by 2022.

Amongst the activities aimed at achieving this target one finds micro and mini-grids. In order to accelerate the aforementioned target, this project will seek to undertake a master plan for the development and installation of micro and mini-grids across isolated areas in the islands of Lake Victoria in an orderly and fair way.

SREP funding is intended to pave the way for construction of the mini-grids for those remote communities.

In addition, and given the relative small amounts of funding required, this project will also encompass a pilot experience in on-grid solar PV net-metering systems, first on public sector buildings. The objective, as this pilot is under operations, is to prepare the market and both legal and regulatory frameworks that will ensure a significant scale-up by private sector companies and households. While relevant to the future of renewable energy in Uganda, it was decided that this project would be implemented together with the off-grid Solar PV because the proposed technology is common, but mainly to ensure economies of scale and implementation by MDBs in timely manner.

Activities under this project will include, among others, the following:

- Prepare a Master Plan for the sequenced electrification of isolated islands.
- Undertake Feasibility Studies for the electrification of at least 5 islands.
- Construct Solar PV micro or mini-grids (hybrid systems may be required in which case SREP will only finance the renewable component).
- Construct distribution networks to ensure that the number of connections is maximized.
- Setup and thoroughly assess at least ten solar PV net metering systems on public buildings.
- Review the existing and where necessary draft regulations, legislation and standards required for net metering scale-up.

### **Project 3: Wind Resource Map Assessment, Feasibility Studies and Pilot Wind Farms**

The GoU has embarked on a wide survey of energy resource potentials with varied levels of success. As the drive for a wider utilization base of renewable technologies gains momentum, it is increasingly important to establish full potentials of hitherto relatively unexploited technologies. This is the case for wind development in the region of Karamoja, where data collected so far suggests the viability of commercial electricity generation.

Activities under this project will include, among others, the following:

- Install wind masts to consolidate the amount and reliability of wind data measurements
- Generate a wind map of the region that identifies the most promising sites
- Undertake a feasibility study and construct a pilot wind farm to establish track record
- Build technical capacity on wind energy at the relevant national institutions
- Promote wind energy resources for investment by the private sector

#### **5.1.6 Program Implementation Arrangement**

##### **Overall Supervising Entity and Implementing Entities and their roles**

The Directorate of Energy Resources Development (DERD) in MEMD will be responsible for the overall program coordination and implementation of SREP in Uganda. DERD will work closely

with ERA, REA, the Geothermal Resource Department (GRD), Private Sector entities and UEGCL in the implementation of the projects.

GRD will implement Project 1, while Project 2 will be implemented by both REA and DERD and Project 3 by DERD.

DERD is currently implementing a number of donor funded projects such as the Energy for Rural Transformation Project and Electricity Sector Development Project that is financed by the WB. It is also coordinating development of large hydro power projects in the country using financing from the Government of China. DERD has experience in implementing projects financed by AfDB, JICA and the Germany cooperation and has over time demonstrated its capability to structure and implement projects in a sound manner. Their experience will be vital to ensure proper implementation, monitoring and evaluation of the SREP investments.

The GRD has been recently created to focus on geothermal development. The members of this entity were former employees in the Geological Survey and Mines Department which was handling geothermal related work in MEMD. The team is capable and was trained to undertake geothermal investigations in addition to participating in the field work. The GRD is currently implementing a number of preparatory projects financed by both the GoU and the German Cooperation.

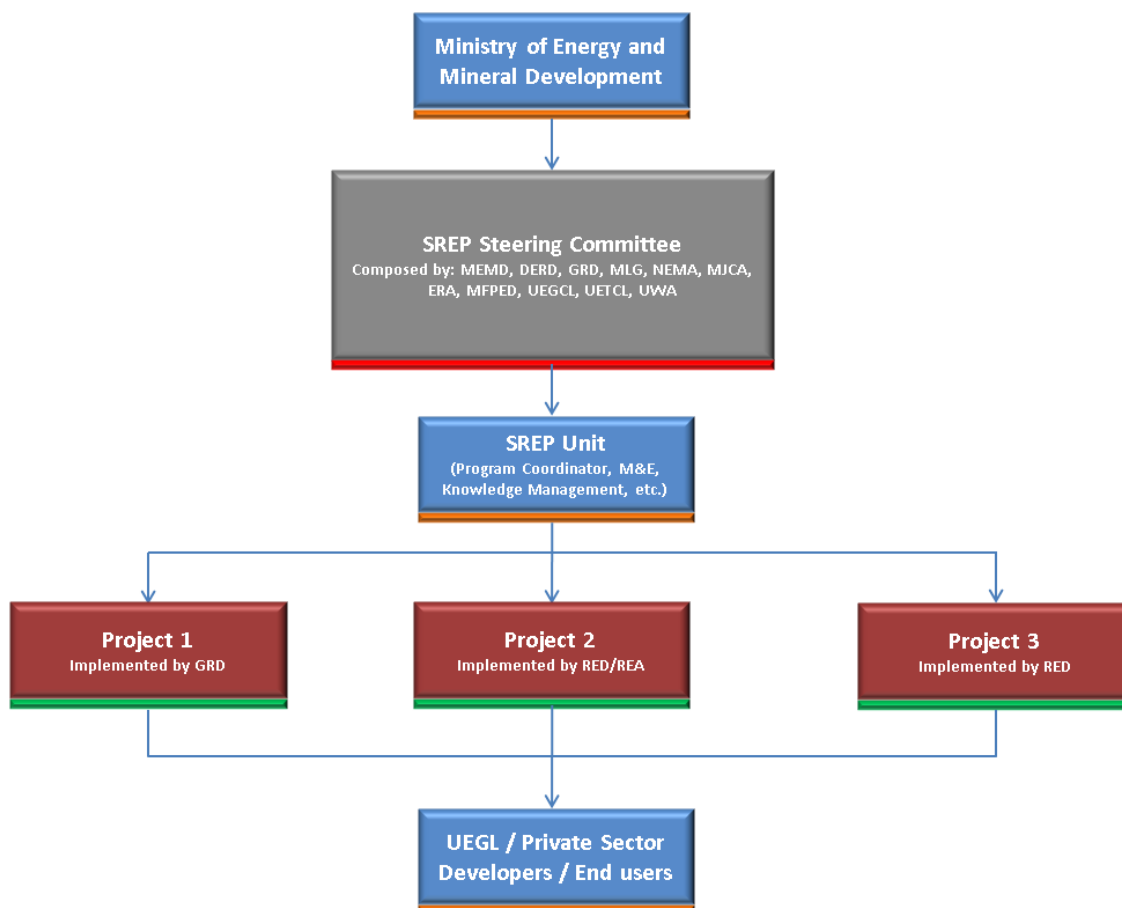
DERD will be the interface between the GoU and the financing partners as well as the CIF community. It will prepare monitoring and evaluation reports on key aspects of the program. It will also be responsible for leading the procurement of all services, goods and works to be carried out as part of the SREP. In addition, they will be responsible for managing and implementing environmental and social management measures.

A multi-sectoral SREP Project Steering Committee (PSC) comprising of representatives of institutions such as MEMD, REA, MFPED Ministry of Justice and Constitutional Affairs (MoJCA), UEGCL, and the Private Sector will be set up to provide oversight responsibility to all SREP activities in the country. The PSC will meet at least twice per semester to facilitate the smooth delivery of the program by removing any bottlenecks along the way.

DERD will submit any reports or requests for information to the CIF Administration Unit and other CIF stakeholders through AfDB as the lead MDB for the SREP Uganda.

The Institutions framework covering SREP activities in the country are summarized in the organogram below.

## 5.1.7 Organogram of Implementation Structure



## 5.1.8 SREP Co-Benefits

The ultimate goal of the Uganda SREP Investment Plan is to engage all relevant stakeholders and civil society in a large-scale development of renewable energies in the country. The benefits of renewables are many and widely known but it is vital that people are continuously sensitized to the positive impacts arising from the deployment of such infrastructure, whether soft or hard.

SREP is expected to contribute to the following:

- Reduce the exploitation of non-renewable energy sources by increasing the share of renewable energy in the national energy mix
- Reduce GHG emissions due to a scale-down on the use of fossil fuels
- Reduce pressure on forest assets caused by increased access to modern energy services
- Maximize economic development through the creation of new jobs
- Improve the quality of life of rural and isolated populations, especially women and disadvantaged groups
- Improve gender equality
- Implement proper management and supervision mechanisms of social and environmental issues
- Reduce the country's dependence on fossil fuels which will lower energy costs
- Reduce levels of poverty
- Reduce the country's high dependence on hydro resources and consequently improve the country's resilience to the negative effects of climate change

- Improve women's quality of life, especially in rural areas by reducing time allocated for household activities, contributing to an increase in income generation activities resulting from access to modern energy services, contributing to improvements in health and education

### 5.1.9 Financing Plan

The total estimated budget for implementing the SREP Uganda Investment plan is USD 455.1 million. In addition to the USD 50 million being requested from the SREP, the GoU will seek financing from MDBs, development partners and aim at creating conditions for the private sector to participate in the financing plan as well.

SREP funds will be implemented by AfDB, WB and IFC. An amount of USD 33.8 million will be allocated to the geothermal project and will be divided between AfDB (USD 31.8 million) and IFC (USD 2 million). Project 2 will benefit from USD 9.4 million in SREP resources to be implemented by the AfDB, while Project 3 will absorb the remainder of SREP resources in the tune of USD 6.8 million which will also be implemented by AfDB.

Table 15 presented below shows the financing plan for the entire SREP Investment Plan. Co-financing amounts are tentative and will be confirmed during the project preparation phase once costs are estimated more accurately. The co-financing amounts presented for the geothermal project are largely dependent on successful exploration of the resource.

The GoU will undertake discussions and negotiations with Development Partners and MDBs to determine borrowing amounts since these are dependent, among others, on the sovereign borrowing capacity of the country and on the funds available under the AfDB's ADF and WB's IDA funding windows.

TABLE 15: FINANCIAL PLAN

PROJECTS	GoU	SREP	MDBs	PS	DPs/ Others	Total
Geothermal	7.0	33.8	70.0	230.0	48.0	388.8
Solar PV Off-grid Mini-grid and Net Metering	2.1	9.4	14.6	0.0	0.0	26.1
Wind Assessment & Pilot Wind Farms	5.4	6.8	14.0	0.0	14.0	40.25
<b>Total</b>	<b>14.5</b>	<b>50.0</b>	<b>98.6</b>	<b>230.0</b>	<b>62.0</b>	<b>455.1</b>

The SREP financing will include a combination of grant and concessional loans. The GoU is aware that the final breakdown between grant and non-grant resources is directly linked to the Sovereign Debt Sustainability Framework as jointly presented by the International Monetary Fund and the WB from time to time.

## 6.0 ENVIRONMENTAL AND SOCIAL ASPECTS

The 1995 Constitution of Uganda imposes obligations on the GoU to promote sustainable development and environmental protection, and it obliges the state and citizens to endeavour to preserve and protect public property and Uganda's heritage. The Constitution gives every Ugandan a right to a clean and healthy environment. According to national regulations, specific measures are intended to protect and preserve the environment from abuse, pollution and degradation and to manage the environment for sustainable development. Uganda has a well-developed legal and regulatory framework for environmental management. The National Environment Management Policy (1994) aims to promote sustainable economic and social development. Among the provisions of the policy is a requirement for an Environmental Impact Assessment (EIA) to be conducted for any policy or project that is likely to have adverse impacts on the environment.

The Constitution of Uganda 1995 vests all land directly in the Citizens of Uganda, and states that every person in Uganda has the right to own property. The Constitution also sets the standard for any form of compensation in Uganda and provides for prompt payment of fair and adequate compensation prior to the taking possession or acquisition of the land/property. A variety of regulations are in place to deal with management of social issues and effects. For instance, the Land Acquisition Act, 1965 makes provision for the procedures and method of compulsory acquisition of land for public purposes. The Constitution requires that if a person's property is compulsorily acquired, that person must receive prompt payment "*of fair and adequate compensation prior to taking possession*" of the property. Finally, the Land Act, Cap 227 states that land tribunals must be established at district level. It is up to the District Land Tribunals to determine disputes relating to amount of compensation to be paid for land acquired compulsorily. The affected person has the right to appeal to a higher ordinary court.

### 6.1 Environmental and Social Management Framework

In compliance with national legal and regulatory frameworks, as well as Multilateral Development Banks (MDBs) policies and guidelines, IP-SREP-Uganda will prepare an Environmental and Social Management Framework (ESMF) for each planned investment project with the aim of:

- Defining the environmental and social (E&S) planning, review and clearing processes,
- Ensuring that energy is produced and utilized in an environmentally sound manner,
- Providing a corporate environmental and social safeguard policy framework, institutional arrangements and capacity available to identify and mitigate potential safeguard issues and impacts of RE projects;
- Representing a statement of policy, guiding principles and procedures of reference.

The ESMF will be prepared in compliance with national guidelines and MDB safeguard policies. The GoU is fully committed to support and actively participate in international efforts and cooperate with international organizations that seek to ensure sustainable delivery of energy to mitigate negative environmental impacts and climate change.

#### 6.1.1 Components of the Environment and Social Management Framework

The different investment project developers or promoters, by adopting national mechanisms and procedures, will prepare the following ESMF components:



- (i) Environmental and Social Impact Assessment (ESIA) to identify key environmental and social impacts and corrective measures for each subproject once exact intervention locations are known.
- (ii) Environmental and Social Management Plan to translate the ESIA into coordinated activities at local level, with detailed checklists and mitigation measures in order to address expected environmental and social impacts.
- (iii) Resettlement Policy Framework (RPF) followed by Resettlement Action Plans (RAP), to present legal and institutional framework, eligibility criteria, methodology for asset valuations and mechanisms for stakeholder consultations and grievance redress.

Additional, specialized environmental and social management plans and/or initiatives may also be required to address impacts associated with a given subproject. This could concern, for instance, in-cash or in kind compensation to some natural resource users because of initiatives which would temporarily or permanently restrict their access to and use these resources.

### **6.1.2 Stakeholder Consultations**

During SREP implementation, participatory consultations will be held with all stakeholders involved in planning, executing and monitoring the different investment projects (including ministerial officials, representatives of local governments, the private sector and associations of civil society, including women associations). The objective of these consultations will be:

- (i) Provide adequate information about the nature, timing, and scope of relevant projects as well as their major social and environmental impacts and related mitigation measures
- (ii) Highlight gender issues, in order to improve women's access to lower-cost and cleaner energy while reducing the time that women and girls spend on fire wood collection and improving income-generating opportunities)
- (iii) Identify themes requiring more in-depth analyses

The outcomes of these consultations may be fed into the final design of the proposed projects, and will particularly help define grievance-redress mechanisms.

### **6.1.3 Responsibilities**

Because of the multi-sectoral aspects of social and environmental management, several institutions will share the responsibilities concerning the implementation of the ESMF as a whole.

The Ministry of Water and Environment (MoWE) is the line ministry responsible for the formulation and implementation of water and environment-related policies, laws and regulations in Uganda. Its main functions include, among others, the following: (i) mobilization of resources required to implement environmental related projects and related issues, (ii) overall responsibility for environmental policy formulation and implementation, and (iii) coordination with local governments on environment related issues.

Other national institutions fall under the oversight of MoWE. Among them, the National Environment Management Authority (NEMA), which has been established under Section 4

of the National Environment Act as the principal agency in Uganda for the management of the environment to coordinate, monitor and supervise all activities in the field of the environment and many elements of natural resource protection. NEMA has promulgated general guidelines for Environmental Impact Assessment (EIA), a key tool in environmental management, especially in addressing potential environmental impacts, particularly at the pre-project stage.

The Ministry of Lands, Housing and Urban Development (MoLHUD) is responsible for oversight of all land related matters including policy guidance. Its mandate is to ensure sustainable land management, planned urban and rural development and decent housing for all. The ministry prepared the 2013 National Land Policy. The Uganda Land Commission is responsible for the allocation of public land to the private sector for investment purposes and maintains records of leases on state land.

In the areas of social and environmental safeguards, MoWE/NEMA and MoLHUD operate in close collaboration with national governmental and non-governmental institutions, particularly the following:

- (i) MEMD
- (ii) Ministry of Gender, Labour and Social Development (MGLSD), whose mandate is to mobilize and empower communities to harness their potential, while protecting the rights of vulnerable population groups and addressing gender inequalities, labour and employment as well as community mobilization and empowerment
- (iii) Ministry of Lands, Housing and Urban Development (MLHUD), which is responsible for providing policy direction, national standards and coordination of all matters concerning lands, housing and urban development
- (iv) ERA
- (v) Local Government Administrative structures at the decentralized level

Selected national NGOs will also provide services aimed at better sensitizing local populations about challenges and potential of renewables by involving them in the planning, implementation and monitoring of SREP related initiatives. Among these NGOs, the following are likely to play a role: (i) Joint Energy and Environment Program (JEEP), whose mandate is to combat environmental destruction and promote efficient management of natural resources, and (ii) the Global Village Energy Partnership (GVEP), which works with local businesses to increase access to modern energy and improve the quality of life.

#### 6.1.4 Anticipated Environmental and Social Impacts

TABLE 16: ANTICIPATED ENVIRONMENTAL AND SOCIAL IMPACTS

Project type	Major E&S concerns
<b>General</b>	<ul style="list-style-type: none"> <li>- Water flow disruption</li> <li>- Pollution of groundwater</li> <li>- Deforestation</li> <li>- Construction of infrastructures, resulting in the reshaping of topography and modification of landscapes</li> </ul>
<b>Construction of mini-grids</b>	<ul style="list-style-type: none"> <li>- Soil compaction and damage to vegetation due to equipment.</li> <li>- Deposition of waste soil and drilling mud.</li> <li>- Air pollution resulting from gas emissions and smoke exhaust from</li> </ul>

Project type	Major E&S concerns
	<p>generators, compressors, and vehicles.</p> <ul style="list-style-type: none"> <li>- Adverse effect of steam and spray during well testing on local vegetation, including the scalding of trees and grass.</li> <li>- Deleterious effect of dust carried by winds across exposed surfaces.</li> </ul>
<b>Geothermal</b>	<ul style="list-style-type: none"> <li>- Soil compaction and damage to vegetation due to equipment.</li> <li>- Deposition of waste soil and drilling mud.</li> <li>- Air pollution resulting from gas emissions and smoke exhaust from generators, compressors, and vehicles.</li> <li>- Adverse effect of steam and spray during well testing on local vegetation, including the scalding of trees and grass.</li> <li>- Deleterious effect of dust carried by winds across exposed surfaces.</li> <li>- Risk to flora and fauna</li> <li>- Introduction of mining debris to the environment</li> </ul>
<b>Wind</b>	<ul style="list-style-type: none"> <li>- Biodiversity impacts in harm to birds, bats and natural habitats.</li> <li>- Local nuisance by way of visual, noise, interference with radar, telecommunications, aviation and the like.</li> <li>- Social-economic and cultural impacts on land acquisition, local incomes, indigenous and traditional communities and physical cultural resources</li> </ul>
<b>Solar off-grid</b>	<ul style="list-style-type: none"> <li>- Recycling of batteries and parts, improper disposal of industrial waste.</li> <li>- Disposal of waste that normally ranges from used lights, batteries and other components. The poisonous elements in their contents cause a risk to the environment if not properly disposed of.</li> </ul>
<b>Common to all Project Types.</b>	<ul style="list-style-type: none"> <li>- Involuntary resettlements, population displacement, influx of migrant workers associated with the project posing health risks (HIV/AIDS).</li> <li>- Land acquisition.</li> <li>- Loss of harvests.</li> <li>- Influx of workers from other locations.</li> </ul>

The entire documentation on environmental and social safeguards will be widely distributed to national and local stakeholders (directly or indirectly affected by the activities of investment projects) in compliance with the requirements of the MDBs

The documentation will be posted on the websites of MEDM and of MDBs.

## 7.0 MONITORING AND EVALUATION

### 7.1 General Features of the M&E System

The definition and implementation of a simple and effective system of Monitoring and Evaluation (M&E) is a key priority for the SREP in Uganda. With its results measurement framework, the M&E system should be considered as a central part of the SREP Investment Plan design and implementation.

As a key tool to plan and monitor SREP activities, the system is essentially aimed at:

- Defining how transformational impacts will be measured before during and after the life of the program
- Ensuring that data collected, processed and analyzed at the level of the investment projects harmoniously feed into the programmatic M&E system
- Document the social, economic, and environmental impacts of project investments and program
- Supporting the knowledge management and sharing initiatives of the Program, by highlighting successful outcomes and lessons learned and recommending ways to improve program implementation and its transformational impact

Based on a set of SREP core indicators, the SREP M&E system will be perfectly integrated into both the national M&E system of the energy sector - while solving some of its main constraints and bottlenecks, through capacity building initiatives – and the MDBs' own managing for development results approach. Therefore, its design will avoid the development of parallel structures or processes for monitoring and evaluation.

#### 7.1.1 Results Framework

The main objective of the results framework is to establish a basis for future monitoring and evaluation of the impact, outcomes and outputs of SREP-funded activities. In addition, the results framework is designed to guide Uganda and MDBs in further developing their own results frameworks.

In line with the CIF final outcome, the stated impact objective of the SREP IP is to support low carbon, climate resilient development

Accordingly, Table 15 below summarizes the proposed SREP M&E results framework, in line with expected outcomes and results.

#### 7.1.2 Responsibilities and M&E-Related Tasks

MEMD will be responsible, through its Sector Planning Unit, for the formulation, co-ordination, monitoring and evaluation of the overall SREP M&E system, ensuring that it is in line with CIF and SREP standards.

It will particularly support and assist the M&E teams of the investment projects to:

- Operate their respective M&E system
- Fill in the logical framework indicators
- Efficiently and regularly collect and process data
- Demonstrate how their output indicators will help achieve overall SREP outcomes in Uganda
- Document the social, economic, and environmental impacts of all the activities,

- Prepare and submit regular monitoring reports

TABLE 17: SREP RESULTS FRAMEWORK

Result	Indicators	Baseline	Targets by 2020	Means of Verification
<b>SREP Transformative Impacts</b>				
Support low-carbon development pathways by reducing energy poverty and/or increasing energy security.	National measure of energy poverty.	MEPI <sup>a</sup> = 0.87 (Access rate of 13% in 2010)	MEPI <sup>a</sup> = 0.1 (Access rate of 80%)	Country-based reporting using household survey data.
		Electricity used in 2010; 75kWh per capita	Electricity used: 462 kWh per capita.	
	Electricity output from renewables in GWh per year	na	125.4 GWh per year.	Utilities companies and MEMD
	Increased annual public and private investments (\$) in targeted subsector(s) per country	na	USD 455 million	National M&E
<b>SREP Programme Outcomes</b>				
Increased supply of renewable energy	Increased annual electricity output (GWh) as a result of SREP interventions.	na	Project 1: 80.65 Project 2: 0.95 Project 3: 43.8	SREP Projects' M&E systems.
Increased access to modern energy services.	Increased number of women and men and businesses and community services benefitting from improved access to electricity as a result of SREP interventions.	na	Project 1: 520.000 Project 2: 5.000 Project 3: na	SREP Projects' M&E systems.
New and additional resources for renewable energy projects.	Leverage factor: US\$ financing from other sources compared to SREP funding.	USD 50 million	USD 405 million	SREP Projects' M&E systems.
Avoided GHG emissions	Avoided GHG emissions (tons CO <sub>2</sub> e per GWh) as a result of SREP interventions.	0	163.000 tons CO <sub>2</sub> e per year once SREP projects are operational.	SREP Projects' M&E systems

a. MEPI = Multidimensional Energy Poverty Index.

b. According to Document SREP/SC.8/4 on the SREP Revised Results Framework, a proxy-based method (emission equivalent based on diesel-generated electricity: 793.7 tons CO<sub>2</sub>e per GWh) has been used to measure the co-benefit of avoided GHG emissions.

### 7.1.3 Managing Knowledge and Sharing Lessons Learnt

SREP activities related to manage knowledge and share lessons learned are of particularly high value. This section distinguishes the activities at the program level as a whole and those conducted in the four investment projects.

The Uganda SREP Investment Plan will play a crucial role in relation to the awareness of local and national stakeholders about challenges and opportunities for developing the potential of renewable energy in Uganda. Therefore, efficient management of knowledge is needed, among other things, to: (i) support the development and maintenance of an efficient, national-level energy-information system measure the outputs obtained; (ii) communicate SREP results and share them with stakeholders at all levels (including SREP pilot countries and other countries in the sub region); (iii) raise the SREP profile in order to raise additional funds and foster large-scale replication of activities countrywide and in the sub-region; (iv) ensure linkage with the Climate Investment Funds (CIF) and draft regular program implementation

reports intended for the SREP subcommittee; and (v) conduct targeted studies, organize consultation workshops, and develop and support dialogue to achieve more efficient project implementation.

Knowledge-management and capacity-building activities will also be developed at the project level. Specific capacity-building activities will be linked to the renewable-energy technology and business model, which will help in linking proposed investments with the development of local expertise.

### 7.1.4 Risk Assessment

The overall implementation risk of the SREP Uganda IP is assessed from low to high. Table 18 below presents the main identified risks and mitigation measures used to ensure successful implementation of the program. Appropriate corrective and supportive measures will be put in place during the implementation of the Investment Plan following the lessons learned from the activities.

Table 18: Main Risks and Proposed Mitigation Measures

Risk Type	Description	Mitigation Measure	Residual Risk
Technical	Not performing as may be foreseen for geothermal, and solar PV net metering	Technical Assistance would address these in general. Improvements for grid stability and learning from our more experienced Kenya neighbours	Moderate
	Geothermal uncertainty issues	Many drill sites help reduce risks, strengthened by lead technical activities, with all work guided by preceding findings. SREP will finance exploration drilling.	Moderate
	Some initial studies have indicated that the geothermal potential in Uganda may be less than the 450 MW.	GoU will review outstanding licenses and will ensure that sites proposed to SREP are free and clear of any outside interests.	Moderate
	Maintenance and operation failures.	Imparting of skills at various levels will take priority	Low
	Delays of payment by UETCL	A possible UETCL's liquidity problems shall be addressed by GoU with off-taker risk mitigation	Moderate to high
	Currently, close to 30 exploration licenses have been issued in areas with geothermal potential. The government will need to ensure it has clear authority to perform exploratory activities in the sites it proposes and provide clear guidance and the terms and timing for private sector participation.	GoU will review outstanding licenses and will ensure that sites proposed for SREP are free and clear of any outstanding interests	Moderate
Financial	Depreciating Uganda Shilling	In-house preparation needed beefed up by some donor risk guarantees	Moderate
	In event that GoU finds difficulty in meeting agreed funding	The bulk of co-financing is expected from Private Sector investors for which Uganda has already a good legal and regulatory framework that is able to attract interest. Alternatively, the GoU will seek co-financing from other sources.	Moderate
Institutional	Limited human skills/capacity	Strengthen through technical	Low

		assistance and capacity building	
	Regulatory and contractual bottlenecks	ERA has demonstrated capacity in the past to solve any regulatory and contractual issue.	Low to moderate
	Clearance/approval delays	An effort will be made to ensure that EMA delays are not a problem. The SREP Steering Committee will act as an enabler.	Moderate to high
	Poor planning in the renewables sector	SREP is already helping to address this issue and will provide conditions to increase capacity at the national level.	Low
	Given the nascent state of geothermal in Uganda, there is not a clear framework that exists for licensing, regulating, and attracting private investment in the sector. As this work will be taken up by the United Nations Environment Program (UNEP) and not one of the MDBs, it is critical to dovetail all pieces of work to ensure an appropriate approach for developing the sector.	GoU, MDBs, and UNEP must coordinate activities early on and keep engaged throughout their respective work programs.	Low
	Unacceptable environmental impacts	NEMA and MDB will seek compliance with statutes and regulations, and, E&S safeguards respectively	Low
Social	Unacceptable social impacts	Stakeholder consultations, national and MDB safeguards to be applied,	Low
	Negative impacts on foreign workers	Apply ESMF guidelines, supervision by NEMA and other institutions' specialist staff	Low

## Annex 1: Project Investment Concept Notes

### Project 1: Development of 130MW of Geothermal Power in Uganda

#### 1. Problem Statement

Uganda had always used hydropower as its main source of electricity until 2005 when thermal power plants had to be introduced to the national grid to address an acute shortage of power which had come about due to poor planning arising from a history of internal conflict. Installed power capacity in Uganda currently stands at 850 MW, including 100 MW of thermal power. Uganda is a country endowed with abundant forms of renewable energy (biomass, hydropower, geothermal, wind, solar) but exploitation of these clean energy technologies for socio-economic development reasons remain a challenge. Furthermore, one of the greatest challenges facing the country today is the production of sufficient energy to power its economy. A secure and sustainable energy mix is among the central challenges which Uganda will face in the coming years. Geothermal, if properly developed in Uganda, will help the country address this challenge by adding to its energy mix a clean, reliable and base load source of power and at the same time decrease the dependence on hydro power generation that may be affected by droughts and climatic variability. This makes geothermal one of the most suitable sources for electricity generation for the future.

The East African rift valley, in which geothermal power has been exploited in Kenya, has its western arm running through a big part of Uganda in a geological setting of tectonically active rift system and characterized by recent volcanism. These conditions together with clear surface indications of geothermal activity are ideal for geothermal development. The country has an estimated untapped potential of approximately 450 MW but geothermal development remains a challenge in the country for many reasons. The main barrier so far has been the lack of public funding to quantify the geothermal resource information that would allow packaging of bankable power plant projects for private sector investment. Some licenses were in recent years granted to private companies to develop a number of geothermal fields but these efforts have so far not borne fruit partly due in part to the exploration risk.

The GoU (GoU) recognizes that the best way to address this risk is to directly fund the exploration phase and once steam potential is established, to competitively tender out the well field development, construction, operation and maintenance of the geothermal plant to the private sector.

Geological, geophysical and geochemical investigations have been carried on several sites in Uganda with support of the International Development Association of Iceland (ICEIDA) and other development partners, namely JICA, with clear indication of geothermal resource availability in Katwe-Kikorongo, Kibiro and at Buranga geothermal sites but little progress has been done since then due to lack of funding.

Preliminary investigations have been carried out on other sites such as Panyimur and Kanangorok.

This proposed project for SREP support is designed to eliminate the identified barriers and perceived risks by building on the preparatory work done so far on the most promising sites in the country by using SREP concessional funding to finance exploration drilling, prove the resource and develop the appropriate regulatory and policy framework through advisory service support to then attract private finance for the development, construction and commissioning of the power plants following competitive tender processes to ensure best value-for-money to the country.



Figure 1: Location of Geothermal Sites in Uganda



Geothermal resource development in Uganda started a long time ago. Preliminary surveys date back to 1920 when the Geological Survey Department of Uganda was established. Three holes were drilled around Buranga in 1954 after preliminary geophysical surveying. Since then, different donor-funded programs, financial institutions, bilateral partners, multilateral agencies and others, including the African Development Bank and the World Bank that have funded different geophysical surveys in various geothermal sites around the country.

The GoU recognizes that the timeline for geothermal exploration in the country has stretched longer than expected and is fully committed to develop this resource. The commitment of public funds and manpower under the Uganda Geothermal Resources Development Project, under geophysical surveys, geochemical surveys, geological mapping and environment baseline surveys have been undertaken in Kibiro, Katwe-Kikorongo, Panyimur and Buranga, is a good example of this commitment.

Geothermal development has various stages of activities and mainly includes: (i) planning and geophysical studies, (ii) surface exploration, (iii) exploration drilling, (iv) appraisal drilling and feasibility/design, and (v) production drilling and power plant and transmission infrastructure construction. All four sites mentioned above are still under phase (i) and (ii).

SREP funding will be key in allowing Uganda to start with phase (iii), a critical step in geothermal development.

The planning and development of geothermal power in the country would take an estimate 4-6 years from the moment financing is available to undertake the drilling. From the experience of geothermal resource development in various parts of the world, including Kenya, it has been learnt that: (i) timely financing is critical, (ii) some of the exploration wells could be used to run pilot plants to generate some power while decisions for further development are being considered, and (iii) staged development of early wells could allow for the generation of revenue to further contribute to the expansion of other geothermal sites and to build confidence in the technology and the sector.

### **Proposed Contribution to Initiating Transformation**

Geothermal energy has the potential to provide significant amounts of low-carbon, low-cost electricity. It can provide a clean base load capacity that, is not affected by droughts, and could directly replace thermal power in the electricity mix of Uganda and decrease its dependency on hydro power generation. At the same time, geothermal power can optimize the use of other, intermittent, renewable sources on the grid.

Most of the geothermal resources are located in disadvantaged areas in terms of economic and social opportunities. Through the development of this resource, various co-benefits are expected to be made available for local communities: (i) electricity generation, (ii) opening up of the areas through infrastructure development such as roads and water, (iii) opportunity for direct utilization of geothermal heat for industrial and agricultural based activities leading to reduced operational costs for companies, employment creation and income generation, and (iii) increased security in the targeted areas as a result of the economic activities and social amenities.

These activities would improve the life of women in the vicinities of the project areas (e.g water supply from geothermal development will lift the burden of searching for water from long distances, improve farming activities through irrigation leading to food security thereby boosting overall psychological and physical health for women) and contributing to the creation of new jobs and training.

In addition, this project will help Uganda to build on the know-how and examples from other countries in the region, such as Kenya. The Memorandum of Understanding signed between the GoU and the Geothermal Development Corporation of Kenya, a company with successful track record in developing geothermal resource will add value to this SREP proposed intervention and likely accelerate the development of geothermal in Uganda.

In cooperation with different partners, several trainings have recently been undertaken to build a geothermal industry work force with the skills and capacity necessary to enable the rapid development of the industry. These trainings are being conducted at UNU-Iceland, GDC-UNU Naivasha Kenya, West Jec Japan and several in-house training seminars. These are expected to continue as Uganda advances its geothermal development.

### **Implementation Readiness**

At the moment, and as a consequence of the SE4All Action Agenda for Uganda, UNEP is working to provide assistance to address the policy and regulatory barriers for geothermal energy development in Uganda with a view to attract geothermal investment from the private sector in terms of Public Private Partnerships (PPP) and Independent Power Producers

(IPP). The GoU reckons the importance of having proper regulatory, legal and institutional frameworks in place and has commenced preparation of this supported by JICA?. In parallel SREP resources are to be applied in more capital intensive activities such as drilling. The GoU will engage with Development Partners with a view to identify complementary opportunities for the solid development of geothermal resources in the country. Therefore, the expectation is that SREP resources will be implemented in a complementary manner and used to support Uganda as follows:

- i. Undertake exploration drilling in two of the most promising sites by finalizing all required and outstanding preparation activities, procure rigs and all necessary equipment and expertise. The initial objective is to fund at least six exploration wells in two sites.
- ii. In parallel, an advisory component is proposed to support preparatory activities prior to drilling as well as advise the country on the best way to attract private sector developers to undertake the construction, operation and maintenance of the required geothermal power plants once the geothermal exploration phase is completed (or once geothermal resource is confirmed). Specifically, the advisory component will be structured into three phases:

- a. Phase 0: Project Preparation

- i. Review all available data regarding the two proposed sites for exploration and conduct additional detailed technical feasibility studies for the next phases; We may need to carry out additional surface studies (eg MT studies). The scope of this work is to be defined prior to the commencement of any advisory activities with GoU;
- ii. Review issues facing geothermal development, as well as options to overcome them and mitigate risks; included but not limited to: off-taker risks, most likely tariff; sustainability of the tariff; required guarantees; content/terms of PPA; etc.
- iii. Prepare the specifications of the exploratory drilling program that includes the full list of drilling consumables required and avoid delays on implementation of the exploration program;
- iv. Perform market sounding to test out appetite and receive early feedback on deal structure; [including bankability of PPA, etc.]
- v. Provide GoU with options and framework for attracting private sector participation into production drilling and power plant development.

- b. Phase 1: Exploration, Due Diligence, and Transaction Structuring

- i. Support supervision of exploration activities;
- ii. Prepare feasibility study for generation plant(s);
- iii. Perform an environmental and social risk assessment to identify potential E&S issues and propose mitigants in line with MDBs rules and procedures;
- iv. Perform legal and regulatory due diligence;
- v. Provide transaction structure report that i) summarizes due diligence efforts and feasibility study, and market sounding results and ii) recommends transaction structure for attracting private sector investment.
- vi. Capacity-building program for the government including: tender management; geothermal technology know-how; geothermal field

management; the role of geothermal in the power system (including dispatching); environmental and social issues, etc.;

c. Phase 2: Transaction Tender Implementation

- i. Prepare draft transaction documents (RFQ, RFP, PPA, IA, etc.);
- ii. Prepare data room for investors containing all necessary project information;
- iii. Market transaction to potential investors;
- iv. Host bidder's conference and solicit feedback on transaction documents;
- v. Assist GoU in evaluation of proposals and post-bid negotiations.

One of the issues hampering the exploration of some sites is related to the fact that these were licensed to private companies that have failed over the past years to advance to exploration drilling. For example, the license for the Kibiro site, one of the most promising in the country, has expired in July 2015 and the GoU has no intention of renewing it. The same will apply to other licenses in sites that SREP could be instrumental in advancing the development of the respective geothermal fields. The government is aware of the importance of minimizing exploration risk and therefore is committed to use SREP financial resources for exploration drilling in the most promising sites, i.e. those with the most promising geophysical results.

### **Rationale for SREP Financing**

As described above, geothermal development in Uganda will contribute to increase energy security of the country, enhance firm and reliable base load generation capacity, and promote low-carbon development.

It is of paramount importance to have in place, and to follow a strategy, that minimizes cost and maximize success in the exploration and evaluation of geothermal resources.

It is widely known that geothermal development requires significant upfront investment. As a low-income country with limited funding available under the IDA and ADF funding windows and other priority sectors to develop, Uganda will highly benefit from the concessionality of SREP resources being proposed for this project. Despite the significant catalytic effect of the SREP resources, the GoU will still require further financing to initiate transformation in the sector. This will depend on the availability of further long-term and low-cost loans, grants from the GoU. Multilateral Development Banks will be able to fill a part of the gap and co-finance such efforts from Uganda if need be.

This project has potential for replication in the future as the resource potential becomes effective and both the sector and particular sites gain track record and credibility. Evacuation of the generated power will require extensions and new constructions on the existing transmission infrastructure resulting in increased access to energy from renewable energy sources in the country. Furthermore, the GoU will consider viable alternatives to finance exploration in other sites which may include for example, revenues accrued to the public sector as a result of successful tender to the private sector. Uganda expects that development partners, and even the private sector given its historical role in the power sector in the country, will take an interest in the exploration drilling as the SREP project moves into different stages of implementation.

## Results Indicators

The implementation of this project will be made over an estimated period of 5 to 7 years from beginning of exploration drilling up to commissioning of the power plants. Therefore, some of the SREP key indicators will not be as important in the early stages of the project as they will be once power plants start injecting power in the grid. Nevertheless, the indicators selected for this project are in line with SREP Results Framework and those that will be monitored include: (i) annual electricity output from renewable energies in GWh (once power plants start being commissioned), (ii) annual increase in public and private investment in Uganda in USD, (iii) installed capacity in MW, (iv) number of men and women, business and community services benefiting from improved access to electricity as a result of SREP intervention, (v) green-house gas emissions saved as a result of SREP intervention.

## Financing Plan

The total estimated cost of the project is USD 388 million, of which USD 33.8 million is sought from SREP. MoEMD will engage with the Ministry of Finance, Planning and Economic Development to study and agree on co-financing from both the WB's IDA and AfDB's ADF concessional windows. The SREP resources will help finance the following activities: (i) electromagnetic profiling, (ii) ground magnetic, gravity and micro-seismic surveys, (iii) additional geothermal surveys including noble gas sampling, (iv) structural mapping, (v) exploration wells (vi) other consultancy services, (vi) logging and flow tests, (vii) field development (production and reinjection wells), (viii) power plant and transmission infrastructure construction, (ix) and advisory services for the preparation, supervision, structuring and competitive selection of private developers for power plant construction. Power development will be contingent on successful confirmation of the geothermal resource.

The table below provides an estimation of the total costs associated with these activities as well as the sources of financing. Important to highlight that as soon as the preliminary studies are completed in the 4 identified sites, MoEMD will in cooperation with the selected MDB will pick the best two sites to start with exploration drilling.

The SREP allocation of USD 33.8 million will be implemented as follows: (i) USD 301.8 million by AfDB to finance the preparation, exploration drilling and field development phases of the project, and (ii) USD 2 million by International Finance Corporation to finance the aforementioned advisory.

Table 1: Indicative Financing Plan (in USD million)

	GoU	SREP	MDBs	Private Sector	DPs / Other DFIs	TOTAL
Additional Geophysical Studies and Surveys	0.50	-	-	-	1.0	1.5
Exploration Drilling	2.0	11.8	20.0	-	20.0	53.8
Field Development	4.0	20.0	50.0	-	20.0	94.0
Technical and Capacity Building	0.50	-	-	-	1.0	1.50
Advisory Services	-	2.0	-	-	-	2.0
Power Plant Construction	-	-	-	230.0	-	230.0
Transmission Infrastructure	-	-	-	-	6.0	6.0

<b>Total</b>	<b>7.0</b>	<b>33.8</b>	<b>70.0</b>	<b>230.0</b>	<b>48.0</b>	<b>388.8</b>
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## Project Preparation Timeline

Once the Investment Plan is endorsed, the lead-MDB will engage with the GoU to strengthen discussions concerning the implementation of SREP resources as well as amounts of a possible co-financing. Discussions with other Development Partners will be intensified identify the appetite of some development partners in providing financing for this project.

The estimated timetable for submission of the project appraisal document to the SREP Sub-committee is the last quarter of 2016.

<b>PILOT PROGRAMS FOR CLIMATE RESILIENCE</b> <b>FOREST INVESTMENT PROGRAM</b> <b>SCALING UP RENEWABLE ENERGY PROGRAM IN LOW-INCOME COUNTRIES</b> <b>MDB Request for Payment of Implementation Services Costs</b>			
<b>1. Country/Region:</b>	Uganda / Africa	<b>2. CIF Project ID#:</b>	(Trustee will assign ID)
<b>3. Project Title:</b>	Uganda: Development of 130M# in Geothermal Power		
<b>4. Request for project funding (US\$ million)<sup>15</sup>:</b>	At time of country program submission: USD 32.0 million (AfDB: USD 30 million) (IFC: USD 2 million)	At time of project approval: <b>TBD</b>	
<b>5. Estimated costs for MDB project implementation services (US\$)<sup>16</sup>:</b>	Initial estimate - at time of Country program submission: US\$420,000	MDB: African Development Bank	
	Final estimate - at time of project approval: US\$420,00	Date: 01 November 2015	
<b>6. Request for payment of MDB Implementation Services Costs (US\$):</b>	<input checked="" type="checkbox"/> First tranche: US\$210,000 <input type="checkbox"/> Second tranche: US\$210,000		
<b>7. Project/program financing category:</b>	a - Investment financing - additional to ongoing MDB project	<input type="checkbox"/>	
	b- Investment financing - blended with proposed MDB project	<input checked="" type="checkbox"/>	
	c - Investment financing - stand-alone	<input type="checkbox"/>	
	d - Capacity building - stand alone	<input type="checkbox"/>	
<b>8. Expected project duration (no. of years):</b>	6 years		

<sup>15</sup> Including the preparation grant request

<sup>16</sup> If the final MDB cost estimate exceeds the relevant benchmark, it needs to be supported by (i) a breakdown of costs of inputs required (staff/consultant time, travel, number of missions, etc) and (ii) by an explanation of the particular aspects of project design and implementation that drive MDB costs to exceed the benchmark (Item 9 in template).

<b>9. Explanation of final estimate of MDB costs for implementation services:</b>	If final estimate in 5 above exceeds the relevant benchmark range, explain the exceptional circumstances and reasons: Not applicable
<b>10. Justification for proposed stand-alone financing in cases of above 6 c or d:</b> Not applicable	

## Project 2: Off-grid Electrification Development Program for Island Communities on Lake Victoria and Pilot-Project on small-scale Solar PV Rooftop for Electricity Generation using Net-Metering

### Problem Statement

Uganda has a high solar radiation potential with average daily radiation of 5.1KW/m<sup>2</sup>/day. Currently Solar photovoltaic application is limited to small and rural domestic and institutional stand-alone battery systems, and water pumping.

The Rural Electrification Agency (REA) through the Ministry of Finance, Planning and Economic Development (MoFED) is in advanced stages of securing financing from financiers such as World Bank (WB), African Development Bank (AfDB), Islamic Development Bank (IDB), The Arab Bank for Economic Development in Africa, OPEC Fund for International Development (OFID) and the Abu Dhabi Fund for Development are supporting various on-grid electrification projects but little is currently being made on isolated areas, especially in Islands on Lake Victoria. With the exception of a Grant from IDB to undertake electrification feasibility studies for Buvuma and Sigulu islands on Lake Victoria. Also, under the World Bank funded ERT Additional II, Kagondo Hospital mini-grid will be uprated to 64 kW while REA in partnership with the University of Southampton (under Energy for Development (ED4) research program) is currently constructing 2x13.5 kW Solar PV micro-grids at Kanyegaramire in Western Uganda.

In addition, solar PV systems that could be employed to supply power to daytime loads in commercial institutions like banks, government offices, and hospitals. It has been established from observation and studies that day time power consumption for load in commercial and public buildings during day time has same profile as the solar radiation curve which is almost steady through the year as Uganda lies along the Equator. A considerable number of national building rooftops are currently not being used to its most potential by not taking advantage, among others, of this exposure to solar irradiation.

### Proposed Contribution to Initiating Transformation

This project aims at taking advantage of the solar potential of Uganda by supporting the development following:

- i. Development an off-grid electrification master plan on islands on Lake Victoria,
- ii. Design and construct of at-least 10 mini-grids in different islands, and
- iii. Install 10x25KW solar PV rooftop systems in national buildings around Kampala, Jinja, Mbale and Entebbe

The proposed electrification program on the islands is expected to boost considerably economic activities (i.e. sustainable fishing and tourism). In addition, it will provide access to energy to communities that have no access to modern energy services which will in turn drive improvements in the health and education sector. This will greatly benefit from the

development of an off-grid master plan that will provide the basis for the electrification of the remaining islands in an orderly and sequential manner.

All these activities have the potential to improve the life of women and disadvantaged groups given the positive impact on economic opportunities through the creation of more productive jobs in the targeted islands.

In addition, the grid tie solar PV system will introduce smart electricity meters (net metering) compared to the current meter which only measures current to be able to export and import power to the grid. The proposed net metering systems are proved worldwide in the national grid in countries like UK, Germany, USA, South Africa, and others. A study will be undertaken to ensure that the appropriate policies, laws, regulation, and standards for solar grid connected rooftop systems are in place. This will be key for the expected scale-up downstream into non-public buildings following establishment of track record. The pilot project will be implemented in urban areas targeting public building currently connected to the national grid.

SREP financing will be instrumental in opening the new market line for solar products which will increase the solar electricity generation. SREP financing will address the current bottlenecks by providing a supportive regulatory framework with appropriate legislation. In addition, SREP will finance the deployment of demonstration units, build technical capacity among key institutions and reduce the high upfront costs of the solar systems.

The GoU, in cooperation with the MDBs, have agreed that in order to minimize transaction costs, it would make sense to implement these two relatively small distinct projects in parallel. This will allow for economies of scale and to accelerate the overall implementation of phase II of SREP programming.

### **Implementation Readiness**

Following the successful electrification of the Bugala Island, REA has embarked on several programs that aim at providing electricity to other islands on Lake Victoria and has undertaken reconnaissance studies for electrification of Kalangala (excluding Bugala), Buvuma, Koome and Sigulu Islands. In addition, REA is in advanced stages of procuring a consultant to conduct full electrification feasibility studies for Buvuma and Sigulu Islands using a Grant Facility from the Islamic Development Bank.

Availability of financial resources to fast track the electrification of these islands as well as the inexistence of a proper plan to guide that expansion are among the key challenges faced by the GoU. SREP resources will complement the existing activities and highly contribute to accelerate the government's plans for the electrification of these isolated areas that will never be reached by the national grids.

The proposed funding from the SREP will enhance REA's off-grid electrification program by financing the following activities:

- i. Develop an Off-grid Electrification Master Plan for the islands on Lake Victoria. The study will rank the electrification projects for all the islands based on technical, financial and economic viability. Also, the study will identify the most appropriate renewable electricity generation source(s) for each individual island. The Master Plan will accordingly be used by REA to solicit for construction funds;



- ii. Based on item (i) above, undertake detailed full feasibility studies of electrification projects ranked 1<sup>st</sup> – 5<sup>th</sup> (i.e. the most viable five (5) islands ranked by the Master Plan); and
- iii. Implement at least up to ten PV solar-based mini-grids on Lake Victoria. Hybrid mechanisms may be considered with SREP financing the renewable component only.

The existing policies and regulatory guidelines do not support small scale grid solar PV systems using net metering. This pilot will be able to identify all key issues that need to be considered to implement grid tied solar PV systems before a scale-up is allowed by private sector buildings and households. These systems will increase the installed capacity for solar energy contribution in the electricity mix, lower the cost of solar energy systems in the country, and initiate an important transformation change in the country by changing the way buildings interact with the power grid.

SREP's support to the GoU's on net metering will capture the financially capable urban population to support power generation on small scale for use during day time. This will reduce Uganda's reliance on hydro power.

### **Rationale for SREP Financing**

Uganda, just like most developing countries, has ambitious plans of achieving universal rural electrification access. This universal access is expected to be reached by 2040 as outlined in the SE4All Action Agenda. Although the majority of rural households will be served by the national electricity grid, it is envisaged that at-least 60,500 connections will be supplied from isolated mini-grids due to their remoteness from the National Grid. Usually, mini-grids can be supplied from wind, solar PV and bagasse. In many cases, these technologies are complemented with storage capacity (through use of batteries) and diesel generators to ensure the reliability of the system as a whole. However, preliminary studies on some of these islands have shown that wind speeds are not viable.

As a consequence, the most feasible source of supply for the mini-grids is expected to be Solar PV since Uganda by virtue of its position along the equator is well endowed with adequate solar radiation. Furthermore, the use of solar-based PV mini-grids is in line with the objective of SREP of utilizing renewable energy sources to increase access to electricity.

SREP financing will address the current bottlenecks by helping establishing a supportive regulatory and legal framework for the expansion of such technology into private sector buildings. Net-metered solar PV systems provide the possibility for businesses to self-generate and to sell any excess power back to the grid under a power exchange system that will be developed as part of this project. In addition, SREP financing will be instrumental in opening a new market line for solar products in Uganda which may over time contribute to a considerable increase in solar electricity generation.

### **Results Indicators**

The implementation of this project will be made over an estimated period of 1 to 3 years from the moment the Project Preparation Grant begins to be implemented. Indicators selected for this project are in line with SREP Results Framework and those that will be monitored include: (i) annual electricity output from renewable energies in GWh (once power plants start being commissioned), (ii) annual increase in public and private investment in Uganda in USD, (iii) installed capacity in MW, (iv) number of men and women, business and community services

benefiting from improved access to electricity as a result of SREP intervention, (v) greenhouse gas emissions saved as a result of SREP intervention.

## Financing Plan

The total estimated cost of these two sub-projects is about USD 26 million of which USD 9.4 million is sought from SREP. MoEMD will engage with the Ministry of Finance, Planning and Economic Development to study and agree on co-financing from both the WB's IDA and AfDB's ADF concessional windows. The SREP resources will help finance the following activities: (i) development of an off-grid electrification master plan for the islands located on Lake Victoria, (ii) feasibility studies for five islands, (iii) design and construction of at least 10 renewable (or hybrid) mini-grids, (iv) connections and other distribution infrastructure, (v) technical assistance, (vi) 10x25 KW demonstration solar PV roof top systems, (vii) regulatory, legal, strategy and other investment guide. The table below provides an estimation of the total costs associated with these activities as well as the sources of financing. The SREP allocation of USD 5 million to the off-grid component includes USD 2.3 million to be implemented as a Project Preparation Grant by AfDB.

Table: Indicative Financing Plan (in USD million)

In USD million	GoU	SREP	MDBs	TOTAL
<b>Off-grid Component</b>				
Development of Off-grid Electrification Master Plan	-	1.30	-	1.30
Feasibility Studies of Ten Islands	0.50	0.50	-	1.00
Design and Construction of Ten mini-grids including Project Supervision	1.2	2.0	14.0	17.20
Last Mile Connections	0.20	0.20	0.60	1.00
Technical Assistance	-	0.50	-	0.50
<b>Sub-Total</b>	<b>1.90</b>	<b>4.50</b>	<b>14.60</b>	<b>21.00</b>
<b>Pilot Solar PV Net Metering Component</b>				
Mobilization, sensitization, and training of key stakeholders	0.10	-	-	-
10 - 25 KW demonstration solar systems (100 system)	-	4.50	-	-
Marketing and promotion	-	-	-	-
Regulations, legislation, standards, strategy and investment guide	-	0.40	-	-
Technical capacity building	0.10	-	-	-
<b>Sub-Total</b>	<b>0.2</b>	<b>4.9</b>	<b>-</b>	<b>-</b>
<b>Total</b>	<b>2.1</b>	<b>9.40</b>	<b>14.60</b>	<b>26.1</b>

## Project Preparation Timeline

Once the Investment Plan is endorsed, the lead-MDB will engage with the GoU to strengthen discussions concerning the implementation of SREP resources as well as amounts of a possible co-financing. Discussions with other Development Partners will be intensified identify the appetite of some development partners in providing financing for this project.

The estimated timetable for submission of the project appraisal document to the SREP Sub-committee is the last quarter of 2016.

Scaling Up Renewable Energy Program in Low Income Countries Project Preparation Grant Request			
<b>1. Country:</b>	Uganda	<b>2. CIF Project ID#:</b>	[Trustee to Assign ID]
<b>3. Project Title:</b>	OFF-GRID ELECTRIFICATION DEVELOPMENT PROGRAM FOR ISLAND COMMUNITIES ON LAKE VICTORIA		
<b>4. Tentative SREP Funding Request (in USD million total) for Project at the time of Investment Plan Submission:</b>	USD 9.0 million		
<b>5. Preparation Grant Request (in USD):</b>	USD 1,800,000		
<b>6. National Project Focal Point</b>	James Baanabe ; <a href="mailto:baanabe@energy.go.ug">baanabe@energy.go.ug</a> / <a href="mailto:baanabej@gmail.com">baanabej@gmail.com</a> Mr. Charles Lutwama <a href="mailto:clutwama@rea.or.ug">clutwama@rea.or.ug</a> Mr. Andrew Muguwa <a href="mailto:amuguwa@rea.or.ug">amuguwa@rea.or.ug</a>		
<b>7. Executing Agency:</b>	Rural Electrification Agency (REA) of the Ministry of Energy and Mineral Development		
<b>8. MDB SREP Focal Point and Project / Program Task Team Leader</b>	Joao Cunha, SREP Coordinator <a href="mailto:j.cunha@afdb.org">j.cunha@afdb.org</a>	TTL: TBD	
<b>9. Description of Activities Covered by the Preparation Grant</b>			
The Project Preparation Grant will serve to			
(i) Development of an Off-grid Electrification Master Plan for Islands on Lake Victoria. The Master Plan will accordingly be used by REA to solicit for construction funds;			
(ii) Based on item (i) above, detailed full feasibility studies of the most viable five (5) islands will be undertaken by the same Consultant;			
(iii) Technical Assistance (i.e. Solar PV Test Equipment for Solar Mapping & Testing)			
<b>10. Outputs</b>			
Deliverable			Deadline
i) Procurement of Consultancy Services			2016
ii) Off-grid Development Master Plan for Islands on Lake Victoria			2016
iii) Full Feasibility Studies for ten (10) solar PV mini-grids			2016
iv) Purchase of Solar PV Equipment for Solar Mapping & Testing			2016
<b>11. Budget</b>			
Expenditures			Amounts (in USD)
Development of Off-grid Electrification Master Plan			1.30
Feasibility Studies of Ten Islands			1.00
Technical Assistance (i.e. Solar PV Test Equipment for Solar Mapping & Testing)			0.50
<b>TOTAL COST</b>			<b>2.80</b>
GoU			0.50
<b>12. Timeframe</b>			
It is expected that the studies (i.e. both the Master Plan & Full Feasibility Studies) and the purchase of the Solar PV Test & Mapping Equipment will take a period of fifteen (15) months to be implemented including the procurement phase.			
<b>13. Other Partners Involved in Project Design and Implementation</b>			
Individual consultants or consultancy companies will be hired through competitive processes in accordance with MDB rules and procedures.			
<b>14. If applicable, explanation for why the grant is MDB executed</b>			
Not applicable			
<b>15. Implementation arrangements</b>			
In executing the PPG, the Procurement and Fiduciary function will be ensured by REA. The funds will be channeled through AfDB. Procurement of consultancy services will be done in accordance with the AfDB's procurement rules and under the guidance of the local experienced staff.			

**PILOT PROGRAMS FOR CLIMATE RESILIENCE  
FOREST INVESTMENT PROGRAM  
SCALING UP RENEWABLE ENERGY PROGRAM IN LOW-INCOME COUNTRIES  
MDB Request for Payment of Implementation Services Costs**

<b>1. Country/Region:</b>	Uganda / Africa	<b>2. CIF Project ID#:</b>	(Trustee will assign ID)
<b>3. Project Title:</b>	OFF-GRID ELECTRIFICATION DEVELOPMENT PROGRAM FOR ISLAND COMMUNITIES ON LAKE VICTORIA		
<b>4. Request for project funding (US\$ million)<sup>17</sup>:</b>	At time of country program submission:  USD 4.5 million	At time of project approval:  TBD	
<b>5. Estimated costs for MDB project implementation services (US\$)<sup>18</sup>:</b>	Initial estimate - at time of Country program submission: US\$ 150,000	MDB: African Development Bank	
	Final estimate - at time of project approval: US\$ 150,000	Date: 01 November 2015	
<b>6. Request for payment of MDB Implementation Services Costs (US\$):</b>	<input checked="" type="checkbox"/> First tranche: US\$75,000 <input type="checkbox"/> Second tranche: US\$75,000		
<b>7. Project/program financing category:</b>	<input type="checkbox"/> a - Investment financing - additional to on-going MDB project <input checked="" type="checkbox"/> b- Investment financing - blended with proposed MDB project <input type="checkbox"/> c - Investment financing - stand-alone <input type="checkbox"/> d - Capacity building - stand alone		
<b>8. Expected project duration (no. of years):</b>	1 – 3 years		
<b>9. Explanation of final estimate of MDB costs for implementation services:</b>	If final estimate in 5 above exceeds the relevant benchmark range, explain the exceptional circumstances and reasons: Not applicable		
<b>10.</b>	Justification for proposed stand-alone financing in cases of above 6 c or d: Not applicable		

### Project 3: Wind Resource Map Assessment, Feasibility Studies and Pilot Wind Farms

<sup>17</sup> Including the preparation grant request

<sup>18</sup> If the final MDB cost estimate exceeds the relevant benchmark, it needs to be supported by (i) a breakdown of costs of inputs required (staff/consultant time, travel, number of missions, etc) and (ii) by an explanation of the particular aspects of project design and implementation that drive MDB costs to exceed the benchmark (Item 9 in template).

## Problem Statement

The Ministry of Energy and Mineral Development has embarked on an extensive resource assessment of unstudied and unexploited renewable energy resources including wind resource to address the challenge of sole dependence on hydro power resource. The National Vision 2040 identifies wind energy resource as one of the areas to be developed to achieve the national target of 41,738 MW by 2040. The National Development Plan 2010 -15 proposed the establishment of the wind data base and also the promotion of wind mills for water pumping. The GoU through the Ministry of Energy and Mineral Development has procured and installed (July 2015) two wind measuring equipment to collect the wind speed data to make a basis for extensive resource assessment in the Karamoja region. Karamoja Region was selected due to the preliminary data that is available from meteorology weather stations which showed high wind speed and also observations of high wind speed between the months of October – April which are characterized by windy and dusty weather. These two wind measuring equipment are small in number to cover the wide area of the Karamoja region and under the current arrangement it will not accelerate wind energy resource assessment as it will take long time to acquire enough data at different sites to be able to obtain data to support the generation of electricity from wind.

## Objective and Proposed Transformation

Up to now Uganda has always lacked of credible wind potential data which has hampered the sector development and especially the involvement of the private sector. In order to initiate transformation through wind, SREP is proposing a co-financing in order to implement a national wind measurement campaign at additional 6 different sites in the northern region targeting mainly Karamoja which is identified as the most promising wind potential region. Of these 6 sites, only two sites with the best potential will be selected to develop two pilot projects (2x10MW grid connected windfarm). This will allow the GoU to collect wind measurement with the goal to establish a first reliable and bankable wind potential database of Karamoja. The main outcome of the creation of this database will help overcoming one of the most difficult barriers/risks facing wind power project developers, namely the acquisition of one year high quality measurement data proving the real wind potential of a selected area. The existence of such database will be used to not only to encourage private investors/developers to come and operate in the region but also to initiate a national wind mapping program.

Pilot project in Karamoja will aim at demonstrating that such technology could work and be sustainable and profitable. It will also allow the GoU (ERA) to determine the most appropriate tariffs that could be applied to grid connected windfarms in order not only profitable for the developer but also make it affordable to its future customers. Such project will thereby also increase access to electricity in the region as well becoming a project model proving that large scale wind power development in Uganda can be economical, financial and technical feasible, while sustainable and profitable.

This SREP project will thus clear the ground for future investments by demonstrating that wind power will be affordable within the context of Uganda. The project will be developed by the GoU in the Karamoja region and will have an installed capacity of up to 2x10MW. It will be targeting a level of local technological input that is expected to guarantee the overall reduction in unit energy cost for the project as well as for future wind power projects by helping create local industries for manufacture and supply of wind power technology components obtaining in this way gains in economies of scale. This will also be an

opportunity to create a track record of wind energy technology and select the most appropriate one for the country.

The project will bring closer the realization of the GoU's goal of reaching the three UN SE4ALL objectives (Universal Energy Access, Renewable Energy, Energy Efficiency) by 2030 which are aligned with the latest National Development Plan (NDP)'s (2014) targets. In fact, the GoU plans to implement a systematic wind mapping program, starting at areas that are considered endowed with the resource. If the wind energy potential is proved to be significant in Uganda, wind power can become an important large-scale diversification option, with windfarm investments by the private sector.

Thus, by laying the foundation for the growth of local wind industries, the position of wind energy in the renewable energy mix of the country will be secured and made sustainable, which will be difficult to accomplish otherwise. SREP concessional finance will be used to:

- Procurement and Installation of additional 6 wind measurement equipment to collect wind speed data (currently two systems are installed)
- Establishment of the wind speed database and generation of the wind map
- Conduct detailed feasibility study to select two suitable sites for 2 X10MW wind farm
- Package and implement 20MW demonstration wind farm
- Support capacity building/training of local workers/engineers in order to acquire experience and skills needed by the wind energy sectors.
- Prepare wind energy resource strategic plan and investment guide

### **Implementation Readiness**

No wind power program has yet been implemented by the GoU. This pilot project will be able to set up some solid benchmark supporting the development of a wind national mapping program. Thus Uganda will be able to diversify its sources of energy which is currently heavily depending on hydropower. In fact, wind appears to be a proven alternative in other neighboring countries, especially in East Africa such as Kenya.

SREP's support to the GoU's national wind programme arrives at the right time, following the GoU's actual agenda. In fact, MEMD is currently installing two measurement towers in both Kotido and Napak located in Karamoja region, which indicates its strong interest in establishing for the creation of such a National Wind Program. This measurement project will set up the solid base to develop windfarm pilot project (2x10MW) that will fit in the GoU's future national energy development plan.

Implementing agencies will be MEMD, UEGCL, UETCL, viz:

- UEGCL for the procurement of the EPC equipment and work.; and,
- UETCL for signing a PPA with the wind farm operator.

### **Rational for SREP Financing**

SREP financing will be instrumental in bringing down the overall project cost and thus help launch a project that will ultimately make wind power affordable for the country in the long term. This is expected to be achieved through reductions in the cost of the projects' technology inputs, which are expected to be locally sourced and likely cheaper. It is worth mentioning that given the landlocked status of Uganda, transportation costs of components with significant dimensions pose a substantial financial hurdle that bring the costs of an already expensive technology even higher. In addition to cost savings, the project will also form an important part of its expenditures in local currency thereby conserving the country's

foreign currency earnings, which would otherwise be under huge pressure if the country is to rely on imported technology inputs to develop significant levels of wind power.

Tapping into its most wind blessed potential region, GoU will open doors to another alternative source of renewable energy that will ideally complement the country's hydropower master plan. It is important to stress that wind energy as a renewable and clean energy source, is using a free fuel (wind).

## Result Indicators

The results indicators for these projects are:

- Number of sites with good wind regimes and wind maps
- Number of private companies bidding for technical feasibility / ESIA
- The capacity of wind turbines installed and connected to the grid in MW
- Actual annual electricity output of windfarms
- Electricity access rate(number of customers connected)
- Wind energy share in the total renewable energy mix and total energy mix
- Share of local versus external inputs
- Savings in GHG emissions
- Project to benefit from the Clean Development Mechanism
- Increased penetration of wind energy resource transmission lines constructed
- Transmission lines constructed
- Number of local jobs created during construction and operation

## Project Timeline

Once the Investment Plan is endorsed, the lead-MDB will engage with the GoU to strengthen discussions concerning the implementation of SREP resources as well as amounts of a possible co-financing. Discussions with other Development Partners will be intensified in order to identify the appetite of some development partners in providing financing for this project. The ultimate goal is to have two pilot wind farms up and running and incentivize the private sector in taking the lead on the scale-up of this technology.

The estimated timetable for submission of the project appraisal document to the SREP Sub-committee is the last quarter of 2016.

## Indicative Financing Plan

The proposed SREP allocation is USD 6.8 million and includes a Project Preparation Grants of USD 1.875 million. The indicative financing table is presented below.

	SREP	GoU	MDB	Others	Total Cost
Project Preparation Grant	1.8	0.45			2.25
Wind Farm design & construction 2X10MW	5.0	2.0	13.5	13.5	34.0
Substation	-		0.5	0.5	1.0
Transmission Line 20 km est. (US\$0.15m/km)	-	3.0			0.3
<b>TOTAL</b>	<b>6.8</b>	<b>5.45</b>	<b>14.0</b>	<b>14.0</b>	<b>37.55</b>

SCALING-UP RENEWABLE ENERGY PROGRAM IN LOW INCOME COUNTRIES PROJECT PREPARATION GRANT REQUEST			
1. Country:	Uganda	2. CIF Project ID#:	[Trustee to assign ID]
3. Project Title:	Wind Pilot Project		
4. Tentative SREP Funding Request (in USD million total) for Project at the time of Investment Plan submission:	SREP Component: 6,875,000		
5. Preparation Grant Request (in USD):	USD 1,875,000	MDB: AfDB	
6. National Project Focal Point:	James Banaabe ; <a href="mailto:baanabe@energy.go.ug">baanabe@energy.go.ug</a> / <a href="mailto:baanabej@gmail.com">baanabej@gmail.com</a>		
7. Executing Agency:	Ministry of Energy and Mineral Development (UEGL)		
8. MDB SREP Focal Point and Project / Program Task Team Leader (TTL):	MDB HQ Focal Point:Joao Cunha, SREP Coordinator, <a href="mailto:j.cunha@afdb.org">j.cunha@afdb.org</a>	TTL:	
<b>9. Description of Activities Covered by the Preparation Grant</b>			
The Project Preparation Grant will serve to (i) perform a detailed wind assessment in the Northern Region by installing additional 6 wind masts; (ii) Perform a detailed technical feasibility study on 4 best sites; (iii) Conduct a detailed Environmental and Social Impact Assessment and a detailed Resettlement Action Plan (if needed) in accordance with the MDB rules and procedures on 2 optimum pilot sites. ( IV) prepare wind energy strategic plan and investment guide			
<b>10. Outputs</b>			
Deliverable		Timeline (Months)	
Procure and install 6 wind masts (two mast already installed)		12	
Collect and analysis of wind speed data		36	
Technical Feasibility Study for 4 optimum sites		12	
ESIA & RAP for the 2 optimum sites for Pilot project		6	
Prepare wind strategic plan and investment guide		6	
For more details please consult the schedule presented in the concept note.			
<b>11. Budget</b>			
Expenditures		Amounts (in USD)	
Feasibility study, ESIA, wind measurement etc.		1,200,000	
Equipment of 6 masts		600,000	
Travel/Transportation		100,000	
Others (administrative Costs, Operational cost etc.)		200,000	
Contingencies (10%)		225,000	
Total Cost		2,325,000	
Other Contributions:			
GoU		USD 450,000	
<b>12. Timeframe</b>			
Following IP's endorsement and consequent approval of this PPG, the MDB in charge is expecting to finalize the procurement process and disbursement of the funds earmarked herein during the first quarter of 2016. The installation of the wind masts and data collection is expected to start soon after and last for a period of at least 36 month. At the same time, a team of consultants is expected to be hired by UEGE, as executing agency, in accordance with MDB rules and finalize the drafting of the detailed ESIA and RAP by the time the data collection is concluded.			
<b>13. Other Partners Involved in Project Design and Implementation</b>			
Individual consultants or consultancy companies will be hired through competitive process.			
<b>14. If applicable, explanation for why the grant is MDB executed</b>			
Not applicable.			



**15. Implementation Arrangements**

In executing the PPG, the Procurement and Fiduciary function will be ensured by MEMD. The funds will be channeled by the MDB. Procurement of goods and services will be done in accordance with the MDB rules (or national procedures if validated by MDB) and under the guidance of the local experienced staff.

## Annex 2: Assessment of Country's Absorptive Capacity

### MACRO-ECONOMIC CONTEXT

Uganda's economy has remained resilient despite a challenging geo-political situation over the last two years and has continued to experience strong economic growth and financial stability. Real GDP growth was 4.5 percent in FY2013/14, driven by an increase in private sector activity in agriculture, industry and services as well as public infrastructure investment.

The GoU (GoU) is committed to enhancing growth to generate employment through boosting public and private investment. The country's medium term plan, the National Development Plan (NDP II), contains an ambitious investment package focused towards closing the infrastructure gaps (particularly in the transport network and the energy sector), enhancing regional integration, and preparing for oil production. The GoU intends to continue to increase tax revenue and improve the quality of spending. Growth prospects therefore remain favorable and are expected to be supported by the infrastructure investment, although investment in the oil sector has slowed down due to lower oil prices and licensing delays. (Oil production is expected to commence in 2021.) Real GDP growth is projected at 5.3 percent for FY2014/15 and 5.8 percent for FY2015/16 driven by the boost in public investment and a rebound in private demand.

Uganda has relatively subdued inflation (mainly due to low food and import prices), fiscal deficits and public debt levels, although the latter two are rising due to increased infrastructure investment. GoU's fiscal budget for FY2015/16 aims to close infrastructure gaps and promote socio-economic transformation. The fiscal deficit is expected to increase to 7 percent of GDP for FY2015/16, compared to 4.5 percent for FY2014/15 predominantly due to the boost in public investment in infrastructure.

The relatively low level of inflation, healthy international reserves, low levels of debt, a resilient financial system, a flexible exchange rate, and an improved Public Finance Management (PFM) system contribute to a positive economic outlook. Uganda's near term credit outlook will depend on its success in improving its external sector performance and containing downside risks including those arising from pre-electoral spending on the fiscal position and socio-political tensions leading up to and after the 2016 elections. GoU have reiterated their commitment to maintaining election-related expenditures to levels contained in the budget.<sup>19</sup>

### DEBT SUSTAINABILITY<sup>20</sup>

The IMF-World Bank Debt Sustainability Analysis for Uganda classified its risk of debt distress as "Low" as at December 2014. Uganda is currently rated B1 Stable Outlook, B Stable Outlook, B+ Stable Outlook by Moody's, S&P and Fitch respectively.

Since Uganda benefited from debt relief, the authorities have been cautious in accumulating new external debt while steadily developing the domestic debt market. The external debt burden compares favorably to other post-Multilateral Debt Relief Initiative (MDRI) countries. Uganda's external debt stock increased by only about 4.75 percent of GDP in 2007-2012 compared to a median increase of 6 percent of GDP for

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<sup>19</sup>IMF 2015 Article IV Consultation and the Fourth Review under the Policy Support Instrument. (IMF Country Report No. 15/175).

<sup>20</sup> IMF Country Report No. 15/175.

early beneficiaries of MDRI. New debt has mainly financed infrastructure projects and enhancement of transparency and service delivery in the public sector.

The risk of debt distress will remain low in spite of the ambitious infrastructure investment program and GoU have taken steps to enhance their institutional capacity, including the creation of a centralized institutional body within the Ministry of Finance, Economic Planning and Development that manages government debt, and the strengthening of the legal framework through the adoption of the new 2015 Public Financial Management (PFM) Act. However, the risk to a deteriorating debt service-to-revenue ratio is high due to the relatively low revenues and the short maturity of domestic debt, posing some sustainability risks.

As at end June 2015, the IMF Staff Report for the 2015 Article IV Consultation noted that the performance under the Policy Support Instrument (PSI)<sup>21</sup> was positive and on track. This fourth review under the PSI noted that the quantitative assessment criteria and most indicative targets and structural benchmarks were met and recognised strong revenue performance and progress in public financial management.

### **INSTITUTIONAL CAPACITY**

To implement the power sector reform strategy, the GoU passed the 1999 Electricity Act and established an independent Electricity Regulatory Authority (ERA) in 2000 to regulate all sector activities. The Government also unbundled the vertically integrated Uganda Electricity Board, which had been established in 1948, into power generation, transmission, and distribution companies in 2001. A Rural Electrification Board (REB) was established in 2001 to oversee the implementation of rural electrification activities. REB is chaired by the Permanent Secretary (PS) of the Ministry of Energy and Mineral Development (MEMD), and the Rural Electrification Agency (REA) is the secretariat to the REB to support the day-to-day operations.

Most of the fixed assets along the electricity supply chain are owned by three public enterprises: (i) the Uganda Electricity Generation Company Limited (UEGCL) for power generation, (ii) the Uganda Electricity Transmission Company Limited (UETCL) for power transmission, and (iii) the Uganda Electricity Distribution Company Limited (UEDCL) for power distribution.

Several reforms have been initiated to address capacity constraints. With regard to financial governance, a major milestone was reached: the Public Financial Management (PFM) Act was adopted in November 2014, and it incorporates good budget practices, prepares the economy for oil revenue management, and institutionalized the preparation of a fiscal risk statement and the Charter of Fiscal Responsibility (CFR). In addition, accounting and payments systems have been upgraded, the stock of domestic arrears has been reduced, and the inflation targeting framework has been improved. The recent introduction of a Treasury single account with quarterly cash limits should improve the predictability and timeliness of releases to Ministries, Agencies, and Local Governments. However, the utilization of the Treasury Single Account (TSA) is still under discussion between GoU and its development partners.

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<sup>21</sup> The PSI for Uganda was approved by the Executive Board on June 28, 2013.

## ENERGY INVESTMENT IN THE AGENDA FOR TRANSFORMATION

The Scaling-Up Renewable Energy Program (SREP) will, via the AfDB, WB and IFC, support the GoU in diversifying its renewable energy sector and increasing electricity access in line with its national strategies. SREP will also support the GoU in strengthening its capacity to conceive and implement sound technical, financial, regulatory and institutional foundations for a successful implementation of the SREP program and associated flagship renewable energy projects.

The concessional funding allocated to Uganda aims to secure long-term public financing for feasibility studies and for drilling of geothermal potential as well as for deploying potential new sources of renewable energy through the wind data measurement and pilot wind farms, as well as designing a national master plan to develop mini grids and electrifying some of the isolated islands in Lake Victoria. The SREP financing towards the pilot net metering project in public buildings enables the financial viability of the pilot phase, and it will reduce the financing cost, improve returns and set the stage for the sustainable rollout of a robust private sector-led net metering program in Uganda. SREP investments will help demonstrate the economic viability of wind as a source of power. With regards to Geothermal, SREP will play a key role in supporting the country undertaking exploration drilling. Development agencies as well as local and international private sector investors and financiers are expected to embark on further financing for grid-connected wind farms. SREP is also expected to lay the groundwork for the leveraging of substantial financing from the private sector for geothermal development by expediting in the exploration phase.

The SREP investments will benefit the country in leveraging funds and ultimately result in inclusive growth and job creation with the supply of reliable electricity to households and small and medium enterprises and industries. The SREP interventions are aligned to the Vision 2040 of Uganda which identifies power as a major binding constraint to the accelerated economic growth and development of the economy. Finally, given the levels of concessionality attached to the SREP funds, it is expected that SREP will cause little impact on Uganda's capacity to service its debt.

## Annex 3: Stakeholders Consultations

The SREP-Uganda Investment Plan (IP) is the result of a comprehensive participatory process involving many institutional, national, and international actors, led by the GoU and represented by the Ministry of Energy and Mineral Development (MEMD), with support from the multilateral development banks (MDBs), particularly the AfDB and World Bank Group (including the IFC).

The main stages of the consultative process have been the following:

- Multiple technical meetings during the scoping mission with the development partners, civil society organizations, NGOs, and private sector representatives (19 - 23 January 2015);
- Consultations with key national stakeholders during the joint mission, including national institutions, private sector representatives, civil society organizations and development partners, to present the draft investment plan and proposed investment priorities (17 - 25 August 2015);
- Posting the draft Investment Plan on the Ministry of Energy and Mineral Development's website for two weeks to allow national stakeholders to review and comment on the proposed investments (TBD 2015).
- The lists of stakeholders consulted during the missions are available in the Aide-Memoires, which have been posted on the Climate Investment Funds (CIF) website. (<http://www-cif.climateinvestmentfunds.org/country/uganda/ugandas-srep-programming>)

The Joint Mission consultative workshop was aimed at supporting the GoU in prioritizing and validating the IP and projects in the IP through a wide consultation and dialogue process with all interested stakeholders. During the workshop, the SREP National Task Force focal point presented the draft IP and the proposed individual projects to be supported by SREP.

### Stakeholder Feedback and Suggestions

The workshop participants welcomed the programme. The proposed projects were examined and suggestions for improvement were gathered from participants. In addition, some participants put forward the inclusion of a number of additional activities in the IP. The SREP National Team has taken note of all the comments received and will take them into consideration in finalizing the IP.

### Key issues raised by Development Partners

Development partners (DPs) welcomed the SREP-Uganda initiative as an opportunity for the country to accelerate renewable energy development as it is closely aligned to their interventions in the country and provides an opportunity to crowd-in additional resources for the scale-up of RE investments. A number of key observations were raised by development partners and it was pointed out that the SREP-Uganda IP could draw valuable lessons from renewable energy development initiatives of DPs.

DPs' RE development activities are mainly in hydro, off-grid electrification, solar, biomass, bagasse and related technical assistance and grid infrastructure.

### Selected technologies

Several potential activities to be undertaken with SREP support were discussed. The participants rejected the proposed activity for peat development as peat is classified by the UNCCC as non-renewable and emits higher emissions than coal. The DPs also pointed out that the GoU had requested for the restoration of the wetlands, where much the peat is located. The GoU agreed and removed the proposal from the draft IP.

Concerning the solar net metering project proposal, the DPs suggested that private sector buildings be included in the proposal since government buildings mainly use electricity for lighting and the private sector buildings use electricity for productive uses. It would be more compelling to do the pilot with the private sector as more will be learnt this way. In general, DPs noted that the IP should demonstrate how the private sector will be involved. The GoU explained that the private buildings are the ultimate target of this pilot intervention as the GoU creates public awareness and develop an appropriate legal and regulatory framework to enable private participation downstream. The Project Concept Note will better capture this message. From an implementation point of view, the implementing MDB will disburse the resources to a public sector entity.

Other points of interest highlighted included a USD 3 million project for biogas capture for feeding into the grid and any possibility to examine the potential for the use of the hot water by-product from the anticipated oil production.

### **Electricity access concerns**

The IP is expected to be more centred on economic production and electricity access. Mini-grid and off-grid should have thus been considered. The GoU explained that even though Geothermal is the key priority for the GoU, the possibility of including mini-grids and/or off-grid solutions to better address the issue of energy access will be re-examined. This will depend among others on the scale of a possible intervention with a view to reduce transaction costs and reach appropriate scalability. The SREP would run in parallel to the existing ambitious access initiatives of the country, particularly the Rural Electrification Agency's (REA's) Rural Electrification Strategy and Plan (RESP) for the ten-year period 2013-2022.

### **Alignment with other DP initiatives**

The alignment with the SE4ALL Action Agenda access objectives should be indicated, and also with reference to the timeframe of the SE4ALL Action Agenda. Also, with regard to solar in particular, it was noted that UNDP had received a request to assist with the Solar Energy Master Plan and requested collaboration to complement each other's efforts. This was agreed to be included. Members of the SE4All team in the MEMD responsible for SE4All have been consulted and are part of the SREP Uganda National Task Force.

The major RE programme for Uganda, the GET FIT programme (launched in May 2013), is spearheaded and implemented by the GoU, Uganda's Electricity Regulatory Authority (ERA), the German Development Bank (KfW) with funding commitments totalling 91 million Euros from the Governments of Norway, Germany, the UK and the EU and support from the World Bank through the Partial Risk Guarantee facility. SREP support to encourage generation should be harmonized to GETFIT so as not to create competition between the two programs. The GET FIT program is planning for a third round focussed only on grid connected solar PV. Hence, it would not make sense for SREP to duplicate efforts in the solar space. Grid connected solar PV will not be included in SREP. The proposal for Net Metering through the use of solar PV panels remains unchanged. Furthermore, the GoU noted that solar off-grid has not generated significant private sector interest.

Concerning bagasse co-generation, the project, as proposed by GoU would be difficult to implement as part of the SREP program. The initial proposal of adding a tariff top-up to make these transactions bankable cannot be implemented by any of the Multilateral Development Banks (MDBs) due to unavailability of appropriate financial instruments. The MDBs discussed other ways of supporting bagasse cogeneration, such as applying a capex subsidy following a competitive tender process, but there were concerns of the size of the market and whether a truly competitive process could be carried out to ensure value for money for GoU and the MDBs. Additionally, there have been challenges relating to E&S issues for some bagasse sponsors under the GETFIT program. As a result, it was agreed that the MDBs will, in cooperation with the GoU, consider other alternatives. Ensuring the competitiveness and diversity of renewable technologies will be key.

The possibility of using SREP money to finance mini hydros that will not benefit from the GETFIT programme due to GETFIT funding constraints was considered. Currently, three sponsors have applied for GETFIT and will not be approved as all funds under the current GETFIT programme funding are fully committed. However, SREP involvement in mini hydro would be regarded as non-transformational given the amount of mini hydros that have or will be constructed, which is a key priority for the fund. In addition, it is important that the country diversifies its energy mix and becomes less dependent on hydro sources of electricity.

It was also requested that the time schedule for the projects be shown. These will be included in the final version of the Investment Plan that will be posted on a governmental website for public consultations for a month.

### **Grid instability and capacity concerns**

The DPs highlighted a major constraint in Uganda as the grid instability and ability to absorb the increase in capacity. There was assurance from GoU that the government will be able to evacuate the power for the future projects. If requested, the MDBs are available to finance rehabilitation and expansion of the national transmission and distribution infrastructure. Most of the proposed projects under SREP will most likely not be commissioned before 2018-2020.

### **Gender and environmental safeguards**

The gender and environmental sections were found to be in need of improvement and detailed for each specific technology. The GoU and MDBs explained that all the projects would be subject to their respective environmental and social safeguards. The objective at this stage is to undertake a gender and environmental mainstreaming exercise at the Investment Plan level. Once project implementation starts, the E&S rules of the responsible MDBs will apply. The GoU welcomes feedback and support from interested Development Partners to provide written feedback with a view to improve these sections.

### **Key issues raised by the private sector stakeholders**

#### **Geothermal**

With regard to geothermal exploration, drilling is considered to be the main barrier for private sector involvement. The experience gained in other countries shows that this risk is best addressed by the public sector, due to the high cost of exploration and high level of uncertainty of success. In Kenya, the government assumes this risk and once the resource is proved, it competitively bids out the construction, operation and maintenance of the power plants. Uganda will aim to replicate this approach, where possible, to unlock the pre-investment risk. The GoU would make efforts to identify a pool of licensed and unlicensed sites or sites with licenses that are due to expire in the near future with the best potential and a final decision on the selection of the best two sites will be made at a later stage.

The GoU is interested in having IFC providing advisory on how to structure geothermal operations in the country with regard to the role of the government in the future. Support on bidding documents to tender the power plants to the private sector would also be an integral part of the project.

#### **Bagasse Cogeneration subsidy top-up**

The Sugar Corporation of Uganda Limited (SCOUL) and Kinyara Sugar Ltd attended the consultation. Kinyara Sugar Ltd would have hoped to increase installed capacity using the same bagasse they are currently using from the current 14.5MW to 35MW, and plan to use 10MW and sell 25 MW to the grid (UETCL). Efforts are being made to negotiate the PPA with

UETCL, however, their financial model shows that they will need USD 11 cents/kWh. SCOL would be able to export 18-20MW (10-12 MW being own consumption). The two barriers identified were the capital investment cost and the tariff (they would require USD 12 cents/kWh). To this effect, the companies suggested that USD 5-6 million would need to be added to the GETFIT program and it would also need to be extended. Other financial institutions are actively interested but not able to provide finance for longer than 10 years.

The GoU mentioned that a top-up would not have the effect of increasing the tariff. DPs mentioned that the third round of GETFIT would only focus on solar. The MDBs explained that a top-up to the GETFIT programme would not be feasible under the SREP as MDBs do not have the instruments to disburse to subsidy-type programs. In addition, the SREP is unable to provide support for where single source procurement would be used. The IFC would be able to assist on the advisory side, if sole source procurement is used – buying down the capex after the bidding process.

### **Disbursement to the private sector**

How will the Government disburse SREP resources, if any, to the private sector? The GoU will not disburse resources directly to private entities. Any potential SREP disbursement to private companies would always be made directly to the responsible MDB taking into account the principle of minimum concessionality and based on commercial financing rules.

### **Net metering pilot**

How is the net metering pilot with public institutions going to benefit the scaling up for the private sector? And how would it attract private sector investment? The GoU explained that the private sector is not restricted but for the pilot, the GoU is piloting with the public sector to demonstrate to the public in the absence of any regulation for now. The main output will be the policy and regulatory framework that needs to be put in place.

### **Comments from CSO and NGO Stakeholders:**

#### **Access and productive use**

The focus of CSOs is access and productive use. There is no connection between how proposed investments relate to economic development and energy access. An effort will be made to better capture this relationship. Productive use of energy is a priority for SREP. In addition, development outcomes are a core aspect of project appraisal by any of the MDBs involved in SREP participation. GoU sees the SREP as complementary to existing programs.

#### **Leverage effect**

It is unclear how the leverage effect of 1:4 will be reached. The final version of the Investment Plan will better capture the leverage effect at the project level and at the investment plan level. The objective is to reach 1:4 (at least USD 200 million for the entire investment plan). This amount will come from SREP, the GoU, co-financing by participant MDBs, private sector promoters, local commercial banks, etc. Evidence from existing SREP pilot-countries that are more advanced than Uganda suggests that the minimum leverage effect is usually exceeded. The SREP Monitoring and Evaluation Framework pays close attention to this ratio by monitoring it on a semi-annual basis.

#### **Gender and employment**

The gender aspect is not mainstreamed well in the document and there should be many opportunities for employment, training and for families in the rural areas. This was noted by



the GoU to improve these aspects. Are CSO's involved in employment? When the private sector is expected to do the investment, this would depend on them. The ministry has been trying to support energy related organisations.

### Net metering pilot

Would net metering impact the grid given the current limitations of the grid? In the short run the net metering is not expected to have a large impact. However, the longer term impact on the utilities would be informed through the pilot. In Uganda, it is important that this impact is included in the assessment. Grid stability has been a challenge and the GoU has aggressive plans to expand the grid.

Will there be any form of in-kind settlements? GoU explained that in kind settlement is to be avoided; energy costs different amounts at different times and introduces economic distortions.

How does private sector get involved in these technologies? The private sector will be welcomed to participate but in the absence of a legal framework, they will not be able to feed into the grid, however, this could fall under the ministry. Awareness to the public is enhanced by their participation.

### Biomass

Is biomass gasification not a priority? Considering each SREP criteria, Biomass Gasification didn't rank well when compared to other technologies. The Investment Plan includes a section with grades and rankings.

### Other

Will scholarships be considered as part of SREP support? SREP support through scholarships is not expected. However, the GoU noted that training of local Ugandans is included under the project's implementation phases.

The table below highlights comments by various stakeholders.

Topic	Issue	Raised by	Corrective measure
Peat	Peat is classified by the UNCCC as non-renewable and emits higher emissions than coal	Development Partners / Civil Society	Peat has been dropped from the Investment Plan
Net Metering Solar PV Proposal	It is proposed that private buildings be included in the proposal	Development Partners	Private buildings are the ultimate target of this pilot intervention as the GoU creates public awareness and develops an appropriate legal and regulatory framework to enable private participation downstream. The Project Concept Note will better capture this message. From an implementation point of view, the implementing MDB will disburse the resources to a public sector entity.
	How will net metering impact the grid?	Civil Society	At this moment, it is unknown and some studies will be required. This is one of the reasons why the GoU prefers a pilot experience with public buildings before allowing for private expansion.

Topic	Issue	Raised by	Corrective measure
Mini-grid and off-grid	These should be considered	Development Partners	This is noted. Even though Geothermal is the key priority for the GoU, the possibility of including mini-grids and/or off-grid solutions to better address the issue of energy access will be re-examined. This will depend among others on the scale of a possible intervention with a view to reduce transaction costs and reach appropriate scalability.
SE4All	Alignment of proposed projects with the SE4All should be indicated	Development Partners	This is agreed and it will be included. Members of the SE4All team in the Ministry of Minerals and Energy responsible for SE4All have been consulted and are part of the SREP Uganda National Task Force.
Harmonizing SREP with other programs	With GETFIT so as not to create competition between the two programs. In particular, next round of GETFIT will be focused on grid connected solar PV	Development Partners	Grid Connected solar PV will not be included in SREP. The proposal for Net Metering through the use of solar PV panels remains unchanged.
Bagasse co-generation	Co-generation sector is not as competitive as solar sector, so, how will GoU ensure they receive value for money and not seen to be subsidizing specific private entities?	Development Partners	The initial proposal of adding a tariff top-up to make these transactions bankable cannot be implemented by any of the Multilateral Development Banks due to unavailability of appropriate financial instruments. As a consequence, the Multilateral Development Banks will, in cooperation with the GoU, consider other alternatives. Ensuring competitiveness and diversity of renewable technologies will be a key preoccupation.
	GETFIT program has encountered challenges with some bagasse sponsors in relation to E&S issues.	Development Partners	
Mini hydros	Is there a possibility of using SREP money to finance mini hydros that will not benefit from the GETFIT programme due to funding constraints of the program?	Development Partners	SREP involvement in hydro would be regarded as non-transformational which is a key priority for the fund. In addition, it is important that the country diversifies its energy mix and becomes less dependent on hydro sources of electricity.
Schedules	The schedules for project implementation should be provided.	Development Partners	These will be included in the final version of the Investment Plan that will be posted on a government website for public consultations for a month.
Grid stability and capacity	Grid instability and ability to absorb power is a major	Development Partners	The GoU assures that future projects will be able to evacuate power. If requested, the Multilateral

Topic	Issue	Raised by	Corrective measure
	concern.		Development Banks are available to finance rehabilitation and expansion of the national transmission and distribution infrastructure. Most of the proposed projects under SREP will most likely not be commissioned before 2018-2020.
Gender and Environmental sections	These still need to be improved	Development Partners	The objective at this stage is to undertake a gender and environmental mainstreaming exercise at the Investment Plan level. Once project implementation starts, the E&S rules of the responsible Multilateral Development Bank will apply. The GoU welcomes feedback and support from interested Development Partners to provide written feedback with a view to improve these sections.
Geothermal	Drilling is considered to be the main barrier for private sector involvement	Private Sector	The experience gained in other countries shows that this risk is best addressed by the Public Sector, due to the high cost of exploration and high level of uncertainty of success. In Kenya, the government assumes this risk and once the resource is proved, it competitively bids out the construction, operation and maintenance of the power plants. Uganda will aim to replicate, where possible, this approach.
	Private companies are losing money in sites already concessioned but without drilling completed	Private Sector	SREP is unable to provide support for drilling on sites where single source was used for the selection of the concessionaire.
Private sector funding	How will the Government disburse SREP resources, if any, to the private sector?	Private Sector	The GoU will not disburse resources directly to private entities. Any potential SREP disbursement to private companies would always be made directly by the responsible Multilateral Development Bank taking into account the principle of minimum concessionality and based on commercial financing rules.
Project links to economic activities and energy access	There seems to be a disconnection between how proposed investments relate to economic development and energy access.	Civil Society	An effort will be made to better capture this relationship. Productive use of energy is a priority for SREP. In addition, development outcomes is a core aspect of project appraisal by any of the Multilateral Development Banks involved in SREP participation.
Leveraging of SREP co-funding	It is unclear how the leverage effect of 1:4 will be reached.	Civil Society	The final version of the Investment Plan will better capture the leverage effect at the project level and at the

Topic	Issue	Raised by	Corrective measure
			investment plan level. The objective is to reach 1:4 (at least USD 200 million for the entire investment plan). This amount will come from SREP, the GoU, co-financing by participant Multilateral Development Banks, private sector promoters, local commercial banks, etc. Evidence from existing SREP pilot-countries that are more advanced than Uganda suggests that the minimum leverage effect is usually exceeded. The SREP Monitoring and Evaluation Framework pays close attention to this ratio by monitoring it on a semi-annual basis.
Scholarships	Will SREP offer any?	Civil Society	SREP support through scholarships is not expected.
Biomass gasification	Is it a priority?	Civil Society	Considering each SREP criteria, Biomass Gasification didn't rank well when compared to other technologies. The Investment Plan includes a section with grades and rankings.

## Annex 4: Rationale for SREP Ranking and Prioritization

	Geothermal	Solar PV off-Grid	Solar PV Net-Metering	Wind	ICS	Hydro (<10MW)	Municipal Solid Waste	Biogas
<b>SREP CRITERIA</b>								
Increased installed capacity from renewable energy sources	High. Given its base load characteristics and estimated potential of 400MW, it stands to provide the highest increment	Moderate. While it is widely available at 5 MW/m <sup>2</sup> -a-day, it is only limited by resource constraints	Moderate. A new approach, likely to boost grid contribution with time. Again, with the cited irradiation, requiring lesser funding	High. Preliminary wind assessments in the Karamoja region point out to commercially viable generation	Nil.	Low. In view of the fact that attractive sites have been developed, the new ones would result in relatively low capacity addition.	Low. Waste collection systems poorly developed, limiting potential generation.	Low. Scale of operation small, more commercial activities yet to be developed.
Increased access to energy through renewable energy sources	High. Offers high opportunity to areas where resources are found, hitherto not so electrified.	High. Offers high opportunity to areas where grid is likely to take long periods to reach / be provided	Medium. Reduces demand from grid and then tops up on other grid inputs, availing more power for others to access	Low. Likely to provide power for applications as water pumping, grinding mills and small businesses as tailoring.	Medium. Beneficiary institutions that need these exist in the thousands, also stretching to private businesses as small hotels and restaurants	Low. Given the relatively low aggregate energy generated due to lack of attractive sites.	Moderate. Potential is good if tapped, given the extent of waste generated in many urban centres / towns	High. Were the many potential sources of biodegradable waste to be exploited, impact would be big.

Low Emission Development	High. Emissions largely of water / steam	High. Practically 'zero' emissions	High. Practically 'zero' emissions	High. Practically 'zero' emissions	Medium. These can have much reduced levels of emissions.	High. Practically 'zero' emissions	Medium. Impact of emissions like methane are reduced through combustion	Medium. Impact of emissions like methane are reduced through combustion
Affordability and competitiveness of renewable sources	High. Once resource is proven through drilling, it might be more competitive than large hydro	Low. Although abundant, its components remain costly in Uganda, with need to replace batteries at the end of their life cycle	Low. Although abundant, its components remain costly in Uganda, even without need for batteries	Low. With suspect low endowment, it is deemed uncompetitive and not so affordable	High. These come at much more affordable prices, rendering them affordable and competitive	Moderate. Early studies being disproportionately high for low capacity hydros, they render these only affordable but competitive	Low. Logistics of raw waste collection render the technology inappropriate today	Moderate. This technology offers many opportunities, and compares well with others
Productive use of energy	High. Base load with large potential	High. Nation-wide potential high, likely to spur modest electrified businesses in off-grid areas	Moderate. Although likely to remain small in short run, it releases grid power for other productive uses, not to mention adding surplus to grid	Moderate. With potential likely in more off-grid areas, it will modestly promote growth of small power industries	Nil. Save for cooking, there would be no productive use.	High. Hydro strongly supports productive energy use	Moderate. When generated, it can support businesses in towns / urban centres	Low. At the level of small digester operation in the country, this would more likely meet domestic /institutional needs
Economic, social and environmental development impact	High. Provides base load, clean and enhances social development	High. Promotes economic activities, no pollution and facilitates economic activity for places far	Moderate. Promotes economic activities, no pollution and facilitates economic activity	High. Stands to uplift economic standards in rural settings, without pollution	Moderate. Reduces energy bills, with reduced pollution, indoor and outdoor	High. Uplifts industry prospects, no pollution, and, creates other economic opportunities	Moderate. Contributes to a cleaner and healthier setting, generating manure in addition.	Moderate. Reduces burdens in homes replacing biomass for cooking, reduces need for kerosene lighting.

		from the main grid						provides manure.
Economic and financial viability	Low. Low cost once operational but high risk exposure to drilling phase	Moderate. Low operation cost once set up.	Moderate. Low operation cost once set up.	Moderate. Low operation cost once set up.	Moderate. Beyond initial cost, cheaper operating cost to unimproved technologies.	High. Once setup, costs are attractive relative to many technologies.	Moderate. Relatively low operating cost to many biomass alternatives.	Moderate. Relatively low operating cost to many biomass alternatives.
Leveraging additional resources	High. A ratio exceeding 1:5 is expected for investment in production facilities	Moderate. Additional resources will be invested to develop the distribution infrastructure	High. Replication is expected to be high by the private sector building owner entities	High. Beyond ascertaining resources and the feasibility studies, handsome investments are expected	High. If designs are standardized and builders trained, the private sector is expected to pick up and scale up their use	Moderate. Evacuation of power generated is expected to modestly leverage funding, beside private sector investments	Moderate. Installation of generators along with connection to grid are expected to modestly leverage funding	Moderate. Infrastructure development and generation equipment should leverage good funding
Gender	Moderate. Women will be involved in preparatory activities for drilling, construction and operation of the plants.	Moderate. Women will participate in surveys and preparation of feasibility studies.	Moderate. Women will participate in the pilot studies and development of the legal framework, beside working in roll-out programmes in future.	Low. There will be limited participation of women in feasibility study activities.	High. Women would have roles in construction, and extensive use	Low. Women are expected to be involved in early studies to some degree and operation	Low. Women would be modestly involved in construction and operation.	High. As it is largely applied in cooking, women should be involved in construction and extensively in use.

Co-benefits of renewable energy scale up	Moderate. These include improved energy access and security, reduced pollution, contributing to a lower tariff and investment promotion	High. Accessing electricity and improving energy security, reducing indoor pollution, contributing to vegetation conservation and promoting business activity.	High. Contributing to and relief on grid demand, reducing owner utility bills, improving energy security. Legal framework will be in place, with pilots demonstrating how it works.	Moderate. Enhancing energy security, promoting modest electrified businesses and contributing to lesser pollution and environmental degradation.	High. Contribute to reduced environmental degradation, indoor pollution, energy costs,	Moderate. Improves access and energy security, protects environment, promotes industrial development	High. Addresses waste burden, enhances energy security, reduces urban waste costs, contributes to lower tariffs.	Moderate. Reduces domestic burden on women, provides fertilizers, cuts utility bills,
<b>NATIONAL CRITERIA</b>								
New potential areas for RE to diversify energy mix	High. Brings to end long wait for power, with potential for 400MW+	High. Previous efforts only in 5 KWP project in Kasese and 13.5KWP in Kyenjojo	High. This will add a third tier to original post-paid and recent pre-paid schemes.	High. Only small efforts in Karamoja for lack of knowledge of real potential	Nil. This area is already exploited, although at a limited scale.	Nil. Although Uganda started with the large hydros, this area is also already exploited, although at a limited scale.	Moderate. Although not likely to be exploited in very near future, it would be a new area.	Moderate. Although fairly well-introduced at domestic scale, this area can be a new area for large scale operations selling power to the grid



Increases capacity for technology transfer	High. This is currently a near-virgin area	Moderate. This area is not entirely new, given the 5 KWP project in Kaese and 13.5KWP in Kyenjojo projects.	Moderate. This introduces new technology for which new skills are required.	Moderate. This would modestly introduce new aspects if higher level power generation is foreseen, for which new skills would be required.	Nil. Reasonably well developed in country	Nil. Reasonably well developed in country	Nil. Low potential for development currently.	Nil. Low potential for development beyond domestic scale.
Contributes to employment creation	Moderate. Will introduce a number of highly skilled personnel and open new opportunities	High. It is expected that it will add personnel at all stages - drafting master plan, feasibility studies, installations and on roll out.	Low. It is expected that it will add personnel at some stages - running test installations and on roll out, particularly in private sector.	Low. It is expected that the roll-out programmes will create the most employment.	Moderate. Being widely spread in several institutions, it is expected to create many jobs in design, construction and maintenance segments.	Low. A few people are involved in start-up activities and eventual operation, the biggest number being temporary during construction.	Moderate. Most workers would be expected in the collection and delivery of waste.	Moderate. Activities tend to be labour intensive, many persons are involved in construction and operation.



S/N	Organization	Category	Name of Interviewee	Title	Contact	Email	Source	Data status
1	Green Heat Uganda Ltd	Private sector	Vianney Tumwesige	Managing Director	0712 379 889	trustvianney@gmail.com	Moses	Fully entered
2	UltraTec (U) Ltd	Private sector	Keval Shah	Systems Engineer	0752 200 007	<a href="mailto:ultratecug@usa.net">ultratecug@usa.net</a>	Moses	Fully entered
3	Ministry of Trade, Industry and Cooperatives	Government institution	Peter Odong	Engineer	0702 500 178	<a href="mailto:yellemot@yahoo.com">yellemot@yahoo.com</a>	Moses	Fully entered
4	GET FIT Uganda	Donor	Rene Meyer	Tender Expert and Lead Legal Advisor	0793 529 831	<a href="mailto:rene.meyer@getfit-uganda.org">rene.meyer@getfit-uganda.org</a>	Moses	Fully entered
5	Uganda National Biogas Alliance	Business association	Abdu Kalema	Chairman	0776 422 424	<a href="mailto:tuskengineers@gmail.com">tuskengineers@gmail.com</a>	Moses	Fully entered
6	The World Bank	Donor	Mbuso Gwafila	Senior Energy Specialist	0414 302 221	<a href="mailto:mgwafila@worldbank.org">mgwafila@worldbank.org</a>	Moses	Fully entered
7	GRS Commodities Ltd	Private sector	Andrew Ssentongo	Director	0754 442 642	<a href="mailto:andrew@grscommodities.com">andrew@grscommodities.com</a>	Moses	Fully entered
8	Private Sector Foundation Uganda	Business association	Eng. Geoffrey Ssebuggwawo	Director, BUDS-ERT	0772 411 925	<a href="mailto:gssebuggwawo@psfuganda.org.ug">gssebuggwawo@psfuganda.org.ug</a>	Moses	Fully entered
9	Electricity Regulatory Authority	Licensing bodies	Ivan Kisembo Karau	Projects Engineer Development	0772 861 029	<a href="mailto:i.kisembo@era.or.ug">i.kisembo@era.or.ug</a>	Moses	Fully entered
10	Centenary Bank Uganda	Financier	Mr. Abdul Kyanika Nsibambi	Manager Credit	0701\772 672463	<a href="mailto:abdul.kyanika@centenarybank.co.ug">abdul.kyanika@centenarybank.co.ug</a>	Eileen	Fully entered
11	Stanbic Bank	Financier	Mr. Negombye Emmanuel	Manager Agriculture	0777 181 196		Eileen	Fully entered
12	FINCA Uganda	Financier	Mr. Joseph sserwanga	Micro Energy Coordinator	0776 650 156	<a href="mailto:jsserwanga@finca.or.ug">jsserwanga@finca.or.ug</a>	Eileen	Fully entered
13	Pride Microfinance Ltd.	Financier	Mr. Bob Paul Lusembo	Senior Manager Delivery Channel	0752 889 890	<a href="mailto:blusembo@pridemicrofinance.co.ug">blusembo@pridemicrofinance.co.ug</a>	Eileen	Fully entered
14	Reincon Engineers Ltd.	Private sector	Mr. Benard Sembatya		0758 166 047	<a href="mailto:benardsematya@yahoo.com">benardsematya@yahoo.com</a>	Eileen	Fully entered
15	BTC Uganda	Implementer	Mr. Denis Galabuzi	National Infrastructure Facilities Coordinator	0783 403 380	<a href="mailto:denis.galabuzi@btctb.org">denis.galabuzi@btctb.org</a>	Eileen	Fully entered
16	Uganda Revenue Authority (URA)	Government institution	Mr. Sekaayi Benedict	Customs Audit Officer	0712 694 723	<a href="mailto:bsekaayi@ura.go.ug">bsekaayi@ura.go.ug</a>	Eileen	Fully entered
17	Housing Finance Bank	Financier	Mr. Patrice Ocungirwoth	Senior Manager (Head) Agribusiness unit	0772 699 761	<a href="mailto:kernerpat@gmail.com">kernerpat@gmail.com</a>	Eileen	Fully entered
18	Greenewus Energy Africa Ltd.	Private sector	Mr. Conrad Nkutu	Director	0772 722 212	<a href="mailto:conradnkutu@yahoo.co.uk">conradnkutu@yahoo.co.uk</a>	Eileen	Fully entered
19	Uganda Small Scale Industries Association (USSIA)	Business association	Mr. Jooga Kawule	Kampala Zone Coordinator	0712 442 560	<a href="mailto:kjooga@ussia.or.ug">kjooga@ussia.or.ug</a>	Eileen	Fully entered
20	Marma Technical Services Ltd.	Private sector	Mr. Krespo Kitugwanidde	Business Consult Manager	0772/0706 580 055	<a href="mailto:marma@marma.co.ug">marma@marma.co.ug</a>	Eileen	Fully entered
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21	Biomass Energy Efficient Technologies Association	Business association	Madam Proscovia	Chair person	0772 466 205	<a href="mailto:petsd2000@yahoo.com">petsd2000@yahoo.com</a>	Eileen	Fully entered

	(BEETA)		Sebunya					
						<a href="mailto:beetatec@gmail.com">beetatec@gmail.com</a>	Eileen	Fully entered
22	Renewable Energy Incubator	Implementer	Mr. Richard Sseruwagi	Incubator Engineer	0706 095 294	<a href="mailto:engineer@energyincubator.org">engineer@energyincubator.org</a>	Eileen	Fully entered
23	Rural Electrification Agency(REA)	Government institution	Benon Bena	Manager Off-Grid Renewable Energy Development	0772 508 678	<a href="mailto:ben@rea.or.ug">ben@rea.or.ug</a>	Suzan	Partly entered
24	Ministry of Energy and Mineral Development	Government institution	Henry Bidasala	Commissioner Electrical Generation	0772 658 692	<a href="mailto:igaga@energy.go.ug">igaga@energy.go.ug</a>	Suzan	Partly entered
25	Innovation Systems and Clusters Programme	Business association	Denis Okumu	Cluster Development Executive	0774 382 443	<a href="mailto:denisokumu88@gmail.com">denisokumu88@gmail.com</a>	Suzan	Partly entered
26	African Development Bank	Donor	Daniel M. Isooba	Infrastructure Specialist	0772 444 043	<a href="mailto:d.isooba@afdb.org">d.isooba@afdb.org</a>	Suzan	Partly entered
27	GIZ PREEEP	Implementer	Lydia Evace Owino	Technical Officer-Grid Densification and Hydro	0772 527 341	<a href="mailto:evace.owino@giz.de">evace.owino@giz.de</a>	Suzan	Partly entered
28	KFW	Donor	Stephanie Rieger	Senior Project Manager	0794 700211	<a href="mailto:stephanie.rieger@kfw.de">stephanie.rieger@kfw.de</a>	Suzan	Partly entered
29	Wenreco	Private sector	Alfred Ambayo	Design Engineer	0772 068 847	<a href="mailto:ambayo_alfred@yahoo.com">ambayo_alfred@yahoo.com</a>	Harriet	Fully entered
30	UNREA	Business association	Abdalla Kyezira	Publicity Secretary	0772 967 711	<a href="mailto:akyezira@konserve.co.ug">akyezira@konserve.co.ug</a>	Harriet	Fully entered
31	UECCC	Financier	Micheal Rutalo	Transaction Execution Officer	0790 817 038	<a href="mailto:mrutalo@ueccc.or.ug">mrutalo@ueccc.or.ug</a>	Harriet	Fully entered
32	Kirchner Solar Group	Private sector	Kenneth Ngogolo	General Manager	0772 052 185	<a href="mailto:kennetheddie@gmail.com">kennetheddie@gmail.com</a>	Harriet	Fully entered
33	DFCU Bank	Financier	Ssonko Stewart Mark	Branch Manager	0776 760 234	<a href="mailto:mssonko@dfcugroup.com">mssonko@dfcugroup.com</a>	Harriet	Fully entered
34	National Environment Management Authority	Licensing bodies	Waiswa Ayazika Arnold	Director, Environmental Monitoring and Compliance	0772 471 139	<a href="mailto:wayazika@nemaug.org">wayazika@nemaug.org</a>	Moses	Fully entered
35	Kilembe Investments Ltd	Private sector	Elizabeth Busingye	Electrical Engineer	0702 561 480	<a href="mailto:ekora5318@gmail.com">ekora5318@gmail.com</a>	Moses	Fully entered
36	Hydromax Limited	Private sector	Ssentumbwe Godfrey	General Manager	0772 702 715	<a href="mailto:godfreydott@gmail.com">godfreydott@gmail.com</a>	Moses	Fully entered
37	Kalangala Infrastructure Services Ltd	Private sector	John Opiro	Managing Director	0772 705 222	<a href="mailto:john.opiro@kis.co.ug">john.opiro@kis.co.ug</a>	Patrick	Fully entered
38	Pamoja	Private sector	Jerome Nuwabaasa	Technical Manager	0704 695 098	<a href="mailto:jerome@pamojacleantech.com">jerome@pamojacleantech.com</a>	Moses	Not yet entered
39	Lubilia Kawembe Hydro Ltd	Private sector	Cletus Serwanga	Director	0772 566 487	<a href="mailto:cserwanga@lubilia.com">cserwanga@lubilia.com</a>	Moses	Fully entered
40	Mandulis Energy Ltd	Private sector	Peter Nyeko	Director	0792 010 407	<a href="mailto:peter.nyeko@bencolly.com">peter.nyeko@bencolly.com</a>	Moses	Not yet entered
			Wekolawo Bonifence	Electrical Engineer	0705 206 376	<a href="mailto:bowek585920@gmail.com">bowek585920@gmail.com</a>	Moses	
41	Hydro Power Association of Uganda Ltd	Business association	Benard Sembatya	Chairperson	0758 166 047	<a href="mailto:hpauganda@gmail.com">hpauganda@gmail.com</a>	Eileen	Not yet entered
42	Konserve Consult	Private sector	Abdalla Kyezira	Managing Director	0772 967	<a href="mailto:akyezira@konserve.co.ug">akyezira@konserve.co.ug</a>	Harriet	Not yet entered

					711			
43	Radio Pacis	Private sector	Samson Enguma	Technical team leader	0701 129 875		Harriet	Not yet entered
44	UNIDO	Donor	Mary Suzan	Managing Director	0703 284 084	<a href="mailto:msabbo@creec.or.ug">msabbo@creec.or.ug</a>	Suzan	Not yet entered
45	CREEC	Implementer	Smith Tukahirwa	Project Engineer - CREEC	0706 585 438	<a href="mailto:stukahirwa@creec.or.ug">stukahirwa@creec.or.ug</a>	Eileen	Not yet entered
46	Uganda Investment Authority	Government institution	Abdu		0772 426 648	-	Eileen	Not yet entered
47	Uganda National Bureau of Standards	Government institution	Patricia B. Ejalu	Deputy Executive Director- Technical	0414 289 499, 0752 978 787	<a href="mailto:pbageine@unbs.go.ug">pbageine@unbs.go.ug</a>	Eileen	Not yet entered
48	DWRM	Licensing bodies	Tom Kanyike	Water Resource Regulator	0392 549 214	<a href="mailto:tom.kanyike@mwe.go.ug">tom.kanyike@mwe.go.ug</a>	Harriet	Not yet entered
49	Uganda Bankers' Association (UBA)	Business association	Emmanuel Turyamuhika Kikoni	Executive Director	0414 343 199	<a href="mailto:etkikioni@ugandabankers.org">etkikioni@ugandabankers.org</a>	Moses	Brief interview added in report