



# **ENERGY POLICY FOR UGANDA 2023**

**MINISTRY OF ENERGY AND MINERAL DEVELOPMENT**

**APRIL 2023**

## **VISION**

Achieve Universal Access to Sustainable, Affordable and Quality Energy Services for All Ugandans by 2040

## **MISSION**

To Ensure Affordable, Reliable, Equitable, Efficient and Sustainable Development, Management and Utilization of Energy Resources and Services

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## FOREWORD

The role of government is to formulate appropriate policies, legal and institutional frameworks that can attract adequate financing to reinforce Uganda's energy security so that there is adequate, reliable and sustainable energy for social and economic development.

I am therefore pleased to contribute the foreword for the Energy Policy for Uganda 2023. This policy will scale up the achievements of the Energy Policy for Uganda 2002, with a keen emphasis on increasing access to; modern energy services, renewable energy, clean cooking, energy efficiency, nuclear energy for peaceful applications and inclusive cross-cutting areas covering climate change and gender mainstreaming. It also emphasises the need for better planning and coordination amongst all stakeholders, and this will be achieved with an Integrated Resource Plan to be used for an appropriate balance between energy demand and supply for the short, medium, and long-term priorities.

As a country, the shift from electricity generation shortages to surplus, cheaper renewables and energy efficient technologies and the discoveries of commercial oil and gas provide an excellent opportunity for us to be entirely energy independent in the next ten years and become a net exporter of multiple energy sources while also providing the know-how to produce these fuels and technologies in an environmentally sustainable manner

This Energy Policy for Uganda 2023 has been developed in line with the Government of Uganda's commitment to regional and international obligations on energy transition towards a zero-carbon economy through strategies on new energy trends such as; installation of clean energy mini grids (solar PV), the adoption of smart grids, clean energy for transportation (e-mobility) and energy efficient and smart appliances.

Developing this document has followed an intensive consultative process for over three years. At its heart is a multi-stakeholder network of institutions that play a key role in designing, implementing, financing, benefiting, and monitoring and evaluating energy programmes. These stakeholders include government Ministries, Departments and Agencies, district local governments, the private sector, development partners, academia, and civil society organisations. I wish to thank the technical team from the Ministry and sector agencies which spearheaded the review of the Energy Policy of Uganda, led by the Permanent Secretary.

In conclusion, I sincerely thank His Excellency the President of Uganda Yoweri Kaguta Museveni, President of the Republic of Uganda, for his guidance and vision to secure Uganda's energy future. I also thank my colleagues in Cabinet and at the Ministry, Hon. Sidronius Okaasai Opolot (Minister of State for Energy) and Hon. Peter Lokeris (Minister of State for Mineral Development), for their support in executing our duties.

Hon. Dr. Ruth Nankabirwa Ssentamu  
**MINISTER OF ENERGY AND MINERAL DEVELOPMENT**

## PREFACE

The Energy Policy for Uganda 2002, whose goal was “**To meet the energy needs of Uganda’s population for social and economic development in an environmentally sustainable manner**”, has been the guiding document for the past 20 years. It became the basis for the progressive expansion of investment in modern energy services, enhancement of government efforts in sustainable petroleum exploration, establishing of a rural electrification department in the ministry and improving efficient utilization of energy in all sectors from households, transport, and the industrial sector. The achievements of the Energy Policy for Uganda 2002 include:

- a. an increase in power generation capacity from 317 MW in 2002 to 1,378.1 MW in 2022;
- b. an increase in private sector investments in the industry from deficit to surplus generation;
- c. reduction in transmission and distribution system losses from 45% to 18.4%;
- d. increased electrification from about 26% to 57% including on grid (19%) and off grid (38%)
- e. increased uptake of renewable energy technologies, such as solar PV plants, mini-grid solar plants, solar home systems, gasification;
- f. increased capacity development among the local companies in the production of biomass technologies and training of energy auditors; and,
- g. improved sector governance through the introduction of various laws such as; The Petroleum Supply Act 2003, The Atomic Energy Act 2008, The Oil and Gas Act 2013, The Biofuels Act 2020.
- h. Furthermore, sub-policies in the energy sector were developed, such as the Renewable Energy Policy 2007, the Oil and Gas Policy 2008, and the Electricity Connections Policy 2018, that streamlined investment in the respective sub-sectors.

The following factors, however, required that a review of the Energy Policy for Uganda 2002 is undertaken:

- a) New National and International frameworks since 2002, such as Vision 2040, National Development Plans (NDPs), and the Sustainable Development Goals (SDGs), Paris Agreement;
- b) Gaps in the Energy Policy 2002 and other sub-policies;
- c) Technology advancements;
- d) Financing and market changes; Shift from generation shortages to surplus;
- e) Private sector-led growth to Public Private Partnerships (PPPs);
- f) Increased public funding; Demographic changes and outdated statistics;
- g) Population and GDP growth, Mainstreaming of Gender, Climate Change and Health and Safety.

As the government pursues its macro-economic policy on economic growth and employment, the energy sector is still faced with several challenges, which include:

- i. Low levels of access to affordable and modern energy services;
- ii. Constrained economic development due to inadequate energy sector investments;

- iii. High system power losses, poor quality of service and unreliable power supply;
- iv. Environmental degradation due to unsustainable utilisation of biomass energy resources;
- v. Inadequate technical capacity in private and public institutions; and insufficient public awareness.
- vi. Constrained transmission and distribution networks to effectively evacuate and distribute generated electricity countrywide
- vii. High connection costs incurred by the consumers slowing down access.

The Energy Policy for Uganda 2023 has therefore been developed to address the above challenges to achieve the following specific objectives:

1. Strengthen electricity generation, transmission and distribution infrastructure
2. Increase electricity access and uptake of alternative modern forms of energy
3. Enhance utilisation of energy-efficient practices and technologies
4. Promote sustainable utilisation of biomass
5. Attract investment with financial sustainability in the development and utilisation of energy resources
6. Promote nuclear energy development
7. Promote emerging energy resources; geothermal, hydrogen, wind and other resources
8. Enhance energy sector governance, capacity building and integrated
9. Enhance the management of the energy-related environment, health and social safeguards

With this policy, the Government of Uganda is emphasizing the development of new areas such as; clean energy for transportation, nuclear energy for peaceful applications, and affordability of electricity through the reduction of tariffs which comes with benefits such as increasing per capita consumption.

This Energy Policy for Uganda 2023 covers the following sub-sectors: Renewable Energy, Clean Cooking, Electrical Power, Rural Electrification and Access, Energy Efficiency and Conservation, Nuclear Energy and selected cross-cutting issues. Each sub-sector includes; general issues, policy statements and strategies for the sub-sector.

In conclusion, I would like to thank His Excellency, the President of Uganda, Yoweri Kaguta Museveni, whose vision and guidance have enabled the sector to grow and drive the economy. The Hon. Dr Ruth Nankabirwa Ssentamu (Minister of Energy and Mineral Development), Hon. Sidronius Okaasai Opolot (Minister of State for Energy), and Hon. Peter Lokeris (Minister of State for Mineral Development), for their guidance as well as the previous Ministers who over the years have overseen the implementation of the energy policy.

I would like to take note and appreciate the services of the past and present staff in the Ministry and sector agencies, government Ministries, Departments and Agencies who have contributed to the achievements we see in the sector today and their efforts in developing the new Energy Policy of Uganda.

I thank the numerous development partners, especially the Federal Republic of Germany, who, through GIZ, supported this exercise and all those partners that have helped us since 2002 and beyond. We look forward to continuing that collaboration in implementing the Energy Policy for Uganda 2023.

Irene Bateebe  
**PERMANENT SECRETARY**

**LIST OF ACRONYMS**

AEC	Atomic Energy Council
CDAP	Community Development Action Plan
CNDPF	Comprehensive National Development Planning Framework policy
COMESA	Common Market for Eastern and Southern Africa
CSO	Civil Society Organisation
DRC	Democratic Republic of Congo
EAPP	Eastern Africa Power Pool
EPRTF	Energy Policy Review Task Force
ERA	Electricity Regulatory Authority
FHH	Female-Headed Households
GBV	Gender-Based Violence
GHG	Greenhouse Gas
GSDD	Gender, Sex and Age Disaggregated
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome
ICSC	Implementation Coordination Steering Committee
IRP	Integrated Resource Plan
LG	Local Government
LPG	Liquefied petroleum gas
MHH	Male-Headed Households
MEMD	Ministry of Energy and Mineral Development
MoFPED	Ministry of Finance Planning and Economic Development
MOGLSD	Ministry of Gender, Labour and Social Development
MSME	Micro, Small and Medium Enterprise
NDP	National Development Plan
NED	Nuclear Energy Department

NEMA	National Environment Management Authority
NPA	National Planning Authority
PEAP	Poverty Eradication Action Plan
PCC	Policy Coordination Committee
PLWHIV	Persons Living with HIV
PPP	Public Private Partnerships
PWDs	Persons with Disability
RAP	Resettlement Action Plan
RED	Renewable Energy Department
RESP	Rural Electrification Strategy and Plan
RET	Renewable Energy Technology
RIA	Regulatory Impact Assessment
TICC	Technical Implementation Coordination Committee
SDG	Sustainable Development Goal
SEforALL	Sustainable Energy for All Initiative
SSIP	Sector Strategic Investment Plan
SWG	Sector Working Group
UECCC	Uganda Energy Credit Capitalisation Company
UEDCL	Uganda Electricity Distribution Company Limited
UEGCL	Uganda Electricity Generation Company Limited
UETCL	Uganda Electricity Transmission Company Limited
UNEC	Uganda National Electricity Company
UN	United Nations
UNHS	Uganda National Housing Survey
USEA	Uganda Solar Energy Association

## EXECUTIVE SUMMARY

Formulating the Energy Policy for Uganda 2023 entailed comprehensive reference of the 1995 Constitution of the Republic of Uganda, legislation and regulations, other policies, administrative procedures, government guidelines and circulars relating to the energy sector. In line with current practices, the enactment of the policy is preceded by a Regulatory Impact Assessment (RIA) that established that the best course of action is to bring a new energy policy that will replace the Energy Policy for Uganda 2002. Uganda's energy sector organizations carried out a situational analysis that formed the basis for the initial draft of the policy, which was then shared and discussed with stakeholders at a national workshop. Further consultations with key government ministries, departments and agencies, and key energy sector stakeholders were held. A national validation workshop was subsequently held, where several suggestions and comments were received, including several stakeholders' requests for additional time to allow for further input. This document has been enriched from the preceding consultative process, which has been participatory and transparent.

This Energy Policy for Uganda 2023 is aligned with the National Development Plan (NDP) III through the Sustainable Energy Programme, which reaffirms that 'the availability of sustainable (reliable, affordable and clean) energy services is critical for economic growth, poverty reduction, as well as the social and cultural transformation of society'.

The legislative framework of the energy sector is comprised of the 1995 Constitution of the Republic of Uganda (as amended) and the following laws and statutory instruments: the Electricity (Amendment) Act (2022) provides the regulatory framework for the electricity sub-sector; the Petroleum Supply Act (2003) ensures an adequate, reliable and affordable supply of quality petroleum products; the Atomic Energy Act (2008) provides for the regulation of the peaceful applications of ionizing radiation and a framework for the promotion and development of nuclear energy for use in power generation and other peaceful purposes; the Petroleum Act (2013) operationalizes the National Oil and Gas policy; and the Biofuels Act (2020) regulates the production, storage and transportation of biofuels and blending of biofuels with petroleum products.

Uganda subscribes to international frameworks to have opportunities to create an impact on the sustainable development and utilization of energy and the environment, such as; Agenda 2030 and Sustainable Development Goals (SDG), in particular SDG 7, whose aim is to 'Ensure access to affordable, reliable, sustainable and modern energy for all with three interlinked targets, namely, (1) ensure universal access to affordable, reliable and modern energy services, (2) increase substantially the share of renewable energy in the global energy mix, and (3) double the global rate of improvement in energy efficiency. Another key and relevant convention Uganda subscribes to is the Paris Agreement, which pledges to reduce carbon dioxide (CO<sub>2</sub>) and other greenhouse gas emissions and adapt to climate change's impacts. Studies show that clean energy can meet 90% of the Paris energy-related goals.

The Government of Uganda implemented the first Energy Policy for Uganda since 2002 as the primary guiding document for the country's energy sector. The existing policy framework is comprised of the current Energy Policy 2002, whose goal is "to meet the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner"; the Renewable Energy Policy (2007), which aims to increase the share of renewable energy in the national energy mix; the National Oil and Gas Policy (2008) whose goal is to use the country's oil and gas resources to contribute to early achievement of poverty eradication; and the Electricity Connections Policy (2018) which aims to increase access and provide cleaner energy for Ugandans.

The Energy Policy for Uganda 2023 presides over all the existing and related sector policies and reforms. It aims to consolidate these achievements, align the policy framework with recent international, regional and national developments and commitments, and ensure that the Government is well-positioned to address the energy sector's new and emerging socio-economic challenges in the coming decade.

The Energy Policy for Uganda 2023 aims to ensure a sustainable, adequate, affordable, competitive, secure, and reliable supply of energy at the least cost geared to meet national and county needs while protecting and conserving the environment.

Uganda's economy has grown at an average of 4.5% annually since 2010. As Uganda continues to pursue economic growth and industrialization, the Ministry of Energy and Mineral Development forecasts a base case scenario: energy demand in 2027 will stand at 7,664 GWh with a peak demand of 1,250 MW. The Least Cost Generation plan envisages growth in generation from 872 MW in 2018 to 3,127 MW in 2027 on the base case scenario. For a large part of the focus period of the policy, planned energy supply will exceed demand, with most of the pipeline generation projects still being dominated by hydropower. In this regard, the Energy Policy explored and proposed strategies for increasing the uptake of electricity that is scheduled to be generated.

At least 51% of households in Uganda had access to at least one source of electricity in 2019, including the national grid, solar lighting systems/lanterns, solar home systems, mini-grids, and generators. The country's electricity connectivity rate of 28% is still one of the lowest in Africa compared with the Sub-Saharan average of 43%. Access in rural areas is particularly low at 8%, with insufficient access to modern energy sources and services such as Liquefied Petroleum Gas (LPG), biogas and improved cookstoves for clean cooking. The GOU plans to implement a free connections plan depending on the availability of resources as one of the strategies to increase the electricity connectivity rate. The widespread dependence on biomass energy resources for cooking and heating using inefficient methods, such as traditional cookstoves, has resulted in rapid forest depletion for firewood and charcoal, among others. The National Environment Management Authority reported in 2020 that 'Uganda suffers a degradation loss of USD 2.3 Billion, of which 25% is wood fuels and that 2.6% of Uganda's forests are cut down annually for firewood, charcoal, agriculture and to make way for population growth. If this trend persists, Uganda will lose all its forest cover in less than 25 years'.

Uganda is a landlocked nation endowed with renewable energy (RE) resources distributed evenly across the country. Biomass is the most essential energy source for most Ugandan populations, accounting for 90.5% (2021) of the primary energy consumed. Hydropower remains the nation's dominant source of electric energy production, with a potential of over 4100 MW. RE has the potential to enhance energy security and reliability; generate income and create employment; enable substantial foreign exchange savings by reducing dependence on imported fuels and their attendant price volatility, and mitigate climate change as it has minimal adverse effects on the environment. The rate of electricity connectivity access is 28% (June 2019), with a total installed generation capacity of 1,378.1 MW (December 2022) and peak electricity demand of approximately 650 MW. Households comprise the largest energy consumer group, followed by industry and transportation. In 2022, hydro contributed 88% of Uganda's power production. The Ministry of Energy and Mineral Development (MEMD) provides overall policy direction and guidance in developing and exploiting energy, mineral, oil and gas resources. It creates an enabling environment to attract investment in the development, provision and utilisation of energy resources. The Ministry also acquires, processes and interprets technical data to establish the energy resource potential of the country. It is also mandated to inspect, regulate, monitor and evaluate activities of private companies in the energy sector to ensure rational and sustainable development, exploitation and use of energy resources.

The Energy Policy for Uganda 2023 was formulated with specific objectives to;

1. Strengthen electricity generation, transmission, and distribution infrastructure
2. Increase electricity access and uptake of alternative modern forms of energy
3. Enhance utilization of energy-efficient practices and technologies
4. Promote the adoption of energy efficiency and conservation practices
5. Promote sustainable utilization of biomass
6. Attract investment with financial sustainability in the development and utilization of energy resources
7. Promote nuclear energy development
8. Promote emerging energy resources; geothermal, hydrogen, wind and other resources
9. Enhance the management of the energy-related environment, health and social safeguards

To drive economic development, the GOU has identified key focus areas in the Energy Sector captured in this energy policy. This includes increasing power generation, expanding the electricity transmission and distribution grid networks, increasing energy efficiency, promoting alternative energy sources, and strengthening the policy, legal and institutional framework. Arising out of these focus areas are targets to increase access and demand for electricity.

With this policy, the Government of Uganda is emphasizing the development of new areas such as; clean energy for transportation, nuclear energy for peaceful applications, and affordability of electricity through the reduction of tariffs which comes with benefits such as increasing per capita consumption.

This Energy Policy for Uganda 2023 covers the following sub-sectors: Renewable Energy, Clean Cooking, Electrical Power, Rural Electrification and Access, Energy Efficiency and Conservation, Nuclear Energy and selected cross-cutting issues. Petroleum is covered under the National Oil and Gas Policy (2008), and related statutory instruments. Each sub-sector includes general issues, policy statements and strategies for the sub-sector.

## GLOSSARY OF TERMS

Term	Definition
Biofuels	Liquid fuels derived from biomass or waste feedstocks include ethanol and biodiesel. <sup>1</sup>
Biogas	A mixture of methane, carbon dioxide and small quantities of other gases produced by the anaerobic digestion of organic matter in an oxygen-absent environment.
Biomass	Biomass is any organic matter consisting of any whole or part of vegetable matter from agriculture or forestry, which can be used as a fuel to recover its energy content. Biomass includes firewood, shrubs, grasses, forest wastes and agro-industrial residues.
Captive power	Power generated at a facility to produce electricity solely or primarily for internal use. <sup>2</sup>
Clean cooking facilities	Cooking facilities that are considered safer, more efficient, and more environmentally sustainable than the traditional facilities that use solid biomass (such as a three-stone fire stove). Refers primarily to improved solid biomass cookstoves, biogas systems, liquefied petroleum gas stoves, ethanol, solar stoves, and electric cookers.
Deemed generation	Electricity not evacuated from a power generation plant due to grid or other issues. It is the energy which a generating station is capable of generating but cannot generate due to the conditions of the grid or power system beyond the control of generating station. <sup>3</sup>
Energy Access	Defined by the Multi-Tier Framework (MTF) as the ability to obtain adequate energy, available when needed, reliable, of good quality, affordable, formal, convenient, healthy, and safe for all required energy applications. The MTF defines six tiers of access, ranging from Tier 0 (no access) to Tier 5 (full access). It also measures energy access across productive enterprises and community institutions, not just households. <sup>4</sup>

<sup>1</sup>IEA Africa Energy Outlook, November 2019

<sup>2</sup> Uganda: Captive Power. Developer Guide, GET.Invest, June 2019

<sup>33</sup> <https://www.lawinsider.com/dictionary/deemed-generation>

<sup>4</sup> World Bank, Policy Brief #15 - Tracking SDG 7.1 with the Multi-Tier Framework Measuring Energy Access, 2018

Energy conservation	A measure to reduce energy consumption through using less of an energy service.
Energy Efficiency	Energy efficiency refers to using less energy to provide the same output and services.
Energy intensity	<p>Energy intensity is a measure of the energy efficiency of a country's economy. It is the ratio of a nation's energy consumption to its GDP (gross domestic product).</p> <p>High energy intensities indicate a high price or cost of converting energy into GDP. Low energy intensity indicates a lower price or cost of converting energy into GDP.</p>
Energy security	Uninterrupted availability of energy sources at an affordable price. <sup>5</sup>
Energy Transition	The energy transition is a pathway towards transforming the global energy sector from a fossil-based to a zero or neutral-carbon economy by the second half of this century. Notably, at its heart is the need to reduce energy-related CO <sub>2</sub> emissions through renewable energy and energy efficiency initiatives to limit climate change impacts.
Geothermal	Geothermal is heat energy from a layer of hot and molten rock below the earth's crust.
Grid densification	New grid connections, especially for households living close to the local utility grid but not yet connected. Grid densification is achieved by installing additional transformers on existing medium voltage to connect housing clusters within 600 meters of existing distribution transformers.
Grid extension	A network expansion from the national power transmission system to new areas and communities. <sup>6</sup> Extending the medium voltage distribution network to connect housing clusters within 15 kilometres of the grid distribution system.

<sup>5</sup> IEA, <https://www.iea.org/topics/energy-security>

<sup>6</sup>[https://energypedia.info/wiki/Type\\_of\\_On-Grid\\_Activities](https://energypedia.info/wiki/Type_of_On-Grid_Activities)

Grid intensification	The addition of distribution transformers and short (up to 2 kilometres) medium-voltage extensions to capture more consumers.
Hydro	A resource for the production of electric power through the use of falling or flowing water.
Nuclear energy	Nuclear energy is a form of energy released from the nucleus or the core of atoms. It is also the energy used in producing nuclear power, electricity from nuclear.
Independent Power Producer	An entity that privately builds, owns, and operates facilities to generate and sell electricity to utilities or the general public.
Industrial Park	An area of land developed as a site for factories and other industrial businesses.
Integrated Resources Planning	A process of multi-stakeholder planning to meet the public's needs for electricity and energy services in a way that satisfies multiple objectives for resource use. Objectives could include conformance with national, regional, and local development objectives; ensuring that all households, businesses and institutions have access to electricity services; maintaining the reliability of supply; minimizing the short-term or long-term economic cost of delivering energy services; minimizing the environmental impacts of energy supply and use; enhancing energy security by minimizing the use of external resources; ensuring energy efficiency; providing local economic benefits and minimizing foreign exchange costs.
Liquefied Petroleum Gas (LPG)	Liquefied Petroleum Gas (LPG), or propane or butane, are flammable mixtures of hydrocarbon gases used as fuel in heating appliances, cooking equipment and in vehicles. LPG is a convenient super-pressurized gas stored in liquid form in a tank or cylinder.
Mini-grids	Small grid systems linking several households or other consumers. A mini-grid is a power source of a typical capacity ranging from a few kW to a few MW, supplying electricity to consumers in a remote

	location through a local distribution grid justified by the population density in the concerned location. <sup>7</sup>
Modern energy	Refers to clean, safe, and, to a certain extent, convenient energy sources.
Modern energy access	Includes access to a minimum level of electricity; access to safer and more sustainable cooking and heating fuels and stoves; access that enables productive economic activity; and access to public services.
MSME	In Uganda, a Micro Enterprise employs up to four people, with an annual sales/revenue turnover or total assets not exceeding Uganda shillings 10 million. Small Enterprises employ between 5 and 49 people and have total assets between UGX 10 million but not exceeding UGX 100 million. Medium Enterprises employ between 50 and 100 with total assets of more than UGX 100 million but not exceeding 360 million. <sup>8</sup>
Municipal waste	Municipal waste streams consist of solid waste, including organic and inorganic waste from domestic, institutional, and industrial/commercial sources such as manufacturing, agriculture, mining, construction and demolition debris, as well as sludge and liquid waste from water and wastewater treatment facilities, septic tanks, sewerage systems and abattoirs among others.
Net metering	A billing mechanism that credits solar energy systems or other renewable energy owners for the electricity they add to the grid. When the renewable energy system produces excess electricity, it is sent back to the grid, and the electricity utility must buy that energy.
Off-grid systems	Stand-alone systems for individual households or groups of consumers that are not connected to a grid.
Peri-urban	Peri-urban areas are transition zones from rural to urban, which often form the urban-rural interface and may evolve into fully urban.
Power Pool	An arrangement between two or more interconnected power systems that plan, coordinate and operate their power supply and

<sup>7</sup> Towards Universal Energy Access, OFID background paper, September 2016

<sup>8</sup> Uganda Investment Authority. <https://www.ugandainvest.go.ug/sme/>

	transmission most reliably and economically, given their load requirements, for improved efficiencies. <sup>9</sup>
Power Purchase Agreement	A legal contract between an electricity generator and a power purchaser (a buyer, typically a utility or large power buyer/trader).
Productive use	Productive uses of energy are agricultural, commercial and industrial activities involving energy services as a direct input to the production of goods or provision of services, i.e. energy used towards an economic purpose
Quality of supply	Includes reliability, technical availability, adequacy, convenience and safety of energy/electricity supply. <sup>10</sup> For electricity, quality is measured by the occurrence of voltage issues preventing the use of desired appliances.
Reliability	For electricity supply, reliability is measured by the frequency and duration of unscheduled outages.
Renewable energy	Energy from natural sources replenished faster than consumed, including hydro, bioenergy, geothermal, solar, wind, and ocean marine (tide and wave) energy.
Rural Electrification	The process of bringing electrical power to rural and remote areas. Involves grid or off-grid extension of distribution lines and/or installation of solar photovoltaic systems, mini and micro hydro plants for electricity generation in rural areas.
Universal Access	Access by every person on the planet to modern energy services provided through electricity, clean cooking fuels, clean heating fuels, and energy for productive use and community services. <sup>11,12</sup>

<sup>9</sup>Deloitte, The roadmap to a fully integrated and operational East African Power Pool, 2015

<sup>10</sup> IEA, <https://www.iea.org/articles/defining-energy-access-methodology>

<sup>11</sup>Global Tracking Framework, Sustainable Energy for All.

[https://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Sustainable%20Energy/Sustainable%20Energy%20for%20All/0-GTF\\_full\\_report.pdf](https://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Sustainable%20Energy/Sustainable%20Energy%20for%20All/0-GTF_full_report.pdf)

<sup>12</sup><https://www.eia.gov/tools/glossary/?id=electricity>

## 1 INTRODUCTION

### 1.1 The Role of Energy in National Economy

Energy is acknowledged as a critical input towards raising the standard of living of citizens of any country, as is evident from the correlation between per capita electricity (a proxy for all energy forms) consumption and Human Development Index (HDI). Providing secure, affordable and sustainable energy to all is an important policy priority in Uganda, and significant progress has been made towards the United Nations Sustainable Development Goals (SDGs), notably SDG7 on energy. The Uganda Vision 2040 states: “Ugandans aspire to have access to clean, affordable and reliable energy sources to facilitate industrialisation”. Uganda Vision 2040 projections indicate that Uganda will graduate into an upper middle-income category by 2032 and become a first-world country in the next fifty years.

This commitment was further reaffirmed in the third National Development Plan (NDP III) (2020/2021 to 2024/2025), which prioritised energy as critical for Uganda’s aspirations for Vision 2040 and the attainment of upper middle-income status.

The Government of Uganda (GOU) implemented the Energy Policy for Uganda 2002, and since 2002 this has been the primary guiding document for the country’s energy sector. The Energy sector is directly linked to other sectors of the economy and generally provides their lifeblood. The sector is a significant contributor to national development and Government revenues, and its performance impacts the performance of other sectors.

Uganda’s implementation of appropriate broad-based policies has led to a stable macroeconomic environment resulting in positive economic growth. The country’s Gross Domestic Product (GDP) has quadrupled, averaging approximately 6% annual growth over the past two decades. The population grew from 25.72 million in 2002 to 41 million in 2020 and is projected to reach 100 million by 2050. The Vision 2040 targets reflect the Government’s commitment to address the significant social, economic, and infrastructural challenges.

The country has continued to experience relatively low and stable inflation, moderate interest rates and stable Shilling. Key macroeconomic indicators have remained steady, with the overall inflation rate decreasing significantly from 5.46% in 2015 to 2.87% in 2019. The interest rate declined from 17% in 2015 to 7% by the end of 2020. Uganda has a well-developed and well-regulated banking system which compares favourably with other developing countries elsewhere in the world. Uganda has a systemic trade deficit due to the country’s dependence on fuel imports.

The Government has made significant achievements on the objectives set out in the Energy Policy for Uganda 2002. The achievements include; increased electricity generation capacity from 317 MW (2002) to 1,378.1 MW (December 2022), resulting in a supply/demand surplus; increased electricity access from 5% (2002) to 51% (2020); reduction in electricity distribution losses from over 35% (2002) to 16.8% (2019); the dominance of renewable energy in the national energy mix;

enabling environment for private sector investments; increased energy sector contribution to the national GDP; increased efficiency initiatives in the biomass sub-sector; liberalisation and improved sector regulation; increased awareness of environmental compliance; and enactment of various legislation and policy instruments to strengthen sector governance.

Uganda had completed vertical unbundling of the national utility, introduced private sector participation in electricity distribution and generation segments, established an effective independent sector regulator, and sustained near cost-reflective tariffs since 2012. As of mid-2019, industrial electricity consumption was 65.5%, commercial 12.5% and residential 12.5%, in contrast to the 55% residential, 24% commercial and 20% industrial electricity consumption of 2002, highlighting the country's transition to industrialisation. In late 2021 however, Government rationalised operations with a merger of three unbundled utility companies responsible for generation, transmission and distribution in the interest of cost-cutting.

Despite the achievements, the Government recognises the considerable efforts still required to achieve the Sustainable Development Goals and Vision 2040 targets. The cost of energy has a significant impact on economic activities. In a liberalised market such as Uganda, energy prices are substantial determinants of the competitiveness of locally manufactured goods relative to imports. In this regard, high energy prices negatively impact domestic wealth creation, balance of payments and employment creation since consumers opt for cheaper imports.

Fifty-one per cent of households in Uganda had access to at least one source of electricity in 2019, including the national grid, solar lighting systems/lanterns, solar home systems, mini-grids and generators<sup>13</sup>. The country's electricity connectivity rate of 24% is still one of the lowest in Africa compared with the Sub-Saharan average of 43% (2019)<sup>14</sup>. Additionally, there is insufficient access to modern energy sources and services such as Liquefied Petroleum Gas (LPG), biogas and improved cookstoves for clean cooking, mainly due to higher upfront costs than traditional sources.

Previous energy planning in Uganda has emphasised supply-side issues such as increasing generation and attracting more private investors, especially for commercial energy sources. Demand-side issues, such as subsidies to counteract the very high end-user power tariffs and meeting energy demand by increasing area coverage, have received less attention. This approach has tended to favour the urban population, which is the major user of commercial fuels while marginalising the energy needs of the majority of the population — in rural areas — which depends mainly on biomass. The rural areas also contain the most significant proportion of the poor population. Despite the good national economic performance, about 35 per cent of Uganda's population still lives below the poverty line.

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<sup>13</sup> Uganda Bureau of Statistics (UBOS), ERT III Baseline Survey Findings, 2019

<sup>14</sup> Blimpo, Moussa P., and Malcolm Cosgrove-Davies. 2019. *Electricity Access in Sub-Saharan Africa: Uptake, Reliability, and Complementary Factors for Economic Impact*. Africa Development Forum series. Washington, DC: World Bank.

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

## **1.2 Legal and Regulatory Framework**

The Constitution of the Republic of Uganda is the country's supreme law. According to Article 45 of the 1995 Constitution of the Republic of Uganda as amended, electricity is a public good, and its access and utilisation by Ugandans is a right that should be recognised and protected at whatever cost.

### **1.2.1 The 1995 Constitution of the Republic of Uganda (As amended)**

The 1995 Constitution of the Republic of Uganda as amended mandates establishing an appropriate energy policy when it states: "The State shall promote and implement energy policies that will ensure that people's basic needs and those of environmental preservation are met". This constitutional requirement makes it incumbent upon Government to formulate an energy policy that will not only sustain the impressive economic growth of the last decade or so but also ensure widespread access to affordable modern energy services for improving the living standards of all the people in Uganda. It is, therefore, also necessary to review and align the energy sector policy, legal and regulatory framework with the provisions, spirit and aspirations of the Constitution.

### **1.2.2 Existing Policy and Legislation**

The legislative framework of the energy sector is comprised of the 1995 Constitution of the Republic of Uganda (as amended) and the following laws and statutory instruments: the Electricity (Amendment) Act, (2022) provides the regulatory framework for the electricity sub-sector; the Petroleum Supply Act (2003) ensures an adequate, reliable and affordable supply of quality petroleum products; the Atomic Energy Act (2008) provides for the regulation of the peaceful applications of ionising radiation and a framework for the promotion and development of nuclear energy for use in power generation and other peaceful purposes; the Petroleum Act (2013) operationalises the National Oil and Gas policy; and the Biofuels Act (2020) regulates the production, storage and transportation of biofuels and blending of biofuels with petroleum products.

The policy framework is comprised of the Energy Policy for Uganda 2002, whose goal is "to meet the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner"; the Renewable Energy Policy (2007), which aims to

increase the share of renewable energy in the national energy mix; the National Oil and Gas Policy (2008) whose goal is to use the country's oil and gas resources to contribute to early achievement of poverty eradication; and the Electricity Connections Policy (2018) which aims to increase access and provide cleaner energy for Ugandans.

The sector's mandate is also supported by other sector policies, including the Gender Policy (2007), Climate Change Policy (2015), Environment and Social Safeguards Policy (2018), etc.

The sector also ascribes to international and regional legal and policy frameworks that Uganda is a party to, e.g., the UN SDGs, Sustainable Energy for All (SEforAll), and East African Community laws and policies. The integration of gender and equality considerations into policies, programmes and projects that foster women's involvement in policy development and the advancement of human rights.

**Table 1: Summary of Uganda's Policy and Legal Framework**

Elements	GoU Response
Enabling policies	<ul style="list-style-type: none"> <li>• Energy Policy of 2002 (before the current policy document)</li> <li>• Oil and Gas Policy 2008</li> <li>• Renewable Energy Policy 2007</li> <li>• Electricity Connections Policy (2018)</li> <li>• Gender Policy (2007)</li> <li>• Climate Change Policy (2015)</li> <li>• Environment and Social Safeguards Policy (2018)</li> </ul>
Enabling laws/ legislation	<ul style="list-style-type: none"> <li>• The Electricity (Amendment) Act 2022</li> <li>• The Petroleum Supply Act 2003</li> <li>• Atomic Energy Act 2008</li> <li>• The Petroleum (Refining, Conversion, Transmission and Midstream Storage) Act, 2013</li> <li>• The Petroleum (Exploration, Development and Production) Act, 2013</li> <li>• Biofuels Act 2018</li> <li>• The National Environment Act, 2019</li> </ul>
Functional Feed-in-Tariffs (FIT) systems	ERA regularly publishes a standardised Power Purchase Agreement (PPA) with feed-in-tariffs
Functional Energy Regulator	Electricity Regulatory Authority, Atomic Energy Council, Petroleum Authority of Uganda

Regional infrastructure  (Power Pools)	energy  East African Power Pool
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### 1.2.3 Institutional Arrangements

A well-defined coordination and leadership framework is needed for the main sector players to focus on meeting the energy needs of a growing population and address the institutional and legal challenges hindering sustainable development and effective utilisation of energy resources.

The Cabinet provides overall policy direction, and the sector agencies do the implementation. The Ministry of Energy and Mineral Development oversees all the regulatory institutions, government institutions and independent providers in the sector. The Ministry's political leadership consists of the minister of Energy and Mineral Development and two deputy ministers. The permanent secretary is the technical head of the Ministry, assisted by the directors and heads of departments. The Cabinet decision on 22<sup>nd</sup> February 2021 regarding the Rationalisation of Government Agencies, Commissions Authorities and Public Expenditure brought the merger of electricity state parastatals for generation, transmission, and distribution into one company. The Rural Electrification Agency was mainstreamed into the Ministry structure as a department. The key sector institutions are highlighted below.

#### a) Ministry of Energy and Mineral Development

The Ministry of Energy and Mineral Development (MEMD) provides overall policy direction and guidance in developing and exploiting energy, mineral, oil and gas resources. It creates an enabling environment to attract investment in developing, providing and utilising energy resources. The Ministry also acquires, processes and interprets technical data to establish the energy resource potential of the country. It is also mandated to inspect, regulate, monitor and evaluate activities of private companies in the energy sector to ensure rational and sustainable development, exploitation and use of energy resources.

The Ministry of Energy and Mineral Development comprises of 3 (three) directorates, namely;

- i) Energy Resources Directorate has the following departments; Renewable Energy Department, Energy Efficiency and Conservation Department, Electrical Power Department, Nuclear Energy Department and Rural Electrification Department
- ii) Geological Survey and Mines Directorate with the following departments; Geological Survey Department, Geothermal Resource Department and Mines Department and

- iii) Petroleum Directorate with the following departments; Petroleum Development and Production Department, Midstream Petroleum Department and Petroleum Supply and Distribution Department.

b) Electricity Regulatory Authority

The Electricity Regulatory Authority (ERA) is a statutory body established under the Electricity Act, 1999 (Cap. 145) as an independent regulator of the power sub-sector. Its main function is to regulate electricity generation, transmission, distribution, sale, export and import. ERA is also responsible for issuing and regulating compliance with licenses, establishing tariff structures, approving rates of charges and terms and conditions for electricity services by Uganda Electricity Company, and responsible for transmission and distribution, which include Umeme Limited, West Nile Rural Electrification Company (WENRECo), Bundibugyo Electricity Cooperative Society (BECS); Kyegegwa Rural Energy Cooperative Society (KRECS); Pader-Abim Community Multi-Purpose Electric Cooperative Society (PACMECS); Kilembe Investments Limited (KIL); and Kalangala Infrastructure Services Limited (KIS). The Authority also oversees the Electricity Consumer Committees.

c) Electricity Disputes Tribunal

The Electricity Disputes Tribunal (EDT) was established by the Electricity Act 1999 to arbitrate cases in the electricity sector. Stakeholders that are dissatisfied with ERA's decisions may appeal to the Tribunal. Apart from receiving, hearing and adjudicating consumer disagreements relating to the electricity sector, the Tribunal also settles disputes between the consumers and other government institutions since it has the powers of the High Court of Uganda. Any witness before the Tribunal has the same immunities and privileges as if they were a witness before the National High Court.

d) Uganda National Electricity Company (UNEC)

This is a result of the merger of Uganda Electricity Generation Company (UEGCL), Uganda Electricity Transmission Company (UETCL) and Uganda Electricity Distribution Company (UEDCL).

For generation, the UNEC is responsible for; establishing, acquiring, maintaining and operating electricity generation facilities and promoting research and development.

The UNEC owns and operates the transmission infrastructure above 33 kV for transmission. It is also responsible for the transmission, dispatch, bulk electricity purchases from generators and the export and import of electricity. Another function under transmission is coordinating the power system to achieve a balance between supply and demand.

For distribution, the UNEC owns the grid-connected electricity distribution infrastructure operating at 33 kV and below. It is responsible for the operation and maintenance of non-concessioned distribution network infrastructure and the retail function that includes metering and billing.

e) The Uganda Energy Credit Capitalisation Company

The Uganda Energy Credit Capitalisation Company (UECCC) was operationalised in 2009 to manage and administer the Uganda Energy Credit Capitalization Trust. A major objective of the Trust is to provide financial, technical and other support to unlock renewable energy and/or rural electrification projects for development. The Company is mandated to mobilise resources to capitalise the Trust to contribute to the sector's financing requirements, focusing on facilitating private sector participation.

f) Atomic Energy Council

The Atomic Energy Council (AEC) was established by the Atomic Energy Act 2008 to regulate the peaceful applications of ionising radiation. The AEC developed the Atomic Energy Regulations 2012, which revoked and replaced the Atomic Energy (Ionising Radiation Protection) Standards Regulations. The AEC is also responsible for the protection and safety of individuals, society and the environment from the dangers resulting from ionising radiation; production and use of radiation sources and the management of radioactive waste; compliance with international safety requirements for the use of ionising radiation, radiation protection and security of radioactive sources.

## 2 SITUATIONAL ANALYSIS

### 2.1 Analysis of Energy Policy for Uganda 2002

The main policy goal of the Energy Policy of Uganda 2002 was “to meet the energy needs of Uganda’s population for social and economic development in an environmentally sustainable manner. Its broad objectives were to: establish the availability, potential and demand of various energy resources; increase access to modern affordable and reliable energy services; improve energy governance and administration; stimulate economic development; and manage energy-related environmental impacts. Other key focus areas were to harmonize sector activities; integrate resource planning by addressing both demand and supply side issues; ensure compatibility with global and regional policies; develop the necessary legal, regulatory and institutional framework; build the sector’s capacity; and promote private sector participation.

The Energy Policy for Uganda 2002 played an impactful role in achieving some key successes, with substantial progress in the renewable energy sub-sector after the adoption of the Renewable Energy Policy 2008. The key achievements include the growth of Uganda’s electricity generation capacity from 317 MW (2002) to 1,378.1 MW (December 2022); increased nationwide electricity access from 5% (2002) to 51%, with 19% on-grid and 32% off-grid access (2020); reduction in electricity distribution losses from over 35% (2002) to 21.36% (2020)<sup>15</sup>; the dominance of renewable energy in the national energy mix; enabling environment for private sector investments; increased energy sector contribution to the national GDP; increased energy efficiency initiatives; liberalization and improved sector regulation; increased awareness of environmental compliance; and enactment of various legislation and policy instruments to strengthen sector governance. The nine priority actions spelt out in the Energy Policy (2002), and the extent to which they were achieved are outlined below:

- a) Increasing power generation: In 2021, Uganda had a total of 53 generating plants, classified as 6 large hydro plants; 26 small hydro plants; 4 thermal plants (2 on-grid, 2 off-grid); 2 diesel thermal (off-grid); 5 co-generation plants; 8 Solar PV (5 on-grid, three off-grid); and two biomass plants (off-grid).
- b) Diversify power generation sources to ensure the security of supply: Promoting renewable energy projects such as cogeneration, solar, and mini-hydro has enabled progress in achieving this policy action. However, power generation from hydro sources still dominates the energy mix.
- c) Increase access to modern energy in both urban and mainly rural areas: The related strategy proposed grid extension, stand-alone grids and solar photovoltaic (PV) rollout for access growth. The uptake of solar PV and home systems, particularly, has gained

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<sup>15</sup>2020 Statistical Abstract, MEMD

attraction, largely due to innovative financing options such as pay-as-you-go. Additional work is required to increase access through on-grid and off-grid sources and disseminate clean cooking technologies. Increase operational efficiency in the utility companies and connect more customers to the grid:

- d) As of 2022, 6 billion barrels of oil were discovered in Albertine Graben, 1.36 billion barrels of which are recoverable. Gas resources were encountered in 13 sites in the Albertine Graben. In early 2022, the Final Investment Decision for the development of the oils for processing and export was taken, paving the way for the commencement of development<sup>16</sup>
- e) Create a competitive petroleum supply market in the country. Monthly imports of petroleum products for 2020 averaged 939.530 million litres, 45.871 million litres, 992.230 million litres and 69.608 million litres for petrol, kerosene, diesel and jet A1, respectively.
- f) Promote the use of renewable energy and energy-efficient technologies: Some progress regarding renewable energy deployment has been made mainly in cookstoves, biogas, and briquettes, 25 solar PV mini-grids piloted in northern Uganda, among others; Energy efficiency promotion has been carried out voluntarily through initiatives such as energy audits for high energy-consuming facilities, energy investments in selected facilities, voluntary minimum energy performance standards (MEPS) for five (5) appliances that are in place. Establishing standardized Power Purchase Agreements and Renewable Energy Feed-in-Tariff (REFIT) programme helped stimulate renewable energy projects.
- g) Manage energy-related environmental impact: Environmental and Social Impact Assessments (ESIA) are mandatory for all energy development projects, including but not limited to petroleum activities.
- h) Improving energy governance and administration: In addition to the already established Electricity Regulatory Authority, the policy also led to the formulation of other sector regulators, such as the Petroleum Authority and legislation, such as the; Petroleum Supply Act 2003, Atomic Energy Act 2008, Petroleum Acts 2013, Biofuels Act 2018, Mining and Minerals Act 2022. ,.

Despite the achievements above, there were also areas where performance did not meet the expectations of the policy.

First, during the previous policy period (2002-2022), low progress was made on clean cooking using improved stoves and alternative fuels and undertaking institutional energy audits. Continued efforts to advance energy efficiency will form a key focus of the Energy Policy for Uganda 2023.

Secondly, the Energy Policy for Uganda 2002 recognized that energy poverty exists at all levels in Uganda, with rural households particularly being affected by the poor quality of electricity services and relying heavily on biomass and wood fuel sources. Challenges around

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<sup>16</sup>2020 Statistical Abstract, MEMD

fuel substitution persist, with biomass remaining the primary energy source. The predominant use of wood fuel and inefficient charcoal stoves, cookstove liner production kilns and remain a major issue of focus for the new policy. Thus, the adoption and uptake of improved cookstoves, more efficient charcoal production technologies and more efficient devices and practices need to be promoted and accelerated.

Third, the institutional and regulatory frameworks for nuclear energy remain inadequate and as such nuclear energy continues to find limited applications outside of health. Therefore, the Energy Policy for Uganda 2023 will focus on creating a conducive environment for; introducing nuclear power in the electricity generation mix, ensuring sustainable utilization of nuclear fuel resources, increasing utilization of nuclear energy for disease diagnosis and treatment, industrial applications, research and development, and improving radioactive waste management will form a key focus of the Energy Policy for Uganda 2023.

Fourth, insufficiently skilled human resources, inadequate staffing, and limited training opportunities due to budgetary and financial constraints remain systemic challenges. Inefficient communication structures within the sector, due to a lack of a strong integrated planning and communication structure and limited access to finance, would stimulate investments in the energy sector.

Other challenges include the low affordability of clean energy partly due to debt service obligations, deemed energy as a result of evacuation infrastructure constraints, acquisition of land and wayleaves for energy projects and limited demand stemming from low productive use of energy, high power tariffs affecting industrial growth and affordability and enforcement of standards is still largely in the nascent stage hence poor-quality equipment and technologies remain a challenge, particularly for the renewable energy sub-sector.

## 2.2 Energy Balance, Demand and Supply Forecasts

In 2021, biomass contributed 90.5% of the primary energy consumed through firewood, charcoal and crop residues, electricity contributed approximately 1.5%, and fossil fuels (oil products) accounted for 8% of the national energy mix. Transport consumes 90% of oil products, whereas household kerosene consumes 6%.

The national rate of electricity connectivity access is 51%, with 19% on-grid and 32% off-grid access (UBOS 2022). The total installed generation capacity stood at 1,378.1 MW (June 2022), and peak electricity demand is approximately 850 MW. Households comprise the largest energy consumer group, followed by industry and transportation. In 2022, large hydro contributed 67% of Uganda's power production, small hydro 13%, co-generation from bagasse 8% while the remaining 12% is other technologies.

Under Vision 2040, the Government plans to transform the country from predominantly low-income to competitive upper-middle-income, reaching a per capita GDP of USD 9,500 by 2040. The Vision acknowledges energy as one of the critical fundamentals required to harness the country's opportunities and drive the industrial and service sectors. Strong growth in the national economy is bound to increase the energy demand and, thus, open the sector for further development. Ensuring effective strategies in developing energy resources and delivering energy services will be essential to achieving the targeted socio-economic transformation. Furthermore, Uganda's NDP III aims to attain sustainable industrialization for inclusive growth, employment, and sustainable wealth creation. Increasing access to stable, reliable, and affordable energy is one of the strategies pursued under that plan. Given this background, the energy sector will significantly contribute to achieving the goal.

Uganda's economy has grown at an average of 4.5% annually since 2010. The economy grew by 6.4% between 2018 and 2019, according to UBOS. As Uganda continues to pursue economic growth and industrialization, the Electricity Regulatory Authority (ERA) forecasts a base case scenario: energy demand in 2027 will stand at 7,664 GWh with a peak demand of 1,250 MW. This represents a year-on-year growth of 7%, starting from 2020. The Least Cost Generation plan envisages growth in generation from 872 MW in 2018 to 3,127 MW in 2027 on the base case scenario. For a large part of the focus period of the policy, planned energy supply will exceed demand, with most of the pipeline generation projects still being dominated by hydropower. In this regard, the Energy Policy will explore and propose strategies for increasing the uptake of electricity scheduled to be generated.

### **2.3 Problem Statement**

The main issues facing the energy sector: are low access to affordable, quality and reliable electricity, low access to affordable, reliable, modern and clean energy, limited energy security, inefficient utilization of energy, and low-cost sources of financing to enable self-sustainability which are caused by; inadequate power transmission and distribution infrastructure, low uptake to modern forms of energy, limited utilization of energy-efficient technologies, over-dependence on the traditional biomass resource for energy, inadequate investment in the exploitation of energy resources, lack of facilities for the management of energy waste, limited facilities to exploit energy resources and inadequate energy sector governance.

The main effects of the issues include; increased poverty, poor health care services, limited access to adequate and safe housing, poor education services, reduced access to safe drinking water and sanitation, increased incidence of violence, insecurity and conflict, increased environmental degradation, reduced economic growth, reduced economic productivity, reduced resilience and adaptive capacity to climate-related hazards, increased contamination of hazards chemicals to air water and land, increased death and illness due to pollution, constrained industrial growth, increased gender disparity, loss of revenue to

Government, reduced country potential as an investment destination, increased unemployment, poor information communication technology (ICT) services, low energy consumption per capita, increased deemed energy costs.

### **3 ENERGY POLICY DIRECTION**

#### **3.1 Policy Vision**

Achieve Universal Access to Sustainable, Affordable and Quality Energy Services for All Ugandans by 2040.

#### **3.2 Policy Mission**

To Ensure Reliable, Equitable, Efficient and Environmentally Sustainable Development, Management and Utilization of Energy Resources and Services.

#### **3.3 Main Policy Goal**

To Meet the Energy Needs of Uganda's Population for Social Economic Transformation in an Environmentally Sustainable Manner.

#### **3.4 Energy Policy Objectives**

The policy objectives are;

- i. Strengthen electricity generation, transmission and distribution infrastructure.
- ii. Increase electricity access and uptake of alternative modern forms of energy.
- iii. Enhance utilisation of energy-efficient practices and technologies.
- iv. Promote sustainable utilisation of biomass.
- v. Attract investment with financial sustainability in the development and utilisation of energy resources.
- vi. Promote nuclear energy development.
- vii. Promote emerging energy resources; geothermal, hydrogen, wind and other resources.
- viii. Enhance energy sector governance, capacity building and integrated planning.
- ix. Enhance the management of the energy-related environment, health and social safeguards.

#### **3.5 Outcomes of the Policy**

The implementation of the policy will result in the following outcomes;

1. Increased productivity and economic growth.
2. Increased household income and revenue to the Government.
3. Improved healthcare services.
4. Improved education services.
5. Improved environmental conservation.
6. Increased resilience and adaptive capacity to climate-related hazards.
7. Improved industrial growth.

8. Improved food security and sustainable agriculture.
9. Gender equity.
10. Improved investment environment.
11. Increased employment.
12. Improved regional social and economic integration.
13. Increased energy consumption per capita.
14. Eliminated deemed energy costs.

### 3.6 Policy Targets

The Energy Policy for Uganda aims to achieve the targets summarised below.

Table 2: Energy Policy Targets

#	Indicator	Baseline (2022)	Target (2040)
1	Households with at least one source of clean and modern energy on- and off-grid	51%	100%
2	Electricity generation capacity (MW)	1,378.1	52,481
3	Rate of grid electricity access	19%	80%
4	Electricity grid availability at transmission	97.87%	99%
5	Electricity grid availability at distribution	75%	95%
6	Electricity transmission and distribution Losses		
7	Electricity consumption (kWh per capita)	100	3,668
8	Population using clean cooking fuels and technologies	<15%	50%
10	Energy consumption from renewable energy sources	92.5%	>95%
11	Increased energy diversification (energy resources in the energy mix)	5	8
12	Biofuels (Ethanol and Biodiesel)		
13	Energy intensity (MJ per 2017 USD GDP)	9.97	3.7
14	Number of facilities utilising nuclear energy		
15	CO <sub>2</sub> emissions from energy activities (MtCO <sub>2</sub> e)	7.77	13.1

### 3.7 Guiding Principles

The following guiding principles underpin the energy policy:

1. **Sustainability:** Ensuring sustainable energy services delivery and utilisation of energy resources, strengthening local technical capacity, and financial and public awareness.
2. **Transparency and accountability:** Development of robust frameworks that enhance transparency, accountability, predictability and security.
3. **Health, safety and environment:** Advocating for sound health and safety in developing and implementing energy activities and projects. Active promotion of the sustainable management of the environment and natural resources.
4. **Capacity building and employment creation:** building human and institutional capacity and facilitating employment opportunities for Ugandans.
5. **Corporate governance:** facilitating and enhancing working procedures that fully comply with the principles of best governance practice.
6. **Continuous innovation, research and development:** Supporting the development of scientific research.
7. **Technology and knowledge transfer:** facilitating efficiency, sustenance and market, creating innovations and local knowledge transfer.
8. **Partnerships and communication:** Engagement and effective communication among all partners in designing, implementing, monitoring and evaluating energy programmes.
9. **Human rights, gender and equity responsiveness:** Mainstreaming human rights, gender, equity, culture and inclusiveness in the energy sector.

## 4 KEY ISSUES, POLICY STATEMENTS AND STRATEGIES

Uganda has abundant energy resources, mainly hydro, biomass and other renewable resources, yet widespread energy poverty exists throughout the country. Climate change impacts hydropower generation, while the high upfront cost of technologies hampers investment in other forms of renewable energy. International fossil fuel prices and fuel supply constraints make thermal power generation expensive.

Biomass contributed 90.5% of the total primary energy and 89.0% of the final energy consumption in Uganda Energy Balance 2020<sup>17</sup>

The national rate of electricity connectivity access is 51%, with 19% on-grid and 32% off-grid access (UBOS 2022), with a total installed generation capacity of 1,378.1MW (December 2022) and peak electricity demand of approximately 700 MW. Households comprise the largest energy consumer group, followed by industry and transportation. In 2022 hydro contributed 80% of Uganda's power production.

The GOU is committed to promoting legal, regulatory and structural sector reforms, including leveraging private sector investment, providing adequate, reliable and least-cost power generation to meet urban and industrial demand, and increasing sustainable energy access and scale-up energy access in rural areas to underpin broad-based development.

### 4.1 Strengthen electricity generation, transmission and distribution infrastructure

GOU has identified key focus areas in the energy sector in the NDP III, which aims to increase access and demand for electricity.

Uganda is experiencing economic growth and rapid urbanisation, which drive a steady increase in energy demand. Electricity demand is increasing by 8.2% annually, translating to 125,000 new customers yearly. Power generation capacity increased from 540MW in 2010 to 1,378.1 MW (December 2022). This swift expansion has been fuelled by a dynamic economy growing at an average annual rate of 7%, placing Uganda among the fastest-growing economies in the world. The Electricity Regulatory Authority (ERA) forecasts a base case scenario: energy demand in 2027 will stand at 7,664 GWh with a peak demand of 1,250 MW.

Expanding rural access to electricity is another critical factor driving demand. An estimated 49% of Uganda's population currently lacks electricity. Investment in Uganda's energy sector will continue to focus on increasing energy access by increasing supply.

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<sup>17</sup>2020 Statistical Abstract, MEMD

### 4.1.1 Electricity Generation

As of 2022, Uganda's Grid connected installed generation capacity stood at 1,378.1 MW, with a peak demand of about 793.98 MW, with approximately 19% national grid electricity access. The UEGCL owns power generation assets, namely Nalubaale, Kiira and Isimba hydropower stations, which amount to about 41.7% of the electricity generated in Uganda. The remaining generation comes from independent power producers (IPPs). The largest IPPs are Bujagali Energy Limited (18.5% of the total installed capacity), alongside 36 smaller private generation plants.

**Table 3: Installed capacity**

	Category	MW	%age of Total
1	Large Hydro	813	60.2
2	Small Hydro	274.29	20.3
3	Thermal	100.00	7.4
5	Cogeneration	102.4	7.6
6	Solar PV	60	4.4
	<b>Total</b>	<b>1349.6</b>	<b>100.0</b>

To diversify the power generation sources and promote the development and use of renewable energy sources, the GoU has developed a feed-in-tariff structure. Renewable energy in the context of REFIT is defined as electricity, which can be generated from energy resources such as hydro, wind, solar, geothermal, biogas and biomass. The REFIT applies to small-scale renewable energy systems of prescribed priority technologies up to a maximum installed project capacity of 20 MW, as defined by the Electricity (Amendment) Act, 2022.

Uganda Vision 2040 provides development paths and strategies to operationalise Uganda's Vision statement, "A Transformed Ugandan Society from a Peasant to a Modern and Prosperous Country within 30 years". Electricity will be one of the key drivers to meet the objectives of Vision 2040. Table 4 presents the forecast for available energy sources by 2040.

**Table 4: Uganda's energy mix and investment requirements by 2040**

RESOURCE	(MW)	ENERGY MIX (%.ge. share)	COST PER MW (MILLION USD)	INVESTMENT COST (MILLION USD)
Hydro	4,500	9.0	1.97	8,865
Geothermal	1,500	3.0	4.44	6,660
Solar	12,000	20.0	2.41	24,100
Nuclear	24,000	48.0	6.77	162,480
Co-Generation	1,000	2.0	2.6	2,600
Green Hydrogen	2,500	5.0	2.1	5,250
Gas	3,400	6.0	5.7	17,100
Waste to Energy	1,000	2.0	8.8	8,800
Wind	200	0.4	2.5	500
Thermal	1,500	3.0	3.62	5,430
Peat	800	1.6	4.06	3,248
<b>TOTAL</b>	<b>52,400</b>	<b>100</b>		<b>245,033</b>

Source: Ministry of Energy and Mineral Development

### Key Issues

- a) Uncoordinated execution of power generation in line with transmission and distribution infrastructure.
- b) Undiversified electricity generation mix.
- c) Under exploitation and development of the immense hydro potential.
- d) High-generation tariffs arising from commercial loan financing, among other unfavourable financing terms, affect end-user tariffs.
- e) Ageing generation infrastructure, e.g. Nalubaale hydropower station, increases the risk of unreliable supply.
- f) High maintenance costs of hydropower stations commissioned from 1990 – 2020 arising from technologies with a short useful life.
- g) Inadequate usage of electricity generation sites for alternative commercial activities, e.g. tourism, recreation etc.

- h) Lack of a national electricity resources potential database.
- i) Limited adoption of PPP arrangements in the sector.
- j) Lack of financial self-sustainability for generation investments.

### Policy Statement

The Government shall promote safe, reliable and sustainable electricity supply based on integrated planning and facilitate stable regional electricity trade.

### Strategies

1. Establish a planning framework for sequencing power generation in line with transmission and distribution infrastructure and demand forecasts.
2. Promote the development of alternative generation sources based on an integrated resource plan to diversify the energy mix and mitigate over-reliance on hydropower.
3. Develop and implement a Strategic Asset Management Framework based on utility best practices for generation infrastructure.
4. Undertake refurbishment of ageing generation infrastructure to improve reliability
5. Efficiently manage the Victoria Nile cascade operations and implement an Emergency Preparedness and Response Plan.
6. Develop and implement a national safety regulatory framework for hydropower dams and other generation facilities.
7. Establish policy guidelines and a collaborative risk management approach to prepare bankable projects.
8. Establish the national electricity resources potential database.
9. Undertake feasibility studies for large generation projects, including hydropower, to inform GoU and control project costs.
10. Develop a country-integrated resource plan.

#### **4.1.2 Electricity Transmission**

As of 2021, the transmission grid comprised of 496Km of 400kV, 1002km of 220kV, 2348.84km of 132kV, and 35.2km of 66kV high voltage transmission lines and 29 substations.

To ensure that the future electricity needs of the nation are satisfied, there is a need to have significant capital investments in the power sector. Such investments comprise generation plants, transmission lines and expansion of the distribution network. The Grid Investment Plan projects have been classified into the following categories:

- Power evacuation projects

- Grid re-investment projects
- System Expansion Projects
- Regional interconnection Projects

By the end of the planning period (2040) and upon successful implementation of this plan, the Grid shall have a total length of about 13,029.43km, 55 additional substations and 17,229MVA additional transformation capacity. Tables 5 and 6 below illustrate the incremental transmission line length, number of substations and transformational capacity during the period.

Table 5: Transmission line length growth by 2040

<b>Line Voltage (kV)</b>	<b>Line Length 2017 (km)</b>	<b>Line Length 2040 (km)</b>	<b>Additional Grid (km)</b>
66	35.20	35.20	0
132	1,406.99	6,688.99	5,282.00
220	260.00	2,939.84	2,679.84
400	0	3,365.40	3,365.40
<b>TOTAL</b>	<b>1,702.19</b>	<b>13,029.43</b>	<b>11,327.24</b>

Table 6: Additional substations and transformation capacity by 2040

	<b>2017</b>	<b>2040</b>	<b>Additional Grid</b>
No. of Stations (Substations and Switching Stations)	18	73	55
Transformation Capacity (MVA)	1,640.5	18,870	17,229

#### Key Issues

- Inadequate coverage of the transmission infrastructure.
- Vandalism of the transmission network.
- Land and wayleaves acquisition challenges.
- Inadequate framework to evacuate embedded generation through intermediate networks.
- Relatively high electricity transmission losses compared to regulatory targets

- f) Inadequate grid automation.
- g) Lack of participation of private players in the transmission sector.
- h) Lack of financial self-sustainability for transmission investments.
- i) Inadequate technical capacity in the transmission sector.

### Policy Statement

The Government shall promote safe, reliable and sustainable electricity supply based on integrated planning and facilitate stable regional electricity trade.

### Strategies

1. Facilitate investments in adequate redundancy to improve reliability.
2. Develop an interagency framework and laws for punitive measures for culprits.
3. Promote and implement measures to reduce transmission losses.
4. Improve mechanisms and laws for the timely acquisition of wayleaves for transmission projects and provide infrastructure corridors for transmission.
5. Develop comprehensive legal and regulatory frameworks to evacuate embedded generation through intermediate networks.
6. Develop mechanisms to enable embedded generators to sell energy directly to distribution utilities and large consumers.
7. Invest in a robust and smarter transmission grid.
8. Allocate funds for the implementation of the Transmission Master Plan.
9. Develop Regulatory Framework and Incentivise Private Sector Participation in Transmission.
10. Build the technical capacity for the transmission sector.

#### **4.1.3 Electric Power Distribution**

As of 2021, the distribution network covered; (a) 27,037 km of Medium Voltage (MV) lines operated by UEDCL, UMEME and WENRECo, (b) 29,096 km of Low Voltage (LV) lines operated by UEDCL and UMEME, (c) 19,173 transformers operated by UEDCL, UMEME and WENRECo, and (d) the total number of customers stands at 1,789,969 from UEDCL and WENRECo.

The energy losses, i.e. commercial and technical, were at; 25% and 17% for UEDCL and UMEME, respectively.

### Key Issues

- a) Lack of a self-sustainable financial growth model for capital investment in the tariff.
- b) The private sector dominated investment and operation of the distribution network.
- c) Inefficient fragmented operation of the distribution network.
- d) High technical and commercial losses on the electricity distribution network.
- e) Vandalism of the distribution network.
- f) Low reliability of power distribution.
- g) Inadequate standardisation and regulation of equipment.
- h) Low coverage of the distribution network.
- i) High upfront connection costs on the distribution network.
- j) Limited integrated planning for network expansion, including rural electrification.
- k) Inadequate automation of the distribution network and net metering.
- l) Wayleaves comment from transmission/generation-transfer here.
- m) The erroneous categorisation of beneficiaries for free connection under the Electricity Connections Policy.

### Policy Statement

The Government shall promote safe, reliable and sustainable electricity supply based on integrated planning and facilitate stable regional electricity trade.

### Strategies

1. Government should dominate investments in the distribution network.
2. The regulator should implement a capital growth model by including capital recoveries for all government investments into the tariff for financial sustainability.
3. Strengthen the distribution network to reduce technical losses and improve network reliability.
4. Implement innovative measures to reduce commercial losses.
5. Incentivize performance for improved reliability.
6. Promote and enforce standardisation and regulation of all equipment used by distribution utilities, particularly energy meters and wooden poles.
7. Increase investment in the distribution network expansion, maintenance and operations.
8. Devise innovative financing mechanisms for the end consumers.
9. Improve coordination of industrial developments between utilities and other MDAs to ensure timely and adequate distribution infrastructure implementation.
10. Develop infrastructure to facilitate net metering and smart Grid.
11. Copy the Wayleaves solution from generation/transmission and drop it here.
12. Consolidate the service territories in the distribution network.

#### 4.1.4 Electricity Access Options: On-Grid, Off-Grid, Rural Electrification and Standalone systems

Uganda's current level of rural electrification is significantly low; only 8% of rural residences have grid connectivity, 3% have solar home systems, 28% rely on solar lighting systems or solar lanterns, and less than 1% are electrified through mini-grids<sup>18</sup>. The Government is committed to fostering technological and business model innovation, entrepreneurship, finance mobilisation, local capacity building and community engagement to support the translation of energy access into measurable economic development.

The Government of Uganda implements projects that include the following types: Grid extension, Independent Grids and Off-grid Solutions, Photovoltaic systems and Renewable energy generation projects.

At a strategic level, the Electricity Connections Policy sets a plan and target to achieve a 60% connection rate by the year 2027, representing 6,303,923 households both on-grid and off-grid, of which 67% (4,223,628 households) are to be realised on the Grid. The annual target has been set at 300,000 connections.

The Electricity Connections Policy has quantified the required funding to achieve a 60% access rate by 2027 as USD 558.4 million.

##### General Issues

- a) Low levels of national electricity access.
- b) Limited focus on transforming energy access into socio-economic value addition, with low productive use of energy constraining demand growth.

##### On-Grid Access Key Issues

- a) Costly grid extension to sparsely populated settlements with low energy consumption.
- b) Inability of Service Providers to leverage sizeable financing to stock adequate connection materials.
- c) Limited financial and technical capacity in managing rural distribution concessions operated by the private sector.
- d) Limited ability to pay for house wiring hinders connectivity to the Grid.
- e) Overlapping mandates in rural distribution assets ownership.
- f) Limited business and technical experience within communities in efficiently utilising electricity for economic value addition.
- g) Slow pace in creating demand for electricity in rural areas.

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<sup>18</sup> UBOS, ERT III Baseline Survey Findings, 2018

### Mini-Grids Access Key Issues

- a) Inadequate regulatory framework for mini-grid development.
- b) Lack of anchor loads in areas that are suitable for mini-grids to make them financially more viable.
- c) Limited business and technical experience within communities in efficiently utilising electricity for economic value addition.
- d) High risks for developers in the absence of a grid arrival compensation scheme
- e) Limited capacity for operation and maintenance of mini-grid systems.

### Standalone Off-Grid Systems / Solar Home Systems Key Issues

- a) Inconsistent component standards, faulty installations and importation of sub-standard products for standalone off-grid systems.
- b) Limited capacity for operation and maintenance of off-grid systems.
- c) Lack of a firm (self-)regulatory environment for off-grid private sector players.
- d) Limited potential for delivering electricity for productive use and economic development.
- e) Due to limited financial means, there is a low uptake of off-grid technologies and efficient electrical appliances in rural areas.
- f) Inconsistent fiscal policies related to off-grid systems and components.

### Policy Statement

The Government shall facilitate the provision of reliable, stable and equitable electricity services through on-grid, off-grid and standalone solar systems to all Ugandans towards achieving universal access by 2030.

### General strategies

1. Ensure that on-grid and off-grid electrification follows up-to-date Master Plans.
2. Develop appropriate support mechanisms for private-sector rural electrification initiatives without undermining the market delivery approach.
3. Support implementation of national electrification plans with appropriate local skills development initiatives in required technologies, operation, and maintenance.
4. Develop and roll out a productive use of energy (PUE) intervention toolkit, which combines electric appliance financing with local technical and business training to enable electricity-enabled income generation in rural electrification initiatives.
5. In addition to the overall connection target, define and aspire to reach connection targets by type of connection (household electricity connection, commercial / business connection, industrial connection).
6. Create stronger institutional links between Central Government and districts to implement and review electrification master plans efficiently and to enhance community engagement and innovation.

### On-Grid Access Strategies

1. Deploy low-cost grid extension technologies.
2. Promote grid densification and intensification while ensuring equitable service provision across the country.
3. Facilitate the acquisition of connections materials by service providers to meet increased connection targets through capacity building and institutional strengthening
4. Apply appropriate technical standards and low-cost technology options for customers with limited ability to pay for house wiring.
5. Facilitate three-phase customer connections through the provision of credit
6. Streamline ownership and handover of distribution assets constructed for rural electrification.
7. Integration of centralised and decentralised electrification to accelerate the pace of electrification.

### Mini-Grids Strategies

1. Develop a comprehensive legal, regulatory and commercial framework for mini-grids, including tariff policy, subsidies, grid arrival, technical specifications, quality of service standards and consumer protection.
2. Promote bundled mini-grid tenders to increase economies of scale, optimise tariffs and procure competent mini-grid developers.
3. Develop tariff-setting methodologies appropriate for mini-grids.
4. Define technological and compensation details of integrating mini-grids into the national Grid once the latter arrives at a mini-grid location to minimise developer risks.
5. Collect and disseminate market data to prospective mini-grid developers and undertake pre-feasibility studies for identified sites to minimise investment risk.
6. Support targeted productive use of energy (PUE) interventions in mini-grids with tailored appliance finance provision and local skills development based on local PUE potential assessments in agriculture, manufacturing, industrial and service sectors.
7. Raise awareness among communities and local governments of mini-grids' potential for reliable electricity provision and productive energy use.

### Standalone Off-Grid Systems / Solar Home Systems Strategies

1. Support last-mile distribution of standalone systems and promote innovative solutions for last-mile distribution.
2. Promote standalone solar systems for productive use activities, including solar water heating, solar drying and cooling, solar cookers, solar water pumping and irrigation solutions.
3. Sensitise districts and communities on the role that standalone systems play in the overall energy policy vision for the country.

4. Continually update and enforce quality standards for components, installation, maintenance and after-sales service of standalone energy technologies at national and local levels.
5. Promote appropriate mechanisms to mitigate the adverse environmental effects of off-grid electronic waste.
6. Enhance the affordability of standalone solar systems by providing appropriate fiscal and other incentives.
7. Strengthen the capacity of the private sector for self-regulation under the relevant umbrella associations.
8. Encourage the off-grid efficient products market by developing product quality standards for off-grid equipment.
9. Streamline fiscal policies related to off-grid systems and components.
10. Foster small-scale financing mechanisms for efficient household appliances in low-income areas.
11. Provide public information and education on standards, self-regulation and counterfeit products.

## 4.2 Increase uptake of modern forms of energy

### 4.2.1 Renewable Energy

Uganda is a landlocked nation endowed with renewable energy (RE) resources distributed evenly across the country. Biomass is the most essential energy source for Ugandan populations, accounting for 90.5% of the primary energy consumed. Hydropower remains the nation's dominant source of electric energy production, with a potential of over 4500 MW. RE has the potential to enhance energy security and reliability; generate income and create employment; enable substantial foreign exchange savings by reducing dependence on imported fuels and their attendant price volatility, and mitigate climate change as it has minimal adverse effects on the environment.

The following sections present renewable energy sub-sectors: biomass, hydro, wind, solar, geothermal and waste to energy. The general issues, policy statement and strategies are presented below for all renewable sources and technologies, including hydro and wind energy, and details of selected sources are highlighted in the subsequent sub-sections.

#### General Issues

- a) Inadequate information and data on available renewable energy resources.
- b) Limited access to affordable credit and financing for renewable energy projects and technologies.
- c) Inadequate legal, regulatory & institutional frameworks in place.
- d) Limited enforcement of quality standards for renewable energy technologies and products.
- e) Low awareness and appreciation of renewable energy resource(s) and technologies potential, economic benefits, opportunities, and applications.
- f) Limited technical and institutional capacity to develop, promote, deploy, utilise and manage/maintain renewable energy technologies/solutions.

#### Policy Statement

The Government shall promote the sustainable development and utilisation of all renewable energy resources in a socially and environmentally responsible manner.

#### General Strategies

1. Conduct national renewable energy resource assessments, including small hydropower and wind energy resources.
2. Foster research and development of renewable energy technologies/solutions

3. Promote technology transfer in developing renewable energy solutions through regional demonstration centres, exhibition centres, technical training/skills transfer centres and renewable energy-centred labs.
4. Provide incentives to promote the local production and use of renewable energy technologies/solutions.
5. Establish and/or strengthen information exchange/knowledge-sharing platforms to foster knowledge transfer.
6. Develop comprehensive legal, regulatory and institutional frameworks for effective and sustainable renewable energy development and utilisation.
7. Conduct public awareness campaigns on renewable energy's environmental, social and economic benefits.
8. Develop renewable energy resource investment guidelines and strategy
9. Strengthen renewable energy sub-sector/ecosystem coordination on platforms and mechanisms.
10. Strengthen the capacity of the private sector for self-regulation under the relevant umbrella associations.
11. Establish and enforce appropriate standards for modern renewable energy technologies.
12. Promote land use planning for large-scale renewable energy projects, including solar and wind.

#### **4.2.1.1 Solar Energy**

Uganda is endowed with 5-6 kWh/m<sup>2</sup> radiation per day on flat surfaces. The insolation is highest at the Equator. However, it varies up to a maximum of 20% from place to place away from the Equator. The dryer areas (northeast) have the highest temperatures, and the lowest in the country's mountainous areas (southwest). The total estimated potential is about 5,300 MW. These resources remain largely untapped due to the perceived technical and financial risks. Solar energy is used for productive uses such as irrigation, water heating, refrigeration, lighting, telecommunications, and other commercial activities.

This section focuses on Grid-connected solar PV power and solar thermal technologies. Solar Home Systems (SHS) are covered under Off-Grid Electricity Access.

### Key Issues

- a) Lack of an enabling framework for exporting and selling surplus captive power from solar PV self-generating facilities to the National Grid.
- b) Limited awareness of solar thermal system standards.
- c) Faulty installations, importation of sub-standard systems and poor after-sales service undermine market confidence in solar thermal energy products and solar PV systems.

### Policy Statement

The Government shall promote the optimal development of Grid solar PV through integrated resource planning and widespread use of solar thermal technologies in compliance with regulations and standards.

### Strategies

1. Support renewable energy auctions for accelerated deployment of solar power through private sector participation.
2. Incorporate storage into large solar PV generation where it is financially viable.
3. Develop innovative operation and maintenance schemes (including but not limited to technical capacity building) for solar PV and solar thermal projects.
4. Develop a framework for integrating surplus captive power from self-generating facilities to the National Grid through direct sales or net metering.
5. Provide and/or enhance tax incentives and waivers for solar PV systems and thermal equipment.
6. Undertake awareness to promote solar PV systems and solar thermal technologies.
7. Enforce regulations on standards and existing building codes for the appropriate use of solar PV systems and appropriate use of solar thermal technologies.
8. Regular review of standards for solar energy technologies and equipment.
9. Support hybrid power generation systems involving solar and other energy sources to cater for peak demand periods and manage the effects caused by the intermittent nature and availability of solar energy.
10. Enhance penalties for theft and vandalism of solar systems.
11. Promote quality installations, local innovations in solar PV and thermal technologies, and hybridisation with alternative power sources to cater for peak demand periods.
12. Increase government investment public in the development of Grid-connected solar PV plants.
13. Promote the development of floating solar projects

#### **4.2.1.2 Waste to Energy**

Uganda presents energy generation as a cost-effective source to increase energy access and consumption and reduce energy poverty. Uganda intends to invest in bioconversion

technologies to unlock the potential for abundantly available biomass, animal waste and municipal waste using more efficient technologies to maximise energy recovery. Appropriate waste-to-energy technologies, e.g. briquetting, power generation from biogas or incineration, will provide alternative energy sources for cooking and electricity while providing effective waste management solutions.

The total energy potential of the residues amounts to 260 PJ/year, which is about 70% of Uganda's gross biomass energy requirement. Crop residues had the highest contribution of about 150 PJ /year, followed by animal residues with a potential of 65 PJ /year. Maize residue is the predominant crop residue with an energy potential of 65 PJ/year, followed by beans and bananas, each at 16 PJ/year. Agricultural and forest residues can be a significant renewable energy source for Uganda<sup>19</sup>.

#### Key Issues

- a) Inadequate data and information on the quantity and type of municipal waste and its potential energy output and market.
- b) Inadequate and inappropriate waste collection, transportation and poorly managed dumping sites hinder waste-to-energy conversion, especially outside Kampala.
- c) Lack of wastewater and faecal sludge management facilities in many urban areas, and fewer with energy recovery systems.

#### Policy Statement

The Government shall promote the effective collection, transportation and processing of municipal waste streams as alternative energy sources.

#### Strategies

1. Undertake feasibility studies to determine the economic potential for waste to energy in collaboration with relevant Ministries, agencies and municipal authorities.
2. Develop regulatory frameworks to address the management and utilisation of municipal waste to energy in collaboration with municipal authorities.
3. Promote public and private sector investment in waste-to-energy generation in cities and urban centres.

#### **4.2.1.3 Mini, Micro and Pico Hydros**

Micro hydro is a hydroelectric power that typically produces from 5 kW to 100 kW of electricity using the natural water flow. Mini hydro is a hydropower system that generates electric power from 100 kW to 1MW capacity and serves nearby households through a mini-grid. Pico hydro is a term used for hydroelectric power generation under 5 kW. These

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<sup>19</sup>Collins Okello et al, Biomass and Bioenergy, Volume 56, September 2013, Pages 515-525: Bioenergy potential of agricultural and forest residues in Uganda

hydro resources sites are mainly located in the Western and Eastern regions of the country, which are hilly and mountainous. About 64 potential small hydropower sites have been identified on the rivers in these regions. Thirty (30) of these sites have been developed. At the end of 2020, small-scale hydropower contributed 155.7 MW to overall installed power in Uganda.

### Key Issues

- a. Encroachment on riparian areas, threatening long-term resource viability.
- b. Inadequate financial resources and technical capacity for feasibility studies and resource development.
- c. Competing interests between developing the sites and using land and water resources by the concerned communities and institutions.
- d. Vandalism of electric power infrastructure.

### Policy Statement

The Government shall promote sustainable exploitation and utilisation of Mini, Micro and Pico Hydros as alternative energy sources in Uganda.

1. Finance conservation and utilisation of Mini, Micro and Pico Hydros resources catchment areas.
2. Provide incentives for Public-Private Partnerships in small hydros.
3. Invest in hydrological data collection, management and dissemination.
4. Promote the development of capacity and knowledge on the usage of appropriate technologies.

## **4.2.2 Clean cooking**

More than 85% of Ugandans live in rural areas, and about one-third of Ugandan households are headed by women. Unprocessed biomass makes up over 90.5% of fuel use, including cooking on charcoal makes up 13%, and LPG and kerosene are each 0.5%. Most rural households use firewood for cooking, and less than 10% of the population employs clean cooking practices. Uganda's forested land is shrinking by 2.6% a year. Only 15 to 26% of the total land area is still covered by forest, and nearly 22% of the population lives in areas without trees<sup>20</sup>. Using inefficient cooking devices combined with unsuitable cooking spaces is responsible for 8.2% of infant deaths in Uganda<sup>21</sup>. This is due to exposure to indoor air pollution (IAP) resulting from using inefficient fuels, predominantly charcoal and fuelwood. Clean cooking fuels and technologies

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<sup>20</sup>Uganda Clean Cooking Behavioural Diagnostic, ESMAP 2019

<sup>21</sup>GVEP International, 2012

These include improved cook stoves, ethanol, LPG, solar, biogas and electricity. Uganda has less than 5% uptake of clean cooking technologies and fuels (ESMAP 2019).

#### Key Issues

- a) Relatively high cost of clean cooking technologies and equipment relative to traditional dominant biomass methods.
- b) Unreliable supply of clean cooking technologies.
- c) Unreliable supply of clean cooking fuels.
- d) Insufficient awareness in the promotion of clean cooking.
- e) Inadequate equipment to produce, purify and package clean cooking fuels.

#### Policy Statements

The Government shall promote equitable and widespread use of affordable, clean and efficient cooking technologies.

#### Strategies

1. Develop and enforce a comprehensive legal, regulatory and commercial framework for the clean cooking sector.
2. Promote local manufacture of clean cooking equipment, fuels and accessories.
3. Provide fiscal incentives, e.g. subsidies, loans and tax incentives, to encourage private sector involvement in the clean cooking sector.
4. Support the growth of women, youth, persons with disabilities and displaced persons as promoters, suppliers, leaders and manufacturers of clean cooking equipment and resources.
5. Establish and implement national standards, labelling and certification programs for the clean cooking sector.
6. Establish regional centres of excellence to raise awareness and provide training and knowledge transfer on the fabrication, operation and maintenance of clean cooking technologies.
7. Promote purification and packaging of biogas for cooking.

#### **4.2.2.1 Liquefied Petroleum Gas for cooking**

Only 0.5% of the households in Uganda use LPG energy for cooking. The remaining households predominantly relied on biomass, with a further minority using kerosene or electricity as highlighted in 4.2.2.

The Ministry LPG Baseline study of 2017 established that uptake of the product was severely constrained by several challenges, amongst which were supplies, infrastructure and awareness constraints. Even with 20-plus players in the LPG industry, uptake levels

for the product are still barely at 1% of the household population, with consumption growing from a paltry 7,000 Tons 10 years ago to only 18,934 Tons in 2018.

#### Key Issues

- a) Inadequate regulations, technical standards and certification of LPG cylinders and accessories.
- b) Lack of safety standards for LPG filling stations.
- c) Inadequate market development for LPG has led to limited investments, unreliable supply, over-reliance on imports and limited-service points, especially in rural areas
- d) Lack of local production of LPG.
- e) Limited awareness regarding LPG use, benefits and safety.
- f) Lack of climate-friendly green hydrogen development.

#### Policy Statements

The Government shall promote access to affordable, reliable, clean LPG energy services.

#### Strategies

1. Develop, monitor and enforce comprehensive LPG regulations and standards
2. Develop standards for cylinder and accessory equipment certification.
3. Create awareness by undertaking training and information dissemination on the use of LPG, including health and safety tips.
4. Develop technical capacity on LPG services and assess the possibility of a universal valve policy.
5. Support the development of Central and Regional LPG storage and distribution infrastructure facilities to ensure stock availability for sustainable supply.

### 4.3 Promote sustainable utilisation of biomass

Biomass is presently the most utilised energy source for the Ugandan population, accounting for 90.5% of the primary energy consumed. Biomass resources are abundant and diverse due to different vegetation and land use types in Uganda. The total standing biomass stock is estimated to be 284.1 million tons, with a potential sustainable biomass supply of 45 million tons<sup>22</sup>. The major sources are hardwood plantations, which consist of eucalyptus (50%), pine trees (33%) and cypresses (17%). Current accessible, sustainable wood biomass supply is estimated to be 26 million tons. The theoretical potential production of agriculture residues lies between 1.186 million and 1.203 million tons annually<sup>23</sup>. The sugar industry is the only sub-sector that utilises biomass residues for electricity production. A small amount of coffee and rice husks is also utilised for heat production in cement and tiles manufacturing and the production of briquettes. The transition from traditional biomass, often perceived as inefficient, to modern biomass and biofuel production and consumption, is a main focal area of the Government. Biomass takes three forms, namely; solid (firewood, charcoal, briquettes), liquid (ethanol) and gaseous (biogas).

#### Key Issues

- a) Limited information on available biomass energy resources.
- b) Inadequate biomass feedstock supply and limited investment in structured biomass production within forest landscapes.
- c) Inadequate standardisation and certification of biomass products.
- d) Unsustainable use of solid biomass fuels in households, institutions, commerce and industry, mainly through traditional technologies.
- e) Inadequate institution coordination for the sustainable production and utilisation of solid biomass.
- f) Underdeveloped market for efficient biomass energy technologies utilisation.
- g) Lack of biofuels market-demand development.
- h) Limited knowledge of potential feedstock sources for biofuel production.
- i) Lack of legislation and regulations to manage gaseous biomass.
- j) Socio-cultural reservations against the use of gaseous biomass for cooking.

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<sup>22</sup>2015 Energy Survey, MEMD

<sup>23</sup> Adebayo Fashina et al., The Drivers and Barriers of Renewable Energy Applications and Development in Uganda: A Review, May 2018

## Policy Statement

The Government shall promote sustainable biomass energy production and utilisation across all sectors.

## Strategies

### *General*

1. Support biomass resource assessment to evaluate the potential for proper planning.
2. Promote feedstock growth and dedicated land for sustainable commercial biomass energy production in collaboration with other MDAs.
3. Promote the standardisation, certification, labelling and packaging of biomass technologies and fuels.

### **4.3.1 Solid Biomass**

1. Develop appropriate legislation and regulations to promote and govern the use of solid biomass along its entire value chain in a sustainable, modern and clean manner.
2. Mainstream sustainable biomass energy production in the environment, health and economic sectors.
3. Encourage farmers to practice agro-forestry for charcoal production using suitable fast-growing tree species and appropriate cultural practices.
4. The Government to develop, update and disseminate information on biomass energy resources.
5. The Government is to undertake a comprehensive baseline study on biomass energy resources and potential and establish the status of tree cover in the country.
6. Promote standardised commercialisation of charcoal and reduce hardwood species depletion through appropriate valuation by weight instead of unspecified volumes.
7. Undertake public sensitisation and awareness programmes to enhance participation in environmental management, protection, and conservation.
8. Provide incentives for private sector participation in conversion of waste to energy initiatives to reduce overreliance on Biomass energy.
9. Promote alternative energy sources and technologies such as LPG, biogas, electric cooking, ethanol and solar as substitutes for biomass.
10. Streamline and implement coordination between Ministries, Departments, Agencies (MDAs) and other institutions to enforce regulations in managing solid biomass production and utilisation.
11. Promote efficient charcoal and brick production kilns, e.g. Casamance Kilns, Retorts, and Hoffman kiln.

12. Collaborate with other stakeholders to ensure efficient use of land resources for biomass, food production and other human needs.
13. Support market development, entrepreneurship and SMEs for sustainable biomass energy technologies and products.
14. Undertake and promote Research, Development and Dissemination (RD&D) of biomass energy technologies.

#### **4.3.2 Liquid Biomass**

1. Promote the deployment and adoption of liquid biomass technologies, e.g., ethanol stoves.
2. Develop appropriate regulations to support the use of biofuels in the domestic, transport and commercial sectors.
3. Undertake RD&D on biofuel feedstock.
4. Promote the development of the liquid biofuels market, and provide incentives for private-sector investment.
5. Perform detailed feasibility studies on biofuel feedstock and map site suitability.
6. Support resource assessments to evaluate the production potential of liquid biofuels.
7. Review the existing legal, fiscal, regulatory and institutional framework.
8. Provide tax incentives and a stable tax regime for power ethanol to enhance affordability
9. Collaborate with other stakeholders to ensure efficient land resource use for biofuel feedstock, food production and other human needs.
10. Create stakeholder awareness and sensitisation on the importance and viability of biofuel production and consumption.
11. Implement the bioethanol and biodiesel blend pilot program.

#### **4.3.3 Gaseous Biomass**

1. Develop comprehensive standards for the production and use of gaseous biomass
2. Support biomass resource assessment to evaluate the production potential of gaseous biofuels.
3. Provide appropriate fiscal incentives for local biogas plant and equipment manufacture, large-scale production, storage, and distribution.
4. Promote inter-fuel substitution in households and industry by creating and maintaining appropriate taxation systems.
5. The Government to initiate capacity-building programs on biogas technology in learning institutions.
6. Disseminate biogas technology-related information in local languages.
7. Promote biogas production and use for small and large-scale thermal and electrical applications.

8. Promote household and institutional biogas and bio-latrines installations.
9. Promote research and development in thermal gasification technologies and their inclusion in educational curricula.
10. Roll out biogas initiatives to supply the remaining public institutions, including prisons, schools and hospitals, and biogas bottling plants nationwide.

#### 4.4 Promote the adoption of energy efficiency and conservation practices

Energy efficiency is the use of less energy to perform the same task or produce the same result, whereas Energy Conservation is the effort made to reduce energy consumption by using less energy service. Energy efficiency is a core element of ending energy poverty and securing access to affordable, reliable, sustainable, and modern energy. Implementing energy efficiency in parallel with expanding the electricity grid and new clean energy generation reduces energy demand. It helps optimise energy supply to serve more customers reliably at minimum cost. Adopting efficient technology and appliances and informed energy management practices allows rapid scaling up of energy efficiency to ease energy constraints and lower utility bills for both the public and private sectors while supporting a sustainable framework for long-term energy stability.

This section considers interventions for cross-sectoral Demand Side Management (households, institutions, industry, commerce, agriculture and transport).

##### 4.4.1 Cross-sectoral Demand-side Management

###### Key Issues

- a) Availability of obsolete technologies on the market
- b) Low-income levels.
- c) Inadequate testing facilities
- d) Cultural resistance/mindset to the adoption of energy-efficient technologies.
- e) Availability of cheaper inefficient alternative technologies.
- f) Limited access to more affordable energy-efficient technologies.
- g) Underdeveloped market of energy-efficient technologies.
- h) Limited information on efficient equipment/technologies.
- i) Limited capacity.
- j) Inadequate standards, guidelines and regulations.

###### Policy Statement

Government shall put in place an enabling framework to promote energy efficiency across all sectors of the economy.

###### Strategies

1. Develop standards and regulations for energy efficiency across all sub-sectors.
2. Put in place a communication and dissemination strategy for energy efficiency.
3. Build capacity through energy efficiency training programmes for the public and private sectors.
4. Support the establishment of energy efficiency research and development facilities.

5. Promote and incentivise switching from inefficient use of woody biomass to alternative efficient fuels and technologies, e.g. LPG, biogas, briquettes, electric pressure cookers, solar cookers etc.
6. Designate and regulate energy usage among high-energy-consuming industries
7. Promote the implementation of Energy Management Systems (EMS) in high energy-consuming facilities.
8. Promote the undertaking of energy audits for designated energy consumers.
9. Support the implementation of the Building Code to promote energy efficiency in buildings.
10. Establish a certification programme for energy auditors and the accreditation of inspectors for energy efficiency standards.
11. Promote energy-efficient and green cooling initiatives.
12. Promote Productive Use of Energy.

#### **4.4.2 Transport**

In line with Vision 2040, the GoU intends to develop a more secure and efficient transport sector. There is a strong desire to improve the current system of transporting goods. To obtain economic growth and to develop the country in the desired direction, it is necessary to adapt the transport processes according to set goals. The GoU is focusing on improving the infrastructure, as it expects to help the country keep developing in line with the targets stated in Vision 2040. Since transport consumes 90% of imported oil products, efficiency initiatives in the sector will contribute to improved energy security and trade balance.

##### Key Issues

- a) Lack of legal framework and infrastructure to facilitate introducing and using electric mobility.
- b) Lack of knowledge and awareness regarding fuel efficiency and clean electric mobility.
- c) The dominance of old and energy-inefficient engines in motorised transport resulting in increased fuel consumption and high emissions.
- d) Inadequate mass transit system resulting in increased traffic congestion and high energy consumption per passenger.
- e) Increased use of two- and three-wheelers results in higher inefficient fuel use and emissions.
- f) Inadequate and poor infrastructure to facilitate the use of more energy-efficient modes of transport.
- g) Lack of infrastructure to facilitate the introduction, use and scale-up of clean and electric mobility.

### Policy Statement

The Government shall promote clean mobility and energy efficiency in the transport sector and facilitate investments in related infrastructure.

### Strategies

1. Provide legal framework and infrastructure to facilitate introducing and using electric mobility.
2. Establish a sustainable and viable electric vehicle charging ecosystem in Uganda.
3. Develop and enforce energy efficiency regulations and standards for the transport sector.
4. Promote and facilitate the development of infrastructure for cleaner and electric mobility.
5. Introduce fuel economy labelling for all motorised transport.
6. Develop public sector guidelines that promote electric mobility.
7. Promote the development of infrastructure for mass transportation that boosts fuel efficiency and the use of cleaner energy.
8. Draw up policies to guide the e-mobility pathway.
9. Build local capacity in the electric mobility sector.
10. Provide fiscal and non-fiscal incentives for increased adoption of electric vehicles.
11. Conduct information and public awareness campaigns on electric mobility.

### **4.4.3 Agriculture**

Agriculture is one of the most important sectors in Uganda since it is the core of the economy. Agriculture contributes 24% to Uganda's national GDP<sup>24</sup>. The country's aspirations for increased mechanisation and value addition in agriculture will increase the importance of efficient energy use to raise the sector's contribution to national development.

### Key Issues

- a) Use of inefficient equipment and other agricultural machinery.
- b) Inadequate conversion of agricultural waste to energy.

### Policy Statement

The Government shall promote energy efficiency in agricultural methods, practices and technologies.

### Strategies

1. Promote energy-efficient technologies and practices such as drip irrigation to minimise energy use and cooling efficiency.
2. Promote optimisation of pump sizes to consider peak and off-peak season water requirements.

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<sup>24</sup> National Housing and Population Census, 2014.

3. Provide financial incentives and grants to agricultural producers to encourage the uptake of energy-efficient technologies, machinery and practices.
4. Promote deployment of renewable energy systems (such as off-grid solar PV, solar drying, and geothermal) to reduce fossil fuel use in agriculture.

## 4.5 Promote nuclear development

As part of the strategy to diversify the energy mix, the Government is promoting the use of nuclear energy for long-term power generation and other peaceful purposes.

### Key Issues

- a) Inadequate legal, regulatory and institutional framework for nuclear energy use and development.
- b) Limited public awareness of nuclear energy technologies.
- c) Inadequate skilled human resources and infrastructure for nuclear energy research and development.
- d) Limited investment in the nuclear industry.
- e) Inadequate local suppliers of nuclear applications, goods and services.
- f) Limited data on local nuclear fuel resources and national infrastructure for nuclear power development.
- g) Over-dependence on imports for the supply of radioisotopes for medical, research and industrial applications and lack of large-scale irradiation infrastructure.

### Policy Statements

The Government shall promote the sustainable development of nuclear energy for power generation and other peaceful purposes.

### Strategies

1. Enhance the legal and institutional framework for nuclear energy to strengthen the promotion and regulation of the sub-sector in accordance with international Treaties, Conventions, Agreements and Protocols
2. Raise public awareness of the usefulness of power and non-power applications of nuclear energy to the economy
3. Build human resource capacity and establish research and development facilities for the nuclear industry
4. Develop financing mechanisms for PPP investments, including decommissioning, spent fuel and radioactive waste management, in nuclear power development
5. Support local participation in the nuclear industry through incentives, training and certification
6. Conduct detailed technical and economic feasibility studies for the nuclear power project and nuclear fuel resources exploration and production
7. Support the establishment of radioisotope production facilities and irradiation infrastructure for medical, research and industrial applications

## 4.6 Promote emerging energy resources, geothermal, hydrogen, wind and others

### 4.6.1 Geothermal Energy

The Government of Uganda recognises the potential benefits of geothermal energy in providing a clean, reliable and secure source of energy, but also the challenges and barriers in upstream exploration and development.

The primary challenge for geothermal energy development is the significant resource uncertainty or geological risk. This is a major impediment to raising sufficient project finances for the expensive test drilling needed to confirm the presence of a viable resource or otherwise; these costs are fairly fixed irrespective of whether a possible resource is found and involve substantially higher upfront costs compared to fossil thermoelectric power plants and has more significant resource uncertainty compared to hydropower projects.

Uganda has the potential to develop its geothermal resources to provide both electrical power and thermal energy for use in agriculture, industry and tourism. Uganda has at least twenty-five (25) geothermal areas with the potential to produce about 1,500 MWe of geothermal energy.

#### Key Issues

- a) Inadequate institutional, legal and regulatory framework for the development of geothermal resources
- b) High resource/geological risk in upstream exploration stages
- c) High upfront costs of geothermal resource development
- d) Limited available financing for investments in the upstream exploration
- e) Inadequate skilled workforce to develop and maintain a sustainable geothermal industry
- f) Inadequate resource data and information to guide decision making
- g) Limited awareness of the development of geothermal resource

#### Policy Statements

The Government shall promote the sustainable commercial development of geothermal resources for electricity generation and direct heat uses in agriculture, industry and tourism

#### Strategies

1. Establish and strengthen the institutional, legislative and regulatory framework for the geothermal industry
2. Develop a geothermal resources master plan to guide optimised resource development

3. Establish a geothermal communication strategy to raise public awareness and engage local governments and communities affected by geothermal development
4. Formulate innovative financing mechanisms for private geothermal resource development through the provision of fiscal and other incentives
5. Conduct feasibility studies for geothermal resource exploration
6. Support and mobilise funding to manage geothermal exploration risk and attract investors.
7. Streamline the licensing process of geothermal sites

#### **4.6.2 Wind Energy**

Uganda has identified potential for utilisation of the wind resource in electricity generation and special applications, such as water pumping mainly in the Karamoja sub-region and the shores of Lake Victoria. Currently, wind power is being used for small-scale electricity generation and special applications, such as water pumping.

##### Issues

- a) Inadequate/Limited wind regime data
- b) Inadequate skilled human resources
- c) Inadequate local research and development in wind energy resource technologies and solutions
- d) High upfront costs and investment costs for wind power generation equipment and technologies
- e) Inadequate wind energy industry standards
- f) Lack of a strategic plan and investment guide for wind energy development
- g) Limited public awareness of wind energy resource potential, opportunities and economic benefits offered by wind energy resource solutions and technologies

##### Strategies

The Government shall:

- i) Facilitate mapping of wind energy resource potential and sites to collect and compile wind energy data and continuously update the wind energy resource map
- ii) Support Institutional capacity development to promote the usage of wind energy in various sectors
- iii) Enhance technical capacity building on wind energy technologies to provide support services to wind geothermal resource development
- iv) Promote research & development and technology transfer and development of wind energy resource solutions and technologies

- v) Formulate, continually review, and enforce regulations and standards for wind energy technology
- vi) Support hybrid power generation systems involving wind energy resource
- vii) Provide a framework for the connection of electricity generated from wind energy to national and isolated grids through direct sale or net metering
- viii) Enhance advocacy, awareness and promotion of wind energy resource potential & technologies
- ix) Provide incentives and mechanisms to enhance investment in wind energy development
- x) Formulate a strategic plan and investment guide for wind energy development as a component of the Integrated Energy Resources Plan

### 4.6.3 Green Hydrogen

Uganda is prepared to embrace new alternative energy technologies suitable for a fully sustainable energy transition. Green hydrogen is hydrogen derived from renewable energy resources. Green Hydrogen Energy is one of the cleaner, sustainable alternatives and technologies that will link growth and sustainable renewable electricity generation to take the all-time major challenge of Climate change.

Hydrogen is one of the most abundant chemical substances in the universe, and Uganda has to tap into its potential for future energy generation.

#### Issues

- a) Lack of local research and development in green hydrogen energy technologies
- b) Limited information on the green energy technologies
- c) Inadequate skilled human resources and infrastructure for green hydrogen energy resource development (institutional, infrastructural, and technical capacity)
- d) Lack of technical capability in green hydrogen development
- e) Inadequate institutional, legal, and regulatory framework for green hydrogen resources development
- f) Lack of a strategic plan and investment guide for green hydrogen development
- g) Limited public awareness of green hydrogen energy resource potential, opportunities and economic benefits offered green hydrogen energy resource solutions and technologies

#### Strategies

The Government shall:

1. Establish an institutional, legal and regulatory framework for the development of green hydrogen
2. Support private sector investments in green hydrogen development
3. Enhance technical capacity, research and development of the green hydrogen technologies
4. Support institutional capacity building in the exploration and development of green hydrogen resources
5. Provide incentives and mechanisms to enhance investment in green hydrogen energy development
6. Enhance advocacy, awareness, and promotion of green hydrogen energy resource potential, technologies, and applications
7. Support hybrid power generation systems involving green hydrogen energy
8. Provide a framework for the connection of electricity generated from green hydrogen to national and isolated grids through direct sale or net metering

9. Formulate a strategic plan and investment guide for green hydrogen energy development as a component of the integrated energy resource plan.

#### **4.7 Attract investment with financial sustainability in the development and utilisation of energy resources**

Financing the development of energy resources like electricity and others under a self-sustainability model without the need for subsidies either through the rural electrification program or suppressed capital cost recovered has remained a big challenge, especially for those funds injected by the Government. However, some level of private capital has been attracted into the sector, especially electric power, but this has come at a very high cost of financing, thus leading to high tariffs and huge buy-out amounts. This situation has raised issues of financial sustainability. With such compounded challenges, the uptake of energy products and the quality of the products have been heavily affected, including reliability.

##### Issues

- a) Lack of financial capital growth model in the tariff for self-sustainability.
- b) Inadequate investment in power generation with a long gestation period (pre-feasibility, feasibility, financial close, construction, Operation & Maintenance) may cause supply deficits in the long term.
- c) Inadequate investment in transmission infrastructure development relative to demand, generation capacity expansion and regional interconnection potential.
- d) High investment costs in the distribution network lead to increased tariffs.
- e) Limited access to financing for supply chains and end-users in rural electrification.
- f) Limited incentives for rural service providers to make timely and affordable connections to the National Grid.
- g) Low financial means to purchase electrical appliances for productive use of energy in rural areas.
- h) High project development costs of mini-grids result in higher end-user tariffs than the national Grid.
- i) Low financial means to purchase electrical appliances for productive use of energy in mini-grid areas.
- j) The private sector requires a high degree of business model innovation to offer sufficient and reliable electricity at low costs without relying on prohibitive grants or subsidies.
- k) High upfront costs for the acquisition of solar systems.
- l) Base investments in large solar PV generation on technical studies that ensure that the national Grid has adequate flexibility to absorb the generated power.
- m) High cost of technologies to convert agro-waste into helpful energy.
- n) Lack of financing schemes for purchasing clean or improved cookstoves and other clean technologies.

- o) High upfront costs for the development of renewable energy resources and technologies.
- p) High upfront costs for LPG cylinders, accessories and products.
- q) Lack of financing schemes for starter-kit LPG accessories for potential users.
- r) High price of power ethanol compared to other competing uses of bio-ethanol.
- s) High cost of gasification technologies hinders private investment and use.
- t) High cost of new and alternative costs of new resources such as green hydrogen.
- u) Inadequate financing mechanisms for energy efficiency interventions.
- v) High cost of efficient technologies.
- w) Low investment in efficient technologies.
- x) Limited private sector involvement.

### Strategies

1. Develop a capital growth model in the tariff for self-sustainability by re-investing capital recovery plus Return on Equity (ROE).
2. Deploy financing resources starting with low-cost financing, including equity financing excess sector revenue, donor funding and debts.
3. Promote investment in power generation capacity to ensure that future electricity demand requirements are adequately met.
4. Facilitate investments in transmission infrastructure expansion for domestic supply and regional interconnection by government and private-public partnerships.
5. Provide rebates to customers who invest in infrastructure that benefits other businesses and premises.
6. Subsidise connection charges for eligible consumers within the low-voltage network
7. Support greater financing provision by local commercial institutions for local entrepreneurship and innovative rural electrification solutions.
8. Promote mini-grid business model innovation, foster local entrepreneurship and provide a conducive environment for effective partnerships to create a thriving off-grid energy ecosystem capable of delivering social and economic value to scale.
9. Promote appropriate financing mechanisms to ensure investment viability for mini-grid developers and affordable end-user tariffs.
10. Provide financing and support for connections and government-owned distribution infrastructure.
11. Promote innovative financing mechanisms to extend credit to service providers, unserved customers and SMEs.
12. Promote the implementation of affordable credit and innovative Financing mechanisms for renewable energy projects and technologies.
13. Promote financing of renewable energy projects through local investments, PPPs and targeted mechanisms, e.g., climate finance.

14. Support small and micro-enterprises through fiscal incentives to selected renewable energy technologies.
15. Promote financing schemes for clean cooking fuels and equipment through loans from targeted microfinance institutions, banks, SACCOs or other agencies.
16. Provide incentives for increased LPG usage, including free starter-kits distribution for first-time users.
17. Promote investments in LPG service points in peri-urban and rural areas.
18. Promote affordable local production of LPG for domestic and commercial use.
19. Provide incentives to companies that fabricate efficient charcoal and firewood stoves.
20. Support investments in efficient solid biomass production, processing and conversion technologies, e.g., charcoal retorts.
21. Promote the development of green hydrogen production through electrolysis by creating investor-friendly terms, given the current surplus electricity production.
22. Implement incentives to promote the uptake of energy-efficient products and equipment.
23. Mobilise access to affordable financing for energy efficiency programmes.
24. Promote the establishment of Energy Service Companies (ESCOs).

#### 4.8 Enhance the management of environmental, health and social safeguards

The energy sector is vulnerable to adverse changes in climate, which could disrupt the energy supply, including hydropower, biomass, and biofuel supply, among others. Climate change impacts include increased frequency and intensity of droughts, floods, glacial melting, landslides, and heat waves. A critical potential risk is the electricity sector's high dependence on hydropower which is prone to climate change impacts. There is a need to optimise the energy mix to mitigate climate change risks.

##### Issues

- a) Inadequate regulations and guidelines for waste management for energy production and utilisation.
- b) High cost to manage the environmental and social safeguards.
- c) Lack of incentives for properly managing energy waste and uptake of cleaner technologies.
- d) Lack of storage and disposal facilities for waste from energy production and utilisation.
- e) Indoor and outdoor air, water and noise pollution and landscape deformation results from energy activities.
- f) Energy projects impact cultural heritage sites and resources, e.g., tourism and spiritual sites/objects.
- g) Landscape deformation resulting from energy activities.
- h) Ecosystem degradation and biodiversity loss from energy projects.
- i) Involuntary displacement of energy project-affected persons results in lengthy resettlement processes and protracted negotiations that delay project implementation.
- j) Other economic actions within catchment areas impact energy projects.
- k) Waste generation, management and disposal issues, including solar e-waste.
- l) Need to take into consideration and reflect global and environmental challenges around the energy transition, such as electric transport, green buildings, smart technologies, smart grids, and more renewable energy use.
- m) Inadequate national regulatory framework for dam safety for hydropower stations.

##### Policy Statement

Government shall promote and enforce environmental and social impact mitigation and compliance in developing and utilising energy resources.

##### Strategies

1. Develop and implement NEMA-certified Environment and Social Impact Assessments for energy projects.

2. Promote using cleaner, more efficient fuels and substituting biomass and fossil fuels with gas or electricity.
3. Develop and implement biodiversity management plans, ensure payment for ecosystem services through biodiversity offsets, and enforce environmental restoration of energy project sites.
4. Develop a resettlement action framework, ensure timely implementation of resettlement action plans and swift, transparent and equitable compensation for acquired land and wayleaves.
5. Develop and implement Livelihood Restoration Plans, Community Development Action Plans (CDAPs), and catchment management plans.
6. Develop and enforce implementation of cultural site management plans in collaboration with other MDAs.
7. Undertake compliance monitoring and enforcement, including the appropriate disposal of energy-related waste.
8. Undertake Cumulative Impact Assessments and Strategic Environmental Assessments of energy plans, programmes, projects and policies.
9. Develop and implement disaster risk response and risk management plans.

#### 4.9 Enhance energy sector governance, capacity building and integrated planning

There is a shortage of skilled manpower and targeted research and development (R&D), which undermines the sector's long-term sustainability. Many government and private sector institutions lack R&D facilities. The uptake and integration of energy studies and research in institutions of higher learning will be important to ensure improved long-term productivity and sustainability of the sector. The lack of integrated planning of energy projects and programmes creates conflict and competing interests among institutions and sub-sectors. Inadequate coordination and information sharing among the various government institutions, projects and the private sector result in inconsistent energy data and hinder sector-wide planning. Structures and systems for integrated energy planning and monitoring projects considering government goals and regional and international energy commitments are necessary.

##### Issues

- a) Fragmented roles and functions
- b) Inadequate laws and regulations for energy acts include the direct sale of power, net metering, captive power, biomass, and energy efficiency regulation.
- c) Inadequate stakeholder involvement in the formulation and implementation of energy projects.
- d) Lack of energy mainstreaming at the local government level
- e) Inadequate technical capacity.
- f) Inadequate equipment and machinery in the sector.
- g) Limited data and information.
- h) Lack of an integrated resource plan.
- i) Unfavourable Land tenure system and cumbersome land acquisition processes for energy projects infrastructure.
- j) Theft and vandalism of energy infrastructure, equipment, and materials.
- k) Inadequate technical capacity to implement, supervise and manage electricity infrastructure and projects.
- l) Disintegrated planning coordination on and supervision in the electricity supply industry.
- m) Inadequate data and georeferenced information on grid expansion and customer connections.

##### Strategies

1. Strengthen the integrated energy planning in the energy supply and demand value chains.
2. Develop adequate laws and regulations for energy acts such as the direct sale of power, net metering, captive power, biomass, and energy efficiency regulation.
3. Enhance stakeholder involvement in the formulation and implementation of energy projects.

4. Decentralise energy issues to the local governments.
5. Enhance technical capacity in energy sector governance.
6. Enhance stakeholder involvement in the formulation and implementation of energy projects.
7. To mitigate delays, develop mechanisms for effective community engagement on land and wayleaves acquisition and timely compensation payments to energy project-affected persons.
8. Set up and support skilling and training centres for capacity building in the energy sector.
9. Enhance coordination with other sectors, such as security and local government, in designing and implementing energy projects.
10. Promote innovation, research and development in the energy sector.
11. Strengthen data acquisition, including georeferenced information for all energy resources and projects.

## 5 CROSS CUTTING ISSUES

### 5.1 Gender and Equity Mainstreaming

The Government recognizes the importance of access to clean, affordable, and reliable energy in redressing gender inequality and addressing the marginalization of persons with disabilities and youth. As a primary driver of the other Sustainable Development Goals (SDGs), access to sustainable energy is a critical development enabler as it improves access to health, education, and clean water, among other essential services.

This policy will continue to strengthen the understanding of interlinkages between different energy sources and technologies on women, men, youth, and persons with disabilities (PWDs) and refugees and promote solutions that strengthen equality and gender mainstreaming in the energy sector.

#### 5.1.1 Gender Mainstreaming, Youth Inclusion and Refugees

Uganda's initiatives on reducing gender inequalities and improving opportunities for the youth have resulted in social protection programmes such as the Uganda Women's Entrepreneurship Programme (UWEP) and the Youth Livelihoods Programme (YLP), among others. Gender inequalities limit the ability of women and girls to fully participate in and benefit from energy programmes. As of August 2019, Uganda hosted over 1.3 million refugees and asylum seekers in 12 Districts. Refugees face similar challenges in accessing sustainable, modern and efficient energy services like host communities.

##### Issues

- a) Lack of a gender strategy and action plan for the energy sector and limited capacity to undertake regular gender analyses for energy projects.
- b) Limited awareness of the value of gender mainstreaming in the energy sector.
- c) Low representation and participation of women in the energy sector, particularly in management positions and as entrepreneurs, contractors, etc.
- d) Vulnerability of women and girls to sexual and gender-based violence (SGBV) around energy project sites, at workplaces and during biomass collection.
- e) Inconsistency in the generation of gender, sex, and age disaggregated energy statistics (GSDD).
- f) Limited financing and credit for youth to engage in innovation and entrepreneurship in energy products and services.

### Policy Statements

The Government shall promote gender mainstreaming and youth inclusiveness in all energy planning, programming, and projects, including refugee host communities.

### Strategies

1. Establish and implement a gender strategy and action plan for the energy sector
2. Develop and build capacity for gender equality, women's empowerment, gender analysis and gender audits in the energy sector.
3. Provide guidelines and technical support on gender-responsive planning and budgeting.
4. Develop and implement a Sustainable Energy Response Plan for refugees and host communities under the Comprehensive Refugee Response Framework.
5. Ensure Gender and Sex Disaggregated Data (GSDD) collection and highlight GSDD in sector communications and policy statements.
6. Support affirmative action to increase female participation in employment, entrepreneurship, and senior management in the energy sector.
7. Promote career guidance and role models mentoring programmes in schools and tertiary institutions to increase girls' uptake of science, technology, engineering, and mathematics subjects (STEM).
8. Institute measures that require contractors to incorporate local content in their employment scheme targeting young people, both male and female.
9. Develop local energy sector workforce and skills through internships and apprenticeships involving young people.
10. Develop credit and financing mechanisms for young energy entrepreneurs.

#### **5.1.2 Persons with Disabilities (PWDs)**

Persons with disabilities comprised 14% of Uganda's population, according to the National Population and Housing Census 2014. The PWDs face significant challenges in attaining financial independence, full societal inclusion and development, and unfettered access to clean and sustainable energy.

### Key Issues

- a) Limited access to electricity necessary for powering the assistive gadgets or technologies needed by PWDs and more so in their educational environments.
- b) Prolonged exposure to unclean energy emissions due to limited mobility renders many PWDs largely home-bound.
- c) Limited opportunities for active participation, employment, and engagement in the energy sector due in part to limited training and capacity-building opportunities.

- d) Unaffordability of clean, safe, and modern forms of energy due to lower income levels and additional expenses incurred due to disabilities.
- e) Inadequate gender and sex-disaggregated energy-related data on PWDs.

#### Policy statements

The Government shall promote and facilitate the provision of affordable, clean and modern energy infrastructure and services to persons with disabilities.

#### Strategies

1. Establish institutions or measures to provide energy-related training and skills development for PWDs.
2. Institute measures that require large energy sector companies or organizations to include PWDs in their recruitment strategies.
3. Set up energy-related fiscal incentives and waivers for households and educational and health institutions for PWDs.
4. Carry out a baseline study for PWDs and energy.
5. Promote coordinated planning targeting PWDs between the main Ministries for PWDs and energy, namely MOGLSD, Ministry of Education, Ministry of Health and MEMD.

## **5.2 Occupational Safety and Health**

Occupational safety and health (OSH) refer to the anticipation, recognition, evaluation, and control of hazards that could impair the health and well-being of workers, considering the possible impact on the surrounding communities and the general environment.

#### Issues

- a) Limited awareness and appreciation of OSH issues in the public and private sectors.
- b) Increased health and safety risks in energy project areas.
- c) Inadequate technical capacity in OSH.

#### Policy Statement

The Government shall promote occupational safety and health in developing and delivering energy resources.

#### Strategies

1. Implement and enforce OSH Administration (OSHA) standards in energy project design, construction, and operation.
2. Undertake regular monitoring and supervision of OSHA compliance in sector activities
3. Implement monitoring plans and strategies specifically for OSH issues.

4. Carry out awareness campaigns and capacity building on OSH targeting the public and private sectors and including local communities.
5. Undertake Health Impact Assessments and Risk Assessment and Management Plans for energy projects.

### 5.3 HIV and AIDS

Increased HIV prevalence puts a social and economic burden on the energy sector, manifested through increased morbidity and mortality of the labour force, loss of productivity and increased medical and labour costs.

#### Issues

- a) Limited Access to HIV/AIDS information and services.
- b) Inadequate technical capacity to plan and implement HIV and AIDS programmes
- c) Lack of baseline data to guide HIV/AIDS planning.
- d) Limited financial resources to support HIV and AIDS response.
- e) Lack of HIV/AIDS Monitoring and Evaluation System.

#### Policy Statement

The Government shall promote the development of institutional and technical capacity to plan for and implement HIV/AIDS intervention programmes in the energy sector.

#### Strategies

- 1) Raise awareness of HIV risk, prevention, treatment and psychosocial support to empower communities with knowledge and skills to reduce the spread of HIV
- 2) Mobilize and sensitize energy project contractors on HIV prevention and its benefits and provide HIV and AIDS implementation guidelines.
- 3) Support HIV testing and counselling services at workplaces, in projects and communities.
- 4) Implement social welfare schemes specifically for persons living with HIV (PLWHIV), staff and their families.
- 5) Mainstream HIV and AIDS in sectoral policies, plans, projects, and budgets.
- 6) Develop and implement an energy sector HIV and AIDS Action Plan with M&E aligned to the priorities of the National HIV and AIDS Strategic Plan.
- 7) Mobilize internal and external resources to support the implementation of the HIV and AIDS Action Plan and ensure the sustainability of the HIV/AIDS response.
- 8) Build partnerships, networks, and collaborations for enhanced HIV response.
- 9) Ensure the inclusion of variables for collecting HIV and AIDS baseline data in all Environment and Social Impact Assessments for energy projects.

## 5.4 Climate Change

### Issues

- a) Using inefficient biomass technologies, Uganda depends predominantly on biomass energy (firewood and charcoal) for cooking.
- b) The power subsector is highly dependent on hydropower for electricity production.
- c) Climate change can disrupt the energy supply if extreme events like frequent and prolonged droughts reduce water levels in dams and reservoirs, thereby reducing hydropower production potential.
- d) Storms and floods further affect the energy supply chain.
- e) The energy demand is increasing due to industrialisation, urbanisation and population growth.
- f) Inadequate funding to fast-track the energy transition.
- g) There is limited capacity among the sub-national level staff on climate change matters.
- h) There are weak regulations and guidelines to address climate change challenges among the private sector and other agencies.
- i) Inadequate enforcement and monitoring mechanisms for adherence to climate change initiatives among the private sector and other agencies.

### Policy Statement:

To promote climate change mainstreaming in energy planning and energy projects as a means of sustainable development in the face of uncertainties related to climate change.

### Strategies

- a) Prepare a Climate Change Strategy and Action Plan to ensure that climate change is appropriately mainstreamed in the approaches to; project design, implementation, operations and maintenance.
- b) Promote and participate in water resource regulation to ensure water availability for hydropower production.
- c) Promote and participate in water catchment protection as part of hydroelectric power infrastructure development.
- d) Diversify energy sources by promoting alternative renewable energy sources (such as solar, biomass, mini-hydro, geothermal and wind) less sensitive to climate change.
- e) Promote clean cooking technologies such as electric cooking, energy-efficient firewood cookstoves, LPG cookers and ethanol stoves to reduce biomass demand.

- f) Research to determine the potential impacts of climate change elements like rainstorms on the country's power supply chain.
- g) Build the capacity of the key actors through training and re-tooling in climate risk analysis, mitigation, and adaptation measures.
- h) Support research and development into locally appropriate technologies such as improved cook stoves, biogas, and battery storage technologies.
- i) Promote climate-resilient energy and oil and gas infrastructure through design codes and guidelines (this will include developing climate-proof standards for project design, construction, and maintenance).

## 6 POLICY LINKAGES

### 6.1 International Policy Linkages

This energy policy subscribes to and contributes to achieving the Sustainable Development Goals [include targets] of the UN's 2030 Agenda for Sustainable Development. Uganda is also a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) 1992, aimed at mitigating the effects of climate change, whose aims and objectives form the core of the strategic positions proposed in this policy.

The Paris Agreement 2016 defines a concerted global effort to prevent temperatures from rising 2 degrees above pre-industrialization levels. Through its NDCs, Uganda has committed to reducing its emissions by 24.7% by 2030. The energy sector will play a significant role towards achieving this target; hence this policy provides a strong guide to meeting the set targets.

Uganda ratified the United Nations Convention to Combat Desertification (UNCCD) 1994, which targets the avoidance and mitigation of desertification, land degradation, and drought through sustainable land and water resources management. Uganda is a signatory to the Statute of the International Atomic Energy Agency (IAEA) 1957, which includes treaties and conventions on Nuclear Safety and the Physical Protection of Nuclear Material.

### 6.2 Regional Policy Linkages

The Ugandan Government is cognizant of energy sector-relevant policies, strategies and plans of regional bodies such as the East African Community (EAC), the Common Market for Eastern and Southern Africa (COMESA), the Southern African Development Community (SADC) and Economic Commission for West African States (ECOWAS). The EAC treaty calls for Partner States to adopt common policies for developing, conserving and managing energy resources. In addition, the EAC Vision 2050 targets increasing energy production within the region from 3,965 MW in 2014 to 70,570 MW in 2030. This policy will significantly aim at contributing to this set regional objective.

Relevant policies include the EAC Climate Change Policy (2011), EAC Industrialisation Policy (2012), EAC Cross-Border Electrification Policy (2014), and EAC Energy Security Policy Framework (2018), among others. Uganda is also party to policies of the African Union, e.g. the African Convention on the Conservation of Nature and Natural Resources (1968), Convention of the African Energy Commission (2001) and the African Union Gender Policy of 2009, African Commission on Nuclear Energy (AFCON), and the African Regional Cooperative Agreement for Research, Development and Training related to Nuclear Science and Technology (AFRA).

### **6.3 National Policy Linkages**

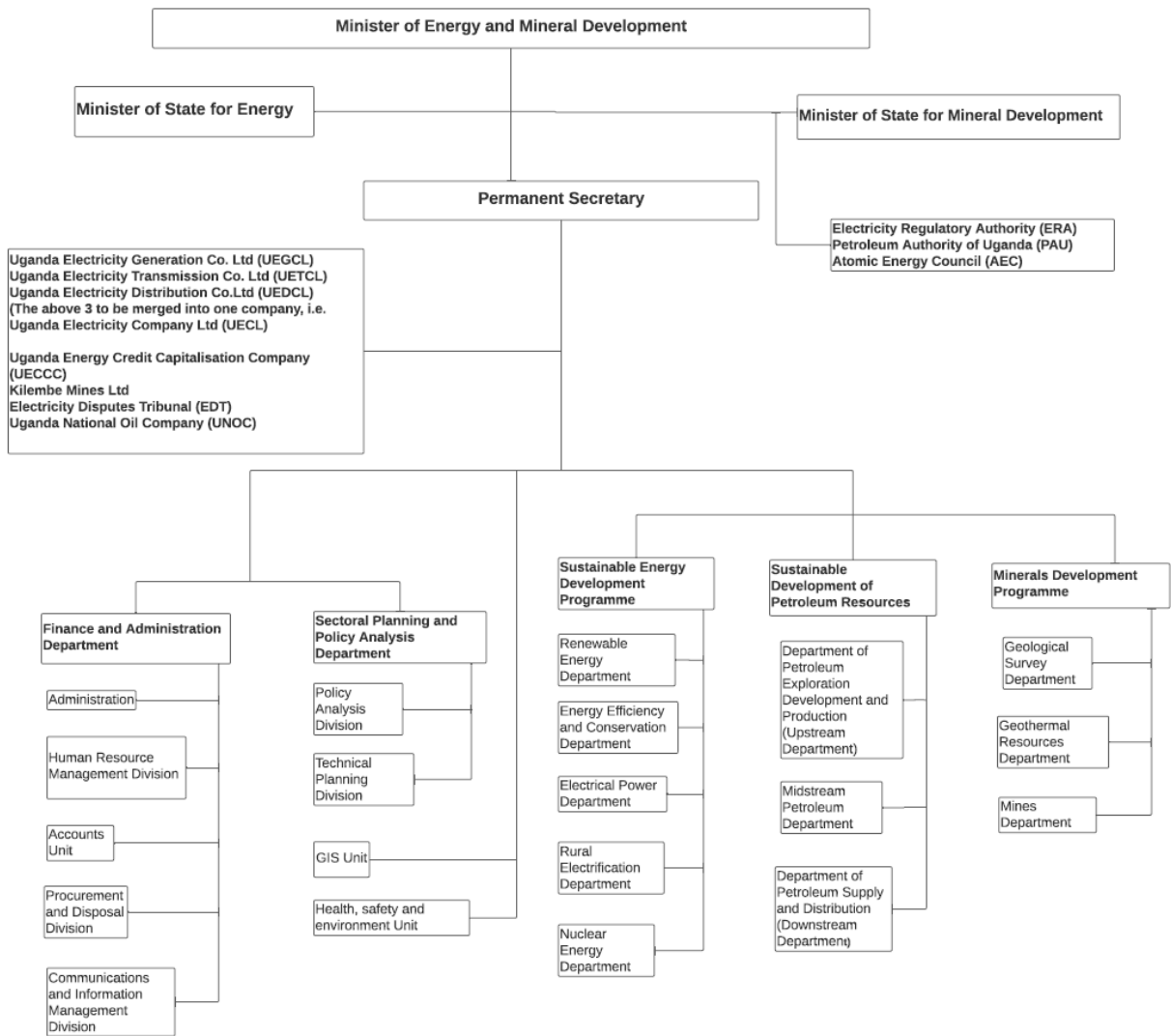
The successful implementation of the Energy Policy will contribute to and require the support of other national policies. National Policies relevant to the energy sector include the Uganda Forestry Policy (2001), Gender Policy (2007), Policy on HIV/AIDS (2007), Climate Change Policy (2015), Environment and Social Safeguards Policy (2018), Agriculture Policy (2013), Transport Master Plan (2008-2023), Health Policy (2010), Land Policy (2013), among others.

## 7 IMPLEMENTATION FRAMEWORK AND STRATEGIES FOR PARTNERSHIP

### 7.1 Coordination and Leadership Framework

A well-defined coordination and leadership framework is needed for the main sector players to focus on meeting the energy needs of a growing population and addressing the institutional and legal challenges hindering sustainable development and effective utilization of energy resources. The Ministry of Energy and Mineral Development will oversee implementation of the strategies within the policy.

Figure 1: Structure of the Departments and Agencies within the Energy and Minerals Sector



## 7.2 Key Players in the Energy Sector

The Minister provides overall policy direction, and the Ministry and its sector agencies implement it. The Ministry of Energy and Mineral Development oversees all the sector's regulatory institutions, government institutions and independent providers. The Ministry's political leadership comprises the Minister of Energy and Mineral Development and two Ministers of State for Energy and Mineral Development. The Permanent Secretary is the Ministry's Chief Executive Officer, assisted by the Directors and Heads of Department. The key sector agencies are briefly described below.

### a) Ministry of Energy and Mineral Development

The Ministry oversees the energy sector's overall policy framework, direction, strategies, development, and oversight. The Ministry is mandated to provide policy guidance in developing the Energy, Mineral, Oil and Gas sectors. Specifically, the mandate of the Ministry is: "To establish, promote the development, strategically manage and safeguard the rational and sustainable exploitation and utilization of energy and mineral resources for social and economic development." To achieve this mandate, the Ministry oversees, inspects, regulates, monitors and evaluates activities of all other sector agencies and the private sector in the energy sector to ensure rational and sustainable development, exploitation, and use of energy resources.

### b) Electricity Regulatory Authority

The Electricity Regulatory Authority (ERA) is a statutory body established under the Electricity Act, 1999 (Cap. 145) as an independent regulator of the power sub-sector. The regulatory body regulates the electricity industry, including the generation, transmission, distribution, sale, export and import of electricity. ERA is also responsible for issuing and regulating compliance with licenses, setting tariffs, and approving rates of charges and terms and conditions for electricity services by transmission and distribution companies. In addition, the ERA is mandated to develop and enforce codes of conduct, performance, and quality standards and oversee electricity consumer committees.

### c) Atomic Energy Council

The Atomic Energy Council (AEC) was established by the Atomic Energy Act 2008 to regulate the peaceful applications of ionizing radiation. The AEC is responsible for the protection and safety of individuals, society and the environment from the dangers resulting from ionizing radiation; production and use of radiation sources and the management of radioactive waste; compliance with international safety requirements for the use of ionizing radiation, radiation protection and security of radioactive sources.

### d) Electricity Disputes Tribunal

The Electricity Disputes Tribunal (EDT) was established by the Electricity Act 1999 to arbitrate cases in the electricity sector. Apart from receiving, hearing, and adjudicating consumer disagreements relating to the electricity sector, the tribunal also settles disputes between consumers and other government institutions since it has the powers of the High Court of Uganda.

e) The Uganda National Electricity Company (UNEC)

The Cabinet decision on 22<sup>nd</sup> February 2021 regarding the rationalization of Government Agencies, Commissions Authorities and Public Expenditure resulted in the merger of electricity state parastatals of Uganda Electricity Generation Company (UEGCL), Uganda Electricity Transmission Company (UETCL) and Uganda Electricity Distribution Company (UEDCL) into one Company, the Uganda National Electricity Company (UNEC). The Rural Electrification Agency was mainstreamed into the Ministry structure as a department.

The UNEC owns and operates the power transmission infrastructure above 33 kV. It is responsible for the transmission, dispatch, bulk electricity purchases from generators and the export and import of electricity.

The UNEC owns the electricity distribution infrastructure operating at 33 kV and below for distribution. It is also responsible for grid extension, the operation and maintenance of non-concessional distribution network infrastructure, and the retail function that includes metering and billing.

f) The Uganda Energy Credit Capitalisation Company

The Uganda Energy Credit Capitalisation Company (UECCC) was operationalized in 2009 to manage and administer the Uganda Energy Credit Capitalization Trust. A major objective of the Trust is to provide financial, technical, and other support to unlock renewable energy and/or rural electrification projects for development. The Company is mandated to mobilize resources to capitalize on the Trust to contribute to the sector's financing requirements, focusing on facilitating private sector participation.

g) Key supporting Ministries, Departments and Agencies

Key partner Ministries include Ministry of Local Government, Ministry of Water and Environment, Ministry of Public Service, Ministry of Finance, Planning and Economic Development, Ministry of Agriculture, Animal Industry and Fisheries, Ministry of Education and Sports, Ministry of Works and Transport, Ministry of Lands, Housing and Urban Development, Ministry of East African Community Affairs, Ministry of Science and Technological Innovation, Ministry of Trade, Industry and Cooperatives, Ministry of Internal Affairs, Ministry of Justice and Constitutional Affairs among others.

Key partner agencies include the Uganda National Bureau of Standards (UNBS), Uganda Bureau of Statistics (UBOS), National Environment Management Authority (NEMA), National Forestry Authority (NFA), Directorate of Water Resource Management (DWRM), Uganda Police Force (UPF), Uganda Peoples Defence Force (UPDF) among others.

### 7.3 Implementation Stages

The success of the Policy is anchored on its implementation plan and strategies. The implementation plan shall establish the controls necessary to achieve the policy objectives and monitor progress. Based on the information obtained from the controls, implementing strategic changes may be necessary to remain in harmony with strategy changes.

The implementation stages should follow the policy arrangement. For each policy component, the implementation stage should start by analysing the issues and their linkage to the policy statements. The activities must be guided by the strategies and actions to address the issues. The actions are followed properly to align with the issues to achieve measurable outcomes. The policy outcomes shall be assessed by monitoring and evaluation using indicators specified in this policy.

### 7.4 Implementation Drivers

Implementation drivers are processes that can be influenced to improve competence and to create a more collaborative organizational and systems environment for the practice of the Policy. Also, drivers can be considered as the factors that promote and support the efficient and effective implementation of the energy policy. Implementation drivers are the key components of capacity and the functional infrastructure supports that enable policy programs and strategies to succeed. To implement the energy policy successfully, the implementation drivers for each section will be linked properly to the policy issues, strategies, outcomes, and indicators to avoid contradictions in achieving the policy objectives.

The Government working with partners and stakeholders, will put up reliable and valid measures of implementation, which will be essential in planning effective implementation support, helping to assess progress toward implementation capacity, and conducting rigorous research on implementation. The three categories of implementation drivers considered in this Policy are Competency, Organization, and Leadership.

**Competency Drivers:** The Government will put up mechanisms to develop, improve and sustain the ability of staff members, especially in the Ministry of Energy and Mineral Development and other stakeholders, to implement the Policy.

**Institution or Organization Drivers:** A conducive working environment plays a significant role in the success of the implementation of an energy policy. The Government will ensure that there are mechanisms to create and sustain cordial organizational and system environments for effective energy services. The availability and distribution of resources must be considered when

implementing the Policy. The Government shall put in place mechanisms to stimulate and spur economic development, which will justify the demand for energy and development of the sector. Resource mobilization and distribution will be properly managed in implementing this Policy. This will be accomplished using a variety of channels and approaches with different stakeholders having different responsibilities. Consideration will be given to environmental laws and policies, and good environmental management systems and plans shall be supported.

**Leadership Drivers:** The Government shall focus on providing the right leadership strategies for the various leadership challenges in the energy sector. The Government should be able to address leadership challenges likely to emerge as part of the change management process needed to make decisions, provide guidance, and support organizational functioning. In this regard, it will be important to work with a strong team of people ready to establish and implement realistic short-term, medium-term, and long-term strategies, to seek and lobby international supporting programs and policies, and to set up sustainable financing mechanisms and policies.

## **8 COMMUNICATION STRATEGIES**

### **8.1 Information, Education, Communication and Dissemination**

Statistics for the energy sector will be collected initially as a baseline for determining sector status and after that on a periodic regular basis. This and other energy sector data will be entered into an Energy Information Management System to serve as a data bank for energy information. This information will be made publicly available and should include data on energy resources and exploitation opportunities, feasibility studies, funding etc.

Public awareness and promotional campaigns on sector standards, programmes and initiatives will be undertaken, and print, broadcast and electronic media will be deployed to disseminate sector information to the public and key stakeholders. Regular updating of the MEMD website with energy-related information, annual sector statements by the Ministry, online publishing of EIAs and other reports, and communication of and online uploads of policy and regulation documents will be done.

Educate the public and relevant stakeholders on issues such as standards, capacity-building ventures, R&D and innovation priorities, community and individual rights pertaining to energy projects, pilot project outcomes and successes through occasional workshops. MEMD may also delegate and assign specific awareness and promotional activities, roles or responsibilities to regulatory bodies, MDAs, and other energy sector stakeholders where this is appropriate and beneficial for implementing the Policy.

Education of the public and various stakeholders will also be done through promoting energy courses at learning institutions and via capacity building centres.

### **8.2 Feedback Mechanisms**

To satisfy the evolving requirements of stakeholders, monitoring stakeholder needs and reactions to the Policy will be important. As the government scope increases and demand for information grows, changes and updates to the Policy will be required during its implementation. Two-way communication on energy-related matters between Government and non-state stakeholders shall be institutionalized by facilitating opportunities for public dialogue and knowledge sharing and enabling information flows from the grass root levels. Management of stakeholders' expectations throughout policy implementation should be equally important. During policy development and implementation, hearing from stakeholders will provide valuable information regarding existing and emerging issues.

These communication activities will promote and inform evidence-based planning at all levels to bolster efficient energy production and utilization. The Ministry of Energy and Mineral Development and the relevant government institutions will use this information to debate and provide appropriate feedback on Government strategies for further developing

the sector. The Government will therefore integrate a feedback mechanism to accomplish this data collection throughout the policy dissemination process.

Strategies to improve stakeholder feedback will include:

1. Disseminate the Policy widely to stimulate debate and, where possible, utilize social media to facilitate instant feedback.
2. Critically evaluate the performance of energy projects and technologies to avoid replicating investments in low-performing technologies.
3. Critical evaluation of the performance of energy projects and technologies to avoid replicating investments in low-performing technologies.
4. Develop innovative ways to engage all stakeholders, then simplify the relevant communication channels and make them readily accessible.
5. Collaborate and establish a favourable environment, communication and networking among sectoral institutions, energy developers and consumers.
6. Develop a networked plan and performance exchange system among the national and regional energy institutes.

As well as informal discussions and public consultations on specific proposals, the Ministry will consult more generally at least once yearly with representatives of external stakeholders in the energy sector. These consultations will be used to present and receive feedback on ongoing activities under the National Energy Policy, progress with implementing plans and policies and preliminary proposals on new or revised plans and policies. The consultations will be conducted through the existing stakeholder fora. All material presented and minutes of the consultations will be made publicly available.

## 9 MONITORING AND EVALUATION

The energy sector is dynamic and subject to fluxes and transitions in technology, policies, resources availability, governance and management, and national priorities. These changes are due not only to national or local factors but also to international trends and pressures. Hence, developing and implementing an energy policy is not a one-time process but requires constant review, assessment, and adaptation. The monitoring and evaluation findings are fed into the policy review and implementation process.

Developing a monitoring and evaluation (M&E) framework is critical to successfully implementing the energy policy. The indicators specified for the various policy statements, strategies and outcomes will be used to assess how effectively the Policy is being implemented.

The core purpose of M&E is to enhance organizational and developmental learning, ensure informed decision-making, support substantive accountability, and enhance the capacity of the implementing team. This is achieved by ensuring efficiency, effectiveness, appropriate cost and time performance, and the sustainability of the results.

As part of the emphasis on results, the departments, and agencies relevant to this Policy shall establish appropriate frameworks to monitor and evaluate the policy interventions within their mandate. This will provide the MEMD Management, Departments and Agencies early indications of progress, or lack thereof, in achieving results. This will, in turn, support the implementing team to judge the level of success and decide how future efforts should be improved.

Baseline data and indicators will be established at the onset to gauge progress in achieving the expected outcomes according to stipulated timeframes. After that periodic assessments and progress reviews will be necessary, which will entail regularly updating the energy statistics and national energy data bank.

Periodic performance reports will be published quarterly and annually, detailing the level of progress in implementation, the effects, benefits and impacts of the Policy, and any unintended impacts. The pertinent parties' reporting mechanisms, roles and responsibilities will be specified at central, regional and district levels, and any necessary related capacity building will be facilitated. The annual reports that should include financial information and updated indicator results will form the basis for the readjustment and realignment of energy sector programmes and strategies for policy implementation.

If necessary and subject to sufficient consultations, the stakeholders should expeditiously address any urgent or significant issues or challenges identified during the M&E that impede the effective implementation of the Policy.

Updated energy statistics and data will be collected annually and used in the M&E process. These statistics will also be made publicly available.

With MEMD as the overall party responsible for coordinating and overseeing M&E of the energy policy, input will also be sought from other stakeholders, including other MDAs, civil society, the public sector, etc. The MEMD will report annually on the developments in the energy sector and progress in meeting the policy targets. The M&E framework is presented in Annex 2.

## 9.1 Key Performance Indicators

The Energy policy aims to ensure progress towards meeting the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner. MEMD, in consultation with relevant line ministries, will track context indicators for economic growth levels of poverty, GDP, regional trade, and electricity consumption. Where appropriate, these broad indicators may include other measures of inclusive social development for policy implementation.

The MEMD will measure progress toward Energy Policy goals through indicators, which will assess the following specific policy objectives:

1. Strengthen electricity generation, transmission and distribution infrastructure
2. Increase electricity access and uptake of alternative modern forms of energy
3. Enhance utilization of energy-efficient practices and technologies
4. Promote sustainable utilization of biomass
5. Attract investment with financial sustainability in the development and utilization of energy resources
6. Promote nuclear energy development
7. Promote emerging energy resources; geothermal, hydrogen, wind and other resources
8. Enhance energy sector governance, capacity building and integrated planning
9. Enhance the management of the energy-related environment, health and social safeguards

At the implementation level, the MEMD will assess outcomes that measure progress towards objective and goal achievement through quantitative and qualitative performance indicators against the baseline. Illustrative indicators for measuring Energy policy implementation will include:

- Electrification rate
- Transmission and distribution grid coverage
- Transmission and distribution off- grid coverage
- Energy demand

- Electricity Demand \
- Energy Intensity
- Availability of Electricity
- Energy Demand-Supply gap
- Investment in clean energy
- Renewable energy participation in on-grid and off-grid
- Reduction in power losses
- Energy savings (sector-specific)
- Share of households using modern energy
- Legal and regulatory frameworks on environmental impacts of energy exploitation and consumption
- Capacity building

The M&E will follow the Energy Policy Tracking Framework approved by the MEMD in consultation with the Coordination, Planning and Monitoring Technical Working Group. The tracking framework will be based on programme interventions for evaluating the present situation in Uganda with respect to each of the indicators (baseline), the target performance by 2030 (target), means of verification, and key responsible department.

The tracking framework is conceived as a live document that will be adapted and updated as progress is monitored and reported and new actions become more relevant and others are completed, or the gap that prompted such action has been overcome.

## 9.2 Monitoring

To adequately monitor the performance of the National Energy Policy and contribution to the National Development Plan objectives, the following will be established and implemented:

- a. Clear results frameworks, defining inputs, outputs and expected outcomes; and detailing assumptions and the theories of change upon which the logic is based.
- b. High-quality plans and budgets through the instruments of Sector Investment Plans, Annual Budget Framework Papers, and Project Documents.
- c. The sector-level monitoring budget will include collating and validating monitoring data from Ministries and local governments, analysing and producing bi-annual performance reports and financing annual sector reviews.
- d. Operational Monitoring and Statistics Functions to ensure timely, coordinated, quality and representative data products based on performance indicators and sound methodologies.

## 9.3 Policy Review and Audit

The Policy's 10-year planning horizon allows for assessing long-term scenarios and impacts, with frequent document reviews as circumstances change. To encourage an open and

proactive approach to identifying issues and reduce the need for amendments being developed piecemeal, the Government will periodically review the Policy. The Ministry will follow a continuous improvement cycle to ensure this Policy remains relevant and current. This cycle will include, but will not be limited to, initiating and endorsing impact evaluations and interim policy reviews in conjunction with regular performance assessments using the indicators outlined in the Policy. Therefore, the policy review will be undertaken at least once every three to five years.

The purpose will also be to identify policy gaps which may come through consultation with government institutions and sector stakeholders or changes in the macro-political environment. To capture useful information from the policy review cycles, the Government will;

- Through the Ministry of Energy and Mineral Development, initiate the review process. The Policy shall be reviewed when there are changes in Government policy, such as changes in the national energy policy or implementation strategy
- The Policy will be reviewed occasionally to ensure that it remains feasible in the face of socioeconomic, macro-economic, political, and environmental changes.
- Although the review shall be technical, the process will be participatory, considering stakeholders' opinions and interests
- The formulation or reformulation of the energy policy consequent upon such reviews shall be accompanied by a new implementation work plan

The Policy management will be housed at the Ministry of Energy and Mineral Development premises, and the policy custodian and day-to-day contact in relation to policy review will be the Permanent Secretary.

#### **9.4 Evaluation**

A fair proportion of public investment projects will be subjected to rigorous evaluation or value-for-money audit to ensure learning from the choice and implementation of the Energy Policy interventions. The Cabinet determines a rolling 5-year agenda of public policies and topics of major national interest to be subjected to rigorous independent evaluation.

The Ministry of Energy and Mineral Development will be responsible for the design, management, and follow-up of their programme and project evaluations (including baseline and mid-term reviews). External evaluators will conduct all project evaluations to ensure independence. The Office of the Auditor General will undertake value-for-money. MEMD, in collaboration with other members of their Sustainable Energy Programmes Group, will prepare and implement a five-year rolling Evaluation Plan.

Budgets will be allocated specifically for evaluation, to be agreed upon by the Development Committee, chaired by MoFPED, when reviewing and approving each Project. The size of this evaluation budget will consider the project's budget and scope. The budget will finance

baseline studies, mid-term reviews and final evaluations or value-for-money audits. The Development Committee (MFPEd) will enforce this requirement in the approval of projects.

## 10 FINANCING MECHANISMS

The energy sector still faces the challenges of financing. An appropriate mix of financing resources from the Government (Central and local), private investments, and bilateral and multilateral partners is vital for successfully implementing the Policy. The energy sector is financed by a combination of Government, Private Sector and Development Partners.

The Government finances the energy sector through three programmes, namely Mineral development, Sustainable Energy Development and Sustainable Development of Petroleum Resources

Government budget allocations to the energy sector are aligned with the NDP projections and aspirations. Development Partner support is by a mixture of grants and commercial and concessional loans. Private Sector financing comes through individual/corporate initiatives or Public Private Partnerships with Government.

The Government of Uganda (GoU) will seek to provide much of the funding required to implement the Energy Policy. This will be through the national budget framework or Medium-Term Expenditure Framework (MTEF), which stipulates each year's available resource envelope and sector ceilings. Additional resources will be mobilized from development partners and the private sector.

The resource mobilization and expenditure strategies to be adopted include:

- a) Computation of short- and medium-term financial estimates of budget and off-budget internally generated funds (IGFs), projected GoU in-flows and resources from development partners;
- b) Determination of resource gaps and identification of appropriate strategies for mobilization of additional resources to meet financial shortfalls;
- c) Computation of annual cost estimates (capital and recurrent) of priority programmes and the overall cost of the plan;
- d) Negotiation with potential donors on funding contributions through direct budget support or specific project or programme funding

The private sector's contribution, domestically and internationally, including the role of financial institutions in extending financial services, will be key to implementing the Policy. Several important energy projects and programmes have been implemented through the PPP framework, and this will be further strengthened to build on national experiences and lessons learnt.

The financial analysis showed that to meet the objectives and implement the energy policy strategies, approximately UGX 4 trillion will be required per year over the 10-year policy period. The estimated financing requirements of the Energy Policy are presented in Annex 1.

The Government has also successfully mobilized domestic currency financing by establishing syndicates of commercial banks and large surplus institutions to finance PPPs in the sector. The development of innovative financing mechanisms, such as energy debt funds, through the existing programmes, will continue to be a key focus area. Table 7 illustrates the current provision and sources of financing.

Table 7: Financing Sources for strategic partnerships

Service Sectors	Sources of funding	
	Public	Private
Public Services • Government institutions	<ul style="list-style-type: none"> <li>• Government of Uganda (central and local Government through taxation)</li> <li>• Donors/Development Partners               <ul style="list-style-type: none"> <li>○ Central Budget Support</li> <li>○ District Budget Support</li> <li>○ Multilateral and bilateral projects and programs channelled through central or local Government</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Individual entrepreneurs</li> <li>• NGO-supported projects and programs</li> </ul>
Private Services • Domestic private sector • International private sector	<ul style="list-style-type: none"> <li>• Government subsidies or cost support to the private sector</li> <li>• Contractual arrangements/PPPs with the private sector</li> <li>• Participation in government-funded programs</li> <li>• Multilateral and bilateral projects and programs channelled through central or local Government</li> </ul>	<ul style="list-style-type: none"> <li>• Household (user fees)</li> <li>• Donations (internal and external)</li> <li>• Income generating activities</li> <li>• Fundraising</li> <li>• NGO-supported projects and programmes</li> </ul>

## **11 STAKEHOLDER ROLES AND RESPONSIBILITIES**

### **11.1 Central Government**

The Government of Uganda is responsible for formulating and enacting legislation, policies and regulations for the energy sector and ensuring their enforcement. The government's responsible for ensuring that the energy policy is developed, implemented, monitored and evaluated. The government will coordinate all stakeholders' activities and ensure that energy projects and activities adhere to national laws and strategies. The government will implement a use-or-lose policy, preventing prospective energy developers from holding a given energy resource indefinitely without developing it within the stipulated time limits.

The stages of the energy policy cycle include preparation, implementation and review, follow-up, and correction of deviations. The government's responsible for ensuring the provision of human resources with the right skills to implement the policy through all the stages of its cycle. The government will work closely with various ministries, departments and agencies, local authorities, civil society, the private sector, research and academic organisations, and its citizens to achieve this.

The government will promote the country's efficient and sustainable use of energy. The government will create more favourable conditions for local enterprises to do energy business in the country, including ensuring transparency and equity. For example, the legal and regulatory framework for developing energy activities and projects will be continually streamlined to attract more local private investors and operators, promote new energy projects, and encourage innovative ideas.

Government shall develop provisions to ensure that meeting local satisfaction and needs is the central role of new energy investments. To be incorporated into concession agreements, new policy measures may include standardising "local content" guidelines suitable for different categories of projects, incorporating clear language on requirements into PPAs, and systematically monitoring compliance for local content participation. The government will set standards for all energy systems, products, and services. It will ensure adherence to the standards for quality service.

The government shall promote innovation and creative ideas in the energy sector. It will enforce local manufacturing and appropriate fiscal policies promoting local manufacturing of systems and components, emphasising job creation and favourable tax regimes for energy technology innovations during pre-commercialisation.

### **11.2 Local Governments**

The Ministry of Local Government is responsible for the government's current decentralisation initiative, which is in line with the development of democracy in the country. Conceptually, the process is to realise sustainable development under the control and

management of the directly affected people, thus ensuring better coordination of development efforts and full participation of communities in poverty reduction efforts.

Local governments are uniquely positioned to drive the government's energy strategies and plans forward. Consideration should be given to the potential necessity of adaptation and customisation to local environments, requirements, cultures, and expertise.

The effective implementation of the energy policy will require capacity building and empowerment of Local Government structures. Local governments have the authority and mandate to monitor and coordinate the implementation of distinct enabling policies to drive local economic developments. Municipalities and districts are responsible for ensuring that the local resources and infrastructure are put to proper and sustainable use. Local governments are directly responsible for all decentralised service delivery, including those related to energy at the grassroots. This includes national programs to scale up sustainable energy consumption.

Without contradicting the national law, local governments will be responsible for developing by-laws to sustainably guide the development and utilisation of local energy resources and systems. Local governments will closely supervise and monitor large government projects to benefit the local community and the country. They will support the promotion and implementation of government energy programmes. They shall coordinate and supervise all energy utilities in the local government area to ensure good service delivery to communities. Local governments shall also enforce laws on energy development and use.

Establishing an energy focal desk/person at the local government offices responsible for coordinating and supervising all energy-related projects in the area will be necessary. Ensuring all national legislative laws governing the energy sector are properly implemented without contravening the constitution of Uganda shall be a mandate of local governments.

Close coordination between the local and central governments, a supportive and enabling regulatory environment, plus access to long-term, low-cost, and reliable funding will be critical for the successful implementation of the energy policy at the local government level.

### **11.3 Other Ministries, Departments and Agencies (MDAs)**

Other Ministries, Departments and Agencies (MDAs) play a substantial role in achieving the objective of the Sustainable Energy Programme to increase access to and consumption of clean energy. Many MDAs are large consumers and producers of energy, such as schools under the Ministry of Education and Sports (MoES), health centres under the Ministry of Health (MoH) or prisons under the Ministry of Internal Affairs (MIA). Other MDAs and sub-sectors, such as Natural Resources, Production, Water and Sanitation, and Health and Education, provide energy resources that can be transformed into electricity or used as biomass energy fuels. These resources must be managed sustainably. Furthermore, the

challenge of operation and maintenance of installed systems (e.g., cooking or lighting) can only be addressed in a coordinated effort of the MDAs. Therefore, making energy a cross-cutting issue to be addressed at the MDA level is important to access clean energy. Relevant MDAs include the Office of the President, Office of the Prime Minister, Ministry of Finance, Planning and Economic Development, National Planning Authority, Ministry of Local Government, Ministry of Education and Sports, Ministry of Health, Ministry of Works and Transport, Ministry of Internal Affairs, Ministry of Water and Environment, Ministry of Gender, Labour and Social Development, among others.

#### **11.4 Development Partners**

Key challenges in energy projects development include inadequate funding, lack of continuity in the funding of projects, low foreign investment from a highly competitive international finance market, inadequate adoption of the most cost-effective energy supply options for the country, low foreign exchange earnings from energy product exports and inadequate local development of energy technologies.

Development partners are important in assisting the government through technical support and guidance, programmes and projects, and funding and budgetary support to develop, implement, monitor, supervise and evaluate the policy implementation.

The government shall seek funding from development partners for specific programmes and/or projects, especially in areas less attractive to the private sector and complement self-help groups and private sector efforts in rural electrification projects.

The development partners shall be encouraged to provide or establish financial facilities for financing energy-related projects at minimal interest rates.

Implementation of interventions supported by Development Partners shall be coordinated through the Ministry of Energy and Mineral Development.

#### **11.5 Private Sector**

The private sector includes financial institutions, independent power producers (IPPs), private sector organisations and other energy-based private companies. They invest capital and other resources into the energy sector, producing and selling energy technologies and products, consuming energy and thus generating government revenue. Manufacturing and agricultural sectors consume significant amounts of energy, creating demand. In some cases, they also serve as energy producers, e.g. through co-generation by sugar factories. The private sector minimises and mitigates any adverse environmental impacts of energy exploration, production, use and disposal.

The government will pursue public-private partnerships (PPPs) to access much-needed financial, technological, and human resources critical for the energy sector's growth. The

government will create and maintain a conducive and enabling legal, regulatory, fiscal, tax, political and infrastructural environment to allow the private sector to flourish and implement the energy policy sustainably and with accountability. The government will investigate and publicise energy investment opportunities, facilitate feasibility studies and other advisory support to potential private sector investors, and capacity-building assistance to the private and public sectors.

## **11.6 Civil Society**

Civil society includes non-governmental organisations and other civil sector organisations. They play a critical role in creating awareness, disseminating information, and serving as intermediaries for communicating needs, expectations, capabilities and culpability between society, government, and the private sector. Civil society is instrumental in ensuring that social, economic and political obligations are met and any shortcomings duly raised.

The government will harness civil society in developing, implementing, monitoring, evaluating, and reviewing the socio-economic and environmental impacts of the energy sector plans and programmes.

Being cognizant that development partners sometimes channel their funding through civil society-led projects and programmes, the government will harness the contribution that civil society can thus provide by facilitating a conducive environment for such energy-related projects and programmes, subject to them meeting the pertinent regulatory requirements.

The government will also support capacity building and awareness creation related to energy in civil society.

## **11.7 The Media**

The media is responsible for publicising information on the energy sector to educate the public and other stakeholders. Thus, The media is responsible for understanding the issues related to the energy sector, and not just the economic, financial, and political issues, but also the science and policy aspects, and communicating these objectively, clearly and accurately. The government will utilise the media to create awareness about energy sector issues and programmes. It will also involve the media in policy development and other stages of the policy life cycle.

## **11.8 Research organisations and Academia**

Research organisations and Academia play a significant role in developing energy solutions that address the country's specific energy needs and sustainably exploit available resources. They also need to keep abreast of regional and international research developments, adopt best practices customised for the local situation, and utilise indigenous resources.

The government will support research initiatives and promote developing and disseminating locally adapted and designed solutions and technologies. It will also support training and skilling on these to attain an adequately equipped, skilled, trained energy workforce that is not technology-locked in their expertise.

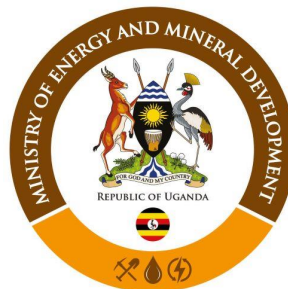
### 11.9 Local Communities

Local communities are important in supervising and monitoring energy projects and programmes and holding the responsible parties accountable. It is thus crucial to communicate with community members and enlist the support of their leaders in creating awareness about the responsibilities of the project implementers in avoiding and limiting any negative impact.

The local communities need to be involved and sensitised from the initial stages of energy project implementation to increase their participation in and contribution to the projects and minimise potential conflicts or rejection of the energy technologies and projects. Local leaders are also essential in ensuring that compensation is done with minimal hitches.

The community should also ensure that energy infrastructure is kept safe and not vandalised to achieve its expected operational lifetime and maximise the utility and benefits they gain from the energy products, technology, and infrastructure.

The government will endeavour to maximise the community involvement and prioritise the provision of social services in energy programmes. It should also promote the inclusion of local labour and the sustainable use of local resources where possible.



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## 12 Annexes

## 12.1 Annex 1: Energy Policy Financing

Policy Strategic Objectives	Cost Estimates/Budget (UGX Billions)											Responsible Institutions
	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25	FY 2025/26	FY 2026/27	FY 2027/28	FY 2028/29	FY 2029/30	Total	
<b>i) Increase Access to Reliable, Affordable and Modern Energy Services</b>												
<b>On-Grid Access</b>	895.0	905.0	924.4	956.6	975.9	877.7	877.1	892.0	892.8	896.1	9092.6	<b>MEMD, UNEC</b>
<b>Mini-Grids</b>	43.55	91.62	60.95	108.64	62.33	92.50	40.39	87.70	41.5	89.58	718.8	<b>MEMD</b>
<b>Stand Alone Off-Grid Systems</b>	24.96	25.42	29.18	30.29	30.30	25.75	26.57	22.82	21.86	23.06	260.2	<b>MEMD</b>
<b>Cross-Cutting Issues in Access to Energy</b>	2.9	6.6	2.9	2.9	5.0	5.3	5.5	5.8	6.1	6.4	49.4	<b>MEMD</b>
<b>Subtotal: Increase Access to Energy</b>	<b>966.4</b>	<b>1,028.6</b>	<b>1,017.4</b>	<b>1,098.4</b>	<b>1,073.5</b>	<b>1,001.3</b>	<b>949.6</b>	<b>1,008.3</b>	<b>962.3</b>	<b>1,015.1</b>	<b>10,121</b>	<b>MEMD, UNEC</b>

<b>ii) Promote investment in the development and utilisation of energy resources</b>												
<b>Electricity Generation</b>	717.2	1120.5	1205.7	893.4	870.2	812.3	865.1	850.4	840.7	828.9	9,004.5	<b>UNEC</b>
<b>Electricity Distribution</b>	290	134	272	131	272	129	273	110	278	138	2,025	<b>UNEC</b>
<b>Electricity Transmission</b>	225.0	405.3	377.9	302.4	305.7	455.8	720.5	665.7	366.2	355.0	4179.5	<b>UNEC</b>
<b>Subtotal: Development</b>	<b>1367.4</b>	<b>1759.8</b>	<b>2110.8</b>	<b>1737.2</b>	<b>1854.6</b>	<b>1808</b>	<b>2269.4</b>	<b>1893</b>	<b>1569.1</b>	<b>1405.6</b>	<b>17,773.4</b>	<b>UNEC</b>
<b>iii) Manage environmental impacts of energy exploitation and consumption</b>	<b>66.53</b>	<b>35.51</b>	<b>843.4</b>	<b>813.3</b>	<b>841.2</b>	<b>852.6</b>	<b>811.8</b>	<b>882.1</b>	<b>931.2</b>	<b>861.2</b>	<b>6,938</b>	<b>MEMD &amp; MDAs</b>
<b>iv) Promote Efficiency and Conservation in energy supply and utilisation</b>	<b>1.40</b>	<b>16.75</b>	<b>17.50</b>	<b>19.50</b>	<b>18.50</b>	<b>12.50</b>	<b>11.50</b>	<b>12.20</b>	<b>12.20</b>	<b>11.40</b>	<b>133.45</b>	<b>MEMD</b>

<b>v) Promote Renewable, Nuclear and other Alternative Energy Sources</b>												
<b>Solar PV</b>	0.2	1.66	17.54	4.69	5	17.56	3.61	0.81	2.55	0.29	53.91	<b>MEMD</b>
<b>Biomass (Solid, Liquid, Gaseous)</b>	3.69	4.16	3.98	3.74	3.27	3.29	2.55	2.68	2.58	2.69	32.66	<b>MEMD</b>
<b>Geothermal</b>	18.5	101	91.5	88.0	290.5	482.15	516.15	360.15	516.15	806.15	3,272.3	<b>MEMD</b>
<b>Wind</b>	-	0.07	0.55	0.57	6.25	0.27	0.19	0.27	0.25	0.17	8.59	<b>MEMD</b>
<b>Waste to Energy</b>	0.36	0.61	0.55	2.26	0.36	0.17	0.08	0.06	0.06	0.06	4.57	<b>MEMD</b>
<b>Clean Cooking</b>	1.14	1.162	1.09	0.75	0.7	0.61	0.61	0.61	0.61	0.61	7.89	<b>MEMD</b>
<b>Nuclear Energy Development<sup>25</sup></b>	21.4	31.6	110.9	198.8	198.8	198.5	198.5	126.5	37.8	37.8	1161	<b>MEMD</b>
<b>Atomic Energy Regulation</b>	113.8	68.4	144.3	211.6	207.9	212.4	212.3	140.4	46.4	45.9	1403.4	<b>MEMD</b>
<b>Subtotal: Resources Development Energy</b>	<b>397.1</b>	<b>492.0</b>	<b>509.6</b>	<b>493.0</b>	<b>760.3</b>	<b>628.3</b>	<b>647.0</b>	<b>488.1</b>	<b>545.0</b>	<b>820.9</b>	<b>5,782.9</b>	<b>MEMD</b>

<sup>25</sup>Nuclear Energy Development and Atomic Energy Regulation have been included in Objective ii) pending discussion and approval by Task Force and Technical Team (Nuclear Energy Department and Atomic Energy Council as discussed).

<b>vi) Raise Public Awareness of Energy Resources, Services and Programmes</b>												
<b>Communication Strategy for the Energy Policy</b>	1.3	1.8	1.9	2.1	2.2	2.3	2.3	2.5	5.5	2.6	24.5	<b>MEMD</b>
<b>Gender, Youth, PWDs &amp; HIV-AIDS</b>	1.9	1.8	0.8	0.8	0.7	1.7	1.6	1.0	1.0	1.3	12.6	<b>MEMD</b>
<b>Subtotal: Awareness</b>	<b>3.2</b>	<b>3.6</b>	<b>2.7</b>	<b>2.9</b>	<b>2.9</b>	<b>4.0</b>	<b>3.9</b>	<b>3.5</b>	<b>6.5</b>	<b>3.9</b>	<b>37.1</b>	<b>MEMD</b>
<b>TOTAL COST ESTIMATE</b>	<b>2,802</b>	<b>3,336.3</b>	<b>4,501.4</b>	<b>4,164.3</b>	<b>4,551</b>	<b>4,306.7</b>	<b>4,693.2</b>	<b>4,287.2</b>	<b>4,026.3</b>	<b>4,118.1</b>	<b>40,785.9</b>	<b>MEMD</b>

## 12.2 Annex 2: Energy Policy Monitoring and Evaluation Framework

	<b>INDICATOR/MEASURE<sup>26</sup></b>	<b>DEFINITION</b> How is it calculated?	<b>BASELINE</b> What is the current value?	<b>TARGET</b> What is the target value?	<b>DATA SOURCE</b> How will it be measured?	<b>FREQUENCY</b> How often will it be measured?	<b>RESPONSIBLE</b> Who will measure it (MDA)?	<b>REPORTING</b> Where will it be reported?
<p><b><u>Policy Goal/Impact</u></b></p> <p>To meet the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner.</p>	<ul style="list-style-type: none"> <li>▪ Access to modern energy services</li> <li>▪ Level of socio-economic transformation attributed to energy</li> </ul>	<p>% household accessing modern energy services</p> <p>Ratio of energy generation to demand</p>	<p>48.8%</p> <p>1.8</p>	<p>100%</p> <p>1.4</p>	<p>Household survey and consumption reports</p> <p>National census report</p> <p>National statistics report</p>	<p>Annual</p>	<p>MEMD, UBOS, ERA,</p>	<p>MEMD energy access, generation and consumption reports</p> <p>MEMD impact study reports</p>

1. <sup>26</sup>The missing indicators and targets at output level will be populated during the sector strategy development process under the leadership of MEMD Planning Directorate in collaboration with respective departments and agencies

						1 in 5 years		
<b>Policy Outcome</b>	<b>Indicator/measure</b>	<b>Definition</b>	<b>Baseline</b>	<b>Target</b>	<b>Data Source</b>	<b>Frequency</b>	<b>Responsible</b>	<b>Reporting</b>
<b>Objective/Result Area 1: Strengthen electricity generation, transmission and distribution infrastructure</b>	▪ Level of energy security (MW)	▪ Installed generation Capacity	1378.1MW	52,481MW	MEMD, ERA, UBOS reports          Power security and	Annual	MEMD, ERA, UECL, UBOS,	MEMD, ERA, UBOS reports
	▪ Energy demand	▪ Energy demand MW	850MW	41,000MW				
	▪ Electricity consumption	▪ Per capita electricity consumption	215kWh	3668kWh				
	▪ Rate of access to electricity	▪ Rate of access to electricity	48.8%	100%				
		▪ Energy not served due to outages %	8%	4%				
		▪ Energy losses due to theft						

	<ul style="list-style-type: none"> <li>▪ Grid reliability rate</li> <li>▪ Reduction in power losses</li> <li>▪ Increased availability of power</li> <li>▪ Energy Diversity Mix</li> </ul>	<p>and vandalism</p> <ul style="list-style-type: none"> <li>▪ Number and duration of clearing power outages</li> </ul> <p>% of energy resources in the energy mix</p>			reliability analysis			
<p><b>Objective/Result Area 2:</b> Increase electricity access and uptake of</p>	<ul style="list-style-type: none"> <li>▪ Electrification rate</li> </ul>	<ul style="list-style-type: none"> <li>▪ % households connected to power</li> </ul>	<p>48.8%</p> <p>48.8%</p>	<p>100%</p>	<p>Power connection records</p>	<p>Annually</p>	<p>MEMD, ERA, UBOS</p>	<p>Power connection reports</p>

<p>alternative modern forms of energy.</p>	<ul style="list-style-type: none"> <li>▪ Transmission and distribution grid coverage</li> <li>▪ Transmission and distribution coverage</li> </ul>	<ul style="list-style-type: none"> <li>▪ % of the national population that can afford energy</li> <li>▪ Transmission grid coverage in Km</li> <li>▪ Distribution grid coverage in Km</li> <li>▪ On-grid and off-grid electrification rate</li> </ul>	<p>3991.6 Km</p> <p>53,733km</p> <p>48.8%</p>	<p>13,029.43 km</p> <p>100%</p>				
<p><b>Objective/Result Area 3:</b> Enhance utilisation of energy-efficient</p>	<p><b>Indicator/measure</b></p> <ul style="list-style-type: none"> <li>▪ Transmission losses</li> <li>▪ Technical losses (% change)</li> </ul>	<p><b>Definition</b></p> <ul style="list-style-type: none"> <li>▪ % Transmission Losses</li> </ul>	<p><b>Baseline</b></p> <p>918GWh</p> <p>141 MW</p>	<p><b>Target</b></p> <p>3%</p>	<p><b>Data Source</b></p> <p>Assessment of efficiency of energy consumption</p>	<p><b>Frequency</b></p> <p>Annual</p>	<p><b>Responsible</b></p> <p>MEMD, MoWT</p>	<p><b>Reporting</b></p> <p>Energy generation and consumption reports</p>

practices and technologies.	<ul style="list-style-type: none"> <li>▪ Electricity savings</li> </ul> <p>Energy consumption per passenger-kilometre</p>	<ul style="list-style-type: none"> <li>▪ Electricity savings (GWh)</li> <li>▪ Energy demand Savings (MW)</li> <li>▪ Energy consumption per passenger-kilometre (energy/pkm)</li> </ul>						
<p><b>Objective/Result</b></p> <p><b>Area 4:</b> Promote sustainable utilisation of biomass</p>	<p><b>Indicator/measure</b></p> <p>% household, institutions, SMEs accessing modern biomass energy technologies</p> <p>% of biomass in National total primary energy consumption (TPEC)</p>	<p><b>Definition</b></p> <p>Access to modern biomass energy technologies (cook stoves, biogas, etc)</p> <p>Biomass contribution out of the total energy demand/consumption of a country</p>	<p><b>Baseline</b></p> <p>12.0%</p> <p>89%</p>	<p><b>Target</b></p> <p>50%</p> <p>50%</p>	<p><b>Data Source</b></p> <p>survey and consumption (energy balance) reports</p> <p>National census report</p>	<p><b>Frequency</b></p> <p>Annual</p>	<p><b>Responsible</b></p> <p>MEMD. UBOS</p>	<p><b>Reporting</b></p> <p>MEMD energy access, generation and consumption reports</p> <p>MEMD impact study reports</p>

	Percentage of blending of fossil fuels with Biofuels	Blending of fossil fuels with Biofuels	0%	5%	National statistics report Uganda National Household Survey Report Licence data	1 in 5 years  Annual		MEMD assessment and impact study reports
<b>Objective/Result</b> <b>Area 5:</b> Attract investment with financial sustainability in the development and utilisation of energy resources	<b>Indicator/measure</b>	<b>Definition</b>	<b>Baseline</b>	<b>Target</b>	<b>Data Source</b>	<b>Frequency</b>	<b>Responsible</b>	<b>Reporting</b>
<b>Objective/Result</b> <b>Area 6:</b> Promote nuclear energy development.	<b>Indicator/measure</b>	<b>Definition</b>	<b>Baseline</b>	<b>Target</b>	<b>Data Source</b>	<b>Frequency</b>	<b>Responsible</b>	<b>Reporting</b>
<b>Objective/Result</b> <b>Area 7:</b> Promote emerging energy resources,	<b>Indicator/measure</b>	<b>Definition</b>	<b>Baseline</b>	<b>Target</b>	<b>Data Source</b>	<b>Frequency</b>	<b>Responsible</b>	<b>Reporting</b>

geothermal, hydrogen, wind and other resources.								
<b>Objective/Result Area 8:</b> Enhance energy sector governance, capacity building and integrated planning.	<b>Indicator/measure</b>	<b>Definition</b>	<b>Baseline</b>	<b>Target</b>	<b>Data Source</b>	<b>Frequency</b>	<b>Responsible</b>	<b>Reporting</b>
<b>Objective/Result Area 9:</b> Enhance the management of the energy-related environment, health and social safeguards.	<ul style="list-style-type: none"> <li>▪ Legal and regulatory frameworks on environmental impacts of energy exploitation and consumption</li> <li>▪ Technologies supporting clean energy</li> <li>▪ Investment in clean energy</li> </ul>	<p># of regulations, standards, and codes in place on energy exploitation and consumption</p> <p>% of the population using alternative cooking fuels (clean cooking)</p> <p>% number of social institutions (schools, health</p>	0	<p>2</p> <p>40%</p>	Survey on clean energy technology and adaptation	Annual	MEMD, NEMA	Energy generation and consumption reports

		centres, prisons, a.o) using improved institutional cook stoves	<10%	60%				
			97%	80%				
			<10%					
<b>Outputs</b>								
<b>I. RENEWABLE ENERGY</b>								
<b>a) Biomass</b>								
<b>i) Solid Biomass</b>								
<b>Improved institutional coordination on solid biomass energy production and utilisation</b>	Share of solid biomass in the national energy mix	#of intuitions using solid biomass energy mix			Renewable energy survey	Annually	MEMD	Renewable energy performance report
<b>Increased use of efficient</b>	#of households using improved	#of households using solid			Renewable	Annually		Renewable energy

<b>biomass energy products and technologies</b>	solid biomass technologies	biomass technologies			energy survey			performance report
<b>Sustainable charcoal and fuel supply</b>	Acreage of dedicated tree woodlots developed for solid bioenergy production	#of acreage of tree woodlots for solid bioenergy production			Renewable energy survey	Annually	MEMD	Renewable energy performance report
<b>Sustainable business models for the production and utilisation of solid biomass products and technologies</b>	Number of registered companies and SMEs (by gender and age of proprietor) producing certified solid biomass products and technologies	#number of registered companies producing certified solid biomass energy products and technologies		200	Document analysis	Annually		Renewable energy performance report
<b>ii) Liquid Biomass</b>								
<b>Increased production and use of biofuels and related technologies in</b>	Share of liquid biomass in the total energy mix	#of new institutions that are using liquid biomass			Renewable energy survey	Annually	MEMD	Renewable energy performance report

<b>a sustainable manner</b>								
<b>Comprehensive regulations for the production and use of biofuels</b>	#of policy frameworks that have been amended for the production and use of biofuels	#of new laws implemented			Document analysis	Annually		Renewable energy performance report
<b>iii) Gaseous Biomass</b>								
<b>Legislation and standards for the production and use of gaseous biomass in place</b>	Share of gaseous biomass energy in the total energy mix	#of shares in the gaseous biomass energy mix			Renewable energy survey	Annually	MEMD	Renewable energy performance report
<b>Increased production and use of gaseous biomass and related technologies in a sustainable manner</b>	The proportion of the population using clean gaseous biofuels and technologies	%of the population using clean gaseous biofuels and technologies			Renewable energy survey	Annually		Renewable energy performance report

<b>Increased private investments in gaseous biomass</b>	Electricity generation capacity from biomass gasification technologies	%increase from biomass gasification			Renewable energy survey	Annually	MEMD	Renewable energy performance report
<b>iv) Biomass Crosscutting</b>								
<b>An integrated GIS database and information centre for biomass resource</b>	Quantities of national biomass energy resource by type	#of national biomass energy resource by type			Renewable energy survey	Annually	MEMD	Renewable energy performance report
<b>Sustainable supply of feedstock for bioenergy</b>	Acreage of feedstock and dedicated tree woodlots developed for solid bioenergy	#of acreage for feedstock and dedicated woodlots developed for solid bioenergy			Renewable energy survey	Annually		Renewable energy performance report
<b>Improved quality of biomass products resulting from compliance with</b>	Number of registered companies producing certified biomass energy	#number of registered companies producing certified biomass energy			Renewable energy survey	Annually		Renewable energy performance report

<b>established standards</b>	products and technologies	products and technologies						
<b>Legal and regulatory framework for the management and utilisation of solid biomass in place</b>	Update and enact a legal and regulatory framework for the management and utilisation of solid biomass	# of New and Revised Policies; Acts and Regulations			Renewable energy survey	Annually		Renewable energy performance report
<b>b) Solar</b>								
<b>Increased use of solar thermal technologies for domestic and commercial applications</b>	Capacity (MWth) of solar thermal systems installed by the consumer category	%increase in Capacity (MWth) of solar thermal systems installed by the consumer category	0		Survey on small and Pico hydro power national energy mix	Annual		Renewable energy performance report
<b>Optimised electricity consumption from the use of solar thermal technologies for heating</b>	Number of households (FHH and MHH) and institutions using solar thermal technologies	# of households and institutions using solar thermal technologies			Survey on small and Pico hydro power national	Annual	MEMD	Renewable energy performance report

					energy mix			
<b>Innovation in various applications of solar thermal technologies</b>	Number of SMEs (by gender and age of owners/operators) engaged in solar thermal business (sales, manufacturing, installation)	# of (gender and age) of owners engaged in solar thermal business			Survey	Annually		Renewable energy performance report
<b>c) Geothermal Energy</b>								
<b>Increased availability and use of clean, sustainable geothermal energy resources and technologies</b>	Well-resourced and operational geothermal resources department	Number of operational geothermal resource departments and plants in place	1	1	Survey	Annually	MEMD	Renewable energy performance report
<b>Increased base load electrical power generation and supply security</b>	Contribution of geothermal energy to the National Energy mix	%increase of geothermal energy to the national energy mix	0	200MW	Energy generation performance analysis	Annual	MEMD UEC ERA	Energy generation performance reports

<b>in the electricity sector</b>								
<b>Increased tourism in the areas where geothermal stations are developed</b>	Number of geothermal areas developed and planned for development	#of geothermal areas	0	2	Survey	Annual	UTB	UTB performance report
<b>Increased use of direct geothermal heat in industry and agriculture</b>	Number of private companies investing in geothermal energy development	Number of geothermal plants constructed	2	6	Physical counting and observation	Annually	MEMD	Renewable energy performance report
<b>d) Waste to Energy</b>								
<b>Increased power generation from municipal waste</b>	Average energy recovered per ton of waste (MJ/ton)	#of Tons of waste available			Renewable energy survey	Annually	MEMD, ERA	Renewable energy performance report
<b>Improved Capacity and incentive for</b>	Number of professionals in government	#of professionals involved in			Human resource	Annually	MEMD, Local	Capacity development report

<b>local governments to manage municipal wastes</b>	involved in managing municipal wastes	managing municipal waste			capacity audit		Government	
<b>1. CLEAN COOKING</b>								
<b>Liquid Petroleum Gas (LPG)</b>								
<b>Households, Institutions, Industries, Transport</b>								
<b>Compliance with developed regulations, standards and certification framework</b>	Comprehensive regulations, standards and certification framework in place	#of certified licenses in place			Inspection or document analysis	Annual	MEMD - Petroleum	Report from the Uganda UNBS
<b>Compliance with safety standards for LPG filling stations</b>	Safety standards for LPG filling stations implemented	#of safety standards for LPG stations implemented			Inspection or document analysis	Annually		Report from the Uganda UNBS
<b>Increased awareness and Capacity for the</b>	Information packages developed and disseminated	#of ICE materials developed and disseminated			Document analysis	Annually		Petroleum Performance reports

<b>safe usage of LPG</b>								
<b>More players in the LPG value chain</b>	Number of players in the LPG industry	#of players in the LPG industry			Survey	Annually		Petroleum Performance reports
<b>Increased number of users of LPG</b>	Increase of users to 30% of national households	%increase of LPG users in up to 30% of national households			Survey	Annually		Petroleum Performance reports
<b>Increased local manufacturers of LPG cylinders and accessories</b>	Number of local manufacturers of LPG cylinders and accessories	#of increased local manufacturers of LPG cylinders and accessories			Survey	Annual		Petroleum Performance reports
<b>Increased financing by local financial institutions for LPG users</b>	Number of local institutions financing LPG	#of increased institutions financing LPG			Survey	Annually		Petroleum Performance reports
<b>Improved supply stability</b>	Five regional storage centres established	#of regional storage centres established			Survey	Annual	MEMD - Petroleum	Petroleum Performance reports

<b>Improved access to LPG services in peri-urban and rural areas</b>	Number of service points established in peri-urban and rural areas	#of active service points established in peri-urban and rural areas			Inspection or survey	Annually		Petroleum Performance reports
<b>2. ELECTRICAL POWER</b>								
<b>i) Crosscutting</b>								
<b>Timely development of power generation infrastructure due to streamlined land acquisition processes.</b>	duration for implementation of new power sector projects	#of meetings since the inspection	6	5	Efficiency analysis	Annual	MEMD, UEC,	Electrical power performance reports
	Number of skilled work force in the ESI and established locally	#of resources centres established and active	0	1	Capacity analysis of resource centres	Annual		Electrical power performance reports
<b>Development of planned and non-committed electricity projects according to an IRP</b>	Number of IRPs jointly developed by power sector agencies	#of active IRPs jointly developed and reviewed	0	1	Performance report on IRPs	Annual		Electrical power projects performance reports

<b>Accelerated demand growth from increased industrialisation, access and power exports</b>	Actual vs projected demand	#of actually increased industrialisation, access and power exports vs projected demand  Expressed as a % deviation		35%	Survey/impact evaluation	Annual		Electrical power performance reports
<b>ii) Electricity generation</b>								
<b>Improved institutional framework for planning generation, transmission and distribution in line with sound demand projections</b>	Sequenced development of large hydropower projects with related transmission and distribution infrastructure	#of large hydropower projects with related transmission and distribution infrastructure	2	5	Generational capacity assessment and reviews	Annual	MEMD, ERA,	Electrical power generation performance reports
<b>Diversified energy generation mix</b>	Percentage contribution of different energy sources to the generation mix	Installed Capacity of other renewable energy resources (MWp)	60.8MWp	10000MWp	Energy mix analysis	Annually	MEMD, UEC	Electrical power generation performance reports

<b>iii) Electricity transmission</b>								
<b>Reduced transmission losses</b>	Percentage losses on the transmission network	%reduction losses on the transmission network	4.1	2%	Energy transmission efficiency analysis	Annual	MEMD ERA	Electrical power transmission performance reports
<b>Improved electricity supply reliability due to reduced vandalism of infrastructure</b>	Number of outages resulting from vandalised transmission equipment	#of outages resulting from vandalised transmission equipment	SAIFI/SAIDI 86.35/190.95	SAIFI/SAIDI 82.3/86.6	Electricity supply reliability analysis	Annual		Electrical power transmission performance reports
<b>Framework for private capital investment into transmission infrastructure established</b>	Quantity of private investments in the transmission grid	#of active private investors in the transmission grid	1	50	Investment analysis into transmission infrastructure	Annually		Electrical power transmission performance reports
<b>Coordinated development of transmission</b>	Quantity of demanded energy accruing from	#of delayed transmissions lines developed	5	0	Infrastructure analysis	Annual		Electrical power transmission

<b>and generation infrastructure in line with the IRP</b>	delayed transmission lines developed							n performance reports
<b>Improved transmission system reliability due to adequate network redundancy</b>	Outages resulting from inadequate redundancy on the transmission network	#of outages resulting from inadequate redundancy on the transmission network	SAIFI/SAIDI	SAIFI/SAIDI	Reliability analysis of transmission system	Annual		Electrical power transmission performance reports
<b>Interconnectors to all neighbouring countries developed</b>	Quantity of regional electrical energy exports to neighbouring countries	Quantity of energy (MW) exported to neighbouring countries	87MW		Energy consumption (export) analysis	Annual		Electrical power transmission performance reports
<b>iv) Electricity distribution</b>								
<b>Coordination between grid distribution and off-grid solutions to accelerate access</b>	Percentage of the population with access to electricity on- and off-grid	%increase in the population with access to on-grid and off-grid	50% [24%-On-grid & 26%-Off-grid].	60% [on-grid].	UNHS Reports Census Report	Annual	MEMD	Electrical power distribution performance reports

<b>Reduced distribution losses</b>	Percentage losses in the distribution network	%reduction in the distribution network	16%	12%	ERA Distribution statistics	Annual	MEMD, ERA	Electrical power distribution performance reports
<b>A reviewed legislative framework to curb distribution equipment theft and vandalism</b>	outages resulting from vandalised distribution equipment	#of outages resulting from vandalised distribution equipment	SAIFI/SAIDI 86.35/190.95	SAIFI/SAIDI 82.3/86.6	Vandalisation and outages reports	Annual	MEMD, ERA	Electrical power distribution performance reports
<b>3. ON-GRID AND OFF-GRID ACCESS TO ELECTRICITY AND RURAL ELECTRIFICATION</b>								
<b>Crosscutting</b>								
<b>Social and economic transformation in rural areas due to increased electricity access</b>	The national rate of rural electrification	%increase in electricity through national rural electrification			UNHS Reports	Annually	MEMDUBOS	Rural Electrification performance reports
	Local utility companies involved in rural electrification initiatives	# of utility companies involved in rural electrification initiatives			Quarterly reports	Annual	MEMD, ERA	Rural Electrification performance reports

	Geographic coverage of rural electrification services	# of HHs, institutions and commercial points connected			Quarterly reports	Annual		Rural Electrification performance reports
	Rate of electricity demand growth in rural areas	% increase in electricity demand growth in rural areas			Quarterly reports	Annual		Rural Electrification performance reports
<b>On-Grid Electricity Access</b>								
<b>Reliable grid electricity supply to rural areas</b>	Number of new electricity connections per annum from grid extension	# of new electricity connections per annum from grid extension			Quarterly reports	Annual	MEMD, ERA	Rural Electrification performance reports
	Growth in grid electricity demand (MW)	%increase in grid electricity demand			UEPPL statistical reports	Annual	MEMD, UEC, ERA	Electrify demand reports
	Reduction in power outages	Number of outage hours/month			Quarterly reports	Annual	MEMD, UEC, ERA,	Power outage reports

<b>Mini-Grids</b>								
<b>Strong legal, regulatory and commercial framework for the development of mini-grids in place</b>	Total installed generating Capacity (MW) of mini-grids developed	#of installed generating Capacity (MW) of mini-grid developed	0	6	Generation capacity analysis	Annual	MEMD, ERA	Generation performance reports
	Tariff setting methodologies appropriate for mini-grids in place	Mini-grids tariff policy in place	0	1			MEMD, ERA	
<b>Increased public and private investments in mini-grid technologies</b>	Number of mini-grids developed	# of mini-grids developed	0	3	Generation capacity analysis	Annual	MEMD, ERA	Generation performance reports
<b>Increased access to modern energy in remote rural</b>	Number of electricity connections from mini-grids	# of electricity connections from mini-grids	100,816/ -Mini-grids.  21,504 – Off-grid	550,816- Mini-grids  115,671- Off grids.	Quarterly reports	Annual	MEMD	Generation performance reports

<b>and island communities</b>	Number of private companies engaged in mini-grid development	# of private companies engaged in mini-grid development			Quarterly reports	Annual	MEMD	Generation performance reports
<b>Standalone Systems/Solar Home Systems</b>								
<b>Increased rural access to modern energy through standalone off-grid technologies</b>	Number of households and institutions using standalone off-grid solutions, including SHS	# of households and institutions using standalone off-grid solutions			Quarterly reports	Annual	Solar Association, UECCC	Electricity access performance reports
<b>Reduced proliferation of sub-standard solar PV products and installations in the market</b>	Number of private companies engaged in standalone off-grid systems business	# of private companies engaged in standalone off-grid systems business			Quarterly reports	Annual	MEMD UNBS	
<b>Integration of standalone off-grid systems into planning</b>	Prevalence of sub-standard standalone systems on the	#of sub-standard standalone systems on the			Quarterly reports	Annual	MEMD	Electricity access performance reports

<b>and policy activities in Government agencies</b>	market, as tested by the national standards agency	market tested by the national standard agency						
<b>Increased consumer confidence and market for high quality durable standalone off-grid technologies in rural areas</b>	Geographic coverage of standalone off-grid system services and businesses	#of regions using standalone off-grid system services and business			Quarterly reports	Annual		Electricity access performance reports
<b>Increased and affordable use of standalone solar PV and solar thermal systems for households, businesses and institutions</b>	Percentage contribution of standalone solar systems to the national energy balance	%increase in the contribution of standalone solar systems to the national energy balance			Quarterly reports	Annual		Electricity access performance reports
<b>4. ENERGY EFFICIENCY AND CONSERVATION</b>								
<b>Cross-Sectoral Demand Side Management</b>								

<b>Increased technical Capacity and interest in energy efficiency</b>	Number of registered energy efficiency professionals in the public and private sectors	#of registered active efficiency professionals in the public and private sectors			Survey	Annually	MEMD	Reports from registered companies both in the public and private sectors
<b>Improved energy output and efficiency of cooking in households and institutions</b>	Cooking energy consumption per capita in households and institutions				Survey		MEMD	
<b>Increased use of alternative, more efficient cooking fuels than charcoal and firewood</b>	Total energy consumption per capita in households and institutions				survey		MEMD	
<b>Industry and Commercial</b>	Energy consumption per unit of production by category	#of energy consumption per unit by category			Survey	Annual	MEMD	Consumption reports
	Total GHG emissions per unit	#of GHG emissions per			survey	Annually		Reports from the

	of production by category	unit of production by category						greenhouse gas companies
	Energy consumption per unit of value added in each category	#of energy units consumed per unit of value added in each category			Survey	Annual		Energy consumption reports
	Energy consumption per floor area in commercial buildings	#of energy units consumed per floor area in commercial buildings			Survey	Annual		Energy consumption reports
	Number of ESCOs established	#of ESCOs established			Survey	Annually		Energy consumption reports
<b>Transport</b>								
<b>Improved energy security in the transport sector due to optimised fuel consumption per capita</b>	Tonnes of GHG emissions per passenger-kilometre (tCO <sub>2</sub> /pkm)	# of GHG emissions per passenger-kilometre (tCO <sub>2</sub> /pkm)			Energy security study/survey	Annually	MEMD	Energy security reports

<b>Streamlined regulatory framework for fuel efficiency and related infrastructure</b>	Energy consumption per passenger-kilometre (energy/pkm)	Number of kilometres per-passenger			Survey	Weekly	MEMD	Energy security reports
<b>Reduced pollution and emissions from the transport sector</b>	Quantity of annual national fuel imports for the transport sector	Litres of fuel imported			Survey	Annual	MEMD	Energy security reports
<b>Agriculture</b>								
<b>Increased utilisation of energy-efficient technologies and methods in agriculture.</b>	Energy input per unit yield	# of input per unit yield			Survey	Annually	MEMD, EECD	Renewable energy survey report
<b>Increase in agricultural yield per unit energy input.</b>	Energy per value-added unit	#of units used per value added			Survey or impact study	Annual		Energy impact studies
<b>5. NUCLEAR ENERGY</b>								

i) Cross-cutting								
<b>A conducive and comprehensive framework for the development of nuclear energy for power and non-power applications</b>	Level of compliance with national and international nuclear energy legislation and regulations	#of compliance with national and international nuclear energy legislations and regulations			Document analysis	Annually	MEMD AEC	AEC performance report
<b>Increased public awareness of nuclear energy applications</b>	Level of public awareness of the nuclear industry	#of advocacy campaigns conducted			Awareness survey	Annually		Survey report
<b>A well-organised and professional nuclear energy fraternity</b>	Number of staff trained in established nuclear industry institutions	#of staff trained			Human resource capacity audit	Annual		Capacity development report
	Number of nuclear training courses in higher education institutions	#of nuclear training courses in higher education institutions			Curricula analysis or audit	Annual		Capacity development report

	Exchange programmes with nuclear technology suppliers undertaken	#of exchange programmes with nuclear technology suppliers undertaken			Performance analysis	Annually		Exchange Programme report
	Nuclear industry professionals certified and registered	#of certified and registered nuclear industry professionals			Performance analysis of registration and certification databases	Annually		Nuclear energy sector performance report AEC Performance Report
<b>Strong local participation in the supply of goods and services for the nuclear industry</b>	Number of local companies participating in the nuclear industry	#number of local companies participating in the nuclear industry			Survey	Annually	MEMD AEC	Nuclear energy performance report
<b>Increased regional and international cooperation on</b>	Regional and international bilateral and multilateral	#of regional and international bilateral and multilateral			Performance analysis of	Annually		Nuclear energy sector

<b>nuclear energy development and regulation</b>	agreements on nuclear energy	agreements on the development and regulation of nuclear energy for power and non-power applications			impleme ntation			performanc e report  AEC Performanc e Report
<b>Comprehensive national mechanisms on Nuclear and radiological emergency response</b>	A strong framework for nuclear and radiological emergency preparedness and response arrangements in place	#of nuclear and radiological emergency preparedness and response equipment and facilities in place and are functioning			Performa nce analysis of impleme ntation mechani sms	Annu al		Nuclear energy sector performanc e report  AEC Performanc e Report
<b>ii) Nuclear Power Infrastructure Development</b>								
<b>increased stock of strategic national nuclear energy infrastructure</b>	Progress of nuclear project implementation	%increase in the progress of nuclear project implementation			Performa nce analysis or review	Annu al	MEMD AEC	Nuclear energy performanc e report
	Planned public and private nuclear power investments (\$)	#of action plans for public and private nuclear power			Performa nce analysis or review	Annu al		Nuclear energy performanc e report

		investments implemented						
<b>iii) Nuclear Power Regulatory Infrastructure Development</b>								
<b>Reviewing/Amending the existing law to include provisions for regulation of the development of nuclear power and widening the mandate of the Atomic Energy Council</b>	Ratifying relevant international treaties and conventions for nuclear power development	#of international conventions and treaties ratified			Self-assessment (SARIS)	Annual	MEMD AEC	Nuclear Sector Performance Report  AEC Performance Report
	Nationwide stakeholder awareness engagements	% increase in awareness of the mandate of the Atomic Energy Council  #of public and stakeholder engagements conducted			Public and stakeholder awareness survey	Annual		AEC Performance Report
	Developing relevant practice-specific regulatory documents	#of regulatory documents developed			Integrated regulatory	Annual		AEC Performance Report

	(Regulations, safety and security guides, standards, codes of practice, etc.				performance review			
	Defined funding mechanism in place to support regulatory activities	#of active funding mechanism in place to effectively carry out regulatory oversight role over all nuclear and radiation installations			Funding analysis	Annual		AEC Performance Report
<b>iv) Regulatory Framework for non-nuclear power applications</b>								
<b>Enhancing Accountability and Control of radiation sources in Uganda</b>	Inventory of radiation generators and radioactive sources in the country	#of radiation generators and radioactive sources registered			Radiation sources database	Annual	MEMD, NEU	AEC Performance Report
<b>v) Nuclear Fuel and Radioactive Waste Management</b>								
<b>Sustainable nuclear fuel supply for the</b>	The tonnage of nuclear fuel resources	#of tonnes of nuclear fuel			Survey	Annual	MEMD NEU AEC	Nuclear energy

<b>national nuclear power Programme</b>	confirmed Regularly updated database on nuclear fuel resources and power generation potential	resource confirmed.						performance report
<b>Regulations for decommissioning nuclear facilities and managing spent fuel and radioactive waste</b>	Funding mechanisms and infrastructure in place for nuclear waste management and disposal	#of active funding mechanisms and infrastructure in place to manage nuclear waste and disposal			Funding/ investment analysis	Annual	MEMD AEC	Nuclear energy performance report
<b>vi) Peaceful Nuclear and Radiation Science and Technology Applications</b>								
<b>Well-developed national nuclear science research and development infrastructure</b>	Number of operational radioisotope production facilities	#of active operating radioisotopes			Facility or infrastructure assessments	Annual	MEMD AEC	Nuclear energy performance report
	Number of operational irradiation facilities for sterilisation	#of active operational irradiation			Facility or infrastructure	Annual		Nuclear energy performance report

		facilities for sterilisation			assessments			
	A well-equipped research and development institute for nuclear and radiation technology applications established	#of research activities/projects conducted			Performance analysis	Annual		RASIMS reports-AEC Research publications Nuclear Energy Sector Performance reports
	A framework for accreditation of Technical and Scientific Support Organisations (TSOs) in the field of nuclear and radiation technology applications	#of accredited TSOs and qualified experts			Capacity analysis of training centres			AEC Performance Report



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