Climate Investment Funds

SREP/SC.14/8
October 20, 2015

Meeting of the SREP Sub-Committee
Washington D.C.
Wednesday, November 11, 2015

Agenda Item 7

SREP Investment Plan for Uganda

PROPOSED DECISION

The SREP Sub-Committee, having reviewed document SREP/SC.14/8, *SREP Investment Plan for Uganda*,

a) endorses the investment plan as a basis for the further development of the projects and programs foreseen in the plan and takes note of the request for USD 50 million in SREP funding.[1] The Sub-Committee requests the Government of Uganda, in the further development of the proposed projects and programs, to take into account comments made at the meeting and any additional written comments submitted by Sub-Committee members by November 27, 2015, and to respond in writing to questions raised during the meeting and in subsequent written comments;

b) reaffirms that all allocation amounts are indicative for planning purposes and that approval of funding will be on the basis of high quality investment plans and projects;

c) approves USD 2.3 million as preparation grant for the project entitled, *Decentralized Renewables Development Program* (AfDB);

d) approves USD 1.875 million as preparation grant for the project entitled, *Wind Resource Map and Pilot-Wind Power Development Project* (AfDB);

e) takes note of the estimated budget of USD 420,000 for MDB project preparation and supervision services for the project entitled, *Uganda: 130 MW Geothermal Development Program* (AfDB), and approves USD 210,000 as a first tranche of funding for such services;

f) takes note of the estimated budget of USD 150,000 for MDB project preparation and supervision services for the project entitled, *Decentralized Renewables Development Program* (AfDB), and approves USD 75,000 as a first tranche of funding for such services; and

g) takes note of the estimated budget of USD 150,000 for MDB project preparation and supervision services for the project entitled, *Wind Resource Map and Pilot-Wind Power Development Program* (AfDB), and approves USD 75,000 as a first tranche of funding for such services.

[1] USD 300,000 in SREP funding has already been approved for the development of the investment plan.

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ADM/273/01

THE REPUBLIC OF UGANDA

MINISTRY OF ENERGY AND
MINERAL DEVELOPMENT
P. O. BOX 7270,
KAMPALA.

16th October 2015

Mafalda Duarte
Climate Investment Funds, Project Manager,
CIF Administrative Unit
Washington D. C.

SUBMISSION OF UGANDAS SREP INVESTMENT PLAN

I wish to submit for the consideration of the Climate investment Fund the Investment Plan for Scaling up Renewable Energy in Uganda. The Government of Uganda greatly appreciates the support provided by the CIF Administrative Unit as well as the Multilateral Development Banks in the Development of the SREP Investment Plan for Uganda. I hope the SREP subcommittee will endorse the Investment Plan so that additional energy is provided for the social economic development of Uganda.

Uganda has priotised the development of the energy sector realising that energy is the driver of social economic development. The country's development is guided by ''Vision 2040 for Uganda'' which provides the development path and strategies to operationalise Uganda's vision of becoming a modern and Prosperous country within 30 years. To realise this vision we shall need adequate and reliable energy.

This Investment Plan for Scaling up Renewable Energy is therefore a critical step towards achieving our vision. The implementation of the Investment Plan will assist the Government of Uganda in meeting the country's targets set in the Uganda's Vision 2040 as well as contribute to meeting the targets set in our SE4ALL Action Agenda 2015.

We believe the SREP support will be instrumental in helping to catalyze investment in projects of Geothermal Development, Solar PV Off-grid rural electrification, Solar PV On-grid Net Metering and in the development of wind mills.

We look forwards to the support of SREP for this Investment Plan and to working with CIF and the Multilateral Development Banks to implement the projects outlined in the Investment Plan.

James Baanabe
FOR: PERMANENT SECRETARY

SCALING-UP RENEWABLE ENERGY PROGRAM INVESTMENT PLAN

FOR GOD AND MY COUNTRY

THE REPUBLIC OF UGANDA
SCALING-UP RENEWABLE ENERGY PROGRAM
INVESTMENT PLAN

Design: Mounir BEN AMMAR

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Acronyms

AfDB	African Development Bank
BST	Bulk Supply Tariff
CIF	Climate Investment Funds
ERA	Electricity Regulatory Authority
ERT	Energy for Rural Transformation
EU	European Union
GDP	Gross Domestic Product
GET FiT	Global Energy Transfer for Feed-in-Tariffs
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft fur Internationale Zusammenarbeit
GoU	Government of Uganda
GRD	Geothermal Resource Department
HPP	Hydro Power Project
ICEIDA	Icelandic International Development Agency
ICS	Institutional Cook Stoves
IFC	International Finance Corporation
IP	Investment Plan
IPP	Independent Power Producer
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau
NEMA	National Environment Management Authority
NGO	Non-Governmental Organization
MoWE	Ministry of Water & Environment
O&M	Operation & Maintenance
PACMECS	Pader Abim Community Multipurpose Electricity Cooperative Society
PPA	Power Purchase Agreement
PPP	Public-Private Partnership
PREEEP	Promotion of Renewable Energy and Energy Efficiency Program
PRG	Partial Risk Guarantee
PSC	Project Steering Committee
PV	Photo Voltaic
R&D	Research and Development
RAP	Resettlement Action Plan
RE	Renewable Energy
REA	Rural Electrification Agency
REB	Rural Electrification Board
REF	Rural Electrification Fund
REFiT	Renewable Energy Feed in Tariff
RESP	Rural Electrification Strategy & Plan
RETF	Rural Electrification Trust Fund

KRECS	Kyegegwa Rural Electricity Co-operative Society
KSW	Kakira Sugar Works
KSWL	Kinyara Sugar Works Ltd
M&E	Monitoring & Evaluation
MDB	Multilateral Development Bank
MEMD	Ministry of Energy & Mineral Development
MEPI	Multidimensional Energy Poverty Index
MoES	Ministry of Education and Sports
MoFPED	Ministry of Finance, Planning and Economic Development
MoJCA	Ministry of Justice and Constitutional Affairs
MoLHUD	Ministry of Lands, Housing & Urban Development
NAMA	Nationally Appropriate Mitigation Actions
NDP	National Development Plan
SCOUL	Sugar Corporation of Uganda Ltd
SREP	Scaling-Up Renewable Energy Program
UECCC	Uganda Energy Credit Capitalization Company
UEDCL	Uganda Electricity Distribution Company Ltd
UEGCL	Uganda Electricity Generation Company Ltd
UETCL	Uganda Electricity Transmission Company Ltd
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
WB	World Bank
WBG	World Bank Group
WENRECO	West Nile Rural Electrification Company

Map of Uganda

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Foreword

Uganda is endowed with a number of renewable energy sources, in particular hydro, geothermal, solar, biomass and wind. These resources have not been fully developed which would contribute to national development. One challenge in the energy sector is the low level of access to electricity now stands at about 17% and the other is the low per capita electricity consumption that is below 150kWh .

To address these challenges, Government of Uganda has prioritised the development of the energy sector. The key priorities of Government in the energy sector are; increasing electricity generation; expanding the transmission and distribution networks; increase access to modern energy services through rural electrification and renewable energy development; and, promotion of efficient utilization of energy.

To increase the share of renewable energy sources in the energy mix government introduced the Renewable Energy Policy 2007. It aims at providing a framework to increase in significant proportions the contribution of renewable energy in the energy mix. Government has also encouraged private sector participation in the energy sector by providing a conducive environment. Among others, the Feed in Tariff has been introduced and the Standardization of the Power Purchase Agreement and the Implementation Agreements for renewable energy projects done.

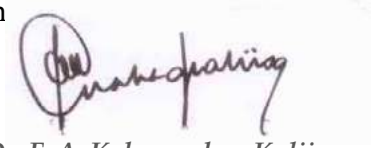
Government has also put in place the National Vision 2040 which estimates that Uganda will require an installed capacity of 41,738MW [1] by 2040. In line with the Vision 2040, the Government is undertaking various projects to increase its generation capacity with the most notable ones being the ongoing projects of Karuma (600MW), Isimba (183MW) and over 125MW from different renewable energy sources under the Global Energy Transfer for Feed-in-Tariffs (GETFIT) program.

Government welcomes the SREP programme, with its main objectives of promoting low carbon development pathways in the energy sector through increasing access to renewable energy. SREP will assist the Government of Uganda in meeting the country's targets set in the Uganda's Vision 2040 as well as contribute to meeting the targets set in the UN's SE4ALL Action Agenda 2015.

SREP will build on previous and ongoing national efforts in the sector and 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.

It is with much gratitude that Government of Uganda welcomes the support in the chosen projects of Geothermal Development, Decentralised Mini-Grids to the deserving island communities, the introduction of Decentralised Urban Small-Scale Solar PV, and efforts toward verification of the wind resource potential.

I wish to express the gratitude of the Government of Uganda to the development partner institutions – African Development Bank, International Finance Corporation and World Bank, as well as the National Task Force who have worked tirelessly to put together this investmen



Dr. F. A. Kabagambe - Kaliisa
Permanent Secretary, Ministry of Energy and Mineral Development

1 Uganda National Vision 2040

EXECUTIVE SUMMARY

Executive Summary

Introduction

It is widely accepted that climate change will increase the frequency and intensity of extreme weather events such as droughts, floods, landslides and heatwaves. In Uganda, the events of the past few years clearly illustrate the magnitude of the problem. The frequency of droughts has increased with eight severe droughts being experienced between 1991 and 2006. These droughts have resulted in a lowering of the water table, causing boreholes to dry up and have had an extremely negative impact in the power sector in a country that is heavily reliant on hydro resources for electricity generation.

The temperature has risen, with significant impacts on health and agriculture. For example, Uganda's highlands are no longer malaria-free and the advent of the disease there has had an immense economic and social cost.

Uganda contributes relatively little to global greenhouse gas emissions with an estimated 0.1 tons per capita in 2011[2]. Despite this very low 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. It does this by pursuing a more sustainable development path in general, and increasing investment in renewables in particular. This will be beneficial to the Ugandans and will lead to a better diversified energy mix in the country that is less prone to droughts.

2 World Bank DATABANK

Energy Sector

Electricity will be critical for Uganda to attain the growth trajectory and socioeconomic 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% (the sixth highest in the world) 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 17%. Limited access to electricity and the high cost of this service has affected Uganda's economic growth and development as well as its 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 in 2013. Following a severe drought in 2006 that resulted in a deficit in power supply that at one time necessitated 12 hr load shedding. 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 Bujagali (250MW) and renewable energy power projects.

The expansion of generation and transmission infrastructure will continue to play a key role in national strategies, with the objective of meeting the challenges faced by the energy sector and to stimulate industrial growth and job creation.

At the same time, the country recognizes that for remote and isolated areas, where connectivity to the main grid is too expensive, off-grid and mini-grid systems will be part of the solution to meeting the electricity needs of the population and to supporting Uganda in achieving its SE4All targets by 2030.

Renewable Energy

Approved in 2007, Uganda's Renewable Energy Policy main objective is 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.

Its key principles are:

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 renewable energy 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 resources in a sustainable manner
vii. Promote the sustainable productions and utilization of biofuels
viii. Promote the conversion of municipal and industrial waste to energy
ix. Utilize biomass energy efficiently, so as to contribute to the management of the resources in a sustainable manner
x. Promote the sustainable productions and utilization of biofuels
xi. Promote the conversion of municipal and industrial waste to energy

This policy combined with the unbundling of the sector, imposed by the Electricity Act 1999, as well as the country's Renewable Energy Feed-in Tariff Program (REFiT) has played a key role in attracting private sector investments into the renewables space and freeing limited public 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 a diverse portfolio of renewables in the country, investment has focused mainly on hydropower, which has led the country to a situation of overdependence. However, Uganda remains committed to diversify its energy mix and to accelerate access to modern services of energy for rural and isolated areas. A significant number of opportunities exist to develop technologies such as solar PV, wind and geothermal in the country, and SREP support could be instrumental in addressing existing constraints for deployment of these technologies, namely:

i. Inadequate regulatory, legal and institutional framework for on-grid solar PV, wind and geothermal generation.
ii. Inadequate licensing for geothermal resource exploration.
iii. Challenging investment climate (e.g. ability to borrow on long-term basis, banks' resistance to move away from traditional sectors, etc.) that affects the ability of small and medium enterprises involved in renewable technologies to access financing.
iv. Lack of sufficient renewable resource availability data for wind and geothermal development.
v. Insufficient experience in the deployment of technologies other than hydro.

SREP Program Description

The SREP will assist the Government of Uganda (GoU) in meeting the country's targets set in the UN's SE4ALL Action Agenda 2015, namely by: (i) promoting an increase in access to modern energy services for more than 98% of the population, and (ii) helping to double the share of renewables in the energy mix. These goals are both linked to the targets set in Uganda's Vision 40[3], a statement providing development paths and strategies to put into operation Uganda's vision of transforming its society from an agrarian one to a modern and prosperous country within 30 years.

The SREP will build on previous and ongoing national efforts in the sector. In addition to investment capital, it will provide technical assistance and capacity building to 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
Total	50.0		

Expected Impacts of SREP

The main expected impacts of the SREP in Uganda include:

i. 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.

3 Approved by the Cabinet in 2007.

ii. An increase in the annual energy output of 125.4 GWh per year.

iii. Lead to an annual decrease in greenhouse gas emissions of 163.000 tons CO2e per year once SREP projects are operational.

iv. Lead to a total investment of USD 455 million in the power sector associated with the SREP projects.

v. Development of two nascent generation technologies in the country (e.g. geothermal and wind). Geothermal has the potential to provide a 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.

vi. Expand the expertise and know-how in the country in relation to renewable technologies.

vii. Lead to better economic and social prospects including women's economic benefits in isolated areas that do not benefit from access to modern and productive energy services.

Conclusions

The SREP program is poised to provide Uganda with a great opportunity to initiate, in addition to the reforms implemented in 2007, another transformational change in its energy sector that has the potential to lead to a reduction in the country's dependence on hydro. This has the potential to make Uganda more resilient to the negative impacts of climate change.

In addition, it will help Uganda achieve its development goals sustainably while meeting the SREP objective of scaling-up renewable energy solutions that lead to an increase in access and economic opportunities.

SECTIONS

Section 1
Country Context

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 square kilometres and a total population of 34.9 million. Of the total population, more than 70% live in rural areas with a high 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, the country witnessed more economic volatility and GDP growth slowed to an average of 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 the highest contributions coming from telecommunications and the wholesale and retail trades. The boom in construction raised the contribution of that sector to 13% while manufacturing played a smaller role. Industrial sector growth has been helped by 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 li-

beralization. However, a civil war in Northern Uganda dampened economic activity and increased 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's 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 Millennium Development Goal of halving the poverty rate.

However, Uganda remains a poor country. Despite declining poverty rates, the absolute number of poor has decreased relatively little due to Uganda's high population growth – its population has doubled 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 productivity 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 17% 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.

Section 2
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 in particular for women and youth. 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 [4]. However, the overall household access to electricity is one of the lowest in Africa at about 17% 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 electricity demand growing fast at about 9% a year 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 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 supports private sector development, (iii) facilitate the setting of cost reflective tariffs, and (iv)

4 Uganda National Population and Housing Census 2014

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, Independent Power Producers (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 centres were leased to Umeme [5] 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.

5 Uganda's largest distribution company, managing over 25,000 km of electricity distribution assets covering 90% of the national grid including major load centres.

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 in 2013 through private investment, including Bujagali (hydro, 250MW) commissioned in August 2012 and the 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 meet the performance targets specified in the respective licences. 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% [6] of the total consumable energy in Uganda. The majority of the population especially women 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.

6 MEMD, Statistical Abstract, 2013

Table 1: Uganda's Energy Balance

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
Total	**100.0**

Source: MEMD, Statistical Abstract, 2013

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 (in%)
Large Hydro	73.6
Small Hydro	7.8
Bagasse Cogeneration	14.0
Thermal	4.6
Total	**100.0**

Source: ERA

Access to electricity in Uganda remains low both by global and regional standards, constraining the achievement of national social and economic development objectives. The overall access to electricity is estimated at approximately 17% [7] nationally and only 7% in rural areas. As a consequence, Uganda has a low per capita electricity consumption which, at about 100 kWh per year, is far below its peers. Kenya's is 155 kWh/year and Ghana's is 300 kWh annually. Nor is it in any way comparable to

7 UBOS, Rural Electrification Survey, 2012

industrialized economies such as South Africa at 4,694 kWh per year, or the Republic of Korea at 8,502 kWh per year. This puts the brakes on the country's effort to accelerate economic development and improve people's livelihoods, as exemplified by the Uganda's low performance of service delivery in health and education, which limits the achievement of national socioeconomic objectives.

The heavy reliance on hydroelectricity led to a power shortage in 2006 due to a severe regional drought that severely cut the water levels leading to a production gap of nearly one half of demand[8]. 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 subsidies from the GoU. This was not sustainable as it cost the economy more than 1,122 billion Shillings (USD 320 million) for the period 2006 – 2010[9].

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.

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 also pursued in 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 on the next page provides information on the installed electricity generation capacity as of 2014.

8 IMF 2006 Article IV Consultation with Uganda; https://www.imf.org/external/np/sec/pn/2007/pn0708.htm
9 Performance of the Uganda Power Sector, May 2010

Table 3: Installed Electricity Generation Capacity as of 2014

Station	No. of units	Unit Capacity (MW)	Installed Capacity (MW)	Date Commissioned
HYDRO				
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 (Mobuku 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
Sub Total			**696.4**	
THERMAL				
Namanve-Jacobson	7	7.285	50.995	2008
Electro-Maxx-Tororo			68.2	2010
* UEDCL - Kalangala			0.64	
Sub Total			**119.835**	
CO-GENERATION USING BAGASSE				
**Kakira Sugar Works	3	16	50.0	2008
**Kinyara Sugar Ltd	3	2.5	7.5	2009
Sub Total			57.5	
Total			**873.7**	

Source: Electricity Regulatory Authority (ERA) ESI Database

* off-grid plants

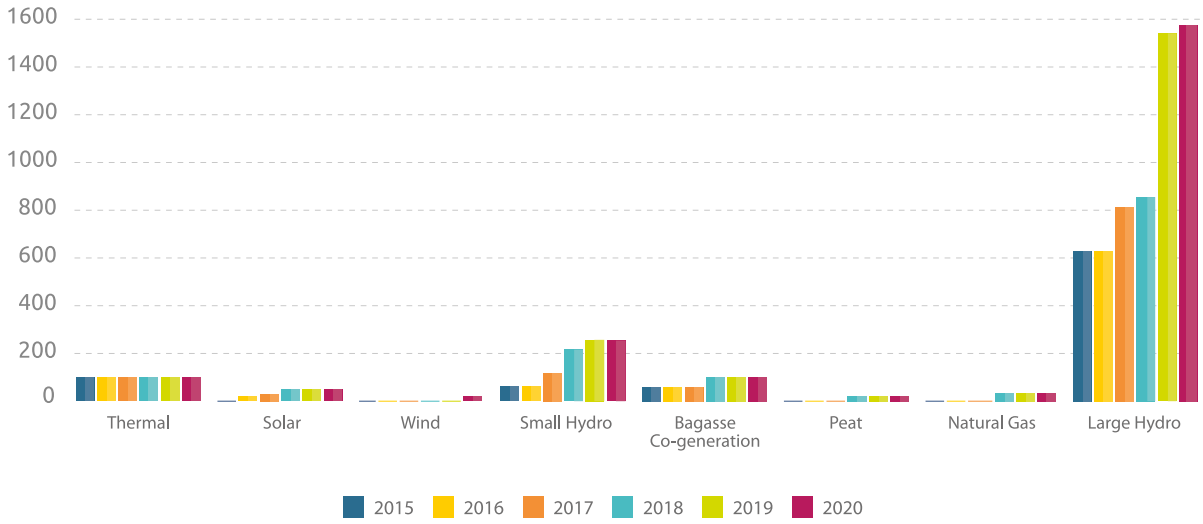
** plants have higher total installed capacities but for sugar manufacturing

The National Vision 2040 estimates that Uganda will require an installed capacity of 41,738MW[10] by 2040, a very tall order that 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 a further 125MW from different renewable energy sources under the Global Energy Transfer for Feed-in-Tariffs (GETFIT) program. Projected generation assets per technology until 2020 and excluding geothermal, wind and solar PV are presented in Figure 1.

10 Uganda National Vision 2040

Figure 1 below shows 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.

Figure 1: Planned Generation Projections in MW (2015-2020)

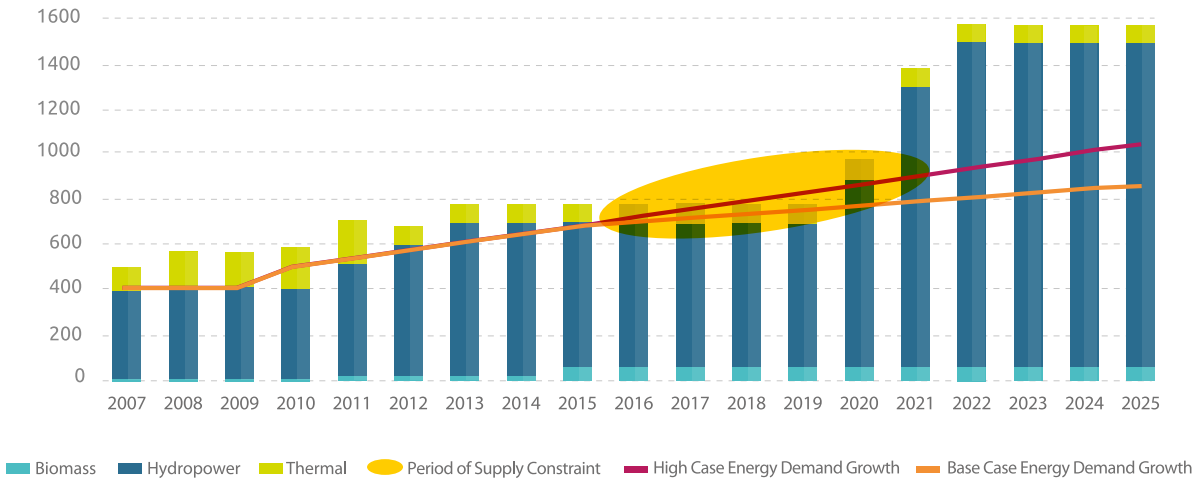


Source: ERA

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.

Major investment is required at every level of the electricity supply chain to secure adequate and reliable supply of electricity. At the current growth rate, 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 burdens on the GoU.

Figure 2: Demand Supply Balance



Source: Source: UETCL

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[11]. In addition to the existing infrastructure, UETCL is currently undertaking eight 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 lines[12].

The transmission network has expanded from 1,165 km in 2003 to 1,627 km in 2014. Transmission losses were 4.82% in 2014 (see Table 4). In the distribution sub-sector, energy purchases from the UETCL in 2014 totalled 3,171 GWh of which Umeme accounted for more than 93%(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 bill collection improved from 80% to 100%. 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.

With most countries in the East and Central African region embarking on huge electricity generation projects, steps have been 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[13].

11 ERA ESI Database
12 MEMD, Joint Sector Review Undertakings, 2014
13 Extracted from the Master Plan, East African Power Pool

Table 4: UETCL Transmission losses 2007-2014

Year	Puchases (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

Table 5: Ongoing Interconnection Projects

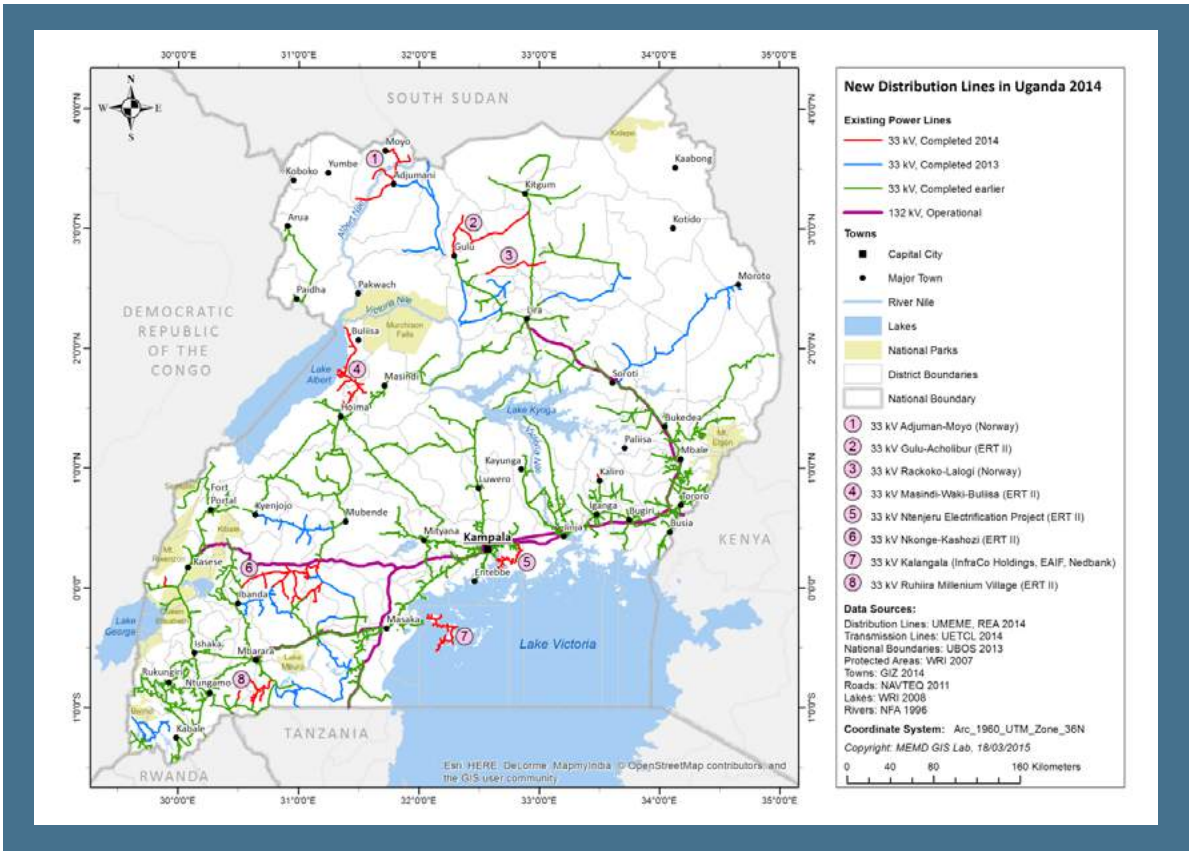
From	To	Type/Length	Capacity MW	Comments
Uganda	Kenya	220kV 2 circuits 254km	300	Runs from Lessos substation in Kenya to Bujagali substation in Uganda passing through Tororo substation, duplicating the existing 132kV.
Uganda	Rwanda	220kV 2 circuits 172km	250	Runs from Mbarara substation to Mirama (Uganda border) to Birembo in Kigali, Rwanda.
Uganda	DRC	220kV 2 circuits	250	Runs from Nkenda substation to Mpondwe (Uganda border) to Beni in DRC.

Source: UETCL

Expanding generation and transmission infrastructure is one of the GoU's strategies to address challenges faced by the sector.

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 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



Source: MEMD

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 for 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 currently in the supply chain is the UETCL's capacity payments for stand-by thermal power plants, which amounted to USD 23 million in 2014, funded by the GoU. These thermal power plants are only dispatched as a 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[14] / Feed-in-Tariff (FIT) levied by UETCL, (ii) the

14 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

BST levied by UETCL, and (iii) the end user tariffs which are levied by the distributors directly to the end consumers.

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 such as 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
Cogeneration	30	211	9.5
Thermals	100	611	25.4
Weighted average generation tariff	823	219.9	8.4

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 reflects the cost of power acquisition and transmission costs, meaning 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 four categories as per the table in the next page.[15]

15 Extracted from ERA, Tariff Setting Guide, 2007 (Pages 13-18)

Table 7: Electricity Tariffs per Categories

Category	Voltage	Time Differentiated[16]	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 10,000kVA.

Source: ERA

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.

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.

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 hydro 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.

16 To ensure energy efficiency, the tariffs are time differentiated under different time of use periods

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 private projects under preparation to be bankable and allow them to reach financial close (due to low rates of return and exchange rate volatility), the GoU, in cooperation with some development partners, have put in place the GETFIT Program Uganda, 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.

The program was first launched in 2013 and following two rounds, a third one of 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 the GoU, 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 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 auction 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 10 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⩽ 20MW	80.2
Biomass	1
Bagasse	26.9
Solar PV	20
Total	**128.1**

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 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 energy experiences from the Hydromax 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.

Rural Electrification

Rural electrification is an integral component of the government's overall policy and program to promote national economic and social development and integration. Providing widespread rural access to electricity will:

i. Stimulate rural employment diversification, and draw value-adding enterprises to rural areas in order to improve farmers' terms of trade and income levels;
ii. Enhance food security for the entire population;
iii. Create the opportunity for rural citizens to join with the urban population in enjoying electrification's many modernizations and lifestyle benefits; and,
iv. Contribute significantly to enabling rural people to participate more broadly and fully in national economic and social development and in harvesting its fruits

As of 2012, less than 5% of the rural population had access to electricity services. Therefore, the GoU established as a priority to achieve a much faster acceleration of the national coverage and consumer access than before. Therefore, as part of the Rural Electrification Strategy and Plan 2013-2022 (RESP-2), Uganda will aim at reaching an electrification access rate of 22% by 2022.

This new strategy focuses on orchestrating resources and stakeholders to operate in a number of scaled-up service territories for which long-term electrification services 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, are playing an important role that is benefiting from an effort made by the GoU to proactively plan and enable program implementation by mitigating commercial

risks and inhibiting barriers that have prevented the private sector from fulfilling its responsibilities under the previous strategy. In addition, the beneficiary population has been given a central role. Currently, they are consulted so that local priorities are determined, demand aggregation is better managed and consumer outreach is put in place.

Public sector involvement is widely viewed as of paramount importance 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, for example, revenues from households and businesses are often insufficient to recover the capital expenditure, especially during the initial years, for extending the grid, rendering these projects in most cases not economically viable.

The country's rural electricity access goals and milestones 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:

i. On-grid services shall be expanded to provide approximately 1.28 million new service connections; and
ii. 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. Achievements towards these goals are routinely monitored under a comprehensive annual rural electrifications plan that are developed by REA and adopted by REB.

The associated capital expenditure funding requirement to achieve these results is estimated to be USD 920 million. Funding resources for capacity building, technical assistance and training is estimated to be USD 10 million. Adding an estimated USD 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 at USD 950 million.

Over the last years, the GoU has embarked on a number of projects and activities that are already expanding access to electricity in rural and isolated areas. These include:

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. ntroduction of low-cost and versatile house-wiring systems such as 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[17] 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).

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 and capacities of private sponsors to take risk and perform this role.

In particular, the main issue to be tackled related to commercial risk and therefore new approaches to mitigate this risk are in place. These include: (i) effective marketing of consumer electricity service to aggregate and build demand, (ii) lower barriers to rapid accumulation of customers, and (iii) enforcing discipline at the renewable energies "cash register" – commercialization functions, including policing electricity to avoid materials' theft.

To fill the void, the Government stepped in with a more direct approach to funding and implementing rural electrification, with improved results in terms of investment flows.

17 7,000 solar PV installations made under GoU sponsored projects

Gender Inclusiveness in the Energy Sector

Uganda has a Gender Inequality Index (GII) value of 0.529, ranking it 115 out of 149 countries in the 2013 index. In Uganda, 35% of parliamentary seats are held by women, and 22.9 % of adult women have reached at least a secondary level of education compared to 33.5 % of their male counterparts. For every 100,000 live births, 310.0 women die from pregnancy related causes; and the adolescent birth rate is 126.6 births per 1000 live births. Female participation in the labour market is 75.9 % compared to 79.3 for men.

The Uganda Bureau of Statistics conducted a Gender Statistics Profile for the Energy Sector. This report (done in collaboration with United Nations Fund for Population Activities (UNFPA) and UN Women) highlighted the existing differential and presents an overview of gender development issues and concerns in the sector. This is part of GoU efforts to increase availability of gender responsive data to inform policy and decision making and is one of the critical starting points for Gender Mainstreaming.

The GoU has prioritized the energy sector as one of the key sectors for economic growth. Uganda is a leading country in Africa regarding gender issues, with a strong National Gender Policy and mechanism, supported by the National Development Plan and Constitution. Gender is required to be included in all new policies. The Ministry of Finance is developing a monitoring system to ensure that the required inclusion of gender in all national policies is actually implemented, through gender and equity budgeting, recognizing that budget allocations have the power to transform gender inequalities.

The Uganda Constitution guarantees equality of women and men and empowerment of women to participate in development through affirmative action. A National Gender Policy and National Action Plan on women were formulated to support the constitutional provisions in this regard, with gender mainstreaming high on GoU's agenda. Today, participation of women in Government stands at 33% in legislature, 28% in the executive and high positions both in the judiciary and public service. Gender gaps are being narrowed by universal primary education.

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 (MDG goal of Universal Primary 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 transformation. The Plan advocates accelerating access to and consumption of electricity nationwide by investing in least cost power generation and promo-

ting 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 comprehensive integrated Renewable Energy Policy (2007) objectives and strategies of the Renewable Energy Policy (2007) as a poverty alleviation plan.

The Rural Electrification Agency (REA) has considerable commitment and informal capacity on gender in place. REA has partnered with NORAD and ENERGIA, the International Network on Gender & Sustainable Energy, to prepare a gender mainstreaming strategy for rural electrification projects. REA has put in place a Gender Focal Team and has an employment ratio of 55% women and 45% men, of these, 29% of women are at management level while 71% are men. To date, REA has achieved the commitment of senior decision-makers to gender mainstreaming; integration of gender in six rural electrification projects; established a Gender Task Team for further gender mainstreaming support; increased awareness of gender issues through workshops with REA staff, contractors and civil society partners; and shared experience with other energy agencies in Uganda and with international networks.

REA attempts to increase RE access by specifically targeting women and men with different promotional messages for connections, according to their energy needs, media access, and household decision making, considers subsidies, pre-payment cards, and ready-boards as a means of increasing access for women and has committed to providing connections to social infrastructure such as health clinics and water pumping stations for free. In addition to this, REA has identified a number of activities to be undertaken in order to successfully ensure gender mainstreaming within REA and in its operations.

The SREP program will ensure that gender aspects will be taken into consideration throughout the project cycle and the entire energy value chain. At the design stage the projects identify the roles of women starting with policy formulation and other activities at apex administration levels, through project implementation, and sustainability.

Section 3

National Energy Policy and Institutional Framework

National Policy and Vision

Since 2002, Uganda's economy has consistently grown at an average rate of 7% per year and has built sufficient momentum for take-off. In order to consolidate and accelerate this growth process, in 2007 the GoU approved 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, the Cabinet approved the National Vision Statement, "A Transformed Ugandan Society from an Agrarian 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 socioeconomic development since 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 3,668 kWh by 2040 from 75 kWh in 2010. To achieve this target, the national grid access rate should increase to 80% with total installed generation capacity reaching to 41,738 MW.

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 (including large hydro) 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.

xii. Biomass Energy Strategy, 2013: Propose rational and implementable approaches to manage the biomass energy sector.

iv. 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. Under the SE4All Action Agenda 2015, the objective is now to meet this target 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:

i. Increase in generation capacity through construction of Karuma HPP (600MW), Isimba HPP (183MW) and commissioning of GETFIT portfolio of projects.

ii. Reinforcement of the transmission infrastructure through construction of various transmission lines of 220kV and 132kV voltages.

iii. 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;

iv. Make adequate investments in new and renewable energy technologies such as biogas, gasification, biofuels, improved stoves and use of solar energy;

v. Government shall study and initiate the peaceful application of atomic and nuclear energy; and,

vi. Government shall encourage investments in programmes aimed at efficient energy use and conservation of energy for sustainable development and a healthier environment

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 10th 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.

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 three goals by 2030 (see table below). In this framework, the 2015 SREP program is planning to finance the development of a list of selected renewable energy projects accordingly.

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.	Reduce national wood consumption by 40% and improve energy efficiency of power users by minimum 20%, target 15% grid distribution losses.	
			Power	Thermal
>98%	>99%	>99%	>90%	36%

Source: Uganda SE4ALL Action Agenda - 2015

The envisaged targeted technologies by SREP are discussed later in the document but fall directly into the list of activities/programs 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:

i. Access: Geothermal and the solar PV components for both off-grid and on-grid net metering, are set to increase generation of electricity to the tune of a combined 280MW over a span of five to seven years, a handsome increase on the existing installed generation capacity of 855.75 MW as at the end of 2014.

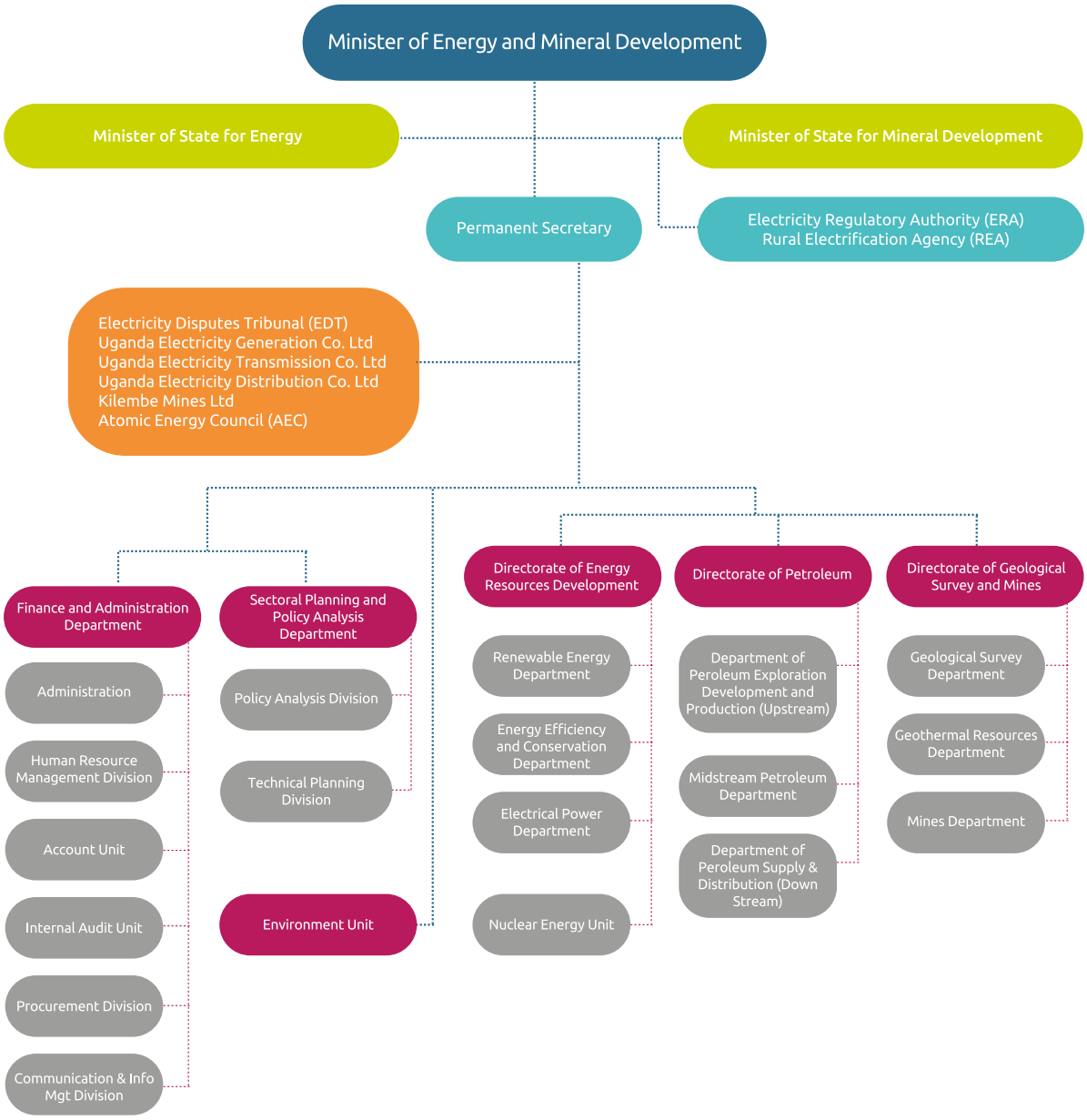
ii. Share of renewables in the energy mix: This will increase substantially through introduction of hitherto untapped and sizeable geothermal, solar PV and wind. The third round of the GETFIT 20MW on-grid tender for solar PV will also positively affect the share of renewables in the energy mix.

Institutional Framework

Figure 4 presented below shows the hierarchy of the electricity sub-sector institutional framework.

MEMD as the line ministry is at the apex of the organigram 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: The structure of MEMD



Source: MEMD

National Institutions

i. Ministry of Energy and Mineral Development (MEMD): The entity responsible for energy and mineral resources in Uganda providing policy supervisory and oversight in these sectors. 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".

ii. 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, tariffs, 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.

iii. Uganda Electricity Generation Company Ltd (UECGL): 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 concessionned assets, provides technical support as and when required by the GoU through MEMD.

iv. 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.

v. 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.

vi. Rural Electrification Agency (REA). It operationalizes the government's rural electrification function under a public-private partnership framework. It operates 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.

vii. Umeme. 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.

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 considered and generating more development activity for those already established, such as hydro power.

i. 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.

ii. 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.

iii. 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.

iv. Licence Holders for Service Territories. Currently eight companies and cooperatives hold licences to distribute power within the prescribed service territories. As aforementioned, UEDCL is managing four service territories under a management contract.

Role of Development Partners

Many development partners have handsomely contributed to the development of the energy sector in Uganda. These interventions are summarised 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 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 two substations; Masaka-Mbarara T-line; Muzizi HPP;; and, Rural Electrification Project.

iii. Germany – KfW: Maziba HPP; Nyagak I HPP; Nyagak III HPP; West Nile Grid Extension; Kampala-Entebbe Transmission Line; and, Mbale-Bulambuli Transmission Line.

iv. 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.

v. 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).

vi. 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 two rural electricity distribution and connection subsidy; construction of six rural distribution projects; GET FiT; and, NELSAP Uganda - DRC t-line study

vii. 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 recourses 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.

viii. 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.

ix. Iceland: ICEIDA is assisting Uganda at the United Nations University Geothermal Training Program in Reykjavik through six months specialized training. ICEIDA is sponsoring a geothermal exploration short course in Niavasha, Kenya together with Geothermal Development Company and KenGen of KenyaI. 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.

x. 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:

- 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.
- 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.
- Institutional Strengthening and Impacts Monitoring: to include an institutional strengthening program for geothermal development.

xi. African Development Bank: AfDB approved recently a USD 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 centres and 1,474 rural public institutions (schools, health centres 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 instalments to intensify connections for more than 99,000 new customers near the existing grid in electrified rural and urban areas.

A request was also made to UNDP to assist in the 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.

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 the country but that can generate revenues and be self-sustainable in the future.

Section 4

Renewable Energy Sector

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/m2 of solar energy. Much of the potential for renewables have so far not been exploited.

This endowment of renewable energy resources has the potential to: (i) help the country diversify its energy mix by making the system less exposed to climate variability and change affecting its hydro resources, and (ii) 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 about having a small share of renewables in its energy mix, but rather being highly dependent on a technology that impacts other key aspects of the electricity supply and utilization structure. Consequently, any plan to scale up renewable energy use in Uganda should be guided by three key considerations: (i) the need to diversify 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 overarching diversification objective, large and small-scale hydro power plants 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 with projects and technologies to be supported by SREP.

Geothermal

The geothermal potential is estimated at 450MW in three areas of Katwe, Buranga and Kibiro, on the western boundary of the country due to 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 has 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 across 80% of the country while Transient Electro Magnetic studies to measure conductivity of subsurface rocks were conducted in selected areas between 2004 and 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 (five to 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. SREP funding for geothermal energy could be key to finalize some of the still-required surface studies, mitigate some of the exploration phase risks and support the development of the much-needed legal and regulatory framework. This could pave the way for private investment in this important resource and ultimately lead to the transformation of Uganda's energy sector.

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 Phase 1 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. Unfortunately, the reality downstream proved the government otherwise which led to a greater focus on tendering and soliciting bids from private investors to develop this technology using the GETFIT platform for the purpose. Under this program, a special window for support was established using a reverse auction process to identify best solar PV projects. The selected developers shall receive a premium payment to bridge the gap between a predetermined tariff set by the ERA, under revised REFIT Guidelines as published by ERA, and the offer from private investors.

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 now is whether Uganda should go for even larger grid-connected solar PV projects, given that International module prices are at an all-time low, and whether the grid could take larger volumes of intermittent power. KFW is undertaking an assessment on the impacts of solar PV intermittent power in the national grid.

In general, grid-connected solar PV power generation is a simpler technology to implement when compared to geothermal or wind. A solar PV power plant is modular and can be easily constructed and operated. The lead time for commissioning is short and the resource data requirement is easily accessed and estimated. 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. The involvement of GETFIT in the aforementioned projects will contribute to addressing barriers common to this technology. The GoU considers that SREP would have a little role to play in the scale-up of on-grid solar PV.

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 mthly bill of UGX 5,000 (about USD 1.5) for 1 bulb, and, UGX 7,000 (USD 2) for two 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 still the least cost solution for providing basic electricity services in the most remote areas, including Ugandan islands in the Lake Victoria.

Wind Power

Wind speeds across the country have been estimated as moderate overall, 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 potential for medium-scale generation of electricity.

Recently, the MEMD has procured wind measurement equipment now 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 considered endowed with the resource. If the wind potential is proved sufficient for commercial on-grid generation, then wind technologies could become an important large-scale diversification option for the country.

Biomass

Biomass contributes more than 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 six 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 waste. The main barriers hindering the deve-

lopment of this resource are high start-up costs, feedstock composition and supply risks.

Whereas 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.

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 six 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-governmental 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 ten schools across the country for cooking purposes, and this program will be expanded. Institutions such as schools use significant quantities of firewood which depletes the forest assets of the country.

The challenges faced in promoting the wider use of biogas in Uganda include the high upfront costs for installing a digester, making the option unaffordable to many households despite significant subsidies. In addition, limited access 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 enough livestock to support the operation of a domestic digester.

Legal and Regulatory Framework for the Promotion of Renewables

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:

i. Introduction of FIT
ii. Standardization of PPA
iii. Obligation of fossil fuels companies to mix products with biofuels up to 20%
iv. Tax incentives on renewable energy technologies

The key principles on which the policy is based are:

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 renewable energy 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 resources in a sustainable manner
vii. Promote the sustainable productions and utilization of biofuels
viii. Promote the conversion of municipal and industrial waste to energy

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
Technical / Skills	
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.
Financial	
Perceived investor risk related to renewable energy sector in Uganda.	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. 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.
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.
Environmental	
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.
Social	
Projects have unacceptable social impacts.	Intensive stakeholder consultations were carried our during SREP preparation and will continue when projects are implemented. A specific project-level, social safeguards assessment will be undertaken according to the ESMF, and compensation or other mitigation actions will be taken in accordance with the framework and GoU and MDB guidelines By providing affordable electricity to more people, the program will promote greater economic growth and equity. A focus on productive energy uses and employment creation and gender mainstreaming is incorporated into the program design and will target vulnerable groups (women and youth)

Section 5

Contribution of SREP to National Energy Roadmap

SREP is expected to contribute to the implementation of the Renewable Energy Policy 2007 and the SE4All Action Agenda which proposes to reach 99% of energy access by 2030. This is achieved by diversify the energy mix away from its dependence on hydro power, and potentially displacing the current existing thermal generation in the country. This is also achieved by increasing access to electricity, especially considering that the majority of the Ugandan population lives in rural areas for which electrification through the national grid will either still take many years to arrive, or the difficulty and uneconomical prospects of this electrification option means that these areas will never be electrified. This is particularly true in the islands around Lake Victoria where, given their isolation and sparse population, decentralised renewable energy-based electrification options are actively being pursued as the only way forward. Cognizant of these challenges, 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.

The proposed projects are perfectly aligned with SREP's development objectives:

i. Increasing capacity: geothermal and solar off-grid very much meet this consideration, with a combined expectation of 280MW in some seven to ten years.

ii. Increased access to renewables: against a current installed capacity of 855.8 MW (end of 2014), solar and geothermal, which are not currently part of the energy mix, stand to increase installed capacity by about 33% upon completion.

iii. Low Emission Development: all three technologies – geothermal, solar PV and wind – will provide power for development with no additional carbon footprint.

iv. Affordability and competitiveness: once exploratory drilling proves successful, geothermal may represent one of the most competitive sources of renewable electricity generation, even when compared against large hydro.

v. Productive use of energy: base load and reliable power from geothermal will help overcome the current dire industrial development energy needs.

vi. 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.

vii. Leveraging resources: for every dollar of SREP spent, an extra USD 8 is anticipated to be disbursed as co-financing.

viii. Gender: all projects propose to involve women and youth through all stages of project development and operation. The projects will improve the number of men and women, business and community services benefiting from improved access to electricity as well as increase the number of jobs created for both men and women

ix. 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 prepared in 2011, the least cost future capacity to supply growing demand comes predominantly from hydro generation. After looking carefully at the generation plan for the country, some important factors should be highlighted. These include:

i. The contribution of thermal plants is expected to remain high until 2017.

ii. 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.

iii. The Isimba hydro project is expected to come online by 2017 to meet new demand

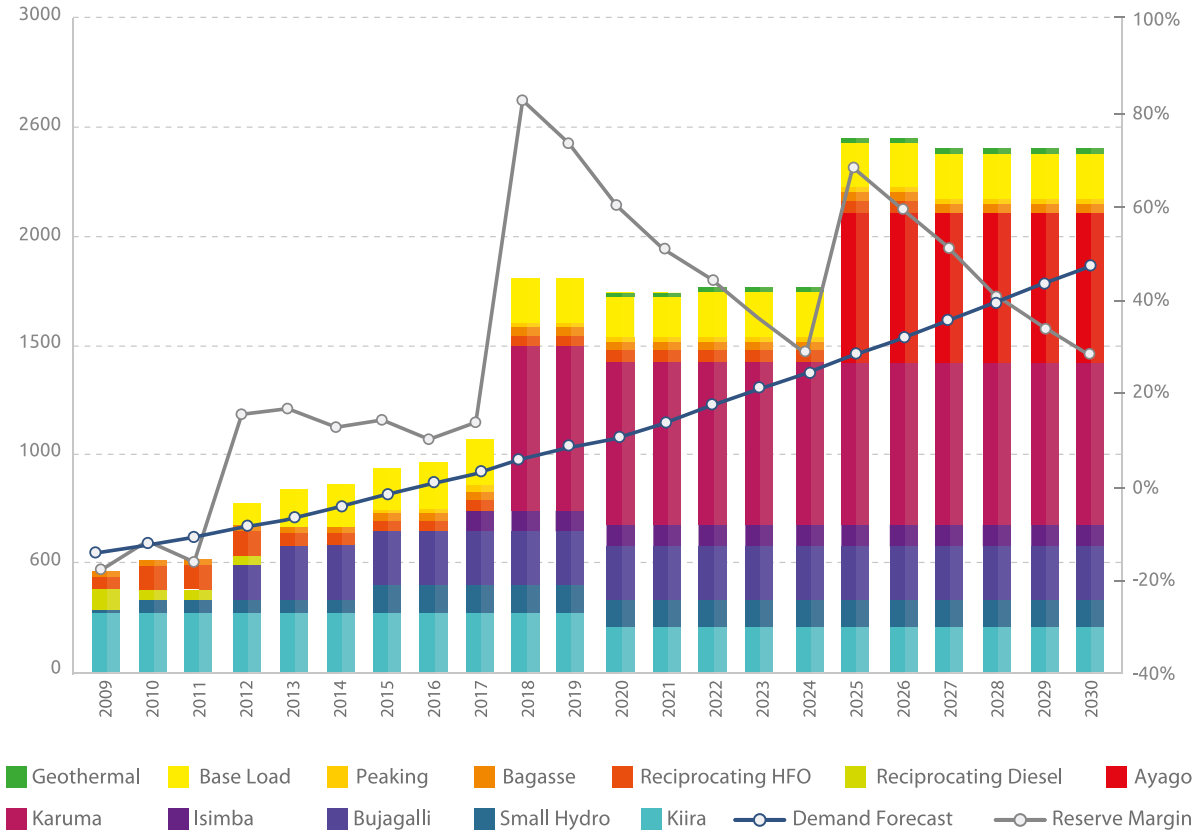
iv. The Karuma hydro project is expected to come online by 2018 to meet new demand

v. With the introduction of the Karuma plant the reserve margin is anticipated to increase to above 80% and remain above 25% until 2024. This will decrease dependence on the existing thermal units from 2018 onwards

vi. In 2022, new base load capacity will be required to serve the base case energy demand forecast. The least cost option is expected to be geothermal

Figure 5 below presents the least cost generation development plan for Uganda. One can see that in the long run, geothermal starts playing a key role in the energy mix of the country. SREP can fast track the deployment of this and other technologies and contribute to an acceleration of the sector's development.

Figure 5: Least Cost Generation Development Plan



Source: Uganda Power Sector Investment Plan 2011

Under the base case demand forecast scenario, 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 13,101 GWh 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%. Energy sales are forecast to grow to 17,877GWh by 2030 which represents an average annual growth rate of 10.8%.

Under the base case scenario, the peak demand is forecast 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. This corresponds to an average annual growth rate of 7.9%.

Figure 6 below provides an idea of the projected generation by technology between 2015 and 2023 including SREP contributions to the sector. Hydro technology is set to dominate electricity generation in the short-term (large hydro at 74%, all hydro at 79%) by far. Without considering SREP technologies, solar that was expected by 2017 to take second place at a 12% share will get a boost of only 20 MW from the two on-grid projects recently awarded. Therefore thermal capacity will continue ranking second with bagasse co-generation following in third place. By adding the expected

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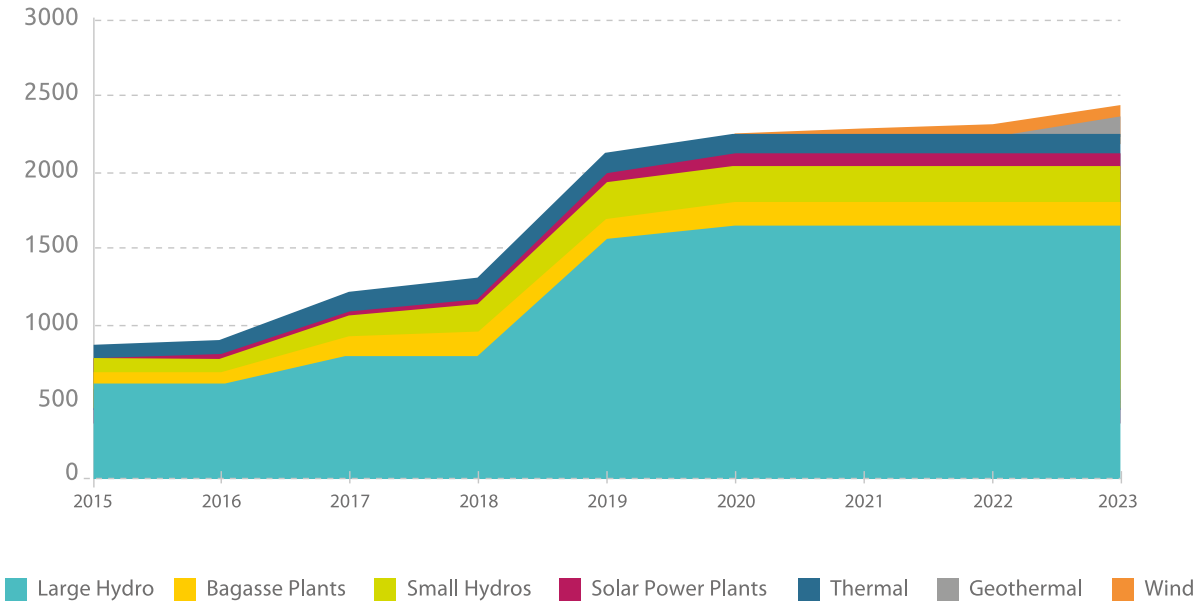
capacity in wind, solar and geothermal that will result from SREP interventions, one concludes that by 2013 geothermal would be very close to bagasse co-generation capacity of which in the country is seen as almost exhausted. Therefore, in the long run and if the geothermal potential in the country is fully developed, this technology could outpace bagasse co-generation and small hydro and rank second behind large hydro.

Figure 6: Projected Generations by Technology in MW (2015 – 2023)



Source: Era, 2015 (corrected to include technologies to be supported by SREP)

Most recently, the Vision 2040 foresees Uganda transforming from an agrarian society to an industrialized and largely urban society, through increasing levels of electricity use and with projections for nuclear energy use before the end of 2030.

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, 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 sub-region where other SREP pilot-countries are already benefiting from concessional resources (e.g. Tanzania, Kenya and Ethiopia). With the possible introduction of geothermal energy, the share of thermal and hydro energy in the mix is likely to be reduced over time.

Oil is an added factor on the horizon. Uganda expects to start commercial production of oil from 2017 onwards. This will have a positive impact in the end-user tariffs as inputs for existing thermal generation will be smaller. This effect can be exacerbated by the fact the levelized costs of geothermal energy may be 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.

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Section 6

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 confirm 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 this 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 includes:

i. Increased installed capacity from renewable energy sources
ii. Increased access to energy through renewable energy sources
iii. Low Emission Development
iv. Affordability and competitiveness of renewable sources
v. Productive use of energy
vi. Economic, social and environmental development impact
vii. Economic and financial viability
viii. Leveraging additional resources
ix. Gender mainstreaming
x. Co-benefits of renewable energy scale up

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The second set of criteria included those relevant to national policies and ambitions. These are:

i. New potential areas for renewables to diversify energy mix

ii. Increasing capacity for technology transfer

iii. 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 the 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 were 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, development partners and MDBs. The table aims at presenting the results of the exercise and how these rank when compared to others. t4 provides the results of the exercise, evaluation and rankings in a detailed manner.

Table 13: Scoring Summary

	Geothermal	Solar PV - Off-grid	Solar PV - Net-Metering	Wind	ICS	Hydro (<10MW)	Municipal Solid Waste	Biogas
SREP Criteria								
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

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National Criteria								
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
Total score	**36**	**32**	**28**	**25**	**23**	**22**	**22**	**24**
Ranking	**1**	**2**	**3**	**4**	**6**	**7**	**7**	**5**

Priority Areas and Projects

It emerged for the exercise undertaken that adopted a number of principles (e.g. not including hydro, etc.) that the following technologies should constitute the priority projects for SREP intervention:

i. Geothermal
ii. Solar PV off-grid
iii. Solar PV on-grid net-metering
iv. 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 the targets and in the delivery timelines. As a consequence of, SREP support is sought for the following three projects:

i. 130MW Geothermal Power Development Program
ii. Decentralized Renewables Development Program
iii. Wind Resource Map and Pilot-Wind Power Development Program

All these projects have embedded 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.

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Section 7
Program Description

The GoU has informed its decision on the final structure of the SREP based on the stock take on Uganda's energy sector and its role in supporting the country's development trajectory, as well as the screening of the various renewable energy options summarized and presented in the previous sections of this Investment Plan. This section presents in more detail the investment projects, including the roles and contributions of different stakeholders and the institutional arrangements for program implementation.

Objectives of the SREP Program

The SREP will be highly catalytic in supporting the GoU in meeting the country's targets set in the SE4ALL Action Agenda, Uganda's Vision 2040 and Renewable Energy Policy.

In accordance with SREP modalities, the goals set in the Investment Plan will be achieved through an integrated approach that includes both "hard" investments in renewable energies and "soft" support for a multitude of stakeholders. The SREP will thus build on previous and ongoing national efforts in the sector and provide technical assistance and capacity building to national institutions and players in the sector, to ensure effective implementation of the policies and 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 while building on the experience in the scaling up of renewable energy sources in Uganda. It will additionally support the consolidation of the sector regulatory framework and promote gender equality and inclusiveness.

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The promotion of private sector involvement in the sector will continue to be a priority; private capital and know-how will play a key role in power generation for the proposed geothermal project and will be key in increasing net metering and wind technologies beyond the pilot proposals that SREP will initially support.

The integrated program approach assumes that transformational change is only made possible by improving energy market conditions and financing, as well as further improving the enabling environment in order to continue attracting private sector investors. These conditions are needed to ensure replication and increasing investments in renewables.

Expected Impacts of SREP program

The main expected impacts of the SREP in Uganda include:

i. 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.

ii. An increase in the annual energy output of 125.4 GWh per year.

iii. An annual decrease in greenhouse gas emission of 163.000 tons CO2e a year once SREP projects are operational.

iv. A total investment of at least USD 455 million in the power sector associated with the SREP projects.

v. Development of two nascent generation technologies in the country, geothermal and wind, with high transformational impact.

vi. Expand the expertise and know-how in the country in relation to renewable technologies.

vii. Lead to better economic and social prospects in isolated areas that do not benefit from access to modern and productive energy services.

SREP Program Description

The Uganda SREP Investment Plan encompasses the three projects highlighted below. Annex I includes detailed concept notes for each one of the projects and Table 14 presents a financing table.

Project 1: 130MW Geothermal Development Program

Geothermal development is characterized by heavy costs in the early development stages 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 have 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.

The GoU will use the SREP funding to finalize pre-drilling activities and proceed with exploration drilling at two of the most promising sites, with the objectives of confirming resource availability, undertaking development of the fields and ultimately tendering 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: Decentralized Renewables Development Program

In view of the very low level of electrification in the country, especially in isolated areas, the Rural Electrification Strategy & Plan seeks to increase access to 26% by 2022, through a variety of interventions including the deployment of micro and mini-grids. This project will aim at preparing 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 manner, given the high number of existing islands that are inhabited and do not benefit from access to modern energy services. SREP funding is intended to design and finance the construction of mini-grids in a number of remote communities.

In addition, this project will also encompass a pilot experience in rooftop solar PV net-metering systems on public sector buildings. The objective is to prepare the market and both legal and regulatory frameworks that will ensure a significant scale-up by private sector companies and households. This project will be implemented together with the off-grid Solar PV intervention in Island communities, both because the proposed technology is common and to minimize transaction costs and facilitate implementation by MDBs in a timely manner.

Activities under this project will include, among others, the following:

i. Prepare a Master Plan for the sequenced electrification of isolated islands.
ii. Undertake feasibility studies for the electrification of at least 5 islands.
iii. Construct Solar PV micro or mini-grids (hybrid systems may be required in which case SREP will only finance the renewable component).
iv. Construct distribution networks to ensure that the number of connections is maximized.
v. Set up and thoroughly assess at least ten solar PV net metering systems on public buildings.
vi. Review the existing and where necessary draft regulations, legislation and standards required for net metering scale-up.

Project 3: Wind Resource Map and Pilot-Wind Power Development Program

As the push for a wider range of renewable technologies gains momentum, it becomes important to establish the full potential of hitherto relatively unexploited technologies. This is the case for wind development in the region of Karamoja, where wind speed data collected so far suggests that electricity generation can be commercially viable.

Activities under this project will include, among others, the following:

i. Installing wind masts to further assess and validate wind data measurements
ii. Generating a wind map of the region that identifies the most promising sites
iii. Undertaking detailed feasibility studies for at least two projects
iv. Constructing two pilot/demonstration wind power plants
v. Build technical capacity on wind energy at the relevant national institutions
vi. Promote wind energy as a viable investment by the private sector

Section 8

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), the private sector 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 funds from the Government of China. DERD has experience in implementing projects financed by AfDB, JICA and the GIZ and has over time demonstrated its capability to structure and implement projects in a sound manner. Their experience will be vital in ensuring 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 German Cooperation.

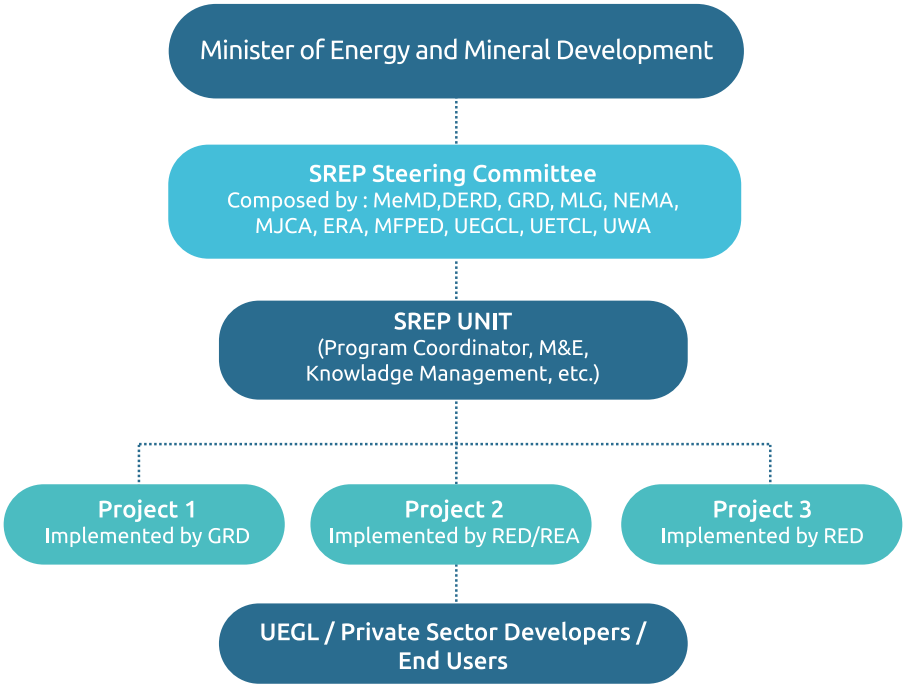
DERD will be the interface between the GoU and the financing partners as well as the CIF community, and will prepare monitoring and evaluation reports on key aspects of the program. It will also be responsible for leading the procurement of all services, goods and works to be carried out as part of the SREP. Finally, it will be responsible for managing and implementing environmental and social management measures. With respect to the gender aspect, a gender expert will be engaged to structure, supervise, monitor and evaluate the effective implementation of gender mainstreaming.

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.

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 organigram below.

Organigram of Implementation Structure



Section 9

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:

i. Reduce the balance of non-renewable energy sources by increasing the penetration of renewable energy in the national energy mix

ii. Reduce GHG emissions due to a scale-down of fossil fuel based generation.

iii. Reduce pressure on forest assets on isolated areas through increased access to modern energy services displacing traditional biomass consumption.

iv. Maximize economic development opportunities that stimulate the creation of new jobs and contribute to the reduction of levels of poverty

v. Improve the quality of life of rural and isolated populations

vi. Implement proper management and supervision mechanisms of social and environmental issues

vii. Reduce the country's high dependence on hydro resources and consequently improve the country's resilience to the negative effects of climate change

viii. Promote gender equality and improve women's quality of life, especially in rural areas by reducing time allocated for household chores, contributing to an increase in income generation activities resulting from access to modern energy services. The availability of electric lighting and other energy services can lead to better education, health, and public security, especially for women and children. As well as substitution of kerosene lamps

with clean powered lights directly to improve women's health by reducing indoor pollution. Access to electricity for other purposes (power for sewing machines, water pumping, radios and TV, etc) reduces the drudgery experienced daily by women and elevates their well-being. The SREP program 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.

Section 10
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 and other development partners, and aim at creating conditions for attracting private sector financing.

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 to the tune of USD 6.8 million which will also be implemented by AfDB.

Table 14 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 funds available from AfDB and WB's concessional windows.

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.

Table 14: Financial Plan

Lead MDB	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 Farm s	5.4	6.8	14.0	0.0	14.0	40.3
Total	**14.5**	**50.0**	**98.6**	**230.0**	**62.0**	**455.2**

Section 11

Environmental and Social Aspects

The 1995 Constitution of Uganda imposes obligations on the GoU to promote sustainable development and environmental protection, and obliges the state and citizens to endeavour to preserve and protect public property and Uganda's heritage. The Constitution gives every Ugandan the 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 that an Environmental Impact Assessment (EIA) 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.

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:

i. Defining the environmental and social (E&S) planning, review and clearing processes,

ii. Ensuring that energy is produced and utilized in an environmentally sound manner,

iii. 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;

iv. 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 as well as cooperate with international organizations that seek to ensure sustainable delivery of energy, as to mitigate negative environmental impacts and climate change.

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 sub-project 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.

iv. Gender assessment ensuring use of gender disaggregated participatory beneficiary feedback and women-targeted communications campaigns to alert project beneficiaries and affected persons to the existence of the planned grievance redress mechanism.

Additionally, specialized environmental and social management plans and/or initiatives may also be required to address impacts associated with a given sub-project. 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.

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 cheaper 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.

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 organizations, 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.

Project or sub-project operators will be responsible—i.e., in compliance with national laws and regulations and MDB safeguard policies, guidelines and standards—for conducting the required detailed E&S studies (e.g., ESIA, ESMP, and RAP); obtaining clearances and licenses from rele-vant authorities; organizing stakeholder and gender disaggregated consultations; implementing all required mitigation measures; and conducting monitoring activities. The costs of all these ac-tivities will be integrated into the budget of each project.

Anticipated Environmental and Social Impacts

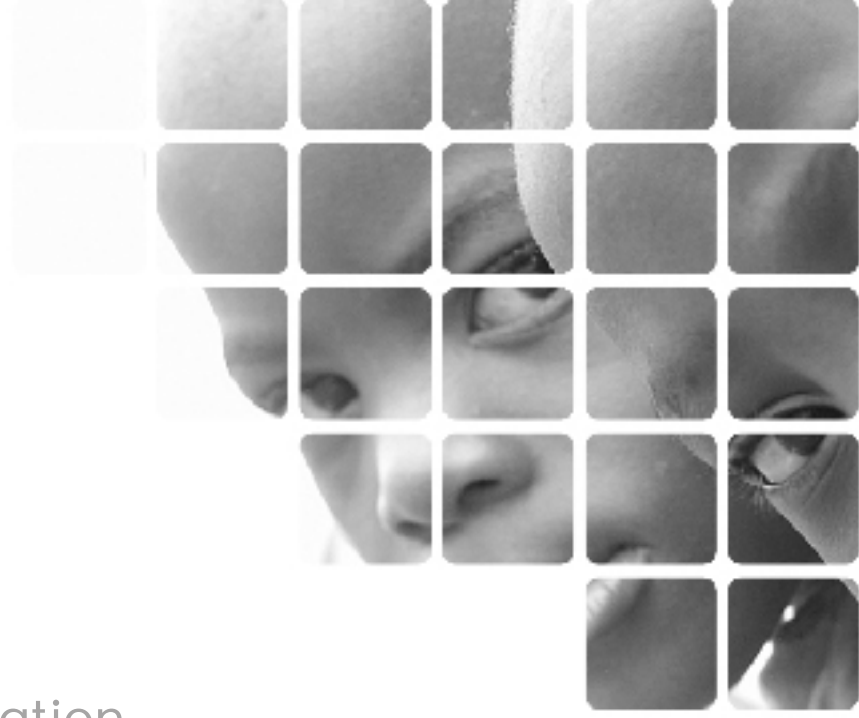
The entire documentation on environmental and social safeguards will be widely distributed to national and local stakeholders (directly or indirectly affected by the activities of investment projects) in compliance with the requirements of the MDBs

The documentation will be posted on the websites of MEDM and of MDBs.

Table 15: Anticipated Environmental and Social Impacts

Project type	Major E&S concerns
General	- Water flow disruption - Pollution of groundwater - Deforestation - Construction of infrastructures, resulting in the reshaping of topography and modification of landscapes
Construction of mini-grids	- Soil compaction and damage to vegetation due to equipment. - Deposition of waste soil and drilling mud. - Air pollution resulting from gas emissions and smoke exhaust from generators, compressors, and vehicles. - Adverse effect of steam and spray during well testing on local vegetation, including the scalding of trees and grass. - Deleterious effect of dust carried by winds across exposed surfaces.
Geothermal	- Soil compaction and damage to vegetation due to equipment. - Deposition of waste soil and drilling mud. - Air pollution resulting from gas emissions and smoke exhaust from generators, compressors, and vehicles. - Adverse effect of steam and spray during well testing on local vegetation, including the scalding of trees and grass. - Deleterious effect of dust carried by winds across exposed surfaces. - Risk to flora and fauna - Introduction of mining debris to the environment
Wind	- Biodiversity impacts in harm to birds, bats and natural habitats. - Local nuisance by way of visual, noise, interference with radar, telecommunications, aviation and the like. - Social-economic and cultural impacts on land acquisition, local incomes, indigenous and traditional communities and physical cultural resources
Solar off-grid	- Recycling of batteries and parts, improper disposal of industrial waste. - Disposal of waste that normally ranges from used lights, batteries and other components. The poisonous elements in their contents pause a risk to the environment if not properly disposed of.

Common to all Project Types	- Involuntary resettlements, population displacement, influx of migrant workers associated with the project posing health risks (HIV/AIDS). - Land acquisition. - Loss of harvests. - Influx of workers from other locations. - Intensive stakeholder consultations were carried our during SREP preparation and will continue when projects are implemented. A specific project-level, social safeguards assessment will be undertaken according to the ESMF, and compensation or other mitigation actions will be taken in accordance with the framework and GoU and MDB guidelines By providing affordable electricity to more people, the program will promote greater economic growth and equity. A focus on productive energy uses and employment creation and gender mainstreaming is incorporated into the program design and will target vulnerable groups (women and youth).



Section 12
Monitoring and Evaluation

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:

i. Defining how transformational impacts will be measured before during and after the life of the program

ii. Ensuring that data collected, processed and analyzed at the level of the investment projects harmoniously feed into the programmatic M&E system

iii. Documenting the social, gender, economic, and environmental impacts of project investments and program

iv. 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.

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.

Responsibilities and Monitoring and Evaluation 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:

i. Operate their respective M&E system
ii. Fill in the logical framework indicators
iii. Efficiently and regularly collect and process data
iv. Demonstrate how their output indicators will help achieve overall SREP outcomes in Uganda
v. Document the social, gender, economic, and environmental impacts of all the activities
vi. Prepare and submit regular monitoring reports

Table 16: SREP Results Framework

Result	Indicators	Baseline	Targets by 2020	Means of Verification
SREP Transformative Impacts				
Support low-carbon development pathways by reducing energy poverty and/or increasing energy security.	National measure of energy poverty.	MEPIa = 0.87 (Access rate of 13% in 2010) Electricity used in 2010 ; 75kWh per capita	MEPIa = 0.1 (Access rate of 80%) Electricity used : 462 kWh per capita.	Country-based reporting using household survey data.
	Electricity output from renewables in GWh per year.	na	125.4 GWh per year.	Utilities companies and MEMD.
	Increased annual public and private investments ($) in targeted subsector(s) per country.	na	USD 455 million	National M&E.
SREP Programme Outcomes				
Increased supply of renewable energy.	Increased annual electricity output (GWh) as a result of SREP interventions.	na	Project 1 : 80.65 Project 2 : 0.95 Project 3 : 43.8	SREP Projects' M&E systems.
Increased access to modern energy services.	Increased number of women and men and businesses and community services benefitting from improved access to electricity as a result of SREP interventions.	na	Project 1 : 520.000 Project 2 : 5.000 Project 3 : na	SREP Projects' M&E.
Newandadditional resources for renewable energy projects . Avoided GHG emissions	Leverage factor: US$ financing from other sources compared to SREP funding.	USD 50 million	USD 405 million.	SREP Projects' M&E systems.
	Avoided GHG emissions (tons CO2e per GWh) as a result of SREP interventions.	0	163.000 tons CO2e 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 CO2e per GWh) has been used to measure the co-benefit of avoided GHG emissions.

Managing Knowledge and Sharing Lessons Learnt

SREP activities related to manage knowledge and share lessons learnt are of particularly high value. This section distinguishes the activities at the program level as a whole and those conducted in the three 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, best practices (including gender mainstreaming) 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.

The SREP encourages projects to draw lessons from the new business models and innovative activities to be adopted in the SREP-supported pilot projects so that similar models and activities can be replicated in other regions of Uganda and/or other countries. Lessons from project implementation and gender mainstreaming will help: determine key factors that contributed to success or failure; quantify some of the co-benefits of renewable energy development; and identify areas of the project implementation phase that could be improved.

Section 13
Risk Assessment

The overall implementation risk of the SREP Uganda IP is assessed from low to high. Table 17 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 17: 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 assistance and capacity building.	Low
	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.	
	Negative impacts on foreign workers.	Apply ESMF guidelines, supervision by NEMA and other institutions' specialist staff.	Low

ANNEX

Contents

Annex 1

Project Investment Concept Notes

Project 1: 130MW Geothermal Development Program

Problem Statement

Uganda had hydropower as its main source of electricity generation until 2005 when thermal power plants were introduced to the national grid to address an acute shortage of power driven by 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 and in the coming years is having a secure and sustainable energy generation mix that can deliver sufficient electricity to power its economy. Geothermal, if properly developed in Uganda, will help the country in addressing this challenge by adding to its energy mix a clean, reliable and base load source of power while decreasing dependence on hydro power generation, which is vulnerable to droughts and climatic variability. This makes geothermal one of the most suitable sources for electricity generation for the future based on cost per kWh and high plant load factor.

The East African Rift Valley, associated with intense volcanism and faulting, has resulted in the development of geothermal systems in Kenya. The western arm running through a big part of Uganda has been characterized by recent volcanism. These conditions, together with clear surface indications of geothermal activity, are ideal for geothermal development. Although the country has an estimated untapped potential of approximately 450 MW, geothermal development remains a challenge in the country, with the main barrier being the lack of public funding for exploration

drilling for the geothermal resource. Information gathered from this drilling is fundamental to allow the packaging of bankable power plant projects for private sector investment through mitigation of the exploration risk. Some licences were in recent years granted to private companies to develop a number of geothermal fields, but these efforts have so far not borne fruit, in part due to the explorattion risk.

The GoU recognizes that the best way to address this risk is directly funding of the exploration phase until steam potential is established.

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 for drilling of exploratory wells. Preliminary investigations have also been carried out on other sites such as Panyimur and Kanangorok.

The proposed SREP project is designed to eliminate the identified barriers and perceived risks, building on the preparatory work done so far on the most promising sites in the country. In particular, SREP concessional funding will be deployed to finance exploratory drilling, prove the resource and develop the appropriate regulatory and policy framework through advisory support in parallel. This is expected to 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 in the early twentieth century. 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 developing 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.

Geothermal development has various stages including: (i) geochemical geophysical studies, (ii) surface exploration, (iii) exploratory 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 and in advancing surface exploration and exploratory drilling.

The planning and development of geothermal power in the country would take an estimated four to six 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 for early stage generation until the desired installed capacity for the target power plant is achieved, 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 economically and socially disadvantaged areas. 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, (iv) increased security in the targeted areas as

a result of the economic activities and social amenities, and (v) increased community economic development from greenhouse farming and other associated agricultural activities, resulting from geothermal by-products such as brine.

These activities would improve the lives 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 (GDC) of Kenya, a company with a 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 co-operation with different partners, several training sessions 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 training sessions 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 looking 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 as 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 identifying 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; Additional surface studies may need to be carried out (e.g. 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 (Request for Proposals, Power Purchase Agreements, 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 licencse for the Kibiro site, one of the most promising in the country, expired in July 2015. The same will happen in some other promising sites where SREP could be instrumental in advancing the development of the respective geothermal fields. The GoU is aware of the importance of minimizing exploration risk and therefore is committed to use SREP financial resources for exploratory drilling in the sites 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, increase 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 maximizes success in the exploration and evaluation of geothermal resources.

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 to expand the exploration efforts. MDBs will be able to fill a part of the gap and co-finance such efforts from Uganda if necessary.

This project has the 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 on the existing transmission infrastructure resulting in increased penetration of the grid. 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, 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 jobs created for men and women, businesses

and community services benefiting from increased grid penetration as a result of the 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 nobble 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. It is important to highlight that as soon as the preliminary studies are completed in the 4 identified sites, MoMED will, in cooperation with the selected MDB, select the best two sites to start with exploration drilling.

The SREP allocation of USD 33.8 million will be implemented as follows: (i) USD 31.8 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
Total	**7.0**	**33.8**	**70.0**	**230.0**	**48.0**	**388.8**

Project Preparation Timeline

Once the Investment Plan is endorsed, the lead-MDB will engage with the GoU concerning the implementation of SREP resources and possible co-financing amounts. Discussions with other development partners will be intensified to assess their appetite 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.

Project 2: Decentralized Renewables Development Program

Problem Statement

Uganda has diverse renewable energy resources to be found throughout the country that mostly remains unexploited. This presents the country with an opportunity to address the challenges of energy access and reliability of electricity supply, while diversifying its energy mix and contributing to the fight against climate change. In particular, decentralised energy solutions can be developed both in areas where the transmission grid does not reach - through mini-grid and off-grid solutions - and incorporated into distribution grids (including mini-grids) through net metering.

The Government of Uganda therefore seeks to promote decentralised energy systems under SREP. This will be done through a Decentralized Renewable Development Program with two components for rural and urban areas. These two components are 1) renewable (or hybrid) mini-grids systems for islands in Lake Victoria, and 2) solar PV net-metering rooftop systems in national buildings around Kampala, Jinja, Mbale and Entebbe. They are discussed separately below.

Decentralised Mini-Grids

The process of rural electrification carries inherent difficulties. High capital costs, low revenue collection rates, insufficient generation capacity, and theft all constrain government and utility operations. These difficulties are severely augmented when the area targeted for electrification is remote and unique in nature, such as the Ugandan islands across Lake Victoria.

Uganda's Kalanga District encompasses the 84 Ssese Islands, 64 of which are inhabited. The population is estimated to be around 106.500 , though gathering census data from the transient inhabitants can be difficult. Most of the population and commercial activities are focused in small, clustered fishing communities along the shores. The district is only accessible by ferry, leaving either from Entebbe or Masaka for the main island, once a day. No bridges exist between islands.

No centralized sources of electricity exist in Kalangala and those who have power utilize fuel-based generators.

A number of impediments to electrification have been identified over the years and include the district's geography and an indeterminable consumer base. Geographical isolation prevents both connections to the mainland grid and implementation of traditional input-based electricity generation. Connections to the mainland would require submarine cables which would be both extremely expensive and potentially detrimental to the lake's ecosystems and the fishing industry. Those who can afford it have resorted to sources such as diesel generators or PV systems, which typically produce power for a single household and are only run for selected hours in the evening.

Renewable energy based hybrid power systems are increasingly being implemented as decentralized power systems for rural electrification to replace diesel-based generators. These hybrid technologies have an important role to play in rural areas in terms of the suitability and cost competitiveness of the existing technological solutions, and also from an environmental point of view. Decentralized rural electrification projects usually entail the installation of stand-alone systems - PV, wind, small-scale hydropower and biomass – in rural areas and/or the setting up of electricity distribution mini-grids fed either by renewables or hybrid systems.

Despite the advanced stages in securing financing for supporting various on-grid electrification projects from financiers such as the WB, AfDB, Islamic Development Bank (IDB) and others, little is happening in isolated areas, namely on islands across Lake Victoria. The exception is a grant from IDB to undertake electrification feasibility studies for the Buvuma islands (population of 80.000) and Sigulu islands (population of 16.517) . The funding for the electrification of those islands have not yet been secured.

Decentralised Urban Small-Scale Solar PV

Uganda has very high solar radiation potential with average daily radiation of 5.1KW/m2/day. Currently Solar photovoltaic application is limited to small and rural domestic and institutional stand-alone battery systems, and water pumping. However solar PV systems can also be employed supply power to daytime loads in commercial institutions like Banks, Government office, hospitals, and super markets that requires power during daytime to power loads like computers, air conditioning, and other low power consuming appliances. Daytime power consumption in commercial and public buildings frequently has a similar profile to the solar radiation curve, which is almost steady through the year as Uganda lies along the Equator.

Net-metering allows for installation of an on-site RE which generates electricity for a customer's own consumption, with the ability to sell any surplus to the grid, or offset the customer's consumption from the grid. This can significantly improve the economics of private investment in solar rooftop systems. Widespread solar rooftop installations will help to utilize the abundant unused rooftop space and reduce land procurement issues and authorization processes, and drastically reduce the cost of unit electricity cost as the cost of battery will be eliminated.

However, current laws, standards, and regulations on trading, licensing, operations, and grid connection do not support the integration of small-scale solar rooftops systems on the nation grid through net metering.

Proposed Contribution to Initiating Transformation

This project will be developed under two separate sub-components. One aiming at developing decentralized renewable (or hybrid) systems in islands across Lake Victoria, and a second aiming at deploying a pilot solar PV net-metering rooftop systems in national buildings around Kampala, Jinja, Mbale and Entebbe.

The mini-grid component will:

viii. Develop an off-grid master plan for the electrification of islands across Lake Victoria to determine priority investments;

ix. Design and construct at-least 10 mini-grids in different islands where impact can be maximized.

The proposed electrification program on the islands is expected to boost considerably economic activities (i.e. fishing, tourism, etc.) and social activities (e.g. schools, clinics, public buildings, etc.) which will improve the life of the most vulnerable ones such as women and youth. 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.

Given the limitation on the availability of funding available for the mini-grids sub-component and because maximizing development impacts should be a key criteria in selecting the islands that will immediately benefit from those mini-grids vis-à-vis the others, the proposed master plan will serve to prioritize these investments and be the basis for the electrification of the remaining islands in an orderly and sequential manner. A consultative process will be undertaken to ensure buy-in from those communities.

Over time, access to reliable power is positively correlated with an improvement in the life of women and disadvantaged groups due to the positive impact on economic opportunities through the creation of more productive jobs.

The net metering component will:

iv. Install 10x25KW solar PV rooftop systems in national buildings around Kampala, Jinja, Mbale and Entebbe to test this technology before a scale-up for private sector.

v. Develop regulations, legislation, standards, strategy and investment guidelines

The grid tied rooftop solar PV systems will introduce net metering as a pilot experience The pilot project will be implemented in urban areas targeting public buildings currently connected to the national grid, and will have significant demonstration impact.

A study and technical assistance will be undertaken to ensure that the appropriate policies, laws, regulation, and standards for solar grid-connected rooftop systems are in place. This will lay the foundation for net metering to be scaled-up by private users such as businesses and households.

SREP financing will be instrumental in opening a new market line for small-scale decentralised products which will increase electricity generation from renewable sources. SREP financing will be key to addressing the issue of lack of technical capacity and legal and regulatory frameworks. As SREP finances the deployment of demonstration units, building technical capacity among key institutions and reducing barriers to entry, a significant scale-up could be expected in the future.

Implementation Readiness

The GoU, in cooperation with the MDBs, has agreed to implement these two relatively small distinct projects in parallel to minimize transaction costs and speed up project implementation. Given the small amounts involved in these two projects – despite the significant development impact in the medium to long-run – a single transaction with procurement being done in parallel to the two initiatives is the best way forward as it ensures economies of scale and will accelerate the overall implementation of phase II of SREP programming. Since the implementing agency for these sub-projects is REA, there is little risk that implementation will suffer due to the distinct natures of the sub-projects.

Following the successful electrification of the Bugala Island in the past, 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 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 plan will rank the electrification projects for all the islands based on technical, financial and economic viability.
ii. Once the master plan is completed, the targeted islands identified and the most appropriate renewable electricity generation source(s) for each individual island determined, REA will proceed with detailed feasibility studies;
iii. REA will then proceed to the Implementation of ten PV solar-based mini-grids on Lake Victoria. Hybrid mechanisms may be considered with SREP financing the renewable component only.

As SREP funds are being implemented and the first mini-grid financed, the above Master Plan will play a central role in supporting the GoU in raising funds for the electrification of other islands.

In terms of solar PV net metering, the existing policies and regulatory guidelines do not support small scale grid solar PV systems using this technology. This pilot will thus facilitate the identification of all issues needed to be considered to implement grid-tied solar PV systems before proper investment guidelines are developed and a scale-up is allowed to private buildings and households. These systems will increase

the installed capacity for solar energy in the energy mix of the country, lower the cost of solar energy systems, release valuable electricity to other more productive uses and initiate transformational change in the country by changing the way buildings interact with the power grid.

SREP's support to the GoU on the net metering sub-component will in overtime 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 is committed to universal access by 2030 as outlined in the SE4All Action Agenda. Although it is the expectation of the GoU that the majority of rural households will be served by the national electricity grid by then, it is envisaged that at least 60,500 connections in remote rural locations will be supplied from isolated mini-grids. Many mini-grids across the continent run on diesel generators, but can also be supplied from wind, solar PV, biomass and bagasse. Clean energy technologies are usually complemented with storage capacity (through use of batteries) and diesel generators to ensure the reliability of the system as a whole. Preliminary studies on some of the islands have shown that wind speeds are insufficient to make wind generation viable, hence the most feasible source of supply is expected to be Solar PV.

This sub-project has the potential to be highly transformational as it will support the kick-start of serious investments in decentralized power systems in isolated areas that over the past decades benefited from little support from the GoU. In addition, this project will considerably contribute to an increase in access to energy services from renewable sources.

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 sub-component. This will lead to an improved energy mix for Uganda and decrease the reliance on hydro power. At the same time, SREP 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 in particular and economic growth in general.

Both interventions will in the long-run lead to an increase in the capacity generated from renewable sources, increase access to modern energy services and products and partially reduce the reliance on hydro power plants on less power intensive activities.

Results Indicators

The implementation of this project will be made over an estimated period of 1 to 4 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) num-

ber 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 these two sub-projects is 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) household connections and other distribution infrastructure, (v) technical assistance, (vi) 10x25 KW demonstration solar PV roof top systems, (vii) regulatory, legal, strategy and other investment guidelines. 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 4.5 million to the mini-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
Decentralised Mini-Grids Component				
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
Sub-Total	*1.90*	*4.50*	*14.60*	*21.00*
Decentralised Urban Small-Scale Solar PV (Pilot) Net Metering Component				
Mobilization, sensitization, and training of key stakeholders	0.10	-	-	-
10 - 25 KW demonstration solar systems (100 system) Marketing and promotion	-	4.50	-	-
Regulations, legislation, standards, strategy and investment guides	-	0.40	-	-
Technical and capacity building	0.10	-	-	-
Sub-Total	*0.2*	*4.9*	*-*	*-*
Total	**2.1**	**9.40**	**14.60**	**26.1**

Project Preparation Timeline

Once the Investment Plan is endorsed, the lead MDB will engage with the GoU on the implementation of SREP resources and amounts of a possible co-financing. Discussions with other Development Partners will be intensified to ascertain their interest 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			
1. Country	Uganda	**2. CIF Project ID# :**	(Trustee to Assign ID)
3. Project Title :	Decentralized Renewables Development Program		
4. Tentative SREP Funding Request (in USD million total) for Project at the time of Investment Plan Submission :	USD 9.0 million		
5. Preparation Grant Request (in USD) :	USD 2,300,000		
6. National Project Focal Point	James Baanabe ; baanabe@energy.go.ug / baanabej@gmail.com Mr. Charles Lutwama clutwama@rea.or.ug Mr. Andrew Muguwa amuguwa@rea.or.ug		
7. Executing Agency:	Rural Electrification Agency (REA) of the Ministry of Energy and Mineral Development		
8. MDB SREP Focal Point and Project / Program Task Team Leader	Joao Cunha, SREP Coordinator j.cunha@afdb.org	TTL: TBD	

9. Description of Activities Covered by the Preparation Grant

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 ten (10)islands will be undertaken by the same Consultant;

(iii) Technical Assistance (i.e. Solar PV Test Equipment for Solar Mapping & Testing)

10. Outputs

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

11. Budget

Expenditures	Amounts (in USD)
Development of Off-grid Electrification Master Plan	1.30
Feasibility Studies of Ten Islands	0.50
Technical Assistance (i.e. Solar PV Test Equipment for Solar Mapping & Testing)	1.00
TOTAL COST	**2.80**
GoU	0.50

12. Timeframe

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.

13. Other Partners Involved in Project Design and Implementation

Individual consultants or consultancy companies will be hired through competitive processes in accordance with MDB rules and procedures.

14. If applicable, explanation for why the grant is MDB executed

Not applicable

15. Implementation arrangements

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.

Project 3: Wind Resource Map and Pilot Wind Power Development Program

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 which is highly vulnerable to climate change events such as droughts. The National Vision 2040 identifies wind energy resource as one the areas to be developed to achieve the national target of 41,738 MW in installed capacity 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. One of the high potential areas is the Karamoja Region, whereby preliminary data from weather stations has shown high wind speed, in particular between the months of October and April. The GoU, through the Ministry of Energy and Mineral Development, has therefore recently procured and installed (July 2015) two wind measurement equipment sets for wind resource assessment in this region. This equipment is however clearly insufficient to cover wind measurements across the wide area of the Karamoja region, and a long lead time is required to collect enough data at different sites required to support the design of on-grid wind power projects. Furthermore, the lack of regulatory frameworks and experience in the field constitute additional impediments to leveraging the much- needed private investment that could make up for scarce available public funding to harness the identified wind energy potential.

Objective and Proposed Transformation

The project has two key objectives: (i) provide a mapping of wind energy potential, and (ii) identify and address impediments hindering further development of the national wind energy market.

Uganda lacks credible wind resource data and this – combined with an inadequate regulatory framework - has hampered the sector development and especially the involvement of the private sector. In order to initiate transformation in the energy sector through wind power, SREP is proposing to co-finance a national wind measurement campaign at an additional six different sites in the northern region, targeting mainly Karamoja which is identified as the most promising region. From these, only two sites with the best potential will be selected to develop two grid-connected wind farm pilot projects totalling 20MW. This will allow the GoU to collect wind measurement with the goal to establish a reliable and bankable wind potential database of Karamoja. This effort will help overcome 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 a database will be used both to encourage private investors/developers to come and operate in the region, and to initiate a national wind mapping program. Given the progress towards maturity of the regional market, and transferability of techno-

logies already tested on the continent, the main challenges of these pilots would be to: (i) test the insufficient geo-referenced resources and data sets to gauge feasibility and guide investments, (ii) the insufficient public sector capacity to oversee the industry's development, and (iii) the procurement models and financing structures.

A pilot project in Karamoja will demonstrate the technical and commercial viability of wind technology and prove the procurement and implementation models. It will also allow the GoU (ERA) to determine the most appropriate tariffs for grid- connected windfarms, balancing profitability for the developer and affordability to its future customers. Such project will also contribute to increasing access to electricity in the region as well becoming a "model project" proving that large scale wind power development in Uganda can be economically, financially and technically 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 in partnership with private sector players and will have an installed capacity of up to 20MW. 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 contribute towards the realization of the GoU's goal of reaching the three UN SE4ALL objectives (Universal Energy Access, Renewable Energy penetration, Energy Efficiency) by 2030 which are aligned with the latest National Development Plan (NDP 2014)'s targets. The GoU plans to implement a systematic wind mapping program, starting at areas that are considered endowed with the resource. with a view to establishing whether wind power can become an important large-scale diversification option and attractive for investments by the private sector.

In order to lay the foundation for the growth of a local wind power industry, SREP concessional finance will be used to:

i. Procurement and Installation of additional six wind measurement equipment sets to collect wind speed data (currently two systems are installed)
ii. Establishment of the wind speed database and generation of the wind map including locations with wind resources and the size of potential output, reviewing the electricity generation mix for currently installed capacity, as well as assessing the outlook of the industry. The mapping of potential is important to establish the upper limits of wind energy development on the continent. These limits are most meaningful when cast against existing technologies and other important considerations in wind energy development
iii. Conduct detailed feasibility study to select two suitable sites for wind farms totalling 20MW
iv. Package and implement 20 MW demonstration wind farm power plants
v. Support capacity building/training of local workers/engineers in order to acquire experience and skills needed by the wind energy sector

vi. Prepare wind energy resource strategic plan and investment guide. This approach could take into consideration structural and ecological restrictions which can be identified on sites.

Implementation Readiness

No wind power program has yet been implemented by the GoU. This pilot project will lay strong foundations supporting the development of a national wind mapping and development program that could assist Uganda diversifying its sources of energy away from hydropower. In fact, wind already is a proven alternative in other neighbouring countries in East Africa, in particular Kenya, Ethiopia and Tanzania.

SREP's support to the GoU's national wind programme arrives at the right time, with MEMD currently installing two measurement towers in both Kotido and Napak located in Karamoja region, as the very first step for establishing such a National Programme. This assessment exercise project will enable the development of a wind power pilot project (2x10MW) that will fit in the GoU's future energy development plan. Implementing agencies will be MEMD, UEGCL for the procurement of the EPC equipment and work, and UETCL for signing a PPA with the wind farm operator.

Rationale for SREP Financing

Experience shows that private investors are willing to invest in the sector as long as a clear regulatory framework is in place and wind resources are geo-referenced to gauge feasibility. The public sector therefore has a vital role to play in creating a conducive environment to attract private investors while at the same time investing in upstream operations such as feasibility studies that would pave the way for further sectorial development. Development Financial Institutions should leverage their global experience to help countries design clear procurement frameworks and adopt best practice in the sector and undertake reforms aimed at facilitating private sector engagement.

SREP financing will thus be instrumental in supporting the development of a wind energy sub-sector with investments at scale, through national resource mapping, pilot demonstration and design of regulatory framework and investment guidelines where needed.

In addition, it will help mitigating development risk, accelerating project preparation and bringing down the overall cost of a demonstration project, with a view to ultimately attracting the private sector in taking the lead on the scale-up of this technology. This is expected to be achieved through reductions in some of the less critical components of this technology.

Another important consideration is that many African countries have been ignoring important wind potentials mainly because of their lack of familiarity with the technology and intermittency and output variability constraints that lead to simple economic and financial comparisons between wind projects versus conventional projects. In addition, pricing that does not take into account all externalities related to renewable energy investments presents an inherent bias against wind projects.

Lack of regulatory frameworks and experience in the field constitute additional impediments. Ultimately, this introduces an important dilemma for African countries: whether to invest in what appears in the short-term to be reliable and more cost-efficient power generation based on fossil fuels, or to invest in wind energy that is unstable, capital intensive and requires development of regulations and schemes to cater for what is still a relatively nascent field. Considering the urgency with which African governments must address electricity deficits and Africa's limited global carbon footprint, the former solution will most likely be adopted unless initiatives such as SREP support capacity building and appropriate knowledge development to build the right decisions and develop suitable plans for the countries.

Starting at its highest potential region, GoU will pave the way through this intervention for an entirely new alternative source of renewable energy that will contribute to energy mix diversification and reduced reliance on hydropower

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 wind farms
- Electricity access rate(number of customers connected)
- Wind energy share in the total renewable energy mix and total energy mix
- Savings in GHG emissions
- Transmission lines constructed
- Number of local jobs for men and women 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 estimated timetable for submission of the project appraisal document to the SREP Sub-committee is the last quarter of 2016.

Financing Plan

The proposed SREP allocation is USD 6.8 million and includes a Project Preparation Grant of USD 1.875 million. The indicative financing table is presented below.

	SREP	GoU	MDB	Others	Total
Project Preparation Grant	1.8	0.45			2.3
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. (UD $0.15m/km)	-	3.0			3.0
Total	6.8	5.5	14.0	14.0	40.3

SCALING-UP RENEWABLE ENERGY PROGRAM IN LOW INCOME COUNTRIES PROJECT PREPARATION GRANT REQUEST		
1. Country :	Uganda	(Trustee to assign ID)
3. Project Title :	Wind Resource Map and Pilot-Wind Power Development Program	
4. Tentative SREP Funding Request (in USD million total) for Project at the time of Investment Plan submission :	USD 6,875,000	
5. Preparation Grant Request (in USD) :	USD 1,875,000	MDB : AfDB
6. National Project Focal Point :	James Banaabe ; baanabe@energy.go.ug / baanabej@gmail.com	
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, j.cunha@afdb.org	TTL :

9. Description of Activities Covered by the Preparation Grant

The Project Preparation Grant will serve to (i) perform a detailed wind assessment in the Northern Region by installing six (6) additional wind masts ; (ii) Perform a detailed technical feasibility study on the 2 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.

10. Outputs

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.

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

12. Timeframe
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 months. At the same time, a team of consultants is expected to be hired by UEGL, 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.

13. Other Partners Involved in Project Design and Implementation
Individual consultants or consultancy companies will be hired through competitive process.

14. If applicable, explanation for why the grant is MDB executed
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% in FY2013/14, driven by an increase in private sector activity in agriculture, industry and services as well as public infrastructure investment.

The 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 favourable 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% for FY2014/15 and 5.8% 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% of GDP for FY2015/16, compared to 4.5% 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[18].

Debt Sustainability[19]

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 favourably to other post-Multilateral Debt Relief Initiative (MDRI) countries. Uganda's external debt stock increased by only about 4.75% of GDP in 2007-2012 compared to a median increase of 6% of GDP for 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[20] (PSI) 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

18 IMF 2015 Article IV Consultation and the Fourth Review under the Policy Support Instrument. (IMF Country Report No. 15/175).
19 IMF Country Report No. 15/175.
20 The PSI for Uganda was approved by the Executive Board on June 28, 2013.

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 being 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.

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

Uganda's Investment Plan is the result of an inclusive and extensive internal and external consultation process, led by MEMD and supported by the MDBs. Aiming at identifying development priorities for the renewables in the country, this participatory process involved many institutional, national, and international actors. The consultation included a wide range of national agencies, development partners, NGOs, representatives from the civil society and the private sector.

The main stages of the consultative process have been the following:

i. Multiple technical meetings with all stakeholders, in separate and together during the Scoping, Technical and Joint Missions.

ii. Meeting that introduced the draft investment plan and proposed investment priorities followed by a Q&A session. The Government of Uganda compiled all issues raised and provided answers to stakeholders during a workshop organized in Kampala as part of the Joint Mission

iii. Online posting of a draft Investment Plan on the MEMD website for further consultations

The lists of stakeholders consulted during the missions are available in the Aide-Memoires, currently available on the CIF website.

The Joint Mission consultative workshop was aimed at supporting the GoU in prioritizing and validating the Investment Plan and projects therein through a wide consultative and dialogue process with all stakeholders that have shown interest in participating. During the workshop, the SREP National Focal Point presented the draft Investment Plan and the proposed individual projects to be supported by SREP. Feedback from stakeholders were welcomed and in many cases led to significant changes in the Investment Plan.

The workshop participants welcomed the SREP by recognizing the importance of more sustainable development paths in the energy sector. High reliance on hydro power was generally commented as something the Government should aim at reducing to avoid situations such as the one in 2006 when the country was hit by severe droughts. 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 Investment Plan. The SREP National Team has taken note of all the comments received and took them into consideration in finalizing the IP.

Key Issues Raised by Development Partners

Development partners welcomed the SREP Uganda initiative as an opportunity for the country to accelerate renewable energy development. Renewables are closely aligned to their interventions in the country and provide an opportunity to crowd-in additional resources for the scale-up of investments in the sector. A number of key observations were raised by development partners and it was pointed out that the Investment Plan could draw valuable lessons from the existing and planned development initiatives in the country.

These are mainly in hydro, off-grid electrification, solar, biomass, bagasse and related technical assistance as well as investments in transmission and distribution 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 UNFCCC as a non-renewable and emits higher emissions than coal. The development partners also pointed out that the GoU had requested support for the restoration of wetlands, where much the peat is located. The GoU agreed and removed the proposal from the Investment Plan.

Concerning the solar net metering project proposal, the development partners suggested that private sector buildings are 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 lessons could be drawn. In general, the development partners noted that the plan should demonstrate how the private sector will be involved. The GoU explained that private buildings are the ultimate target of this pilot intervention once the GoU creates public awareness and develops an appropriate legal and regulatory framework to enable private participation downstream. This technology has not been tested in the country and therefore it could be riskier to open immediately to the private sector.

Other points of interest included a USD 3 million on-grid biogas generation project that considered the examination in the potential for the use of hot water from the anticipated oil production in the country. While this could be of interest, it still very early to consider this technology as oil production is expected to start in 2018 but could suffer delays. In addition, this hot water can be used for other economic applications.

Electricity access concerns. The Investment Plan is expected to be more centred on electricity access. Therefore, 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 would be re-examined. Eventually, off-grid entered the Investment Plan and an intervention is now planned in islands around Lake Victoria which are not connected to the main grid. Factors such as the scale of a possible intervention with a view to reduce transaction costs and reach appropriate scalability as well rural electrification plans for the future were considered in the design of the project. The SREP will run in parallel to the existing and ambitious access initiatives of the country, particularly those embedded in the RESP-2.

Alignment with other DP initiatives. The alignment with the SE4ALL Action Agenda access objectives should be indicated, and also referenced to the timeframe of the SE4ALL Action Agenda. This was addressed in the Investment Plan. Also, with regard to solar, 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 noted and no similar efforts were included in the Investment Plan. Members of the SE4All team in the MEMD responsible have been consulted during all missions in the country and are an integral part of the SREP Uganda National Task Force.

The major renewable energy program for Uganda so far, the GETFIT program is spearheaded and implemented by ERA and KfW with total funding commitments in the order of EUR 91 million from the Governments of Norway, the UK and EU with support from the World Bank through a Partial Risk Guarantee facility. It was highlighted that SREP support to encourage generation should be harmonized with GETFIT plans so as to not create competition between the two programs. This has been addressed and given the focus of the GETFIT program on a third round for on grid connected solar PV, the Investment Plan does not consider on-grid solar PV. The GoU made a real effort to avoid duplication of efforts in the solar space.

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 (similar to what GETFIT does) in order to make these transactions bankable cannot be implemented by any of the MDBs due to unavailability of appropriate financial instruments. In addition, 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 that resulted in GETFIT not supporting these projects in the past. As a consequence, it was agreed that other alternatives would be sought. Ensuring competitiveness and diversity of renewable technologies is of paramount importance.

The possibility of using SREP money to finance mini-hydro power plants that do not benefit from the GETFIT programme was also considered. Currently, three sponsors have applied for GETFIT and will not be approved as all funds under the current GETFIT program were fully committed. SREP involvement in hydro could be regarded as non-transformational given the high contribution of hydro to the energy mix. It was explained that SREP should make an effort to support technologies that would lead to a better diversification of the country's energy mix and make it less vulnerable to the negative impacts of climate change (e.g. droughts).

Grid instability and capacity concerns. The development partners highlighted the grid instability and ability to absorb increases in capacity as a major concern. The GoU assured that it is doing everything it can to address the issue and enable all power generated to be evacuated. MDBs are available to finance rehabilitation and expansion of the national transmission and distribution infrastructure if requested by the Government.

Gender and environmental safeguards. The gender and environmental sections were found to be in need of improvement and detailed for each specific technology. The MDBs explained that all the projects would be subject to their respective environmental and social safeguards. The objective at this stage is therefore to undertake a gender and environmental mainstreaming exercise at the Investment Plan level. Once project implementation starts, the rules of the responsible MDBs will apply.

Key Issues Raised by Private Sector Stakeholders

Geothermal. With regards to geothermal exploration, 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 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, in order to unlock the full co-financing potential in this technology. The GoU is committed to identifying best potential sites in the country.

Some issues around the legal and regulatory framework related to geothermal exploration in the country were raised. The GoU responded that it would be interested in having an MDB providing advisory on how to structure geothermal operations in the country with regard to the role of the government and other national stakeholders. This version of the Investment Plan includes such support and more details can be found in the geothermal concept note presented in Annex 1.

Bagasse Cogeneration subsidy top-up. The Sugar Corporation of Uganda Limited (SCOUL) and Kinyara Sugar Ltd attended the consultations. Kinyara Sugar Ltd would have hoped to increase installed capacity from the current 14.5 MW to 35 MW. It would use 10 MW for its own operations and sell 25 MW to the national grid through a Power Purchase Agreement. Efforts are being made to negotiate this agreement with UETCL, however, their financial model shows that they would need

a subsidy of USD 0.11/ per kWh. SCOUL would be able to inject 18 to 20MW in the grid with 10 to 12 MW being for own consumption. To this effect, the companies suggested that USD 5 to 6 million would need to be added to the GETFIT program, which would have to be extended. Other financial institutions are actively interested but not able to provide finance for another ten years.

The GoU mentioned that a top-up would not have the effect of increasing the tariff. The development partners emphasized that the third round of GETFIT would only focus on solar. The MDBs explained SREP would not be able to provide support where single source procurement would be a central aspect of a possible intervention.

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 by the responsible MDB taking into account the principle of minimum concessionality and based on commercial financing rules.

Key Issues Raised by CSOs and NGOs

Access and productive use. The focus of CSOs is access and productive use of energy. The draft presented showed little no connection between how proposed investments relate to economic development and energy access. It was explained that productive use of energy and access to modern energy services 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. An effort was made to improve the argumentation in the Investment Plan around these two key factors.

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, participant MDBs, private sector promoters, and local commercial banks among others. Evidence from existing SREP pilot-countries that are more advanced in implementation than Uganda, show that the minimum leverage effect is usually exceeded. The SREP Monitoring and Evaluation Framework will pay 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 and the GoU has greatly improved these aspects in the document.

Net metering pilot. Would net metering impact the grid given its current limitations? In the short run, the net metering is not expected to have a large impact on the grid as the pilot is relatively small. However, the potential impact on the utilities would be informed through the pilot-phase once scaling-up by the private sector is expected. This is probably the main reason why the GoU cannot commit at this stage to an

immediate scale-up of this technology beyond the expected public sector buildings. Grid stability has been a challenge over the last years and this needs to be carefully managed.

Will there be any form of in-kind settlements? GoU explained that in kind settlement will continue to be avoided. Electricity has different costs at different times of the daily consumption cycle and those would introduces economic distortions that should be avoided.

Biomass. Why is biomass gasification not a priority? Based on the detailed assessment done to compare each envisaged technology against each SREP criteria and national criteria, it was concluded that biomass gasification didn't rank well compared to other technologies. Annex 4 provides more details on this exercise.

Other. Will scholarships be considered as part of SREP support? SREP support through scholarships is not expected as this would not be easily justifiable given SREP criteria. The GoU expects schools to indirectly benefit from the knowledge and lessons that will be drawn from the implementation of SREP.

The table below provide a summary of the comments raised by the various stakeholders and proposed corrective measures.

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.
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 concern.	Development Partners	The GoU assures that future projects will be able to evacuate power. If requested, the Multilateral 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 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 Biomass gasification	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

	Geo-thermal	Solar PV off-Grid	Solar Pv Net-Metering	Wind	ICS	Hydro (<10MW)	Municipal Solid Waste	Biogas
SREP CRITERIA								
Increased installed capacity from re-newable energy sources.	High. Given its base load characteris-tics and estimated potential of 400MW, it stands to provide the highest increment.	Moderate. While it is widely available at 5 MW/m2-a-day, it is only limited by resource constraints	Moderate. A new approach, likely to boost grid contribu-tion with time. Again, with the cited irradiation, requiring lesser funding.	High. Prelimi-nary wind assess-ments in the Karamoja region point to commer-cially viable genera-tion.	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 genera-tion.	Low. Scale of operation small, more commer-cial activities yet to be developed.
Increased access to energy through re-newable energy sources.	High. Offers high opportu-nity to areas where resources are found, hitherto not so much electrified.	High. Offers high opportu-nity 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 applica-tions as water pumping, grinding mills and small businesses as tailoring.	Medium. Benefi-ciary institu-tions that need these exist in the thousands, also stretching to private businesses as small hotels and restau-rants.	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 biodegra-dable 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. Nationwide potential high, likely to spur modest electrified businesses in off-grid areas.	Moderate. 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 from the main grid.	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, 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.	High. Low initial cost, cheaper operating cost to unimproved technologies.	Moderate. Reduces energy bills, with reduced pollution, indoor and outdoor	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. Additionnal 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 activites 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 programmes in future.	Low. There will be limited participation of women in feasibility study activites.	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 ve involved in construction and extensively in use.
Co-benefits of renewable energy scale up.	Moderate. These include improved energy access and security, reduced pollutio 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,
NATIONAL CRITERIA								
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 fortechnology transfer.	High. This is currently a near-virgin area.	Moderate. This area is not entirely new, given the 5 kWp project in Kasese 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 construction and operation.

Annex 5
External Consultations

#	Independent Reviewer Comments	Response
Specific Comments on the Investment Plan		
1	As planning proceeds for projects under the Investment Plan, particularly if geothermal developments are considered, it will be important that the effective integration of any projects within the (longer-term) national energy plans is clear before final commitments to their implementation. Part of the plan's justification for SREP support is that the proposed projects will assist as practical demonstrations of what could be achieved with wider support from the private sector (and other funders). This assumption should be revisited as each project is better defined.	This is well noted. The geothermal project's design will be fine-tuned during implementation and shall be in line with the Government's Policies and Strategies. Both the Uganda's Vision 40 and the Renewable Energy Policy 2007 already consider geothermal and the GoU is currently developing the country's first Geothermal Policy. The Government's commitment in pursuing and focusing mainly in this technology as part of the SREP program was made very clear in the Expression of Interest submitted to the CIF Admin Unit that was reviewed and ranked by an independent group of experts before the country being selected as a pilot-country by the SREP Sub-Committee.
2	The overall investment proposal that the SREP funds will help seed makes assumptions about significant additional investments that will be secured through MDBs and the private sector. Confirmation of the commitment from these sources should be a key element in making a final decision on the provision of funds under SREP.	This is well noted. At this stage it is premature to provide a firm confirmation on the commitment of resources expected to be leveraged as part of the implementation of the SREP projects. These amounts are best estimates and as such can change during project implementation phase. The GoU is aware of the minimum leverage rate of 1:4 demanded by SREP and believes it will meet it if the geothermal exploration is successful in proving resources.

		Some numbers concerning the Kenyan Menengai geothermal field are pointing out to similar leverage factors.
Proposed SREP Program		
3	The contribution to geothermal activities is a significant portion of the total SREP request and clearly dominates the potential leverage within the overall investment program. The ability to secure the suggested level of co-investment is a key concern for the overall plan as presented.	It is important to note that the preparation/implementation phase of SREP will only start once the Investment Plan is endorsed by the SREP Sub-Committee. Once this phase starts, the GoU will in cooperation with the lead MDB, will identify potential sources of financing, including co-financing amounts of MDBs that have strong lending capacity. No disbursements of SREP funds will ever be made for a specific project if a funding gap exists. This is common practice on projects implemented by MDBs. The leverage issue here seems to be one of timing. Especially in the geothermal proposal as the major co-financing comes at a later stage once financing for the construction of power plants is ensured. If exploratory drilling fails to prove any geothermal resource, the target leverage will very likely not be met. The availability of resources for drilling will depend on various factors such as: (i) government's financial commitment to exploration and field development, (ii) amounts requested by the GoU under the concessional windows of both AfDB and the WB, and (iv) other donor support. The GoU's is fully committed to develop the geothermal potential in the country and in our view this is to a large extent, the key determinant to successfully raise funding from different sources.
4	Acknowledging the limited experience in Uganda in undertaking renewable projects to date, with the exception of larger hydro and solar activities, the projects and focus suggested for support through SREP appear reasonable.	This is well noted.
Geothermal Development		
5	To provide a reference point for geothermal development there are a number of international experiences which may be relevant. Geothermal can offer good long term generation benefits but its development is neither quick nor straightforward.	The GoU recognizes the complexity of geothermal development and is working closely with the Government of Kenya, the Government of Iceland and with other relevant stakeholders.

		Uganda recognizes that still has many lessons to learn and that the geothermal expertise developed in these countries will be of great value to the successful development of geothermal in Uganda. The country is planning to create early on an Advisory Board – in a similar fashion to the one created in Kenya – which will source expertise from countries with a great deal of expertise in geothermal development. ICEIDA is assisting Uganda at the United Nations University Geothermal Training Program in Reykjavik through a six month specialized training as well as a geothermal exploration short course in Kenya together with the Geothermal Development Company and KenGen from Kenya. In addition, the World Bank is supporting the country through an institutional and strengthening program for geothermal development. The GoU will continue building on these partnerships in the future.
6	While the approach that the government takes the early exploration drilling risk has some appeal, in practice in any commercial development funders are looking to see almost 100% of steam proven before financial close can be considered. This may mean that equity funding is not only required for the exploration wells but also the majority of production wells, in total perhaps amounting to 30% to 40% of the total project cost. There are few companies that have the balance sheet to consider covering this level of exposure.	This well noted. It is important to note that over the last years, the GoU has licensed the exploration and field development of some geothermal fields in the country to private entities that made very little progress. This is mainly because of the risk-return profile associated with the highly risky initial phase. The GoU is committed to take the lead in the geothermal exploration and field development activities in the most promising geothermal areas in Uganda. Private sector will only be called to finance the constructions of the associated power plants with the GoU taking the lead on the work.
7	International experience suggests that the establishment of geothermal markets has been on the back of significant government participation in the first few projects; this is true for Kenya, New Zealand, Iceland, Indonesia and Philippines; the early US market was built on tax incentives and grants and these continue to underwrite more recent projects. In looking to build possible private sector participation in geothermal in Uganda this experience should be carefully considered; as noted in the Investment Plan, policies and regulations will need drafting but there may well be extended negotiations around the Feed-in Tariff for geothermal when the true costs of a long term development schedule are fully understood.	This is well noted. The Advisory Component of the Geothermal Project will be vital in ensuring a proper enabling environment for private sector participation. In addition, the regulator will consider a review of the tariffs once the country is ready to start negotiations leading up to the establishment of geothermal generations.

Solar and Wind Opportunities		
8	The Investment Plan notes "…it was decided that this [net metering] 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." Including the trial of net metering within this program suggests that some of the challenges encountered during the earlier introduction of feed-in tariff efforts (where the initial tariff level did not meet market costs so had to be revised) have been recognized. A focused project that has scale and is expected to be completed in a timely manner should allow an optimized design for net metering to be developed in a controlled and well managed environment with early market consultation so that it can be more readily rolled-out after this pilot.	This is well noted. The Project Concept Note was revised to allow, in the case of the micro/mini-grids sub project, for different renewable technologies. Each island should target the technology that best fits the existing conditions. Despite this change, economies of scale are still important and therefore the proposal to implement these two relatively different projects remains unchanged.
9	With limited wind information and experience in using this technology in Uganda the proposed approach, installing field monitoring equipment and moving relatively quickly to a pilot plant would seem to offer a pragmatic solution.	This is well noted.
Compliance with SREP Goals		
10	Catalyze increased investments in renewable energy: The plan outlines how it is anticipated that SREP investments and program support will help attract other donor and private funding. As noted, around the geothermal program in particular, this is an aggressive plan with SREP funding the basis for what is anticipated would see significant leverage of other funds. This has yet to be clearly demonstrated as achievable. There is a real concern that it will not be straightforward to attract private sector investment into the first geothermal developments. Consideration of alternative (MDB) sources of finance should be undertaken for the geothermal facility completion.	See response #3 and #6 above. Both the commitment of Uganda as well as the eagerness shown in the past to involve private sector in geothermal provide strong signs to the market that involvement from Development Partners and Private Sector will be of paramount importance to the development of the sector, especially at this early stage. Given the nature of geothermal exploratory risk, it is very likely that the Private Sector will only come at a later stage once the resource is proven.
11	Enabling environment : The Investment Plan acknowledges that there are a number of unaddressed hurdles to renewable implementation; there are strategies and an allocation of responsibilities to particular agencies to address these. Without prior engagement with these agencies it is hard to assess whether these tasks can reasonably achieved by these entities. This process will require close monitoring as the success in establishing a sound enabling environment will be a key control on the value of the SREP investments.	All entities mentioned were consulted during the Scoping and Joint Mission. This is well document in the Stakeholder Consultations annex presented in this document. In addition, all these institutions are represented in the SREP National Task Force that will manage and oversee the implementation of SREP projects. During Project Implementation, the lead MDB will evaluate the capacity of the designated Project Implementation Unit with the objective to ensure that the needed skills and competences are present.

12	Increase energy access: The need for increased access to energy is clear. The SREP support will help accelerate this in some areas but is also being targeted at grid connected (geothermal) supply which generally may have limited impact on improving access at an individual level. The combination of solar PV, geothermal and wind do however offer pooled prospects for improved strength in the economy and progressive improvement in access to electricity. There are a number of parallel considerations around other forms of generation and interconnection which will enhance the supply of electricity across the country.	This is well noted. As per the target established in the SE4All Action Agenda 2015, the GoU is committed to the increase energy access to the entire population by 2030. This is a key objective of the country given the small electricity access rate in the country of 17%. The Rural Electrification Plan and Strategy provides a good description of how the GoU will reach the target. SREP micro/mini-grids projects in Lake Victoria islands will highly contribute to increase access in parts of the country that historically have not benefit from public support in this area. As the power consumption will continue growing in tandem with economic growth and given the fact that Uganda is highly exposed to hydro resources, which in turn makes the system highly vulnerable to the negative impacts of droughts, efforts to diversify its energy mix by continuously adding power to the grid are also key to the future viability of the system.
13	Implementation capacity : It is explained that the Directorate of Energy Resources Development (DERD) in MEMD will be responsible for the overall program coordination and implementation of SREP in Uganda. The Investment Plan notes that DERD is currently implementing a number of donor funded projects and 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 Geothermal Resource Department (GRD) has been recently created with former employees from the Geological Survey and Mines Department to focus on geothermal development. There are a number of collaborative programs underway with donor support; it will be important to ensure that the GRD quickly builds up its project execution capabilities capacity to look and at the commercial aspects of geothermal exploration and development, beyond a focus on scientific aspects alone.	This is well noted. GRD will, in close coordination with MEMD, play a key role in the geothermal proposal. At this stage and given the status in geothermal development in the country, the core competences of GRD are mainly scientifically but will be expanded in due time as project implementation advances and training provided by ICEIDA, GDC and KenGen continue.

14	Improve the long-term economic viability of the renewable energy sector : The Investment Plan outlines some of the challenges that have been faced to date in looking to build a stronger and deeper renewable capacity within the country. It is acknowledged that there has been limited experience with solar, beyond the SHS programs. The move to trial micro and mini-grid systems would seem an appropriate step to begin to consolidate the PV market and potentially develop a scale of activity that will encourage increased private sector participation. The issues that Uganda has faced in this market have been experienced in many other markets; clearly a more substantial demand tends to accelerate private sector interests. The situation with wind is likely to be a longer term opportunity given what appear to be limited national wind resources and no current wind farm projects. The geothermal issues have been elaborated earlier and should be considered in context with the longer term plans to build this market alongside other renewable alternatives.	This is well noted.
15	Transformative impact : The targeted nature of the proposed SREP investments in Uganda is seen as pragmatic given the current energy market status, limited electricity access and a need to enhance the enabling environment. Given the renewable sector is relatively immature, it is not to be expected that there will be major transformations in the market through SREP alone but if well managed and executed the proposed program should help further develop the wider renewable energy sector in the country. Experience suggests that demonstration projects with specialist funding, such as SREP, have to be managed with care to ensure that they help build an attractive commercial market place.	This is well noted. We believe that the targeted SREP interventions in Uganda will highly contribute to initiate a transformational change in the energy sector. Most likely this will only be visible in the long run as the core project interventions will still take time to be fully implemented. SREP could play a catalytic role in developing geothermal resource, a reliable technology that the country has been eager to develop for many years without much success. If appropriately managed and implemented, SREP will be responsible for taking this nascent technology one level up the ladder and open the market for effective participation of private investors, which have a positive history of investing in the sector. The GoU is highly committed to geothermal and will manage SREP resources in the most transparent and effective manner. MDB's policies relating to fiduciary risks will play a role in ensuring that.
Comments and Recommendations		
16	The Investment Plan demonstrates the obvious effort that has gone into the background research, stakeholder consultation and evaluation of potential options that could be supported under SREP funding in Uganda.	This is well noted.

17	The plan has a strong focus on geothermal and this work would utilize a significant portion of the requested funding; it is also heavily dependent on substantial private sector co-investment and the ability to achieve this in a timely fashion is questioned. It is recommended that consideration be given to testing the ability to raise alternative funding through MDB / donor support for the full initial geothermal development if private sector interest is not as anticipated.	Please see response #3 and #6. MDBs are ready to co-finance the initial geothermal development phase in Uganda.
18	The nature of geothermal exploration and development is complex, but there is a good level of regional and international experience that can be called upon. One approach that is successfully used by KenGen in Kenya is that they have a small external advisory board – current members from US, New Zealand, Guatemala and Iceland, each of whom bring specialist knowledge but can also contribute experience across the spectrum of issues within any geothermal project. Such a group might be of value in helping focus efforts in Uganda and could include those with regional experience from Kenya and Ethiopia.	This is well noted. Uganda will continue its close cooperation with its Development Partners and build on their experience and competences.
19	The attraction of the private sector into geothermal projects is recognized as challenging but part of the SREP program will be to test the practicality of an overall geothermal strategy and this experience, if critically evaluated and managed, can only be of value in determining the best models for future expansion of the energy sector.	This is one of the objectives included in the Advisory Component of the Geothermal project proposal.
20	Off-grid activities, beyond the past SHS work, may be more immediately attractive to the private sector and care should be taken to ensure that the availability of SREP funds does not discourage this participation.	Since 2007 that Private Sector participation in the energy sector in Uganda is a priority for the government. Aware that financial resources are limited, private sector involvement will continue to be a priority for the GoU. The Rural Electrification Strategy and Plan 2013-2022 (RESP-2) recognizes the importance of private sector and outlines a number of lessons learned and proposed new measure to encourage a stronger role from private sector in off-grid activities. These are documented in the Investment Plan but can be consulted by anyone as the RESP-2 is a publicly available document.
21	It would be useful to have some generic cost analysis for various technologies to support their consideration; more thorough business plans for each project should however be prepared in due course to ensure that the individual aspects of each are adequately considered to ensure commercial viability. An understanding of any inherent subsidies due to the concessional nature of funding should be clearly identified.	Such business plans will be prepared during project preparation. Issues such as environmental and social safeguards, technical, economic and financial viability among others will be central aspects of the MDB's appraisal.

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

1. **Country/Region**:	Uganda / Africa	2. **CIF Project ID#**:	(Trustee will assign ID)
3. **Project Title:**	Uganda: 130 MW Geothermal Development Program		
4. **Request for project funding (US$ million)[1]:**	At time of country program submission: USD 33.8 million (AfDB: USD 31.8 million) (IFC: USD 2 million)	At time of project approval: TBD	
5. **Estimated costs for MDB project implementation services (US$)[2]:**	Initial estimate - at time of Country program submission: US$420,000 Final estimate - at time of project approval: US$420,00	MDB: African Development Bank Date:	
6. **Request for payment of MDB Implementation Services Costs (US$):**	x First tranche: US$210,000 ☐ Second tranche: US$210,000		
7. **Project/program financing category:**	a - Investment financing - additional to ongoing MDB project ☐ b- Investment financing - blended with proposed MDB project X c - Investment financing - stand-alone ☐ d - Capacity building - stand alone ☐		
8. **Expected project duration** (no. of years):	6 years		
9. **Explanation of final estimate of MDB costs for implementation services:**	If final estimate in 5 above exceeds the relevant benchmark range, explain the exceptional circumstances and reasons: Not applicable		

10. **Justification for proposed stand-alone financing in cases of above 6 c or d:**
Not applicable

[1] Including the preparation grant request
[2] 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).

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**			
1. Country/Region:	Uganda / Africa	**2. CIF Project ID#:**	(Trustee will assign ID)
3. Project Title:	Decentralized Renewables Development Program		
4. Request for project funding (US$ million)[3]:	At time of country program submission: USD 4.5 million	At time of project approval: TBD	
5. Estimated costs for MDB project implementation services (US$)[4]:	Initial estimate - at time of Country program submission: US$ 150,000 Final estimate - at time of project approval: US$ 150,000	MDB: African Development Bank Date:	
6. Request for payment of MDB Implementation Services Costs (US$):	x First tranche: US$75,000 ☐ Second tranche: US$75,000		
7. Project/program financing category:	a - Investment financing - additional to on-going MDB project ☐ b- Investment financing - blended with proposed MDB project X c - Investment financing - stand-alone ☐ d - Capacity building - stand alone ☐		
8. Expected project duration (no. of years):	1 – 3 years		
9. Explanation of final estimate of MDB costs for implementation services:	If final estimate in 5 above exceeds the relevant benchmark range, explain the exceptional circumstances and reasons: Not applicable		
10. Justification for proposed stand-alone financing in cases of above 6 c or d: Not applicable			

[3] Including the preparation grant request

[4] 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).

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**			
11. Country/Region:	Uganda / Africa	**12. CIF Project ID#:**	(Trustee will assign ID)
13. Project Title:	Wind Resource Map and Pilot-Wind Power Development Program		
14. Request for project funding (US$ million)[5]:	At time of country program submission: USD 6.8 million	At time of project approval: TBD	
15. Estimated costs for MDB project implementation services (US$)[6]:	Initial estimate - at time of Country program submission: US$ 150,000 Final estimate - at time of project approval: US$ 150,000	MDB: African Development Bank Date: 01 November 2015	
16. Request for payment of MDB Implementation Services Costs (US$):	x First tranche: US$75,000 ☐ Second tranche: US$75,000		
17. Project/program financing category:	a - Investment financing - additional to on-going MDB project ☐ b- Investment financing - blended with proposed MDB project X c - Investment financing - stand-alone ☐ d - Capacity building - stand alone ☐		
18. Expected project duration (no. of years):	1 – 3 years		
19. Explanation of final estimate of MDB costs for implementation services:	If final estimate in 5 above exceeds the relevant benchmark range, explain the exceptional circumstances and reasons: Not applicable		
20. Justification for proposed stand-alone financing in cases of above 6 c or d: Not applicable			

[5] Including the preparation grant request

[6] 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).