THE REPUBLIC OF UGANDA

Ministry of Energy and Mineral Development

Energy and Mineral Development Sector

Sector Development Plan
2015/16 – 2019/20

June 2015

Foreword

The Energy and Mineral Development Sector Development Plan (EMDSDP) defines the sector development agenda for the next 05 (five) financial years from FY2015/16 to 2019/20. This plan is a culmination of a comprehensive sector review process grounded on a new National Planning Framework, the Vision 2040, the second National Development Plan (NDP II) and the various sector policies. The theme for the vision 2040 is, "a transformed Ugandan society from a peasant to a modern and a prosperous country with 30 years". The theme for the second National Development Plan (NDP II) is "strengthening Uganda's competitivesness for sustainable wealth creation, employment and inclusive growth".

In line with the vision 2040 and the NDP II theme, the Energy and Mineral Development (EMD) sector, through the Ministry of Energy and Mineral Development is set to continue implementing its prioirities under its mandate. The Ministry's mandate 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*****".**
The medium term priorities of the ministry are: -

(i) increase electricity generation capacity and expand the transmission network;
(ii) increase access to modern energy services through rural electrification and renewable energy development;
(iii) promote and monitor petroleum exploration and development in order to achieve sustainable production of oil and gas resources;
(iv) develop petroleum refining and pipeline transportation infrastructure;
(v) streamline petroleum supply and distribution to promote free and fair competition in petroleum supply and marketing industry; and
(vi) promote and regulate mineral exploration, development, production and value addition.

Other priorities include:

(i) promotion of efficient utilisation of energy; and
(ii) monitoring geotectonic disturbances and radioactive emissions.

In order to contribute effectively to the national objectives as enshrined in the second National Development Plan (NDP II) and the vision 2040, the sector's policy goals are: -

i) To meet the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner.
ii) To use the county's oil and gas resources to contribute to early achievement of poverty eradication and create lasting value to society.
iii) To develop the mineral sector for it to contribute significantly to sustainable national economic and social growth.

Sector developments have been packaged under 04(four) thematic program areas of priority, namely:-

1) Enhancing production and value addition;
2) Attraction of more foreign and local investments in the sector;

3) Creating an enabling legal and policy environment; and
4) Institutional capacity strengthening in the sector.

The EMDSDP also defines the institutional framework, the various roles and responsibilities for the implementing sector institutions. These include the political leadership (Cabinet, Parliament and its various Committees), Technical staff and the Local Government Councils. The Energy and Mineral Development sector comprises of the ministry that has 03(three) Directorates and 11(eleven) Departments.The ministry gives policy guidance and supervises the following sector agencies and parastatals categorised as follows:

A) Regulators/ Arbitrators:
1) Electricity Regulatory Authority (ERA)
2) Petroleum Authority of Uganda (PAU)
3) Atomic Energy Council (AEC)
4) Electricty Disputes Tribunal (EDT)

B) Agencies:
1) Rural Electrification Agency (REA)

C) Parastatals/Companies:
1) Uganda National Oil Company (UNOC)
2) Kilembe Mines Limited (KML)
3) Uganda Electricity Generation Company Limited (UEGCL)
4) Uganda Electricity Transmission Company Limited (UETCL)
5) Uganda Electricity Distribution Company Limited (UEDCL)
6) Uganda Energy Credit Capitalisation Company Limited (UECCC)

The political leadership of the Ministry consists of the Minister of Energy and Mineral Development and 02(two) Ministers of State, for Energy and Mineral Development. The Permanent Secretary is the Chief Executive Officer of the Ministry assisted by the Directors and Heads of Department.

It is therefore, with great honour, that I present and interest you to read this 05(five) year Sector Development Plan (SDP) for the Energy and Mineral Development sector. The ministry and its agencies remain committed to the fulfilment of its mission, "*To ensure reliable, adequate and sustainable exploitation, management and utilization of energy and mineral resources in Uganda"* to continue serving our country diligently.

For God and My Country

Hon.Eng. Irene Muloni (MP)

MINISTER OF ENERGY AND MINERAL DEVELOPMENT

Table of Contents

List of Tables

List of Figures

List of Maps

ACRONYMS & ABBREVIATIONS

AERDP	Alternative Energy Resources Development Program
AfDB	African Development Bank
AFIEGO	Africa Institute for Energy Governance
ASR	Aggregate Silicon Reaction
BEL	Bujagali Energy Limited
BoU	Bank of Uganda
CBO	Community Based Organisation
CDM	Clean Development Mechanism
CIREP	Community Initiated Rural Electrification Project
CSCO	Civil Society Coalition for Oil in Uganda
CSF	Credit Support Facility
CSO	Civil Society Organisation
DWRM	Directorate of Water Resources Management
EA	Exploration Area
EAC	East African Community
EAPMP	East African Power Master Plan
EDT	Electricity Disputes Tribunal
EIA	Environmental Impact Assessment
EITI	Extractive Industry Transparency Initiative
EMDSDP	Energy and Mineral Development Sector Development Plan
EPS	Early Production Scheme
ERA	Electricity Regulatory Authority
ERT	Energy for Rural Transformation
EWT	Extended Well Testing
GEF	Global Environment Facility
GOMC	Generation Operation & Maintenance Costs
GOU	Government of Uganda
IAEA	International Atomic Energy Agency
ICT	information and Communication Technology
IMF	International Monetary Fund
IPP	Independent Power Producer
LIREP	Locally Initiated Rural Electrification Project
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MEMD	Ministry of Energy and Mineral Development
MoFPED	Ministry of Finance, Planning and Economic Development
MTTI	Ministry of Tourism, Trade and Industry
MW	megawatt
NAPE	National Association of Professional Environmentalists
NEMA	National Environment Management Authority
NEPAD	New Partnership for Africa's Development
NFA	National Forestry Authority
NGO	Non-Governmental Organisation

NOGP	National Oil and Gas Policy
NRC	Natural Resources Committee
NRPC	National Radiation Protection Commission
PAC	Public Accounts Committee
PEAP	Poverty Eradication Action Plan
PEPD	Petroleum Exploration and Production Department
PERD	Public Enterprises Restructuring & Divestiture
PPA	Power Purchase Agreement
PPDA	Public Procurement and Disposal of Assets
PREP	Priority Rural Electrification Project
PROBICOU	Pro-biodiversity Conservationists in Uganda
PSA	Power Sharing Agreement
PSFU	Private Sector Foundation for Uganda
RDC	Resident District Commissioner
REA	Rural Electrification Agency
REB	Rural Electrification Board
RET	Renewable Energy Technology
SCOUL	Sugar Corporation of Uganda Limited
UCPA	Uganda Consumer Protection Association
UEB	Uganda Electricity Board
UECCC	Uganda Energy Credit Capitalisation Company
UECT	Uganda Energy Capitalization Trust
UEDCL	Uganda Electricity Distribution Company Limited
UEGCL	Uganda Electricity Generation Company Limited
UETCL	Uganda Electricity Transmission Company Limited
UIA	Uganda Investment Authority
UMA	Uganda Manufacturers Association
UNBS	Uganda National Bureau of Standards
UNFCCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environment Programme
URA	Uganda Revenue Authority
UREA	Uganda Renewable Energy Association
URSB	Uganda Registration Services Bureau
USSIA	Uganda Small Scale Industries Association
VAT	Value Added Tax
WENRECO	West Nile Rural Electrification Company Limited

EXECUTIVE SUMMARY

This Sector Development Plan (SDP) is intended to propel the Energy and Mineral Development sector to play its role to stimulate the economic growth and accelerate the structural transformation process of Uganda. The Sector Development Plan (SDP) is therefore intended to support the second National Development Plan (NDP II) whose theme is "strengthening Uganda's competitivesness for sustainable wealth creation, employment and inclusive growth". In line with Vision 2040 and the theme for the second National Development Plan (NDP II), the Energy and Mineral Development Sector's mandate 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*." The sector supports the aspirations of the Vision 2040 and the objectives of the national development plans by ensuring that there is reliable, adequate and sustainable exploitation, management and utilization of energy and mineral resources. The second National Development Plan has prioritized energy as one of the sectors where various interventions have to be implemented if Uganda is to realize the Vision 2040.

The mission of the Ministry is *"To ensure reliable, adequate and sustainable exploitation, management and utilisation of energy and mineral resources".* To achieve this mission, the following major strategies have been adopted by the Ministry: (a) review and put in place modern policies and legislation that offers a conducive business environment; (b) increase the energy mix in power generation, promote and co-invest in the development of new power generation and transmission infrastructure; (c) acquire and provide necessary technical information and data to attract and facilitate private sector participation and capital inflow; (d) promote and implement rural electrification through grid extension, development of decentralized power supply systems and use of renewable energy resources; (e) promote and monitor petroleum exploration and development of oil and gas resources through refining and pipeline transportation infrastructure, for local consumption and export; (f) promote and monitor mineral exploration, development, production and value addition through the private sector for local consumption and export; (g) carry out specialized and general training of manpower and strengthening capacity of the institutions responsible for managing and safeguarding the energy and mineral resources; (h) carry out energy audits and consumer awareness campaigns to achieve energy efficiency; (i) establish standards and promote product quality, industrial safety, environmental protection and code of practice in petroleum supply operations; (j) promote more efficient modes of transportation, in order to maintain security of petroleum products supply and curb smuggling; and, (k) monitoring and acquisition of seismic data and radioactive emissions.The underlying analysis on which this SDP is based reveals that there has been some considerable positive performance in the sector as highlighted below.

Progress of subsectors

Energy subsector

In the energy sub-sector, good progress has been made in the area of total energy generation, which has grown by 8.45% since 2009/10. This mix of generation capacity includes large hydro plants such as Nalubaale (180MW Owen falls Dam), Kiira (200MW Owen falls extension) and Bujagali (250MW); small hydro Plants such as Mpanga (18MW), Bugoye (13MW), Kabalega Power (Buseruka,9MW), Kasese Cobalt Company Ltd (9.9MW), Ishasha (6.5MW), Mobuku I (5MW), Nyagak 1 (3.5MW) cogeneration at Kakira (50MW) and Kinyara (14.5MW); and thermal generators such as

Jacobsen(50MW), EletroMaxx (86MW). New large hydro power projects namely Karuma (600MW) and Isimba (183MW) are under construction. As a supplementary effort to optimize the supply capacity, Government is also undertaking a number of energy efficiency measures that include energy audits to establish areas of improvements in energy use, refurbishment of the grid network, and installation of prepaid meters. Significant progress has been registered in rural electrification and a number of 33/11 kV schemes have been commissioned in various parts of the country. A total of 113districts have been covered out of the 116district Headquarters with the national electricity coverage at 20.6%. Solar PV systems have been installed in households, health centres, schools and water pumping stations. Diversification of biomass resource technologies of biogas, bio latrines, gasification, briquetting, bio fuel are gaining ground in additional to the increased awareness and adoption of energy saving stoves for homes and institutions.

Mineral subsector

In the minerals sector, airborne geophysical survey (magnetic, radiometric and electromagnetic) covering 80% of the country has been accomplished. Ground geological and geochecical mapping covering various areas has been done. Consequently,16 (sixteen) potential mineral targets for exploration and development from targets have been identified in the following locations: Iganga, West Nile, Moroto, South Eastern Uganda, Nigobya, Bukusu, Masindi, Buhweju, Pakwach, Kaiso, Mayuge, Kafunjo- Ntugamo, Makuutu, Hoima, Kaliro and Aboke. In addition, increased exploration and new data led to discoveries of new iron ore occurrences and deposits in South West Uganda, in Buhara, Muyebe and Nyamiringa in Kabale; Nyamiyaga and Kazogo in Kisoro; and at Kinamiro in Kanungu district. Mineral exploration in Karuma in Kiryandongo district and in Lamwo district has led to the discovery of Nickel-Cobalt-Copper-Chromium and Platinum Group Minerals (PGM).

Petroleum subsector

Arising out of oil and gas exploration and appraisal work, the country's petroleum potential now stands at 6.5 billion barrels of oil in place with 1.4 billion barrels estimated to be recoverable. The Petroleum (Exploration, Development and Production) Act and the Petroleum (Refining, Conversion, Transportation and Midstream Storage) Act were enacted in 2013 to regulate the oil and gas activities. Consequently, the attendant regulations for both Upstream and Midstream were developed and gazetted. A comprehensive feasibility study for refining in Uganda was concluded in 2010 and promotion for the development of a 60,000 BPD oil refinery development in the country is ongoing. The Oil and Gas Revenue Management Policy (2012) was developed by the Ministry of Finance Planning and Economic Development which recommended the incorporation of the petroleum revenue management in the Public Finance Management Act, 2015. Production licences have been granted and the pipeline route determined.

In the petroleum supply and distribution, Government has promoted free and fair competition in petroleum supply and marketing industry. Overall volumes and supply of white petroleum products' imports has stabilised at the retail outlets countrywide.A total of 1.227 billion litres of petroleum products were imported in 2012. Of these, 41.1%, 6.1% and 52.8% were Petrol, Kerosene and Diesel imports. Petrol and Kerosene imports increased while diesel imports decreased between 2011 and 2012.Generally, petroleum products imported in 2012 were lower than those in the previous year (2011) by 5.8%. This was the first time imports in a given year are lower than those in the previous year since 2008. In the year 2012, a total of UGX 787 billion was collected as Government Revenue. At the same time, the monthly import bill stood at UGX 2,530 billion.

The retail prices have continued to be stable at an average price of UGX 3,750, 2,850 and 3,550 for petrol, kerosene and diesel respectively, dropped and stabilized overtime to an average price of UGX 3,400, 2,600 and 3,150 for petrol, kerosene and diesel and have largely remained stable year. On the international market, there was rising price trend for crude petroleum products which crossed from 2011, stabilized after hitting record highest in March in 2012, with an average of US$ 123.01, 124.40 and 106.62 per barrel for Opec Basket, IPE Brent and Nymex Lt Sweet respectively. Thereafter, the prices started to fall steadily reaching their lowest averages of US$ 96.31, 97.27 and 83.37 per barrel for Opec Basket, IPE Brent and Nymex Lt. Swt. These translate into 21.7%, 21.8% and 21.8% decreases for Opec Basket, IPE Brent and Nymex Lt Sweet respectively from their peak before a small rise and later stability. The prices remained stable at an average price of US$ 106.23, 109.27 and 87.94 per barrel for Opec Basket, IPE Brent and Nymex Lt Swt till end of the year.

Government has continued to implement the Fuel Marking and Quality Monitoring Program (FMQP) which is a Government initiative implemented under a cooperative arrangement between Ministry of Energy and Mineral Development (MEMD) and Uganda National Bureau of Standards (UNBS) in collaboration with Oil Marketing Companies (OMCs). It is guided by the Fuel Marking Regulations 2009 (as amended in 2012). Overall, this intervention has led to a tremendous reduction in product failure rates, smuggling, dumping and reduced tax evasion.

Challenges and Opportunities

Notwithstanding this performance, the EMD sector continues to face some challenges of which some can be turned into opportunities. Some of the challenges and opportunities are outlined here below: -

Energy subsector:

The key energy challenge in Uganda still remains the lack of a good mix of energy sources in power generation, low level of access to modern energy, over dependence on biomass, inadequate infrastructure for generation, transmission and distribution and low level of energy efficiency. Cognizant of the above challenges, the Energy programme intends to take these opportunities for consideration over the next 05 (five) years in this Sector Development Plan; and these include: -

- Increase in demand for electricity – It is envisaged by the second National Development Plan that strong growth in the national economy will increase the demand for electricity and thus, open up the power market for further development. It is estimated that an installed capacity of 41,738MW is required to increase Uganda's electricity consumption per capita from the current 75kWh to 3,668 kWh by 2040.This SDP therefore looks at opportunities for investments in large hydro power, small hydro power plants, renewable energy, and nuclear power infrastructure
- Enhanced regional cooperation in energy will open up the regional market for electricity trading which Uganda must take advantage of because interconnection within the East African Community (EAC) region power pool and Africa are important to ensure that the country's national growth projections are met.
- Government continued to improve the working climate in the country, and to provide incentives for private sector to increase their participation in the power sub- sector. This shall be done through incentives such well negotiated Power Purchase Agreements (PPA) and better tax regimes.
- Uganda has a high potential of hydro electricity generation of over 4500MW, biomass co-generation of 1,650MW, geothermal potential of over 450MW, and peat power potential of 800MW. High potential also exists for solar power, fossil fuel and nuclear energy. There is need to invest in both

exploration and development of new energy sources and technologies to meet future demand. Exploitation of the existing potential will ensure that there is adequate capacity to meet the growing demand.

Mineral subsector

There are several observed challenges that when addressed over the planning period and beyond, will represent tremendous opportunities for growth in the mineral subsector as follows:

- The geological, geophysical, and geochemical mapping of Uganda is incomplete. Currently, only 80% of the country has undergone geological, geophysical, and geochemical mapping and yet there is still a need to reach 100% countrywide mapping.
- Infrastructure like electricity, rail, water and roads in mining areas is under-developed for Uganda to completely benefit from the subsector.
- The current land tenure system makes it difficult for the investors to acquire land in the mineral prospective areas. In some parts of the country, land is owned communally and this hampers the development of the mining industry. One of the difficult issues facing the mining sector is the compensation for land acquired for mining activities.
- Small scale and informal mining in areas such as Mubende, Bugiri, Namayingo and Karamoja region, where extensive and to easy-to-exploit gold deposits exist results in large settlements which are neither controlled nor regulated, pausing a security threat.
- The mining sector in Uganda is characterized by acute shortage of skilled personnel and retention of skilled labour, yet the sector is faced with a challenge of a high proportion of small-scale artisanal miners who use rudementary and poor mining techniques.

Despite these challenges in the mineral subsector, there are opportunities which include detailed exploration and proving of reserves of the newly identified mineral targets, promoting value addition for minerals particularly the ones that are exported in raw form. Uganda is also endowed with geothermal resources located in over 20 geothermal sites in the country which have to be mapped to establish geothermal reservoirs for drilling to generate electricity from steam.

Petroleum subsector

Uganda is destined to benefit from oil resources and there are considerable opportunities that are being explored along the value chain of the oil and gas activities. The following are the key challenges identified for the subsector: -

- Infrastructure like roads and airports in the country is still inadequate to meet the developments of the petroleum subsector.
- Managing people's expectations; both positive and negative. The positive expectations associate the resource with a 'windfall' of revenues that will deliver substantial social, economic and infrastructural improvements for the region and the nation. The negative expectations view the abundance of tradable natural resources (such as diamonds, gold or oil) as a resource 'curse' that will paradoxically lead to economic stagnation, the extinction of other traditional and non-traditional exports such as agricultural and manufactured products, and conflicts over the allocation of resources. In addition, there are also environmental concerns.
- There is a need to map the range of occupation and the requisite qualifications needed and develop a minimum standard of numeracy and literacy for all human resource needs in the oil and gas industry.

- Financial resources, while improved, are still inadequate to ensure that oil and gas projects progress from development to production stages.

SDP Interventions

This SDP outlines how several opportunities in the sector will be harnessed. It provides a roadmap to guide Government, Private Sector, Development Partners and Key Stakeholders to make interventions that will help meet the key objectives of the sector. The key goals for the SDP are to: (i) meet the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner; (ii) use the county's oil and gas resources to contribute to early achievement of poverty eradication and create lasting value to society, and; (iii) develop the mineral sector for it to contribute significantly to sustainable national economic and social growth. In that regard, the SDP is a combination of policies and programs around which stakeholders can build consensus and mobilize the required resources. Projects under the SDP have been packaged under the following subprograms.

Energy subsector:

The Government key priorities for the Energy Management, Planning and Infrastructure Development are categorised under the following sub-programmes; (i) enhancing electricity generation capacity; (ii) expansion of the electricity transmission and the electricity distribution network; (iii) promoting access to modern energy servicesin the rural areas; (iv) promoting new and renewable energy; (v) promotion, development and regulation of nuclear energy; and, (vi) Promotion of efficient utilization of energy resources.Progress over the next 05(five) years will be measured against the existing opportunities as follows: -

(i) Increasing Electricity Generation capacity through the commissioning of Karuma Hydro Power Project (600MW) and Isimba Hydro Power Project (183MW), commencement of the construction of Ayago Hydro power Project (840MW), and commissioning of atleast 150MW from small renewable energy projects. Government will endeavour to fast track the implementation of several renewable energy projects that will bridge supply deficits between the commissioning the large hydros, through a smart subsidy programme,Global Energy Transfer Feed in Tariff (GETFiT) and realise some 150 MW of small hydroelectricity over the next 05(five) years.

(ii) Reinforcing the transmission infrastructure through construction of several transmission lines including; 400kV Karuma-Kawanda; 220kV Projects of Bujagali – Tororo – Lessos, Mbarara – Mirama – Birembo, Kawanda – Masaka, Nkenda – Fort Portal – Hoima, 132kV Tororo – Opuyo – Lira, Mbarara – Nkenda, and Mutundwe – Kabulasoke. Development of Namanve South, Luzira, Mukono and Iganga industrial park substations. Upgrading of the Bujagali switchyard to 220Kv.

(iii) Enhancing rural electrification through implementation of ERT Phase III programme and implementation of the Rural Electrification Strategy and Plan (RESP) 2013 – 2022.

(iv) Enhancing the safety and reliability of the Nalubaale Power station against Aggregate Silicon Reaction (ASR) effects.

(v) Make adequate developments in new and renewable energy technologies such as Biogas, gasification, biofuels, improved stoves, wind energy, peat, and use of solar energy.

(vi) Development of a comprehensive national strategy to assess the potential role, viability and obligations associated with nuclear energy in the context of energy needs for national socio-economic development.
(vii) Development of programmes aimed at efficient energy use and conservation of energy for sustainable development and a healthier environment.

Mineral subsector

Government's strategic development programme in the mineral subsector over the period 2015/16-2019/20 shall include: (i) Appraising the mineral potential of Uganda through enhanced mineral exploration; and, (ii) enhancing mineral development and value addition. Progress in the mineral subsector over the next 05(five) years will be measured against the existing opportunities as follows: -

(i) Establishing the mineral potential of Uganda through extensive acquisition of geo-scientific data through airborne geophysical surveys, geological mapping, geochemical surveys, and mineral resource assessmentsand proving of ore reserves.
(ii) Supporting investments that add value to Uganda's mineral resources through establishment and development of mineral analysis laboratory infrastructure.
(iii) Establishing mineral data management infrastructure in order to ensure that mineral wealth data and information is safe and available at all times for sustainable planning and development
(iv) Mainstreaming Artisanal and Small Scale Miners (ASM) through strengthening regulatory legal framework for environmental sustainability and formalization of ASM into the mineral value chain and the economy.
(v) Conduct feasibility studies as a public-private partnership to achieve maximum and comprehensive evaluation and processing of iron ore and phosphates to final products. The study will include options for iron ore reduction through the use of locally produced gas resources.
(vi) Exploring and developing the geothermal energy potential through geological mapping and surveys of Panyimur, Buranga, Katwe-Kikorongo, Kibiro and other potential geothermal areas.
(vii) Renovating the earthquake research facility and equipping it fully with modern earthquake monitoring equipment.
(viii) Developing an effective communication strategy and guidelines for land acquisition for mining activities to mitigate the negative impact of the current land tenure system on mineral resource development and value addition.

Petroleum subsector

Government's strategic development programmes in the Petroleum subsector over the period 2015/16-2019/20 shall include:

a) The Upstream Petroleum activities and outputs will be as follows:-

(i) Promotion of the country's petroleum potential and licensing of Ngasa, Turaco and Kanywataba prospects.
(ii) Acquisition of geological, geophysical and geochemical data in the unlicensed basins and new areas.
(iii) Conducting resource assessment and laboratory analyses of the collected data and package them for promotional purposes.
(iv) Infrastructure development: Complete Phase – 2 and 3 of the construction of the data centre and office block.

(v) Support the implementation of a robust Communication Strategy and effort for the oil and Gas Sector in Uganda to diffuse the negative perceptions on the Oil and Gas resources management and promote the development of mutual beneficial relations between all stakeholders and actors in the oil and gas sector.
(vi) Review and update the National Oil and Gas Policy inorder to address the challenges which have emerged over the last 10 (ten) years and to harmonise the petroleum value chain.
(vii) Continue capacity building in the subsector through formal and informal training.

b) Midstream Petroleum activities and outputs will be as follows: -
(i) Complete the acquisition of land for development of the refinery at Kabaale, Buseruka subcounty, Hoima district.
(ii) Undertake an environmental baseline study and detailed routing survey for the multi-products pipeline from the refinery to Buloba terminal.
(iii) Undertake the Resttlement Action Plan (RAP) study and its implementation for the multi-products pipeline from the refinery to the Buloba terminal.
(iv) Development and implementation of the national strategy and plan for petroleum transportation and storage facilities.
(v) Construction of the refinery and attendant infrastructure.
(vi) Support the development of the crude export pipeline.

c) Petroleum supply and downstream activities and outputs will be as follows:-
(i) Development of the downstream transport and storage infrastructure.
(ii) Development and restocking strategic petroleum reserves.
(iii) Promotion of Liquefied Petroleum Gas (LPG) usage.

Cost Estimates of the SDP and Sources of Financing

The total estimated cost for implementation of the 05(five) year SDP is approximately UGX 15,735 billion. The yearly projections range from UGX 2,426 billion in the first year to UGX2,766 billion in the final year of implementing this SDP and the peak is in 2017/18 at UGX4,348 billion. This pattern of spending is in line with the overall macroeconomic fiscal stance where spending on infrastructure is expected to build up in 2017/18-2018/19 as Uganda prepares itself for oil production and to competitively position itself within the East African Community, while fiscal consolidation is expected to be realized towards the end of the SDP. The total cost of financing this SDP is in line with the NDP II overall financing of the energy and mineral development sector.

Table 1: EMDSDP Cost Estimates

Subprogram (in UGX Bns)	2015/16	2016/17	2017/18	2018/19	2019/20	Total
1.0 Energy Development						
1.1: Enhancing Electricity Generation Capacity	667.07	319.41	457.87	328.20	191.77	**1,964.32**
1.2: Enhancing Electricity Transmission Network	1,152.81	1,341.25	1,438.39	844.72	162.88	**4,940.04**
1.3: Enhancing Electricity Distribution Capacity	37.10	70.30	39.20	37.30	39.90	**223.80**
1.4: Promoting Energy Penetration to Rural Areas	201.17	344.69	291.62	226.70	232.56	**1,296.74**
1.5: Promoting New and Renewable Energy	2.28	2.53	2.44	2.53	2.53	**12.31**
1.6: Peaceful Application of Nuclear/Atomic Energy	6.47	6.35	5.57	4.30	3.45	**26.14**
1.7: Promotion of Efficient Utilization of Energy Resources	1.00	1.68	1.70	1.76	1.49	**7.63**
2.0 Mineral Development						
2.1: Establishing the Mineral Wealth of Uganda	91.91	40.42	33.27	30.21	30.16	**225.97**
2.2: Enhancing Mineral Sector Infrastructure to Support Mineral Development and Industrialization	41.05	171.04	234.69	184.49	279.89	**911.16**
3.0 Petroleum Development						
3.1 ***Strategic Developments in Upstream***						
3.1.1 Promotion of Petroleum Exploration	1.62	1.83	1.93	2.00	2.14	**9.51**
3.1.2 Promotion of Petroleum Development and Production	2.00	2.26	2.38	2.50	2.63	**11.76**
3.2 Strategic ***Developments in Midstream***						
3.2.1 Crude Oil Refining	58.48	65.95	1,500.00	1,500.00	1,500.00	**4,624.43**
3.2.2 Development of Midstream Transportation and Storage Infrastructure.	28.28	9.33	10.36	10.36	-	37.82
3.3***: Strategic Developments in Downstream***						
3.3.1 Regulation of Petroleum Supply and Distribution	5.76	4.40	4.40	4.40	3.82	22.78
3.3.2 Development of Downstream Transportation Infrastructure.	121.20	320.70	321.30	321.30	310.00	**1,394.50**
3.3.3 Development and Restocking of Strategic Petroleum Reserves	2.50	2.30	1.30	1.30	1.30	**8.70**
3.3.4 Promotion of Liquefied Petroleum Gas (LPG) Usage.	5.70	5.15	2.34	2.34	2.25	**17.78**
Overall Total	**2,426.39**	**2,709.59**	**4,348.75**	**3,504.41**	**2,766.76**	**15,735.38**

The main source of financing is the annual budgets within the medium term expenditure framework and this may not necessarily be sufficient for all the programs and projects. To complement this, Government may seek for grants and concessional loans from local and international organizations. Other forms of financing may include the: (i) issuance of bonds; (ii) establishment of a fund such as the Energy fund; and, (iii) private venture capital financing especially for the Small and Medium Enterprises(SMEs) in the energy and minerals sector.

F. A. Kabagambe-Kaliisa, PhD,MSc, *BSc. (Hons), MAAPG, MSPE, CRS*

PERMANENT SECRETARY

1. INTRODUCTION

This section provides an overview of the Energy and Mineral Development (EMD) sector, national objectives and major strategies. The section also outlines the vision and mission of EMD sector as well as the EMD development framework based on the provisions of Vision 2040 and the second National Development Plan (NDPII). This section also identifies the key institutional arrangements and coordination mechanisms within the sector.

1.1.1 Overview of the Energy and Mineral Development Sector

The Ministry mandate is to *"Establish, promote the development, strategically manage and safeguard the rational and sustainable exploitation and utilisation of energy and mineral resources for social and economic development"*. The mission of the ministry is *"To ensure reliable, adequate and sustainable exploitation, management and utilisation of energy and mineral resources".* The key roles of the ministry include:

(i) Provide policy guidance in the development and exploitation of the Energy, Mineral, Oil and Gas resources.

(ii) Create an enabling environment in order to attract private sector investments in the development, provision and utilisation of energy and mineral resources.

(iii) Acquire process and interpret technical data in order to establish the energy and mineral resource potential of the country.

(iv) Inspect, regulate, monitor and evaluate activities of private companies in energy and mineral sectors so that the resources are developed, exploited and used on a rational and sustainable basis.

In order to contribute effectively to the national objectives as enshrined in the second National Development Plan (NDPII), the Sector's policy goals are: -

(i) To meet the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner;

(ii) To use the county's oil and gas resources to contribute to early achievement of poverty eradication and create lasting value to society.

(iii) To develop the mineral sector for it to contribute significantly to sustainable national economic and social growth.

To achieve the above priorities, the following major strategies have been adopted: -

a) To review and put in place modern policies and legislation that offers a conducive business environment;

b) Increase the energy mix in power generation, promote and co-invest in the development of new power generation and transmission projects;

c) To acquire and provide necessary information and data to attract and facilitate private sector participation and capital inflow;

d) Promote and / or implement rural electrification through grid extension, development of decentralized power supply systems and use of renewable energy resources;

e) Promote and monitor petroleum exploration, development, production and value addition for local consumption and export;

f) Promote and monitor mineral exploration, development, production and value addition by the private sector for local consumption and export;

g) To carry out specialized and general training of manpower and strengthening capacity of the institutions responsible for managing and safeguarding the energy and mineral resources;
h) Carry out energy audits and consumer awareness campaigns for energy efficiency;
i) Establish standards and promote product quality, industrial safety, environmental protection and code of practice in petroleum supply operations;
j) Promote more efficient modes of transportation, in order to maintain security of petroleum products supply and curb smuggling;
k) Monitoring and acquisition of seismic data and radioactive emissions.

1.1.2 Overview of the EMD Sector Performance

Biomass energy will remain the main source of energy for the country for a long time and the current rate of exploitationof biomass is unreliable. The demand for biomass is steadily increasing with increasing population where the sustainable supply of biomass has been exceeded. According to 2014 statistics, biomass demand was 45.5 million metric tons of wood equivalents compared the estimated supply of 32.4 million metric tons of wood. According to the Uganda households survey 2009/10 report 70% of Uganda households use traditional three stones open fire stoves for cooking followed by traditional metal charcoal stoves at 19% (commonly known as sigiri) only 9% of all households use improved charcoal or firewood stoves. The Government has embarked on diversified uses of biomass resource by promoting biogas, briquetting, gasification to reduce pressure on the wood biomass, and also promote tree planting for energy production.

The expressed demand shows that the demand for electricity is increasing. This is also supported by the increase in energy consumption per capita, which is envisaged to increase from 80kwh in 2012 to 578 Kwh/capita by 2020. To address this challenge, Government has responded by increasing the installed power generation capacity, which is currently 851.5MW by construction of new hydro power dams. Currently (2014), the national electricity coverage is 20.6%, with approximately 7% of the rural population has access to electricity. The promotion of rural electrification programmes have of recent been hampered by a number of challenges including issues of way leaves and compensation, high costs of development and connection rates, increasing demand for electricity access, inadequate local private sector capacity to invest in the power industry and the inadequate private uses of the electricity. According to the Rural Electrification Strategy and Plan (RESP), Government's target is to achieve 22% of rural Ugandans having access to modern forms of energy by 2022, rising from the current (2014) 7%. The on-grid services will be expanded to provide approximately 1,276,500 service connections, including 543,887 in the non-Umeme service territories and 732,613 as densification within the Umeme footprint by 2022. The off-grid services are estimated to be increased by 140,000 additional installations of solar PV system and mini-grid distribution service connections. Wind resource assessment are ongoing with the collectionof the wind speed data from the two wind measuring masts at Napak and Kotido district headquarters which will estimate the wind potential for power generation.

A number of issues such as commercial and technical losses have contributed to relatively high electricity tariffs; a situation that is not helped by relatively low-income levels across the population. This has contributed to the limited increasing access to electricity. The Electricity Regulatory Authority (ERA) has revised the methods of setting the price of electricity for domestic consumers depending on changes in the economic conditions in the country. Compared to other countries in East Africa, tariffs in Kenya

and Tanzania for power rates for industrial usage make Uganda uncompetitive for industrial production.

In the minerals sector, airborne geophysical survey (magnetic, radiometric and electromagnetic) covering 80% of the country has been accomplished. Ground geological and geochecical mapping covering various areas has been done. Consequently,16 (sixteen) potential mineral targets for exploration and development from targets have been identified in the following locations: Iganga, West Nile, Moroto, South Eastern Uganda, Nigobya, Bukusu, Masindi, Buhweju, Pakwach, Kaiso, Mayuge, Kafunjo- Ntugamo, Makuutu, Hoima, Kaliro and Aboke. In addition, increased exploration and new data led to discoveries of new iron ore occurrences and deposits in South West Uganda, in Buhara, Muyebe and Nyamiringa in Kabale; Nyamiyaga and Kazogo in Kisoro; and at Kinamiro in Kanungu district. Mineral exploration in Karuma in Kiryandongo district and in Lamwo district has led to the discovery of Nickel-Cobalt-Copper-Chromium and Platinum Group Minerals (PGM).

Arising out of oil and gas exploration and appraisal work, the country's petroleum potential now stands at 6.5 billion barrels of oil in place with 1.4 billion barrels estimated to be recoverable. The Petroleum (Exploration, Development and Production) Act and the Petroleum (Refining, Conversion, Transportation and Midstream Storage) Act were enacted in 2013 to regulate the oil and gas activities. Consequently, the attendant regulations for both Upstream and Midstream were developed and gazetted. A comprehensive feasibility study for refining in Uganda was concluded in 2010 and promotion for the development of a 60,000 BPD oil refinery development in the country is ongoing. The Oil and Gas Revenue Management Policy (2012) was developed by the Ministry of Finance Planning and Economic Development which recommended the incorporation of the petroleum revenue management in the Public Finance Management Act, 2015. Production licences have been granted and the pipeline route determined.

In the petroleum supply and distribution, Government has promoted free and fair competition in petroleum supply and marketing industry. Overall volumes and supply of white petroleum products' imports has stabilised at the retail outlets countrywide.A total of 1.227 billion litres of petroleum products were imported in 2012. Of these, 41.1%, 6.1% and 52.8% were Petrol, Kerosene and Diesel imports. Petrol and Kerosene imports increased while diesel imports decreased between 2011 and 2012.Generally, petroleum products imported in 2012 were lower than those in the previous year (2011) by 5.8%. This was the first time imports in a given year are lower than those in the previous year since 2008. In the year 2012, a total of UGX 787 billion was collected as Government Revenue. At the same time, the monthly import bill stood at UGX 2,530 billion.

The retail prices have continued to be stable at an average price of UGX 3,750, 2,850 and 3,550 for petrol, kerosene and diesel respectively, dropped and stabilized overtime to an average price of UGX 3,400, 2,600 and 3,150 for petrol, kerosene and diesel and have largely remained stable year. On the international market, there was rising price trend for crude petroleum products which crossed from 2011, stabilized after hitting record highest in March in 2012, with an average of US$ 123.01, 124.40 and 106.62 per barrel for Opec Basket, IPE Brent and Nymex Lt Sweet respectively. Thereafter, the prices started to fall steadily reaching their lowest averages of US$ 96.31, 97.27 and 83.37 per barrel for Opec Basket, IPE Brent and Nymex Lt. Swt. These translate into 21.7%, 21.8% and 21.8% decreases for Opec Basket, IPE Brent and Nymex Lt Sweet respectively from their peak before a small rise and later stability. The prices remained stable at an average price of US$ 106.23, 109.27 and 87.94 per barrel for Opec Basket, IPE Brent and Nymex Lt Swt till end of the year.

Government has continued to implement the Fuel Marking and Quality Monitoring Program (FMQP) which is a government initiative implemented under a cooperative arrangement between Ministry of Energy and Mineral Development (MEMD) and Uganda National Bureau of Standards (UNBS) in collaboration with Oil Marketing Companies (OMCs). It is guided by the Fuel Marking Regulations 2009 (as amended in 2012). Overall, this intervention has led to a tremendous reduction in product failure rates, smuggling, dumping and reduced tax evasion.

1.1.3 EMD Linkage to Macroeconomic Issues, the second National Development Plan (NDP II) and Vision 2040

The Energy and Mineral Development sector is one of the key sectors in the Ugandan economy. Both the NDP II and Vision 2040 recognize the importance of energy and developments in energy infrastructure as vital for the transformation of Uganda's economy by supporting rapid industrialization and sustainable economic growth. The energy and mineral sector provides a major contribution to Government revenues (e.g. fuel taxes, VAT on electricity, levy on transmission, bulk purchases of electricity, license fees and royalties) and foreign exchange earnings (power exports). This is in addition to the significant contribution of minerals to national revenues. In 2012/2013 oil revenues amounted to 92 billion. Because of its potential to spur growth, government in 2013/2014 financial year government allocated 17 percent of its budget to the sector. In 2012/2013 financial year the mineral sector contributed 178 billion to the national revenue and development (Background to the Budget, 2013/2014). Following liberalization, the energy and mineral sector is now attracting the largest private sector developments in the country. Therefore, the sector is not only a vital input into other sectors, but also promises to be a large source of employment for Ugandans.

Following the expiration of the Millennium Development Goals (MDGs) development framework and the adoption of the 2030 agenda with the Sustainable Development Goals (SDGs), Uganda has embraced the principles for sustainable development, namely; people, planet, prosperity, peace, and partnerships, to *"Ensure that no one is left behind"*. Accordingly, Uganda is among the first countries to localize the 2030 agenda for sustainable development. The SDG goal 7 is *'to ensure access to affordable, reliable, sustainable and modern energy for all by 2030'.* This goal has three inter-related targets and these are:-

(i) By 2030, ensure universal access to affordable, reliable and modern energy services.
(ii) By 2030, increase substantially the share of renewable energy in the global energy mix.
(iii) By 2030, double the global rate of improvement in energy efficiency.

This goal 7 is under the Sustainable Energy for All Initiative (SE4All) to which Uganda joined as one of the first countries in Africa. Government of Uganda in preparation of country's SE4All Action Agenda as the first step towards designing and implementing integrated country actions that would provide long-term vision and ensure overall sector-wide coherence and synergy of the accumulated efforts towards the three objectives of SE4All in the country.

The theme for the NDP II is "strengthening Uganda's competitivesness for sustainable wealth creation, employment and inclusive growth", identified the key binding constraints that need to be addressed. These constraints among others include inadequate physical infrastructure required to make Uganda competitive. The Energy and Mineral Development Sector, and in line with the NDP II, constitutes both primary growth and complementary sectors. The primary growth sectors include mining and oil and gas

while energy forms the complementary sector. The Vision 2040 recognizes energy as the key driver to the quest for social economic transformation. For Uganda to achieve the desired socio-economic transformation, it is estimated that this will require 41,738 Mega Watts by year 2040 thus increasing its electricity consumption per capita from 80Kwh to 3,668 kWh.

In addition, access to the national grid will have to increase from the current 20.6 to 80 percent. This will be done through an ambitious agenda of developing its hydro power potential by developing large and small Hydro Power Plants (HPPs) and complementing them with other renewable forms of energy including; wind, solar and bio-gas. On mineral development, the Vision 2040 recognizes an unexploited potential in minerals that is yet to be exploited. The airborne geophysical survey, geological mapping and geochemical sampling estimate over 27 types of minerals in significant commercial viable reserves. For the country to fully benefit from these opportunities, specific fundamentals including energy development will have to move in tandem.

1.1.4 Analysis of the Institutional Framework, Management Systems and Current Reforms

The Ministry has streamlined the structures in the sector in order to adequately meet the existing implementation challenges. The restructuring provided for two more Directorates in the ministry in addition to the Energy Resources Directorate, and these are: (i) Directorate of Petroleum and (ii) Directorate of Geological Survey and Mines. The energy programme comprises of power generation (hydro, solar, thermal and wind)[1]; regulation, transmission and distribution. The Government regulates power policy which is fairly liberalised with room for private players to provide other related services. The transmission segment however remains a Government preserve under UETCL. The key players in the power subsector are Government (The Ministry of Energy and Mineral Development, Uganda Electricity Generation Company Ltd, Hydro Power Development Unit, power generation companies, Uganda Power distribution companies, Uganda Electricity Transmission Company Limited) and private sector players on the other hand.

There are several players in the mineral subsector who include both public and private. Kilembe Mines Ltd is a Government company that supervises the conceded assets to the concessionaire, M/s Tibett Hima Mining Company Ltd that is licenced for copper mining and power generation in Kasese. The Directorate of Geological surveys and Mines is divided into three (03) Departments, namely; Mines, Geological Surveys, and Geothermal that are responsible for policy direction and development.

The upstream petroleum subsector consists of exploration, data acquisition, production and development. Government provides policy guidance and number of private companies are involved in the upstream activities. The midstream petroleum consists of the refinery plant, processing and bulk transportation. In the midstream subsector, Government shall contribute 40% towards the refinery development and the remaining 60% by the selected private investor. In the downstream petroleum subsector, Government plays a regulatory role and is involved in data acquisition and the other roles are fully liberalised where private players market and transport the petroleum products.

[1] There are proposals for developing nuclear energy but this is still in its infancy.

1.1.5 Key Players in the EMD Sector

The main players in the Sector are Government, Development Partners and the Private sector. In this regard, Cabinet provides overall policy direction, and implementation on the other hand takes place at the agency level as described below:

Electricity Regulatory Authority (ERA)

The Electricity Regulatory Authority (ERA) is a body corporate established under the Electricity Act, 1999 (Cap. 145), as an independent sector regulator with a separate budget from that of MEMD. Its main function is to regulate the generation, transmission, distribution, sale, export and import of electricity. ERA is inter alia responsible for the issuance and regulation of compliance with licenses, establishment of a tariff structure, approving rates of charges and terms and conditions of electricity services of transmission and distribution companies.

Atomic Energy Council (AEC)

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

Electricity Disputes Tribunal (EDT)

Part XIII of the Electricity Act, 1999, provides for an Electricity Disputes Tribunal; a body concerned with the arbitration of cases in the electricity sector. Any stakeholder, who may not be satisfied with ERA's decisions, can appeal to the tribunal.

Rural Electrification Board (REB)

This was established in 1998 to manage the Rural Electrification Fund (REF). The secretariat of the REB is the Rural Electrification Agency (REA). The REB, as the governing body of REA, provides subsides to support rural electrification projects.

Rural Electrification Agency (REA)

This was established in 2003 to be in charge of managing rural electrification projects. Its key role is to increase the rural electricity grid coverage. This mandate shall periodically be reviewed under the various Rural Electrification Strategic Plans (RESP), for example the RESP from 2013-2022 is geared to have rural electricity coverage of 23%.

The Uganda Electricity Generation Company Ltd (UEGCL)

The UEGCL is a Government limited liability Company (by guarantee) incorporated in March 2001. The Company's major functional areas include concessioning and monitoring the concessioned facilities to ensure quality and reliable electricity generation. In addition, the UEGCL is mandated to offer technical services that may involve: oversight of the operations and maintenance of the generation complex; safety surveillance of civil and dam structures

The Uganda Electricity Transmission Company Ltd (UETCL)

The UETCL is a public limited company incorporated in March 2001 after unbundling of Uganda Electricity Board into successor companies. It owns and operates the transmission infrastructure operating above 33kV. It is responsible for the transmission, dispatch, bulk electricity buying from generators and for the export and import of electricity. The mandate of the UETCL includes the following, coordinating the power system to achieve balance between supply and demand, responsible for dispatching generation facilities, responsible for bulk power purchase and sales as the single buyer. In addition, UETCL is responsible for power exports and imports. In this regard, UETCL has two core businesses, Transmission System Operator and Single Buyer.

The Uganda Electricity Distribution Company Ltd (UEDCL)

UEDCL is the state owned distribution company. UEDCL builds, owns distribution network at 33kV and below in the areas where UEB used to operate with a few additions made by REA and Umeme Ltd. Umeme Ltd is operating UEDCL's distribution network under a concession agreement. UEDCL owns the grid –connected electricity supply infrastructure at 33kv and below. It leased out its assets to Umeme Ltd. Currently, Umeme Ltd is the distribution concessionaire. It is responsible for operating and maintenance of the network as well as the retail function that includes metering and billing.

The Uganda Energy Credit Capitalisation Company (UECCC)

The UECCC was operationalized in 2009 for purposes of managing and administering 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 the Trust in order to contribute to the sectors financing requirements; with particular focus on facilitating private sector participation.

The Directorate of Water Development (DWD)

The Directorate of Water Development (DWD) under the Ministry of Water and Environment is responsible for managing the water resources of Uganda in an integrated and sustainable manner in order to secure and provide water of adequate quantity and quality for all social and economic needs for the present and the future. It is the agency that awards surface-water permits (also known as abstraction permits) to project developers.

Other players in the energy subsector include: (i) Eskom Uganda Limited which operates UEGCL's Nalubaale-Kiira Power Complex under a concession agreement; (ii) Independent Power Producers such as Bujagali Energy Limited (BEL) which currently manages Bujagali Hydro Power Station, Electromaxx, Jacobsen, Tronder Energy, among others; and (iii) Concessionaires such as Ferdsult Engineering Services Ltd, West Nile Rural Electrification Company (WENRECO), Bundibugyo Electricity Cooperative Society (BECS), Pader Abim Cooperative Society (PAMECS), Kilembe Investments Ltd (KIL) who distribute and manage different rural power schemes; (iv) Umeme Limited; (v) Kilembe Mines Ltd and (vi) International Atomic Energy Association (IAEA).

In the mineral, oil and gas subsectors, most of the activities are implemented by private investment agencies and multinational companies. Development Partners are mostly involved in policy and financial support but not actual implementation. The following are the main institutions in the minerals, oil and gas

subsectors are: Petroleum Authority of Uganda (PAU), Uganda National Oil Company (UNOC) and the private sector players that include: Tullow Uganda Operations Pty Ltd, Total E&P Uganda Ltd, China National Offshore Oil Corporation (CNOOC). Others are the Uganda Chamber of Mines and Petroleum which coordinates the private sector players in the subsector.

1.1.6 Analysis of the Funding Issues Related to EMD Sector

The Sector is financed through five Vote functions (programmes), namely (a) Energy Planning, Management and Infrastructure Development; (b) Petroleum Exploration, Development and Production; (c) Petroleum Supply, Infrastructure and Regulation; (d) Mineral Exploration, Development and Production and; (e) Policy, Planning and Support Services. Financing the Sector is by a combination of Government, Private Sector and Donors/Development Partners. The Development Partners' support is by a mixture of Grants and loans (commercial and/or concessional). The Private Sector comes in either alone or in partnership with Government.

Budget allocation to the energy and mineral development sector is aligned with the NDPII projections and aspirations. For example, the fiscal year 2011/12 of the UGX 1,300 billion which was budgeted for, 84 percent was released and of this, 99.8 percent was absorbed (GAPR 2012). For the fiscal year 2012/13, the sector was allocated UGX 1,481.83 billions. The disaggregation of this spending was as follows: recurrent wages UGX 2.525 billions, non-wage recurrent expenditures was UGX 4.645 billions, domestic development was UGX 1,246.301 billion was domestic development and donor development funding was UGX 228.363 billions.

Despite the increased funding to the sector, there are concerns that non-wage recurrent budget allocation to the sector has been declining which has compromised implementing the development budget. There are still some challenges in terms of funding the sector. First, the development budget is more allocated to the implementation of key infrastructure projects in the power sub-sector and development activities in the oil and gas sub-sector. Second, budget releases are low compared to the planned budget expenditures.

1.1.7 Summary of Sector Challenges and Opportunities

The sector still faces some challenges as outlined below:

i) Land acquisition for infrastructure development is one of the key challenges. The land is required for infrastructure like pipelines, refinery, power generation, transmission lines and rural electrification projects.
ii) The commercial and technical power system losses remain a serious challenge. This result into loss of revenue required to provide cheap and affordable power. Notwithstanding, there are efforts under way to address this problem through rehabilitation and refurbishment of the distribution line network and amendment to the Electricity Act,1999 inorder to curb power theft.
iii) Limited access to modern energy forms especially among rural households remains a serious challenge. This wider distribution of electricity to transform rural areas in encumbered by the low population densities, scattered settlements and low incomes by households to afford connecting and paying for electricity services.
iv) Low funding of the operational (recurrent) budget, which affects the implementation of key sector programs.
v) The high labour turn-over affects the capacity and ability to implement and manage programs.

vi) The long duration it takes to mobilize funds, requires excessive government guarantees and often capital is overpriced. This limits the role played by the private sector as stakeholders in the sector.

vii) High depletion rate of biomass resources which is providing about 90% of the total energy consumed in the country with very low funding allocations to support replacement and management of the biomass resources.

viii) Climate change impacts on the energy sector are one of the constraints toward sustainable development. Indeed, Energy is at the core of this challenge, being both part of the problem (two third of the world Greenhouse Gas (GHG) emissions are related to energy, as well as a range of local pollutions (e.g smog, acidification, and oil spill) and part of the solution (providing sufficient energy services for all through efficient, environmentally friendly and climate-resilient solutions). Thus addressing the challenges of climate change is materialised through the 2013 Uganda National Climate Change Policy (NCCP) and will be recognised and integrated in the Uganda's second National Development Plan.

ix) Lack of appropriate legislation, regulation and standards on integration of small intermittent renewable energy technologies of solar rooftops on the national grid using two way power meter.

x) The Target group for rural electrification using standalone small solar photovoltaic standalone home small are poor and do not have disposable income to purchase solar home system on any financial model. The poor of the poor target group need to be provided with free two lighting solar home systems.

Despite these challenges, there are several opportunities identified for the energy and mineral sector, which could be exploited in the SDP for the period 2015/16 to 2019/2020. Broadly, these can be summarized as follows:

(i) The exploitation and development of the estimated energy potential of over 5,300MW;

(ii) High potential for other types of energy sources including for solar power, wind, geothermal, fossil fuel and nuclear energy to contribute in the electricity generation to supplement hydro;

(iii) Increasing demand for energy use given the current low per capita consumption of energy and the rising urbanization and the quest for industrialization;

(iv) High potential for energy efficiency interventions on the demand side management due to new technology of LED, remote load management, householdand industrial appliances.

(v) The 27 types of minerals identified under the airborne geophysical survey which are in significant commercial viable reserves;

(vi) The confirmed existence of oil in commercial quantities. It is estimated that oil production can be sustained at between 30,000 to 200,000 barrels per day and this could last for another 20-30 years;

(vii) The potential for value addition of the minerals identified and the oil and gas sector; and

(viii) The potential gains from the wider regional market of the East African Community for value added mineral products.

2. SITUATIONAL ANALYSIS

2.1 Introduction

This section analyses the current situation, the strategic development programmes and the milestones/targets of the Energy and Mineral Development Sector. This includes the overview of the each subsector, the policy, legal, institutional and regulatory framework, the recent developments, an analysis of the progress and achievements made, the performance gaps, challenges, risks and the developments opportunities and priorities for the next 05(five) years.

2.2 Energy Management, Planning and Infrastructure Development

2.2.1 Overview of the Energy Subsector

The energy subsector in Uganda is mandated to increase electricity generation capacity and transmission, increase access to modern energy services through rural electrification and renewable energy development and promotion of efficient utilization of energy. The sector has implemented both short and long term measures to address the country's electricity supply needs such as commissioning a number of power plants to increase power generation and these include thermal and small hydro power plants. This is all aimed at increasing power supply leading to minimal load shedding during the evening peak.

Comparative analysis, shows that Uganda has one of the lowest electricity consumption per capita in the worldestimated at 58 kWh per capita in 2012 (*Source: CIA World Fact Book,2012*). It compares poorly with countries like Kenya (133 kWh per capita), Tanzania (73 kWh per capita), Ghana (246 kWh per capita) and Zambia (551 kWh per capita). In North Africa, Egypt's consumption is over twenty-two times higher than that of Uganda at 1,304 kWh while South Africa's is seventy-five times higher. By the end of 2012, energy consumption was estimated at 75kWh which is significantly lower than Africa's average of 578kWh per capita and the world's average of 2472kWh per capita.

Accordingly, 92% of the population depends on traditional biomass for cooking, 7% depends on fossil fuels and only 1% depends on electricity. Most of the biomass energy is from wood, which is consumed in the form of charcoal and firewood. This exploitation pattern is not sustainable because it heavily relies on non-renewable biomass energy that is costly, untimely, limited and has serious environmental effects. The low level of access to electricity, high tariff and low generation capacity explain why the majority of Ugandans use woody biomass energy as a source of fuel and biomass will remain the main supply of energy for the country in the near future.

The critical source of energy for industrial and commercial production in Uganda is electricity. According to statistics obtained from Electricity Regulatory Authority (ERA), the pattern of electricity consumption in 2012 was as follows: 24 percent for domestic activities, 11 percent for commercial, 11 percent for small industrial users and 47 percent for large industrial. An increase in industrialisation in the country has seen increased use of electricity for industrialization from 10.7% in 2007 to 47% in 2012. However, this is still low, compared to international standards.

The limited access and use of energy significantly slows down economic and social-transformation. The low energy consumption per capita in Uganda has largely contributed to the slow economic

transformation by limiting industrialization as well as value addition. It is one major factor that has negatively impacted on the country's competitiveness over the last decade. The energy exploitation and consumption patterns reflect that the country is still in infancy stages of energy application in production processes. The energy subsector comprises of the electric power, atomic/nuclear, new and renewable sources of energy and energy efficiency and conservation programmes.

2.2.2 Current Analysis of the Energy Subsector

Government recognizes the need and importance of accelerating access to modern energy services, especially in rural areas. Over the past ten (10) years, Government embarked on the Power-Sector Reform Programme. The reform programme was aimed at providing adequate, reliable and least-cost power supply to meet the country's demand, promoting the efficient operation of the Power Sub-sector and scaling up rural and peri-urban access to maximize the impact on poverty reduction. Despite the implementation of these reforms, the country continues to experience significant power supply shortages, low rates of access to electricity and high levels of power losses, all impacting negatively on the country's economic growth. The GoU plans to develop clean energy resources like hydropower systems, solar energy and biomass as well as their associated technologies. The GoU has a very ambitious programme to achieve 80% electrification by 2040.

1) Policy and Legal Framework of the Energy Sub-sector

a) Principal policy and legal framework

In 1997, the government of Uganda formulated a comprehensive plan for transforming the energy sector into a financially viable industry. This has resulted into significant policy and legislative reforms indicated below:

(i) The Electricity Act, 1999; was aimed at bringing about an enabling environment for the transformation of the electricity sector. The main objective of the Act was to provide a framework for regulation of the generation, transmission, distribution, sale, export, import of electrical energy in Uganda.

(ii) The Energy Policy for Uganda (2002), which guides plans of the energy sub-sector. Its main policy goal is to meet the energy needs of the Ugandan population for social and economic development in an environmentally sustainable manner.

(iii) Renewable Energy Policy for Uganda, 2007: The overall goal of the Renewable Energy Policy (the "REP") is to increase the use of modern renewable energy, so that its proportionate use increases from the current 3.8% to 61% of the total energy consumption by the year 2017.

b) Related legal and Policy frameworks

The Uganda National Climate Change Policy adopted in 2013 complements the above policies and aims in the power sub-sector, to promote diversify the energy sources by using clean energy resources and technologies in order to reduce GHG emissions. As a result, strategic interventions have been identified such as to develop hydroelectric and geothermal power systems and integrate them into the East African power pool in the medium term and to determine the potential impacts of climate change on the country's power supply chain.

2) Recent Developments, Achievements and Progress in the Energy Sub-sector

This section presents the development, achievement and progress made in implementation of several key policies, strategies and interventions in the energy programme.

a. Growth in Electricity Generation

There has been a consistent increase in the amount of electricity generated since 2009/2010. The total grid electricity supply increased by 8.45% from 2,264 GWh in 2009 to 2,456 GWh in 2010. The increase was attributed to new plants commissioned which included Bugoye hydropower plant (13 MW) and the 20 MW Heavy Fuel Oil thermal power plants by M/s Electro-Maxx Ltd in Tororo. By December 2011, the total grid electricity supply had reached 2599GWh and this increment was attributed to the new plants commissioned which included Mpanga hydro Power plant (18MW) in Kamwenge district and Ishasha hydropower plant (6.6MW) in Kanungu district. In 2012, the total grid electricity supply increased by about 10.07% from 2589GWh in December 2011 to 2849.8 GWh. The increase is due to new plants commissioned which include Bujagali hydro power plant of capacity 250MW and Kabalega hydro power plant of capacity 9MW in Hoima district. However, the energy generation rate is still low, if 80% Ugandans are to have access to electricity by 2040.

b. Electricity Supply

The electricity supplied in the country is generated from hydropower (84%), cogeneration from biomass, specifically bagasse (4%) and thermal power (12%) by both public and private actors. The current installed power generation capacity is 851.5MW. Large hydropower generation accounts for 630MW out of which 180MW is from Nalubaale, 200MW from Kiira, and 250MW from Bujagali. Cogeneration contributes to the national grid 30MW from biomass from Kakira sugar factory (50MW) and Kinyara sugar factory (14.5MW). In addition, thermal generation accounts for 136MW from heavy fuel oil were installed in Namanve and Tororo. Currently, the two plants are not being dispatched, with the coming on line of Bujagali hydropower plant in 2012. Table 2 below, shows the existing generation capacity by technology type.

Table 2: Existing Generation by Technology Type

	Plant	Installed Capacity(MW)	Firm Generation Capacity*
Large Hydros			
1	Eskom (Nalubaale and Kiira)	380	140
2	Bujagali	250	167
Mini Hydros			
3	Africa EMS Mpanga	18	7.5
4	Hydromax Buseruka	9	3
5	Eco Power Ishasha	6.5	3.3
6	Kilembe Mines Limited	5	2.4
7	Kasese Cobalt Company Limited	10.5	1.5
8	Tronder Power Bugoye	13	7
Cogeneration			
9	Kakira Sugar Works	50	10
10	Kinyara Sugar Works	14.5	3
Thermal Power & others			
11	Jacobsen-Namanve	50	49
12	Electro-Maxx-Tororo	86	49
14	KPLC (Import)	30.2	30.2
15	Electrogaz (Import)	3.2	3.2

**Average generation in 24hours of the day*
**Source: ERA Records, 2014*

In addition to the efforts to enhance supply capacity, Government is also undertaking a number of energy efficiency measures. These include energy audits to establish areas of improvements in energy use, refurbishment of the grid network, installation of prepaid meters and other actions to curb illegal use of electricity. These measures require development of appropriate strategies by MEMD for implementation by various sector players. The current supply levels cannot support heavy industries like steel mills, textile mills and or exploitation of the key minerals like iron-ore. A number of companies have expressed a need for additional power supply in order to meet increased productivity and economies of scale. This therefore calls for concerted efforts and appropriate strategies to fast track commissioning of additional generation capacity. In order to create a favourable climate and attract heavy investments in the sector, there is need to develop appropriate strategies that will ensure that sufficient electricity generation capacity is created. It is important that radical and drastic actions are taken to step up electricity supply to drive the economy to the indicators compared to middle income countries.

c. Hydropower Generation Infrastructure Development

(i) Large Hydro Power Generation Infrastructure

Government developed a hydropower development master plan in 2010, which forms the basis for the sequencing of the base load developments of the country's large hydro resources. Below is the status quo of this plan: -

a) Bujagali Hydropower project (250MW) was fully commissioned in 2012 and is supplying 250MW to the national grid;
b) Karuma Hydropower project (600 MW): Government executed the contract with Sino Hydro

Corporation Ltd to construct the plant and the associated transmission line;

c) Isimba Hydropower Project (183MW): Government signed an EPC contract with China International Water and Electric Corporation (CWE), and construction works commenced;

d) Ayago Hydropower Project (840MW): Government signed a Memorandum of Understanding with China Gezhouba Group Company Limited (CGGC). Under this MoU, CGGC is to undertake the Financing, Engineering Procurement and Execution of the Ayago Hydro Power Project. The Procurement of a supervising consultant to review the feasibility study was under way.

(ii) Small Hydro Power Projects

Government continued with the development of small hydro power plants, and the following progress has so far been achieved: -

i) Kabalega Hydro Power Plant (9MW): This Plant was commissioned in January 2013. However, it is still facing evacuation challenges since the demand in the region is limited and the maximum that can be evacuated is 4MW of the generated capacity.

ii) Kikagati (16MW): The Government is yet to sign the bilateral agreement between Uganda and Tanzania. If signed, the agreement will pave way for the independent developer to take over the site.

iii) Nyagak III HPP (4.5MW): International Finance Cooperation (IFC) and UEGCL held an Investor's meeting in June 2013 comprising of 8 firms. The plant is to be developed as a PPP and therefore GoU is looking to partner with a private firm for the development of this project.

iv) Muzizi HPP (44.7MW): GoU conducted a Feasibility Study. GoU is sourcing for funding to develop the site.

v) Feasibility Studies have been completed on several small hydro power sites that include: Nengo Bridge 6.8MW, Rwimi 9.6MW, Waki 4.8MW, Lubilia 5.4MW, Siti 5MW, Nyamwamba 14MW and Kakaka 7.2MW.

vi) Other sites where feasibility studies are on-going include: Nshungyezi 40MW, Achwa – Agago 88MW, Kanyampara 7.2MW, Muyembe 3.1MW, Kyambura 8.3MW and Nyamabuye 2.2MW. UECCC is implementing the ORIO Project that entails development of 10 mini hydro sites as one project. Pre-feasibility studies are on-going. Expected total power from the project is 6.5 MW.

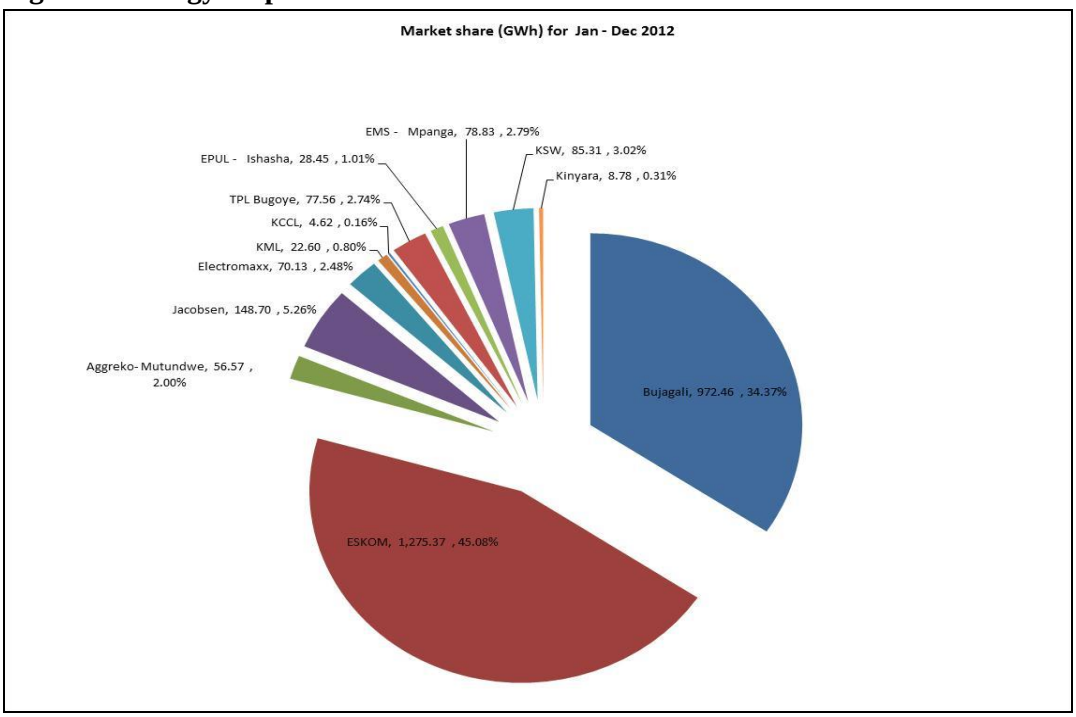
d. Eskom Concession

The Government entered into a concession arrangement with Eskom Uganda Limited, a subsidiary of Eskom Enterprises of South Africa as the Operations and Maintenance (O&M) operator of Nalubaale and Kiira Power Stations under a 20-year concession agreement which became effective in 2003. Nalubaale formally called Owen falls power station is the oldest and is a 10 X 18MW (180MW) station while Kiira the newest is a 5*40MW (200MW) plant which together gives a total installed capacity of 380MW. The performance of the concession is monitored by the Regulator, which among others shows the following indicators: -

(i) Energy generation; during the FY 2011/12, a total of 1,441GWh of energy was generated of which 1,421GWh was dispatched. In the FY 2012/13, the concession generated a total of 1,228GWh with Nalubaale contributing 68% of the total energy generated; and

(ii) Energy Generated by Eskom; Eskom's contribution to the national grid has however been decreasing over the last 5 years, from 54.5% in 2009, to 45.08% in 2012. This decrease is attributed to energy increase from Bujagali Power plant and other several hydro power plants that have been commissioned recently (Figure 1).

Figure 1: Energy Dispatch Contributions to the National Grid



Source: *Sector Performance Report 2012/2013*

(iii) Plant availability:

During the FY 2012/13, the overall plant availability was 94.99% which is above the contractual minimum of 94%. However, forced outages due to age related failures negatively affected performance of the plant causing some variations. The company should continue with developments in reliability and safety improvement projects to ensure that the contractual minimum is not breached and guarantee power supply to the customer.

e. Transmission Infrastructure

UETCL is mandated to augment and reinforce Government's efforts of increasing electricity coverage and expanding the national power system network as an efficient and focused Transmission System Operator and a Single Buyer Actor.

(i) UETCL Energy Purchases

Currently, Eskom Uganda Limited (EUL) and Bujagali Energy Limited (BEL) are the biggest suppliers of electric power to UETCL followed by thermal generators (those available for dispatch namely; Jacobsen-Namanve, and Electromaxx-Tororo). In addition, there are several embedded generators namely; Kasese Cobalt Company Ltd, Kilembe Mines Ltd, Eco Power-Ishasha, Tronder Power- Bugoye, EMS-Mpanga, Hydromaxx-Buseruka, Kinyara Sugar Works and Kakira Sugar Works). Also, some minimal power is imported from Kenya Power Lighting Company Ltd (KPLC)-Kenya and Energy Water and Sanitation Authority (EWSA)-Rwanda. A total of 2,849.8GWh of electricity were purchased by UETCL in 2012 from various sellers compared to the 1,896.7GWh that were purchased in 2007, a 50% increase in energy purchases within the five-year period.

(ii) UETCL Energy Sales

UETCL sells most of the electric power to Umeme, with total sales to the company worth 13,182.53 GWh over the period from year 2007 to 2012. It also sells to other companies including domestic companies such as Ferdsult Engineering Services, Pader Abim Co-operative Society, Kilembe Investments Ltd, and Bundibugyo Co-operative Society; and exports the rest to Kenya Power and Lighting Company (KPLC), Tanzania Electricity Supply Company Limited (TANESCO), Energy Water and Sanitation Authority (EWSA, Rwanda), and Societe Nationale D'Electricite (SNEL, Congo).

f. Electricity Distribution

UEDCL is mandated to supervise the completion of the Rural Electrification Schemes that were under construction before the transfer of business to Umeme. In this regard UEDCL has:-

a) Continued to operate the Off-grid systems in Moroto, Adjumani, Moyo, and took over the management and operation of the new off-grid system in Kalangala District;
b) Carried out Monitoring and Evaluation of the state of the distribution network in 2012 and submitted a report to stakeholders, to which Umeme is supposed to address areas of concern;
c) Pole Plant Operations; Uganda National Bureau of Standards certified the treated wood poles for Uganda Electricity Distribution Company Ltd (UEDCL) hence pole plant products now carry the UNBS Quality mark symbol. As a further stage in product certification, the pole plant is now in the final stages of ISO certification;
d) Forestation: UEDCL obtained a license from the National Forestry Authority to establish a Eucalyptus plantation in the degraded parts of Walumanyi Forest Reserve. 32.2ha have been planted. UEDCL is in the process of acquiring more land for plantation establishment. About 500ha is being targeted in the next 5years. The objective is that the trees will provide a source of poles for electrification in the near future since the demand for electricity is high, act as a corporate social responsibility in conserving the environment and also provide other alternative sources of energy (firewood);
e) Out-grower Scheme: UEDCL has partnered with farmers in all regions of the country to establish Eucalyptus plantations through an out-grower scheme in which the farmers are provided with seedlings that they plant on their own land, maintain them up to maturity and then sell to UEDCL at the time of harvest. A memorandum of understanding is signed between UEDCL and farmers stipulating clearly the responsibilities of both parties.

g. Umeme Concession

The Government offered concession of the main distribution assets to Umeme Uganda Limited in 2005. Umeme's mandates include inter alia investing in the distribution network; enhance new connections; improve cash collection; reduce losses (both collection and distribution) and improve the quality of service. The actual energy losses for 2012 were 26.1% slightly above the target for that year of 25.5%. By June 2013, energy losses stood at 24.9%, which is still above the target for that year of 23.0%. There is still need to ensure that energy losses are reduced as much as possible.

Regarding collection rates, Umeme achieved 94% against a target of 97.1% in 2012 while by June 2013; the company had achieved 102.7% against an annual target of 97.3%. The underperformance in 2012 was partially due to the increase of the end-user tariffs of 52% on average that took effect from 15th January

2012. Collection above 100% in the first half of 2013 partially accounts for the under collection in 2012. Umeme introduced pre-payment meters as a strategy to reduce losses in 2011/12. By the end of August 2013, Umeme had installed 33,985 prepayment meters (85% against 2013 plan). Of these, 3,658 were new customers (92% of 2013 plan) and the rest are retrofitted customers and government accounts.

h. Rural Electrification Programmes

Rural Electrification Agency (REA) is a Government institution that promotes, enables and realizes rural electrification schemes within and out of Umeme's designated area of supply. REA managed to complete the following projects in the FY 2012/13 as shown in Table 3:

Table 3: Progress of Implementation of REA Interventions

Activities	Status of Implementation
Eleven District Headquarters Electrified and power extended to Rural Growth Centres in the financial year 2012/2013	The following 7 districts have been electrified: Kyankwanzi, Amuria, Katakwi, Moroto, Napak, Kiruhura, Kyegegwa. Five (5) districts where construction works is ongoing: Amuru, Buliisa, Otuke, Adjumani and Moyo
Rural Electrification schemes with a distance of 1,000 extended in the FY 2012/2013	Implementation of Rural Electrification Schemes (33/11 kV) commissioned during this FY 2012/13, these are: Katakwi-Moroto with t-offs to Matany and Lorengedwat; Rwashamaire-Nyamitooma-Karuruma; Ibanda-Kazo - Rushere and Kyabirukwa-Nyarukika; Soroti -Katakwi-Amuria; Ayer-Kamdini-Bobi – Minakulu. Mubende-Kyegegwa - Kyenjojo; Kyalhumba, Karambi, Ibanda – Bugoye, Ibanda – Nyakalingijo (Kasese District).
Install 7,000 solar systems and solar charge stations	4,636 Solar PV systems installed in household, health centres, schools and water pumping stations
Develop a 10 year RESP 2013 - 2022 to accelerate electricity access while ensuring programme efficiency and sustainability	The preparation of the RESP 2013 - 2022 with a target aimed at achieving a rural electrification access rate of 22% of the estimated population by 2022 and position the electrification development programme on a path that will progressively advance towards achievement of universal electrification by the year 2040 was finalized and approved by Cabinet.
Scale-up service territories (other than lines and footprints) for which long term electrification business plan will be developed, implemented and monitored	Under the new Rural Electrification Strategy and Plan 2013- 2022, the country was divided into 13 service territories outside the 1km Umeme footprint

The other Rural Electrification Programmes include: -

i) Community-initiated schemes funded by GoU with financial contribution from the Community; REA extended subsidies amounting to Ushs 3.25 billion for construction of 21 Community Schemes during this FY 2012/13.

ii) Output Based Aid (OBA) Project: OBA project is a 4-year project funded by the World Bank (IDA) under ERT II, the Global Partnership on Output-Based Aid (GPOBA), the Government of Uganda and the German Financial Cooperation (KfW). The project aims at connecting about 132,500 low-income Ugandan households (or approximately, 655,000 beneficiaries) to electricity grids throughout Uganda, in rural, peri-urban and urban areas. The financing agreement with the World Bank was signed and the Implementation Manual was approved by the World Bank. The government also signed four implementation agreements with four Licensed Distribution Companies (LDCs).

iii) Implementation of the Rural Electrification Strategy and Plan (RESP), 2013 – 2022. Under the Rural Electrification Strategy and Plan 2013 – 2022, the country was divided into 13 service territories outside the Umeme footprint. The service territories will be managed on a management contract basis for the first 2-3 years. During that period, development will be made by government in the service territories to increase customer connections and energy consumption to make the territories financially attractive. GoU and the World Bank are financing Management Contracts for the Service Territories.

i. Electricity Regulation

As part of the reforms in the electricity industry, Electricity Regulatory Authority (ERA) was formed in 2001 following the enactment of the Electricity Act 1999, Cap.145. ERA plays a key role in the functioning of the privatized and liberalized electricity industry in Uganda. Following its functions outlined in the Act, ERA registered the following achievements in the FY 2012/2013 (Table 4).

Table 4: Progress of Implementation of ERA Interventions

Function	Progress/Achievement
1. Licensing	The authority managed to award 2 permits out of the 11 applications received. In addition, 22 permit applications for renewal were received of which 15 were renewed, 2 of which were declined while 5 remained in the process. On the other hand, 8 applications for license renewal were received of which 6 were renewed while 2 are still under review.
2. Tariff Management	The suspension of subsidies to electricity consumers by the government led to an upward adjustment of the end-user tariff by 46%. Given this change, ERA at the end of 2012 proposed to introduce an Automatic Tariff Adjustment – (ATA). This would ensure long run financial sustainability of the sector. This mechanism is intended to ensure that the sector is kept financially sustainable at all times. This will make the sector more attractive to private development and ensure a good credit rating for UETCL which ultimately benefits the sector especially the consumer. ERA has continued to pursue the operationalisation of ATA by engaging various stakeholders for its approval.
3. Tariff Review	The Authority has continued with the tariff review of the respective licensees as required by law. In the FY 2012/2013, the authority reviewed tariffs of the following licensees; Bundibugyo Electricity Corporative Society (BECS), Pader Abim Community Multi-Purpose Electric Corporative Society (PACMECS), Kilembe Investments Limited (KIL) and West Nile Rural Electrification Company (WENRECo). ERA verified and approved, for tariff purposes, the developments of Umeme to see whether the amounts are fairly stated and that they qualify to earn a return on investment as per Electricity Development Guidelines. As provided for in the Renewable Energy Policy (2007), ERA also revised the Renewable Energy Feed-in-Tariffs (REFiT) to take care of the changing funding and technology requirements for the generation plants. This REFiT revision was aimed at spurring accelerated development of projects that have hitherto experienced slow progress or completely stalled.
4. Monitoring and Enforcement of Compliance	ERA introduced a risk-based approach in enforcing compliance so as to minimize the adverse effects of non-compliance. Implementation of the compliance monitoring programme started with several companies being inspected and many non-compliance aspects being identified. Licensees were given specific timeframes within which to implement the required arrangements to ensure compliance.
5. Developed Operational Procedures and guidelines	ERA has been able to develop Bulk Metering guidelines, investment verification and approval guidelines, and Standardized Power Purchase Agreement.

Function	Progress/Achievement
6. Collaboration with Local and International Stakeholders	ERA has continued with its inter-agency collaboration Directorate of Water Resource Management (DWRM), National Environment Management Authority (NEMA), Rural Electrification Agency (REA) and Uganda National Bureau of Standards (UNBS). The authority also hosted the Annual General Assembly of the Energy Regulators Association of East Africa

3) Investment Opportunities in the Energy Subsector

The following opportunities provide a strong basis for growth of the power sub-sector in the medium to long term. The growth in the national economy will increase the demand for electricity and thus, open up the power market for further development. According to the second National Development Plan (2015/16-2019/20), an installed capacity of 41,738MW is required to raise Uganda's electricity consumption per capita from 80 kWh in 2013 to 578 kWh by 2020 and 3,668 kWh by 2040

i) Enhanced regional cooperation in energy will open up the regional market for electricity trading. Uganda can take advantage of this opening to achieve the vision of becoming a major exporter of power in the near future. The interconnection within the region and Africa are important to ensure that national projections are met.

ii) Strong Government commitment to private-sector led economic development will provide an incentive for private sector to increase their participation in the power sub- sector.

iii) Existence of a transparent and strong regulatory environment that not only provides a comfort for private sector investors, but also ensures efficient and optimal operation of the sector.

iv) Existence of potential sources of energy: Although, the consumption per capita is low, Uganda has an estimated hydropower potential of over 4500MW, biomass co-generation of 1,650MW, geothermal potential of over 450MW, and peat power potential of 800MW. High potential also exists for solar power, fossil fuel and nuclear energy. There is need to invest in both exploration and development of new energy sources and technologies to meet future demand. Exploitation of the existing potential will ensure that there is adequate capacity to meet the growing demand. This calls for appropriate interventions to facilitate investment in both exploration and development of new energy sources/technologies to meet future demand and the vision targets.

4) Analysis of Performance Gaps, Challenges and Risks in Energy Subsectors

The power sub-sector in Uganda faces the following challenges: -

i) High upfront cost of renewable energy technologies like solar and development of the small hydro power projects as wellas limited public and domestic financial resources to invest in large infrastructure power projects.

ii) It takes a long time to mobilize funds, projects usually require excessive government guarantees and often capital is overpriced.

iii) Sustainable supply of adequate and clean water for hydropower generation plants due to declining water sources in some critical catchments (e.g. Rwenzori) and declining quality (main due to sedimentation) due environmental degradation in catchments. Both attributes arise from effects of climate change and poor environmental management practices upstream.

iv) Resistance from environmental groups on dams and hydropower projects development.

v) Uncertain global energy markets have reduced capital inflows into the emerging markets

vi) A lack of institutional capacity to deal with such issues as integrated least-cost system planning,

increased access, and sustainability of hydro resources;

vii) Procurement delays for big projects due to unnecessary complaints from bidders whose bids are not selected.

viii) Operational challenges for new mini hydros: The hype of encouraging private sector players to develop several mini hydro plants has come with operational challenges. Typically, most of these hydro plants have been designed on the understanding that they will be dispatched onto the grid. In many instances, these hydros are located far away from the grid and in the absence of a robust grid to absorb the generation (like is the case in several instances) the most optimal solution is to dispatch them in island mode (i.e. dispatch the produced energy within the vicinity of the plant location), a situation that calls for costly redesigns since several of the localities do not have enough consumption to absorb the generation.

ix) Inadequate power supply infrastructure requiring huge investments: Until the commissioning of Bujagali power station, Uganda did not have sufficient generation capacity to meet the electricity demand. The existing large hydropower plants at Kira and Nalubaale have significantly aged and unable to deliver to their maximum installed capacity. This situation was exacerbated by the restrictions on the water quantities that could be abstracted for power generation. Although there has been increased interest by the private sector to develop power generation projects, the project development and commissioning rate has been slow, largely because of long project lead times (typically three to five years for hydropower projects) and high capital developments. In meeting future electricity demand, policymakers need to consider how, when, and through what means they plan to scale up capital development in the electricity sector. Attractive policies need to be put in place to promote development of renewable energy options with shorter lead times. Further to this, Public Private Partnership (PPP) models may need to be promoted.

x) Inadequate access to modern electricity: Rural electrification is an integral component of the Government's overall policy and program to promote national economic and social development and integration. By 2014, only 7% of the rural population have access to electricity which is a positive growth up from 1% in 2001. This level of electrification is an impediment to the achievement of the desired rural transformation. The newly approved Rural Electrification Strategy and Plan (RESP) 2013 – 2022 is therefore instrumental as its implementation should facilitate achievement of a much faster acceleration of national geographical coverage and consumer access than hitherto.

xi) High cost of fuel for electricity generation: Government has elected to retain thermal generation in the energy mix as a backstop gap to intervene in the event that they would be desirable dispatch sources of energy may be curtailed for various unprecedented reasons. In that event, the cost of supply can be greatly impacted by the several exogenous factors like foreign exchange movements, changes in the fuel prices on the international market, fuel supply logistics challenges etc thereby hiking the tariff.

xii) Inadequate regulatory capacity and enforcement: There are shortcomings in capacity of the regulator from the financial and human resources perspective to effectively monitor and regulate the excesses of both public and private sector players.

xiii) Low quality of electricity supply and customer service: The quality of electricity supply and service provided by the existing distribution companies leaves remains inadequate. The electricity system often experiences instability, voltage fluctuations, etc. In addition to this, connection and re-connection times are long, complaints resolutions take a long time to be resolved and customer

contact centres are still few. Appropriate mechanisms will need to be put in place by Electricity Regulatory Authority to ensure that these challenges are addressed.

xiv) High technical and non-technical losses: The significant level of losses in the network greatly impact on the end user tariff, as a loss factor is a key factor imputed into the tariff. These losses are attributed both to a dilapidated network and electricity theft. The distribution utilities should implement various measures aimed at bringing down the distribution loss levels from the current 24.5% (average for January – September 2013) to a regional average of 14%. Significant investment in the distribution network will need to be made; in addition to punitive measures for theft of electricity will be included in the amendment of the Electricity Act, 1999.

xv) Acquisition of way leaves is costly and takes a lot of time, thereby delaying project implementation

xvi) Vandalism of electrical equipment: The existing law does not provide for adequate punitive measures for theft of electrical equipment. It will be necessary to amend the law to include appropriate measures that will deter theft of electrical equipment.

xvii) Uncoordinated planning: Hitherto, the tendency has been to put the thrust of effort on addressing the generation challenges without a corresponding effort in the downstream transmission and distribution segments, a situation that may plunge the sector in a situation of non-performing assets at some point.

xviii) Inconsistency between objectives: Some of the policies and plans propose long term objectives which on occasion are contradictory: for example, the vision 2040 aims for universal access to electricity by 2040, whereas the Rural Electrification Strategy and Plan has an access target of 51% by 2040.

xix) Non-integration of Sustainable Energy for All (SE4All) in sector policies. The Global initiative under SE4All envisions fast tracking of activities to achieve universal connectivity under three core pillars namely; Access to modern energy services, doubling the share of renewable energy in the country's energy mix, and doubling the energy efficiency. For SE4All to succeed, the actions and policies of the other sector departments (like petroleum on biofuel policy) and ministries like transport, Forestry/Environment, Agriculture towards this initiative must be closely coordinated.

5) Development Priorities in the Energy Sub-sector

(i) Increasing Electricity Generation capacity through the commissioning of Karuma Hydro Power Project (600MW) and Isimba Hydro Power Project (183MW), commencement of the construction of Ayago Hydro power Project (840MW), and commissioning of atleast 150MW from small renewable energy projects. Government will endeavour to fast track the implementation of several renewable energy projects that will bridge supply deficits between the commissioning the large hydros, through a smart subsidy programme,Global Energy Transfer Feed in Tariff (GETFiT) and realise some 150 MW of small hydroelectricity over the next 05(five) years.

(ii) Reinforcing the transmission infrastructure through construction of several transmission lines including; 400kV Karuma-Kawanda; 220kV Projects of Bujagali – Tororo – Lessos, Mbarara – Mirama – Birembo, Kawanda – Masaka, Nkenda – Fort Portal – Hoima, 132kV Tororo – Opuyo – Lira, Mbarara – Nkenda, and Mutundwe – Kabulasoke. Development of Namanve South, Luzira, Mukono and Iganga industrial park substations. Upgrading of the Bujagali switchyard to 220Kv.

(iii) (Enhancing rural electrification through implementation of ERT Phase III programme and implementation of the Rural Electrification Strategy and Plan (RESP) 2013 – 2022.

(iv) Enhancing the safety and reliability of the Nalubaale Power station against Aggregate Silicon Reaction (ASR) effects.

(v) Make adequate developments in new and renewable energy technologies such as Biogas, gasification, biofuels, improved stoves, wind energy, peat, and use of solar energy.

(vi) Development of a comprehensive national strategy to assess the potential role, viability and obligations associated with nuclear energy in the context of energy needs for national socio-economic development.

(vii) Development of programmes aimed at efficient energy use and conservation of energy for sustainable development and a healthier environment.

2.2.3 Current Analysis of the Atomic Energy Sub-sector

This section provides an analysis of the atomic energy sub-sector. This includes the overview of the sub-sector, the policy, legal, institutional and regulatory framework, and the recent developments in the sub-sector. It gives an analysis of the progress and achievements made, the subsector performance gaps, challenges, risks and the development opportunities and priorities for the next 05(five) years.

a) Overview of Atomic Energy Sub-sector

Uganda became a member state of the IAEA in 1967 and it has been cooperating with this International body to promote peaceful application of the nuclear science and technology under the Technical Cooperation Programme. In Uganda, atomic energy is applied mainly in human health, water resources management, industry, food and agriculture, and on a limited scale in education and research. Atomic energy sub-sector therefore, comprises of a number of techniques such as teletherapy, nuclear medicine, brachytherapy, mammography, Non-Destructive Testing (NDT), oil well logging, level/density/moisture gauging, radiography, isotope hydrology, among others. Government is also developing a nuclear power programme to meet the energy deficit and plans to develop uranium resources for sustainable supply of nuclear fuel.

b) Policy, Legal and Regulatory Framework

The sub-sector is guided and regulated by the following framework:

i. ***Energy Policy for Uganda, 2002:*** The Policy recognizes atomic energy application in agricultural and health sectors in Uganda. It also recognizes that the atomic uses be regulated in order to protect the public and the environment from dangers arising out of improper practices and uses of ionizing radiation.

ii. ***Atomic Energy Act, 2008:*** The Act established the Atomic Energy Council (AEC) as the corporate body to regulate the peaceful use of atomic energy matters in the country. The Act also established the Nuclear Energy Unit (NEU) in the Ministry of Energy and Mineral Development to promote and develop the use of nuclear energy in electricity generation and other peaceful purposes.

iii. ***Atomic Energy Regulations, 2012:*** The regulations specify the minimum requirements for the protection of individuals, society and the environment from the dangers resulting from ionizing radiation and provide for the safety and security of radiation sources.

iv. ***Safety Guides and Codes of Practice*** involve the use of ionising radiation have been drafted as follows: -

   a) Guide for the safe use of industrial gauges containing radioactive sources.

b) AEC radiation safety guide for safe use of industrial devices containing sealed radioactive sources.
c) AEC Radiation Safety Guide for Safe Use of Baggage X-Ray Inspection Systems.
d) AEC Inspection Guidelines for Medical Diagnostic X- ray Facilities in Uganda.
e) AEC Radiation Safety Guide for Industrial Radiography (X-Ray and Gamma).

c) Institutional Framework

The Atomic Energy Act, 2008, provided for the establishment of the Atomic Energy Council (AEC), to ensure the protection and safety of individuals, society and the environment from the dangers resulting from ionizing radiation. The council replaced the Atomic Energy Control Board, and it has a fully-fledged Secretariat. The Council is an independent body that reports directly to the Minister of Energy and Mineral Development. The functions of the AEC as provided for under Section 9 of the Atomic Energy Act, 2008. The Atomic Energy Act, 2008, under Section 53 also provided for establishment of Nuclear Energy Unit (NEU) in the Ministry of Energy and Mineral Development to promote and develop the use of nuclear energy in electricity generation and other peaceful purposes. In addition, Section 53 provides for the functions of nuclear energy unit.

The Government is considering developing local uranium resources to ensure sustainable supply of nuclear fuel for power generation, as provided for under Section 53 (2c) of the Atomic Energy Act, 2008. Like any other mineral, uranium exploration and mining is regulated under the mining legislation by Geological Survey and Mines Directorate. Atomic energy activities are implemented with support from International Atomic Energy Agency (IAEA) under a Technical Cooperation Programme as outlined in the Country Programme Framework (CPF). The National Liaison Office in the Nuclear Energy Unit is responsible for the coordination of all Technical Cooperation Project (TCP) between the IAEA and the Government of Uganda. The Atomic Energy Council currently manages five (5) thematic areas; radiation protection, human health, water resource management, food and agriculture, and animal health, implemented by respective Government MDAs.

The Radiation Safety Information Management System (RASIMS) National Coordination Office under the NEU is responsible for collection, analysis, and dissemination of information about Uganda's Radiation Safety Infrastructure in the implementing institutions. This information is shared through RASIMS website. Uganda is also a member of the International Nuclear Information System (INIS). The purpose of INIS is to foster information exchange between IAEA member states and the International organizations.

d) Analysis of the Progress and achievements in Atomic Energy programme

The following are the achievements made by the government in the implementation of the atomic energy strategies and interventions:

(i) Inspection: A total of 189 inspections were conducted during the period FY 2010/11-FY2012/13. Random search of contaminated cars in car bonds in Kampala were conducted, and total of 151 cars in 5 car bonds were checked for contamination with radio-nuclides suspected to be from the Japan Nuclear Disaster.
(ii) Licensing: A total of 206 licenses to possess and use radiation sources, for transport, import and export of radiation sources were issued in the FY2011/12-FY2012/13.

(iii) Regulations and Safety Guides: Atomic Energy Regulations, 2012 were gazetted and a total of four practice specific safety guides have been drafted.

(iv) Monitoring of Occupationally exposed workers: In 2011, AEC received 500 TLDs from IAEA for monitoring of occupationally exposed workers. Another batch of 500 TLDs was received in 2013 from IAEA. AEC received a state of the art Harshaw 6600 TLD Reader Machine which has eased Reading, annealing and calibration of TLDs. As a result, a total of 35 institutions/facilities, and 327 workers are being monitored.

(v) Atomic Energy Council acquired 11.5 acres of land at Mpoma Village in Mukono District for establishment of administrative block (AEC Tower) and National Radiation Protection Laboratories.

(vi) A Nuclear Power Roadmap Development Strategy has been prepared. This strategy outlines the issues for consideration before embarking on a nuclear power programme and a plan for assessment of these issues to come up with a comprehensive roadmap for nuclear power Development in the country. The roadmap will determine the activities to be undertaken and resources required by Government and other stakeholders to commission the first nuclear power plant in Uganda. The issues to be considered include suitable nuclear power sites, sound policy and legal framework, strong regulatory framework, adequate human resources, stakeholders` involvement and appropriate nuclear power physical infrastructure. A prefeasibility study for launching the first nuclear power plant in Uganda commenced.

(vii) A study to identify gaps in the current Government policies in terms of deploying nuclear power in Uganda has been conducted. A draft Nuclear Energy Policy for Uganda has also been prepared. The document lays down the principles and mechanisms that will guide Government`s nuclear power programme while embracing safety, security and safeguards regime.

(viii) Uganda signed the second five-year (2014 – 2018) Country Programme Framework (CPF) with the International Atomic Energy Agency in 2013. The Country Programme Framework constitutes the frame of reference for the medium-term technical cooperation between the International Atomic Energy Agency (IAEA) and the Government of Uganda (GoU). It was developed through intensive consultants between the component national authorities and IAEA. This CPF focuses on the following areas: - feasibility studies for nuclear power projects; uranium exploration and evaluation; cancer management; food and agriculture; water management and strengthening the national nuclear and radiation safe infrastructure.

(ix) The Government has conducted a number of public awareness campaigns on nuclear energy in Uganda. Awareness campaigns on nuclear power, global concerns, social and economic benefits were also conducted.

(x) The Government has so far trained eight officers in different nuclear fields including MSc. Nuclear Engineering (4), MSc. Nuclear Science and Technology (3), LLM in Nuclear Law and Policy (1). Four (04) staff are currently undergoing training in the fields of Nuclear Engineering (2), Nuclear & Radiation Safety (1) and Nuclear Science & Technology (1). Other staffs have trained in short courses in areas of energy planning, nuclear and radiation safety, uranium resource management, and managing nuclear projects.

e) Analysis of Subsector Performance Gaps, Challenges, and Risks

The Atomic Energy Sub-sector players are constrained in implementing their undertakings by a number of factors, which include:

i. Weak policy, legal and institutional framework to guide the sub-sector
ii. Limited equipment to support field activities.
iii. Limited operational funds and logistics to effectively carry out core functions.
iv. Inadequate skilled human resource in the sub-sector; AEC has 11 technical staff who are inadequacy to handle the inspection and monitoring activities. In addition, the Nuclear Energy Unit currently has only seven (7) staffs and lacks an established organizational structure.
v. Absence of MOU's with relevant MDAs such as customs department, UNBS, NEMA, Police, and Ministry of Health, etc. to help ease regulatory operations.
vi. Lack of assessment laboratories and an information centre.
vii. Inadequate counterpart funding in the partner institutions where the IAEA-Technical Cooperation Programme is being implemented.
viii. Limited public understanding of the nuclear techniques and their benefits to society.

f) Proposed Investment Priorities and Core Projects

The Government will consider the following as core projects for the Atomic Energy Sub-sector:

i) Strengthening the Atomic Energy Regulatory Infrastructure.
ii) Expansion of Radiation Dosimetry Services.
iii) Developing National Radiological Emergency Preparedness and Response Capability
iv) Strengthening Regulatory Control of Radiation Sources.
v) Nuclear Power Infrastructure Development.
vi) Sustainable Development of Nuclear Fuel Resources.
vii) Strengthening Management of Radioactive Waste.
viii) Support to Other Peaceful Uses of Nuclear Technology.

2.2.4 Current Analysis of the New and Renewable Energy programme

a) Overview of the New and Renewable Energy in Uganda

Uganda has considerable unexploited renewable energy resources for energy production and provision of energy services. These resources include biomass, geothermal, wind and solar energy. Other new sources of energy include; Charcoal Briquettes, Biogas and Bio-fuels. In addition, there are several tested and mature Renewable Energy Technologies (RETs) on the market including, cogeneration, gasification, improved cooking stoves, and kilns and ovens is shown in Table 5.

Table 5: The New and Renewable Energy Power Potential

Energy Source	**Estimated Electrical Potential (MW)**
Solar	200
Biomass	1,650
Geothermal	450
Peat	800
Hydro and Mini-hydros	2,200
Total	**5,300**

Source: *The Renewable Energy Policy for Uganda, November 2007*

The development and use of renewable energy resources have the potential to ensure Uganda's energy security and also mitigate the negative impacts of climate change associated with energy production and use. Renewables improve environmental sustainability and can solve sanitation problems. Biomass based power generation has a large potential to increase the renewable energy contribution in the national energy mix as it, is increasingly becoming competitive and considerably cheaper than thermal power based on fossil fuels. The need for modern biomass energy has become more tenable due to increased electricity demand, coupled with unfavourable weather changes that once resulted into decreased water levels in Lake Victoria and Biomass is biomass is renewable which makes it reproduced through re afforestration. Biomass alone contributes nearly 90% of the total consumable energy out of which charcoal and firewood supplying about 5.6% and 78.6% respectively and other residues supplying 4.7% (Table 6). Fuel wood and charcoal are principal cooking fuels in Uganda in addition to being fuel sources for small and medium scale, and rural cottage industries.

Table 6: Uganda's Energy Consumption Matrix

Source of Energy	**Contribution (%)**
Biomass	Fuel wood 78.6
	Charcoal 5.6
	Residues 4.7
Petroleum products	9.7
Electricity	1.4
Total	**100**

Source: *MEMD Energy Balance 2012*

Uganda has a potential for co-generation, which is appropriate in situations where there are excess agricultural residues such as bagasse, coffee and rice husks. Sugar industries are generating about 60MW of electricity connected to the national grid with a potential for heat recovery and more power generation as more sugar factories are coming on board. There is small scale generation of electricity from biomass using gasifier from maize cobs, rice husks, and wood cheap which can be employed to supply power in rural areas as off grid biomass power plants using agricultural wastes.

Geothermal energy is one of the possible alternative renewable energy sources in Uganda, which could supplement other sources of energy. The country has more than 40 geothermal sites that have been subjected to studies. Parameters like temperature, chemistry of reservoir, natural heat transfer and fluid characteristics were evaluated to identify specific project areas and prioritize those for more detailed investigation. These investigations revealed three major potential areas that require detailed exploration, namely, Katwe-Kikorongo, Buranga and Kibiro. These sites are all situated in or near the Western Rift Valley of Uganda (zone of most recent volcanic activities), and their combined geothermal potential is estimated at 450MW.

The country also has solar potential of averaged at 5.1KWh/$m^{2/}$ day which is to equivalent annual generation of electricity of about 1022KWh/$m^{2.}$Uganda has total area of 241.04 Billion m^2 considering 0.01% of the total land areas for Uganda, the potential for the solar photovoltaic generation is about 24,000MW and the annual the annual power generation will be about 25,126,974 MWh which is about eight time the total volume of electricity purchased by UETCL in 2014. However the solar energy resource is intermittentwhich require strategic planning to ensure steady utilization which can be through electricity storage (water pumping, springs, battery banks,or hydrogen cell technologies) or intelligentmanagement of the solar power plants with the existing hydro power through saving water to

enable usage at night and in case of bad weather. The challenges of intermittent of solar energy technology results in high tariffs and there is also need to establish appropriate legislation, regulations, and standards for proper usage of grid connected solar PV systems.

b) **Policy Direction**

i) Renewable Energy Policy for Uganda (2007)

The Renewable Energy Policy (REP) was formulated with the overall goal to increase the use of modern renewable energy to 61% in 2017 from 4% in 2007, of the total energy consumption. This aims to ensure energy security, independence and of diversification of energy supply sources and technologies. The policy emphasizes the sustainable utilization of biomass energy by investing and promoting clean biomass-derived fuels as well as a range of BETs such as improved stoves (wood and charcoal), baking ovens, improved kilns (charcoal, lime, brick), biogas, biofuels, briquetting, cogeneration and gasification.

ii) Climate Change Policy

The Uganda National Climate Change Policy (NCCP) 2013 compliments the implementation of the REP, in particular with respect to the promotion and development of new clean energy technologies in order to reduce Green House Gases (GHGs). The policy emphasizes the need for energy resource development and use of technologies that balance adaptation and mitigation to climate change impacts.

iii) The Energy Policy for Uganda 2002; the objective of the policy is to meet the energy needs of Uganda's population for the social and economic development in an environmentally sustainable manner.

iv) National Biomass Energy Strategy (NBEST)

Government developed a National Biomass Energy Strategy (NBEST) to provide a comprehensive framework for managing both the supply and demand sides of biomass. The NBEST will guide all actions and interventions in the biomass subsector through the establishment of the action plan for the strategy.
The Government should also continue to collect relevant and quality data and information on the different facts of new and renewable energy resource to establish the potential of this energy source to supplement programmes aimed at increasing access to energy.

v) Institutional Framework

The Renewable Energy Department was established with the mandate to develop and promote the renewable energy resources and technologies in the country. The renewable energy being promoted for development are solar and biomass energy, while other sources like geothermal, peat and wind energy resources are under studies and investigation for development. The department is responsible for development of the renewable energy resources (Solar, wind, and micro/picohydro energy efficiency stoves, kilns, firewood, charcoal, biogas, waste to energy technologies, and bio fuels).

The Bio Energy Division promotes biomass energy saving stoves for homes, and institutions, Biogas digestion systems for homes, institutions, and electricity generation, efficient baking stoves and kilns for small and medium enterprises, waste to energy technologies of gasification systems and briquetting technology. In addition the division promotes and develop biofuel legislation, promotion, production and blending processes and collaborates with the petroleum downstream on biofuel storage and transportation.

Physical Renewable Energy Division promotes rural electrificationoff grid solar photovoltaic systems for homes and institutions, and on-grid solar photovoltaic roof tops for urban houses and industries, solar water heating systems to save electricity, solar thermal technologies, solar drying technology to save post-harvest losses and improve crop quality, solar thermal technologies for electricity generation, wind energy development, and pico/micro and small hydro power renewable energy systems.The sector output and NDP II key result areas for the department is to increase access to affordable, efficient and modern renewable sources of energy. Specific outputs include the review of the current policies and tabling of future strategies and legislation as follows:

- Energy Policy for Uganda 2002 currently under review.
- Renewable energy policy of 2007 due for review in 2017.
- Strategic sector investment plan for the Ministry.
- Biomass Energy Strategy to guide the sustainable utilization of the biomass resources.
- Draft bio fuels legislation.

Government through the MEMD takes lead in policy guidance, awareness creation, monitoring and quality assurance in the renewable energy sub-sector. A significant number of private actors in the sub-sector have been capacitated to produce and disseminate various Renewable Energy Technologies including improved stoves, baking ovens and improved charcoal and limekilns, biogas, briquetting and gasification using a commercial approach.

c) **Analysis of Progress and Achievements in the New and Renewable Energy Subsector**

The rate of development of renewable energy resources in Uganda is still very low and there exists opportunities for scaling up the sustainable and reliable utilization of the renewable energy resources to meet the country's energy needs. The following are the achievements and progress made in the implementation of the New and Renewable Energy Interventions as highlighted in the table 7 below.

Table 7: Progress of Implementation of New and Renewable Energy Interventions

Intervention	Achievement
1) Promotion of Renewable Energy	a) Promoted the use of biomassthrough several trainings, demonstrations models, and workshopsThe government also established several house hold biogas systems in the country. A total of 1,609 biogas users were also trained on system operation and maintenance and bio-slurry management and application. The Uganda National Domestic Biogas Programme is supported Uganda with a grant of US$ 6.0 million targeting to disseminate 12,000 biogas digesters in a period of 4 years. So far more than 6,000 biogas digesters and 20 biogas companies have been formulated. 10 demonstrational house hold bio gas systems have been constructed in Kampala capital city authority jurisdiction to demonstrate management of animal waste in the city the beneficiary households have been also sentised on the use. b) The government established the technical performance of the 4

	Multi-functional platforms under the Energy Access and Productive uses program in Luwero and Masindi districts. c) High grade PVC biogas digesters introduced in the country and demonstration plants set up in Wakiso district. d) GOU has set up a large scale briquetting unit at Kampala jerritone Suppliers Buloba Kampala Mitiyana Road to scale up briquette production in the country as an alternative for charcoal. e) In 2015, Government carried out training of artisans (26) in construction skills for improved institutional rocket stoves at UCC in Tororo and Masaka SSS; also government put up 46 demonstration model institutional stoves for emulation by institutions at various institutions across the country f) Promoting the green charcoal production, and sustainable land management in five district of Mubende, Kigoga, Kiryandongo, and Nakaseke g) Establishment of East Africa Centre of Excellence in renewable energy and energy efficiency at Makerere to conduct research and promote innovation in renewable energy technologies and innovative dissemination. h) The government established the technical performance of the 4 Multi-functional platforms under the Energy Access and Productive uses program in Luwero and Masindi districts
2) Data collection and renewable energy Database	a) Alternative Resources Assessment Study of Renewable Energy Resources in Uganda, 2002 b) National charcoal survey on production, storage, transportation and consumption of Charcoal in Uganda, March 2016 c) Balancing of Biofuel Production and food security study in Uganda 2010 with Support received from the United States Trade and Development Agency (USTADA) to a tune of US$ 500,000 in 2010 to provide the Government of Uganda d) Study on the Potential of Household Biogas systems 2009 e) Setup two wind measuring equipment to collect wind speed data in Karamonja region for energy investment f) Established Renewable Energy Database at the Ministry
3) Policies, regulations, Standards and strategic plans	a) Renewable energy policy 2007 under implementation b) National Biomass Energy Strategy that stipulates that sustainable use of the biomass resourcein the country. c) The Cabinet approved the principles to be embedded in in the biofuels legislation d) Draft Biofuels Bill, 2015 on production, transportation, storage, and blending of biofuels was approved by cabinet and is before

	parliament for debate. e) Established standards for solar PV, and solar water heating systems. f) Draft standards for stoves, biogas, and bio fuels are under discussion g) The government has developed and published the Guidelines for Sustainable Biofuels Production in Uganda. The Guidelines were developed under the project to develop a National Clearing House Mechanism for Uganda
4) Capacity building and support to stakeholders	a) Established strategic partnerships and collaborations with IRENA, WWF, SNV, UNDP, PSFU, CREEC, KCCA, Nyabeya Forestry College, DFID, GIZ, CEDAT, UNCST, UNBS, Local Government, research and academic institutions b) Establishment of East Africa Centre of Excellence in renewable energy and energy efficiency at Makerere to conduct research and promote innovation in renewable energy technologies and innovative dissemination. c) Uganda ratified the International Renewable Energy Agency (IRENA) statute where it is represented at both the Council and the Assembly meeting d) Trained 20 biogas artisans on Bio latrine technology, e) Trained 36 stove artisans in Toror and Masaka district in collabolaration with the districts. f) Trained 46 participants in small scale briquetting production, g) Ttrained six (6) participants in large scale briquetting production Developed the technical and managerial capacity of the Ministry technical team through training at master in renewable energy and various short courses in different technologies.
5) Demonstrations and dissemination of the technologies	1) 82.5kW gasifier at Nyabeya Forestry College to generate electricity using biomass wood chip demonstrated. 2) The Uganda National Domestic Biogas Programme with a grant of US$ 6.0 million targeted to disseminate 12,000 biogas digesters in a period of 4 years and only 6000 biogas digesters were achieved and involved 20 biogas companies. 3) setup 50 institutional cook stoves were as show case for adoption in Schools, 4) 10 demonstration household biogas systems in Kampala in collaboration with Kampala Capital City Authority (KCCA) to promote urban farming by managing the aminal wastes which is nuances to the communities.

	5) 11 (Eleven) demonstration biolatrine system were setup in different schools across the country to generate biogass for cooking from human waste, saves the school money due to replace pit latrine, and promote farming through generate manure for schools farms. 6) Twenty (20) small briquetting systems have been supplied tourban community to generate energy from waste, create jobs, and clean the environment. 7) One large scale briquetting installed at Kampala Jellitone to demonstrate large scale production of briquettes, training centre, and research on various feed stocks. 8) setup 50 institutional cook stoves were setup as show case for adoption in Schools 9) 10 demonstration household biogas systems in Kampala in collaboration with KCCA, 10) 11 (Eleven) biolatrine system, by the Ministry and over 20 biolatrine systems deomstrated by UNICEF –Uganda. 11) Seven demonstration wind turbines for electricity generation in public institutions in Uganda
6) Financing Mechanisms and models	i) Government had formulated a bioethanol production project on a PPP basis for funding under the IRENA renewable energy facility - but project lacked framework for financial guarantee ii) Tax exemption on renewable energy systems components and accessories resulting in lowering prices for solar components enabling Institutions to install larger sizes of solar photovoltaic systems to supply their own electricity (Seroma Christian High School Mukono – 25KW solar systems, and 20KW solar Mini Grid in Kabunyanta in Luwero powering telecommunication tower and the community).
7) Promotion of Bio-fuels	a) The government established the technical performance of the 4 Multi-functional platforms under the Energy Access and Productive uses program in Luwero and Masindi districts. b) The government hasdeveloped and published the Guidelines for

d) **Analysis of the Challenges and Risk in the New and Renewable Energy Subsector**

i. High upfront costs for acquisition of renewable energy technologies. Development and acquisition of renewable energy systems and technology adoption is the high upfront cost which requires payment of full amount of the costs at ago renewable energy sources are used in its traditional form, like biomass is used as firewood, charcoal and crop residues that are largely unregulated and using inefficient technologies abundant renewable energy resources are unexploited and underutilized for energy production like the sun, geothermal, wind and biomass. This is because there is limited access to improved and efficient biomass conversion technologies in the country. There is also no conducive legal framework to support investment in efficient improved biomass technologies, no specific incentives for the private sector for the growing of

energy crops, lack of a financing window or credit facility through financing institutions for biomass energy technologies for modern energy production.

ii. Poor quality products on the market due to unimplemented standard and technical regulations coupled with limited access to improved and efficient biomass conversion technologies with low adoption rates, limited facilities for testing biomass energy technologies and as a result there are no standards for majority of biomass energy technologies in UgandaLimited data and information on the renewable energy potential,Limited data and technical capacity to explore and fully utilize renewable energy resources

iii. Unregulated andlimited coordination of the private companies and key stake sector -Inadequate technical and institutional capacity for the private sector to roll out the renewable technology. There is lack of skilled manpower to transfer the developed technology on to the market. This makes people to resort to use of under developed technology. Many rural households also lack kitchens where Improved Cooking Stoves can be installedInadequate regulatory and investment frameworks to provide enabling environment for such development, uptake and transfer of technology on a larger scale.

iv. Uganda's energy sector is dominated by biomass that contributes nearly 90% of the total primary energy needs. Fire wood and charcoal are principal cooking fuels in Uganda in addition to being fuel sources for small and medium scale, and rural cottage industries. Biomass resource utilization is meeting a number of challenges including;

v. Sector, conduct massive role out of the technology, and replenish the biomass supply base.

vi. Inadequate financing to roll out the technologies, provide incentive to low the upfront costs

vii. Limited specific incentives for growing of energy crops

viii. High rate of the depletion of the forestry resources for energy resulting in biomass deficiencies in some regions in Uganda.

ix. Limited institutional leakages and capacity to manage and exploit renewable energy technologies. The Biomass production chain, (Plantations –feedstock, productions, transportation, Storage, and distribution) and management is a cross-sectorial mandate involving several institutions including MWE, MAAIF, District Local Governments and MEMD. However, demand-side management is a sole responsibility of MEMD to ensure sustainable supply of energy to the public. While the supply chain aspects are managed by Ministry of Water and Environment and its Agencies, Local Governments, and the other institutions. High rate of the depletion of the forestry resources for energy resulting in with biomass deficienciest in some regions in Uganda.

e) **Opportunities in the renewable energy Sub sector**

Uganda is richly endowed with a variety of renewable energy resources that include biomass, peat, solar, wind, geothermal and hydro power which are not fully exploited. Over 6 million households use biomass for cooking in Uganda analysed as follows:

i. Local production and selling of over 3 million standard Biomass energy efficient conversion technologies (household and institution cook stoves, kilns, biogas digesters).

ii. Production and sale of 2.4 million of tons of charcoal for industrial uses in cement/lime industries.

iii. Establishment and management of biomass plantations of quick growing coppices with annual production capacity of 42 million of tons of wood annually.

iv. Local generation of electricity for local internal consumption for institution by employment of

solar PV root top designed such that the solar array do not exceed the maximum load of the user to avoid export of power to the grid and also uses of other renewable energy technologies (Similar to the current uses of diesel generator sets).

v. Establishment of the Uganda Energy Credit Capitalization company to be able provide funding options and models for renewable energy technology through mobilization of grants and investment funds

vi. Abundant municipal solid waste generated in urban and peri –urban areas which are suitable for Waste to Energy projects which can generate about 20MW of electricity as pilot project.

vii. Installed two wind measuring equipment that are generating wind speed data which will establish the wind potential and will setup 20MW of wind farm for electricity generationand water pumping.

viii. Solar PV curriculum in technical and vocational institutions that is examinable by the Uganda national Examinations Board. These programme are producing engineers who can design, size and trouble shoot solar energy systems thus local technical capacity.

ix. Planned drilling of geothermal wells underinvestigationto develop about 200MW of the geothermal resources.

x. Biofuel legislation that regulates the production, transportation, storage, and blending of biofuel with petroleum products.

f) **Investment Priorities and Core Projects to develop the uptake of the technologies**

Government's proposed investment priorities and core projects include:-

(i) Review of renewable energy policy by 2017 and development of strategy plans for renewable energy.

(ii) Setup commercial biomass plantation of energy farming projects for sustainable production of firewood, charcoal, and biofuels to ensure biomass security.

(iii) Enact and implement the biofuel legislation.

(iv) Establish and implement Standards and Codes of Practices for various renewable energy technologies including review of the existing standards.

(v) Refinance Uganda Energy Credit Capitalization Company Limited (UECCC) to capitalize renewable energy projects. UECCC is implementing a solar credit facility through the financing institutions.

(vi) Setting up a Biofuel Laboratory to promote, test, and blending ensure quality of biofuel products
Promote and disseminate bio – Toilet (Bio Latrines) mainly in schools to replace pit latrines, domestic biogas digesters, solar photovoltaicand solar water heating systems, gasification technology.

(vii) Develop the human resources in geothermal drilling, reserve management, and power production, wind farm development and operation, biomass technologies, solar thermal technologies.

(viii) Develop a strategy for maintenances and troubleshooting of failed renewable energy systems to increase adoption and reliability of the Human resources development in design, installation, and system management of larges solar grid connected systems using photovoltaic and solar concentrated thermal plants.

(ix) Promote decentralization of renewable energy guidelines to local governments.

(x) Establishment of renewable energy fund through the UECCC and other funding institutions.

(xi) Develop and implement a strategy to rehabilitate non-functional renewable energy systems in homes, school, and health units due to lack of replacement of component and routine repair and maintenance. The main failure component for solar energy are mainly batteries and the failure for wind mills in Karamoja is mainly lack of technical knowledge (place under (d) above)

(xii) Support private sector companies association that deal in renewable energy technologies to conduct self-regulation of members to ensure quality services.

2.2.5 Situational Analysis of Energy Efficiency and Conservation

a) Overview of the Efficient Utilization of Energy

There are considerable opportunities to save energy in Uganda because most industries are yet to introduce Energy management in their organizational structures. In industries which have not adopted an energy management strategy, energy consumption can also be reduced by about 10% just by applying sound managerial practices and good house-keeping measures. For many key industries, energy use per unit of output is substantially higher in comparison to world norms, with causes ranging from age of equipment, technology, state of maintenance and repair, and lack of attention to operational detail. Industries making detergents, cement, sugar and tea are performing more efficiently than the likes of steel manufacturing.

Specific energy consumption for individual services can still be considerably reduced in many areas of the Ugandan economy. The use of improved cooking stoves for households and institutions, for example, can reduce the biomass used for cooking by 50%. Electricity consumption for lighting in households and other buildings can be reduced by up to 70- 80% simply by replacing incandescent bulbs by Compact Fluorescent Lamps (CFLs).

The public transport system is under-developed and the mechanical condition of vehicles is generally very poor. In the transport sector, diesel has 17.6% more energy per unit volume than petrol, while highway travel at 90 km/hr has a better fuel economy than city traffic travel with lower pollution emissions. In the building sector, energy efficiency and conservation is not a prerequisite in building designs and construction. As a result, building plans are approved without consideration of energy efficiency. This has resulted into additional energy demands from such buildings, an issue that would otherwise be avoided. There is need to regulate this sector to ensure that energy efficiency aspects are included in building designs before approval by the relevant authorities. Introduction of energy efficiency in new buildings can result in about 10 - 20 % savings in the long term.

There is lack of financing instruments targeting energy efficiency investments. Financial institutions are not geared towards lending for energy efficiency measures since these are not traditional asset-based deals and are perceived as high-risk investments as they are driven by estimated energy savings. The lack of reliable and commercially viable financing to end-users, developers, contractors and manufacturers/vendors has hindered investments in energy efficiency improvements.

b) Intervention Programs to Improve Efficient Utilization of Energy

The Government has been implementing energy efficiency and demand side programs which include:

- Government is in the process of tabling the Energy Efficiency and Conservation Bill to Parliament for enactment. This will lead to the implementation of energy efficiency standards and labelling programs in Uganda.

- Minimum Energy Performance Standards (MEPS) for air conditioners, lighting appliances (self-ballasted lamps, double-capped fluorescent lamps and ballasts for linear fluorescent lamps), electrical motors, freezers and refrigerators were developed and gazetted in 2012 by the Uganda National Bureau of Standards (UNBS).

- The Ministry and UNBS have developed the importers guide to assist them understand the Minimum Energy performance standards for selected equipment. The Guide contain parameters related energy consumption which the appliances imported into Uganda must conform. The importers guide is due for printing.

- Energy Labels for selected appliances have been developed to be put on appliances and provide information to the consumers on the level of energy efficiency of a particular appliance.
- Energy Audits for over 50 High Energy Consuming industries and commercial facilities were conducted in 2015. These included sectors: Tea, Cement, plastics, agro – processing, breweries, soft drinks, commercial buildings, hospitality, flower farms, steel industry. The Audits revealed that there's a potential for energy savings of at least 5% among many enterprises.
- Training in Energy Auditing for Energy auditors and Energy Managers in high energy consuming facilities has been done.

- Energy Week is held as an annual event a means of increasing awareness on renewable energy and energy efficiency.

c) The Policy Legal and Regulatory Framework

Efficient utilisation of energy is guided by the following policies: -

1. Energy Policy for Uganda 2002

The Energy Policy for Uganda 2002 clearly outlines a number of energy conservation issues as key areas of concern which include: -

- Insufficient awareness among energy end-users about energy conservation possibilities and practices.
- Lack of incentives, including financial mechanisms to invest in modern, efficient technologies and practices.
- Lack of skilled, specialised manpower in energy management.

2. Renewable Energy Policy for Uganda 2007

The Renewable Energy Policy for Uganda 2007, targets energy efficiency through identifying the main barriers for energy efficiency and formulating an Energy Efficiency Implementation Programme and determining corresponding targets.

3. The Kyoto Protocol

The Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC), was ratified by Uganda on 25th March 2002, recognises the global need for a significant reduction of Green

House Gas (GHG) emissions around the globe. Uganda will make efforts on the reduction commitment, of GHG and to contribute to the global efforts by providing a supportive framework for GHG abatement projects. Since these projects are usually related to energy efficiency or the use of renewable energy, this strategy is well in line with the obligations arising from Uganda's status as a signatory to the Kyoto Protocol and the UNFCCC. Furthermore, if a supportive regulatory framework for GHG abatement projects is in place, Uganda can benefit from the Clean Development Mechanism (CDM), creating additional revenues for energy efficiency and renewable energy projects.

4. The NDP II: the objectives, strategies and interventions highlighted in the National Development Plan II (2015/16 – 2019/20) in regard to the Energy Sector. To this effect, the NDP II under Section 11.2 on Energy, objective 3 (page 182) is "to improve energy efficiency" while objective 5 is ''to improve the policy, legal and institutional framework" in the energy sector.

5. Goal No.7 of the Sustainable Development Goals (SDGs) adopted by the United Nations in September 2015 namely "Ensure access to affordable reliable, sustainable and modern energy for all by 2030". One of the targets of this goal is "by 2030 doubling the global rate of improvements in energy efficiency".

6. The proposed legislation is in line with Uganda's commitment to participate in the Sustainable Energy for All initiative that has one of its targets as "to reduce energy intensity by half by 2030". Putting in place an appropriate legal framework to promote energy efficiency will facilitate Uganda's effort to fulfill the National Sustainable Energy 4 All targets.

d) Institutional Framework

The functions herein are under the department of Energy Efficiency and Conservation headed by the Commissioner. The department has two divisions:-

(a) Households, Institutions and Transport.
(b) Industry, Commercial and Agriculture.

Main Functions of the Department Responsible for Energy Efficiency

The key functions of the Energy Efficiency and Conservation Department are as follows: -

i) To regularly collect, analyse and interpret data on the status of energy efficiency and conservation throughout the country.
ii) To develop strategies and programmes to improve energy efficiency and conservation.
iii) To implement and monitor programmes that intends to improve energy efficiency and conservation.
iv) To recommend and develop standards that can be used to improve energy efficiency and conservation.
v) To coordinate and conduct research on the measures to improve energy efficiency and conservation.
vi) To provide advice and technical guidance to energy users on the best practices of energy efficiency and conservation.
vii) To provide technical advice to other government departments, local governments, the private sector and other stakeholders on energy efficiency and conservation.

e) Stakeholder Analysis

The key stakeholders in the efficient utilization of energy include Government Ministries, Departments and Agencies (MDAs) and the Private Sector.

1. Government Ministries

These include: Ministry of Energy and Mineral Development, (as leading institution), Ministry of Finance, Planning and Economic Development, Ministry of Tourism, Trade and Industry, Ministry of Works and Transport, Ministry of Lands Housing and Urban Development, Ministry of Water and Environment, Ministry of Education and Sports, Ministry of Justice and Constitutional Affairs.

2. Government Agencies

These include: Uganda Bureau of Statistics, National Curriculum Development Centre, National Council for Higher Education, Business, Technical, and Vocational Education and Training, Uganda National Council for Science and Technology, Uganda National Bureau of Standards, Uganda Industrial Research Institute, National Agricultural Research Organisation, Electricity Regulatory Authority, Uganda Electricity Transmission Company Ltd, Rural Electrification Agency, Uganda Electricity Generation Company Ltd, Bank of Uganda and National Housing and Construction Company.

3. The Private Sector

Includes: Private Sector Foundation Uganda, Uganda Manufacturers Association, Uganda Small Scale Industries' Association, Energy Institute of Uganda, ESKOM as leading electricity generator, Umeme Limited as major electricity distributor, Independent power producers (industry, others), Energy service companies and commercial banks.

f) Challenges and Risk in the New and Renewable Energy Subsector

- The policy and regulatory tools which are currently available do not favour implementation of some of the programmes; for example, enforcement of energy efficiency standards and labelling of electrical appliances and energy management and periodic energy audits in industries. These are facing a challenge to be implemented due to lack of a clear legislative and regulatory framework in the country.
- High specific energy consumption and energy intensity resulting from low level of energy efficiency in all sectors (both supply and demand side).
- Inadequate planning for demand side management programmes for industrial consumers, commerce, institutions and households.
- Limited knowledge regarding best available energy efficient technologies.
- Lack of proper institutional arrangement to facilitate implementation of various energy efficiency programmes.
- Poor and inadequate maintenance practices of electrical equipment.
- Lack of awareness about efficient use of energy.
- No financial incentives for more efficient use of energy.

g) Development Priorities and Core Projects

Over the next five years government is committed to improve on the efficient utilization of energy through the following priority areas: -

(i) Capacity building & training in energy efficiency

(ii) Information & Awareness
(iii) Energy management in industrial, commercial, agricultural sector, households, institutions & and transport sector
(iv) Financial Support and Incentives for energy efficiency
(v) Regulation & legislation framework
(vi) Energy management in households, institutions & and transport sector

2.3 Petroleum Subsector

2.3.1 Introduction

This analysis covers the petroleum subsector through its entire value chain. The value chain is divided into three subsectors, namely: the petroleum exploration, development and production subsector (the upstream subsector); the midstream subsector which involves petroleum refining, crude oil transport and storage infrastructure development; and the downstream petroleum subsector which includes the marketing, distribution and transport of petroleum products.

2.3.2 Petroleum Exploration, Development and Production (Upstream) Petroleum Subsector

This section covers the overview of the upstream petroleum subsector; institutional framework; recent developments, progress and achievements, gaps, challenges and opportunities of the subsector.

a) Overview of Upstream Petroleum Subsector in Uganda

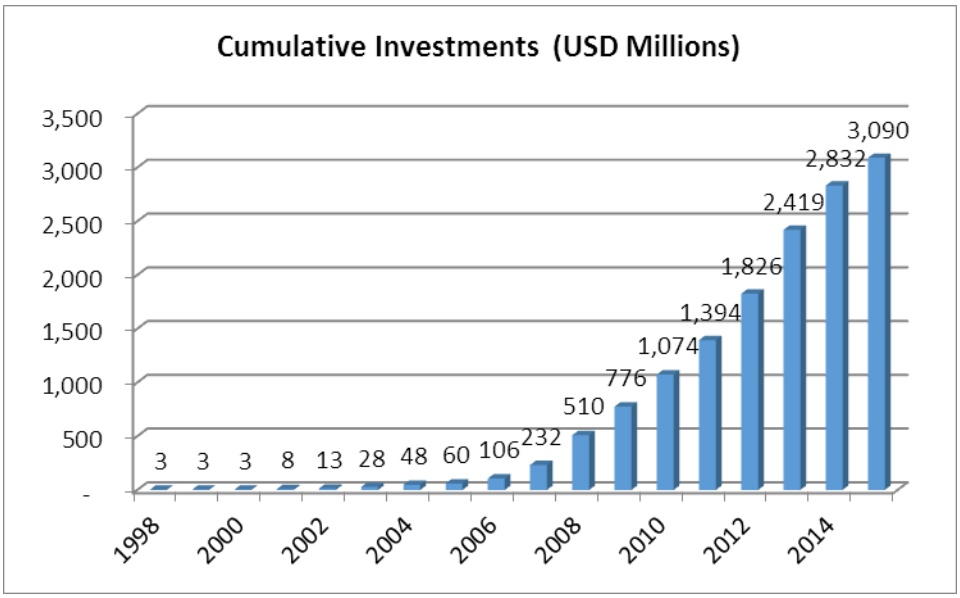
The exploration for Petroleum in Uganda dates back to the early 1920's but intensive exploration commenced in 1980's with the acquisition of aeromagnetic data in 1983, whose interpretation confirmed the existence of sedimentary basins in the Albertine Graben. This was followed by the enactment of the Petroleum Exploration and Production Act in 1985, collection of ground geological and geophysical data and promotion, ultimately leading to licensing of international oil companies, to undertake seismic surveys and drilling. However, the first oil discovery was made in 2006, and since then a number of wells has been drilled in the Albertine Graben, leading to a discovery of 21 oil fields, with the latest field, Lyec discovered in December 2012.

To date, 40% of Albertine Graben has been explored and there is additional potential in the unexplored parts of the Graben; 120 wells have been drilled in Albertine Graben; and 106 wells have been confirmed to have hydrocarbons representing 88% success rate. There are four (4) active Production Sharing Agreements (PSAs) in the Albertine Graben and the licenses are held by three Operators, namely; (a) Tullow Uganda Operations Pty limited (Tullow), (b) Total E & P and (c) China National Offshore Oil Corporation (CNOOC). Each of these operators holds 33.3% of share equity in the four licenses.

The estimated crude oil in place is at 6.5 billion barrels of Stock Oil Initially In Place (STOIIP), with 1.4 billion barrels recoverable. The proven gas resources are estimated at 499 billion cubic feet. Seventeen (17) fields were taken for appraisal and 16 fields were completed. Government received applications for production licenses of 16 fields. Four fields (Taitai, Karuka, Ngassa, and Kanywataba) were considered non-commercial and were returned.One production license entailing Kingfisher field was granted. This was as a result of Government lifting the condition on the production license for the Kingfisher oil field, effectively making this the first production License issued in the country. The Licensee, CNOOC Uganda Limited is in the process of developing the Kingfisher oil field in preparation for production.

CNOOC, Total E&P and Tullow Oil are developing the hydrocarbon resources and are expected to invest more than US$ 13.8 billion in 20 years. Investments in the upstream sector are expected to increase as Uganda embarks on the next stage of field development and production of oil and gas. Investment by industry in seismic surveys, exploratory and appraisal drilling reached a total of 2.8 billion and projected to reach US $ 3.090 billion by the end of 2015.

Figure 2: Cumulative private sector investment in the oil and gas sector



Source: *PED&PD*

b) Policy, Legal, and Regulatory Framework

The National Oil and Gas Policy (2008) guides the Petroleum Exploration, Development and Production subsector performance. The goal of this policy is "to use the country's oil and gas resources to contribute to early achievement of poverty eradication and create lasting value to society". The policy seeks to achieve this by providing for: the setting up of relevant institutions and capacity building in the country; attraction of companies to invest in the development of the country's petroleum sector; adequate and commensurate return on the companies' investments; ensuring the country's receipt of appropriate share and benefits from any oil and gas resources and activities; and ensuring efficient and effective resource management and utilization together with the revenues accrued.

This policy contains provisions to limit GHG emissions increases by prohibiting the venting of gas and discouraging flaring of oil and gas as referred to in the National Climate Change Policy (2013). As energy is the main source of GHG emissions (two third of the World GHG emissions), attention should be paid in the management of the recent discovery of oil and gas in Uganda to avoid an important increase in GHG emissions.The National Oil and Gas Policy (2008) is buttressed by a recently developed Monitoring and Evaluation Strategy (2013) that will be used to assess the performance and progress being made in its implementation.

The revenues from the oil and gas are managed under the Oil and Gas Revenue Management Policy (2012) and the Public Finance Management Act, 2015. The policy clearly spells out the fiscal framework to cover aspects of managing revenues from the oil and gas resources. The fiscal regime, which is based on the production sharing agreements, constitutes key components including royalties, cost recovery oil, profit oil and income tax. The framework also envisages setting up a petroleum fund in Bank of Uganda

where all revenues from the sector are kept for transparency and accountability and allocated by Parliament through the annual national budgeting process. For the management of resources, the oil and gas policy envisages that the second National Development Plan (NDPII) will stipulate the long-term goals and associated medium term expenditure fiscal strategy. The following sectoral policies apply to the Petroleum subsector: i) the National Environment Management Policy (1994) ; ii) The National Water Policy (1997); iii)The National Land Use policy (2000), iv) The Wildlife Policy (1999), v) The Forestry Policy (2001), vi) The Fisheries Policy (2003), vii) The National Tourism Policy (2003), viii) The National Policy for Conservation and Management of Wetland Resources (2005), and, ix), National Climate Change Policy (2013).

The principal legislations in the upstream petroleum subsector are; The Petroleum (Exploration, Development and Production) Act 2013, Upstream Regulations 2014, and Oil and Gas Revenue Management Policy and Public Finance Management Act, 2015. Other relevant statutes include; the National Environment Act, Uganda Wildlife Act, Water Act, Forest and Tree Planting Act, Income Tax Act, and the Land Act and a Model Production Sharing Agreement (MPSA) also guide the upstream subsector. The following environmental regulations also apply to the upstream Petroleum subsector:

i. The National Environment (Environment Impact Assessment) Regulations, S.1 No. 153-1
ii. The National Environment (Waste Management) Regulations S.1 No.153-2.
iii. The National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations. S.1 No. 153-3.
iv. The National Environment (Delegation of Waste Discharge Functions) Instrument. S.1 No. 153-4.
v. The National Environment (Wetlands, River Banks and Lakeshores Management) Regulations. S.1 No. 153-5.
vi. The National Environment (Minimum Standards for Management of Soil Quality) Regulations, S.1. No. 59/2001.
vii. The National Environment (Noise Standards and Control) Regulations, S.I. No. 30/2003
viii. The Water (Waste Discharge) Regulations, S.1 No. 152-4.
ix. The Water (Water Resources) Regulations, S.1 No. 152-1.
x. Petroleum (Exploration and Production)(Conduct of Exploration Operations) Regulations

c) The Upstream Institutional Framework

The Petroleum Exploration, Development and Production Department (PEDPD) in the Ministry of Energy and Minerals Development (MEMD) is responsible for implementing and coordinating activities related at promoting and regulating the upstream petroleum sub-sector in the country. The role of PEDPD is to establish the petroleum potential of the country and promote its sustainable development. Other functions of PEDPD are: a) Promotion of petroleum exploration in the country; b) monitor and regulate licensees undertaking petroleum exploration and production in the country; c) acquire, process and interpret geophysical, geological and geochemical data with a view of assessing the country's petroleum potential; d) initiate policy and legislation on petroleum exploration and development; and d) build national capacity in the field of petroleum exploration, production, and development. Following the enactment of the Petroleum (Exploration, Development and Production) Act 2013, Government commenced the process of fully establishing the required new institutions. These are: the Uganda National Oil Company (UNOC) and the Petroleum Authority of Uganda (PAU).

d) Recent Developments, Achievements and Progress of Policy Implementation in the Upstream Petroleum Subsector

Todate, Government has made the following progress (as reported by objectives) in implementing the National Oil and Gas Policy, 2008.

Table 8: Progress made in the Upstream Petroleum Subsector

NOGP Objective	Progress Made
1. Efficiency in licensing areas with the potential for oil and gas production in the country	(i) The Petroleum (Exploration, Development and Production) Act, 2013 to regulate the oil and gas activities, was passed in 2013 and consequently the drafting of the attendant regulations is in progress. (ii) A halt in licensing was put in place by Government six years ago and over 10,000 km^2 with good potential have been relinquished as required by law. This area will be available for relicensing along with the unlicensed areas through competitive licensing rounds. (iii) Resumption of licensing still awaits completion of the new regulatory framework. However, in the meantime the subsector continued to collect data (geological, geophysical and geochemical) especially in unlicensed areas to attract more investors for the next licensing round once the new licensing regime is in place. (iv) Preparations for the first licensing round continued. However, out of the twelve exploration areas established in the Albertine Graben, four (4) of them are licensed to oil companies, these companies are: Tullow Uganda, China National Offshore Corporation (CNOOC), and Total Exploration and Production. (v) Preparations for non-speculative seismic surveys are ongoing. (vi) The international oil industry has continued to show significant interest in Uganda's petroleum potential. An expression of interest was mainly to acquire acreage for exploration in the Graben, participate in development of a refinery and other opportunities in the country's oil and gas sector.
2. Establish and efficiently manage the country's oil and gas resource potential	(i) The country's petroleum potential is estimated to be over 6.5 billion barrels of oil in place and between 1.4 billion barrels is recoverable. (ii) National Petroleum Data Repository Systems is under establishment. (iii) Planning of the establishment of the Petroleum Authority and National Oil Company commenced.
3. Efficiently produce the country's oil and gas resources	(i) Extended Well Testing (EWT) programme is being undertaken as part of the appraisal process to plan for production; test crude (40,000bbls) is stored on site. (ii) Review of the submitted applications for production licenses to ensure optimum production strategy is adopted. The production license for Kingfisher oil field has been awarded to CNOOC. (iii) Operations in the following exploration areas are closely monitored: *a. Exploration Area 1 (Total E&P)* *b. Exploration Area 1A (Total E&P), Tullow, and CNOOC* *c. Exploration Area 2 (Tullow)* *d. Exploration Area 3A (EA 3A)-CNOOC*
4. Promoting valuable utilization of the country's oil and gas resources	A comprehensive feasibility study for refining in Uganda was concluded in 2010 and planning for the development of green field 60,000 BOPD oil refinery developments in the country is ongoing. The planned development of the refinery is as follows: a) In July 2013, the Ugandan Parliament enacted The midstream petroleum law. Along with the Petroleum Supply Act of 2003, the law paves the way for the Project. b) A transaction Advisory Team has been retained by the GoU to provide on-going assistance during the tendering process and subsequent financing. c) The GoU is in the process of acquiring 29 km^2 of land for the Refinery and related infrastructure.

NOGP Objective	Progress Made
5. Promote the Development of suitable transport solutions which give good value to the country's oil and gas resources	(i) Petroleum transportation and storage study for crude and products has been undertaken and results are under consideration. (ii) Upgrading of road and other infrastructure in the Albertine Graben is on-going.
6. Ensure collection of the right revenues and use them to create lasting value for the entire nation	(i) Oil and Gas Revenue Management Policy (2012) developed and Public Finance Management Act 2015, which among other things caters for Petroleum Revenue management.
7. Ensure optimum national participation in oil and gas activities	(i) A study on the opportunities and challenges for Ugandans' in participation the oil and gas sector was concluded during 2011 and a National Content strategy and plan for its implementation is being developed; some of the recommendations from the study are currently being implemented.
8. Support the Development and maintenance of national skills and expertise.	(i) Training courses at Universities and technical institutions focusing on petroleum industry have been introduced at MUK and UPIK for professional and blue collar training respectively. (ii) Capacity building continued to be undertaken at both strategic and professional levels.
9. Ensure that oil and gas activities are undertaken in a manner that conserves the environment and mitigates likely effects resulting into GHG emissions.	(i) Close monitoring of environment and biodiversity is continuously undertaken; (ii) EIAs undertaken; (iii) Environment Sensitivity Atlas developed; (iv) Strategic Environment Assessment undertaken; (v) Environment Monitoring Plan in Place; (vi) Guidelines for Waste Management and Operations in protected areas are in place; (vii) Multi-Institutional monitoring is on-going.
10. Ensure mutually beneficial relationships between all stakeholders in the Development of a desirable oil and gas sector for the country	(i) A communication strategy for the oil and gas sector was developed in 2011. and its implementation is ongoing. (ii) The Ministry continued to implement the Communication Strategy for the Oil and Gas sector through radio talk shows, stakeholder workshops in the Albertine Graben, Newspaper inserts on progress of the implementation of the National Oil and Gas Policy, participation in the two cross-border dialogues organized by International Alert in Arua and Hoima and maintaining and updating the PEPD website (www.petroleum.go.ug).

Source*: Sector Performance Report, MEMD 2012/2013*

e) Analysis of Performance Gaps, Challenges and Risks in Upstream Petroleum Subsector

The discovery of petroleum resources in the country has come with significant challenges for all Ugandans, Development partners, and all stakeholders. These challenges include:

(i) **Inadequate industry infrastructure to support upstream petroleum activities**

Although there is an increasing emphasis on the Development of infrastructures in the country, this is not yet adequate to meet the upstream infrastructural demands. There is a need for more national and regional roads, railways, electricity, water, communication, health, and educational infrastructures. These infrastructures are essential in terms of reducing the cost of investing the upstream subsector.

(ii) **Excitement and high expectations from the general public**

People's expectations exist in two distinctive forms – the positive and the negative. In the case of oil discovery, the positive expectations are really hopes that the precious resource and the associated 'windfall' revenues will deliver substantial social, economic and infrastructural improvements. Oil revenues will finance a larger proportion of the national budget, and boost investments in physical and social infrastructure (such as roads, power generation plants, education and health infrastructure). At the Local Government (LG) level, oil is expected to boost LG finances and reposition local governments as

key agents of local economic Development. At the community level, Bunyoro Kingdom officials and all districts in the Albertine Graben region including their local communities have expressed hope that oil revenues will result in a better road and railway network, high quality education and healthcare, a regional technical and university infrastructure, and considerable employment opportunities.However, negative expectations also abound.

Conceptually, resource abundance is a double-edged sword. While oil discovery, for example, presents considerable opportunities for Uganda to deepen domestic revenues and growth, resource abundance carries an important risk of the so-called natural "resource curse". The resource 'curse' is a situation whereby abundance of tradable natural resources (such as diamonds, gold or oil) paradoxically leads to economic stagnation, the death of other traditional and non-traditional exports such as agricultural and manufactured products, and conflicts over the allocation of resources. There are also negative anxieties about the possible negative effects that come with developing the resources like environmental degradation.

It is vital that Government communication channels provide realistic information about oil exploration and extraction, generated revenues including the associated challenges in the management of the resource. There should be substantial improvements in the flow of information from knowledgeable government officials to other stakeholders. This will create the transparency base on which Government should start to mitigate the likely negative perceptions. It is vital that the country should also use the oil as an opportunity for building high value-added petrochemical industries in order to expand the level of available opportunities for its citizens. The more socio-economic benefits accrue to the citizens the more the negative perceptions will be eroded.

(iii) **Inadequate skilled manpower, both in the public and the private sectors**

The gas and oil extraction industry has a wide range of occupations (e.g. mining engineers, metallurgists, quarry and mine workers, heavy truck or tanker drivers, general labourers) and the qualifications vary accordingly. The sector also tends to have a high proportion of staff with no formal qualifications compared to the national average but such workers should have the right attitude to work coupled with good literacy and numeracy levels. The challenge is that the private sector in Uganda is in shortage of these skills and needs better preparation to be able reap from the spill-overs that come with development and production of the oil resources.

Likewise the public sector doesn't have enough manpower with relevant skills in petroleum related activities to ensure maximum returns to the country. A large part of the work force needed by the oil companies and their subcontractors will be skilled and semi-skilled with a vocational training background. An adequate capacity building program for the industry should be developed. The present capacity status of the local potential suppliers to the petroleum sector should be subject to a national Training Needs Assessment (TNA) to identify the major present gaps. A priority capacity building program should be designed based on the findings of a TNA. The program should be organized as private-public partnership and implemented by an appropriate institution, such as the Private Sector Foundation Uganda.

(iv) **Inadequate Financing**

Although the budget allocation to the subsector has improved overtime, more financial resources are required the oil and gas projects to progress into the development and production stages. The subsector receives funds from the Government and Development Partners. However more funds are required to meet part of the upstream activities such as continuation in acquisition of geological, geophysical and geochemical data in areas outside the Albertine Graben to establish petroleum potential in preparations for subsequent licensing; Support development of the necessary transport and storage infrastructure for upstream phase; develop the national content strategy in the oil and gas activities; and undertake licensing of the unlicensed areas and those that will be relinquished in the Albertine Graben.

f) Priorities in the Upstream Petroleum subsector

The priorities and opportunities for the upstream petroleum subsector include:

i) ***Promotion of the country's petroleum potential and licensing***, which will include: Government promoting the country's petroleum potential; Preparation for petroleum licensing rounds during the strategic plan period and acquisition of geological, geophysical and geochemical data in the unlicensed basins and new areas; monitor non-exclusive surveys, to acquire more geophysical data in old and new areas, in preparations for a licensing rounds; and conducting resource assessment and laboratory analyses on the collected data and package them for promotional purposes.

ii) ***Infrastructure Development:*** Complete the construction of the data centre and office blocks.

iii) ***Support the implementation of a robust communication Strategy*** and effort for the oil and Gas Sector in Uganda to diffuse the negative perceptions on the Oil and Gas resources management and promote the Development of mutual beneficial relations between all stakeholders and actors in the oil and gas sector.

iv) ***Review elements of Legal and Regulatory Framework***: Following the putting in place of the Petroleum (Exploration, Development and Production) Act 2013, New Regulations and Guidelines for the upstream activities being developed; Government will review and update the Model Production Sharing Agreement (PSA).

v) ***Capacity Building****:* This will be a key activity of the development of the subsector in the next five years where Government should continue to build capacity for the Oil and Gas sector through formal and informal training. In the first place of this capacity building process Government will put in place the new institutions, i.e. the Petroleum Directorate, the Petroleum Authority and National Oil Company and train members of staff in Petroleum Geoscience, Engineering and Refinery Design at postgraduate level. Government will continue supporting Government petroleum-training institutions in Uganda especially support will continue at Petroleum Institute Kigumba (UPIK) and Makerere University. Government will also support and implement National content strategy in the oil and gas sector in order to realize the recommendations made in the National Content Study, that aim at ensuring maximum participation of Ugandans in the oil and gas sector.

vi) ***Monitor the exploration for oil and gas activities by oil companies***: - Government will operationalization its Monitoring and Evaluation (M&E) strategy for the National Oil and Gas Policy (NOGP) and strengthen its capacity to monitor the activities of oil companies; continue monitoring of seismic surveys and drilling of wells in operational areas, accompanying well tests, plus other field operations; continue reviewing of applications for production licenses and accompanying field development plans and petroleum reservoir reports for fields whose appraisal is complete; and continue monitor the sale of extended well test crude oil.

2.3.3 The Midstream Petroleum Subsector

This section covers the situational analysis of Uganda's midstream petroleum subsector. The activities in the midstream petroleum subsector include: crude oil refining and development of crude oil and refined product transport and storage infrastructure. The analysis further discusses the status of performance, associated challenges and risks, and investment priorities in the subsector.

a) Overview of the Midstream Petroleum Subsector

East Africa's rapid economic progress is leading to the growing demand for petroleum products in the region. The discovery of oil resources in Uganda raises an opportunity for the country to position itself in meeting the growing demand for refined oil and petrochemical products. It is vital for the country to turn the current difficulties in transporting imported refined products inland which raises costs and risks for petroleum product supply in the hinterland into opportunities for value addition and distribution of the newly discovered oil and gas resources.

The Government has committed itself to invest in the development of an oil refinery and crude oil and product pipeline and storage infrastructure. The refinery will be developed on a Public Private Partnership (PPP) with 40% Public and 60% by the Lead investor. Government conducted a feasibility study that defined the key aspects of developing a refinery in terms of its size, configuration, location and financing. The refinery will be developed in a phased manner starting with 30,000 barrels of oil equivalent/day in the short term. This will be expanded to 60,000 barrels of oil equivalent bbl/day in the medium term and further be expanded to 120,000 barrels of oil equivalent bbl/day and 180,000bbl/day in the long term subject to discovery of additional reserves and market demand. The refinery will be established at Kabaale in Hoima district and the project is expected to commence its operations in 2018/2019.

b) Policy, Legal and Regulatory Framework

The activities in the Midstream subsector will be regulated by the Petroleum (Refining, Conversion, Transmission and Midstream Storage) Act, 2013 and the National Oil and Gas Policy, 2008. The process of developing regulations and Standards and Codes is on-going.The Government has made the following progress in implementing different key activities in the Midstream subsector (Table 9):

Table 9: Progress made in the Midstream Subsector

Key area of Performance	Progress Made
1) Land Acquisition for refinery Development and attendant infrastructure	- Government is in the process of acquiring 29 square kilometres in Kabaale Parish Buseruka Sub-County, Hoima District that will accommodate the refinery and attendant infrastructure. - Government completed the Resettlement Action Plan (RAP) which assessed and valued the property of the project affected persons. . This RAP affects 7,118 persons in 2708 households. Of these households 93 opted for resettlement. Of the persons, 49.4% are females, 52.8 persons are children below 18 years, and 42.9% are persons between 10-59 years. In terms of tribal distribution 70.7% are Alurs, 7.3% Banyoro, 6.6% Bakiga and 5.6 are Lugbara. In terms of land ownership; 63.4% of affected persons are landowners, 18.8% co-owners, 10.8% squatters, 6.6% tenants, 0.2% licensees. A total of 40 community/social assets exist on the land.
Identify the developer for the Refinery	The Ministry hired a Transaction Advisor to guide on the following key aspects of refinery Development:

Key area of Performance	Progress Made
	– Developing a feasible project financing structure; – Securing appropriate Development partners; – Advising on the best contractual arrangements. – Advise on the pricing framework of both crude oil and refined products; and – Guide the process on forming the Joint Venture Refining Company and attaining financial closure. A request for qualification for the lead investor and/or operator was advertised in the local and International media on 10th October 2013. Evaluations were conducted in November 2013 and six firms were shortlisted. These were issued with the Request for Proposals and these were submitted at the end of May 2014 .Evaluation of the proposals is ongoing and the lead investor is expected by September 2014.
The Environmental Baseline Survey for the refinery	The Government completed an environmental baseline study of the refinery land The study characterized the initial environmental and social conditions in and around the refinery land. This provides a benchmark for comparing the state of the environment before the oil refinery Development starts, when the operations are being undertaken and at the decommissioning stage
Formulate legal framework, Regulations, Standards and Codes for midstream operations	The Petroleum (Refining, Conversion, Transmission, and Midstream Storage) Act, 2013 was developed. The process of developing regulations commenced and consultations are ongoing. A technical working group on standards and codes was formed in June 2013 and is working with the Uganda National Bureau of Standards to develop the Standards and Codes for Midstream operations.
Infrastructure for Transportation of Crude Oil to the Refinery	A study to evaluate Development of pipelines and storage facilities for crude oil and gas in Uganda was completed in March 2012. The study assessed two pipeline routes; one from the northern oil fields and the other from the southern oil fields to a central hub/refinery. The northern pipeline (96 km, 16 inch) is expected to cost US$ 132 M and the southern oil pipeline (46 km, 12.75 inch) is expected to cost US$ 53.4 million. The oil companies will spearhead the Development of the crude oil pipeline from the oil fields to the refinery.
East African Community (EAC) Infrastructural Cooperation	The EAC Partner states agreed to invest in the oil refinery to be constructed in Uganda, develop a crude oil pipeline from Uganda to Kenya and develop pipelines for finished products from Eldoret to Kampala and from Kampala to Kigali, Rwanda. It was agreed that committees will be instituted to coordinate and mobilise resources required for taking forward these developments. Uganda will spearhead the refinery development, whereas Kenya will spearhead pipelines development. This is an opportunity for the government of Uganda to spearhead its agenda of refining of its oil and gas resources.
Capacity Building	a) Ten (10) officers have so far been trained in oil refining, pipelines and storage related MSc courses. b) There is however a need for capacity building for Artisans and technicians who will be required at the construction stage of the refinery and pipelines. c) Engagements with the higher institutions are ongoing in order to consider incorporating refinery and pipelines related studies in their curricula. This will boost one of government's objectives of developing national content in the oil and gas industry.

Source: *Sector Performance Report, MEMD 2012/2013*

Analysis of Performance Gaps, Challenges and Opportunities in Midstream Petroleum Subsector

1) There are mixed expectations on the developments in the midstream, which are catching up from the upstream challenges associated with the effect of the natural resource curse. In the midstream, for example, Civil Society Organisations (CSOs) need to be helpful by not inciting the residents of areas that are going to be affected by the refinery and pipeline developments to revolt against the Resettlement Action Plan (RAP) implementation process. Delayed compensation of residents has hindered the timely implementation of the RAP and other development activities. Government needs to address the public anxiety, negative expectations and manage public confidence through enhanced sensitization and

communication programmes with the relevant audiences as part of implementing the communication strategy for the oil and gas sector.

2) There is still limited expertise of service providers to provide logistical support to the refinery development program. There is need for more services such as general works, construction and fabrication, logistical services, insurance services, geophysical surveys particularly seismic surveys, power generation by independent power producers, future petrochemical industry and many others, waste management and treatment, provision of ICT services and facilities, and environmental consultancy including associated research and development. Refining is a new area, and there is need for the industry to develop huge capacity to handle future work in the refinery and related infrastructure developments. There is need to train process and pipeline engineers, specialized Health and Safety and Environment (HSE) personnel and technicians, among others

c) Priorities and Core Projects in Midstream Petroleum Subsector

(i) Continuous promotion and development of the refinery project: The Government plans to have a Greenfield refinery to develop the oil and gas resources. The Government of Uganda appointed a Transaction Advisory Team to assist in the procurement of a Lead Investor. The refinery project will have a dominant position in the target markets of East Africa. The process of land acquisition (29 square km) for the construction of the refinery is ongoing.

(ii) Developments in transportation and storage infrastructure include: pipelines and storage facilities for all categories of refined products. Pipelines will be required to deliver crude oil from oil fields to the refinery and to transport refined products to distribution and marketing centres. In this regard, the government is planning to develop the products pipeline from Refinery to a terminal at Buloba in Kampala. Two crude oil pipelines (from oil fields to the refinery) will also be developed. These include: the northern pipeline (96 km, 16 inch) and the southern oil pipeline (46 km, 12.75 inch). The oil companies will spearhead the development of the crude oil pipeline from the oil fields to the refinery.

(iii) Communication Strategy: The Government will continue to carry out sensitization programs through different fora with the relevant audiences as part of implementing the communication strategy for the oil and gas sector. In this way the public will be kept updated with the developments in the industry and the policy direction for the country regarding the sector.

(iv) Capacity building: Given the fact that refining is a new industry in the country, the Government recognizes the need for capacity building in the mid-stream aspects as a means of addressing the challenge of limited expertise. The Government should conduct a capacity needs analysis and capacity development plan for the sector to identify the skills gap and train and recruit skilled personnel for all activities in the subsector.

2.3.4 The Petroleum Supply, Regulation and Infrastructure Development (Downstream) Subsector

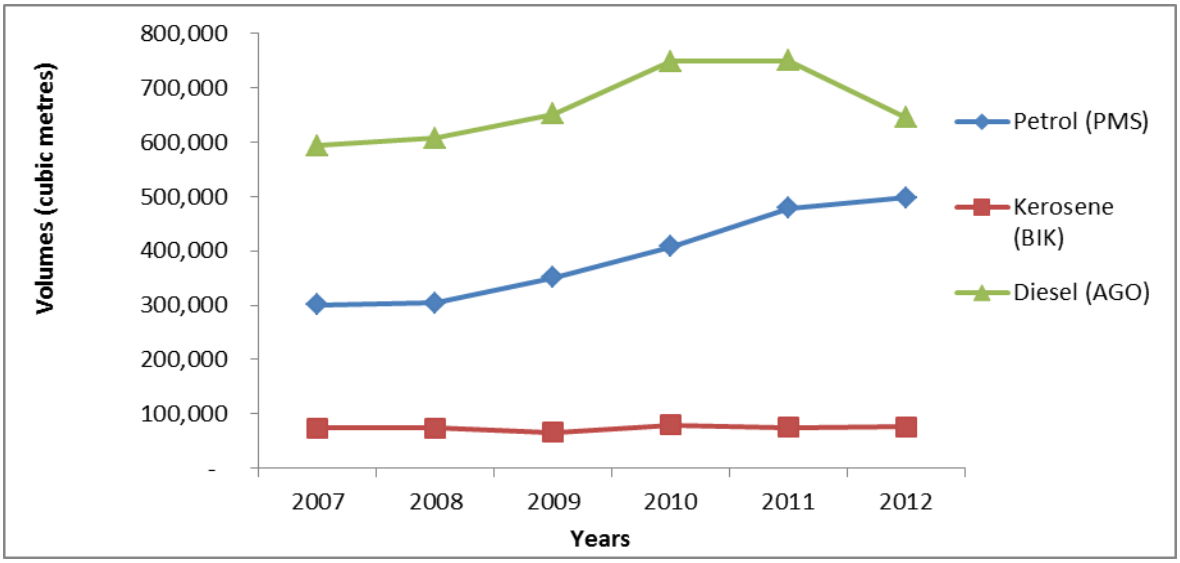
This section of the situational analysis covers the petroleum supply and regulation, and infrastructure development. It gives an overview of the downstream subsector, including the policy, regulatory and institutional framework of the subsector, and the state of performance, challenges, risks and development priorities of the downstream petroleum subsector.

(a) **Overview of the Downstream Subsector**

Uganda is a land-locked country, and currently a net importer of petroleum products. It imports 95% of the products through Kenya and 5% through Tanzania. Most products destined for Uganda through Kenya are delivered from Mombasa seaport to western Kenya terminals of Eldoret and Kisumu by pipeline and thereafter by road and rail to Uganda. In Uganda, these products are distributed by road around the country. Supply disruptions and high transportation costs along the Mombasa route and in country translate into high prices paid for refined products by Ugandan consumers. Any petroleum supply activity must operate with the relevant operating license or construction permit prior to commencement of the activity. By June 2013, the ministry had licensed 142 oil marketing companies, a rise of above 17% from 121 companies by same time in 2012. So far only three oil marketing companies namely: Shell Uganda, Total Uganda and Gapco are licensed to deal in bulk Jet A-1 for Entebbe International Airport.

The average annual growth of petroleum consumption stands at about 7%. In the past there has been a higher increase in the consumption of petroleum products, which is attributed to power generation using diesel. Currently the annual consumption of petroleum products is 1.4 billion litres (2012 data) an increase of 13.9 percent from 2011. In 2012, the import bill for petroleum and petroleum products was the highest, totalling US$ 1.3 billion and accounting for 22.2 percent of expenditure on formal imports. The total amount of petroleum products imported in 2012 stood at 1.227 billion litres. The composition as follows: Petrol (41.1%), Kerosene (6.1%), and diesel products (52.8%). Figure 3 below shows the composition of petroleum product imports.

Figure 3: Imports of Petroleum Products, 2007 to 2012 (Cubic Meters)



Source: *MEMD Annual Performance Reports, UBOS, Statistical Abstracts 2010, 2011, 2012, 2013.*

Government collected UGX 787 billion in oil tax revenue in 2012 (Table 10). This was slightly less than the UGX 819.3 billion collected in 2011 by 3.9%. In addition, the petroleum product import bill in 2012 was slightly less than that registered in 2011 by 5.3%. This was the first time imports in a given year were lower than those in the previous year since 2008. This could have been attributed to increase in global oil prices which led to decline in imports and decline in tax receipts.

Table 10: Annual Import Bill and Government Revenue, 2008-2012

Year	Import Bill (UGX billion)	Government Revenue (UGX billion)
2008	658	516
2009	746	1216
2010	2516	759.41
2011	2670.77	819.13
2012	2530	787
Total	**9120.77**	**4097.54**

Source: *MEMD Statistical Abstract, 2012*

(b) Policy, Legal and Regulatory Framework

The Petroleum Supply subsector is regulated by the Petroleum Supply Act, 2003 and Petroleum Supply General Regulations, 2009 which operationalizes the Supply Act; and the Petroleum (Fuel Marking and Quality Control) Regulations 2009 SI 56 of 2009. Other relevant legislations for the subsector include: National Environment Management Act 1995, and the Standards Act 1983. The 2002 Energy Policy also guides the down stream petroleum subsector. Developing of the downstream petroleum regulations and petroleum facility standards is ongoing.

(c) Institutional Framework

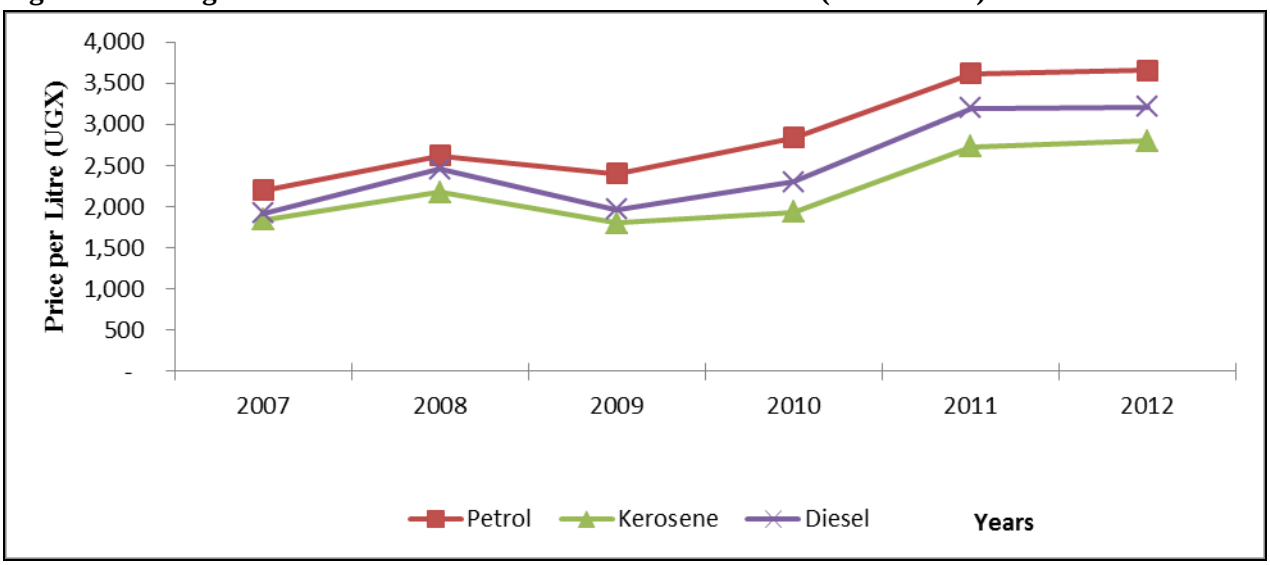
The department of petroleum supply which is located in the Ministry of Energy and Mineral Development coordinates all the activities of the subsector. The department has three (3) divisions which are: Petroleum standards, Business and Economics, and National Petroleum Unit. The core functions of the department include: inspecting and monitoring the operations of private oil companies with respect to volumes, prices, quality, safety of operation, and technical and environmental standards; and managing and ensuring that the country has sufficient national strategic petroleum reserves to act as a reserve buffer when there is a supply shortage and stabilize prices of petroleum products in the country.

(d) Recent Developments in the Downstream Petroleum Subsector

Domestic Pump Prices

The high prices at the end of 2011, which had an average price of UGX 3,750, UGX 2,850 and UGX 3,550 for petrol, kerosene and diesel respectively dropped and stabilised in January in 2012. Prices of petroleum, Diesel and Kerosene increased during the festive season (December) reaching an annual highest of UGX 3,800, UGX 3,560, and UGX 2,880 respectively. Even though the number of licensed importers increased the competition in the refined petroleum products' market, prices remained relatively high (Figure 4) due to factors such as the weak shilling against the US dollar, infrastructural constraints, and political instability in the Middle East. The rise in prices is also partly attributed to the rising international price trend for crude petroleum products, which crossed from 2011, stabilised after hitting record highest in March in 2012, of an average of US $ 123.01, US $124.40 and US $106.62 per barrel for Opec Basket, IPE Brent and Nymex Lt. Sweet respectively.

Figure 4: Average Annual Prices of Selected Petroleum Products (2007 – 2012)

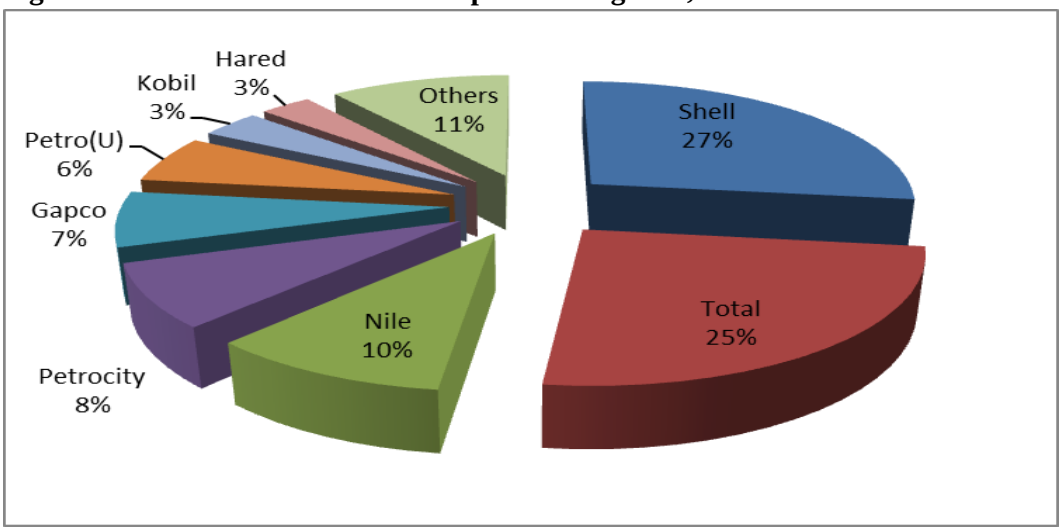


Source: *UBOS Statistical Abstracts 2010- 2013*

Market Shares

The market shares of petroleum and petroleum products in Uganda in 2011 were as follows: Shell (31%), Total (24%), Gapco (8%), Hass (8%), Petrocity (6%), Nile (5%), and Petro (U) (3%) and Mogas (2%), and Others (13%). The retail market share of petroleum and petroleum products continued to be dominated by Shell and Total who have over 50% of the total market share in 2012. In the same year, the other key participants in the market included Nile Energy, Petrocity, Gapco, Petro (U), Kobil and Hared. These take a combined share of 37% (Figure 5). There also many other small companies that have a combined share of 11%. This group tends to operate in rural areas, which are not cost effective for the operations of many larger companies who look for economies of scale.

Figure 5: Market Shares for Oil Companies in Uganda, 2012



Source: *Sector Performance Report, FY 2012/2013*

(e) **Achievements and Progress on Policy Implementation in the Downstream Petroleum Subsector**

This section analyses the achievements and progress made regarding the implementation of proposed strategies and interventions.

1) **Develop a strategy and plan for pipelines and storage facilities: -** The Government of Uganda completed the feasibility study on the distribution and storage facilities for petroleum products.
2) **Development of storage tanks to Nakasongola and refurbishment of Jinja storage tanks: -** The terms of reference for Development of the 40 million litres Nakasongola Storage tank site have been developed awaiting final concurrence and input from other relevant Ministries, Departments and Agencies. The refurbishment of the Jinja Storage tanks was completed and the facility will be used as a bonded warehouse to attract other oil marketing companies.
3) **Entebbe Joint Aviation Facility: -** Aviation business has grown tremendously in Uganda. This has led to increased consumption of Jet A-1 fuel at Entebbe International Airport. The current 3.5 million litre Joint storage facility operated by Shell, Total and Gapco is no longer adequate. Due to this, three companies have built an additional 3 million litre storage tank to meet the increasing demand for Jet A-1 fuel.
4) **Promotion of Kenya-Uganda Oil Pipeline project: -** The re-designing of the Kenya-Uganda Oil Pipeline to cater for the reverse flow concept, whereby the refined products at a later stage will be pumped back to Western Kenya, was re-tendered and negotiations are ongoing with best evaluated bidder. Negotiations are also on-going for the best evaluated bidder to develop the Kenya-Uganda oil pipeline project.
5) **Crude Oil Export Pipeline Development: -** Government has decided in principle to develop a crude oil export pipeline to the East African Coast. A related feasibility study was authorized and carried out by a potential investor, to develop a 22-inch diameter, 1300km crude oil export pipeline from Hoima via Lokichar to Lamu in Kenya, with a possibility of linking at Lokichar with another pipeline from South Sudan. Such a project involves the setting up of storage facilities at Lokichar and construction of a larger diameter (about 32 inches) pipeline from Lokichar to Lamu Port. To develop such critical infrastructure, a Public-Private Partnership development arrangement was recommended
6) **The Uganda-Rwanda Export Oil Pipeline Extension: -** The two Governments of Rwanda and Uganda signed a Memorandum of Understanding (MoU) to cooperate in the development of the project.
7) **Institutional Capacity Building: -** Training of officers is being undertaken in the filed of Masters of Science courses in pipeline engineering, Business administration, Economic Policy, Petroleum Law and Petroleum Engineering. Others officers will continue their post graduate training in the fields of Business Administration and information technology while others have been admitted for a M.Sc. in Pipeline Engineering and Environmental science respectively.
8) **Developing the Downstream National Policy: -** A consultant shall be procured to develop a downstream petroleum policy. The consultant accomplished the task by presenting a final report of this policy. One stakeholder's consultative workshop was held and it was agreed that more consultations will be held before the policy is adopted.
9) **Develop the National Petroleum Information System: -** Terms of reference for the procurement of a consultant to develop National Petroleum Information System (NPIS) have been developed and the

procurement process has commenced. NPIS is expected to ease momitoring and tracking of product volumes and sales once in place.

10) **Development of standards for petroleum products and facilities: -** The Government is in the process of developing the petroleum facility standards; so far eight (8) standards have been developed. Of these one standard 'specifications for construction, operation and maintenance of filling stations for handling (dispensing) of petroleum products and their derivatives' "DUS 947-1:2011" was gazetted. Five standards on calibration and onsite storage of petroleum products are ready for gazettement. Standards for the handling, storage, distribution and maintenance of Liquefied Petroleum Gas in domestic, commercial, and industrial installations DUS971-1 and 2 were also developed but awaiting a stakeholder workshop before gazettement by Uganda National Bureau of Standards.
11) **Monitoring and Enforcement of Standards: -** The Fuel Marking and Quality Control Programme progressed well is ongoing. The process of developing other standards is ongoing. The objective of this program includes supervision and monitoring the quality of petroleum products in the entire supply chain. Quality monitoring is done to ensure that petroleum products imported into the country meet the legal standards to offer consumer quality assurance and protection. It also ensures that product malpractices such as adulteration, contamination, dilution, smuggling, and dumping that may result into loss of Government revenue are minimized. Under this program, petroleum products are inspected, verified and marked at the border entry points. This is followed by field monitoring teams which carry out sampling and testing of fuel depots/bulk storage sites and retail stations.
12) **The Enforcement to compliancy with Petroleum Supply (General) Regulations (2009): -** This commenced in 2012 to check on petroleum operators that had not heeded to the requirements of the Petroleum Supply Act, 2013. These are operators that had neither been licensed or construction permits. Penalties range from sealing off stations for non-compliance and the offenders are made to pay fines and/or penalties to Government. As a result, the level of compliancy has continued to be generally positive in all the regions that are visited by the enforcement team.

(f) Analysis of Performance Gaps, Challenges and Risks in Downstream Petroleum Subsector

The following constraints have been identified as impediments to the performance of the Petroleum Supply, Regulation and Infrastructure Development:-

1) Use of an outdated manual National Petroleum Information System (NPIS). The current NPIS makes the analysis of data difficult and reports are not made in untimely manner. In order to manage petroleum supply data, there is need to develop a flexible data system to enable the analysis and reporting. The following is the minimum key information required for the NPIS programme to operate properly.

Table11: Minimum Information Required by the National Petroleum Information System

Downstream Activity	**Nature of Information and Data**
(a) Importations, exportation, processing and other transformation operations	(i) Monthly imports and exports by type of petroleum product received or dispatched, including the foreign ports of origin or destination, border crossing point into Uganda; (ii) Monthly production, consumption product losses and sales of the product; (iii) Monthly dead stock and maximum storage capacity owned or under contract by the licensee per product and location; (iv) Monthly average daily stock of petroleum products held by or on behalf of the licensee by type of petroleum product per month;

	(v) Quarterly estimated imports, exports or production by type of petroleum product per month; and (vi) Annual developments in new or improved installations, major rehabilitation or repairs and the respective plans for the following year;
(b) Wholesale and retail distributions, including industrial consumers	(i) Monthly sales, purchases and product losses per product by geographical region and economic sector; (ii) Monthly dead stock and maximum storage capacity owned or under contract by the licensee per product and location; (iii) Monthly average daily stock of petroleum products held by or under contract by licensee by product and location; (iv) Monthly average sales per product and region; and (v) Annual developments in new or improved installations, major rehabilitations or repairs and the respective plans for the following year.
(c) Transportation	(i) Monthly available transport unit capacities at the end of the month by, mode of transport, product and operating region; (ii) Monthly quantities transported by product, product losses, loading points and unloading points by region; and (iii) Annual developments in new or improved installations, major rehabilitations or repairs and the respective plans for the following year.

2) Inadequate regulations relating to Health, Safety and the Environment (HSE) of petroleum activities in the downstream subsector. Upholding the principle of human dignity and recognizing that safety takes precedence over all else, Government will strive to ensure safety through a coordinated and concerted effort and create a safe and comfortable working environment, free from disaster in the downstream operations. Government will promote achievement of zero occupational accidents in all petroleum operations, enforce laws and regulations that enable the prevention of environment pollution caused by petroleum activities and encourage petroleum entities to have a safe and comfortable workplace for people working in petroleum operations.

3) Inconsistent periodic fuel supply on the market leading to scarcity of Petroleum products and up surging of the product prices and the consequent inflationary tendencies in the general economy. It is vital that Government considers the development of strategies that deal with the eminent profiteering that results from the surging prices. Surging prices for fuel have the effect of raising the general level of goods (such as food) and services (transport). Policy may include better planning to monitor the fuel supply chain during emergency periods, strategic protection of necessary goods such as food and industrial raw-materials whose price tends to rise each time there is an inconsistent fuel supply episode, and strategically setting price ceilings for strategic products such as industrial raw materials.

(g) **Development Priorities and Core Projects in Downstream Petroleum Subsector**

1) **Development of National Petroleum Information System (NPIS) to Enhance Sector Monitoring: -** The NPIS should consist of an integrated and centralized information system using modern data processing technology. The proposed NPIS should cover the petroleum supply operations and installations, market activities and the country statistics as well as information reference data for the purposes of serving as a strategic tool for the government; and informing periodically the public about the status of the petroleum products' market.

2) **Development of Regulations Relating to Health, Safety and the Environment (HSE):** - The HSE regulations should aim at preventing accidents and damage to the environment and health of individuals in order to promote wellbeing at petroleum facilities. The effects of petroleum facilities operations on the external environment must be kept at an absolute minimum. The HSE regulations should also ensure the health and safety of petroleum products' consumers.

3) **Development and Restocking of Strategic Reserves:** - To ensure that the usually unreliable supply of petroleum products is done away with in the country, the Government will develop, refurbish and restock strategic fuel reserves and depots. The refurbishment of Jinja Storage Reserve is already complete and the facility will be used as a bonded warehouse to attract other oil marketing companies and the development of the 40 million litres Nakasongola Storage tank site is underway with and the draft contract is with the Solicitor General for Clearance. The Government is also considering re-developing other storage facilities in Mbale and Kasese.

4) **Construction of Inter-State Petroleum Products' Pipeline:** The Development process of inter-state pipeline infrastructure i.e. the Kenya-Uganda Oil Pipeline Project, the Uganda-Rwanda Oil Pipeline Extension and the Crude oil pipeline extension project to the East African Coast is underway. The government is to take up this project under the EPC arrangement to develop the section from Eldoret to Kampala and later from Kampala to Kigali. The proposed pipelines will ease the transportation of petroleum products and crude oil products.

5) **Capacity Building for Skilled Staff:** -Although Government has put emphasis in building the capacity of its staff; more staffs are required in the areas of business administration, Economic Policy, Petroleum Law and Petroleum Engineering among others. The available staffs are unable to monitor for compliance to standards of petroleum facilities in the country, and they thus require to be re-enforced with more specialized and skilled staffs.

2.4 Mineral Exploration Development, Production and Value Addition

2.4.1 Overview of the Geological Survey and Mines Subsector

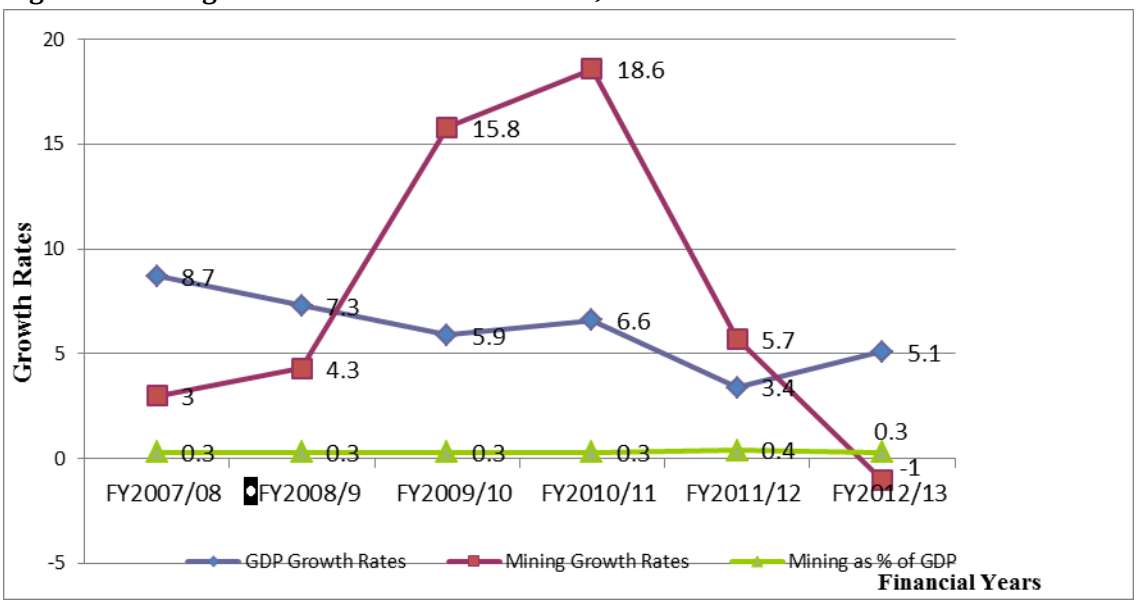
The mineral sector in Uganda provides great potential for wealth creation, employment, and security in the country. The Government Policy is to sustainably promote and develop national mineral resources as well as to protect the lives and livelihoods of people. Within the framework of the Vision 2040 the Ugandan government envisions the transformation of Uganda into a modern and prosperous country within the next 30 years.

The Government of Uganda's recent efforts to rejuvenate the mineral sector which had declined tremendously in the 1970's through to the 1990's due to political and economic instability has been able to bear some fruit. This is evident in increased investments in the sector, increased local participation (mostly in the artisanal and small scale sector), increased collections of Non-Tax Revenue (NTR), and new discoveries of mineral potential targets for exploration. The mining industry in Uganda reached peak levels in the 1950s and 1960s when the sector accounted for up to 30% of Uganda's export earnings.

However, political and economic instability rather than resource depletion in the 1970s saw the sector's contribution decline to less than 1% of the Gross Domestic Product (GDP). This triggered the need for sectoral reforms, which were initiated in 1987 where key constraints were identified, and intervention mechanisms established.Uganda has a favourable geological environment that hosts a wide range and a variety of minerals, which provide an opportunity to develop a strong mining industry.

The airborne geophysical surveys, geological mappings and geochemical sampling estimate over 27 types of minerals in significant commercial viable reserves. The mineral sector has a great potential of contributing to economic growth and poverty alleviation through mineral exports and employment generation. Since minerals are non-renewable resources, the potential for the minerals subsector to support sustainable economic development and poverty alleviation faces unique challenges while providing numerous opportunities. According to the background to the Budget (FY 2012/2013), growth in the mining subsector contracted by 1.0 percent in the FY2012/13, compared to a growth of 5.7 percent registered in FY 2011/12 Figure 6. The subsector's contribution to GDP is estimated at 0.3 percent in FY2012/2013.

Figure 6: Mining Sector Growth Rates Vs GDP, 2007/8-2012/13



Source: *GoU Background to the Budget 2012/2013*

Value added by the mining subsector at current prices increased from UGX 134 Billion in FY 2010/2011 to UGX 175 Billion in FY 2011/2012. The value added of the subsector was UGX 185 Billion in FY 2012/2013. During the same period, the value of mineral exports increased between 2010 and 2012 mainly driven by exports of gold and cement. In the last twenty years, the Government has put more emphasis to attract private investments in mineral resources exploration and development through the provision of geo-scientific information on minerals, and management of equitable and secure titles systems for the mining industry.

The gains made in the mineral sector notwithstanding, still faces a number of challenges emanating from inadequate funding to the Directorate responsible for Geological Surveys and Mines to enable it fulfil its mandate. The effect of this is shown in the increased number of non-performing licenses which are not

fully monitored, inability of the department to undertake independent assessment of mineral production, failure to fully appraise mining projects, failure for the country to fully reap benefits from mining since value addition has not been enforced, and environmental degradation by both exploration projects and mining operations.

2.4.2 Policy, Legal and Regulatory Framework

Mineral Policy 2001

The Mineral Policy of Uganda published in 2001 with a Vision to attract investment, build capacity for acquisition and utilisation of Geo-data and increase mineral production for social and economic development of Uganda. The Ugandan mineral policy sets out to provide conditions conducive to attract new investment for exploration and mining development, with the private sector providing the necessary management, technical and financial resources required. In collaboration with Commonwealth Secretariat Commission, the department has drafted a revised mineral policy of Uganda and prepared model mineral agreements. It will be useful for Government to implement and enforce these mineral agreements especially in respect with the small scale and informal mining activities.

Mineral Legislation

The mineral sector is governed under the Mining Act 2003 and the mining regulations of 2004. This was after repealing the Mining Act of 1964 that was the basic mining legislation in Uganda until changes in the international mining scene necessitated its revision with participation of relevant stakeholders, including mining-sector regulators, civil society, local government authorities, mining investors and academia resulting in the current Act. The Act has provisions on ownership of minerals, licensing, and royalty sharing.

Other Relevant Laws to the Mineral Sector

The other important laws in Uganda that affect mining and exploration, besides the Mining 2003 and the Mining Regulations 2004, include: The National Environment Act 2003; The Revised Land Act 1998; The Land Regulations Act 2004; Registration of Titles Act 2000; Contracts Act 2000; The Arbitration and Conciliation Act 2000, Water Act (2205), Forest and the Tree Planting Act (2004).Other relevant policies to the Minerals sector include Climate Change Policy (2013), Wetlands Policy (1995), Water Policy (2007), Environment Policy (1994), among others.

2.4.3 Institutional Framework

The Ministry of Energy and Mineral Development has the mandate of planning, development, management of the mineral resource in Uganda. Technically, the Directorate of Geological Survey and Mines (DGSM) is responsible for the technical issues related to the planning, development, and management of the mineral resource in Uganda. Since 1919, it has remained the lead Government agency technically responsible for the administration and management of the mineral sector. The DGSM's vision is to have in place a predictable, consistent and sustainable environment for Development of the mineral sector's legislation and to spearhead obligations and functions of the DGSM to realize the optimum socio economic returns. The mission is to promote and ensure rational and sustainable Development and utilization of mineral resources for socio-economic enhancement of the people of Uganda. The

Directorate has three (03) operational departments namely: Geology, Mines, and Geothermal. Specifically, the directorate has a mandate to:

a) Collect, collate, process, analyse, archive and disseminate geosciences data;
b) Monitor operators and enforce regulations in the sector; and
c) Develop and retain professionals capable of generating and utilizing the available geosciences data.

The objectives of the DGSM are:

a) To systematically collect, interpret, preserve and disseminate geological information that is required to maintain the national geoscience database;
b) To maintain a body of expertise that can use this data to advise the Government, the private sector and the general public;
c) To carry out geological investigations and promotional activities to attract investment in exploration and Development of mineral resources;
d) To carry out engineering geology investigations and monitor earthquakes and other related natural disasters such as landslides and volcanoes and advise the public on remedies;
e) To provide effective and reliable laboratory services in the mineral sector for institutional and public use; and
f) To administer the Mining Act and Regulations, and provide advisory services to miners on mining methods and environmental protection.

Others key actors in the Minerals Sector include:

a) The District Local Administration Authorities are responsible for receiving and forwarding applications for various mineral rights, arbitrating in compensation, resolution of disputes and granting of licenses, for those minerals not administered under the Mining Act and goldsmith licenses.
b) The National Environment Management Authority (NEMA), which is responsible for environmental quality and management e.g., through approving environmental impact assessments and environmental monitoring reports for mining projects, controlling /monitoring pollution, hazardous wastes, waste disposal, in co-ordination with mineral agencies.
c) Ministry of Water and Environment, which is responsible for water use, water quality, discharge of effluents and waste disposal.
d) Ministry of Gender, Labour and Social Development, which is responsible for Labour, Occupational Health and Safety, including handling of chemicals and hazardous wastes.
e) The Uganda Chamber of Mines, an umbrella association for all stakeholders in the mineral sector

2.4.4 Recent Mineral Sector Performance, FY 2010/2011 - FY 2012/2013

a) Mineral Exploration

In the minerals sector, airborne geophysical survey (magnetic, radiometric and electromagnetic) covering 80% of the country has been accomplished. Ground geological and geochecical mapping covering various areas has been done. Consequently,16 (sixteen) potential mineral targets for exploration and development from targets have been identified in the following locations: Iganga, West Nile, Moroto, South Eastern Uganda, Nigobya, Bukusu, Masindi, Buhweju, Pakwach, Kaiso, Mayuge, Kafunjo- Ntugamo, Makuutu,

Hoima, Kaliro and Aboke. In addition, increased exploration and new data led to discoveries of new iron ore occurrences and deposits in South West Uganda, in Buhara, Muyebe and Nyamiringa in Kabale; Nyamiyaga and Kazogo in Kisoro; and at Kinamiro in Kanungu district. Mineral exploration in Karuma in Kiryandongo district and in Lamwo district has led to the discovery of Nickel-Cobalt-Copper-Chromium and Platinum Group Minerals (PGM).

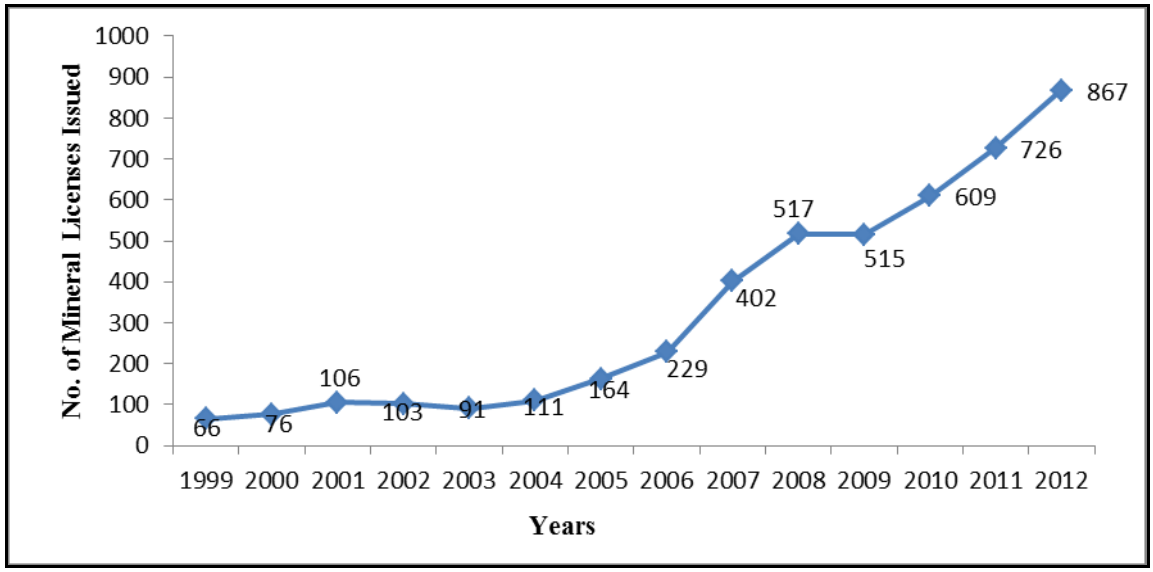
b) Mineral Development

Promotion of Iron and steel industry led to discoveries of new iron ore occurrences and deposits in southwest Uganda such as in Buhara, Muyebe and Nyamiringa in Kabale district; Nyamiyaga and Kazogo in Kisoro district; and at Kinamiro in Butogota, Kanungu district by exploration companies supported by the ministry staff. Significant production of iron ores by small-scale miners were registered in 2012 and sold to Hima Cement and Steel Rolling Mills Ltd. On the Sukulu Phosphate Development, a Memorandum of Understanding was signed with Guangzhou Dong Song Energy Group Co. Ltd to implement the project.

c) Inspections, Licensing and Monitoring of Exploration and Mining activities

Inspections and monitoring are usually undertaken in various districts of Uganda such as Mukono (gold), Jinja (copper smelter), Tororo, Busia (gold), Manafwa (vermiculite), Moroto (marble), Kamwenge (limestone), Kasese (limestone, copper, lime and salt), Kabale (wolfram), Mubende (gold).The number of licenses issued has steadily increased from 164 in 2005, 229 in 2006, 402 in 2007, 517 in 2008, 515 in 2009, 609 in 2010 and 726 in 2011. A total of 867 licences and certificates were operational as at 30th June 2013 (refer to figure 7). The licenses issued include, Prospecting Licenses (PL), Exploration Licenses (EL), Retention Licences (RL), Location Licenses (LL), Mining Leases, and Mineral Dealers' Licenses (MDL).

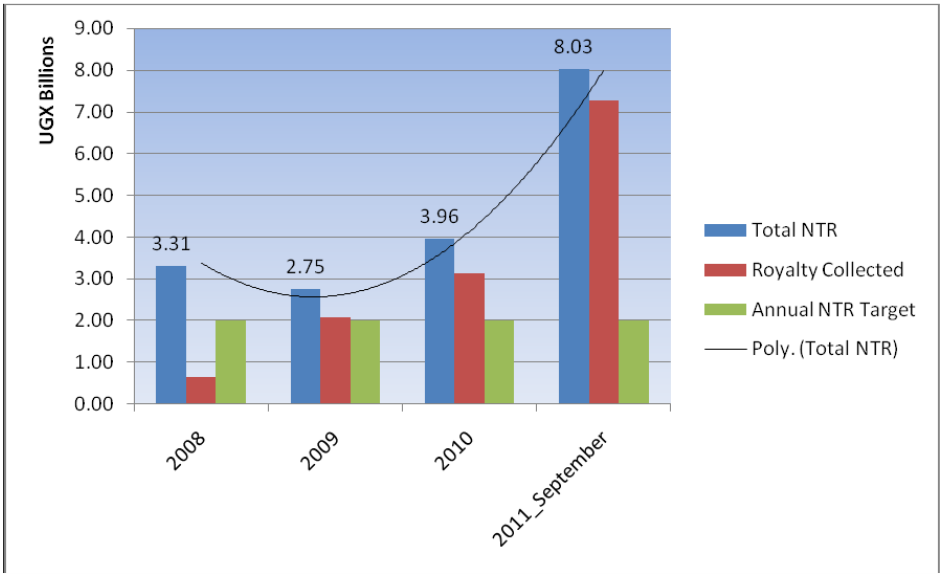
Figure 7: Licensing Status by the end of 2012



Source: *Sector Performance Report, FY 2007/8 - FY 2012/2013*

Assessed and collected Non-Tax Revenue (NTR) rose to the tune of UGX. 3.98 billion, which exceeded the target of UGX 3 billion by 32.8% in the FY 2012/13 (figure 8). From the FY 2009/2010 to 2012/13, the Government has been earning about UGX 3 billion annually from mineral fees, rent and royalty. This is because of the investment in geodata acquisition.

Figure 8: NTR Collections, FY 2010/2011



Source: *Energy and Mineral Sector Performance Report, 2008/2009-2010/2011*

The Government has already collected UGX 8.03 billion (Figure 8 above) and this is attributed to recovery of undeclared royalty arrears (UGX 3,845,835,308/=) from Kilembe Cobalt Company Limited (KCCL), for the period from 2004 – 2010 and the increased awareness of the public on the investment opportunities in the mineral sector. A summary of non-tax revenue collections for the period January – December 2012 are presented in the table 12 below.

Table 12: Non Tax Revenue Collections, January-December 2012

Details of NTR	Jan-March 2012	April-June 2012	Jul-Sept 2012	Oct-Dec 2012 (Q4 2012/13	Total Amount
Prospecting License fees	8,800,000	4,200,000	9,800,000	6,800,000	29,600,000
EL fees and Rents	238,856,000	121,320,000	203,010,000	192,948,000	756,134,000
Location Fees and rents	2,700,000	4,780,000	4,050,000	1,500,000	13,030,000
ML/SML Fees and rents	11,720,000	303,340,000	22,460,000	20,220,000	357,740,000
Mineral Dealers License fees	89,400,000	34,600,000	29,540,000	14,500,000	168,040,000
Royalties	766,231,048	1,466,938,114	948,492,918	343,203,858	3,524,865,938
Import Fees	180,710,764	127,847,013	0	0	308,557,777
Grand Total	**1,298,417,812**	**2,063,025,127**	**1,217,352,918**	**579,171,858**	**5,157,967,715**

Source: *MEMD Annual Report, 2012*

d) Mineral Production

Mineral Production in Uganda has declined in the recent past, partly due to a fluctuation of prices, increased production costs and changes in Government policies. In addition, there was no production of

minerals such as vermiculite as Rio Tinto; the company licensed to produce vermiculite was still reorganizing after buying the mine in 2007. In 2009, mineral production increased compared with 2008 due to increased production of limestone and pozzolanic materials to meet cement demand. Gold production declined as a consequence of non-production by Busitema Mining Company, which was locked in a conflict with artisanal miners in Busia.

Additionally, Kisita Gold Mining Company, which mines most of the gold in the country was not operational most of the year, also lost Gold Location Licenses (LLs), , and reported very low production. Production of cobalt reduced because of low prices in international markets. In 2010, wolfram production increased in response to surging prices to US$260/t compared with US$60/t in the previous year. Gold production fell in 2011 as companies undertook mineral exploration activities, while output was also low from the artisanal and small-scale miners. On the other hand, limestone output notably increased during 2011 (up to 930,000t) in comparison to the earlier levels (Table 13).

Table 13: Mineral Production in Uganda ('000 tonnes), 2008-2012

Mineral Type	Average Price per Tonne in 10^3 UGX, 2011	Production in Tonnes				Average Value in 10^3 UGX		
		CY2009	CY2010	CY2011	CY2012	CY2009	CY010	CY2011
Limestone	120	588,944.71	634,673.48	932,348.22	936,263.66	70,673,365	76,160,818	111,881,786
Pozzolanic Materials	21	440,292.49	446,315.90	690,910.62	650,323.76	9,372,634	9,372,634	14,509,123
Vermiculite	579	-	1,121.47	7,960.42	51,961.80	-	649,331.13	4,609,083
Colombite/Tantalite		50	10					
Cobalt**	64,815	389.16	568.24	673.07	555.8	16,941,433	33,968,655	43,624,952
Gold(kg)*	117,291	-	0.0039	0	0.00	-	324.159586	57
Coltan (30% purity)	28,413	0.05	0.009	0.01	0.00	8,003.00	257	256
Tin (75% Purity)	34,034	0.04	32	0.01	0.00	883	1,089,088	309
Gypsum		-				-		
Manganese (Above 46% Mn)	3,037		10			-	30,370	
Lead (Galena)		-				-		
Wolfram	34,575	8.83	55.17	10.04	43.4	185,409.00	1,907,330	347,237
Kaolin	100	4,721.34	27,236.75	20,883.32	42,886.46	472,134.00	2,723,675	2,088,332
Iron Ore	271.2926	971.95	3,794.74	2,133.82		68,037.00	265,632	578,890
Synetic aggregates	1.5	14,026.87	14,337.55	9,764.98		21,040.00	21,506	14,647
Total						**97,742,938**	**126,189,620**	**177,654,672**

Source: *Ministry of Energy and Mineral Development Annual reports 2008, 2009, 2010, 2011, 2012.*

*Average price of gold on LME and average URA monthly fixed exchange rates were used to compute the average value of gold (and other minerals) over the year.

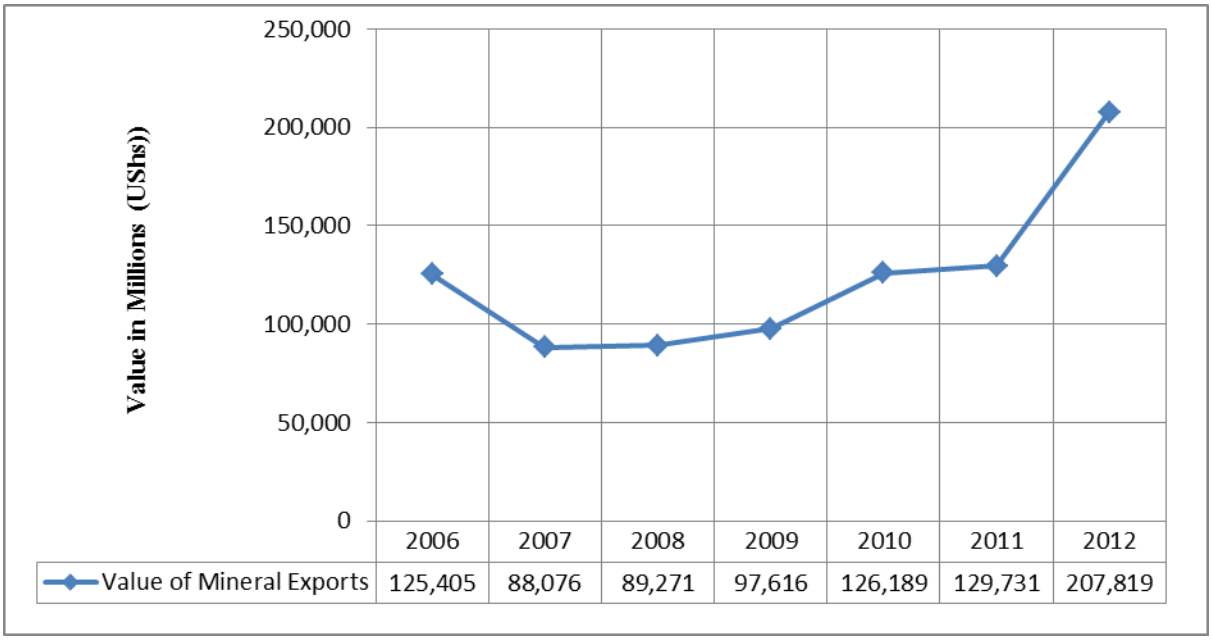
**Cobalt prices have been on the low for a long time subsequently resulting in a slump in processing activity at KCCL. However, the figures improved significantly in 2010

e) Mineral Exports

Over the past ten years the value of Uganda's mineral industry has grown strongly achieving average annual growth of 5 percent. In 2007, the value of mineral exports dropped from the previous year due to the drastic drop of vermiculite exports, which subsequently led to the eventual transfer of the mineral right to M/S Rio Tinto Exploration. The closure of both the Busitema gold mine and Kitaka lead-gold mine in the same year contributed to the low export value. In 2008, there was decline in mineral production due to the persistent low price of vermiculite. However, the value of mineral exports increased as cobalt prices picked up, resulting in the export of some stockpiled material. The year 2009 showed

very low mineral production, but because of re-exporting the imported gold, the revenues were very high compared with those of the previous year. In 2010, the wolfram price increased to US$260/t compared to US$60/t in the previous year. The industry performed relatively well between 2010/2011 and 2012/2013. Despite being dominated by mineral exploration activities and artisanal and small-scale mining practices, which largely represent lost production and revenue. The increasing trend of the value of reported production is shown in Figure 9.

Figure 9: Value of Formal Mineral Production, 2008-2012



Source: *Energy and Mineral Sector Performance Report, 2008/2009-2010/2011*

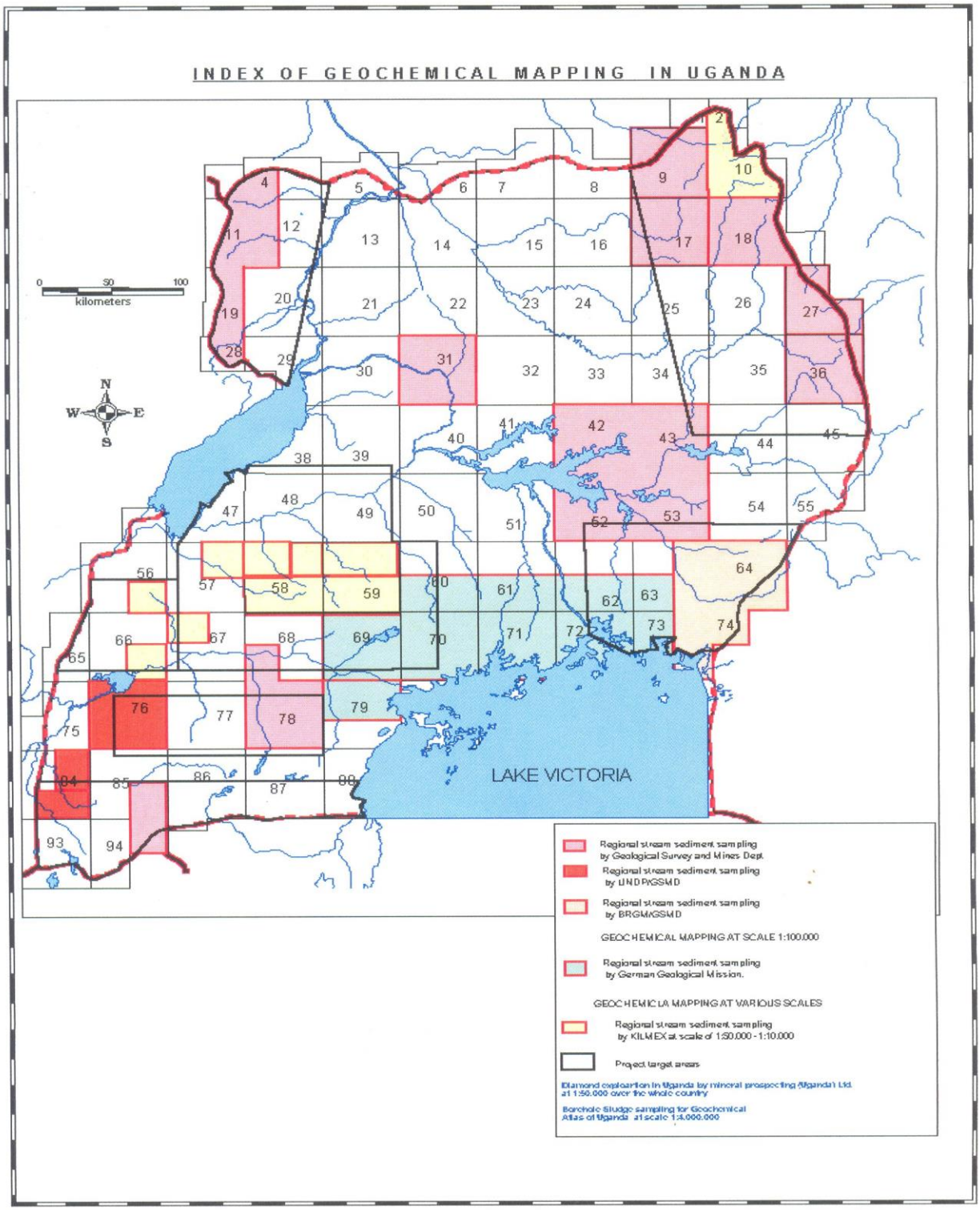
Mineral commodities, which included; limestone, pozzolana, gold, vermiculite, cobalt, wolfram, aggregates, kaolin, and iron ore worth UGX 207,819,297,000 (Uganda Shillings Two Hundred Seven Billion, Eight Hundred and Nineteen Million, and Two Hundred and Ninety Seven Thousand) were produced in the country in 2012/2013 compared to UGX 129,731,501,000 (Uganda shillings One hundred twenty nine billion, seven hundred and thirty one million, five hundred and one thousand shillings in 2010/2011. Mineral commodities, which included cobalt, copper, gold, manganese ore, quartz, silver, tin, tungsten and vermiculite worth UGX 69.9 billion were exported during 2012/2013 while gold worth UGX 31.5 billion was imported during FY 2012/2013.

2.4.5 Analysis of the Progress and achievements in policy Implementation for the period 2010/11-2012/13

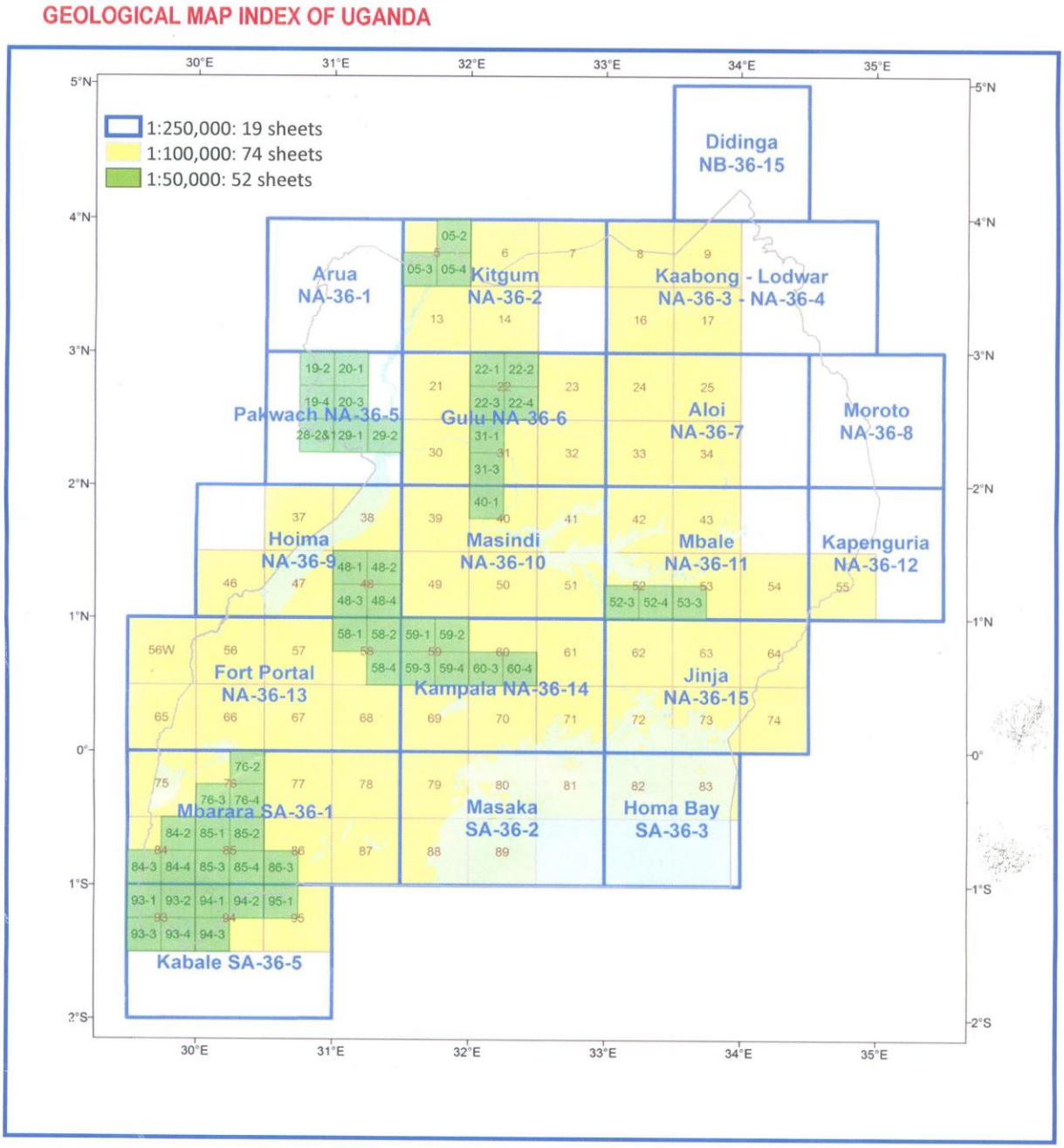
a) Geological Mapping and Geophysical Surveys

The ministry carried out detailed geological mapping covering 80% of the country to establish the mineral potential of the country, mineral location, and operational mines. Geological surveys involved the collection of high quality magnetic, radiometric, and electromagnetic mineral data which is then disseminated to potential investors for detailed exploration and development of mines.

Map 1: Geochemical Index Mapping of Uganda



Map 2: Geological Map Index of Uganda



(a) Detailed geological and geochemical survey of 16 mineral targets and sheet 63/3 (Busesa), sheet 62/2 (Namwendwa).

Base maps at 1:50,000 were produced showing boundaries for interpreted lithological units. The review identified anomalous areas associated with the gabbro and as a result, detailed grounds follow up to establish their mineral potential was planned based on geology, geophysics and geochemistry as follows:

1) Two hundred and ten (210) geological observation points for each sheet;
2) Fifty (50) rock samples to be collected per sheet for petrographic and microscopic study;

3) One hundred (100) stream sediment samples;
4) Detailed soil geochemistry on grid of 100m x 50m over an area of 800m by 250m with prominent structures and lineaments that would result in 75 geochemical sampling points per sheet.
5) Ground geophysical surveys; as follows:
   b) Magnetic and radiometric surveys to be recorded for every geological observation point that would result in three hundred (300) geophysical sampling points per sheet per method;
   c) Gravity and resistivity/induced polarization surveys for five (5) survey lines totalling 114 line kilometres at sampling intervals of 100 metres for gravity and Pole-Dipole array with 25 meter electrode spacing for resistivity survey on sheet 63/3 (Busesa); and
   d) Magnetics and gravity survey of 5 lines totalling 122 line kilometres at sampling intervals 100 meters for magnetics & gravity was planned for sheet 62/2 (Namwendwa).

(b) Carrying out detailed ground geophysical survey of five (5) exploration sites out of sixteen (16) mineral targets identified under the Strategic Management of Minerals Resources Project (SMMRP)

Literature review was carried out on five mineral potential targets, namely: Karuma Ni-PGE prospect, Kafunjo Nickel Prospect, Makuutu radiometric anomaly, Mashonga gold prospect and the Bukusu carbonatite complex. The review indicated the following:

1) Strong magnetic anomaly with nickel grades of 700 – 860 ppm at Karuma prospect;
2) High magnetic and dense ultramafic/mafic body with probable nickel-cobalt sulphide deposits that are considered to be of a similar type as the Kabanga-type in Tanzania are interpreted to underlay the Kafunjo prospect;
3) Radioactive anomaly averages 24 kms in length and 1.7 kms in width with apparently discontinuous bodies of uranium anomalies surrounded by areas of thorium anomalies at Makuutu;
4) Gold bearing gravels are found to lie on schist of Igara series at Mashonga and also granite-gold is indicated to be shed from quartz vein in the Karagwe-Ankolean rocks of Buhweju escarpment; and
5) Bukusu carbonantite complex is a highly magnetic and dense anomaly and a potential source of apatite, magnetite and Rare Earths Elements (REE).

The government had planned to undertake a follow up of the above prospects using a wide range of geophysical techniques ranging from magnetics, gravity, gamma rays, and spectrometry and resistivity/induced polarization. However, due to financial constraints, no ground follow up was undertaken.

(c) Carrying out geological mapping of two (2) geo-sites in Kabarole and Nyero paintings in Kumi

Literature review of Nyero paintings in Kumi District, Eastern Uganda was carried out. The review revealed the following;

a) The geo-site consists of three rock shelters of Precambrian granitic rocks formed by slumping of granite blocks from a joint.
b) Campsites have been established on the beautiful sceneries of both Nyero and Mukongoro sites and can be developed further for picnics, overnight visitor activities and are potential spots for bird viewing.

Literature review of the geosite at Nyakasura in Kabarole District, Western Uganda was carried out. The stalactites are locally known as "Amabere ga Nyinamwiru" literally translated as "Breasts of mother of Mwiru". This cultural site is locally recognized but is not yet nationally gazetted.

(d) Geothermal Resource Survey: Implementation of the Uganda Geothermal Development Project (1199)

Ground geophysical surveys were undertaken in Panyimur, Buranga, and Kibiro. In these areas, interesting anomalies were detected and new surface manifestations of geothermal activity were discovered. Processing, analysis, and interpretation of geological, geochemical and geophysical data were undertaken in Panyimur, Buranga, Katwe-Kikorongo, and Kibiro followed by an environmental baseline study. In Panyimur, new surface manifestations with low magnetic surface revealed widespread geothermal sources. In Buranga, surface manifestations revealed a geothermal system that is larger than previously known. In Kibiro, geophysical surveys confirmed low magnetic signature which is part of the Kibiro geothermal system. The geothermal potential of Katwe-Kikorongo is not yet established.

(e) Carry out airborne geophysical surveys and geological mapping of the Karamoja Region.

The ministry conducted a review of previous geochemical work for Karamoja region (1996-1998). This review covered geochemical work related stream sediment sampling, soil sampling, and trenching and targeted gold mineralisation. The results of this exercise were the identification of gold exploration targets. Karamoja region was not surveyed due to insecurity in the region. Government has now embarked on carrying out airborne geophysical surveys and geological mapping of the region. It has started with conducting sensitization and consultative workshops targeting the local communities and all stakeholders in the mineral sector. The sensitization has created awareness about the project and also established a security framework for geological survey activities in Karamoja Region. The outputs under this strategy are as follows:

1) Established a security framework in Moroto, Napak and Kotido Districts through collaboration with the Ministries of Defence, Internal Affairs and security agencies;
2) Disseminated over fifty (50) copies of Mineral Policy 2001, Mining Act 2003 and Regulations 2004 in Karamoja Region. Training manuals on Small-scale Mining Handbook were disseminated to Natural Resources Officers of Moroto, Napak, Nakapiripirit and Amudat Districts;
3) Undertook mining inspections in Rogom in Abim District and mining operations of M/S Great Lakes Cement Ltd., M/S African Minerals, M/S MCB Resources Ltd., and M/S DAO marbles in Moroto District;
4) Appraised the iron ore prospect in Tororo, Karamoja Region and disseminated information to potential investors;
5) Sensitized the local communities during community dialogue sessions in Katikekile, Nakibat, Nadunget, North Division in Napak District at Kangole Boys Primary School and Morulem sub-county headquarters on the airborne geophysical surveys and geological mapping;
6) Sensitized M/S Dao Marble Limited about their mining activities and advised them to apply for a mining lease;
7) Conducted training workshops for GSMD staff at Entebbe on Mineral Resources, Value Addition and Rare Earth Element (REE) potential of Karamoja;
8) Promoted the mineral resources potential of Karamoja Region during the Mining Indaba Convention in Cape Town, South Africa;
9) Presented and submitted technical and financial proposals for the airborne geophysical surveys to potential Development partners to finance the funding gap of the project. Technical and financial

proposals were submitted to World Bank, Ministry of Finance, Sector Working Group and the Counsel of Abu Dhabi;
10) Confirmed allocation of two (2) plots in Moroto for Karamoja Regional Office;
11) Carried out policy & regulatory review through consultations with communities in Karamoja where a number of sectoral issues were generated;
12) Reviewed airborne magnetic, radiometric data (Huntings Surveys of 1961), regional geological and geochemical stream sediments data (M/S Branch Energy Limited (1996 -1998)); and
13) Trained mining communities on health and safety, mining best practices to improve livelihood through mining and disseminated 50 manuals.

(f) Geo-hazards survey-Earth Monitoring

Earthquake occurrence in Uganda is associated with East African Rift Valley System (EARS) and is currently monitored using stations at Kilembe, Hoima, Entebbe, and Kyahi near Mbarara. Earthquake data is compiled into annual bulletins and maps for public information and use. Two stations were constructed at Butologo (Mubende) and Nakawuka (Wakiso) in order to improve network coverage. The earthquake monitoring unit received an assortment of monitoring equipment that will be used to overhaul or upgrade Kyahi Seismographic Station in Mbarara. The government is looking at refurbishing earthquake research facility and extension of network coverage in earthquake prone zones in the country.

(g) Capacity Building involved the following activities:

In a bid to enhance the efficiency and productivity of the mineral sector, concerted effort has been invested in promoting capacity building of staff. Capacity building resulted into the following:

1) Built Capacity of Staff in the geosciences and this resulted in 3 PhDs, 20 MSc, Diplomas and Certificates in various fields).
2) Twelve (12) members of staff were trained in geothermal data management and project management in Nairobi, Kenya.
3) Two members of staff attended training on Enhancement of Planning Capacity for Geothermal Energy Development in Fukouka, Japan in July 2012.
4) A member participated in the Inter-Governmental Forum on Mining, Metals, Minerals and Sustainable Development (IGF) meeting in Geneva, Switzerland held in October 2012.
5) Two (2) members of staff attended training on Uranium Mining, Milling and Regulation in Namibia and China during November 2012.
6) Three (3) members of staff participated in African Women in Mining and Development Study tour to South Africa and Australia during November, 2012.
7) One staff member continued with her Post-Graduate Diploma in Public Administration and Management at Uganda Management Institute (UMI).
8) Two members of staff continued with the Masters programme in Australia.
9) Two members of staff continued with PhD programmes in Canada and the United States of America.

(h) Integration of ICT and Mineral Information Access and Management

1) The integration of ICT in geoscience data management created a modern documentation system now hosting a website www.uganda-mining.go.ug put in place.

2) Mining Cadastre and Registry System (MC&RS) to enhance transparency in licensing was established. A web based portal on www.flexicadastre.com/uganda to get access to mineral rights information on a GIS interface was set up.
3) Geological and Mineral Information System (GMIS) to host geological, mineral, environmental, seismological and laboratory data is in place.
4) Integration and access of spatial data produced by various sections is now possible thereby enabling quick and easy access to spatial data on Geographic Information System (GIS) platform to attract investments in the sector.

2.4.6 Mineral Subsector Performance Gaps, Risks and Challenges, 2010/11-2012/13

The following are the performance gaps, risks, and challenges for the mineral exploration, Development, production, and value addition subsector:

(a) Inadequate establishment of the country's mineral wealth

Government has completed geological, geophysical, and geochemical mapping for 80% of Uganda. There is need however to reach 100% geological, geophysical, and geochemical mapping of Uganda. Acquisition of extensive geo-scientific data and development of information largely comprises of airborne geophysical surveys, geological mapping, geochemical surveys and mineral resource assessments. Airborne geophysical surveys, one of the initial activities commenced in 2006 and cover of approximately 80% of Uganda's land surface are complete. There is thus a need to complete the remaining 20% mapping and surveying of the country. The quantification of mineral reserves and mapping of base metals, special metals precious metals carbonetites, carbonates pegmatite minerals and industrial minerals are also incomplete.

(b) Infrastructural Challenges

Infrastructure such as electricity, rail, water and roads in mining areas are under-developed. In turn this makes the development costs high for the private mineral investors. For example investors have attempted to set up mineral processing plants (such as cement plants) in districts such as Tororo where the infrastructure is better and opted to fetch raw materials from districts such as Karamoja region where the infrastructure to support mining activities is underdeveloped. It is vital that while Government invests in infrastructure developed, such investments should be planned to extend or networked to pass through mineral rich areas in order to encourage and attract investors to such areas.

(c) Land tenure system

The current land tenure system makes it difficult for the investors to acquire ownership to the mineral prospective lands. In some parts of the country, land is owned communally and this hampers the development of the mining industry. One of the difficult issues confronting the mining sector has to do with the payment of compensation for land acquired for mining activities. Presently, there is no policy on compensation processes for crops, property and land in mining areas. In some cases, the determination of what represents fair, adequate and prompt compensation packages becomes a thorny issue, as there are no clear-cut determinants. A direct effect of this vacuum is the perception that mining companies exploit their host communities by not paying appropriate compensation for their crops and structures.Whilst beneficiaries generally complain about the inadequacy of these compensation packages, some members of the communities engage in speculative activities in order to secure compensation. The speculative activities include planting of crops and trees 'overnight' as well as erecting structures on parts of the already licensed mining areas for compensation purposes.

(d) Small scale and Informal Mining

Small scale and Informal Mining in areas such as Mubende and Karamoja region, where extensive and to easy-to-exploit gold deposits exist, offers challenges of large settlements which are neither controlled nor regulated and often may lead to loss of revenue to the government. It also leads to poor management of mining rights, which tend to overlap with indigenous land rights, along with environmental pollution, emerging social conflicts and the onset of many other illegal activities. It is vital that this complex challenge is adequately assessed and solutions identified which enable linking these small-scale miners into the mining value chain. Key lessons from Latin America and elsewhere in the world that may provide a solution to the challenges of small scale and informal mining include:

(i) Government to ensure that these small scale miners are included in the mineral value chain and provided with oversight and regulation such that they are formed into fewer actors where most of the rent is generated.

(ii) Improvement of the environmental performance of small scale mining to involve an integral approach that addresses technical, social, economic, legal, and organizational aspects.

(iii) In dealing with small-scale miners, media can play a key role in exposing corruption and pressuring government to take action against any pervasive aspect of small-scale mining.

(iv) Cooperative schemes opportunities between formal mining firms and small-scale miners can be an effective tool to prevent conflicts and reduce environmental impacts.

(e) Mineral Resources value addition

The mineral obtained by mining is referred to as a raw material. The physical changes such as reducing the size, milling and concentrating brought about without altering the chemical nature is referred to as upgrading/smelting the minerals to finished products. The price of the basic mineral could be increased by subjecting it to a value addition process. It is possible to gain many advantages by value addition to minerals. Some of them are as follows:

(i) It is possible to export the value added product at a higher price than the raw material;
(ii) Development of technological knowledge in the country;
(iii) Creation of a competitive market and by increasing the demand for finished products;
(iv) Creation of new industries thereby generating more employment avenues.

While Uganda is making good progress in terms of understanding its mineral resource potential, with 80% of the country geo surveyed and mapped, it has a long way with dealing with the following challenges:

(i) Understanding the full mineral utilization potential;
(ii) Identifying and promoting value addition;
(iii) Developing a mineral value chain with its economic linkages; and
(iv) Developing a mineral analysis and laboratory infrastructure to support mineral utilization, value addition, the value chain activities and the associated economic linkages.

(f) Underdeveloped Geothermal Energy Resources

Uganda is endowed with potential geothermal resources located in over 20 geothermal centres in the country with surface temperature indicators subsurface heat sources, which have to be mapped to establish geothermal reservoirs for drilling to generate electricity from steam but lacks the policy, legal and regulatory

framework for geothermal resources. Geothermal energy presents a clean and more environmentally friendly alternative to traditional fuels. Geothermal energy has the potential to provide long-term, secure base-load energy and greenhouse gas (GHG) emissions reductions. Uganda lacks policy, legal and regulatory framework for geothermal resources. In addition, geothermal development is constrained by inadequate resources to procure deep subsurface and surface exploration equipment. The lack of adequate financial resources continues to limit the development of geothermal energy resources.

(i) Earthquake disaster management infrastructure

Given the rate of urbanization and construction of high-rise building there is needed to enhance compliance of buildings and infrastructure models to withstand simulations and similar characteristic in reference to earthquakes. Also the increased mining activity, which includes drilling for oil and gas, requires that the country strengthen its capacity for earthquake disaster management. Government in the medium term needs to full revamp the earthquake monitoring activity in order to support the new exploration and development activity in Petroleum and other minerals; and the construction industry.

(j) Shortage of mineral data management infrastructure

The country lacks data recovery master plan in case of any disaster. The mineral data management infrastructure is meant to put up mechanisms and systems to ensure that mineral wealth data and information is safe and available at all times for sustainable planning and development. Without careful and effective data management, data disorder becomes a norm impacting its quality and availability, which has a negative impact on both the productivity and ultimate profitability of the mining industry. The Government should set up a centralized data management system. Such a system can easily be backed up, restored and managed – with reliable support for synchronization, and a scalable approach to identifying and searching for data. This single source of trusted information must be complimented by a robust method for secure, responsive remote access, including via internet. Because many mine sites lack a sophisticated technology infrastructure, a complex data management solution would not be a viable option at the moment.

(k) Limited Human Resource Development

The mining sector in Uganda is characterised by acute shortage of skilled personnel and retention of skilled labour. In addition, the sector is faced with a challenge of a high proportional of small scale artisanal miners who use indigenous and poor mining techniques. It is already apparent that training and retaining high skilled labour is critical to increasing the productivity of the mining sector. High employment turnover is a result of low remuneration.

(l) Compliance with environmental standards and requirements

Mining activities are regulated to comply with environmental management standards and requirements during mining, minerals processing, disposal of mining wastes, handling and disposals of chemical, pollution control and environmental restoration of mined areas. This is a big challenge due to remoteness and isolated nature of mining activities that renders enforcement of environmental regulations or monitoring compliance cumbersome.

2.4.7 Core Development Priorities

(1) Establish the Mineral Wealth of Uganda

Acquisition of extensive geoscientific data and development of information largely comprises of airborne geophysical surveys, geological mapping, geochemical surveys and mineral resource assessments. Airborne geophysical surveys, one of the initial activities commenced in 2006 and covered approximately 80% of Uganda's land surface. There is need to complete the geological surveys and mapping of the country (20%). The quantification of mineral reserves and mapping of base metals, special metals precious metals carbonetites, carbonates pegmatite minerals and industrial minerals are also incomplete.

(2) Mineral resources value addition

The country has insufficient mineral analysis laboratory infrastructure to support value addition. Value addition comes with benefits derived from mining, processing and assembly, and it encompasses the multiplier effect of those industries that benefit the service and supply industry, i.e., construction, energy, engineering and environmental services, equipment parts and supplies, financial and legal expertise, etc. Value addition increases the activities associated with further processing and its related spin-offs such as employment creation. The country would gain greater economic benefit from analysis and assessment of the mineral content; pricing and revenue collection. Standing out among the benefits of value addition to Uganda's mineral resources is huge savings in foreign exchange which could have been spent on imports of products which could then be locally produced.

(3) Earthquake disaster management infrastructure

There is need to renovate the earthquake research facility and equip it fully with modern earthquake monitoring equipment.

(4) Mainstream Artisanal and Small Scale Miners

Artisanal and small-scale mining activities are becoming an environmental disaster. For instance the artisanal limestone makers can cause great loss of forest cover as a source of energy. The use of mercury in gold mining may contaminate the fresh water sources and the source of the livelihood hence long-term ill health in mining communities. Some mining methods such as open cast mining without ensuring corporate environmental social responsibility for restoration of the land cover may too grossly destroy land vegetation cover. The national action is therefore to strengthen regulatory legal and framework for environmental sustainability and formalization of ASM into the mainstream mineral value chain and the economy. These artisans can also be organized into groups, empowered and provided with licenses to operate. This will make it easier for the government to acquire rent and royalties from their activities.

(5) Develop Geothermal Energy Resources

Geological mapping and surveys of Panyimur, Buranga, Katwe-Kikorongo, and Kibiro have shown that Uganda has huge potential of geothermal energy resources. Geothermal energy presents a clean and more environmentally friendly alternative to traditional fuels. In addition, geothermal energy has the potential to provide long-term, secure base-load energy and greenhouse gas (GHG) emissions reductions. Geothermal development is constrained by inadequate resources to procure deep subsurface and surface exploration equipment. The lack of adequate financial resources continues to limit the Development of geothermal energy development and Uganda. The government should continue with geothermal

explorations and development in Kibiro, Katwe, Buranga, Panyimur, and other potential geothermal areas.

(6) Skilling and Tooling Human Resource

The mining sector in Uganda is characterised by high skilled labour shortages and low remuneration. Providing high skilled labour with competitive salaries would be key to retaining their services.An integrated, holistic mining industry skills strategy is required to meet industry's needs concerning workforce management and development, skilling and tooling the human resource by ensuring that:

i) Mining Industry employees have the appropriate knowledge and skills to carry out their work efficiently and safely;
ii) Promotion of career opportunities to encourage the Development of a future workforce;
iii) Accessibility of training opportunities to the greatest talent pool available to provide companies with choice when recruiting;
iv) Consistency in training quality and content to ensure a safe, efficient and mobile workforce;
v) Opportunities for the provision and recognition of training for employee Development throughout a mining career.

(7) Establish mineral data management infrastructure

Mineral data management infrastructure is meant to put up mechanisms and systems to ensure that mineral wealth data and information is safe and available at all times for sustainable planning and Development. The government should put sufficient data recovery equipment in place which includes: computers, solar powered backup system, data virtual recovery sites and disaster recovery sites, and installation of fibre cable for mineral dressing labs, seismology unit, petrology laboratory and geophysical unit among others.

(8) Land tenure system

The current land tenure system makes it difficult for the investors to acquire ownership to the mineral prospective lands. Communal land ownership limits the development of the mining industry and compensation of land (i.e. how much, adequacy and fairness, and timely payment etc.). In order to address this challenge, the government should develop an effective communication strategy and guidelines regarding land acquisition for mining activities.

Other Development Priorities include:

a) Iron Ore

Government conducted airborne geophysical surveys (IP/resistivity and magnetic) under UNDP in 1994. Later 19 holes totalling 669m over Butare were drilled; airborne geophysical and geological mapping carried under the SMMRP revealed more iron ore potential. In 2013,an additional nine (9) holes were drilled in Buhara totalling 684m. The amount of iron ore reserves is estimated at more than two hundred (200) million tonnes.A feasibility study was carried out to establish a sponge iron processing plant using hematite as the main raw material and coal from Tanzania as a reducing agent. By using coal, the study established that to process 92 thousand tonnes of iron ore would require 70 thousand tonnes of coal. This was found not to be economically feasible. Government should carry out a feasibility study using methane gas from the Albertine Graben and Lake Kivu in Rwanda to process Uganda's Iron ore.

b) Phosphates

Apatite is the main commercial ore of phosphate known in Uganda. The most important occurrences are associated with carbonetites, the two largest being at Sukulu and Bukusu. Weathering of the carbonetites has resulted in the residual concentration of apatite, magnetite, vermiculite, pyrochlore, barite, and zircon and rare earth elements.The total resource in three valleys at Sukulu is estimated at over 230 million tons, with still further large resources under the laterite mantle. The apatite content is variable, averaging 13.1% P_2O_5 and can be beneficiated to yield a product containing 40- 42% P_2O_5. Sukulu Mines Ltd mined the deposit with a 25,000 tons/year single super-phosphate fertilizer plant at Tororo from 1964 to 1978. In mining, beneficiation is a variety of processes whereby extracted ore from mining is separated into mineral and gangue, the former suitable for further processing or direct use. Based on this definition, the term has occasionally been used metaphorically for the economic development and corporate social responsibility to describe the proportion of the value derived from asset exploitation, which stays 'in country' and benefits local communities.

For example, in the diamond industry, the beneficiation imperative argues that cutting and polishing processes within the diamond value chain should be conducted in-country to maximize the local economic contribution. Similarly for phosphate, it is vital that a great proportion of its value chain processes are conducted in the country to ensure that there is maximum benefit to the Country.

Busumbu Ridge though a smaller deposit, contains the richest concentration of phosphates in Bukusu. The bulk of the deposit consists of soft apatite-bearing soil, varying from 3- 25% P_2O_5 O5. A resource of 8.5 million tons averaging 13% P_2O_5 has been established. The government of Uganda through a public-private partnership should carry out feasibility studies so as to achieve maximum and comprehensive evaluation of iron ore and phosphates.

2.5 Crosscutting Issues

2.5.1 Introduction

This section reviews major cross-cutting issues that impact and/or are impacted upon by developments in the energy and mineral sector. In addition to the supporting services, which support the growth and development of the ministry such as finance management, supplies, facilities management and welfare, human resource management, and global partnerships, the environment, gender, and citizen engagement and participation are important cross cutting issues for consideration.

2.5.2 Environment

Environmental management in Uganda is aimed at achieving national objectives and directive principles of State Policy, that promote sustainable development and public awareness of the need to manage land, air, and water resources in a balanced and sustainable manner for the present and future generations as enshrined in The 1995 Constitution of the Republic of Uganda.However, long-term sustainable growth, employment and prosperity cannot be achieved without sustainable utilization of the environment and natural resources including biomass energy. The NDP highlights challenges of poor compliance with environmental policies, laws and regulations to address degradation of environment and natural resources and weak policy and legal framework for mainstreaming of climate change into development plans at all levels. The National State of Environment Report (2008) highlighted that biomass energy constitutes over 90% of national energy sources but the biomass sub sector has not benefited from research, development

funding and technology transfer. Most of the basic needs of cooking and water heating in rural and most urban households, institutions and commerce are derived from wood, with the annual consumption of wood in the country estimated to be about 25 million tons (or about 1.1 tons per capita), out of which about 4 million tons is consumed as charcoal. The contribution of firewood and charcoal to Uganda's GDP is estimated to be Uganda Shs. 120 billion and 67 billion respectively.

Oil and Gas exploitation and production activities have the potential for a variety of negative impacts on the environment. They induce, economic, social; and cultural changes through alteration in land use patterns, local population levels, social economic, and cultural systems. They also result into increases aqueous and gaseous waste streams which may affect plant and animal communities due to changes in their environment through variations in water, air and soil/ sediment quality and through disturbance by noise, extraneous light and changes in vegetation cover. These negative impacts need to be mitigated and addressed to ensure ecosystem integrity.

Oil exploration and development environment issues are largely regulated through the National Environment Act and the other related regulations that prohibit degradation of the natural environment (Water, Air and Land), and promotes the protection of biological diversity. Specific petroleum laws, guidelines and policies that enforce/ provide for detailed requirements for environment pollution control are however inadequate and the existing legal framework (policies, laws and regulations) in other sectors need to be updated as well.

In many cases, human capacity and technical infrastructure in government agencies is inadequate to handle upstream and downstream oil and gas impacts on the environment. In addition there is insufficient knowledge about the environment and possible environmental impacts of oil and gas exploration in the potential oil and gas areas. This calls for integrating environmental safeguards in all stages of exploration, Development and production, including Strategic Environmental Assessment (SEA), oil spill contingency planning and stakeholder sensitization.

In addressing environmental issues, climate change should specifically be addressed. Indeed, Uganda's five year National Development Plan already recognises that addressing the challenges of climate change is key to enhancing sustainable economic and social development. The National Climate Change Policy and Costed Implementation strategy is an important step towards the operationalization of addressing the climate change challenge. This policy aims to ensure a harmonised and coordinated approach towards a climate-resilient and low-carbon development path for sustainable development in Uganda. In order to achieve that, all stakeholders should address climate change impacts and theirs cases through appropriate measures, while promoting sustainable development and a green economy. This policy provides strategic priority directions for the key sectors of the economy, including the Energy Sub-sector.

According to the IPCC report in 2007[2], the main impacts of climate change on the Energy Sub-sector in Africa will come through losses or changes in hydropower potential for electricity generation and the effects of increased runoff on hydrogenation, as well as changes in the growth rates of trees used for fuelwood. Indeed, African countries are highly dependent on the biomass fuel as energy use. Thus biomass fuel is the primary energy use with 53%, followed by petroleum 26%, coal (14%), large-scale

[2] IPCC fourth assessment report, 2007

hydro (3%), natural gas (2%), and other renewables (2%). The most vulnerable areas of the Energy Sub-sector to climate change in Africa are the provision of energy services for rural areas. Biofuel and charcoal (particularly in East Africa) are produced from indigenous forest while hydropower may be reduced by the scarcity of water and variability of rainfall. Uganda is among the countries of Sub-Saharan Africa most vulnerable to the effects of climate change[3] due to the high exposure and low adaptation capacities.

2.5.3 Gender

Both women and men play substantial economic roles in Uganda, while women bear the brunt of domestic tasks in addition to agricultural and other productive work. Women work considerably longer hours but tend to be poorer than men due to a number of gender disparities in poverty determinants, including ownership of land (7% women versus 93% men), formal labour force participation (12% versus 88%), literacy (63% versus 77%), distribution of credit (9% versus 91%), and political participation such as membership in Parliament (24% versus 76%). Current energy use in Uganda is dominated by traditional biomass energy sources, which make up around 95% of total primary energy consumption. More than 80% of households depend on fuel wood for cooking. At present, national electricity access stands at 16%, with most concentrated in Kampala and nearby towns; rural electricity access is about 7%.

Since it is women's responsibility to provision their household with fuel for cooking, the principal energy issue for women is energy for cooking. Their current reliance on wood fuels for cooking is extremely time-consuming, human-energy intensive and exhausting work, and highly inefficient. The health effects of biomass fuel use are also becoming increasingly well known. Interestingly, the primary concern with petroleum development expressed in many reports and in the media is about the environmental sensitivity of the Albertine Graben. There is no analysis of the effects of petroleum Development activities on human settlements, livelihood activities or household needs. There are no estimates given for the numbers of people affected in local communities, their current levels of income or gender differences in anticipated effects such as dislocations. Consideration of local social impacts focuses on the influx of people coming for work, urbanization and unplanned growth of existing settlements and the new settlers' increased demands on resources. There is very little treatment and no analysis about existing communities outside fishing sites, fish and boat landing sites and major crops.

Yet there are important gender differences in the impacts of oil development activities since men and women have different roles in fishing, farming, household management, water and energy use, and in health, nutrition and sanitation support. Women are likely to have unequal access to resources, information and decision-making. These differences need to be considered in the assessment of effects, impacts and mitigation strategies for petroleum development. The Ministry of Energy and Mineral Development (MEMD) is guided by a number of key Ugandan development policy objectives as well as energy policy, including a mandate to mainstream gender, with the long-term objective of eliminating gender inequalities. The MEMD has recognized gender concerns in some of its activities, and is seeking to further strengthen gender mainstreaming in its energy projects, as part of its mandate "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."

[3] Adelphi, 2011, *Water, Crisis and climate change in Uganda. A policy brief*,

2.5.4 Citizen Engagements, Participation and Social Inclusion

The National Oil and Gas Policy recognise the role of Civil Society Organisations in advocacy, mobilisation and dialogue with the communities and expect them to help "get the voices of the communities in the oil areas into the designing, monitoring and implementation of the oil and gas sector programmes. Most importantly however these organisations will be expected to contribute to ensuring that oil and gas operations are carried out in accordance with good governance principles" (transparency and accountability).

2.6 EMD Funding, Operations and Performance Management

2.6.1 Introduction

In Uganda, several institutions are in charge of ensuring the performance of the Government and the quality of service delivery. These institutions include, among others, the Office of the Prime Minister (OPM); National Planning Authority (NPA); Ministry of Finance, Planning, and Economic Development (MFPED); and the Ministry of Public Service (MoPS). The functions and responsibilities of most of these institutions are defined in the 1995 Constitution of the Republic of Uganda and in the subsequent acts (Local Government Act of 1997, Budget Act of 2001, National Planning Authority Acts of 2002 and Public Finance Management Act of 2015).

The Sector receives funding through five Vote functions/programmes, namely (a) Energy Planning, Management and Infrastructure Development; (b) Petroleum Exploration, Development and Production; (c) Petroleum Supply, Infrastructure and Regulation; (d) Mineral Exploration, Development and Production and; (e) Policy, Planning and Support Services.Sources of Sector funding comprise a combination of Government, Private Sector and Development Partners. The Donors or Development Partners provide funding through Grants or commercial and/or concessional loans. The private sector comes in either alone or in partnership with Government.The Budget releases by the Ministry of Finance Planning and Economic Development has improved with time over the previous financial years.

Table 14: Budget releases by the MFPED (Amount in Millions)

Budget Item		**2011/12**				**2012/13**		
		Approved	**Releases**	**Outturn (%)**		**Approved**	**Releases**	**Outturn (%)**
Recurrent	Wage	2.197	73	73		2.525	2.525	100
	Non-Wage	6.157	61	61		4.645	3.813	82.1
Development		1,097.631	87	87		1,246.301	112.208	9.0
Total			**87**	**87**		**1,253.471**	**118.546**	9.0

Source: *MEMD Sector Performance Report 2012/13*

2.6.2 An Overview of the National Planning and Budgeting Process

The approach of the Government of Uganda (GoU) to national planning has evolved over the last decade, with reforms of the country's public expenditure management resulting in new institutional arrangements for planning and budgeting. Critical components of these arrangements include: Sector-Wide Approaches

(SWAps), the Medium-Term Expenditure Framework (MTEF), the Poverty Action Fund (PAF), the fiscal decentralization process, the National Development Plan (NDP) and most importantly Vision 2040. NDP is the National Development framework and medium-term planning tool replacing PEAP which had since 1997 played that role.

VISION 2040	⇐	**NDP**	⇐	**MTEF**	⇐	**ANNUAL BUDGET/ WORK PLANS**
Long-term Policy Priorities and Targets		5-Year Strategic Plans to implement Vision 2040		Costing the NDP		Allocating resources and sequencing MTEF

Vision 2040 sets the long-term aspirations of government in terms of policy priorities and targets. The NDP is a comprehensive plan that articulates clearly the planned strategic interventions of all sectors of the economy. MTEF undertakes the costing of NDP stipulating sector ceilings. The Budget then allocates resources to finance MTEF in accordance with the NDP for the 3 to 5-year periods.

The budget process is characterized by transparency, openness and broad participation. Important components of this process are the Budget Framework Papers (BFPs), which are prepared at the national, sectoral and Local Government levels. They are five-year (although more emphasis is still placed on three years) rolling frameworks used to streamline and guide the budget process, setting out planned outputs and their associated expenditures in the medium term.

The National BFP is prepared by the Ministry of Finance and Planning for Economic Development (MOFPED) and consists of the expenditures proposed by sectors and Local Governments. The process is guided by GoU's annual budget strategy, sector strategies and inter-ministerial policy discussions on outstanding issues. Spending restrictions and limitations are imposed by the macro economic framework, an updated MTEF and its provisional ceilings.The sector working groups (SWGs) are responsible for the sectoral budget process. The sectoral BFP is the official statement of sector expenditure priorities and outlines the sector's contribution to poverty reduction.

2.6.3 Current (2015) Projects

MEMD sector projects are managed by various Project Units headed by Project Managers/Officers. The Sectoral Planning and Policy Analysis Department (SPPAD) is the overall coordinator of the project units. Table 15 below lists some of the projects and others are expected in the period of the NDP implementation.

Table 15: Current Sector Project Financing

Code	Project	Budget '000s	Financing (MTFE Projections)		
			GOU Amount	DONOR	
				Amount	Name
0325	Energy for Rural Transformation II	3,643,000	2,337,000	1,306,000	IDA
0940	Support to Thermal Generation	68,000,000	68,000,000	-	
1023	Promotion of Renewable Energy & Energy Efficiency	23,375,594	1,926,894	21,448,700	Fed. Republic of Germany
1024	Bujagali Interconnection Project	31,589,900	8,500,000	17,889,900	Japan
				5,190,000	ADB
1025	Karuma Interconnection Project	1,920,000	1,920,000	-	
1026	Mputa Interconnection Project	9,556,800	1,500,000	8,056,800	Norway
1137	Mbarara - Nkenda/Tororo-Lira Transmission Lines	110,694,300	5,400,000	105,294,300	ADB
1140	NELSAP	152,894,200	3,200,000	2,440,000	Norway
				132,064,000	Japan
				15,190,000	ADB
1144	Hoima - Kafu Interconnection	3,839,600	3,000,000	839,600	Norway
1149	UETCL/Statnett Twinning Arrangement - Phase II	2,798,500	-	2,798,500	Norway
1198	Modern Energy from Biomass for Rural Development	2,930,000	2,930,000	-	
1212	Electricity Sector Development Project	48,572,941	12,057,553	36,515,388	IDA
1221	Opuyo Moroto Interconnection	1,000,000	1,000,000	-	
1222	Electrification of industrial Parks	3,040,000	3,040,000	-	
1257	Mirama -Kikagati - Nshungyenzi Transmission Line	2,284,600	-	2,284,600	Nordic Development Fund
1259	Kampala - Entebbe Expansion Project	2,000,000	2,000,000	-	
B:	**PETROLEUM EXPLORATION PRODUCTION**				
1142	Management of the Oil & Gas Sector	28,111,540	20,182,440	7,929,100	Norway
1184	Construction of Oil Refinery	41,372,180	34,982,280	6,389,900	Norway
C:	**PETROLEUM SUPPLY**				
1258	Downstream Petroleum Infrastructure	5,000,000	5,000,000	-	-
D:	**GEOLOGICAL SURVEYS AND MINES**				
1199	Uganda Geothermal Resources Development	3,297,000	3,297,000	-	-
1200	Airborne Geophysical Survey & Geological mapping of Karamoja	3,599,000	3,599,000	-	-

3. STRATEGY AND DEVELOPMENT PROGRAMMES

Introduction:

The previous section presented a situational analysis of the various subsectors within the Energy and Mineral Development sector. The analyses of the subsectors revealed a number of challenges as well as opportunities for investment and development. The identified opportunities in these subsectors serve as an entry point for identifying strategic programmes and interventions to ensure an alignment between subsector goals and objectives with national development objectives and goals. In addition, the overview and analysis of crosscutting issues including gender, the environment, health and safety and citizen participation highlights programme areas where mainstreaming these crosscutting issues will strengthen and contribute to the sustainable development of the energy and mineral development sector.

This section outlines the strategic development programmes that will bridge observed strategic gaps. The Government's strategic programme in the Energy and Mineral Development sector is aimed at achieving 03(three) main strategic objectives and these are:-

a) Ensuring that the energy needs of Uganda are met in a an environmentally sustainable manner;

b) Ensuring that there is sustainable use of mineral resources for socio-economic growth and development; and

c) Ensuring that there is sustainable use of oil and gas resources for socio-economic growth and development.

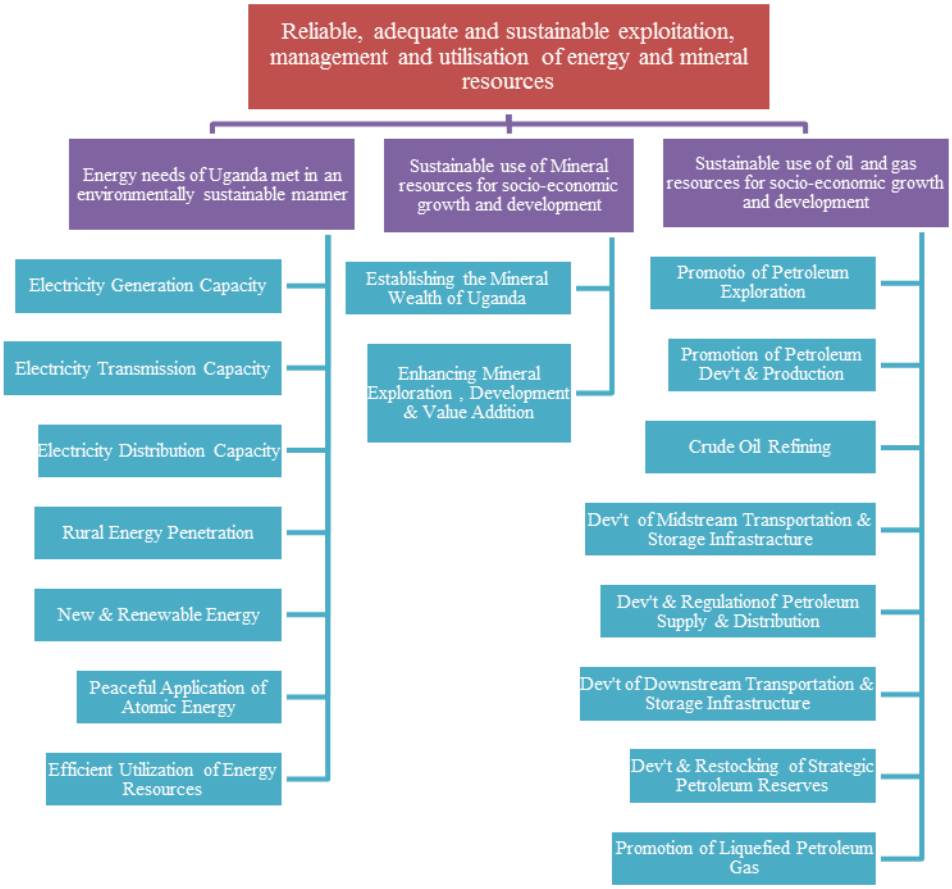
The above strategic objectives shall be achieved through 03(three) major development programmes and these are:-

(i) Energy management, planning and infrastructure development;

(ii) Mineral exploration, development, production and value addition; and

(iii) Petroleum exploration, development, production, supply, regulation and infrastructure development.

The programmes and objectives are linked through the following logical diagram:



3.1 Energy Management, Planning and Infrastructure Development

Uganda is endowed with abundant potential energy resources, which are fairly distributed throughout the country. These include hydro, biomass, solar, geothermal, peat and fossil fuels. The energy resource potential of the country includes an estimated 2000MW of hydro power, 200MW of mini-hydro, over 450 MW of geothermal, 460 million tonnes of biomass standing stock with a sustainable annual yield of 50 million tons, 5.1kWh/m2 of solar energy, and about 250Mtoe42 of peat (800MW). However, the country currently has one of the world's lowest levels of electricity development as well as the lowest per capita electricity consumption at 75kWh[4]. About 20.6 percent of the country's population is connected to the national electricity grid. The country's peak demand is about 489 MW and actual installed generation capacity is 851.5 MW, and according to the NDP II peak power demand is projected to grow at 22.7% per annum. The country's current levels of electricity supply, which cannot support heavy industries, are constrained by limited generation capacity, energy losses and low access due to high power tariffs, corresponding limited transmission and distribution network as among other key constraints to the performance of the Energy Sub-sector in the country. The high cost of electricity is a key constraint to

[4]BTTB 2013 - 2014

improved competitiveness, and significantly reduces the number of investors willing to do business in Uganda[5].

Uganda's energy potential is not yet fully exploited and the Vision 2040 emphasizes exploiting all these potential sources to enable the country meet its development targets. Currently the energy sources include biomass, which is mainly used in the traditional forms and constitutes 92% of the energy consumed in the country. Other sources of energy include hydropower with an installed capacity of 850MW. New large hydro power projects namely Karuma (600MW) and Isimba (183MW) are under construction. The country has several other sites with varying estimates of potential hydropower including Kalagala 450MW, Ayago 840MW, Murchison Falls, 600MW, Oriang 400MW, and Kiba 300MW. If all these are developed, the country would have the capacity to produce over 3000MW. There is big potential under-developed renewable/alternative sources of energy. For example, Uganda is endowed with favourable solar radiation of between 5 and 6.8kWh/m^2 per day, indicating a lot of potential to generate electricity. In addition, Uganda has the potential to generate over 450MW of geothermal electricity from the wells at Katwe-Kikorongo, Buranga, Panyimur and Kibiro. Other potential sources of electricity include wind, Peat (300MW), and over 50 potential sites for small hydros that can generate over 150MW. Government has plans to harness these energy opportunities to mitigate the energy deficits in the country.

In order to address the above challenge and transform the Ugandan society from a peasant based agrarian society to a modern and prosperous country within 30 years, the GoU has articulated the "Uganda Vision 2040" that lays out broad policy directives and sets out a target of increasing access to electricity to 80 percent by 2040. In this context, the second National Development Plan (NDP II) FY2015/16-2019/20 has focused on increasing access and usage of electricity by investing in least cost power generation. Promotion of renewable energy and energy efficiency in addition to the associated transmission and distribution infrastructure and to promote private sector participation in the Energy Sub-sector; and as a result considerable development is being channelled towards development of energy infrastructure. The Government plans to provide adequate and reliable power supply, and to this end development of large hydros and several other small hydro power plants and renewable energy projects, are on going.The Government key priorities as layed in the NDP II for the energy management, planning and infrastructure development are categorised under the following sub-programmes:-

(i) Enhancing Electricity Generation Capacity;
(ii) Enhancing Electricity Transmission Network;
(iii) Enhancing Electricity Distribution Capacity;
(iv) Increasing access to modern Energy services through Rural Electrification;
(v) Promoting New and Renewable Energy;
(vi) Atomic Energy Promotion and Regulation;
(vii) Promotion and Development of Nuclear Energy; and
(viii) Promotion of efficient utilization of energy resources.

[5] Global Competitiveness Index Report (2012).

3.1.1 Enhancing Electricity Generation Capacity

The major source of energy in Uganda for industrial and commercial production is electricity which is generated from hydropower, cogeneration from biomass and thermal by both public and private actors. The current installed capacity is 851.5MW out of which 630 MW is large hydropower (Nalubaale, Kiira and Bujagali) 65.84MW[6] is mini-hydropower, 64.5MW is cogeneration[7] and 136 MW is from Oil fired plants[8]. This was mainly attributed to water shortages caused by the drought in the region as result of lake water dropping. Despite the substantial potential of power resources, its capacity to provide reliable, cost effective electricity supply has continuously lagged behind the demands of its growing economy.

The current power generation and unreliable electricity supply cannot favour the creation of a favourable investment climate and attract heavy developments in the industrial sector, thus limiting the socio-economic development of the country.Investment in the energy infrastructure is considered a key priority in the NDP II (2015/16 – 2019/20). Therefore, energy will remain a key priority for the realization of the national development targets. Table 16 below shows indicative projected capacity requirements to raise the consumption per capita from 80kWh in 2012 to 3,668kWh in 2040.

Table16: Electricity Consumption and Generation Projections to meet the NDP II Targets

Year	2012/13	2015/16	2016/17	2017/18	2018/19	2019/20
Consumption (kWh/Capita)	80	90	212	341	463	578
Capacity (MW)	825	1000	1200	2025	2325	2500

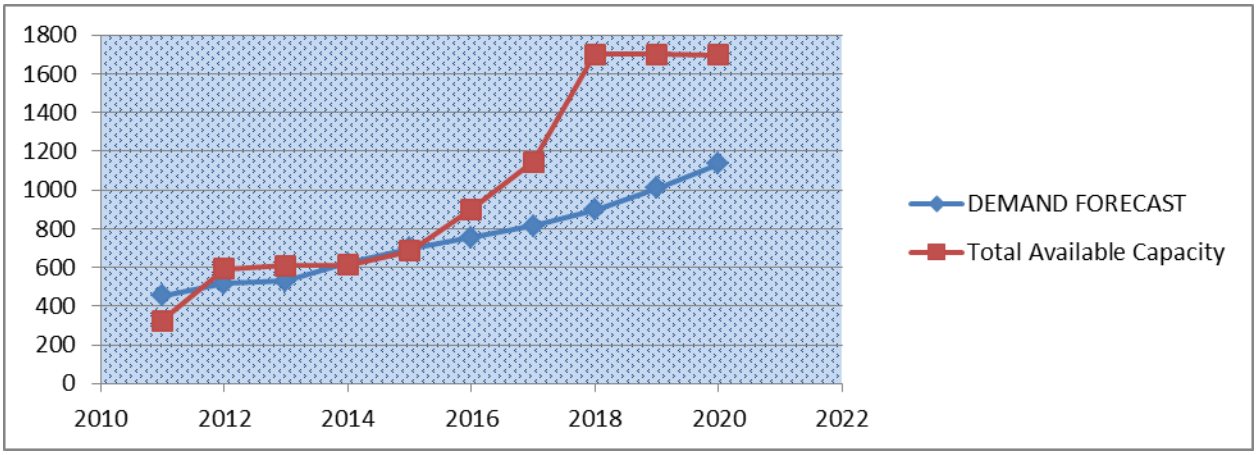
This table is also complimented by the table 17 and Figure 10 below which shows the different energy demand forecasts up to 2020 vis-à-vis the projected available capacity and the energy surplus/deficit for the planning period.

Table 17: Energy Demand- Supply Balance Forecasts

YEAR	2013	2014	2015	2016	2017	2018	2019	2020
Peak demand	530	621	699	754	813	897	1009	1136
Shoulder Demand	428	497	549	583	618	656	711	769
Off peak Demand	339	375	414	443	475	509	551	597
Total Available Capacity	608	612	684	900	1146	1699	1699	1698
Surplus (deficit) - Peak	78	-9	-15	146	333	802	690	562

[6] Mini-hydro power plants include Mpanga (18MW), Buseruka (9MW), Kilembe Mines/Mobuku I, (5MW), Kasese Cobalt/Mobuku II (10MW), Bugoya/Mobuku III (13MW), Ishasha (6.4MW), Kisizi (0.26MW), Kagando (0.06MW), Kaluva (0.12MW), Nyagak (3.5MW).
[7] Cogeneration power plants include Kakira 32MW, Kaliro 12 MW and Kinyara 7MW.
[8] Oil fired Plants include Jacobsen (56MW) and Electromaxx (80MW).

Figure 10: Plotted Energy Demand Forecasts for the Planning Period



Source: *UETCL Demand-Supply Balance*

Observations and Findings from Demand - Supply balance

Peak Period

In the last quarter of 2014, capacity deficit of up to 20MW (imports inclusive) had been envisaged during the peak period.From year 2017, the generation capacity shall have increased at a rate much higher than the demand growth rate and this shall result into generation surplus ranging from 150MW and growing over the period with a maximum surplus reaching 800MW, 900MW and 1000MW during the peak, shoulder and off peak period during the planning horizon.

Recommendations

(i) Optimisation of generation resources needs to be done so that the excess capacity during off peak period is utilised during the deficit periods.

(ii) To mitigate the deficits envisaged, it is recommended that the projected generation be implemented as planned as well as optimisation of the existing generation facilities as already mentioned.

(iii) The technical constraints that hinder evacuation of power plants should be addressed immediately.

(iv) As improved generation capacity is envisaged in the medium term, a market assessment for the energy needs to be developed and/or coordinated holistically.

To realise the sector vision and objectives, Government has therefore put in place strategic actions to increase power supply in the country. The short term actions include the promotion of energy efficiency at the demand side, reduce power system losses and contracting the independent power producers to supply electricity from fossil fuel. The medium term projects to be commissioned include Karuma Hydropower project (600MW) and Isimba (183MW). Government plans to commence the construction of Ayago (840 MW) Hydropower project in 2018. Several small scale power generation capacities (from mini-hydropower and co-generation) are underway. Additional 700MW of thermal generation capacity based on Heavy Fuel Oil is also planned as an integral part of the refinery project.

1) Construction of Karuma Hydro Power Project (600MW)

The Government signed a bilateral arrangement with the Chinese Government to expedite the construction of the project. A Contract was awarded to M/s Sinohydro Corporation Ltd to construct both the power plant and transmission line. Exim Bank of China is providing 85% of the project funds while the Government of Uganda is providing 15%. The total project cost (the hydropower plant, the Power substations, and the transmission lines) is estimated at US$1.69 billion. The implementation of the Resettlement Action Plan (RAP) for the power plant is near completion with about 80% of the affected persons paid. The project is expected to be commissioned in 2018.

2) Construction of Isimba Hydro Power Project (183MW)

The Government is undertaking the construction of Isimba hydro power station in Busaana sub-county, Kayunga district. The project is a 183 Megawatt plant on River Nile, equipped with four Kaplan turbines and will generate 1039 Gigawatt hours annually. The cost of the plant and associated substation is US $ 556 million while the transmission line will take US $ 11.7 million. The dam to be located at Koova Island is projected to take 3 years to successful completion. The project is to be developed with support from the Government of China. Exim Bank of China is providing 85% of the project funds while the Government of Uganda is providing 15%.The project implementation was launched in 2013, and is being constructed by M/s China International Water and Electric Corporation (CWE) and is expected to be commissioned in 2017.

3) Ayago Hydro power Project (840MW)

The Ayago Hydro Power Project is to be developed by Government as a Public Project. The detailed feasibility studies were completed to pave the way for construction to start in 2018. The Government signed a Memorandum of Understanding with M/s China Gezhouba Group Company Limited (CGGC). CGGC is to undertake the Engineering Procurement and Construction (EPC) of the Ayago Hydro Power Project. The project is expected to be commissioned in 2022.

4) Development of Small Hydropower Projects

The Government continues to develop the small hydropower projects[9] in several parts of the country in order to increase electricity generation. The Government has completed some small dams and others sre still under feasibility studies whose construction activities are due to start. These include:-

a) Kabalega Hydro Power Plant (9MW): This Plant was commissioned in January 2013, though it still faces capacity evacuation challenges to the main Hoima substation. The Government is working out a possible solution to enhance the systems' ability to evacuate the excess capacity from the Hoima region.

b) Kikagati (16MW): Owing to the Trans-boundary nature of this site, the Government of Uganda will sign a Bilateral Agreement with Tanzania. The signing of the agreement will pave way for the independent developer to take over the site and commence on construction activities. The two governments are making arrangements to meet to sort out the outstanding issues.

[9]These Small Hydro Power Projects include Kakaka (7.2MW), Agago/Achwa (88MW), Nengo Bridge (7.5MW), Kabaale: Gas & Test Crude (53MW), Kabalega (9MW), Namugoga solar (50MW), Rwimi (5.5MW), Sindila (5.5MW), Lubilia (5.4MW), Ndugutu (5.1MW), Kinyara (40MW), Nyagak 3 (4.4MW), Nsongezi (35MW), Kabale Peat (33MW), Kakira (32MW), Muzizi (26-52MW), Siti (21.5MW), Maziba (1MW), Kyambura (8.3MW), Kikagati (16MW), Nyamwamba (14MW), Muyembe (10MW), Waki (5MW), and Albatros II (230MW).

c) Nyagak III HPP (4.5MW): This project will be developed under the PPP arrangements and the Government is looking to partner with a Private firm for the development of this project.

d) Muzizi HPP (44.7MW): After conducting the feasibility study and Environment Impact and Social Assessment, the GoU is sourcing funding for the development of the site although there are options of developing the plant as a PPP. Financial closure of the project is expected in 2016/2017 financial year.

The Government will also develop several small hydro power sites that include: Nengo Bridge 6.8MW, Rwimi 9.6MW, Waki 4.8MW, Lubilia 5.4MW, Siti 5MW, Nyamwamba 14MW and Kakaka 7.2MW. Other sites where feasibility studies are on-going include: Nshungyezi 40MW, Achwa – Agago 88MW, Kanyampara 7.2MW, Muyembe 3.1MW, Kyambura 8.3MW and Nyamabuye 2.2MW through PPP arrangements. Government is also planning to develop the following renewable power plants so that they can also contribute to the energy capacity of the country. These projects are; Katwe Geothermal (450MW); Kabale Peat (33MW); Local Oil/Gas/HFO in Kabaale Hoima district (53MW); Hoima Thermal Plant (50MW); Kakira Cogeneration (50MW); Kinyara Cogeneration (14.5MW); and Solar Thermal (50MW).

Table18: Timing of additional generation plants required to meet the growing demand[10]

Plant	Installed Capacity	Expected Year of Commissioning	Plant	Installed Capacity	Expected Year of Commissioning
Albatros II	230MW	2019	Nyamwamba	14MW	2019
			Muzizi	26-52MW	2019
Kikagati	16MW	2019	Nyagak 3	4.4MW	2019
			Ayago	840MW	2022
			Muyembe	10MW	Year Not Available
Kabaale: *Gas & Test Crude*	53MW	2019	Nengo Bridge	7.5MW	2019
Karuma	600MW	2018			
Isimba	183MW	2017	Nshungezi	35MW	2019
Ayago	840MW	2022	Lubilia	5.4MW	2019
Kyambura	8.3MW	Year Not Available	Siti	21.5MW	2019
Kakaka	7.2MW	2019	Rwimi	5.5MW	2019
Maziba	1MW	Year Not Available	Agago/Achwa	88MW	2019
Kinyara	40MW	2019	Ndugutu	5.1MW	2019
Waki	5MW	2019	Sindila	5.5MW	2019

3.1.2 Enhancing Electricity Transmission Network

The energy needs of Uganda are huge and electricity demand is growing at an average rate of 10% p.a. In order to meet this demand, the government is establishing several major electricity generation projects. The Uganda Electricity Transmission Company Limited (UETCL), the system's single buyer and transmission system operator must therefore continue to implement power transmission lines projects to evacuate power from new electricity generation plants, to expand the transmission network to new areas

[10] Timings are subject to developer progress

of the country and improve the reliability of service.The country's strategic objective is to transmit electricity from upcoming power plants and to improve the electricity access, reliability, and quality of supply to consumers in the country. This will be done through an efficient and focused transmission system operator. In order to achieve this objective, UETCL is employing the following strategic interventions:-

a) Increasing the transmission voltage from 66kV and 132kV to 220kV and 400kV respectively;
b) Increasing the transmission network coverage;
c) Increasing the number of transmission substations equitably distributed around the country to aid in rural electrification and reduction in technical losses due to long distribution lines; and,
d) Negotiating power purchase agreements from power producers.

The Government has earmarked for construction a number of transmission lines to evacuate power from the generation plants and transmit it to different parts of the country. The following transmission infrastructures were identified for the grid expansion for the financial years 2015/16 – 2019/20:-

(i) Completion of the Feasibility, ESIA & RAP Studies for the following Projects;
Hoima–Kinyara- Kafu 220kV line; Nkenda – Mpondwe – Beni 220kV line; Ayago Interconnection project; Opuyo-Moroto 132kV Line; Mirama-Kabale 132kV; Kikagati – Mirama-Nsongezi 132kV line; Mutundwe- Entebbe 132kV line; Bulambuli (Atari)-Mbale Industrial parks 132kV line; and, Lira-Gulu-Agago 132kV line; Kabulasoke-Kiboga-Hoima 132kV line; Lira – Gulu – Nebbi – Arua 132kV line; Masaka-Mbarara 220kV line; Masaka-Mwanza 220kV Line; Kawanda –Kasana 132kV line. Nalubaale – Lugazi 132kV line; Nalubaale-Kampala North 132kV upgrade: Karuma-Nimule-Juba 400kV; Mutundwe-Kabulasoke-Nkenda 220kV.

(ii) Construction of the following Transmission Lines and associated substations; Mbarara – Mirama – Birembo 220kV line; Kawanda – Masaka 220kV line; Nkenda – Fort Portal – Hoima 220kV line; Tororo – Opuyo – Lira 132kV line; Mbarara – Nkenda 132kV line; Bujagali switchyard upgrade to 220kV; industrial parks of Namanve South, Luzira, Mukono and Iganga.

(iii) Construction of the following Generation Station Interconnection Lines; Isimba Interconnection project; and Karuma Interconnection project; Mutundwe- Entebbe 132kV line; Upgrade of Lugogo and Mutundwe substations; Upgrade of Queensway substation; and Kabulasoke-Kiboga-Hoima 132kV.

(iv) Upgrading and extension of the following Substations in different parts of the country i.e.; Nkenda substation, Lugazi substation, Lira substation, upgrade of Lugogo and Mutundwe substations, Upgrade of Queensway substation. Others include; Tororo substation transformer 132/33kV, 32/40MVA; Kampala North substation upgrade; Lugogo, Nkenda, Opuyo, Kabulasoke, Mbale substations, Iganga substation; Lira substation 132/33kV, 32/40MVA.

3.1.3 Enhancing Electricity Distribution Capacity

The Government of Uganda concessionaired out the electricity distribution to Umeme Ltd, a private investor in the electricity distribution and supply business, through a 20 year concession beginning in March 2005. This was aimed at attracting foreign direct investments, improve the quality of services,

rehabilitate, upgrade and expand the distribution network, and increase the electricity access to other customers in the country. The Government will continue with the following strategic actions:-

1) Continue the Electrification Project

The Government's medium term plan is to support growing demand and reduce losses through various projects which include:-

i) Continuous Implementation of the prepayment metering for domestic customers and AMR system for industrial customers. The Government will continue with the connection of 80,000 new customers per year using pre-payment metering, and convert existing customers to the same technology. This is expected to improve operating efficiency by reducing non-collection, lowering the distribution, operating and maintenance costs, minimising fatalities and improving customer relations. Umeme is expected to invest USD 440 million between the 2013 and 2020. To Finance this medium term plan, M/s Umeme Ltd is currently negotiating with International Finance Corporation (IFC) for a loan of UGX440.5 billion (USD170 million).
ii) Replacing of Low Voltage (LV) open cables with Aerial Bundled Cables (ABCs); and,
iii) Refurbishing of all Medium Voltage (MV) lines to minimise technical losses.

2) Pole-Plant Production

The Government will continue operating the pole plant and production through its distribution holding entity UEDCL. The Uganda National Bureau of Standards certified the treated wood poles for Uganda Electricity Distribution Company Ltd (UEDCL) hence pole plant products now carry the UNBS Quality mark symbol. As a further stage in product certification, the pole plant is now in the final stages of ISO certification. The Government will enhance the production of poles to support electricity transmission and distribution in the entire region. This will involve investing approximately USD65,000 in establishing the second line, installation of the killer drier to enhance pole seasoning and hence improve the quality of poles produced at the plant. The strategies include:-

a) **Forestation:** UEDCL obtained a license from the National Forestry Authority to establish a eucalyptus plantation in the degraded parts of Walumanyi Forest Reserve (32.2ha) has been planted. UEDCL is in the process of acquiring more land for plantation establishment. About 500ha is being targeted in the next 5years. The objective is that the trees will provide a source of poles for electrification.
b) **Out-grower Scheme:** UEDCL has partnered with farmers in all regions of the country to establish eucalyptus plantations through an out-grower scheme in which the farmers are provided with seedlings that they plant on their own land, maintain them up to maturity and then sell to UEDCL at the time of harvest. The partnership involves the farmer providing land, while UEDCL provides the seedlings and advises the farmer on how to manage the plantation well until the trees are mature and ready for harvesting. UEDCL harvests the trees and pays the farmer at prevailing market rates.

3) Off-Grid Generation

Off-grid stations are stand-alone systems or mini-grids that typically provide a smaller community with electricity. Off-grid electrification is an approach to access electricity used in areas with no access to the main electricity grid due to scattered or distant population. It can be any source of electricity generation.Off grid stations are not part of the concessioned assets and were retained by UEDCL to

manage and operate. Therefore, UEDCL will continue to offer services at the off-grid stations in the country.

4) Regulatory Aspects of the Electricity Supply business

i) Operationalisation of the Automatic Tariff Adjustment Mechanism (ATA)

The Government decided to suspend subsidies to the electricity consumers directly and channel these funds into infrastructure development. Given the change in the Government policy on subsidies, the Electricity Regulatory Authority (ERA) at the end of 2012 proposed to introduce an Automatic Tariff Adjustment – (ATA) mechanism. This was to ensure long run financial sustainability of the sector. This is a mechanism where the end-user tariff regularly reduces or increases to take care of movements in the factors that are outside the control of the sector in other words called the exogenous factors i.e. inflation, exchange rate and oil price movements.

This mechanism is intended to ensure that the sector is kept financially sustainable at all times. It is expected that this move will make the sector more attractive to private investment and ensure a good credit rating for UETCL and ultimately ensure benefits to the consumers.In this regard as part of its awareness and sensitization campaign, ERA continuously engages various stake holders including the Government and consumer groups like the Uganda Manufacturer's Association (UMA) to embrace the automatic adjustment mechanism.

ii) Energy Loss reduction

Following the expiration of Umeme's seven-year (2005-2012) performance targets in early 2012, ERA set new performance targets for the subsequent five-year period ending 2018. These focus on reducing technical and commercial losses, improving collection rates and maintaining distribution, operation and maintenance costs at pre-agreed levels. The ERA also amended the supply license to allow for Automatic Tariff Adjustment. Currently, ERA has set for Umeme the following pre-agreed tariff parameters and targets:-

Table 19: Annualised Regulatory Targets

Year	2015	2016	2017	2018	2019	2020
Distribution Losses Target*	22.00%	20.00%	18.00%	16.00%	14.00%	12.00%
Target Uncollected Debt Factor*	2.70%	2.50%	2.30%	2.10%	1.80%	1.50%
Days Lag*	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Distribution Operation and maintenance Cost(USD Mil)*	44,093	44,553	46,186	47,678	49,300	51,100
Distribution Capex Development US$ Mill*	49.755	49.459	49.355	49.532	46.496	49.949
Transmission Losses	3.85%	3.80%	3.75%	3.70%	3.65%	3.60%

Source: *ERA*

***As the performance trajectory set for Umeme*

UMEME's technical losses reduced from 38 percent in 2005 to 26.1 percent in FY2012/13. Ongoing network refurbishment and the completion of the Lubowa and Waligo substations pushed technical losses further during first half of 2015 to 23 percent against a full year target of 20 percent. The government plans a further reduction to 12 percent by 2020

iii) Umeme investments Review

Government through the ERA and UEDCL will continue to streamline the process of verifying Umeme investments and work plans so as to monitor and evaluate its performance against ERA – set targets on a continuous basis. This verification exercise is part of the regulatory framework to establish that; the investments amounts are fairly stated, qualify to earn a return as per the electricity investments approval and verification guidelines, 2013.

iv) Operationalization of the Global Energy Transfer for Feed-in-Tariffs (GETFiT)

As provided for in the Renewable Energy Policy (2007), ERA revised the Renewable Energy Feed-in-Tariffs (REFiT) in 2012 to take care of the changing funding and technology requirements for the generation plants. This REFiT revision was aimed at spurring accelerated development of projects that have hitherto experienced slow progress or completely stalled. Working with the Ministry of Energy and Mineral Development and Ministry of Finance, Planning and Economic Development, and the Development Partners, the Global Energy Transfer for Feed-in-Tariffs (GETFiT) project was launched in April 2013, to prop the existing feed in tariff and fast truck the implementation of smaller sized renewable energy technologies. This is expected to address the short to medium term generation requirements targeting to bring on stream at least 125MW of installed capacity by 2020. During this period however, recognizing the short lived nature of the "GETFiT" there will be a need for specific endeavours that will reinstate the "REFiT" in the subsequent periods.

v) Monitoring and Enforcement of Compliance

Government undertook a risk-based approach in enforcing compliance so as to minimize the adverse effects of non-compliance and will continue implementing this approach and identify non-compliant aspects that might exist within certain regulated companies.

3.1.4 Promoting Energy Penetration to Rural Areas

Rural electrification is an integral component of the government's overall policy and program to promote national economic and social development and integration. Currently (2014), approximately 7% of the rural population has access to electricity up from 1% in 2001. This sub-programme is an important step in transforming rural into urban areas, which promotes industry, improves productivity and enhances service provision, hence contributing to the long term vision of eradicating poverty and foster opportunities for the rural opportunities in every part of the country.

This sub programme also takes cognizance of the UN initiative on modern energy access for all which obligates all governments to ensure availability of clean and affordable modern energy in all homes by 2030. This includes the provision of cleaner, more efficient technologies for cooking and lighting in households. The promotion of rural electrification programmes have of recent been hampered by a number of challenges including issues of way leaves and compensation, high costs of development and connection rates, increasing demand for electricity access, inadequate local private sector capacity to invest in the power industry and the inadequate private uses of the electricity. Vision 2040 lays emphasis on the acceleration of the rural electrification programmes. This will promote energy penetration to rural areas using both public and private arrangements.

Government has developed a strategy to increase access to modern energy services through rural electrification and renewable energy development. The primary objective of the RESP is "achieve an accelerated pace of electricity access and service penetration to meet the national development goals during the planning period". The Strategy will ensure that, progressively, the programme facilitates access to all forms of modern energy services to replace kerosene for lighting and other forms of traditional cooking and heating. According to the strategy, the Government's target is to achieve 24% of rural Ugandans having access to modern forms of energy by 2022, rising from 7% in 2014.The Rural Electrification investment priorities and programmes for the next five years are in line with the 10 year Rural Electrification Strategy and Plan (RESP, 2013 - 2022). These are as follows:

a) On-grid electricity service expansion

In the RESP, the Government will reconfigure the rural electrification sector into thirteen (13) commercially-scaled service territories[11]. The on-grid services will be expanded to provide approximately 1,276,500 service connections, including 543,887 in the non-Umeme service territories and 732,613 as densification within the Umeme footprint by 2022. The service territories will be managed on a management contract basis for the first 2-3 years. During that period, development will be made by Government in the service territories to increase customer connections and energy consumption to make the territories financially attractive.

b) Off-grid electricity service expansion

Government shall invest in off-grid electricity expansion programme. The off-grid electricity services comprise several types of electricity services based on renewable energy technologies, primarily solar PV home systems, and development in islanded mini-distribution systems drawing electricity from decentralised power generation facilities. The off-grid services are estimated to be increased by 140,000 additional installations of solar PV system and mini-grid distribution service connections. Off-Grid Electrification financing, totalling to $55.4 million, comprising the solar PV program associated with the installation of 130,000 new solar home systems throughout the 13 service territories, the capital cost of islanded mini-grid projects estimated to add 8,500 new service connections, and the cost of pre-development support for advancing the development of larger distributed power generation facilities directly serving the power supply requirements of the on-grid electrification service providers.

Where it will not be possible to access one form of electricity service or another, the government will promote the inclusion of the dissemination of other modern energy services through the existing electricity service providers. The items that will be promoted will include LPG cookers, and cylinders, lamps, improved charcoal stoves, etc. this package will be worked out with Micro-finance Institutions to provide credit services for these energy appliances as it is done with solar PV programme.

c) Institutional Reforms

In order to achieve the acceleration of the service expansion programme, the government will carry out several reforms within RE programme. The programmatic adjustments will be phased-in over a period of

[11] This excludes the rural areas of the present Umeme electric distribution service footprint.

approximately three years, so that a new and simplified model of service delivery will be established. Under this reform, the following activities will be conducted;

(i) Modification and enactment of pertinent legislation and policies relating legal definition, organisational procedures and rules required for the implementation of the new model;

(ii) Revision and implementation of the new RE marketing and management systems based on the continued long-term development of service territories, building capacity of electricity service providers, oversight, and financing of periodic construction programme developments;

(iii) Development, approval and adoption of improved RE sector planning procedures, together with service monitoring and performance benchmarking;

(iv) Formulation and adoption of design and construction standards for economically efficient rural electric distribution Development;

(v) Establishment and implementation of REA debt financing and similar long-term contracting mechanisms and procedures with electricity service providers, capital accounts management and loan administration system; and,

(vi) Implementation of transition provisions and arrangements, including procedures for adapting current and on-going programs and project developments in the new model.

3.1.5 Promoting New and Renewable Energy

Uganda is richly endowed with a variety of renewable energy resources which include plentiful woody and non-woody biomass, solar, wind, geothermal and hydrological resources. Presently, with the exception of biomass, only a meagre fraction of the country's renewable energy potential is exploited. To reduce on reliance on the national grid, the government policy is to promote and facilitate the use of renewable energy technologies at the household and institutional levels. The government will implement the following key strategic actions to enhance the use of new and renewable energy.

1) Financial support to Uganda Energy Credit Capitalisation Company (UECCC)

The Government will continue to finance the Uganda Energy Credit Capitalisation Company (UECCC) to facilitate developments in Uganda's high potential renewable energy sub-sector. The company's main objective is to provide financial, technical and other support for renewable energy infrastructure development in Uganda. The company will continue to fulfil this aim through a number of strategies including:

a) Offering Transaction Advisory Services to Independent Power Producers (IPPs).This entails providing Technical Assistance and funding support for early stage project development to IPPs and Programme implementation support to Participating Financial Institutions. Funding of Euro 1.5million was available up to 2014/2015. Additional funding of US $ 3 million will be required to sustain the intervention for the next four years up to 2019/20.

b) Providing end user financing through Participating Financial Institutions for Solar systems acquisition. This is to address the barrier of the initial upfront cost of the solar systems. Current funding is US $ 1.25milion under ERT II. Additional funding of US $ 1 million earmarked under ERT III.

c) Providing end user financing for connecting to grid electricity. This is to address the challenge of high connection costs. Currently US $ 1 million has been availed under ERT II. Additional funding of US $ 2 million earmarked under ERT III.

d) Putting in place an end user financing mechanism for acquisition of domestic biogas systems and modern cook stoves. This is currently not funded. US $ 1.5 million is required to kick start the intervention.
e) Putting in place a Partial Risk Guarantee (PRG) to partially cover the default risk of the working capital loans offered to Solar Vendors by participating Financial Institutions. This is currently not funded. US $ 1 million is required to kick start the intervention.
f) Continue to mobilise resources from development Partners for renewable energy development. In this regard, UECCC obtained funding from the Dutch ORIO Infrastructure Development Fund for development of up to 10 mini Hydro power sites as one Project, Each of the 10 project sites will be an island generation and distribution project.
g) Setting up a Programme of Activities (PoA) under the Clean Development Mechanism (CDM) for hydropower generation projects, with funding support from the Belgian Development Agency.

2) Solar PV generation and Solar Thermal applications

Generation of electricity using solar photovoltaic systems and heating of water using solar collector is proven technology in Uganda. The extensive acquisition of the equipment mainly in rural areas is hampered mainly by the upfront costs and also poor quality of products by some suppliers. There are many Agencies, private companies, and institution dealing in the promotion and dissemination of solar energy technologies. The Ministry on its routine inspections and monitoring has established that many installed systems in the field stop working as the first set on installed battery cease function.The following are strategic areas of intervention:-

i. Review of the policies and regulation on the licensing of large solar PV systems for on grid connection and Mini grid.
ii. Develop a strategy for sustaining the continued performance of solar energy installation in Government schools and health units.
iii. Review and implementation of solar standards in collaboration with UNBS

3) Promotion and dissemination of biogas systems

The Renewable Energy policy put a target of 100,000 biogas units for Uganda by 2017. Whereas a feasibility study by WINROCK revealed that Uganda has a potential for over 200,000 household biogas digesters, over a 10 year period. The current Uganda Domestic Biogas Project set a target of 12000 biogas systems and so far only about 6000 biogas systems have been installed. The Ministry has embarked on the promotion of the institutional biogas systems and in 2013 trained 20 biogas technician and installed one bio–toilet demonstration systems in Kayunga and other 10 systems in various parts of the country. The following strategic actions have been planned over the medium term, namely:-

(i) Develop and implement National Biogas Programme;
(ii) Draft standards developed for biogas;
(iii) Promote the adoption of bio-latrine technology in all education institutions and prisons;
(iv) Conduct two pilot projects for electricity generation using biogas resources;
(v) Continue with provision of technical support to Uganda National Biogas Program;
(vi) Train artisans in advanced biogas construction; and
(vii) Support the establishment of large scale biogas systems for electricity generation.

4) Promotion of Gasification technology

Gasification is break down of biomass into gas components containing carbonmonoxide, hydrogen, methane and some other inert gases – producer gas. The gas produced is composed of carbon monoxide and hydrogen and can be used either for heat generation or for power generation. A wide range of biomass materials (wood, charcoal, coconut shells, and rice husk) can be used to fuel gasifiers. Typically 1kg of air-dried biomass gives 3-3.6kWh heat, or 0.7-0.9kWe electricity plus 1.4kWh heat. The cost of generating electricity from gasification is comparable to cost of hydro electricity generation and is lower than that generated from fossil fuels or photovoltaic cells. Government will strategically demonstrate Gasification in the recently refurbished 150 kW Nyabyeya gasifier systems in Masindi district, and as a way of promoting biomass gasification through the following measures:

(a) Scaling up the operations of recently refurbished Nyabyeya gasifiers;
(b) Relocate and rehabilitate Buddo gasifier;
(c) Rehabilitate Kyambogo gasifier system;
(d) Support the installation of small scale gasifier units at community and institutional level for electricity generation for communities far from the grid; and
(e) Conduct research and development to localize the gasification technology.

5) Development and Promotion of biofuels

Biofuels are generally defined as solid, liquid, or gas fuels that are derived from biomass. They have over the years become an important means of reducing greenhouse gas build-up, as they provide a viable alternative to fossil fuels. Bio-fuels are associated with ethanol-produced crops and bio-diesel, which is produced from woody material as well as vegetable oils from plant oils. Biofuels fuel use is recommended for its role it plays in reducing the rate of global climate change, by replacing fossil fuels, which in turn, increase Uganda's access to climate-related concessional finance and moderately reduce on the greenhouse effect caused by the increased emission of carbon from developed countries; its by-products such as glycerine can be used in soap making and fertilizer production. In the next five years, the government will:-

(a) Produce and implement a Biofuels Act
(b) Provide the technical support to the energy Multi-function platforms
(c) Promote the growing of energy crops for biofuels production
(d) Develop a Biofuels laboratory

6) Improved Cook Stove Promotion

Improved cook stoves, mostly household stoves, are mainly being disseminated by several NGOs, CBOs and individual artisans at a good pace. However institutional stoves penetration is still low due to high upfront costs, low technical skills capacity and lack of awareness. In 2010, about 100,000 households adopted the improved firewood Stoves. However, there is still a big gap to achieve nationwide coverage as the country's rural households exceed 4million. The use of improved cook stoves is important since; a)Stoves emit less carbon dioxide and as a result they reduce the risk of respiratory diseases and eye infections; b) In rural areas the time spent for collecting firewood is reduced, which enables women to do other things such as starting or expanding income generating activities; c)Improved cooking stoves cook faster than firewood; d) the production and commercialization of improved technologies generates jobs

and small businesses; and, e) can be used to curb indoor air pollution. In order to promote the use of improved cook stoves, the Government of Uganda will:

i) Partner with key actors in the distribution of improved cook stoves (WWF, Energy and Environment Partnership (EEP), and BEETA) to promote Biomass Energy Technologies (BETs);
ii) Backstop EEP initiatives in the promotion of BETs; and,
iii) Promote UNACC activities and initiatives.

7) Briquetting Technology Promotion

Due to the high price of charcoal (UGX 60,000 – 80,000 or US$25 – 32/50kg bag) and its reducing availability, several community groups and individuals have come up with value addition techniques for production of briquettes from charcoal and other crop wastes especially in peri-urban areas. This is providing a number of people with gainful employment, access to renewable energy product, and reducing overdependence on existing trees for fuel production. The government will promote the use these briquettes through:

i) Promoting small scale briquetting enterprises
ii) Supporting the establishment of large scale briquetting enterprises.

8) Promote and dissemination efficient biomass Kilns, Ovens and Stoves.

The Ministry has constructed a private company to installed 40 Institutional Energy Saving stoves in schools. These systems are to work as demonstration systems inorder to:-

(a) Create financing mechanisms and incentives to facilitate the development and promotion of improved energy technology.
(b) Train at various levels - for the kilns, ovens, and stoves.
(c) Set up demonstrations of various units, and awareness campaigns targeting the stakeholders.
(d) Formation of charcoal producers and marketing associations. The associations could also be used by support agencies to reach the industry actors easily
(e) Establish curriculum on stove, kilns, and oven making.
(f) Promote adoption of improved institutional kilns, oven, and stoves in all educational institutions, hospitals, and prisons.

9) Promotion and Development of Wind Energy

The Government is in the process of procuring wind equipments for wind speed data collection to be installed in Napak and Kotido districts. This measuring equipment will be installed in parallel with small wind energy turbines and wind mills for water pumping. The objective is to study and establish the potential of wind in Karamoja region for water pumping and small standalone wind turbines for electricity generation. The following key activities will be conducted:-

(i) Wind speed data collection through installation of the wind measuring equipments;
(ii) Setup of demonstration systems for small wind turbines for electricity generation; and
(iii) Study the existing 30 wind mill in Karamoja region for water pumping.

10) Mini Hydros

Rural electricity supply is often hampered by the dispersed nature of settlements and low population densities, plus the limited purchasing power of rural people. As a result, most rural areas are not covered by the national grid. Therefore small and mini-hydro power plants present the best source of electricity for remote areas. Although the unit cost of energy cost may be higher than that from the national grid, they present a category of energy which could sustainably contribute to economic development and poverty reduction to households in isolated areas. More than twenty four (24) mini hydro power sites have been studied in detail over the last 20 years. The country's current development plan is to construct two mini hydro plants per year. Government of Uganda operating through REA and the PSFU in collaboration with Development Partners has set aside funds to support private development in isolated electricity mini grids through cost sharing arrangements. Specific benefits from mini hydros include:-

- Usage of low voltage lines, different rural load centres can be supplied with power
- Leads to creation of economic activities and offer local employment for poverty alleviation
- Provision of power for social economic services
- Support agro processing industries (coffee/corn/rice milling machine).
- Mini-hydro power is pollution free, ecologically and environmentally friendly
- Support agriculture and fisheries though provision of water
- Power can be wheeled to the national grid for increased power supply to urban and peri – urban areas

The key activities will include:-

- Liaising with DWD for readily avail flow rate measurements and other technical data necessary for development of mini hydro sites
- Creating awareness among the public about the value of mini hydro natural resources
- Marketing of mini-hydro sites to potential local and international investors
- Conducting research and training on mini-hydro management and development
- Establishing ten (10) community hydro power project mini grids.

3.1.6 Atomic Energy Regulation

Atomic energy plays a big role in major sectors such as agriculture, health and water resources management and oil and gas exploration. With support from the International Atomic Energy Agency (IAEA) and other Development Partners, the number of projects in these areas has increased tremendously. The creation of the Atomic Energy Council (AEC) has given Uganda a limelight to pursue the wide variety of the peaceful use of atomic energy including nuclear power generation. The Energy Policy for Uganda, 2002, guides the council activities**.** The policy recognizes Atomic Energy use in Uganda but limited to agricultural and the health sectors. It also recognizes that Atomic Energy uses must be regulated in order to protect the public and the environment from dangers arising out of improper practices and uses of ionizing radiation.In order for the country to derive benefit from the use of atomic energy in a safe and secure manner, Government will execute the following key projects under atomic energy regulation sub-programme:-

i) Strengthening the Atomic Energy Regulatory Infrastructure.
ii) Expansion of Radiation Dosimetry Services.
iii) Developing National Radiological Emergency Preparedness and Response Plan Capability.
iv) Strengthening Regulatory Control of Radiation Sources.

1) Strengthening the Atomic Energy Regulatory Infrastructure

It is an international requirement to establish and maintain a regulatory body with legal powers and technical competence necessary to ensure safe and secure operation of nuclear and radiation installations. The AEC, which is mandated to regulate peaceful applications of atomic energy in the country, has inadequate regulatory infrastructure to regulate all the existing practices and the new upcoming ones. The council will require about 50 competent staff in the planning phase and this will progressively increase to 150 in the construction, operation and decommissioning phases of the nuclear power programme. Therefore the government needs to gradually recruit, train and retain more technical staff especially in nuclear safety regulation and acquire adequate space to accommodate staff and laboratory facilities. In a bid to ensure effective independence of the Atomic Energy Council, adequate capacity to carry out research and training of its citizens on benefits and risks of radiation, monitoring of food and environment, Government will:

a) Prepare a master plan for developing the 11(Eleven) acres of land at Mpoma in Mukono.
b) Establish an administrative tower and National Radiation Protection Laboratories at Mpoma site.
c) Establish an orphan and illicit source bunker at Mpoma.
d) Establish an ICT infrastructure (Network, Hardware & Software, and Data Management Systems).
e) Develop practice specific regulations, standards, codes and guides for application of atomic energy in health, education and industry, siting nuclear installations, management of radioactive waste, uranium exploration, mining and milling and other nuclear activities.
f) Develop a human resource Development programme.
g) Recruit, train and retain more staff.
h) Develop the East African Community Regulatory Charter
i) Conduct Regulatory Re- engineering/Reviews.
j) Develop an Enforcement Policy.
k) Restructure the Atomic Energy Council to effectively regulate uranium activities, nuclear power and other peaceful application of nuclear technology.
l) Develop a Radiation Safety Communication Strategy.
m) Increase public awareness on nuclear safety and security.

2) Expansion of Radiation Dosimetry Services

Government operates dosimetry service to ensure safety of radiation workers. Currently, 1000 radiation workers receive dosimetry services under the occupational exposure control programme. However, there is need to expand the services to cover all radiation workers. Monitoring requires equipments such as Thermo-lumiscent dosimeters and a reader. The Government will expand the radiation dosimetry services by:

a) Operationalize the Harshaw 6600 Automated TLD System.
b) Register all radiation workers.
c) Attract developments in dosimetry service provision.
d) Acquire and distribute 12,000TLDs.
e) Accredit radiation monitoring and calibration service providers.
f) Establish internal dosimetry for underground miners.
g) Recruit and train staff on occupational exposure control.

3) Developing National Radiological Emergency Preparedness and Response Capability

Uganda requires arrangements in place for a timely, managed, controlled, co-ordinated and effective response at the scene and at the local, regional, national and international level, to any nuclear and radiological emergency. Section 57 of the Atomic Energy Act, 2008 provides for establishment of a Radiological Emergency Response Committee, which needs to be constituted. In addition, Government will:

a) Establish a National Radiological Emergency Preparedness and Response Plan (NREPRP)
b) Develop emergency guidelines.
c) Establish a National Radiological Emergency Preparedness and Response Centre.
d) Designate of Regional Radiological Emergency Centre.
e) Conduct radiological emergency drills with stakeholders.
f) Collect, refine and disseminate public health alerts and readiness measures.
g) Procure Emergency Mobile Vans.
h) Train radiological emergency first respondents like Emergence Doctors, Police, UPDF and technical committee.
i) Procure emergency kits/equipment.
j) Establish and maintain a 24 Hour emergency line.

4) Strengthening Regulatory Control of Radiation Sources

Uganda borders are porous and favour illicit trafficking of radiation sources due to lack of surveillance systems. This increases the risk of terrorism attacks with radioactive materials. Therefore, there is an urgent need to strengthen the regulatory control of radiation sources for the safety and security of people and environment within the country. AEC conducts authorization and inspections of practices involving the production, processing, handling, use, storage, transport or disposal of natural and artificial radioactive material and devices emitting ionising radiation. Authorizations aim at ensuring accountability of all radiation sources in the country.The inspections are also done to ensure safe and secure operations and strictly adherence to operating procedures. However, more facilities and orphans sources need to be put under regulatory control. Government will strengthen the regulatory grip on use radiation sources by:

a) Installing border radiation surveillance systems.
b) Increasing the number notifications.
c) Increasing authorization.
d) Intensifying inspections.
e) Enforcing non-compliance.
f) Maintaining the Regulatory Authority Information System (RAIS).
g) Conducting search and secure of orphan sources.

3.1.7 Promotion and Development of Nuclear Energy

Energy is one of the drivers of the socio-economic transformation of a nation. This has necessitated the generation and Development of sufficient sources of energy to drive the economy. The Vision 2040 projects that the Uganda will require 41,738 MW by 2040. The National Development Plan (NDP II) 2015/16 – 2019/20 projections indicate that generation potential from hydro, biomass, Geothermal and peat, if fully developed cannot meet projected development target. To meet the vision targets of 41,738 MW by 2040, other energy sources such as fossil fuel and nuclear must be integrated into the generation

mix. However, thermal from the fossil fuel and the use of biomass contribute to the amount of the atmospheric carbon dioxide – a major greenhouse gas causing global warming. The Government has taken a decision to develop the nuclear power programme to meet the future energy demand, and help to meet the vision strategies. However, a nuclear power programme is a major undertaking, which requires careful planning, preparation, and development in time and human resources. Currently the country lacks adequate infrastructure to drive the nuclear power programme.

Government plans to develop local uranium resources for power generation. Recent air borne geophysical survey (radiometric) undertaken by Government of Uganda under Sustainable Management of Mineral Resources Project (SMMRP) indicated 80 targets that are geologically favourable for the discovery of uranium. These have been prioritized into 13 first priority areas and 17-second priority areas. Literature review carried out by Geological Survey and Mines Directortae indicate existence of radioactive anomaly in Hoima, Iganga, Pakwach, Kabarole, Kitgum, Masindi, Mbarara, Adjumani, Arua and Ntugamo districts. The uranium will be developed in sustainable manner to ensure supply of nuclear fuel to future nuclear power programme.

Government will also support the peaceful use of nuclear technology in cancer management, food safety assessment, and tsetse control, improving agricultural productivity, water resources management and industries. As earlier on mentioned, implementation of related activities has been affected by limited counterpart funding and support. There is need for promotion and development of these applications by providing technical and financial support to related activities.

The planned uranium activities, nuclear power projects and applications of nuclear technology in health, water resources management, food and agriculture, industries will generate radioactive waste. Uganda lack national strategies and facilities for management of such waste. Section 53(d) of Atomic Energy Act; provides for preparation of a plan for the management, interim storage and final disposal of nuclear waste from operations of nuclear power plants.Therefore, government will undertake the following projects under promotion and Development of nuclear energy sub-programme:

1) Nuclear Power Infrastructure Development

Pre-feasibility studies for launching the first nuclear power plant in Uganda are being conducted with support from International Atomic Energy Agency. Results of these studies will guide formulation of the nuclear power roadmap, nuclear energy policy, legislation and development of human resources. Preliminary site surveys are being conducted to establish potential sites for nuclear power development. This is to ensure that the radiological dose from normal operation and postulated accident will be acceptably low and that natural phenomena and potential man-made hazards can be appropriately accounted for in the design of the plant. Detailed site survey to identify candidate sites for nuclear power development will be conducted.

Plans for establishing physical infrastructure such nuclear power plants, facilities that supply nuclear fuel, waste management facilities, security systems, electricity transmission and distribution systems, transport of fuel and plant components, testing laboratory systems, and emergency facilities will be established.
Nuclear Power Project of 2000MW requires 30 and 1000 technical staff with specialized competencies to plan and operate respectively. Government will continue recruiting and training officers in various

disciplines related to nuclear power development including nuclear engineering, nuclear science and technology, nuclear law and policy among others. In addition, the Government will continue organizing short training courses and workshops in the following areas; energy planning and managing nuclear power project. Government will also prepare a human resource development plan to guide capacity building for operation and management of nuclear power plants.

Furthermore, developing a nuclear power program creates both national and international concerns. This therefore calls for identification of the concerned parties to ensure effective engagement of stakeholders. The key nuclear power stakeholders include the general public, local governments, the civil society, and the international community. Therefore, the activities to be conducted under this development will include:-

a) Continue with pre-feasibility studies for launching the first nuclear power plant.
b) Prepare a Nuclear Power Roadmap for Uganda.
c) Develop a Nuclear Energy Policy for Uganda.
d) Develop a Nuclear Energy Bill with requirements for nuclear safety, security and safeguards.
e) Train Government Staff.
f) Develop a nuclear power communication strategy.
g) Conduct detailed site survey for nuclear power Development.
h) Conduct feasibility studies for the first Nuclear Power Project in Uganda.
i) Establish a Nuclear Laboratory and Nuclear Information Centre.
j) Establish bilateral cooperation on nuclear energy: This will involve preparing a plan for regional International Cooperation and Initiating Bilateral Cooperation.

2) Sustainable Development of Nuclear Fuel Resources

One of the key aspects in defining the sustainability of any energy source is the availability of fuel resources. Uranium is the basic nuclear fuel used in the conventional nuclear power plants. Availability of uranium anomalies presents a great opportunity for Uganda to generate nuclear power in a sustainable manner. However, exploitation should be done so as to meet the present and future local needs. Nuclear Energy Policy for Uganda, which will guide uranium development in Uganda, is being drafted. The policy will also provide guidance on strengthening of exiting institutions and creation of new ones so as to effectively manage uranium resources, entire nuclear fuel cycle and state equity in uranium mines. In addition, Government shall:-

a) Develop appropriate bill on uranium exploration and development.
b) Conduct short and long term training on uranium development.
c) Develop nuclear fuel supply strategy for nuclear power plants in Uganda taking into consideration the local uranium resources.
d) Establish a uranium analytical laboratory to support uranium exploration and development.
e) Monitor uranium exploration activities.
f) Conduct uranium production feasibility studies for the proved deposits.
g) Develop a uranium development communication strategy covering issues related to uranium exploration, mining and milling.

3) Strengthening Management of Radioactive Waste

A study on integrating nuclear power in the generation capacity plan 2015 – 2040 is planned and will among others, assess the management options for spent fuel and radioactive waste from nuclear power plants. Volume of radioactive waste from existing peaceful applications of nuclear technology in human health, food and agriculture water resources management and industries will also be assessed. These studies will guide the development of a management strategy for spent fuel and radioactive waste from power generation, uranium activities and other peaceful application of nuclear technology and establishment of management facilities. Thus, the following activities will be conducted under this development:

a) Assess all existing and anticipated radioactive waste and spent fuel volumes in the country.
b) Develop a radioactive waste management strategy.
c) Develop a national radioactive waste management facility to cater for all the radioactive waste including the existing ones from other interventions.

4) Support to Other Peaceful Uses of Nuclear Technology

Government of Uganda will support the peaceful applications of nuclear technology in human health, food and agriculture, water resources management and industries.In human health, radiotherapy and nuclear medicine techniques are used in management of cancer. According to the International Agency for Research on Cancer (IARC) GLOBOCAN 2008 estimate, the incidence of cancer cases in Uganda will be close to 34,000 by 2015. The existing radiotherapy and nuclear medicine services are in adequate to meet the national demand. Establishment of new radiotherapy facilities at Uganda Cancer Institute and three regional centres will be supported.

The tropical equatorial climate of Uganda provides suitable habitat for tsetse flies with 70 to 75% of Uganda being tsetse infested. Both Human African Trypanosomiasis (sleeping sickness) and African Animal Trypanosomiasis (Nagana) are common in the tsetse infested areas. Over 11 million people are continuously at a risk of contracting sleeping sickness in addition to the latent threat of drug resistance. Livestock Development is constrained by a number of factors among which; African Animal Trypanosomiasis (AAT) is a major concern. Focus will be put on creating a tsetse-free zone in the Lake Victoria Basin. To this end, an Area-Wide Integrated Pest Management (AW-IPM) strategy including a Sterile Insect Technique (SIT) component to eradicate tsetse flies from the Lake Victoria region of Uganda will be supported.

Major trans-boundary livestock diseases such as Foot and Mouth Disease (FMD), African Swine Fever (ASF), Contagious Bovine Pleuropneumonia (CBPP), Contagious Caprine Pleuropneumonia (CCPP), Capripox, Brucellosis, Lumpy Skin Disease (LSD), Rabies and Tuberculosis (TB) currently present persistent constraints to the Development of the livestock industry in Uganda and export of animal products. In addition to that, tick-borne diseases and Newcastle disease continue to be a critical problem in livestock and poultry respectively. Enzyme-Linked Immuno-Sorbent Assay (ELISA) and Ordinary Polymerase Chain Reaction and Real Time-PCR technologies, are employed in the surveillance and monitoring of most of the above mentioned livestock diseases. In bid to bring services nearer to the people, establishment of thirteen (13) Regional Animal Disease Diagnostic Centres (RADDCs) countrywide will be supported.

Protecting the integrity of the food supply is necessary for food security, food safety and quality, consumer protection as well as international trade. The safety of foods can be threatened by chemical or microbiological hazards anywhere in the food chain (pre- and post- harvest including packaging and distribution). Laboratory analytical capacity and awareness are also required in animal feed safety, contaminants of which could end up in animal products. The nuclear techniques will be used to address the problems of food contaminants through a concerted effort to assess and inform the public on the magnitude of the problem in Uganda and to facilitate both preventive and corrective measures. In the near term, Uganda Bureau of Standards will strengthen national capacity to test/monitor veterinary drug residues in animal and derived animal products and surveillance of trace metals and aflatoxins in fish.

The sustainable development and management of water resources is another vital area of conceptualization for Uganda. Although Uganda is usually considered to be well endowed with water resources, these are variable in space and time due to uneven distribution of rainfall. Similarly, the increased demand from domestic, industrial, agricultural and hydropower uses due to population and industrial growth combined with environmental degradation and extreme poverty, are putting pressure on the quantity and quality of water resources.

With respect to water development for large projects such as hydropower, and water supply for agricultural production and large towns, there is a high dependence on surface water resources from the Nile system. Assessment and sustainable management of the Nile water resources is therefore key in the achievement of socio-economic development targets. With the increase in environmental degradation combined with the impacts of climate change, the need for sustainable management of water resources has greatly increased.

Investigation of groundwater resources systems using isotope hydrology techniques in several areas of the country has provide information of quality and quantity for over 15 years now. The support has been used in assessment of groundwater resources of in Wobulenzi, Kisoro, and Rukungiri and Mubende towns. Site-specific recharge studies and groundwater mapping of the rest of the districts will be carried out by Directorate of Water Resource Management in order to increase knowledge of the available groundwater resources.

Industrial applications of ionizing radiation in the country are on the increase. The current main areas of interest includes the use of radioactive sources in well-logging in petroleum exploration, density/moisture gauges in the construction sites, level gauges in the bottling plants, etc. In addition, Uganda plans to apply Non-Destructive Testing (NDT) techniques in construction of the refinery, oil pipelines and hydro power plants. Therefore, the activities to be supported under this development will include:

i. Construction and equipping of a new Radiotherapy Centre at Uganda Cancer Institute.
ii. Establishment of three (3) Regional Radiotherapy and Nuclear Medicine Centres i.e. at Mbarara Regional Referral Hospital, Mbale Regional Referral Hospital and St. Mary's Hospital, Lacor, Gulu.
iii. Eradication of tsetse flies from the Lake Victoria Basin region of Uganda using Sterile Insect Technique (SIT).
iv. Establishment of thirteen (13) Regional Animal Disease Diagnostic Centres countrywide i.e. Kabale, Kabarole, Hoima, Mbarara, Masaka, Nakasongola, Iganga, Mbale, Soroti, Moroto, Lira, Gulu and Arua.

v. Monitoring Veterinary drug residues in food.
vi. Assessment of groundwater quality and quantity in the Albertine Graben region using isotope hydrology technique.
vii. Feasibility studies on the use of cobalt-60 irradiation source for fish and fruits preservation for the export market.
viii. Building capacity for Non-Destructive Testing (NDT) during construction of the refinery, oil pipelines, railway and power plants.

3.1.8 Promotion of Efficient Utilization of Energy Resources

Energy consumption in Uganda is currently characterised by heavy dependence on traditional biomass resources, which provide approximately 93% of the country's primary energy demand; inadequate electricity supply from the national grid, which supplies about 16% of Ugandans (and about 7% of rural population); an increasing number of household, institutional, commercial and industrial generators, mostly running on imported fossil fuel with low energy efficiency in conversion of fuel energy into electricity; transport patterns that are inefficient, heavily dependent on fossil fuels and with underdeveloped public transport, in particular in urban areas; and inefficient use of energy is having an adverse effect on the environment.

The improved economic growth rates will lead to a further rise in energy demand throughout all sectors, which is likely to deplete the country's current low energy resource base and thus limiting the growth of the economy. In order to counteract this, electricity consumption for lighting in households and other buildings can be reduced by up to 70-80% simply by replacing incandescent bulbs by compact fluorescent lamps (CFLs). In industries which have not adopted an energy management strategy, energy consumption can also be reduced by about 10% just by applying sound managerial practices and good house-keeping measures.

The public transport system in Uganda too is underdeveloped and the mechanical condition of vehicles is generally very poor. In the transport sector, diesel has 17.6% more energy per unit volume than petrol, while highway travel at 90 km/hr. has a better fuel economy than city traffic travel with lower pollution emissions. Lower capacity engines (below 1800 cc) consume less energy, and mass transit vehicles have a higher product of load factor and equivalent passenger distance travelled per unit volume of fuel. If these achievements of energy savings are harnessed, a number of advantages for both the individual consumer and the community are realised including reduction of expenditures on energy services; increase of productivity; and the possibility of providing energy (in all forms) to a greater number of consumers.

The Government of Uganda – in close collaboration with the main stakeholders – commits to undertake all the necessary steps that are required to improve the overall efficiency of energy use in Uganda. This is exhibited in the Energy Policy for Uganda, 2000, whose key areas of concern under this sub-programme are the insufficient awareness among energy end-users about energy conservation possibilities and practices; Lack of incentives, including financial mechanisms to invest in modern, efficient technologies and practices; and inadequate skilled, specialised manpower in energy management.

The strategic objective is to improve the efficiency of utilization of energy resources by at least 10% in Uganda supporting economic growth, ensuring energy security and creating a cleaner environment for

sustainable development in order to reduce GHG emissions, especially at consumer levels (industries, households, commercial buildings) as referred to in the Uganda National Climate Change Policy (UNCCP). In order to achieve this, the government will encourage efficient and sustainable use of energy in industry, commerce, institutions, households, transport and agricultural sectors. This will be achieved through the five strategic actions which will be developed, implemented, monitored and regularly updated under the following 'pillars' of energy efficiency:

(i) Increase awareness regarding energy conservation and energy efficiency;
(ii) Integrate energy aspects in the education curricula and introduce on-job training programmes on energy efficiency in various sectors;
(iii) Promote research and development of appropriate technologies and applications in the efficient use of energy;
(iv) Put in place financing mechanisms to accelerate the dissemination and adoption of energy efficient technologies and practices;
(v) Enact legislation and technical regulations that will promote efficient utilization of energy through efficient technologies and good energy management practices; create new institutions; strengthen capacity of existing institutions; provide local and international networking on energy efficiency.

1) Increase Awareness and Information Dissemination

Awareness is the precursor to wider knowledge and understanding. The government will Increase awareness regarding energy conservation and energy efficiency. This will involve the production, development and promotion of tailored public awareness materials on energy efficiency technologies. This will be achieved by:

(i) The use of rural campaigns providing information in local languages using a variety of forms of public communications, such as posters using illustrations rather than text, the staging of plays with energy efficiency themes, the use of radio and TV broadcasts, etc.
(ii) The design of curricula for pre-primary education, starting at the early stages of children's education.
(iii) The early implementation of these basic strategies to get a broad public understanding of energy efficiency basics.

Heightened awareness about energy efficiency supports the appreciation of the need for switches to better practices, and also speeds up the adoption of such practices.

2) Conduct Education and Training in Energy Efficiency

This will work together with better public awareness about energy efficiency. The government will take advantage of experience in the teaching of other social and science related subjects, and Integrate energy aspects in the education curricula and introduce on-job training programmes on energy efficiency in various sectors. This will feature:

(i) The design of energy efficiency materials for incorporation in courses from primary, secondary right through to tertiary levels, such as colleges and university;
(ii) The Development of appropriate teaching materials;
(iii) The training of trainers in energy efficiency;
(iv) Training of Energy Auditors in Industries
(v) Energy Management Workshops/Conferences in educational Institutions and designated industries

However, targeted training for different groups, mostly regarding demand side management and energy auditing in industry & commerce, public institutions and for energy consultants shall be carried out in the short to medium term.

3) Promote Research and Development in Energy Management in Industrial, Commercial, Agricultural sector, Households, Institutions & and Transport sector

The government will promote research and development of appropriate technologies and applications in the efficient use of energy. This will help to improve energy management in industrial, commercial, agricultural sector, households, institutions & and transport sector. The activities under this strategy will include:

(i) Support of energy management activities in industrial, commercial & agricultural sectors;
(ii) Support of energy management activities in households, institutions & and transport sector;
(iii) Sustainable energy management program in industries (energy awards).

4) Financial Support and Incentives

Meeting the nation's energy requirements in a reliable manner with as low as possible impact on the environment is the highest priority, and improvements in energy efficiency are urgently needed to achieve this as quickly as possible. This in turn demands that enough resources are provided. This is the vital theme that runs through the energy efficiency strategy's implementation period, and will involve:

(i) The preparation of budget proposals for review by MEMD and other relevant stakeholders for the energy sub-sector programme of activities;
(ii) The development of complementary programmes in other sectors that will support energy efficiency improvements, (e.g. promoting use of stabilised bricks and efficient brick kilns in the building sector to reduce amount of energy used in producing burnt bricks);and
(iii) The search for support funding from a variety of external sources.

5) Development of Legislation & Framework

The Energy Efficiency and Conservation Department constitutes of the following divisions, each headed by an Assistant Commissioner, namely: Households, Institutions & Transport Division and the Industry, Commercial & Agricultural Division.

The department plans to achieve the following:

(i) Preparation and implementation of the associated energy efficiency regulations;
(ii) Development and implementation of Energy Efficiency Standards and Labels (EESL);and
(iii) Acquisition of testing equipment to enforce EESL.

3.1.9 Five-Year annualised workplan for the Energy Management, Planning and Infrastructure Development

Table 3: Five-Year annualised workplan for the Energy Management, Planning and Infrastructure Development

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
Objective 1: To Increase Electricity Generation Capacity to drive Economic Development	**Strategy 1.1: Enhancing Electricity Generation Capacity**	(i) Karuma (600MW)	Continue construction	Continue construction	Continue construction	Commissioning	Operational	UEGCL& MEMD
		(ii) Isimba (183MW)	Continue construction	Continue construction	Continue construction	Commissioning	Operational	UEGCL& MEMD
		(iii) Ayago (840MW)	Firm up the consultancy for feasibility study	Mobilise financials	Financial closure	Commence construction	Continue construction	UEGCL& MEMD
		(iv) Small Hydropower Projects[12]	Continue with construction of some projects	Monitor the progress of feasibility studies for ongoing projects and status of plants under the GETFiT project	Commence the Construction at least 2 Small Hydro power projects i.e. Kikagati, Nyamwamba or Muzizi	Continue the Construction	Commissioning	UEGCL MEMD & ERA
		(v) Hybridization of small hydropower projects with PV/other renewables	Continue with construction of some solar projects	Carry out pre-feasibility studies to identify potential pilot plants for resource optimization	Study on grid integration of REs and execute full feasibility studies for the selected plants	Commence the hybridization of selected projects	Project operationalisation	MEMD
Objective 2: To expand the electricity transmission grid network	**Strategy 1.2: Enhancing Electricity Transmission Network**	***a) Completion of the Feasibility, ESIA & RAP Studies and construction of the following Projects***						
		Hoima –Kinyara- Kafu 220kV line;	EPC Contractor procured, Site Hand-over, Detailed Designs and design Reviews	Detailed Designs and design Reviews, Line Profiling,	Stringing, Line Commissioning, Installation of Switchgear, Transformers,	Defects Liability Period	Line operational	UETCL

[12]These Small Hydro Power Projects include Kakaka (7.2MW), Agago/Achwa (88MW), Nengo Bridge (7.5MW), Kabaale: Gas & Test Crude (53MW), Kabalega (9MW), Namugoga solar (50MW), Rwimi (5.5MW), Sindila (5.5MW), Lubilia (5.4MW), Ndugutu (5.1MW), Kinyara (40MW), Nyagak 3 (4.4MW), Nsongezi (35MW), Kabale Peat (33MW), Kakira (32MW), Muzizi (26-52MW), Siti (21.5MW), Maziba (1MW), Kyambura (8.3MW), Kikagati (16MW), Nyamwamba (14MW), Muyembe (10MW), Waki (5MW), and Albatros II (230MW).

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
				Tower spotting, Tower Foundations, Tower Erection, Substation Earthworks, Installation of Switchgear	Protection, communication and SCADA equipment, Testing and Commissioning			
		Nkenda – Mpondwe – Beni 220kV line;	Feasibility Studies, ESIA and RAP Studies, RAP Implementation, Procurement of Supervision Consultant	Procurement of Supervision Consultant, EPC Contractor Procurement	Site Hand-over, Designs and design Reviews, Line Profiling, Tower spotting, Tower Foundations, Substation Earthworks, Installation of Switchgear	Erection, Stringing, Line Commissioning, Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Defects Liability Period	UETCL
		Ayago Interconnection project;	Feasibility Studies, ESIA and RAP Studies, RAP Implementation, Procurement of Supervision Consultant	Procurement of EPC Contractor	Site Hand-over, Designs and design Reviews, Line Profiling, Tower spotting, Tower Foundations, Substation Earthworks, Installation of Switchgear	Erection, Stringing, Line Commissioning, Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Defects Liability Period	UETCL
		Opuyo-Moroto 132kV Line;	Procurement of Supervision Consultant, EPC Contractor Procurement,	Site Hand-over, Designs and, Designs and	Erection, Stringing, Line Commissioning, Installation of	Defects Liability Period		UETCL

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
				design Reviews, Line Profiling, Tower spotting, Tower Foundations, Substation Earthworks, Installation of Substation switchgear	Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning			
		Mirama-Kabale 132kV;	Procurement of Supervision Consultant, EPC Contractor Procurement,	Site Hand-over, Designs and design Reviews, Line Profiling, Tower spotting, Tower Foundations, Substation Earthworks, Installation of Switchgear	Erection, Stringing, Line Transformers and switchgear installation,	Protection, communication and SCADA equipment, Testing and Commissioning	Defects Liability Period	UETCL
		Kikagati – Mirama-Nsongezi 132kV line;	Feasibility study	Supervision consultant procurement, EPC Contractor Procurement, Site Hand-over, Designs and design Reviews, Erection, Line Profiling, Tower spotting,	Tower spotting, Tower Foundations, Erection, Stringing, Substation Earthworks, Installation of Switchgear,	Transformers, Protection, communication and SCADA equipment, Testing and Commissioning ,	Defects Liability Period	UETCL
		Bulambuli (Atari)-	Feasibility Studies,	EPC	Tower spotting,	Transformers,	Defects Liability	UETCL

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
		Mbale Industrial parks 132kV line;	ESIA and RAP Studies, RAP Implementation	Contractor Procurement, Site Hand-over, Designs and design Reviews, Erection, Line Profiling, Tower spotting,	Tower Foundations, Erection, Stringing, Substation Earthworks, Installation of Switchgear.	Protection, communication and SCADA equipment, Testing and Commissioning	Period	
		Lira-Gulu-Agago 132kV line.	Feasibility Studies, ESIA and RAP Studies, RAP Implementation, Procurement of EPC Contractor	Site Hand-over, Detailed Designs and design Reviews, Line Profiling, Pole spotting, Pole Erection, Substation Earthworks, Installation of Switchgear	Erection, Stringing, Commissioning, Substation Earthworks, Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Defects Liability Period		UETCL
		Lira – Gulu – Nebbi – Arua 132kV line;	Feasibility studies, ESIA & RAP Concluded	Procurement of Supervision Consultant	Procurement of EPC Contractors, Site Hand-over, Designs and design Reviews, Line Profiling, Tower spotting, Substation Earthworks	Tower spotting, Tower Foundations, Erection, Stringing, commissioning, Substation Earthworks, Installation of Switchgear,	Transformers, Protection, communication and SCADA equipment, Testing and Commissioning, Defects Liability Period	UETCL
		Masaka-Mbarara 220kV line;	Feasibility studies, ESIA & RAP Concluded	Procurement of Supervision Consultant, Procurement of EPC Contractors,	Tower spotting, Tower Foundations, Erection, Stringing, commissioning,	Transformers, Protection, communication and SCADA equipment, Testing and	Defects Liability Period	UETCL

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
				Site Hand-over, Designs and design Reviews, Line Profiling, Tower spotting, Substation Earthworks	Substation Earthworks, Installation of Switchgear,	Commissioning		
		Masaka-Mwanza 220kV Line;	Update of Feasibility studies, ESIA & RAP	RAP implementation	Procurement of Supervision Consultant,	Procurement of EPC Contractors, Site Hand-over, Designs and design Reviews, Line Profiling, Tower spotting, Substation Earthworks	Tower spotting, Tower Foundations, Erection, Stringing, commissioning, Substation Earthworks, Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	UETCL
		Kawanda – Bombo 132kV line.	Feasibility studies, ESIA & RAP Studies	Conclusion of Feasibility studies, ESIA & RAP Studies	RAP implementation, Procurement of EPC Contractors,	Site Hand-over, Designs and design Reviews, Line Profiling, Tower spotting, Substation Earthworks	Tower spotting, Tower Foundations, Erection, Stringing, commissioning, Substation Earthworks, Installation of Switchgear, Transformers, Protection, communication	UETCL

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
							and SCADA equipment, Testing and Commissioning	
		Nalubaale – Lugazi 132kV;	Commencement of Feasibility studies, ESIA & RAP	Continue with Feasibility studies, ESIA & RAP	Completion of feasibility studies, Procurement of Supervision Consultant	Procurement of EPC Contractors	Tower spotting, Tower Foundations, Erection, Stringing, commissioning,	UETCL
		Karuma- Nimule-Juba 400kV;	Feasibility studies, ESIA & RAP Commenced	Completion of feasibility studies, Procurement of Supervision Consultant	Sourcing of financing and financial closure	Procurement of EPC Contractors, Site Hand-over, Designs and design Reviews, Line Profiling, Tower spotting, Substation Earthworks	Tower spotting, Tower Foundations, Erection, Stringing, commissioning, Substation Earthworks, Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	UETCL
		Mutundwe-Kabulasoke-Nkenda 220kV	Feasibility studies, ESIA & RAP Commenced	Feasibility studies, ESIA & RAP Continues	Feasibility studies, ESIA & RAP Completed	Procurement of EPC Contractors, Site Hand-over, Designs and design Reviews, Line Profiling, Tower spotting, Substation Earthworks	Commissioning	UETCL
		*b) **Construction of the following Transmission Lines and associated substations***						

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
		Mbarara – Mirama – Birembo 220kV line;	Tower spotting, Tower Foundations, Tower Erection, Substation Earthworks, Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Construction on going	Construction on going	Commissioned and under Defects Liability Period	Commissioned and under Defects Liability Period	UETCL
		Kawanda – Masaka 220kV line (Under ESDP);	Contract signing, Site Hand-over, Detailed Designs and design Reviews, Line Profiling, Line Profiling, Complete tower spotting, start foundation,	Tower Erection, Substation Earthworks, Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Construction on going	Commissioned and under Defects Liability Period	Commissioned and under Defects Liability Period	UETCL
		Nkenda – Fort Portal – Hoima 220kV line;	Site Hand-over, Detailed Designs and design Reviews, Line Profiling	Tower spotting, Tower Foundations, Tower Erection, Substation Earthworks, Installation of Switchgear	Tower Erection, Stringing, Line Commissioning, Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Commissioned and under Defects Liability Period	Commissioned and under Defects Liability Period	UETCL
		Tororo – Opuyo – Lira 132kV line;	Tower Erection, Stringing,	Stringing, Line,	Commissioned and under	Commissioned and under	Commissioned and under	UETCL

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
		Mbarara – Nkenda 132kV line;	Substation Earthworks, Installation of Switchgear, Installation of Switchgear, Transformers, Protection, communication and SCADA equipment	Testing and Commissioning	Defects Liability Period	Defects Liability Period	Defects Liability Period	
		Bujagali switchyard upgrade to 220kV;	Substation Earthworks, Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Commissioned and under Defects Liability Period	Commissioned and under Defects Liability Period	Operational	Operational	UETCL
		Industrial Parks of Namanve South, Luzira, Mukono and Iganga substations.	Site Hand-over, Detailed Designs and design Reviews, Line Profiling, Tower spotting, Tower Foundations, Tower Erection, Substation Earthworks, Installation of Switchgear	Tower Erection, Stringing, Line Commissioning, Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Line Commissioning	Commissioned and under Defects Liability Period	Commissioned and under Defects Liability Period	UETCL
		*c) **Construction of the following Generation Stations Interconnection Lines***						
		Isimba Interconnection project;	Site Hand-over, Detailed Designs and design Reviews,	Detailed Designs and design Reviews, Line Profiling, Tower spotting,	Tower spotting, Tower Foundations, Tower Erection, Substation Earthworks, Installation of	Stringing, Line Commissioning, Installation of Switchgear, Transformers, Protection,	Defect Liability Period	UETCL

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
				Substation Earthworks,	Switchgear	communication and SCADA equipment, Testing and Commissioning		
		Karuma Interconnection project;	Site Hand-over, Detailed Designs and design Reviews,	Detailed Designs and design Reviews, Line Profiling, Tower spotting, Substation Earthworks,	Tower spotting, Tower Foundations, Tower Erection, Substation Earthworks, Installation of Switchgear	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning of facilities	Defect Liability Period	UETCL
		Mutundwe- Entebbe 132kV line;	Procurement of EPC Contractor, Site Hand-over, Detailed Designs and design Reviews	Line Profiling, Tower spotting, Tower Foundations, Tower Erection, Substation Earthworks, Installation of Switchgear	Stringing, Line Commissioning, Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Defect Liability Period	Defect Liability Period	UETCL
		Upgrade of Lugogo and Mutundwe substations;	Completion of Feasibility Studies, Feasibility Studies, ESIA and RAP Studies, RAP Implementation, Procurement of EPC Contractor	Substation Earthworks, Installation of Switchgear	Installation of Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Defects Liability Period	Defect Liability Period	UETCL
		Upgrade of Queensway substation;	Feasibility Studies, ESIA and RAP Studies, RAP Implementation	Procurement of EPC Contractor, Site Hand-over, Detailed Designs and	Substation Earthworks, Installation of Switchgear, Transformers, Protection,	Commissioned and under Defects Liability Period	Operational	UETCL

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
				design Reviews	communication and SCADA equipment, Testing and Commissioning			
		Kabulasoke-Kiboga-Hoima 132kV.	Feasibility Studies, ESIA and RAP Studies, RAP Implementation, Procurement of EPC Contractor	Site Hand-over, Detailed Designs and design Reviews, Line Profiling, Pole spotting, Pole Erection, Stringing, Line Commissioning, Substation Earthworks, Installation of Switchgear	Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Defects Liability Period	Operational	UETCL
		d) Upgrading of the following Substations in different parts of the Country						
		Nkenda substation, Lugazi substation, Lira substation, Kawanda substation upgrade and new substation at Mbale.	Feasibility Studies, ESIA and RAP Studies, RAP Implementation, Procurement of EPC Contractor	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Defects Liability Period	UETCL
		Tororo substation transformer 132/33kV, 32/40MVA;	Feasibility Studies, ESIA and RAP Studies, RAP Implementation, Procurement of EPC Contractor	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissionin	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Defects Liability Period	Defects Liability Period	UETCL

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
				g				
		Kampala North substation upgrade;	Feasibility Studies, ESIA and RAP Studies, RAP Implementation, Procurement of EPC Contractor	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Defects Liability Period	Defects Liability Period	UETCL
		Namanve south substation	Feasibility Studies, ESIA and RAP Studies, RAP Implementation, Procurement of EPC Contractor	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Installation of Capacitor Bank, Testing and Commissioning	Defects Liability Period	UETCL
		Kabulasoke, Nkonge, Nkenda, Opuyo, Lugazi and Kawaala substations	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissioning	Defects Liability Period	UETCL
		Lira substation 132/33kV,32/40MVA;	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment	Installation of Switchgear, Transformers, Protection, communication and SCADA equipment, Testing and Commissionin	Testing and Commissioning	Defects Liability Period	Defects Liability Period	UETCL

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
				g				
Expand the electricity transmission grid network	**Strategy 1.3: Enhancing Electricity Distribution Capacity**	i) Continue the Electrification Project through the prepayment metering	Connection of 1000 customer on prepayment system	Connection of 1500 on prepayment system	Connection of 2000 customers on pre-payment	Connection of 2500 on prepayment System	Connection of 3000 on prepayment system	UEDCL; REA financed
		West Nile Grid Extension project	Completion of 20% of the project	Complete construction up to 40%	Complete construction up to 60%	Complete construction up to 80%	Complete construction up to 100%	UEDCL, kfw and GoU financed
Expand the electricity transmission grid network and Improve Energy Efficiency.		Extension of Distribution power Lines in Masaka and Rakai Districts	Complete the project 20%	Complete construction up to 40%	Complete construction up to 60%	Complete construction up to 80%	Complete construction up to 100%	UEDCL, GoU financed
		Extensions of Distribution Power lines in Bunyangabu County, Kabarole District	Continue with LV networks across the country	Continue with LV networks across the country	Continue with LV networks across the country	Continue with LV networks across the country	Continue with LV networks across the country	UEDC ,Financed by GoU
		Power line extension in Fort Portal Municipality	Continue with LV networks across the country	Continue with LV networks across the country	Continue with LV networks across the country	Continue with LV networks across the country	Continue with LV networks across the country	
		Other Distribution power line extension projects		Complete 100km of MV distribution lines and 100km of LV distribution lines using	Complete 100km of MV distribution lines and 100km of LV distribution lines using ABC on LV	Complete 100km of MV distribution lines and 100km of LV distribution lines using ABC on LV	Complete 100km of MV distribution lines and 100km of LV distribution lines using ABC on LV	Financed by GoU and implemented by UEDCL

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
				ABC on LV				
		ii) Replacing of Low Voltage open cables with aerial bundled cables (ABCs); and,	Continue with LV networks across the country	Continue with LV networks across the country	Continue with LV networks across the country	Continue with LV networks across the country	Continue with LV networks across the country	UMEME
		iii) Refurbishing of all Medium Voltage Low Voltage lines to minimise technical losses.	Continue with LV networks across the country	Continue with LV networks across the country	Continue with LV networks across the country	Continue with LV networks across the country	Continue with LV networks across the country	UMEME
		iv) Replacement of post-paid meters with pre-paid meters	Continue with the Replacement of post-paid meters with pre-paid meters	Continue with the Replacement of post-paid meters with pre-paid meters	Continue with the Replacement of post-paid meters with pre-paid meters	Continue with the Replacement of post-paid meters with pre-paid meters	Continue with the Replacement of post-paid meters with pre-paid meters	UMEME
		v) Feeder upgrades and substations	Continue with feeder upgrades and substations	Continue with feeder upgrades and substations	Continue with feeder upgrades and substations	Continue with feeder upgrades and substations	Continue with feeder upgrades and substations	UMEME
		2. Pole Plant production	-Introduce kiln drier -Ability to produce 30,000 poles	Introduce a 2nd line of production -Ability to produce 40,000 poles	Construct a concrete production plant	Construct a concrete production plant	Construct a concrete production plant	UEDCL
		3. Mini hydro Generation	Procure the contractor and start the construction activities	70% of the project completed	100 % of the project completed	100 % of the project completed	100 % of the project completed	Financed by Kfw and AND GoU implemented by UEDCL
		4. Lease and	Monitoring and	Monitoring	Monitoring	Monitoring	Monitoring and	UEDCL

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
		Assignment agreement with UMEME	Enforcement of Compliance – LAA Umeme Ltd	and Enforcement of Compliance – LAA Umeme Ltd	and Enforcement of Compliance – LAA Umeme Ltd	and Enforcement of Compliance – LAA Umeme Ltd	Enforcement of Compliance – LAA Umeme Ltd	
		5. Capacity Building	Improved staff performance	Improved staff performance	Improved staff performance	Improved staff performance	Improved staff performance	
		6. Safety	Improved safety to zero fatality	Improved safety to zero fatality	Improved safety to zero fatality	Improved safety to zero fatality	Improved safety to zero fatality	UMEME
		7. Load growth	Install more load growth centres	Install more load growth centres	Install more load growth centres	Install more load growth centres	Install more load growth centres	UMEME
		8. Reliability and quality of supply improvement	Reliability and quality of supply improvement	Reliability and quality of supply improvement	Reliability and quality of supply improvement	Reliability and quality of supply improvement	Reliability and quality of supply improvement	UMEME
		9. Business efficiency improvement	Business efficiency improvement	Business efficiency improvement	Business efficiency improvement	Business efficiency improvement	Business efficiency improvement	UMEME
	Strategy 1.4: Promoting Energy Penetration to Rural Areas	**(i)** On-grid Service Expansion	***Establishment of Service Territories and ESPs;*** - Develop service territory concessions - Develop construction work plans - Finalise service territory boundaries - Complete service territory master plans - Carry out concession	***Establishment of Service Territories and ESPs;*** - Develop construction work plans - Finalise service territory boundaries - Complete service territory	***Establishment of Service Territories and ESPs;*** - Carry out ESP support and advisory activities	***Establishment of Service Territories and ESPs;*** - Carry out ESP support and advisory activities	***Establishment of Service Territories and ESPs;*** - Carry out ESP support and advisory activities	MEMD

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
			solicitation award procedure - Promulgate ESP concession licenses - Develop/Execute ESP financing agreements/leases - Ongoing ESP construction financing - Carry out ESP support and advisory activities	master plans - Carry out concession solicitation award procedure - Promulgate ESP concession licenses - Develop/Execute ESP financing agreements/leases - Ongoing ESP construction financing - Carry out ESP support and advisory activities				
		(ii) Off-grid Service Expansion	***Off Grid Electrification and Other tasks;*** - Continue on-grid distribution construction - Develop public information campaign - Revise REA's engineering design and construction standards - Develop rural power	***Off Grid Electrification and Other tasks;*** - Continue on-grid distribution construction	Promote Off-grid Service Expansion	Promote Off-grid Service Expansion	Promote Off-grid Service Expansion	MEMD

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
			development program					
		Mini-grid Service Expansion	Continue development and Implementation of mini-grids projects	Continue development and Implementation of mini-grids projects	Continue development and Implementation of mini-grids projects	Continue development and Implementation of mini-grids projects	Continue development and Implementation of mini-grids projects	MEMD/ERA
		Solar PV (PVTMA)	- Implement PVTMA - Devise/test Solar PV Program Modifications	- Implement PVTMA - Devise/test Solar PV Program Modifications	- Implement PVTMA	- Implement PVTMA	- Implement PVTMA	REA/MEMD
		Rural Power Development	***Program Transition;*** - Implement transition Plan - Implement interim distribution operator contracts	***Program Transition;*** - Implement transition Plan - Implement interim distribution operator contracts	Implement interim distribution operator contracts	Implement interim distribution operator contracts	Implement interim distribution operator contracts	PSFU/MEMD/REA
To Improve the policy, legal and institutional Framework.		**(iii)** Institutional Reforms	***Development of Legal and Regulatory Enabling Systems;*** - Develop and promulgate new REA Incorporation documents - Adopt new electric cooperative by-laws ***Reform of REA Structures*** - Develop REA Board Policies - Establish Board Committees	***Formulate and implement RE monitoring and Evaluation methodology***	***Formulate and implement RE monitoring and Evaluation methodology***	***Formulate and implement RE monitoring and Evaluation methodology***	***Formulate and implement RE monitoring and Evaluation methodology***	MEMD

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
			- Draft critical path RE operating procedures - Develop first Annual RE Plan - Conduct first annual national rural electrification stakeholders conference ***Formulate and implement RE monitoring and Evaluation methodology***					
Promoting Renewable energy and energy efficiency	**Strategy 1.5: Promoting New and Renewable Energy**	*(i) Funding support to UECCC* • Provide Technical Assistance (TA) and funding support for early stage project development to Independent power Producers (IPPs)	Offer TA for early stage project development to 6 IPPs	Offer TA for early stage project development to 6 IPPs	Offer TA for early stage project development to 6 IPPs	Offer TA for early stage project development to 6 IPPs	Offer TA for early stage project development to 6 IPPs	MEMD UECCC/PFIs
		• Provide programme implementation support to Participating Financial Institutions (PFIs)	Offer implementation support to 2 PFIs	Offer implementation support to 2 PFIs	Offer implementation support to 2 PFIs	Offer implementation support to 2 PFIs		UECCC
		• Provide end user financing through PFIs for Solar systems acquisition.	Provide Solar Refinance to 2 PFIs for on lending for solar acquisition	Provide Solar Refinance to 1 PFI on lending for solar acquisition	Provide Solar Refinance to 1 PFI on lending for solar acquisition	Provide Solar Refinance to 1 PFI on lending for solar acquisition	Provide Solar Refinance to 1 PFI on lending for solar acquisition	UECCC

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
		• Provide end user financing for connecting to grid electricity.	Provide Connection refinance to 2 energy cooperatives to finance connections to the grid	Provide Connection refinance to 2 energy cooperatives to finance connections to the grid	Provide Connection refinance to 2 energy cooperatives to finance connections to the grid	Provide Connection refinance to 2 energy cooperatives to finance connections to the grid	Provide Connection refinance to 2 energy cooperatives to finance connections to the grid	UECCC
		• Put in place an end user financing mechanism for acquisition of domestic biogas systems and modern cook stoves. million is required to	Design Biogas refinance programme Provide biogas refinance to 2 PFIs for on lending for domestic biogas system acquisition	Provide biogas refinance to 2 PFIs for on lending for domestic biogas system acquisition	Provide biogas refinance to 2 PFIs for on lending for domestic biogas system acquisition	Provide biogas refinance to 2 PFIs for on lending for domestic biogas system acquisition	Provide biogas refinance to 2 PFIs for on lending for domestic biogas system acquisition	UECCC
		• Put in place a Partial Risk Guarantee (PRG) to partially cover the default risk of the working capital loans offered to Solar Vendors by PFIs	Design the PRG Provide PRG to 3 solar Vendors	Provide PRG to 3 solar Vendors	Provide PRG to 3 solar Vendors	Provide PRG to 3 solar Vendors	Provide PRG to 3 solar Vendors	UECCC
		• Continue to mobilise resources from Development Partners for renewable energy development.	Continue to mobilise resources from Development Partners for renewable energy development.	Continue to mobilise resources from Development Partners for renewable energy development.	Continue to mobilise resources from Development Partners for renewable energy development.	Continue to mobilise resources from Development Partners for renewable energy development.	Continue to mobilise resources from Development Partners for renewable energy development.	UECCC

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
		• Set up a Programme of Activities (PoA) under the Clean Development Mechanism (CDM) for hydropower generation projects	Set up a PoA under the Clean Development Mechanism (CDM) for hydropower generation projects	Implement PoA for hydropower generation projects	Implement PoA for hydropower generation projects	Implement PoA for hydropower generation projects	Implement PoA for hydropower generation projects	UECCC
		(ii) Promote and implement projects on solar and wind energy generation	• Review of the policies and regulation on the licensing of large solar PV systems for on grid connection and Mini grid. • Develop a strategy for sustaining the Continue performance of solar energy installation in government school and health unit. • Review and implementation of solar standards in collaboration with UNBS	Promote and implement projects on solar and wind energy generation	Promote and implement projects on solar and wind energy generation	Promote and implement projects on solar and wind energy generation	Promote and implement projects on solar and wind energy generation	MEMD/DP
		(iii) Promotion and dissemination of biogas system	• Standards developed for biogas; • Promote the adoption of bio-latrine technology in education institutions and prisons • Support the establishment of large scale biogas systems for electricity generation • support establishment of institutional and	• Standards developed for biogas; • Promote the adoption of bio-latrine technology in education institutions and prisons • Support the establishme nt of large scale biogas	• Standards developed for biogas; • Promote the adoption of bio-latrine technology in education institutions and prisons • Support the establishment of large scale biogas	• Standards developed for biogas; • Promote the adoption of bio-latrine technology in education institutions and prisons • Support the establishment of large scale biogas	• Standards developed for biogas; • Promote the adoption of bio-latrine technology in education institutions and prisons • Support the establishment of large scale biogas systems	Modern Biomass Energy Project; SNV

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
			domestic biogas	systems for electricity generation • Support establishment of institutional and domestic biogas	systems for electricity generation • Support establishment of institutional and domestic biogas	systems for electricity generation • Support establishment of institutional and domestic biogas	for electricity generation • Support establishment of institutional and domestic biogas	
		(iv) Promotion and dissemination of gasification systems	• Scale up the operations of recently refurbished Nyabyeya gasifiers; • Support the installation of small scale gasifier units at community and institutional level for electricity generation for communities far from the grid. • Conduct research and development to localize the gasification technologyConduct research and development to localize the gasification technology	Promotion and dissemination of gasification systems across the country	Promotion and dissemination of gasification systems across the country	Promotion and dissemination of gasification systems across the country	Promotion and dissemination of gasification systems across the country	Modern Biomass Energy Project/MEMD
		(v) Promotion and development of biofuel production	• Produce and implement a Biofuels Act • Provide the technical support to the energy Multi-function platforms • Promote the growing	Table Biofuels bill for enactment by parliament into an Act	Promotion and development of biofuel production	Promotion and development of biofuel production	Promotion and development of biofuel production	Modern Biomass Energy Project

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
			of energy crops for biofuels production • Develop a Biofuels laboratory					
		(vi) Improved Cook stove Promotion	• Enhanced marketing strategy for up scaling stove dissemination	Enhanced marketing strategy for up scaling stove dissemination	Enhanced marketing strategy for up scaling stove dissemination	Enhanced marketing strategy for up scaling stove dissemination	Enhanced marketing strategy for up scaling stove dissemination	Modern Biomass Energy Project/GIZ
		(vii) Promotion and dissemination of kilns, ovens and improved stoves	• Create financing Mechanisms. Develop financial incentives to facilitate the development and promotion of improved energy technology. • Training at various levels - for the kilns, ovens, and stoves. • Set up demonstrations of various units, and awareness campaigns targeting the stakeholders. • Formation of charcoal producers and marketing associations. The associations could also be used by support agencies to reach the industry actors easily • Establish curriculum on stove, kilns, and oven making. • Promote adoption of improved institutional kilns, oven, and	Promotion and dissemination of kilns, ovens and improved stoves	Promotion and dissemination of kilns, ovens and improved stoves	Promotion and dissemination of kilns, ovens and improved stoves	Promotion and dissemination of kilns, ovens and improved stoves	Modern Biomass Energy Project/GIZ

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
			stoves in all educational institutions, hospitals, and prisons					
		(viii) Sustainable production and supply of biomass energy through energy farming	• Establishment of an energy crop demonstration farms for Biofuels, firewood and charcoal production • Promotion of energy crop farming f or fuel use for households on hedgerows, and through agroforestry	Sustainable production and supply of biomass energy through energy farming	Sustainable production and supply of biomass energy through energy farming	Sustainable production and supply of biomass energy through energy farming	Sustainable production and supply of biomass energy through energy farming	MEMD
		(ix) Promotion of waste to energy technologies	• Awareness creation on waste management using briquetting and biogas technology. • Strengthen private sector dealing in waste to energy technologies. • Demonstration of biogas and briquetting technologies in all regions of Uganda	Promotion of waste to energy technologies	Promotion of waste to energy technologies	Promotion of waste to energy technologies	Promotion of waste to energy technologies	Modern Biomass Energy Project; GEF Project on Charcoal
		(x) Establish a Research, Development and Testing facility on biomass and other renewable technologies	• Research/ Development and Testing facility	Continue with Research, Development and Testing facility on biomass and other renewable technologies	Continue with Research, Development and Testing facility on biomass and other renewable technologies	Continue with Research, Development and Testing facility on biomass and other renewable technologies	Continue with Research, Development and Testing facility on biomass and other renewable technologies	MEMD
		(xi) Briquetting Technology	Briquetting Technology	Briquetting Technology	Briquetting Technology	Briquetting Technology	Briquetting Technology	MEMD

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
		Promotion	Promotion	Promotion	Promotion	Promotion	Promotion	
		(xii) Mini Hydro Development and Promotion	Mini Hydro Development and Promotion	Mini Hydro Development and Promotion	Mini Hydro Development and Promotion	Mini Hydro Development and Promotion	Mini Hydro Development and Promotion	MEMD
		(xiii) Mainstream energy activities into district development plans of DLGs	• Pilot mainstreaming of energy in Lango and West Nile sub regions • Scale up mainstreaming of energy activities in all sub regions of Uganda.	Scale up mainstreaming of energy activities in all sub regions of Uganda.	Scale up mainstreaming of energy activities in all sub regions of Uganda.	Scale up mainstreaming of energy activities in all sub regions of Uganda.	Scale up mainstreaming of energy activities in all sub regions of Uganda.	MEMD/LGs
		(xiv) Review of the Renewable Energy Policy and related standards, regulations, and laws	• Review of Renewable energy policy; • Formulate law on biofuels; • Finalise Standards on Cook stoves	Continue with implementation of the renewable energy policy, mobilize stakeholder for biogas standards	Renewable Energy standards, regulations, and laws in place	Renewable Energy standards, regulations, and laws in place	Renewable Energy standards, regulations, and laws in place	MEMD
	Strategy 1.6: Atomic Energy Regulation	a. Strengthening the Atomic Energy Regulatory Infrastructure	-Master plan for developing Mpoma Land prepared. -Preparation of Human Resource Development Programme initiated -Enforcement policy developed -Radiation safety communication strategy developed -Safety guides for nuclear medicine drafted -Radiation detection and protection equipment acquired -Two field vehicles	▪ National Radiation Protection Laboratory designed ▪ Human Resource Development Program completed ▪ Regulations for siting nuclear installations drafted. ▪ Radiation detection and	▪ Design of AEC Administration Tower completed ▪ Construction of National Radiation Protection Laboratories completed. ▪ Design of orphan and illicit sources bunker completed. ▪ East African Community	▪ Construction of AEC Administration Tower initiated. ▪ Construction of orphan and illicit sources bunker completed. ▪ ICT infrastructure (Network, Hardware & Software, Data Management	▪ Construction of AEC Administration Tower completed ▪ ICT infrastructure (Network, Hardware & Software, Data Management Systems) completed ▪ East African Community Regulatory Charter	MEMD

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
			acquired. -Five (05) technical staff recruited. -Two (02) technical staff pursues postgraduate training in radiation protection field.	protection equipment maintenance and calibrated. ▪ Atomic Energy Council Secretariat restructured. ▪ Four field vehicles acquired. -Ten (10) technical staff recruited -Eight (08) technical staff pursues postgraduate training in radiation protection field.	Regulatory Charter initiated ▪ Standards for siting nuclear installations drafted ▪ Safety guides for Oil well logging developed ▪ Radiation detection and protection equipment maintenance and calibrated. Ten (10) technical staff recruited. Twelve (12) technical staff pursues postgraduate training in radiation protection field.	Systems) initiated ▪ East African Community Regulatory Charter drafted ▪ Codes for siting nuclear installations drafted. ▪ Radiation detection and protection equipment maintenance and calibrated. Ten (10) technical staff recruited Ten (10) technical staff pursues postgraduate training in radiation protection field.	developed ▪ Regulatory Re-engineering/Reviews conducted ▪ Safety guides for NORMS developed ▪ Safety guides for siting nuclear installations drafted.. ▪ Radiation detection and protection equipment maintenance and calibrated. Five (05) technical staff recruited Eight (08) technical staff pursues postgraduate training in radiation protection field.	
		b) Expansion of Radiation Dosimetry Services	50% of radiation workers registered and monitored. -Harshaw 6600 Automated TLD System operationalized. One (01) dosimetry service provider authorized.	-60% of radiation workers registered and monitored. -Harshaw 6600 Automated TLD System maintained.	-70% of radiation workers registered and monitored. -Harshaw 6600 Automated TLD System maintained. -One (01)	-80% of radiation workers registered and monitored. -Harshaw 6600 Automated TLD System maintained. One (01)	-90% of radiation workers registered and monitored. -Harshaw 6600 Automated TLD System maintained. -One (01) dosimetry service	MEMD/AEC

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
			2, 400 TLDs acquired, calibrated and distributed. Two (02) staff recruited and trained on occupational exposure control.	One (01) dosimetry service provider authorized. 2, 400 TLDs acquired, calibrated and distributed. Two (02) staff recruited and trained on occupational exposure control.	dosimetry service provider authorized. -2, 400 TLDs acquired, calibrated and distributed. 40% underground miners monitored.	dosimetry service provider authorized. -2, 400 TLDs acquired, calibrated and distributed. 60% underground miners monitored.	provider authorized. -2, 400 TLDs acquired, calibrated and distributed. 80% underground miners monitored.	
		c) Developing a National Radiological Emergency Preparedness and Response Capability	▪ Establishment of National Radiological Emergency Preparedness and Response Plan (NREPRP) initiated. ▪ Emergency kits/Equipment procured. ▪ 20 Radiation injury Emergence Doctors, Police, UPDF, technical team trained. ▪ A 24 Hr emergency line established and operational. ▪ Development of Emergency Guidelines initiated.	▪ Establishment of National Radiological Emergency Preparedness and Response Plan (NREPRP) completed. ▪ Design of National Radiological Emergency Preparedness and Response Centre completed. ▪ One Emergency Mobile Van acquired.	▪ Construction of National Radiological Emergency Preparedness and Response Centre initiated. ▪ Radiological emergency drills with stakeholders conducted annually. ▪ 10Radiation injury Emergence Doctors, Police, UPDF, technical team trained ▪ A 24 Hour emergency line	▪ Construction of National Radiological Emergency Preparedness and Response Centre completed. ▪ Radiological emergency drills with stakeholders conducted annually. ▪ Public Health alerts and Readiness Measures Disseminated ▪ A 24 Hour emergency line maintained.	▪ Three (3) Regional Radiological Emergency Centres (Mbarara, Jinja and Gulu) designated. ▪ Radiological emergency drills with Stakeholders conducted annually. ▪ Public Health alerts and Readiness Measures Disseminated ▪ A 24 Hour emergency line maintained.	MEMD/AEC

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
				▪ Emergency kits/Equipment acquired. ▪ 20 Radiation injury Emergence Doctors, Police, UPDF, technical team trained ▪ A 24 Hour emergency line maintained ▪ Development of Emergency Guidelines completed.	maintained.			
		d) Strengthening Regulatory Control of Radiation Sources	• Radiation surveillance systems installed at Busia border point. • 50% of the sources have authorization. • 50% facilities inspected regularly. • Regulatory Authority Information System maintained • Search and secure of orphan sources in Central Uganda completed	• Radiation surveillance systems installed at Malaba border point. • 70% of the sources have authorization. • 60% facilities inspected regularly. • 50% of non-compliance enforced.	• Radiation surveillance systems installed at Mpondwe border point. • 80% of the sources have authorization. • 70% facilities inspected regularly. • 60% of non-compliance enforced. • Regulatory Authority Information	• Radiation surveillance systems installed at Paidha border point. • 90% of the sources have authorization. • 90% facilities inspected regularly. • 70% of non-compliance enforced.	• 100% of the sources have authorization. • All facilities inspected regularly. • 80% of non-compliance enforced. • Regulatory Authority Information System maintained	MEMD/AEC

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
				• Regulatory Authority Information System maintained • Search and secure of orphan sources in Eastern Uganda completed	System maintained • Search and secure of orphan sources in Northern Uganda completed	• Regulatory Authority Information System maintained • Search and secure of orphan sources in Western Uganda completed		
	Sub-programme 1.7: Promotion and Development of Nuclear Energy	i) Nuclear Power Infrastructure Development	-Survey of potential sites for nuclear power development completed. -Study on integrating nuclear power in the generation capacity plan completed. -Review of existing policy, legal and institutional framework related to nuclear energy development completed. -Preparation of Local Industrial Involvement plan completed. -Human resources development plan for nuclear power project coordination and implementation prepared. -Consultations on draft Nuclear Energy Policy for Uganda conducted -Short training courses on nuclear energy for 20 staff from MDAs	-Nuclear Power Roadmap for Uganda completed -Nuclear Energy Policy for Uganda finalised. -Nuclear Energy Bill initiated -Two Nuclear Energy Unit staff sponsored to pursue postgraduate studies in nuclear related field. -Second regional sensitization workshop conducted.	-Nuclear Energy Bill completed. -Two Nuclear Energy Unit staff sponsored to pursue postgraduate studies in nuclear related field. -Nuclear Power Communication strategy developed. A plan for regional and international cooperation prepared -Third regional sensitization workshop conducted.	-Feasibility studies for the first nuclear power project initiated. - Evaluation of Potential site for nuclear power development initiated. -Two Nuclear Energy Unit staff sponsored to pursue postgraduate studies in nuclear related field. -Fourth regional sensitization workshop conducted.	-Feasibility study for the first nuclear power project completed. - Evaluation of Potential site for nuclear power development completed. -Two Nuclear Energy Unit staff sponsored to pursue postgraduate studies in nuclear related field. -Second opinion polls conducted -Fifth regional sensitization workshop conducted.	NEU/MEMD

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
			conducted. -Study tours for 20 targeted staff from Government MDAs conducted in countries with nuclear power. -Nuclear Information Centre established. -First regional sensitization workshop conducted.					
		ii) Sustainable Development of Nuclear Fuel Resources	-Design of a Uranium Analytical Laboratory completed.. -Development of nuclear fuel supply strategy initiated. -Uranium exploration and evaluation monitored.	Establishment of a Uranium Analytical Laboratory completed.. -Development of nuclear fuel supply strategy completed. Development of Uranium Resource Management bill initiated. -Uranium exploration and evaluation monitored.	-Development of Uranium Resource Management bill completed. -Uranium exploration and evaluation monitored.	-Preparation of Uranium development communication strategy initiated. -Uranium exploration and evaluation monitored -	-Preparation of Uranium development communication strategy completed.. -Uranium Production Feasibility studies initiated. -Uranium exploration and evaluation monitored.	NEU
		iii)Strengthening Management of Radioactive Waste	Assessment of all existing and projected radioactive waste and spent fuel volumes in the country completed.	Development of a radioactive waste management strategy initiated Feasibility studies for establishment of a National	Development of a radioactive waste management strategy completed. Siting and Engineering Designs for National Radioactive	Construction of a National Radioactive Waste Management Facility initiated.	Construction of a National Radioactive Waste Management Facility completed.	NEU

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
				Radioactive Waste Management Facility completed	Waste Management Facility completed.			
		iv) Support to Other Peaceful Uses of Nuclear Technology	- Construction of a new radiotherapy facility at Uganda Cancer Institute initiated. - Feasibility studies on the use of cobalt-60 irradiation source for fish and fruit preservation for export market initiated. - Strengthening of the Food Monitoring Facilities at UNBS initiated. -Tsetse mass rearing continued. - Tsetse suppression continued. - -Participation in IAEA Annual General Conference. - Short training course on nuclear energy conducted for two NEU staff.	- Construction of a new radiotherapy facility at Uganda Cancer Institute completed. - Development of Regional Radiotherapy and Nuclear Medicine Centres at Mbarara, Mbale and Gulu initiated. - Feasibility studies on the use of cobalt-60 irradiation source for fish and fruit preservation for export market completed. - Strengthening of the Food Monitoring Facilities at UNBS completed.	-Development of Regional Radiotherapy and nuclear Medicine Centres at Mbarara, Mbale and Gulu completed. -Establishment of Regional Animal Disease Diagnostic Centres in Kabale, Kabarole, Hoima, Mbarara, Masaka, and Nakasongola completed. -Two MoWT staff trained in Non-Destructive Testing (NDT) technique. -Assessment of groundwater quality and quantity in the Albertine Graben region initiated. -Sterile Male	- Construction of Regional Radiotherapy and nuclear Medicine Centres at Mbarara, Mbale and Gulu initiated. - Establishment of Regional Animal Disease Diagnostic Centres in Iganga, Mbale, Soroti, Moroto, Lira, Gulu and Arua completed. - Two MoWT staff trained in Non-Destructive Testing (NDT) technique. - Assessment of groundwater quality and quantity in the Albertine Graben region completed.	- Construction of Regional Radiotherapy and nuclear Medicine Centres at Mbarara, Mbale and Gulu completed. - Two MoWT staff trained in Non-Destructive Testing (NDT) technique. - - Participation in IAEA Annual General Conference. - Short training course on nuclear energy conducted for two NEU staff.	NEU

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
				- Tsetse mass rearing continued. - Tsetse suppression continued. - -Participation in IAEA Annual General Conference. - Short training course on nuclear energy conducted for two NEU staff.	Flies released at Kalangala islands. -Participation in IAEA Annual General Conference. -Short training course on nuclear energy conducted for two NEU staff	- -Participation in IAEA Annual General Conference. - Short training course on nuclear energy conducted for two NEU staff.		
Promotion of Efficient Utilization of Energy Resources	**Strategy 1.8: Promotion of Efficient Utilization of Energy Resources**	i) Increase Awareness and Information Dissemination	Increase Awareness and Information Dissemination	Increase Awareness and Information Dissemination	Increase Awareness and Information Dissemination	Increase Awareness and Information Dissemination	Increase Awareness and Information Dissemination	Energy Efficiency & Conservation Department
		ii) Conduct Education and Training in Energy Efficiency	Conduct Education and Training in Energy Efficiency	Conduct Education and Training in Energy Efficiency	Conduct Education and Training in Energy Efficiency	Conduct Education and Training in Energy Efficiency	Conduct Education and Training in Energy Efficiency	Energy Efficiency & Conservation Department
		iii) Promote Research and Development in Energy Management in Industrial, Commercial, Agricultural sector, Households, Institutions & and Transport sector	Reduction of energy wastage in all sectors	Reduction of energy wastage in all sectors	Reduction of energy wastage in all sectors	Reduction of energy wastage in all sectors	Reduction of energy wastage in all sectors	Energy Efficiency & Conservation Department
		iv) Financial Support and Incentives	Financial Support and Incentives for energy	Financial Support and	Financial Support and	Financial Support and	Financial Support and Incentives	Energy Efficiency & Conservation

NDP II Objective	Strategic Investment Programme	Projects	Performance Targets/workplan					Responsible Institution
			FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	
			Efficiency Programs	Incentives for energy Efficiency Programs	Incentives for energy Efficiency Programs	Incentives for energy Efficiency Programs	for energy Efficiency Programs	Department
		v) Development of Legislation & Framework	- Development of Legislation & Framework - Implementation of the Energy Efficiency and Conservation Bill and Associated Regulations. - Procurement of Testing Equipment to Enforce EESL	- Development of Legislation & Framework Implementation of the Energy Efficiency and Conservation Bill and Associated Regulations. - Procurement of Testing Equipment to Enforce EESL	- Development of Legislation & Framework Implementation of the Energy Efficiency and Conservation Bill and Associated Regulations. - Procurement of Testing Equipment to Enforce EESL	- Development of Legislation & Framework Implementation of the Energy Efficiency and Conservation Bill and Associated Regulations. - Procurement of Testing Equipment to Enforce EESL	- Development of Legislation & Framework Implementation of the Energy Efficiency and Conservation Bill and Associated Regulations. - Procurement of Testing Equipment to Enforce EESL	Energy Efficiency & Conservation Department

3.2 Petroleum Subsector

The history of oil discovery in Uganda was manifested in the oil seeps that were reported along the shores of Lake Albert in the 1920's and since then the search for oil in Uganda commenced. The exploration activities slowed down in the 1940's up to the 1980's mainly due to political instability in the country. The revival period started in the 1980's with the acquisition of aeromagnetic data over the entire Albertine Graben. Government commenced systematic training and capacity building of staff in petroleum related studies in the late 1980s with a view of taking forward the development of the industry from an informed position.

In 1985, the Petroleum Exploration and Production Act was enacted, followed by the Regulations in 1993.The combined efforts of Government and licensed oil companies led to the first commercial discovery of oil in Uganda in 2006. Oil and Gas exploration activities in the Albertine Graben (AG) of Uganda have had 88 % drilling success rate, with 106 of the 120 exploration and appraisal wells drilled to date encountering oil and/or gas. Twenty-one (21) of the oil and gas fields in the Albertine Graben have been taken forward for appraisal. Appraisal for 8 of the fields was completed and applications for production license submitted. Of these, one Production Licence for the Kingfisher was approved in September 2013. Appraisal of the remaining discoveries was still ongoing and is expected to be completed in the medium term.

In order to better address the emerging sector, Government formulated the National Oil and Gas Policy for Uganda. The policy was formulated through a wide consultative process and approved by Cabinet in 2008. The policy articulates, among other things, the key issues for the sector, guiding principles, policy goal, objectives together with strategies and actions to meet the desired objectives. The goal of the National Oil and Gas Policy is *"to use the country's oil and gas resources to contribute to early achievement of poverty eradication and create lasting value to society".* This Policy is currently being implemented. The following are some of the activities being undertaken in order to meet the objectives of the policy:

1) ***Efficiency in Licensing Areas with the Potential for Oil and Gas***

There is currently a halt in licensing of new acreage to allow for new petroleum Resource Management Law to replace the current Petroleum Act of 1985. Two pieces of legislation i.e. the Petroleum (Exploration, Development and production) Act 2013 and the Petroleum (refining, gas conversion, transmission and midstream storage) Act 2013 were enacted by Parliament and were assented to by the President and subsequently gazetted in 2013.Following the enactment of these laws, new Regulations and Guidelines for the upstream and midstream activities commenced through a wide consultative process; standards and codes of both upstream and midstream activities are to be developed; also the Model Production Sharing Agreement (PSA) to guide contracts with future licensees is to be reviewed and updated.

2) ***Establish and Efficiently Manage the Oil and Gas Resource Potential.***

Twentyone (21) oil and gas discoveries have been made in the country to-date and the country's petroleum resources have risen to an estimated 6.5 billion barrels of oil in place. Over 1.4 billion barrels of these are recoverable and these resources will contribute to the take-off and social economic transformation of the country once production starts. An efficient Resource Management framework is also being put in place through the creation of sound Institutional Framework that separates Policy

setting, from Regulation of the Industry and Commercial Businesses. This has led to the creation of a Petroleum Directorate; a Petroleum Authority of Uganda; and a National Oil Company. The National Petroleum Data Repository Systems are under establishment and strengthening existing collaborating institutions is also ongoing.

3) ***Efficiently Produce the Country's Oil and Gas Resources***

There has not yet been production in the country. However, Government has received and is reviewing applications for production licenses together with field development plans for some of the discoveries. So far one production license over Kingfisher field operated by CNOOC has been awarded. CNOOC has now commenced the development of this field, with a view of producing the field in the medium term. Applications for production licenses over eight discoveries in Exploration area 2 operated by M/s Tullow Uganda Pty Ltd and another one application by M/s Total E&P for a Field in Exploration Area 1 have been submitted and are currently under review by Government, for consideration. The above field development plans were arrived at after a comprehensive appraisal of the fields through drilling of appraisal wells, well testing and acquisition of additional seismic data over the fields.

4) Promote valuable utilization of the country's oil and gas resources

There are three strategies in this area, early commercialization refinery development, and crude oil exporting:

a) Early commercialization shall entail the following:-
   (i) Utilisation of crude oil and gas for power generation through an integrated power project (IPP), until the refinery is operational
   (ii) Utilisation of crude oil from well testing to be sold and use in industries like Hima cement Limited, Thermal power plants, etc.

For the IPP, the plan is to deliver natural gas as the initial feedstock to supply a 50MW dual power station. Additional to gas, crude oil (HFO) from extended well tests is to increase capacity and life of the project to 25 years. Pre-FEED activities including geotechnical surveys for infrastructure for the gas processing centre and pipeline routes (all for the IPP) have been completed.

b) Refinery Development

A feasibility study on refining in Uganda was concluded in September 2010 and was approved by Government. This study defined the key aspects of developing a refinery in Uganda like size, configuration, location, financing and markets for the products. The study recommended "Kabaale" in Buseruka Sub County, Hoima District as the most optimum location for the refinery. Specific aspects of implementing the development of the refinery have commenced such as acquisition of land for the development.The oil refinery is planned to be developed as a 60,000 BOPD in a two-phased manner of 30,000 BOPD capacity each. The commercialisation plan is based on the current discovered recoverable reserves in the country estimated at a range of 1.2 to 1.7 billion barrels of crude oil. In the event that additional resources are confirmed in the licensed areas, the refinery is to be expanded to120,000 – 180,000 BOPD capacity.

c) Crude oil pipeline development

A decision to develop the crude oil export pipeline route was made in which it was agreed that two

pipelines be developed, one from Hoima to Tanga to be developed by Uganda in close cooperation with Tanzania and the other from Lokichar to Lamu to be developed by Kenya.

5. Promote the Development of Suitable Transport and Storage Solutions

A petroleum transportation and storage study for the country has commenced. The study will cover both transportation of crude oil from the fields to the refinery and petroleum products from the refinery to markets.

6) Collection of the Right Revenues and Use them to Create Lasting Value.

The existing Revenue Management Policy is being reviewed with a view of putting in place appropriate legal framework for petroleum revenue management. In addition, tax legislation has been updated to deal with petroleum revenues. In this regard, Government through the Uganda Revenue Authority collects capital gains tax from sale of company interests. The Public Finance Management Act 2015 addresses aspects of oil and gas revenue management.

7) Ensure Optimum National Participation in Oil and Gas Activities.

Government strongly encourages national participation as one of the optimum ways to ensure sustainable development through: partnering with the Ugandan investors, use of local goods and services, contribution to development of skills and expertise through employment and training in line with the industry quality and safety standards. In line with that, Government undertook a study on Ugandan local content development strategies for the oil and gas sector that will promote indigenous private sector service provision and competitiveness.

8) Development and Maintenance of National Skills and Expertise

Capacity building has been undertaken by Government at both strategic and professional levels in the fields of Petroleum Geosciences, Petroleum Engineering, Economics, Structural geology, Refinery and Pipelines design. Government officials have been trained in petroleum related areas such as, geosciences, law, audit, taxation and management. Beneficiaries of this training are drawn from all government institutions implementing the National Oil and gas policy.

In addition, capacity building is being enhanced through the establishment and supporting of training institutions in the country. Government established the Uganda Petroleum Institute at Kigumba (UPIK), which was opened in March 2010 and is offering diploma and certificate courses in petroleum related studies. Makerere University commenced Bachelor's and Master's Degree Programmes in Petroleum Geoscience in 2009 and 2012 respectively, which is being supported by the University of Bergen in Norway. Some Private institutions are introducing petroleum related courses, thus increasing the number of trained Ugandans in oil and gas professions from both public and private players.

9) Environmental Protection and Biodiversity Conservation

A Multi-Institutional monitoring team is in place and Biodiversity Institutions are working together to efficiently manage the interface between petroleum and the environment. An Environment Sensitivity Atlas for the areas where petroleum has been discovered in the country was developed and a Strategic Environment Assessment (SEA) of these areas is on-going. As one of the key environmental challenges, attention should also be paid to limit GHG emissions. Therefore, SEA should also address the risks

associated to climate change. The Albertine Graben has been declared a special planning area. Land use planning and physical planning for the Albertine Graben by MLHUD has commenced, with planning of urban areas like Buseruka, Buliisa and Sebagoro in progress.

10) Mutually Beneficial Relationships between All Stakeholders.

Government has developed and is implementing a national communication strategy to bridge the communication gap between the oil and gas industry and the general public.

Development Programmes in Petroleum subsector

3.2.1 Promoting Petroleum Exploration

The government has undertaken steps to Promote and regulate petroleum exploration in Uganda under the Ministry of Energy and Mineral Development through the Petroleum Exploration Development and Production Department (PEDPD). However, the increasing number of investors and stakeholders are leading to increasing complexity of tasks in managing this sub sector. The Government's strategy is to effectively and efficiently institutionalise the regulatory framework to create a conducive environment for the continued promotion and exploration of the country's oil and gas resources. This will be pursued through the short, medium and long term strategic plans which include:-

1. Promotion of the Country's Petroleum Potential and Licensing

The NOGP 2008 indicates that one of the government strategies aimed at ensuring efficiency in licensing areas with the potential for oil and gas production in the country is to promote the country's oil and gas potential with a view of attracting companies to invest in the industry. This includes acquiring and preparing data for licensing, carryout promotional efforts, prepare procedures and criteria for competitive licensing, and undertake open and transparent licensing round.

Government currently has four (4) active Production Sharing Agreements (PSAs) in the Albertine Graben and three Operators namely; Tullow, Total and China National Offshore Oil Corporation (CNOOC) each hold the licenses with 33.333% equity in the four licenses. By the end of 2012, the total cumulative developments in the oil and gas sector reached USD1.8billion at the end of the calendar year 2012 and development in the sector was projected at USD 2.5billion by the end of 2013. The Government will however continue conducting promotional activities of the oil and gas potential in the next planning period by:-

(i) ***Conducting Geological, Geophysical and Geochemical Surveys in the Albertine Graben areas outside the Albertine Graben:*** The government will continue the process of acquiring Geological, Geophysical and Geochemical data both in the Albertine Graben and Areas outside the Albertine such as L. Kyoga and Moroto-Kadam basins;

(ii) ***Conduct Competitive Licensing Rounds:*** The Petroleum (Exploration, Development and Production) Act 2013 provides for competitive licensing rounds in future. Along those lines, government plans to conduct a licensing round in the country of the unlicensed and relinquished areas in the Albertine Graben. The government will prepare for petroleum licensing rounds during the strategic plan period and monitor non-exclusive (multi-client) surveys to acquire more geophysical data in old and new areas, in preparations for a licensing. This multi-client seismic survey will enable better definition and understanding of the areas to be licensed in areas with insufficient data coverage;

(iii) ***Prepare and Analyse Data for promotional purposes:*** The government will also conduct resource assessment and laboratory analyses on the collected data and package them for promotional purposes.

2. Review and Formulation of Petroleum Policy, Legislation, Standards and Codes

The government will develop policies and legislation that will enhance effective management of the oil and gas sector industry in Uganda. These will help to guide and regulate the implementation of activities in both the midstream and upstream value chains. In the next five years the government will ensure regulation and guidance of the sector by;

a) Putting into Place Regulations

These regulations will be used to operationalize the Petroleum (Exploration, Development and Production) Act 2013 [upstream Act] and the Petroleum (Refining, gas conversion, transpotation and midstream storage) Act 2013 [midstream Act]. The Government recognised the inadequacies in the 1993 regulations to cover exploration operations that were not adequately addressing development and production phases. Government then enacted and gazetted the two above mentioned upstream and midstream Acts during 2013.

The purpose of the upstream act is to operationalise the National Oil and Gas Policy of Uganda by - creating a conducive environment for the efficient management of petroleum resources of Uganda including - (i) promotion of exploration for petroleum in Uganda; (ii) evaluation and development of discoveries; and (iii) production of petroleum resources; (b) establishing institutions to manage the petroleum resources and regulate the petroleum activities; (c) regulating petroleum activities, including licensing, exploration, development, production and cessation of petroleum activities or decommissioning; (d) providing for the optimal social and economic benefits of petroleum resources with a long term perspective for Ugandan society as a whole; (e) ensuring public safety and protection of public health and the environment (and climate) in petroleum activities; and (f) supporting the development of state participation and national content in the petroleum industry in Uganda.

The purpose of the midstream act is to operationalize the National Oil and Gas Policy of Uganda by - (a) establishing an effective legal framework to ensure that midstream operations in Uganda are carried out in a sustainable manner that guarantees optimum benefits for all Ugandans both the present and future generations; (b) enabling the development of petroleum refining, gas conversion, pipelines, transmission pipelines and midstream storage facilities; c) facilitating investment in midstream operations; (d) regulating the planning, preparation, licensing, installation and maintenance of facilities for midstream operations; (e) providing for the security of midstream operations; (f) promoting equitable access to facilities for midstream operations; (g) ensuring public safety and protection of public health and the environment (and climate) in relation to midstream operations; and (h) promoting state participation and national content in midstream operations.Following the enactment of the two Acts, the Government commenced on the development of regulations and guidelines to operationalize the Acts.

b) Development of Standards and Codes of both upstream and midstream

As the oil and gas sector in Uganda moves into the development, production and commercialization phases, there is need to prepare for oversight and compliance of material inputs, processes, infrastructure and operations to meet industry standards and codes. The process of developing standards has progressed and is being taken forward in coordination with the Uganda National Bureau of Standards (UNBS) technical team on standards to discuss the steps/ activities required for the standards development process. Existing technical committees responsible for the development of standards in Uganda have been reviewed to ensure that the committees are well constituted and relevant stakeholders identified and scope for each committee developed. An inauguration ceremony is planned to launch the Technical Committee (TC 16) and its mandate to develop standards for the entire petroleum value chain.

c) Model Production Sharing Agreement (PSA) is to be reviewed and updated

As a result of the gaps that existed in the legal and regulatory framework, some of the clauses were included in the PSAs to address this shortcoming. It is the intention of Government that many of the provisions in the PSAs be embedded in the Act and Regulations to render the PSAs simple and easy to negotiate and manage. Before this is done, however, a full review of the PSAs is necessary to reflect the developments in the petroleum industry in the country. Subsequent ones have addressed specific areas. Due to the significance of the review of the model PSA to the legal and regulatory process, it is recommended that this is one of the priority areas.

d) Operationalization of Monitoring and Evaluation (M&E) Strategy for the National Oil and Gas Policy (NOGP)

The Government will operationalize the monitoring and evaluation strategy for the National Oil and Gas Policy. The government developed this strategy for the National Oil and Gas Policy to enable decision making and keep the implementation of the oil and gas policy on track. The M&E Strategy derives its value from the flow of information to the decision makers, who can in turn make informed decisions on the modification of the implementation of the NOGP. This strategy has been developed to function when the managers at different levels of the Oil and Gas sub-sector management system, as well as users of public services, are provided with reliable facts and analysis about what works and what does not as a basis for public action. An important role of the NOGP M&E strategy is also to keep other stakeholders other than the executive branch of Government (i.e. the legislature, civil service organizations and the public at large, as well as Development Partners) informed, in a timely manner about the progress of implementation of the NOGP. This role will enable them offer informed advice to decision makers about the sub-sector, and at the same time offer them the opportunity to modify their own policies and programs.

e) Formulate Legislations of the National Content Policy and Strategy for the oil and gas sector

The government will formulate legislations for the national content policy and strategy for the oil and gas Sector. The Production Sharing Agreements (PSA) have, embedded in them, the option of State Participation, but it was not legislated upon. The amended act improves the harmonisation between the provisions of the PSAs and the relevant legislation. Legislation in regard to national content is important to ensure that local capacity is built to contribute to and participate in the oil industry operations. The above requirements are in line with objectives of the NOGP, namely:

(1) To ensure optimum national participation in oil and gas activities by; (i) Putting in place the necessary regulatory framework for state participation and the implementation of national content; (ii) Putting in place an institution to undertake state participation in oil and gas activities; and (iii) Identifying the opportunities for national content in oil and gas activities and plan for its implementation.

(2) To support the development and maintenance of national expertise by; (i) Training Government personnel in oil and gas exploration, development and production; (ii) Reviewing and expanding the education curricula in the country with a view of producing the workforce required for oil and gas activities nationally; (iii) Supporting the development of skills and competitive competencies necessary for the country's entrepreneurs to participate in the delivery of goods and services for the oil and gas sector; and, (iv) Requiring licensed oil companies and their subcontractors to provide training for Ugandans.

f) Implementation of the Communication Strategy on Oil and Gas Activities in the Country

The Government of Uganda, in a bid to implement Objective 10 (g) Action (III) of the National Oil and Gas Policy, 2008, did put in place an efficient communication strategy for the country's oil and gas sector. The government is now moving forward to implementing this strategy. The communication strategy is expected to improve stakeholders' understanding of Uganda's oil and gas sector and promote transparency and accountability as well as generate national and international support for the development of the sector through information dissemination, exchange and sharing. Good communication between the various stakeholders will foster informed choices and decision making and lead to the development of the new resource into an opportunity and better lives for society.

The oil and gas upstream and midstream sector is a new phenomenon in Uganda and very few people in the country understand its nature and operations. The success of the sector requires goodwill and support from all stakeholders, which can be achieved through a well-executed communications strategy. It is for this reason that the government developed and is now to implement a communication strategy for the sector as it takes root in the country. The strategy would be invaluable in informing and educating the key publics about developments in the sector, opportunities for participation in the sector and the expected benefits from its development. Thus, the strategy specifically intends to:

(i) Strengthen government's communication leadership, and foster a co-ordinated approach to communication by the multiple actors in the sector.
(ii) Meet the information needs of the public through regular information dissemination, exchange and sharing.
(iii) Promote accurate and balanced coverage of Uganda's oil and gas sector through proactive communication.
(iv) Establish a co-ordination structure to synchronise internal communication within MEMD and communication between other government institutions active in the sector
(v) Engage and promote communication synergies with key stakeholders in the sector such as industry actors and the media

In order to successfully implement this Communication Strategy, the government will establish a clearly defined communications function, structure and reporting mechanisms for the oil and gas sector.

3. Creation of New Institutions

Following the confirmation of commercial quantities of oil in Uganda in early 2006, the Government of Uganda and the oil companies had earlier on agreed to an Early Production Scheme (EPS). However, with the discovery of more volumes of hydrocarbons in quick succession, Government reconsidered a much bigger project for efficient and effective utilisation of the discoveries. The Government resolved to construct a refinery. These new developments, although well prepared for, the upstream activities, were overwhelming that there was need for additional man power especially of the regulatory function and the commercial aspects. The Government recognised these as potential and significant challenges to the management of the Petroleum industry and committed to the establishment of new Institutions to manage the Petroleum value chain in the country. In the National Oil and Gas Policy, 2008, the Government identified a number of institutions that would fulfil this mandate and it is in the process of forming these new institutions as described in the new law. On top of the national institutions that have roles in this sector, the following institutions are under formation:

a) Petroleum Authority of Uganda (PAU) to handle the regulatory function;
b) Uganda National Oil Company (UNOC) to handle commercial interests of the country; and,
c) Petroleum Directorate, which will house the upstream, midstream and downstream departments to deal with the exploration and promotion, policies, refining, gas conversion, transportation, marketing and sales.

In preparation for the new institutions, Transitional Units and structure were created in the Department of Petroleum Exploration Development and Production (PEDPD) and have since commenced operations. These include Policy, Regulatory, Commercial and Infrastructure Units. An interim arrangement involving existing human resources within the PEDPD was been put in place to manage these units.

4. Monitoring and Regulating of Oil Company Activities

In order to efficiently develop the country's oil and gas resources, Government shall; (a) develop an appropriate supervisory framework for monitoring and supervising exploration programmes; (b) develop an appropriate supervisory framework for monitoring and supervising petroleum development and production programmes; (c) develop an HSE supervisory strategy and plan; and, (by use of these strategies), Government has been able to monitor the drilling of 120 exploration and appraisal wells that had been drilled by December 2014. Of these, 106 wells have encountered oil and gas in the subsurface representing a drilling success rate of over 88%. Twenty one (21) discoveries have been made to date with the total petroleum resources now estimated at 6.5 billion barrels of oil in place out of which an estimated 1.4 barrels of oil equivalent are estimated to be recoverable.

Similarly, Government continued to appraise nine (09) fields that were nearly complete and applications for production licenses over these fields along with their field development plans have been submitted to Government and are under review. The Government will continue to conduct appraisal the other six (6) of the discoveries whose action is aimed at improving the understanding of the volumes of oil and gas in the respective discoveries. It will also aid field development planning with appropriate methods of recovery for the reservoirs. The Government will also continue to monitor the appraisal of 3D seismic surveys and drilling of appraisal wells in licensed areas, accompanying well tests, plus other field operations.

3.2.2 Promoting Petroleum Development and Production

1. Capacity Building and Retention

The government will take all the necessary actions to build capacity in the respective institutions of government in management of the oil and gas sector. Considering that the oil companies are also looking for well-trained people, there is a danger that the companies may drain this manpower from the Government institutions. In order to protect against this, the government proposes that the salary structure for the new institutions be such that Government will retain its manpower.

There is also a need to build capacity within the institutions under the environment, revenue and resource pillars that are mandated to monitor impacts of oil and gas developments in the respective disciplines. Most of these institutions need support both in terms of human resource and equipment to enable them perform their duties effectively. Capacity building will continue to be undertaken at both strategic and professional levels in the fields of Petroleum Geoscience, Petroleum Engineering, Economics, Structural geology, refinery and pipelines design. In addition to training personnel, Government continues to support the training of artisans and professionals in petroleum related fields at the Uganda Petroleum Institute Kigumba and Makerere University respectively. This is to support the oil and gas manpower requirements for the private sector in the country.

2. Development and Implementation of the Local Content Policy and Plan

The oil and gas sector will lead to significant developments in the country. It is necessary to use these developments to create as much value as possible in the country. National participation through provision of goods and services by the country's entrepreneurs and direct employment in the sector will be some of the key avenues to achieve the desired value creation in the country. The extent to which the private sector and the nationals can participate in the oil and gas sector is currently limited by the financial capacity, together with the technical skills.

In the Vision 2040, the government strategy is to support the citizenry to take up the opportunities through enterprise development, strengthening the private sector associated with the oil and gas industry, capacity building and establishment of local area development fund. These will be in the entire value chain most especially in the secondary and tertiary industries. The secondary industries include; plastics, agro chemical, lubricants, paint, bitumen, thermal power generation among others. On the other hand the key tertiary industries that are likely to develop among others include; machinery, transport, hotel, construction, real estate and communication. Government is developing a policy framework for enhancing national participation in oil and gas sector through a wide consultative process. Government strongly encourages national participation as one of the optimum ways to ensure sustainable development through:

(a) Partnering with the Ugandan investors;
(b) Use of local goods and services; and
(c) Contribution to development of skills and expertise through employment and training in line with the industry quality and safety standards.

In order to ensure national participation in the oil and gas industry, the government shall:-

(i) transform the human resource and build a critical mass of scientists, engineers and technicians in the oil and gas sector, and ensure that they are equipped through application of the latest

science and technology. In addition, provide specialized programs to train in highly specialized oil and gas areas of geoscience and engineering in other international institutions will be pursued;

(ii) establish a specialized oil and gas research development centre;
(iii) regulate of inflow of expatriates by ensuring that expatriate workers acquire work permits;
(iv) develop nationalisation Plans for expatriate positions;
(v) approve the organisation structures for oil companies by Government;
(vi) streamlining the procurement procedures for oil companies;
(vii) ensure that Production Sharing Agreements (PSAs) provide for state participation in the range of 15% to 20%; and,
(viii) develop the national content policy and strategy.

3. Field Development and Preparations for Petroleum Production

In September 2013 Government issued a production licence over the Kingfisher field operated by CNOOC. CNOOC has now commenced the development of this field which is expected to take a period of four years before production can commence. Applications for production licenses over eight discoveries in Exploration area 2 operated by Tullow and another one application by Total E&P for a field in Exploration Area 1 have been submitted and are currently under review, for consideration.

The Government's strategy will be to ensure that production of petroleum shall take place in such a manner that as much as possible of the petroleum in place in each individual petroleum deposit, or in several deposits in combination, will be produced. The production shall take place in accordance with prudent technical and sound economic principles and in such a manner that waste of petroleum or reservoir energy is avoided. The licensee shall carry out continuous evaluation of production strategy and technical solutions and shall take the necessary measures in order to achieve this. If a licensee decides to develop a petroleum deposit, the licensee shall submit to the Ministry for approval a plan for development and operation of the petroleum deposit. The plan shall contain an account of economic aspects, resource aspects, technical, safety related, commercial and environmental aspects, as well as information as to how a facility may be decommissioned and disposed of when the petroleum activities have ceased. Government shall institute measures that will cause the licensee to develop and submit for approval two types of field plans:-

Plan for Development and Operation - A comprehensive document describing the various aspect of a planned field development (the production facilities); and

Plan for Installation and Operation - A comprehensive document describing the various aspects of the plan for development and operation of facilities for transport and utilization of petroleum (i.e. pipelines and terminals).

The overall objective from a Government point of view will be to ensure that there is real influence with the objective to achieve a maximised added value for society at large, qualitative approval process, and efficient evaluation of the development plan.

4. Plan For Commercialization of the Discovered Resources

The Plan for Commercialisation of the discovered resources refers to clear roadmap to the production of oil and gas resources in Uganda. In a bid to enhance the commercialisation of the discovered resources,

the government went into a memorandum of understanding (MoU) on sustainable development of discovered petroleum resources in the Albertine Graben with the oil companies. This is a significant step for Uganda as it gives a roadmap for the commercialization of petroleum resources discovered in the country. The purpose of the MoU is to provide a framework for achieving a harmonized commercialization plan for the development of the discovered oil and gas resources in the country. The plan includes:-

(i) The use of petroleum for power generation, supply of crude oil to the refinery to be developed in Uganda by Government and export of crude oil through an export pipeline or any other viable options to be developed by the oil companies.

(ii) Government shall develop a refinery with an input capacity of 60,000 barrels per day (BPD) whereas the partners will develop a pipeline or any other viable transportation option to export crude oil. The refinery shall have the right of first call on production volumes from the licensed areas.

(iii) In the short term and prior to the refinery coming on stream, the companies will supply crude oil from the contract areas to be used for power generation. Excess associated and non – associated gas will be used for power generation or any other viable option.

(iv) The commercialisation plan is based on the current discovered recoverable reserves in the country estimated at 1.4 billion barrels of crude oil. The MoU also provides for the expansion of the refinery beyond 60,000 barrels per day in the event that additional resources are confirmed in the licensed areas.

(v) Crude oil export pipeline

This plan will be executed in three phases as below:-

a) Short term plans (0 – 3 years)

In this phase, the companies will supply crude oil and gas for power generation until the refinery is operational. The crude oil from well testing will be sold and used in industries like cement factories, Thermal power plants, etc.

b) Medium term plan (3 – 6 years)

Government's plan is to develop a refinery with an input capacity of 60,000 barrels per day in a modular manner, starting with a capacity of 30,000 barrels per day which will be increased to 60,000 barrels per day. Uganda's demand for petroleum products to-date is at 27,000 barrels per day. The transit volumes to Rwanda, Burundi and Eastern Democratic Republic of Congo (DRC) are estimated at 7,225 barrels per day. The planned refinery will meet the petroleum product market for Uganda and her immediate neighbours, which is currently at 34,225 barrels per day and growing at 7% p.a. Further expansion of the refinery beyond 60,000 barrels per day will depend on confirmation of additional reserves. In the medium term, the Government will also support transport and storage infrastructure and the development of a crude oil export pipeline.

c) Long term plan (> 6 years)

In the long-term the Government shall expand the refinery (120,000 – 180,000 BOPD) and support the development of petrochemical and energy based industry.

5. Environmental Monitoring of Oil and Gas Operations

The high overlap between ecologically sensitive and biodiversity rich areas and the occurrence of exploitable hydrocarbons in the Albertine Graben (AG) poses a particular challenge for oil exploration

and development in Uganda. The Albertine Graben (AG) is the most species rich eco-region for vertebrates in Africa and contains 39% of Africa's mammal species, 51% of its bird species, 19% of its amphibian species and 14% of its plant and reptile species. On the other hand, the rate of biodiversity loss in Uganda is high and was calculated in 2004 to be 10-11% per decade or about 0.8% annually. The principal threats to biodiversity in Uganda persist including habitat loss, modification and alteration along with unsustainable harvesting, pollution as well as introduction of alien species.

Oil and Gas exploration and production activities have the potential for a variety of negative impacts on the environment. They induce economic, social, and cultural changes through alteration in land use patterns, local population levels, socio-economic and cultural systems. They also result into increases of aqueous and gaseous waste streams which may affect plant and animal communities due to changes in their environment through variations in water, air and soil/sediment quality and through disturbance by noise, extraneous light and changes in vegetation cover. These negative impacts need to be mitigated and addressed to ensure ecosystem integrity

The monitoring of environment in the oil and gas sector is at three tiers; the executive level, technical/ operational level and field based monitors. UWA and NEMA have appointed full time officers to monitor oil exploration activities whereas PEDPD monitors also monitor technical aspects. Also there is a Multi-Institutional monitoring team - Government Institutions working together to efficiently manage the interface between petroleum and the environment composed of representatives from; National Environment Management Authority, Uganda Wildlife Authority, Petroleum Exploration and Production Department, Directorate of Water Resources Management, Climate Change Unit, National Forestry Authority, Directorate of Environmental Affairs, Directorate of Physical Planning and Land use, the Department of Fisheries Resources, and districts in the Albertine Graben.

In the strategic Planning period, the government will pursue the following activities:

(i) Development of a sensitivity atlas for murchison falls national park;
(ii) Implementation of management plans for protected areas (MFNP, QENP, Bugoma FR);
(iii) Development of a national oil spill contingency plan and mechanism for hazardous waste management plan;
(iv) Updating of standards, guidelines and regulations by lead institutions;
(v) Conducting land use planning. The Albertine Graben has been declared a special planning area; planning of three urban areas Buliisa, Butiaba and Sebugoro. This activity will be conducted the Ministry of Lands Housing and Urban Development;
(vi) Develop and Implement capacity development programs in all relevant institutions for areas identified as relevant/critical to the oil and gas sector with particular emphasis on managerial skills;
(vii) Review all environmental and biodiversity related policies with respect to oil and gas including biodiversity off-sets, and present them for approval; and,
(viii) Strengthen the framework for compliance monitoring and enforcement of the oil and gas Industry.

6. Participation in Regional Initiatives

The country is to continue participating in regional initiatives. There already frameworks for regional cooperation in petroleum matters through the committee on energy of the East African Community of

which Burundi, Kenya, Rwanda, Tanzania and Uganda are members. The agreement of cooperation of 1990 as amended in January 2008 addresses mainly cross-border issues that govern the cooperation between Uganda and the Democratic Republic of Congo (DRC).Cooperation within the East African Community Partner States is more advanced than that between Uganda and DRC. Partner states of EAC have exchanged data and information pertaining to their respective petroleum sectors during the East African Petroleum Conferences. The Partner States have also used each other's facilities for training and analysing data, visited each other's basins to gather information that may help to promote the petroleum potential of the region and participated in joint training sessions. The country will participate in a number of initiatives on oil and gas in the region including:-

a) Harmonization of policies, legal and fiscal framework for the oil sector in the community. This is one of the most important exercises that are taking place under the auspices of the Energy Committee of the East African Community for the oil sector. A task force identified a large number of areas which needed harmonisation to make joint promotion and the development of the oil industry in the region possible;
b) Development of Regional Infrastructure: Since the oil reserves established so far are sufficient for commercial exploitation, the development of infrastructure such as pipelines and refineries will require cooperation within the region especially to make this infrastructure more cost-effective. This Programme, therefore, will support the strengthening and expansion of the areas of cooperation;
c) Organization and participation in Regional conferences especially the East African Petroleum Conference and Exhibition (EAPCE). This is a bi-annual event organized and hosted by EAC Partner states, which brings together international Petroleum Industry players to come to East Africa and appreciate the region's petroleum potential and also other areas including tourism, etc.
d) Participation in EAC Energy Committee meetings; and,
e) Participation in meetings on co-operation with DRC.

7. **Completion of Phase – 2 & 3 of the Construction of the Data Centre and Office Block**

In order to alleviate office accommodation related problems and also to improve on data and information storage, Government embarked on the construction of office blocks including the National Petroleum Data Repository, Laboratory and Offices. This is being done in three (03) phases, with the first one having been completed at the end of 2010. The second phase of the construction of the laboratories, a petroleum data repository and offices for the Petroleum Authority and the Petroleum Directorate commenced during 2012/13 and was completed at the end of financial year 2013/2014. Government has since then embarked on the third and final phase of the construction that shall involve finishing of the office block

3.2.3 Crude Oil Refining

a) Refinery Development

The consumption of petroleum products in Uganda has been growing at an annual rate of about 7%. This fact presents an opportunity to Uganda, with the confirmation of over 1.2 billion barrels of recoverable oil in the country. The National Oil and Gas Policy 2008 address the entire spectrum of oil exploration, development, production and valuable utilization of the country's oil and gas resources. Objective 4 of the

Policy is to promote valuable utilisation of the country's oil and gas resources through in-country refining of crude oil.

Government therefore formed a Midstream Petroleum Department (MPD) to guide the development of a refinery in the country. Uganda's refinery projectis in line with the East African Regional Refineries Development Strategy that was adopted by the EAC Partner States in 2008 that recommended a second refinery in East Africa be developed in Uganda. The East and Central African region has only one refinery in comparison with other regions like South Africa with seven refineries and North Africa with 21 refineries. Uganda, like other EAC Partner States, therefore faces challenges in stability of supply of petroleum products.

The refinery in Uganda will boost the region's refining capacity and ensure security of supply of petroleum products especially for the land locked Partner States such as Rwanda and Burundi. Besides being a strategic development for the country and the region, developing a refinery in the country will improve Uganda's balance of payments by reducing the petroleum products import bill. The construction of the refinery and development of attendant industries such as the petrochemical and manufacturing industries will create jobs for Ugandans and ensure the transfer of technology in the refining and associated industries. Other benefits include enabling the rational exploitation of the resource to support sustainable development and contribution to the country's growing energy requirements by providing Heavy Fuel Oils (HFO), which can be used for power generation, and Liquefied Petroleum Gas (LPG) that will help offset use of trees for domestic cooking.

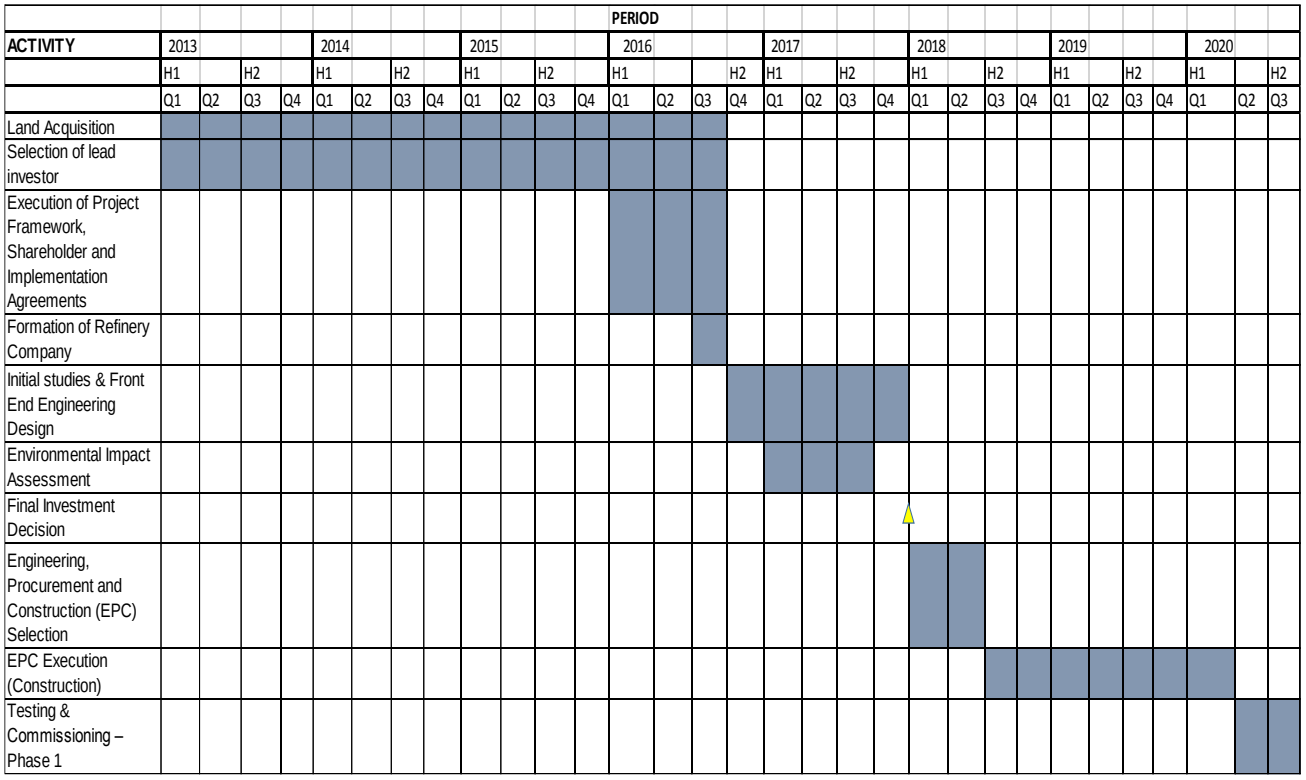
Government conducted a feasibility study in 2010, which recommended the construction of a refinery. It also recommended the size and configuration of the refinery, location, financing options, social and environmental assessment, among others. The refinery as a more commercially viable option with a Net Present Value (NPV) of US$ 3.2 billion at a 10% discount rate and an Internal Rate of Return (IRR) of 33%. The Government plans to develop a refinery with an input capacity of 60,000 barrels per day in a modular manner, starting with a capacity of 30,000 barrels per day by 2020, which will be increased to 60,000 barrels per day before 2020. The enactment of the Petroleum (Refining, Conversion, Transmission and Midstream Storage) Act 2013 gives a firm legal foundation for this development. The refinery configuration and complexity determines which products can be produced from the crude oil. The planned refinery will produce Liquefied Petroleum Gas (LPG), diesel, petrol, kerosene, jet fuel and Heavy Fuel Oil (HFO).

The refinery will be developed on a Public Private Partnership (PPP) basis through a joint venture company with a proposed ratio of 40:60 sharing between public and private entities, respectively. The higher participation share (60%) provides confidence to investors for funding and also operation of the industry. Government invited the EAC Partner States to express their interest to participate in the refinery project. A Special Purpose Vehicle (Refinery Company) will be formed comprising the lead investor and GoU to take forward the Engineering and financing aspects of the refinery. The activities to be pursued in the refinery Development project are:

i) Conducting a Feasibility Study;
ii) Land Acquisition;
iii) Conducting an Environmental Baseline Surveys;

iv) Identification of the Lead Investor;
v) Conduct Front End Engineering Designs (FEED) and an Environmental Impact Assessment;
vi) Procure Engineering Procurement Constructions (EPC);
vii) Commissioning Phase.

Fig. 11: Proposed refinery development schedule



3.2.4 Development of Midstream Transportation and Storage Infrastructure

(a) Feeder pipeline development

There shall be crude oil pipelines transporting crude oil from the northern and southern central processing facilities to the export hub near the refinery at Kabaale, Hoima. The crude oil pipeline will then be fed into the refinery and/or export crude oil pipeline.

(b) Refined Products Pipelines

Refinery (Hoima) to Buloba (near Kampala) Pipeline

Government conducted a feasibility study on distribution and storage for petroleum products in 2012 and recommended the construction of a 205km long, 10 inch diameter from the refinery in Hoima to the refined products distribution centre in Buloba, Kampala.The pipeline is expected to cost $307 million and will be developed on Public-Private Partnership. These pipelines are proposed to be developed as part of refinery project.

(c) Crude Export Pipeline

Three route options were considered and evaluated:-

- Northern route through Hoima to Lockichar toLamu Port in Kenya - 1380km long
- Central route through Kampala, Malaba to Mombasa -1300km long
- Southern route through western L. Victoria region through Tanzania to Tanga -1950km long.

On completion of the evaluation, the final decision on the export pipeline route was be made and the Southern route through western L. Victoria region through Tanzania to Tanga -1950km long was adopted. The plan for developing the project would be defined be defined by the stakeholders.

3.2.5 Strategic Investments in the Downstream Petroleum Subsector

(a) Development and Regulation of Petroleum Supply and Distribution

As Uganda's oil and gas sector to the development, production, and commercialization phases of Uganda's oil and gas sector will need the preparation for oversight and compliance of material inputs; processes, infrastructure, and operations to meet industry standard and codes. Government will implement the process of developing in coordination with the Uganda National Bureau of Standards (UNBS) technical team. The technical teams responsible for the development of standards in Uganda have been reviewed to ensure the committees are well constituted; relevant stakeholders identified and scope for each committee developed. Government to enhance petroleum supply, regulation, standards and distribution will implement the following actions:-

i) Monitor and enforce standards of products and facilities by implementing:
ii) The fuel marking and quality control program;
iii) Develop the petroleum standards and facilities;
iv) Develop regulations for Healthy, Safety and the Environment (HSE);
v) Develop and Operationalisation of the National Petroleum Information System (NPIS);
vi) Institutional capacity building for downstream operations; and,
vii) Develop the National Policy for downstream operations.

(i) Development and Monitoring of the Petroleum Products and Facilities' Standards

a) Implementation of the Fuel Marking and Quality Control Program

Under this arrangement, MEMD and UNBS entered into a MoU with UNBS to carry on fuel marking and quality monitoring. Government issued a Statutory Instrument on Fuel marking and Quality control, 2009 that introduced mandatory marking. Government will review the MoU with UNBS to narrow the scope of operation to quality control activity only. Government will continue to monitor downstream petroleum activities for compliance to national standards, the prevention of adulteration, contamination, dilution, and dumping of imported petroleum products. Finally, monitoring teams will carry out sampling and analysis of fuel facilities for presence or dilution of the marker in the fuel.

b) Development of the Petroleum Standards and Facilities and Laboratory

The law empowers the Ministry of Energy and Mineral Development to regulate downstream operations by developing standards and procedures, and enforcing these standards for compliance. Government in conjunction with UNBS have been undertaking the development of petroleum facility standards, so far 8 standards have been developed. Two (2) standards for specification for construction, operation, and

maintenance of filling stations for handling (dispensing) of petroleum products and their derivatives has been gazetted. Government will gazette the remaining 6 standards i.e. Five (5) standards on calibration and onsite storage, and standards for the handling, storage, distribution, and maintenance of LPG in domestic commercial, and industrial installations DUS971-1 and 2. In addition, Government will implement the construction of the laboratory for accrediting and validating different standard aspects of petroleum products. The development of petroleum standards is a consultative process and shall continue over the medium term. During this strategic development plan period, government will develop forty (40) standards for petroleum facilities, operations and products.

(ii) Development and operationalisation of the National Petroleum Information System (NPIS)

The law requires the Ministry of Energy and Mineral Development to have a National Petroleum Information System to monitor the sector and downstream operations of oil marketing companies. The new software of NPIS will replace the old and out-dated manual excel based information system and enable the MEMD to systematically monitor prices, track volumes, sales, and imports of petroleum products. In addition, the NPIS will provide a mechanism for the capture of data relating to volumes, prices, licensing, Government stocks as well as laboratory test results. It will also provide a tool for the generation of information for the different stakeholders interested in this information. With the NPIS in place, MEMD will be in position to advise the Minister on recommended product prices, and generate and distribute reports to be used by other agencies such as UBOS, and Bank of Uganda

(iii) Development National Policy for Downstream Operations

The 2003 National Policy for downstream operations is out-dated. By then, Uganda was viewed as a net importer of petroleum products. However, the eminent production of Uganda's oil and gas resources necessitates the development of new policies and regulations since there is likelihood that the country will become a net exporter of refined petroleum products. In addition, the old downstream policy did capture biofuels and downstream operations for LPG. Government will develop the national policy for downstream operations.

(iv) Development and Operationalization of Downstream Health, Safety and the Environment (HSE) Regulations

By law, the Ministry of Energy and Mineral Development is required to have a downstream policy for Health, Safety and Environment (HSE). Currently, the government does not have standard Health, Safety and Environment regulations. The production and processing of Uganda's oil and gas will increase downstream activities which necessitates development of new downstream regulations. Over the SDP period, government will procure a consultant for HSE, conduct consultations with other agencies, procure HSE system based on International Standard Organisation (ISO) and enforce standards in the downstream subsector.

(v) Institutional capacity building for downstream operations

(b) Development of the Downstream Transport and Storage Infrastructure

The government conducted a feasibility study on the distribution and storage facilities for finished products from the refinery in Uganda were completed in 2012. The study recommended the development

of pipelines as the most viable mode of transportation of finished products to the distribution centres. Pipelines will be required to deliver crude oil products from the oil fields to the refinery and to transport refined products to distribution centres. Following commercial oil discoveries and the planned inland refinery, the government will implement the development of downstream transport and storage infrastructure which includes the construction of pipelines for transporting refined products from the refinery to distribution centres Kenya-Uganda products pipeline; and extension of Kenya-Uganda pipeline to Kigali (Rwanda).

(i) Kenya –Uganda (Eldoret-Buloba) Product Pipeline Extension Promoted

Following commercial oil discovery and plan to set up an inland oil refinery, the Kenya-Uganda oil pipeline adopted the reverse flow concept, whereby refined products at a later stage will be pumped back to Western Kenya. Subsequently, the project was re-designed to cater for this new concept and hence re-tendered. The Kenya-Uganda oil pipeline extension will connect with the existing 14-inch diameter pipeline, running from Nairobi to Eldoret, to ease fuel supplies to the landlocked Uganda, Rwanda and Burundi.

The feasibility study recommended a 325km long, 12 inch pipeline. Negotiations are in progress with the best evaluated firm. The definitional phase will be finalised. In addition, government will complete the implementation of the resettlement action plan (RAP) for Kenya-Uganda petroleum Products. The pipeline will be developed under a public-private partnership. The private partner will maintain 75% equity, and the Ugandan and Kenyan government will contribute the 25%. The joint coordinating commission of the two governments will continue to meet periodically to discuss new issues regarding the Development of this project.

(ii) Development of the Kampala-Kigali Product Pipeline

Over 50 per cent of Rwanda's imports come through Mombasa Port, which also serves other regional countries like Uganda, eastern DR Congo, Burundi, northern Tanzania and South Sudan. Uganda and Rwanda are land locked and the transportation of petroleum products through long distances from Mombasa to Eldoret and from Eldoret to Kampala and Kigali often results into supply disruptions, high transportation costs, and prices of imported products in both countries. To solve this problem, and maintain adequate supply of petroleum products, plans are underway to extend the Eldoret–Kampala pipeline to Kigali. The Joint Coordinating Commission (JCC) comprised of representatives from both governments is first tracking the development of this pipeline. The feasibility study commenced in January 2014 and is ongoing and construction is expected to commence thereafter.

(c) Development and Restocking of Strategic Petroleum Reserves

To ensure security of supply of refined products to the market during periods when the planned Ugandan refinery temporary undergoes routine maintenance, including technology upgrades, and due to other unseen circumstances, Government will develop and restock petroleum reserves (i.e. Nakasongola, Jinja, Kasese and Mbale) to serve this purpose. Government will construct refined petroleum products storage reserves of up to 320,000m^3 (320million litres) worth of refined products strategic reserves and operational depots. The planned storage reserves include:-

(i) 40,000m^3 (40 million litres) Nakasongola Storage Reserves.
(ii) 30,000m^3 (30 million litres) Jinja storage reserves (now completed).

(iii) Facilities for the remaining capacity of 210,000m^3 will be developed after the completion of the storage and transportation of petroleum products development plan.

The total cost of developing downstream petroleum storage infrastructure to supply over 250 million litres in five years is estimated at $120 million.

(i) Operationalisation of Jinja Storage Tanks (JST)

Refurbishment of the 30 million litres of refined products facility was completed in 2013. The facility is now fully operational under the management of the private developer; M/s Hared Petroleum Ltd. Government will construct a petroleum quality laboratory, monitor and supervise the facility.

(ii) Nakasongola Storage Tank Site

The terms of reference for the development of the 40million litres Nakasongola Storage tank site have been developed awaiting final concurrence and input from other relevant Ministries, Departments and Agencies (MDAs) to enable the commencement of the feasibility study. The storage facility is located in Ministry of Defence operation area though the Project is under the MEMD. Construction is expected to commence after final discussuions with the Ministry of Defence. Restocking of the facility with petroleum products and monitoring and supervision will commence in 2017/18. The development of this facility will be implemented as a Public project since it is in a sensitive operations area of Government.

(d) Promotion of Liquefied Petroleum Gas (LPG) usage

The consumption of LPG in Uganda is still low (at approximately 1%). With the discovery of oil and Gas, the production and supply of LPG will increase. This will necessitate the implementation of massive sensitization and promotion campaign in the whole country, development of storage infrastructure (i.e. bottling plant, validation facilities etc.) and development of downstream regulations for LPG. LPG facilities will be developed under Public private partnership. Government will implement the following strategies to promote LPG usage:-

(i) Promotion of sensitization campaigns on LPG in a 4 regions of the country;

(ii) Development of common terminals for LPG which will include conducting feasibility study, procurement of the developer, and construction and commissioning of the project, and monitoring and supervising LPG facility; and,

(iii) Development of LPG bottling plant will follow the packaging of the project, securing a private developer, construction of the project and monitoring and supervision of the bottling plant.

3.2.6 Five-Year annualised workplan for the Petroleum Sub-sector

Table 4: Five-Year annualised workplan for the Petroleum Subsector

NDP II Objective	Workplan /Targets						Responsible Institution
	Strategic Investment Areas	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
(A) **Promoting of Petroleum Exploration**							
Objective 1: Increase the exploitation of oil and gas production	1.Promotion of the country's petroleum potential and licensing	Two hundred (200) line km of geophysical data and 50sq. km of geological and geochemical mapping acquired in unlicensed and new basins collected and packaged. Announcement of the1st Licensing Round for the Albertine Graben and other areas. Hold the 1st Licensing Round for the Albertine Graben and other areas	Two hundred (200) line km of geophysical data and 50 sq. km of geological and geochemical mapping acquired in unlicensed and new basins collected and packaged. Seismic speculative surveys in unlicensed areas in the Albertine Graben undertaken;	Two hundred (200) line km of geophysical data and 50 sq. km of geological and geochemical mapping acquired in unlicensed and new basins collected and packaged.	Another two hundred (2 00) line km of geophysical data and 50 sq. km of geological and geochemical mapping acquired in unlicensed and new basins collected and packaged.	Preparations to undertake the 2nd Licensing Round for the Albertine Graben and other areas commenced.	PD
Objective 1: Increase the exploitation of oil and gas production	2.Review and formulation of petroleum policy, legislation, standards and codes	New regulations and guidelines for the upstream activities in place; Reviewed and updated Model PSAs in place.	Regulations and guidelines for the upstream activities in place	Regulations and guidelines for the upstream activities in place	Regulations and guidelines for the upstream activities in place	Regulations and guidelines for the upstream activities in place	PD, MOJCA

NDP II Objective	Workplan /Targets						Responsible Institution
	Strategic Investment Areas	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
Objective 2: Increase efficiency and effectiveness in management of Uganda's oil and gas resource potential	3.Creation of new institutions, new institutions in place	New institutions, i.e. Petroleum Authority of Uganda (PAU) to handle the regulatory functions; National Oil Company (NATOIL) to handle commercial interests of the country; and, Petroleum Directorate to handle policy issues of the sector. Recruit the Board members and executive members of the respective new institutions.	Recruit the rest of the staff of the respective new institutions **Milestone: New Institutions in place**	New Institutions fully operational	New Institutions fully operational	New Institutions fully operational	MEMD, Min of Pub Service
Objective 3: Increase efficiency in extraction of oil and gas resources	4.Monitoring and regulating of oil company activities	3D seismic data for Kingfisher Development Area in place. Environmental regulations updated. **Milestone: 3D seismic data for Kingfisher Development Area in place.**	20 appraisal and development wells in EA1, EA2 and KFDA (EA3A) drilled.	Another 20 appraisals and development wells in EA1, EA2 and KFDA (EA3A) drilled. **Milestone: Fields in EA1, EA2 and KFDA ready for production.**	Production on going	Production on going	PD
(B) **Promoting Petroleum Development and Production**							
Objective 2: Increase efficiency and effectiveness in management of Uganda's oil and gas resource potential	5. Capacity building and retention	Train four (04) members of staff at M.Sc. Level in petroleum related studies **Milestone: Four MSc. Degrees attained**	Train four (04) members of staff (at M.Sc. Level in petroleum related studies	Train four (04) members of staff (at M.Sc. Level in petroleum related studies.	Train four (04) members of staff (at M.Sc. Level in petroleum related studies.	Train four (04) members of staff at M.Sc. Level in petroleum related studies.	MEMD

NDP II Objective	Workplan /Targets						Responsible Institution
	Strategic Investment Areas	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
Objective 2: Increase efficiency and effectiveness in management of Uganda's oil and gas resource potential	6. Development and implementation of the national content policy and plan	National Content Policy and Plan in place.	Implement National Content Policy and Plan.	Implement National Content Policy and Plan.	Implement National Content Policy and Plan.	Review the National Content Policy and Plan.	MEMD, Min of Internal Affairs (Immig Dept), Min of Trade and Industry
Objective 3: Increase efficiency in extraction of oil and gas resources	7.Field Development and preparations for petroleum production	Issue two Production Licenses in exploration Area 2 operated by Tullow. **Milestone: 3D seismic data for Kingfisher Development Area in place.**	Issue one Production License in exploration Area 2 operated by Tullow; Issue two Production Licenses in Exploration Area 1 operated by TOTAL E&P	Issue two Production Licenses in Exploration Area 1 operated by TOTAL E&P	Preparation for Production on going	Preparation for Production on going	PD
Objective 4: Produce refined oil and oil by-products for the local and export markets	8.Plan for commercialization of the discovered resources	Sale of crude oil from well testing (*of oil so far collected*) undertaken	Sale of more crude oil from well testing *(generated at that time*) undertaken	Commence production of crude oil and gas for power generation; Commence development of a 30,000 BOPD refinery	Develop a 30,000 BOPD refinery	Commission a 30,000 BOPD refinery	MEMD, MOFPED
Objective 6: Improve protection of the environment against oil and gas activities and mitigate the likely effects of Green House Gases (GHG) emissions	9.Environmental monitoring of oil and gas operations	Environmental regulations updated.	Commence Establishment an environmental lab	Environmental lab in place Albertine Graben Environmental Monitoring Plan updated	Environmental lab in place Albertine Graben Environmental Monitoring Plan updated	Environmental lab in place Albertine Graben Environmental Monitoring Plan updated	MEMD, MWE, NEMA, UWA, MAAIF
Objective 7: Improve stakeholder relationships in the development of a desirable oil and gas	10.Participation in regional initiatives	In partnership with other EAC states, hold the East African Petroleum Conference and Exhibition 2015 (EAPCE' 15).	In partnership with other EAC states, commence preparations for the East African Petroleum Conference and Exhibition 2017	The East African Petroleum Conference and Exhibition 2017 (EAPCE' 17) held. In partnership with other	In partnership with other EAC states, commence preparations for the East African Petroleum	In partnership with other EAC states, hold the East African Petroleum Conference and Exhibition 2019	MEMD

NDP II Objective	Workplan /Targets						Responsible Institution
	Strategic Investment Areas	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
sector.			(EAPCE' 17). In partnership with other EAC states, continue to plan/develop for regional integrated infrastructure for the oil and gas industry. Engagements on cooperation with DRC on the oil and gas activities held.	EAC states, continue to plan/develop for regional integrated infrastructure for the oil and gas industry. Engagements on cooperation with DRC on the oil and gas activities held.	Conference and Exhibition 2019 (EAPCE' 19). In partnership with other EAC states, continue to plan/develop for regional integrated infrastructure for the oil and gas industry. Engagements on cooperation with DRC on the oil and gas activities held.	(EAPCE' 19). In partnership with other EAC states, continue to plan/develop for regional integrated infrastructure for the oil and gas industry. Engagements on cooperation with DRC on the oil and gas activities held.	
Objective 2: Increase efficiency and effectiveness in management of Uganda's oil and gas resource potential	11.Completion of phase – 2 of the construction of the data centre and office block and commence the third phase	Complete Phase-2 and commence Phase-3.	Complete Phase-3	Commission the building	Office Block under use	Office Block under use	MEMD, MOWT
(C) **Crude Oil Refining**							
Objective 4: Produce refined oil and oil by-products for the local and export markets	1.Complete the acquisition of land for development of the refinery	All property owners from the refinery land fully compensated and resettled. Title deed for refinery land processed.	Resettlement houses and other resettlement infrastructure constructed. Refinery land boundary marked. Monitoring and Evaluation of	Monitoring and Evaluation of the Resettlement Action Plan activities for refinery land	Monitoring and Evaluation of the Resettlement Action Plan activities for refinery land	Monitoring and Evaluation of the Resettlement Action Plan activities for refinery land	Midstream Petroleum Department

NDP II Objective	Workplan /Targets						Responsible Institution
	Strategic Investment Areas	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
			the Resettlement Action Plan activities for refinery land. Land title for the 29 square kilometre obtained				
	2.Construct the refinery and attendant infrastructure	Conclude negotiations of Refinery Agreements. The Special Purpose Vehicle (SPV) for the refinery development incorporated.	Configuration and logistics studies undertaken. Front End Engineering Design (FEED) studies for refinery development commenced. Environmental Impact Assessment (EIA) for refinery development undertaken	Construction of refinery on-going.	Construction of first phase concluded. Commission phase 1 of the refinery Monitor the operations of the Phase 1 activities	Commission phase 1 of the refinery Monitor the operations of the Phase 1 activities	Midstream Petroleum Department
		Develop a Master Plan for the Airport at Kabaale, Hoima district.	Conclude the development of a Master plan and detailed engineering design for Airport in Hoima.	Participate in the implementation of recommendations of the Master study plan and detailed engineering design	Commence Airport at Kabaale, Hoima district	Commissioning of Airport at Kabaale, Hoima district	CAA & MoWT
		Procure a Consultant to develop a Master plan for the Kabaale Industrial Park, Refinery Complex Area	Develop a Master plan for the Kabaale Industrial Park, Refinery Complex Area	Implement the recommendations of the Master plan	Implement the recommendations of the Master plan	Implement the recommendations of the Master plan	Midstream Petroleum Department
		A strategy and plan for petrochemicals and other energy based industries formulated	A strategy and plan for petrochemicals and other energy based industries formulated	Implement the strategy and plan for petrochemicals	Implement the recommendations of the Master plan	Implement the recommendations of the Master plan	Midstream Petroleum Department

NDP II Objective	Workplan /Targets						Responsible Institution
	Strategic Investment Areas	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
		Capacity building and Institutional Framework development continued	Capacity building and Institutional Framework development continued	Capacity building and Institutional Framework development continued	Capacity building and Institutional Framework development continued	Capacity building and Institutional Framework development continued	Midstream Petroleum Department
		Regulations for Midstream operations concluded	Monitor compliance by investors	Update regulations for midstream petroleum operations developed and issued Monitor compliance by Investors	Inspection and Monitoring compliance by investors/operators	Inspection and Monitoring compliance by investors/operator	Midstream Petroleum Department
		Development of Standards, Codes and Guidelines continued	Continue the development of Standards, Codes and Guidelines for Midstream operations	Standards and Codes for midstream petroleum operations and facilities developed and issued	Inspection and Monitoring compliance by investors /operators Continue with development of standards, codes and guidelines for Midstream operations.	Inspection and Monitoring compliance by investors/operator	Midstream Petroleum Department
(D) **Development of Midstream Transportation and Storage Infrastructure**							
Objective 4: Produce refined oil and oil by-products for the local and export market	1.Develop and implement the National Strategy and Plan for	Develop, submit and passed the cabinet paper for the National Strategy and Plan for Transportation and storage facilities.	Implementation of the National Strategy and Plan for Transportation and Storage facilities	Implementation of the National Strategy and Plan for Transportation and Storage facilities	Implementation of the National Strategy and Plan for Transportation and Storage facilities	Implementation of the National Strategy and Plan for Transportation and Storage facilities	Midstream Petroleum Department
	2.Conduct a detailed routing survey and Baseline	Conduct a detailed route survey for crude oil pipeline from the fields	Conclude detailed route survey for crude oil pipeline from the fields				Midstream Petroleum Department

NDP II Objective	Workplan /Targets						Responsible Institution
	Strategic Investment Areas	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
	Environmental survey for the Multi-product pipeline from the Refinery to Buloba terminal (near Kampala) Pipeline	to the fields to the refinery and products pipeline from the refinery to Buloba terminal.	to the fields to the refinery and products pipeline from the refinery to Buloba terminal concluded				
	3.Conduct the Resettlement Action Plan study and its implementation for the Multi-products pipeline from the refinery to Kampala for the right of way	Resettlement Action Plan (RAP) study crude oil from the field to the refinery and products pipeline from the refinery to Buloba terminal undertaken.	Conclude Resettlement Action Plan (RAP) study crude oil from the field to the refinery and products pipeline from the refinery to Buloba terminal undertaken	Commence FEED Inspection and monitoring FEED activities.	EPC execution (construction) Inspection and monitoring EPC activities	EPC execution (construction) Inspection and monitoring EPC activities	Midstream Petroleum Department
	4. Support the development of the export pipeline i.e. land acquisition Inter-government Agreements among others.	Carry out and participation in feasibility studies for crude export pipelines. Participate in negotiations for least cost route determination of crude export pipeline	Support the development of the export pipeline i.e. land acquisition conclude Inter-government Agreements among others.	Participate in route optimisation of crude export pipeline Conclude the relevant agreements Commence FEED Monitoring and inspection of FEED activities	EPC execution (construction) Monitoring and Inspection of EPC execution activities	EPC execution (construction) Monitoring and Inspection of EPC execution activities	Midstream Petroleum Department Upstream Partners UNOC
	5.Feeder Pipelines from the Central Processing Facilities to the Refinery *(both Northern and Southern CPF)*	Conduct a study for the crude oil pipeline from the	Land acquired for the development of the pipelines Identification of Developer for the pipeline	Engineering, Procurement and Construction commenced Inspection and monitoring of construction activities	Engineering, Procurement and Construction concluded and commissioning Inspection and monitoring of construction	Commissioning of the pipelines	Refinery Development Project/PEPD Licensed Upstream companies

NDP II Objective	Workplan /Targets						Responsible Institution
	Strategic Investment Areas	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
					activities		
e) Strategic Developments in Down Stream petroleum							
NDP II Objective		**Milestones/Targets**					**Responsible Institution**
	Strategic Investment Areas	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
1. Development and Regulation of Petroleum Supply and Distribution							
Objective 5. Increase efficiency in transportation ,storage, handling, and security of stocks of petroleum products	a) Two hundred (200) standards for petroleum facilities, operations and products developed	Development of Forty (40) standards for petroleum facilities, operations and products	Development of Forty (40) standards for petroleum facilities, operations and products	Development of Forty (40) standards for petroleum facilities, operations and products	Development of Forty (40) standards for petroleum facilities, operations and products	Development of Forty (40) standards for petroleum facilities, operations and products	PSD and UNBS
	b) National Petroleum Information System (NPIS) in place and operational	Appointment of NPIS developer Procurement of NPIS supporting infrastructure	NPIS in place with the necessary infrastructure Subscription International Journals such as PLATTS	NPIS updated with information. Reports generated and distributed to relevant agencies such as BOU, UBOS etc. from NPIS on international and local prices, imports, sales etc	NPIS updated with information. Reports generated and distributed to relevant agencies such as BOU, UBOS etc. from NPIS on international and local prices, imports, sales etc	NPIS updated with information. Reports generated and distributed to relevant agencies such as BOU, UBOS etc. from NPIS on international and local prices, imports, sales etc	PSD
	c) National Policy and regulations for Downstream sub-sector in place	Consultant to develop National Policy for Downstream Sub-sector appointed	Development of Downstream Petroleum Policy continues. Consultation of various stakeholders continue	Downstream Petroleum Policy is in place Development of the regulatory framework based on the new Policy commence	Development of the regulatory framework based on the new Policy continue Consultation with other agencies on the new regulatory framework	Development of the regulatory framework based on the new Policy continue Consultation with other agencies on the new regulatory	PSD and MJCA

NDP II Objective	Workplan /Targets						Responsible Institution
	Strategic Investment Areas	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
						framework	
Objective 6: improve protection of the environment against oil and gas effects and GHG emmissions	d) Health Safety and Environment (HSE) Policy and standards for down stream petroleum in place and operational	Consultant to develop HSE Policy and standards for downstream petroleum in place HSE Policy and standards for downstream petroleum in place	Consultation with other agencies on HSE Policy and standards Procurement of HSE protective gears for PSD staff done Procurement of HSE laboratory equipments	Procurement of HSE system based on ISO Regulatory framework on HSE in place	Enforcement of HSE standards in the downstream sub-sector	Enforcement of HSE standards in the downstream sub-sector	PSD
Objective 2: Increase efficiency and effectiveness in management of Uganda's oil and gas resource potential	20 staff trained in long-term courses and others in short-term courses. Departmental infrastructure procured	4 technical staff attend Msc. Courses Procurement of 3 field vehicles done	4 technical staff attend Msc. Courses	4 technical staff attend Msc. Courses Procurement of 3 field vehicles	4 technical staff attend Msc. Courses Procurement of 2 field vehicles	4 technical staff attend Msc. Courses Procurement of 2 field vehicles	PSD
2. Development of the Downstream Transport Infrastructure							
Objective 5. Increase efficiency in transportation ,storage, handling, and security of stocks of petroleum products	1.Kenya-Uganda Petroleum Products Pipeline in place and operational	Way leave acquisition commences for Uganda section Process of procurement of EPC contractor commences	Way leave acquisition continue EPC contractor in place and construction works commence	Way leave acquisition completed Construction of the line continues	Construction works Completed the pipeline is commissioned	Oil pipeline is operational with its oil terminal	PSD

NDP II Objective	Workplan /Targets						Responsible Institution
	Strategic Investment Areas	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
	2.Uganda -Rwanda Petroleum Products Pipeline in place and operational	Finalization of the feasibility study for Uganda-Rwanda Products Pipeline Commencement of EIA for the project	Route identification for the project EIA study completed	Development of the FEED for the project Detailed route survey done Route acquisition commences	Selection of EPC contractor Construction works commences	Pipeline construction completed Project commissioned	PSD
3. Development and Restocking of Strategic Petroleum Reserves							
Objective 5. Increase efficiency in transportation ,storage, handling, and security of stocks of petroleum products	1.Jinja Storage Tanks (JST) stocked to full capacity and operational	Stocking of JST with petroleum products Survey and titling of the JST site land Construction of road to JST	Setting up a petroleum quality laboratory at JST Monitoring and supervision of JST	Monitoring and supervision of JST	Monitoring and supervision of JST	Monitoring and supervision of JST	PSD
	2.Nakasongola stocked to full capacity and operational	Feasibility study for Nakasongola Tanks Project Packaging under Public Private Partnership Survey and titling of Depot land	Soliciting for Private operator Construction works commences	Construction works completed	Restocking of depot with petroleum products Monitoring and supervision	Restocking continues Monitoring and supervision	PSD
4. **Promotion of Liquefied Petroleum Gas (LPG) usage**							
Objective 5. Increase efficiency in transportation ,storage, handling, and security of stocks of petroleum	1.Promotion and sensitisation Conducting baseline study on LPG usage in Uganda	Dissemination of study findings and developing strategy to implement report recommendations	Mass sensitization in Central region on LPG usage	Mass sensitization in Western region on LPG usage	Mass sensitization in Eastern region on LPG usage	Mass sensitization in Southern and Northern region on LPG usage	PSD

NDP II Objective	Workplan /Targets						Responsible Institution
	Strategic Investment Areas	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
products							
	2.Feasibility study for Development of LPG common user terminal	Packaging of the project for developing LPG facility under PPP arrangement	Soliciting of the private partner for the project FEED Development for the project	Commencement of construction works	Completion of construction works and project commissioning	Monitoring and supervision of LPG facility	PSD
	3.Feasibility study for Development of LPG bottling plant	Packaging of the project for developing bottling plant under PPP arrangement	Soliciting of the private partner for the project FEED Development for the project	Commencement of construction works	Completion of construction works and project commissioning	Monitoring and supervision of bottling plant	PSD

3.3 Mineral Exploration, Development, Production and Value Addition Subsector

Uganda is endowed with a variety of minerals owing to its favourable geology comprising of very old rocks that have been subjected to several geological events in the past leading to the mobilization of metals and their subsequent emplacement and concentration in economic deposits. Government's strategic direction will be to exploit and manage the vast mineral resource in order that mineral sector can contribute to poverty reduction, economic growth, social transformation and industrialization.

The mining industry in Uganda is under the oversight of the Ministry of Energy and Mineral Development. It reached its peak levels in the 1960's when the sector accounted for up to 30% of Uganda's export earnings. However, political and economic instability experienced in the 1970's led to drastic decline of mining activities and contraction of the share of mineral sector's contribution to GDP. The decline was not a result of resource depletion. Since 1996, the economic recovery programmes supported the Government's efforts by implementing policy reforms in order to enhance the mineral exploration, development, production and value addition. Government put in place a mineral policy in 2001 followed by revised legal and regulatory regimes–namely the Mining Act 2003 and Mining Regulations 2004. Government envisages that economic transformation enshrined in the country's National Development Plan (NDP II) and Vision 2040 will be attained by significant developments in priority sectors such as mining. The mining industry will contribute to the socio-economic development of Uganda through creation of employment and support the development of manufacturing, agriculture, and ICT industries.

3.3.1 The Opportunities in the Mineral Subsector

The mining sector presents opportunities comprising of minerals grouped as metallic and non-metallic minerals which investors can prospect and mine. The results of the airborne geophysical surveys and mineral resources assessment under Sustainable Management of Mineral Resources Project (SMMRP) identified potential mineral target areas for further exploration and development that included the following opportunities:-

(a) Limestone, Phosphorus, Iron, Titanium, vermiculite and Rare Earth Elements in Eastern Uganda
(b) Nickel, Chromite, Platinum Group Elements and Iron potential in Masindi Karuma Falls area
(c) Diatomites in Pakwach area – Diatomites have been formed in the Quaternary beds of the Western Rift, on the western side of the Albert Nile.
(d) Kaiso kaolin and bentonite clays
(e) Mayuge iron ores – There are ironstone prospects outside the town of Jinja in Lake Victoria .The iron content is quite high, about 70% Fe but so is also the P2O5 content (1-2%).
(f) Gold Potential in the following areas:
    i) Kitaka –Buhweju area, West Nile – Arua – It has been postulated that the Kilo-Moto gold fields in the DRC extend to Uganda, since similar Archaean greenstone formations have been observed in the West Nile.
    ii) Kaliro-Ivukula gold in quartz veins – In the south Eastern Part of Uganda (Kaliro) gold has been detected in weathered outcrops of Archaean gneisses in connection to quartz and dolerite veins with indicative grades of up to 2 ppm gold.
    iii) Hoima area stream sediment survey (gold potential)

Current exploration and development activity includes:

i) Limestone, Phosphorous , Iron, Titanium, vermiculite and Rare Earth Elements in Eastern Uganda
ii) Nickel , Chromite, Platinum Group Elements and Iron potential in Masindi Karuma Falls area
iii) Diatomite in Pakwach area – Diatomite has been formed in the Quaternary beds of the Western Rift, on the western side of the Albert Nile.
iv) Kaiso kaolin and bentonite clays
v) Mayuge iron ores – There are ironstone prospects outside the town of Jinja in Lake Victoria. The iron content is quite high, about 70% Fe but so is also the Phosphorus pentoxide content (1-2%).
vi) Gold Potential in: Kitaka –Buhweju area
vii) Marble resources in Eastern Uganda (Moroto area, Karamoja)
viii) Kimberlites in South East Uganda
ix) Several mineral potential formations of gold in the Karamoja and Mubende region.
x) Extensive marble formations in Eastern part of the country (Moroto) and other occurrences in the northern Uganda.

3.3.2 Mineral Potential and Reserves

Various survey studies indicate mineral commodities, which could prove to be economically exploitable, such as limestone, phosphates, vermiculite, iron-titanium ores, rare earth elements minerals and base metals.

Table 22: Status of Uganda's Mineral Reserves

♯	Mineral	Location	Status of Reserves	Nature and Progress of Action
1	Copper	(a) Kilembe in Kasese District (b) Boboong in Kotido District; (c) Kitaka in Bushenyi District; (d) Kampono in Mbarara District	(i) Reserve at closure was about 6 million tonne at 1.77% Cu; (ii) Grade of 1.7% at Boboong; and Reserves at Kitaka and Kampono are under evaluation	• Government signed concession agreement with a Chinese company Tibet Hima to develop the copper resources at Kilembe mines. • Reserves at Kitaka and Kampono are under exploration.
2	Cobalt	Kilembe in Kasese District	5.5 Million Tones with grade of 0.17 of cobalt	Kasese Cobalt Company Limited has been processing cobalt stockpile, which is nearly exhausted.
3	Beryl	(i) Kazumu in Ntungamo District (ii) Mutaka in Bushenyi, (iii) Bulema in Kanungu District (iv) Ishasha in Rukungiri District (v) Mbale Estate in Mubende (vi) Lunya in Mukono District	Under evaluation	Under Exploration
4	Chromite[13]	Nakiloro in Moroto District	Under evaluation	Under Exploration
5	Gold	Districts of: Bushenyi, Mbarara, Kabale Kisoro, Rukungiri Kanungu, Busia, Mubende,	(i) Five (5) million ounces of gold in Mubende District by Anglo Uganda Corporation;	Mining Leases Granted to: 1. M/s Greenstone Resources at

[13] Associated with platinum precious metal

#	Mineral	Location	Status of Reserves	Nature and Progress of Action
		Moroto, Hoima, & many streams of West Nile	(ii) One (1) million ounces of gold estimated at Mashonga; (iii) 500,000 ounces of gold estimated at Tiira, Busia; and (iv) Over 500,000 ounces estimated at Alupe in Busia. (v) 139,000 ounces and possible reserves of 160,000 of gold at Nakabat in Moroto District.	(Tiira, Busia District) 2. M/s Anglo Uganda Corporation (AUC Mining, Mubende District) 3. M/s Kisita Co. Mining (Mubende District) and 4. M/s Jan Mangal (U) Limited in Moroto District
7	Iron Ore	(i) Districts of: Muko, Kabale, Kisoro, Mbarara, & Hoima Tororo (Magnetite in Bukusu and; Sukulu), Moroto (Napak) & Kotido (Toror) (ii) Recent discoveries are in Bufumbira County, Kisoro, Nangara, Karukara, Buhara in Kabale District, and Butogota in Kanungu District & Kateera in Mityana.	(i) 50 Mt at Muko, Kabale (ii) 2 Mt in Mugabuzi, Mbarara (iii) 23 Mt at Bukusu and 45 Mt at Sukulu; Tororo District (iv) 48 Mt at Buhara in Kabale District (new discovery) (v) 55 Mt at Butogota in Kanungu District (new discovery) (vi) 8 million tonnes in Bufumbira, Kisoro (new discovery)	Four (4) Mining Leases, granted for Development of iron ore resources: 1. Great Lakes Iron & Steel Company Limited, 2. Kigezi Steel Company Limited, Uganda 3. Uganda International Mining Company Limited 4. Sino Minerals Development Company Limited
9	Lead	Kamwenge District (Kampono, Kanyambogo and Kitaka in Kitomi Forest), Isingiro district (Kikagati)	Under Evaluation	Under Exploration
10	Lithium	Ruhuma in Kabale District; Mwerasandu, Rwamwire and Nyabushenyi in Ntungamo District; Lunya in Mukono District; Nampeyo and Mbale Estate in Mubende District.	Under Evaluation	Pegmatite deposits suitable for small scale mining
11	Columbite Tantalite[14]	(i) Ntungamo District; Bushenyi District; Kanungu District; Kisoro district and Lunya in Mukono District. (ii) Sukulu in Tororo District, Bukusu Complex in Mbale District; Napak in Moroto District and Toror in Kotido District.	(i) 130 million tons of Niobium at Sukulu. (ii) 3.5 million tons of columbite-tantalite estimated at Kagango in Ntungamo district.	The Sukulu phosphate deposit is potentially the most important source of Niobium.
13	Tin	Mwerasandu, Kaina, Nyinamaherere in Ntungamo District; Kikagati in Isingiro District, Ndaniyankoko, Kitezo in Mbarara District, Burama Ridge on the Kabale/ Ntungamo border, Rwaminyinya in Kisoro District.	1.0 million tons at 2.5% tin estimated in Ntungamo and 2.5 million in Isingiro by First Mining Company Limited	Under-developed. Two mining leases: (i) Zarnack holdings; and (ii) First Mining company Limited

[14] Niobium-Tantalum

#	Mineral	Location	Status of Reserves	Nature and Progress of Action
14	Titanium	Bukusu Complex in Manafwa District (22% TiO_2) and Sukulu in Tororo District (13% TiO_2).	Grade of titanium is 22% TiO_2 and (13% TiO_2 in Bukusu and Sukulu respectively.	Undeveloped
15	Tungsten	Nyamuliro (Bjordal Mine) and Ruhija in Kabale District; Kirwa, Mutolere, Rwamanyinya and Bahati in Kisoro district; Kyasampawo in Mubende District and Buyaga in Rakai District	(a) **Kirwa wolfram** resources are at **801,300 metric tonnes** with average grade of 68.67% WO_3, (b) **One (1) million** tones and possible reserves of **355 million** tonnes at Nyamuliro with ore grade at 0.1%	Three (3) Mining leases granted: 1.Krone Uganda Limited; 2.Berkeley Reef Limited; and 3. Sino Minerals Developments.
16	Silver	Silver occurs in association with galena at Kitaka in Kamwenge District and Mubende granite in Mubende District	Under evaluation	Under Exploration
17	Zinc	Zinc occurs with galena at Kitaka in Kamwenge District	Under Evaluation	Under Exploration
18	Rare Earth Elements (REE)	(i) Isolated pegmatites in SW Uganda, (ii) Carbonatite centres in Eastern Uganda (Sukulu, Butiriku, Bukusu, Napak) (iii) Makuutu- Buwaaya area, Eastern Uganda.	(a) 73.6 million tonnes of Rare Earth Elements estimated at Sukulu with grade of 0.32% La2O5 (b) Aluminous clays that are enriched in scandium, Gallium, Yttrium and REE in Makuutu area estimated at three (3) billion tonnes (c) With grades of 23% REE and 27% Alumina.	Unexplored, but Sukulu is now under exploration
19	Limestone/ Marble	(i) Muhokya in Kasese District and Dura in Kamwenge District, and Hima in Kasese District. (ii) Sukulu and Tororo in Tororo District; Napak and Katikekile in Moroto District and Tororo in Kotido District; Moyo Districts.	(a) 14.5 million tonnes at Hima, Kasese and (b) 11.6 million tonnes at Dura, Kamwenge (c) Over 300 million tonnes of marble in Karamoja region	Production on large scale in Kasese, Tororo and Moroto Districts
20	Phosphates	Sukulu in Tororo District and Bukusu in Mbale District, Lolekek in Napak	**(a)** 230 million tonnes at Sukulu with grade of 13.1% p_2o_5; **(b)** 50 million tonnes at Bukusu with grade of 12.8% p_2o_5	• Development in fertilizer manufacturing plant viable; • Apatite with magnetite, vermiculite, pyrochlore, barite, zircon, uranium, titanium, Niobium and rare earth elements.)
21	Vermiculite	Sukulu in Tororo District and Bukusu Carbonatite Complex (Namekhara, Nakhupa, Surumbusa, Kabatola and Sikusi) in Mbale District	54.9 million tonnes at Namekhara	• Mine developed at Namekhara • Development in fertilizer manufacturing plant viable
22	Kaolin	Namasera, Migadde and Buwambo in Wakiso district;	(a) 2.8 million Tonnes at Mutaka, Bushenyi.	On demand by local industrial sector

♯	Mineral	Location	Status of Reserves	Nature and Progress of Action
		Mutaka in Bushenyi District, Kisai in Rakai District and Kilembe in Kasese District	(b) One (1) million tonnes at Kisai(Koki), Rakai	
23	Gypsum	Kibuku in Ntoroko Distict, Lake Mburo in Kiruhura District and Kanyatete in Lake George basin Kasese District.	2 million tons in Kibuku	Available market
24	Salt	Kibiro in Hoima District; Katwe and Kasenyi in Kasese District	22 Million tonnes of trona at Katwe and Kasenyi, Kasese District	Mined for animal and human consumption locally. Industrial production opportunities available
25	Feldspar	Bulema in Kanungu District; Bugangari in Rukungiri District; Mutaka in Bushenyi District; Nyabakweri in Ntungamo District and Lunya in Mukono District.	Under evaluation	Development in downstream industries viable
26	Glass sand	Diimu and Bukakata in Masaka District; Lwera in Masaka District, Nalumuli Bay, Nyimu Bay and Kome Island in Mukono District	The highest quality 99.95% SiO_2 at Kome islands, 2 Mt at Dimu and Bukakata (99.93% SiO_2)	Viable Development
27	Kyanite	Kyanite occurs at Ihunga and Kamirambuzi hills in Rukungiri district; new prospect around Murchison Falls	Under Evaluation	Not yet explored
28	Diatomite	Panyango, Alui, Atar and Amboso River near Packwach in Nebbi District	Under evaluation	Undeveloped
29	Dimension stones	(i) Marble occurs in Karamoja Regio (ii) Granite in various colours and textures occur in various parts of the country.	Over 300 million tonnes of marble in Karamoja (Rupa, Kosiroi, Tank Hill, Forest Reserve, Matheniko, Pule and Lolung)	• Tiles in Uganda are 100% imported. • A Mining Lease granted to Building Majesties (u) Limited (BML) to process granites in Mubende into dimension stone
30	Clays, aggregates and hard cores	Various parts of the country		Stable demand, viable Development
31	Others potential minerals	(i) Nickel at Kafunzo in Ntungamo District; Rugaga in Isingiro District. (ii) Platinum Group of Metals at Nakiloro in Moroto District, Bweyale in Kiryandongo District (iii) Diamond potential in Kibaale, Butare in Buhweju District, areas around Lake Kyoga, indicator minerals occur in Katakwi and	Unknown	Further exploration and Development being undertaken

♯	Mineral	Location	Status of Reserves	Nature and Progress of Action
		Karamoja		

The mineral resource and its certainty have been assessed and established by the Directorate of Geological Survey and Mines. The resource assessment studies that have been conducted and evaluated the likelihood of the occurrence of mineral deposits in terms of levels of mineral resource potential and the certainty of the assessment. Given this potential, the contribution of mining industry to the national economy is needed to help drive the economic growth and in the longer term, to play a key role in national sustainable economic development. Whilst satisfying the demand to increase the role of the mineral sector to support the national economy, Government will also remain committed to protecting the environment through the enactment and implementation of appropriate laws and regulations.

3.3.3 Development Opportunities in the Mineral Subsector

Other opportunities in the mineral sector, which can be exploited by the private sector or through public private partnerships, include:

(a) Supply of mining services such as drilling, airborne geophysical surveys; or refining. This also includes supply and/or hiring of equipment for large and small-scale miners as well as contract mining.
(b) Infrastructure development such as the road networks
(c) Establishment of capacity building centres of human resources to handle geo-scientific data.
(d) Establishment of an industrial scale quarrying operation

3.3.4 Mineral Sector Growth and Development Strategy

The Government's strategic direction has been to provide a favourable business climate in Uganda for over two decades now. This has attracted many mining companies that have been licensed in the mining sector. Over the last ten years the sector has been growing positively with growth rates peaking 19.4% in FY 2006/07. In FY 2009/2010, the sector grew by 12.8%. In the FY 2012/13 Mineral production in commodities limestone, pozzolana, gold, vermiculite, cobalt, wolfram, aggregates, kaolin, and iron ore generated UGX. 207.9 billion. Mineral Exports revenue worth UGX 69.9 billion was generated from mineral exports of cobalt, copper, gold, iron ore, manganese ore, quartz, silver, tin, tungsten and vermiculite. Meanwhile, a total of UGX 31.5 billion was realized as import fees for gold.

Government recognizes that the mineral resources are finite; therefore mineral wealth will be invested in order to create new wealth and used to create forms of renewable capital, such as human, social and physical capital, which is key to the sustainable development of Uganda beyond the mining period. Also key is to develop minerals clusters and to create opportunities for growth of lateral or downstream businesses that have the potential to create more employment and generate valued-added rents and wealth. Over the planning period, Government's strategies will be to address the creation, development, distributional, governance and macroeconomic challenges of mineral resource management and mainstream mineral wealth into the growth and poverty reduction strategies as defined in the second National Development Plan (NDP II) and Vision 2040. The general strategic path for Government in the mineral sub-sector will include the following:-

(i) Creating a conducive, stable and predictable policy, legal and regulatory framework and a competitive fiscal regime with a view to attracting and retaining the required level of development in the mineral sector, creating wealth, promoting employment and opening-up opportunities.
(ii) Achieving better mineral resources revenue allocation and redistributing the benefits of mineral wealth through improvements in the governance and management of revenue flows deriving from mining, and through decentralization of decision-making and resource allocation.
(iii) Promoting a calculated, parsimonious and well informed spending, savings and development (in other assets) strategy, which prioritizes human, social and physical capital creation and transformation of mineral wealth into financial assets that yield higher returns (the annuity policy).
(iv) Promoting mineral resources revenue stabilization and reducing fiscal imbalances through greater fiscal discipline, certain level of fiscal conservatism and increased capacity for forecasting and managing mineral revenues with a view to reducing uncertainties about their magnitude, mitigating market externalities and minimizing adverse macro-economic impacts associated with commodity price fluctuations.
(v) Enhancing governance systems, organizational and institutional capacity in sectoral ministries, in the ministries of finance and planning, and in local governments.
(vi) Forging tri-sector partnerships and creating coalitions of change (Steele, 2004) between public, private (mainly mining companies) and local stakeholders to improve community livelihoods and to maximize other socio-economic and development outcomes.
(vii) Empowering communities in mining regions to be able to make informed decisions and to better participate in their own development.
(viii) Unbundling the sector and promoting a strategy that encourages local procurement and outsourcing of goods and services, value-addition and local beneficiation of minerals, diversification from minerals, as well as optimizes business multipliers and enhances linkages between mining and other sectors of the economy, including at local community level.
(ix) Encouraging mining companies to behave in a more social and corporate responsible manner with a view to improving the social relevance of mining.
(x) Promoting environmentally friendly/sensitive mining standards and operations that cause minimal harm to the environment and human health.

The contribution of the mineral subsector to national development is hinged on significant investments in the following programme areas: 1) Establishing the mineral wealth of Uganda; and 2) Enhancing Mineral Sector Infrastructure to Support Mineral Development and Industrialization.

3.3.5 Establishing the Mineral wealth of Uganda

The airborne geophysical mapping of the country is currently at 80% and there is need to complete the remaining 20%. The geology of the country is good with mineral varieties that need to be quantified based on their geologic certainty and economic value. The quantification of the mineral reserves and mapping of the base metals, special metals, precious metal carbonetites, carbonates pegmatites and industrial mineral is complete. The Government will ensure that the mineral wealth of the country is fully established after covering the whole country. The key strategic actions that will enable the establishment of the mineral wealth of Uganda include:

(a) Geological Mapping of Minerals

The Government will undertake detailed geological, geochemical, geophysical mapping of key strategic minerals such as Iron ore, phosphates and others minerals relevant to domestic industrialization and enabling productivity in agriculture sector activity. Strategic planned investments will include:

i) Carrying out geological study of sheets 79/1 (Kawoko) and 79/2 (Lukaya) and produce base maps at scale of 1:50,000 showing boundaries of lithological units and lineaments. Two hundred and ten (210) geological observations will be carried out on each sheet to interpret lithological units in the base map. Fifty (50) rock samples are proposed to be collected per sheet for petrographic and microscopic study. For each sheet, seventy five (75) stream sediment samples will be taken while detailed soil geochemistry on grid of 100m x 50 over an area of 800m by 250m with prominent structures and lineaments are planned resulting in 75 geochemical sampling points per prospect. For every geological observation point, magnetic and radiometric surveys will be conducted resulting in two hundred (200) geophysical sampling points per sheet. Detailed geophysical surveys on grid of 100m x 50 over an area of 800m by 250m using magnetic, IP and radiometry surveys are planned where 75 geophysical sampling points per prospect per method would be recorded.
ii) Carrying out detailed geophysical surveys of five mineral potential targets namely; Karuma Ni-PGE Prospect, Kafunjo Nickel Prospect, Makuutu radiometric anomaly, Mashonga gold prospect and the Bukusu Carbonatite complex was carried out.
iii) Carrying out detailed ground geochemical surveys of the Bombo, Buhweju, and Kisamura anomalies.
iv) Carrying out detailed geological, geochemical, geophysical mapping of sheets 62/2 (Namwendwa) and 63/3 (Busesa).

(b) Airborne Geological Survey and Geological Mapping of Karamoja

The Karamoja region is endowed with both metallic and industrial minerals due to the diversity of its geology. Parts of Karamoja have been prospected for minerals and mining activities have remained on small scale, while vast region remained unexplored. With the numerous mineral varieties known in Karamoja region, investing in mining activities can transform the wellbeing of the people of Karamoja for greater social and economic benefits. The Region hosts occurrences of over 50 different economic minerals, including gold, silver, copper, iron, gemstones, limestone and marble, making it one of the most prospective areas of the country. It has attracted over 20 foreign and Ugandan owned companies to conduct exploration and, to a much lesser extent, mining in the region. The sector employs a substantial number of men and women as Artisanal and Small scale Miners (ASM) in the Karamoja sub region. The Karamoja sub-region which comprises Block WB4 (20%) was not flown because of the then insecurity by the warriors and cattle rustlers and hence was not mapped. Strategic development will be made to complete the mapping of Karamoja Region and this will include:-

i) Continued disarmament and pacification of the local warriors and cattle rustlers;
ii) Carrying out sensitization of the local population on the importance of minerals;
iii) Carrying out airborne geophysical survey of Karamoja;
iv) Complete the gap in high quality airborne geophysical data coverage of Uganda;
v) Acquire remote Sensing data for Karamoja region to map mineral signatures;
vi) Map mineral potential of Karamoja;
vii) Package Karamoja region for mining opportunities in Karamoja;
viii) Update Geophysical map of Uganda for mineral promotion;
ix) Construct and equip Karamoja Office and other Regional Offices; and
x) Procure exploration equipment for assessing Minerals of economic importance.

(c) Exploration and Development of Uganda Geothermal Energy Resources

Government has put emphasis on the development of renewable energy technologies to be integrated into the national energy supply mix. Among the renewable sources of energy being considered is geothermal energy, which can produce base load electricity, if well explored and developed. Government's strategic plan will be to develop a strategy for geothermal development in Uganda. It will review the existing policy, institutional and regulatory framework with a view of proposing the necessary legal and institutional framework to fast track geothermal energy development in Uganda. Inadequate policy, institutional and regulatory frameworks is a stumbling block for Uganda's geothermal development. In East Africa, only Kenya has a policy, institutional and regulatory frameworks for geothermal development and indeed it is the only country that is leading in developing its geothermal resources in Africa. The plan is therefore designed to complete surface exploration in the four areas, and carry out a feasibility study in the most promising prospect. It will also put in place a geothermal policy, institutional and regulatory frameworks.

In order to develop the geothermal energy, Government will make priority developments designed to complete surface exploration in the four areas of Katwe, Buranga, Kibiro and Panyimur, and carry out feasibility studies in the most promising prospect. This will include carrying out the following:

i) additional geophysical studies at Katwe, Buranga and Kibiro using Transient Electromagnetics (TEM), Magneto-tellurics (MT) and Gravity methods to probe deeper and identify the heat source and targets for deep drilling.
ii) detailed geological, geochemical and geophysical (MT, TEM and Gravity) surveys at Panyimur to delineate geothermal anomalous areas identify the source of heat and targets for deep drilling.
iii) additional hydrological and hydro-geological surveys to study in detail the structures that control the fluid flow mechanisms in the four areas.
iv) updates the current surface models based on geology, geochemistry, and geophysics; with additional geophysical surveys (TEM and MT), and hydrology and hydrogeology results, to come up with integrated models that will be a basis for locating deep exploration wells.
v) sociological and environmental baseline studies and infrastructure assessment in the four areas.
vi) Selection of the most promising area for the feasibility study.
vii) Environmental Impact Assessment for drilling in the most promising prospect.
viii) Drilling of three (03) deep geothermal exploration wells in one selected prospect with the aim to discover a geothermal reservoir.
ix) Training of Ugandans in exploration and resource testing, project design, operation and financing.
x) Purchase of equipment for geothermal exploration and well testing.
xi) Put in place adequate policy, institutional and regulatory frameworks for geothermal energy development.

(d) Mapping Geosites and Geoparks

Geosites are natural unique geological, paleontological or archaeological sites with scientific, education, heritage of cultural values and interest. These sites if developed will boost the tourism industry. There is therefore need for mapping and gazetting these strategic geo-sites across the country for Geo-tourism and mining industrial parks. This move will cause growth of the tax base and increase Non Tax Revenue (NTR) from mining.

(e) Gazetting of Uranium Resources

Uganda is faced with inadequate energy to meet the increasing demand by: domestic; industrial and commercial users[15]. In addition, energy from renewable energy resources is limited. To overcome this challenge and to access nuclear power energy as part of its energy mix, government is planning to develop nuclear power to meet future energy demand. To develop nuclear energy, government strategy is to invest in exploration of radioactive minerals, particularly uranium. Recent airborne and geophysical survey (radiometric) carried out indicated 80 targets that are geologically favourable for the discovery of Uranium. In order to strengthen the exploration of uranium in the country Government will make investments in the following areas:

i) **Policy Formulation and Regulation:** The successful exploration of Uranium for nuclear energy production in Uganda hinges on an effective policy and regulatory framework. With support from IAEA, Government will formulate, harmonize uranium exploration and utilization policy and standards.

ii) **Institutional Capacity to Enhance Uranium Exploration:** To effectively carry out Uranium exploration and build a sustainable nuclear power program, the government will develop institutional and human resource capacity to enhance Uranium exploration. The government will train and retain human resource in the unit responsible for Geology, Surveys and Mines for Uranium exploration.

iii) **Reconnaissance of Uranium Anomalies:** Government is to undertake detailed assessment of uranium resources as a viable source of nuclear energy to support national and social Development. To establish the amount of uranium resources in the country, government plans to carry out reconnaissance of uranium anomalies in the medium term. To achieve this target, government will implement the following strategies i) carry out uranium exploration on topographic map sheets 66/1 (Mobuku), 66/2 (Kahungye) and 39/2 (Pakanyi); ii) complete exploration maps for two (2) uranium areas; iii) complete geophysical maps and profiles for two (2) uranium areas and; iv) identify and map drilling targets for two (2) uranium areas and estimate uranium resources for two (2) uranium areas.

iv) **Health and Safety Measures for Uranium Exploration:** To promote uranium exploration, government strategy will develop health and safety measures for uranium exploration. The strategic activities will include; developing standard operating procedures (SOP's) for analyses of radioactive samples, procurement of at least twenty (20) XRF standards and 1,000 aluminium cups for XRF samples, Procurement of standards of at least 50 kg of lithium tetra borate/lithium metaborate or lithium borate/ lithium iodide fluxes and 10 kg of SASOL wax/ cellulose binder, and procurement and installation of at least one sample preparation unit with dust extraction and suppression capability.

v) **Exploration and Mapping of Uranium Resources**: Government plans to **gazette uranium resources** as a way of promoting its peaceful exploration. The activities for gazetting uranium resources in the medium term include: i) supervise uranium exploration activities sheets 66/1 (Mobuku) and 66/2 (Kahungye); ii) supervise uranium exploration activities on ground geophysical surveys of sheets 66/1 and 66/2; iii) supervise uranium exploration activities in Pakanyi and other areas and; iv) produce a yearly report on supervision of uranium exploration activities.

vi) **Purchase of Specialized Machinery & Equipment:** In addition to physical infrastructure, enhancing uranium exploration requires specialized machinery and equipment because uranium has the potential

[15] MDGs Country Report, 2013

to cause large and uncontainable accidents and other environmental and health hazards especially those related to radioactive waste. To minimize the risks associated with uranium, governments will make investments include: procurement a uranium exploration equipment; acquisition of four (4) portable gamma ray spectrometers, five (5) handheld scintillometers, one (1) Portable XRF with accessories and standards, and two (2) microscopes for mineralogical analysis.

(f) Exploration and Development of Rare Earth Elements (REE)

Recent geo-surveys and mineral resources assessment led to the discovery of mineral deposits rich in REE. These deposits are located in Bukusu, Makuutu, Iganga, Butiriku (Butiribo), Budeda, Lolekek, Napak and Sukulu in Tororo). Geological Survey of Uganda indicate that northern complexes host mineral commodities which could prove to be economically exploitable, such as limestone, phosphates, vermiculite, iron-titanium ores, REE minerals and base metals. Rare earth elements are of high value for their use in hi-technology industry (computer chips) and can generate more revenues if strategic developments are made to fully exploit these minerals.Government plans to write and implement a Rare Earth Elements (REEs) Exploration Project. This project has the following activities:

i) Developing a national policy on rare earth elements;
ii) Training human resource capacity in REE exploration technologies;
iii) Conducting Geological and Geochemical surveys and Ground geophysical surveys of Rare Earth Elements;
iv) Developing exploration standards for REEs;
v) Conducting Supervision and inspections for Rare Earth Element exploration;
vi) Establishing a Rare Earth Exploration Unit and;
vii) Procuring Rare Earth Exploration Equipment.

3.3.6 Enhancing Mineral Exploration, Development and Value Addition

Uganda is lightly explored from a mineral perspective. The available information is certainly enough to establish that the country has considerable potential but it may well be that this potential is even greater than studies to date have shown, given how little exploration and research has been carried out. There is a strong role for Government to improve the knowledge of our mineral resources in order to attract investment to develop this potential. This involves management and dissemination of geo-data on the country's mineral wealth; monitor and assist small scale miners and also enforce regulations in Mineral Exploration. Under the Mineral Policy, the Government intends to maximize the economic benefits of mineral exploitation, and promote private sector participation by putting in place an internationally competitive legal and fiscal regime for the sector. Nonetheless, there is high mineral exploration potential in Uganda, which remains inadequately explored despite the country's long history of exploration and production. In order to enhance mineral exploration, Government shall implement the following strategies in the next five (5) financial years:-

1. Strengthening of National Seismological Network Infrastructure and Institutions

Earthquakes are a matter of national concern whose occurrence in Uganda is associated with the East African Rift System (EARS). The western border of the country lies entirely in the western branch of the lift valley, while the eastern border is about a few hundred kilometres from the eastern branch of the rift;

and there is more seismic activity in the western than in the eastern branch. There are a number of tectonic features that make Uganda Earthquake prone. These include:

i) The Rwenzori Mountain- the Rwenzori massif and tectonic movements cause stress accumulation that is released along the border and boundary faults to the mountain. The faults include: - the Nyamwamba, Kicwamba, Bwamba, Kitimbi-Semuliki, Ruimi-wasa and Bunyoro –Toro;
ii) Katonga Fault: This fault starts from the foothills of the Rwenzori Mountain, traverses Lake Victoria and connects to Kavirondo Gulf in western Kenya and Speke Gulf south of Lake Victoria in Tanzania; and
iii) Aswa Shear Zone: the shear zone is observed in Uganda from Nimule at Uganda –Sudan Border and joins Mt Elgon on the eastern border.

There is a correlation between the areas where seismic risk exists and where increased petroleum and mineral exploration activities are taking place (such as the Albertine Graben). Government's strategy will be to map all areas prone to seismic risk and put in place measures to mitigate the risk. Government will therefore make developments in the following areas:-

i. Put in place earthquake administration policy, disaster management plan and legal framework to enforce seismic safety standards in all infrastructure designs, buildings and construction industry.
ii. Extend and strengthen seismological and infrasound network coverage to areas prone to seismic and volcanic risk.
iii. Map very low to very high seismic risk areas so that settlements and infrastructures are planned very well in good sites.
iv. Strengthen institutional research capacity and develop skills of Ugandans in seismology, earthquake engineering, seismic instrumentation, and computing and earthquake policy.

2. Mineral Data Management Infrastructure

Through activities related to mineral exploration such as geological, geochemical, geophysical surveys and mapping; there is a strong and useful dataset developed on the mineral potential of Uganda. This data often needs to be processed, analysed and interpreted, archived, packaged and disseminated to potential users (such as private sector companies in need of making developments in the mineral sector) through print and electronic media. In order to enhance this resource; Government will invest in a Geological Information Management system to ensure that geological data is populated, maintained and coordinated. This geological management information system will host a number of key geological databases and other information systems related to the mineral sector. The Government investments will include:

i) Setting up a geophysical data processing and interpretation unit;
ii) Development of web-based national geophysical data management system which will host geoscience databases and Mining Cadastre and Registry System (MCRS);
iii) Development of staff capacity to manage the geophysical data processing and interpretation unit and the national geophysical data management system;and
iv) Design and implement follow-up ground geophysical programmes.

3. Laboratory Infrastructure Enhancement for Mineral Value Addition

The Vision 2040 recognises that the mineral subsector will be the major driver in the socio-economic growth of Uganda. For this to occur, the government will put emphasis on the promotion of local

beneficiation, where the government will ensure that value addition on the minerals is done in Uganda and providing manufacturing feedstock. This will help to establish an industrial base for local production of mineral products for the local and export markets.

There is a need to add value and promote industrial use of locally produced minerals, which can only be met through research. Currently; the country has inadequate laboratory infrastructure to support value addition in the mineral sector. The only government laboratories at the Geological Survey and Mines Directorate in Entebbe which are able to provide some mineral analysis and mineral beneficiation tests are in dire need of furnishing with state of the art equipment and continued budgetary support for their operation. Because of the current state of these laboratories any mineral analysis is done overseas and/or in neighbouring countries in the East African region where better facilities exist.

With the increased importance of the mineral sector government will undertake to rehabilitate and equip the laboratories in Entebbe with a view of promoting of value addition to Uganda's minerals to develop its manufacturing industry and improve export earnings, whereas also save on foreign exchange which could have gone into importation of metal raw materials. Government planned investments will include:

i) Developing a Mineral Laboratories Service Policy;
ii) Procuring of laboratory and mineral processing equipment;
iii) Training of personnel in analytical chemistry, process mineralogy, and metallurgical engineering;
iv) Training staff in operation and maintenance of equipment;
v) Developing standard operational procedures;
vi) Developing methods and procedures for analysis of mineral ores, water, environmental and botanical samples;
vii) Carrying out research in laboratory analysis and mineral processing; and
viii) Promoting value addition on the minerals.

4. Mainstream Artisanal and Small Scale Miners

The mineral policy objective includes regularizing and improving Artisanal and Small-scale Mining (ASM). There is an opportunity for harnessing the potential of Artisanal Small-scale Miners in order to improve rural livelihoods, to stimulate entrepreneurship in a socially responsible manner, to promote local and integrated national development as well as regional cooperation. ASM refers to mining operations run by local enterprises usually in informal settings, as opposed to large-scale mining (LSM) operations, which are usually run by transnational companies. Usually ASM is not capital intensive and is affected by the following challenges:

i) Lack of policy framework that is flexible enough to accommodate the ASM;
ii) ASM is challenged technically; for example the operators usually lack knowledge about legislation on health and safety, protection of the environment, mineral rights and decent work environment;
iii) The ASM usually lack access to a transparent market, they are often tied to a sole sponsor who provides inputs such as mercury (for gold extraction) or tools and it is this operator who sets the selling price rather than the market;
iv) The informal, unregulated nature of ASM makes it vulnerable to illegal dealings. ASM is an easy victim of organized crime;
v) Even among the poor there are levels of poverty and in ASM women benefit less than men from

mining. Women are disadvantaged in respect of mineral rights, capital and equipment. Their role as provides of fuel wood and flesh water can be affected by environmental consequences of mining; and

vi) Children suffer disproportionately too; child labour in mines damages not only young bodies and minds but also means that schooling is missed.

Government's strategy will be to bring ASM into the mainstream economic life over the strategic planning period and offer it financial and technical support. Government's plan over the medium term will include:-

i) Regularizing informal ASM.
ii) Simplifying and decentralizing procedures for acquiring ASM rights.
iii) Devising realistic implementation plans that enhance institutional capacity.
iv) Assisting miners to graduate from subsistence to sustainable businesses.
v) Assuring a legal regime that gives ASM right holders enough land, duration of rights and security of tenure.
vi) Providing accessible institutional, technical and financial support.
vii) Encouraging support for ASM from the more established private sector (including LSM).
viii) Expanding exploration work to help designate and allocate areas for ASM.
ix) Ensuring regional and international cooperation to address the challenges of conflict minerals.
x) Raising capacity locally to run tracking and certification schemes before enforcing bans on transporting non-compliant minerals.
xi) Enforcing international norms prohibiting child labour.
xii) Exploring and launching measures to redress discrimination against women, whether due to the law or operation in practice.
xiii) Promoting sub-regional cooperation in technology development, research, construction of appropriate plant and machinery, technical standards, compilation of a database of local capacity and generation of financial resources.

5. Skilling and Re-Tooling Human Resources

The current human resources in the Directorate of Geological Survey and Mines need to be retooled, trained with new and advanced skills and capitalized to be able to explore, evaluate and develop the mineral potential of Uganda and to license, monitor and enforce compliance effectively. The current size of manpower is unable to cope up with the rapidly expanding mineral industry especially after identification of new opportunities by airborne geophysical surveys and surface mapping. Government plans to:-

i) Finalize the ongoing re-structuring of the Ministry and expand manpower;
ii) Recruite and train of young professionals;and
iii) Reform and harmonize the incentive structure for the staff in the working on geological survey and mines.

6. Support and Encourage the Participation of the Private Sector

Tapping private sector initiative and development in the mining sector is critical for poverty reduction and for socially useful purposes. In parallel with public sector efforts, private development, especially in competitive markets, has tremendous potential to contribute to growth. Private markets are the engine of productivity growth, creating productive jobs and higher incomes. Government playing a complementary

role of regulation, funding, and service provision, private initiative and development can help provide the needed developments in the mineral sector in order for the country to gain better from its identified mineral potential. Government's plans will therefore include:

(a) Mineral sector restructuring by preparing and reforming the Mineral Act 2003 in order to accommodate the prevailing issues related to encouraging and attracting new development in the mineral sector, regional and community developments, small scale mining operations, land ownership, worker health and safety, and environmental management;
(b) Encouraging efficiency and technological improvement in the harnessing of Uganda's mineral resource;
(c) Establishing close coordination among Government institutions such as the National Forestry Authority, National Environment Management Authority, Uganda Wild Life Authority, to create favourable regulations for the optimal benefit of national development;
(d) Implementing swift and firm action to stop illegal mining operations;
(e) Mitigate the excessive speculation by licensees sitting on acreage and transfer of mineral rights with no substantive work done on those mineral reserves;
(f) Solving the problems related to regional claim and demand on mineral benefits;
(g) Optimizing ore process toward producing an end product to secure high added value to meet domestic downstream industry demand;
(h) Expanding research and development programs toward the utilization of domestic mineral raw materials for intensifying domestic industry; and
(i) Establishing complete and accurate mineral resource data information system accessible worldwide, to attract mining development.

7. Compliance Monitoring of Environmental Standards and Requirements

Mining activities are regulated to comply with environmental management standards and requirements during mining, minerals processing, disposal of mining wastes, handling and disposals of chemical, pollution control and environmental restoration of mined areas. This is a big challenge due to remoteness and isolated nature of mining activities that renders enforcement of environmental regulations or monitoring compliance cumbersome.

3.3.7 Five-Year annualised workplan for the Mineral Exploration, Development, Production and Value Addition Subsector

Table 23: Five-Year annualised workplan for Mineral Exploration, Development, Production and Value Addition Sub-sector

NDP II Objectives	*Strategic Development Areas*	Workplan/Targets					Responsible Institution
		FY 2015/16	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
1. **Establishing the Mineral Wealth of Uganda**							
Objective 1: Establish the geological and mineral potential of the country	Geological Mapping of Minerals Fifteen (15) Minerals & Mining Industrial Development	Three (3) Strategic Minerals Generate Structural maps of mineral targets Structural maps for targets of mineralization	Three (3) Strategic Minerals Generate Structural maps of mineral targets Structural maps for targets of mineralization	Three (3) Strategic Minerals Generate Structural maps of mineral targets Structural maps for targets of mineralization	Three (3) Strategic Minerals. Generated Structural maps of mineral targets Commence activities to Celebrate 100 years of geological mapping and Mining	Thee (3) Strategic Minerals Generated Structural maps of mineral targets Celebrate 100 years of geological mapping and Mining	GSMD
	(ii) Airborne Geological Survey and Geological Mapping of Karamoja 20 % of Geological data Coverage Gap filled	Sensitize policy makers and local communities in Karamoja about 20% High Resolution Geophysical data coverage and mobilization of funds Review & update existing geophysical and mineral resources maps of Karamoja region	Make request to MoFPED on financial implication of acquisition of 20% High Resolution Geophysical data	Carry out airborne surveys of Karamoja and fill 20% High Resolution Geophysical data coverage gap	Interprete 20% of High Resolution Geophysical data. Disseminate the data products	Disseminate 20% High Resolution Geophysical data and the data products Update geophysical and mineral resources maps of Karamoja region	GSMD
	Geological Mapping and Mineral resources assessment.	Radiometric and Magnetic Data and Maps.	Radiometric &	Structural maps for targets of mineralization	Structural maps for targets of mineralization	Structural maps for targets of mineralization	
		Map and gazette Strategic geo-sites Karamoja region	Magnetic data Map 20% High Resolution Geophysical data				
Objective 5: Increase Geothermal Energy Resources in the country	Electricity from Geothermal Resources	Detailed focused Surface Exploration at Katwe, Kibiro, Panyimur and Buranga	Production Drilling and testing	Project Design	Evaluation of Geothermal Resource Models	Capacity Building	GSMD
		Drilling Shallow wells (Thermal Gradient survey)	Exploration Drilling (3 deep wells)	Drilling, Appraisal & Development	Capacity Building	5MW Plant construction & commissioning	
		Reconnaissance / preliminary survey of sites in North and North	Capacity Building	Capacity Building	5MW Plant construction & commissioning	Communication and stakeholder consultations	

NDP II Objectives	*Strategic Development Areas*	Workplan/Targets					Responsible Institution
		FY 2015/16	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
		eastern Uganda					
		Capacity Building	Procurement of Equipment.				
		Putting in Place Policy Legal and Regulatory framework	Construction of Geothermal Resources Department				
		Procurement of Equipment.	Communication and stakeholder consultations	Communication and stakeholder consultations	Communication and stakeholder consultations		
		Construction of Geothermal Resources Department					
		Communication and stakeholder consultations					
Objective 4: Increase private investment in the mineral sector	Mapping Geo-sites and Geo-parks Expand Tax Base in Geo-tourism & E&SCR in Mining	Map and gazette Strategic geo-sites Western region	Map and gazette Strategic geo-sites Central region	Map and gazette Strategic geo-sites Northern region	Map and gazette Strategic geo-sites West Nile region	Map and gazette Strategic geo-sites Eastern and Karamoja region	GSMD
Objective 1: Establish the geological and mineral potential of the country	Gazetting Uranium Resources Ten (10) Zones (A to J)	**J:** Mabale, Kagadi, Isunga, Pachwa, Kabwoya-Hoima district.	**I:** Kinyasano, Nyakibale, Kagamba, Ntugamo, Rubare.	**H:** Rubindi, Kashongi - Nyabishekye Basin, Mirama Kababo Basin – Mbarara district.	**F:** Bulyango, Kigozi-Kiizi Basin-Kabarole district.	**A:** Kei and Midigo-Kaya Basin, Arua district.	GSMD
		E: Karongo-Waki Basin-Masindi			**G:** Mpanga-Kahambu Basin Kyatwa (Ndale) - Mpaga Basin, Kyakutama-Basin-Kabarole district.	**B:** Acha-Alo basin-Pakwach district.	
						C: Zipia, Bibia, Pekelle - Ayugi Basin-Adjumani	
						D: Naam-Okora, Ogli and Wol (Pager-Agago-Ogel Basin)-Kitgum district.	
	Exploration and Development of Rare Earth Elements (REE) Explore Ten (10) zones	Explore Eastern Uganda	Explore Western Uganda	Explore Northern Uganda	Explore Central Uganda	Explore Karamoja region.	GSMD
		Identify targets for Mining & Industrial Development	Identify targets for Mining & Industrial Development	Identify targets for Mining & Industrial Development	Identify targets for Mining & Industrial Development	Identify targets for Mining & Industrial Development	
2. Enhancing Mineral Exploration							
Objective 6: Increase response to mitigate seismic risk	Strengthening of National Seismological Network Infrastructure and institutions Extend Seismic Network Coverage	Restore Earthquake Research Infrastructure and laboratory in Entebbe	Map very low to very high seismic risk areas so that settlements and infrastructures are planned very well in good sites.	Extend and strengthen seismological network coverage to areas prone to seismic and volcanic risk.	Extend and strengthen seismological network coverage to areas prone to seismic and volcanic risk.	Extend and strengthen seismological network coverage to areas prone to seismic and volcanic risk.	GSMD

NDP II Objectives	***Strategic Development Areas***	**Workplan/Targets**					**Responsible Institution**
		FY 2015/16	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
	Station Density Minimum 100 km to 200 km.	Seismic hazard & Risk maps	Legal framework awareness to enforce seismic safety standards in all infrastructure designs, buildings and construction industry	Bulletins & Seismicity Maps	Seismicity Maps	Bulletins & Seismicity Maps	
	National Coverage: Fourty (40) Permanent Seismic Stations).	Active fault Mapping	Active Fault Maps Passive structural maps	Skill Ugandans in seismology & earthquake engineering fields	Strengthen institutional research capacity and develop skills	Skill Ugandans in seismic instrumentation, and computing and earthquake policy.	
	Restore earthquake research laboratory in Entebbe	Seismic Adaptation and Mitigation Put in place earthquake administration policy earthquake disaster management plan.	Updated Seismic Hazard Maps				
Objective 2: Increase monitoring and regulation in the mining sector	Mineral Data Management Infrastructure and an active Mining Cadastre.	Install e- security system for geological data management & Mineral rights governance.	Strengthen geo-data and mineral information management system.	Install and test E-mineral rights & E- governance infrastructure	Install and Test E-manager infrastructure in the Mineral Data and rights Managements	Celebrate Centenary activities of the Mineral Sector.	GSMD
	E-mineral rights & E-governance	Upgrade Mineral data backup Bank infrastructure	Increase transparency in Mineral information access and dissemination			Publish Mineral Ores and Reserves of Uganda.	
Objective 4: Increase private investment in the mineral sector	Laboratory Infrastructure Enhancement for Mineral Value Addition and procurement of Mineral Value addition infrastructure	Purchase analytical and mineral beneficiation equipment to support feasibility studies for value addition projects Train personnel in metallurgy, analytical chemistry, mineralogy/petrology, and gemmology Appraise mining operations/ and or exploration projects for purposes of value addition Identification and Development of linkages/partnerships with academic institutions to	Purchase analytical and mineral beneficiation equipment to support feasibility studies for value addition projects Train personnel in metallurgy, analytical chemistry, mineralogy/petrology, and gemmology Appraise mining operations/ and or exploration projects for purposes of value addition Undertake value addition projects in partnership with mining operators	Undertake refresher training of personnel in metallurgy, analytical chemistry, mineralogy/petrology, and gemmology Purchase consumables for mineral analysis and mineral beneficiation test work to support feasibility studies for value addition projects Undertake value addition projects in partnership with mining operators Train operators in metallurgical technology and Occupational Health	Undertake refresher training of personnel in metallurgy, analytical chemistry, mineralogy/petrology, and gemmology Purchase consumables for mineral analysis and mineral beneficiation test work to support feasibility studies for value addition projects Undertake value addition projects in partnership with mining operators Train operators in metallurgical technology and Occupational Health	Undertake refresher training of personnel in metallurgy, analytical chemistry, mineralogy/petrology, and gemmology Purchase consumables for mineral analysis and mineral beneficiation test work to support feasibility studies for value addition projects Undertake value addition projects in partnership with mining operators Train operators in metallurgical technology and Occupational Health	GSMD

NDP II Objectives	*Strategic Development Areas*	Workplan/Targets					Responsible Institution
		FY 2015/16	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
		under research on mineral beneficiation Undertake value addition projects in partnership with mining operators Formulate a strategy/proposal for cost sharing (service charge) for laboratory and mineral beneficiation test work services for the sustenance of laboratory infrastructure and systems Initiate the process of establishing a National Metallurgical Research Centre to spearhead value addition and research into processing of Ugandan ores	Train operators in metallurgical technology and Occupational Health and Safety Implement the laboratory services cost sharing scheme Submit proposal for establishing a National Metallurgical Research Centre which is to spearhead value addition and research into processing of Ugandan ores	and Safety Fast-track the establishment of a National Metallurgical Research Centre which is to spearhead value addition and research into processing of Ugandan ores	and Safety Undertake construction of physical infrastructure for the National Metallurgical Research Centre and initiate the procurement process for analytical and mineral beneficiation equipment	and Safety Commence the recruitment process of personnel for the National Metallurgical Research Centre	
Objective 2: Increase monitoring and regulation in the mining sector	Mainstream Artisanal and Small Scale miners (ASM) by forming Small Scale Miners Associations (ASMA)	Formalize Artisanal and Small Scale Miners in Western Uganda mining Districts	Formalize Artisanal and Small Scale Miners in Central Uganda Mining Districts	Formalize Artisanal and Small Scale Miners in Northern Uganda mining Districts	Formalize Artisanal and Small Scale Miners in Eastern Uganda Karamoja Region Increase NTR Revenue from Minerals	Formalize Artisanal and Small Scale Miners in all parts of Uganda	GSMD
		Increase NTR Revenue from Minerals	Increase NTR Revenue from Minerals	Increase NTR from Minerals	Reduce illegal ASM	Increase NTR Revenue from Minerals & Reduce illegal ASM	
		Reduce illegal ASM	Reduce illegal ASM	Reduce illegal ASM			
Objective 7: Increase the stock of skilled human capital along the mineral development value chain	Skilling and Tooling of Human Resources and the Youth Regional Training Centres of Excellence in Mining	Youth Mining Training Centre in Karamoja region	Youth Mining Training Centre in Western Uganda	Youth Mining Training Centre in Central Uganda	Youth Mining training Centre in Eastern Uganda	Youth Mining Training Centre in Northern Uganda	MoES, MGSMD
Objective 2: Increase monitoring and regulation in the mining sector	Developing procedures that promote environmentally friendly mining exploration activities	Developed Standards and procedures Develop Code of Conduct	Sensitize miners (commercial, artisanal) on standards, Code of conduct	Enforce Standards and procedures Monitor compliance with Standards and procedures	Enforce Standards and procedures Monitor compliance with Standards and procedures	Enforce Standards and procedures Monitor compliance with Standards and procedures	MEMD, MGLSD, NEMA

NDP II Objectives	*Strategic Development Areas*	Workplan/Targets					Responsible Institution
		FY 2015/16	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
	Mining exploration standards and procedures for ensuring compliance with environmental standards and requirements Code of conduct for ensuring compliance with environmental standards and requirements		Enforce Standards and procedures Monitor compliance with Standards and procedures and code of conduct	and code of conduct	and code of conduct	and code of conduct	
Objective 3: Increase regulations for trade in mineral commodities	Mineral Certification and traceability systems and institutions established	Initiate capacity building and seek technical assistance for the implementation of the International Conference on the Great Lakes Region (ICGLR) Participate in regional Mineral Certification Mechanism processes. Prioritise certification of the 3T mineral commodities (Tin Tantalum, Tungsten) and gold	Establish an inspection system Establish a public institution to handle certification process. Establish a traceability system to ensure availability of the operators	Implement a regional certification mechanism as a tool for rational management of natural resources to avoid illegal exploitation.	Implement a regional certification mechanism as a tool for rational management of natural resources to avoid illegal exploitation.	Implement a regional certification mechanism as a tool for rational management of natural resources to avoid illegal exploitation.	

3.4 Strategic Development Programmes under Crosscutting Issues

This section provides the rationale for developing comprehensive programmes to address strategic gaps that cover crosscutting areas such as: citizen participation, HIV and AIDS, gender and the environment and climate change. These issues impact on developments in the energy and mineral sector. In addition, the support services such as finance management, supplies, administration, welfare and human resource management, and global partnerships are needed inorder to achieve the goals of the energy and minerals development sector.

3.4.1 Gender, Citizen Engagements, Participation and Social Inclusion

Government recognises the role of Civil Society Organisations (CSOs) in advocacy, mobilisation and dialogue with the communities and expect them to help "get the voices of the communities in the project affected areas into the designing, monitoring and implementation of the projects. Most importantly however these organisations are expected to contribute to ensuring that project operations are carried out in accordance with good governance principles of transparency and accountability.

1) Enhancing Local Community and Citizens' Engagement, and Capacity

There is need to ensure adequate engagement and participation with local communities and governments in decisions about the use of land and resources as a core principle of the strategic development plan. Comprehensive and coordinated consultation and engagement by various associated industries, local governments, and non-government organizations is a necessary first step to moving energy and mineral exploration and development forward in a timely and conflict-free manner. Clarity regarding the roles, responsibilities and expectations of industry, government and local communities is fundamental to improving the engagement process. Early meaningful engagement sets the stage for positive relationships that help to create certainty, social, economic and environmental sustainability.Three Goals form the basis for pragmatic interventions to enhance citizen participation. These include:

- Local Governments are better positioned to effectively participate in all stages of the energy and mineral development process
- Communities are able to effectively participate in regulatory processes
- Communities are able to benefit from opportunities as a result of energy and mineral exploration and development

(a) Community Engagement

Early engagement with local communities and Non-Government Organizations (NGOs) during the exploration phase is crucial to stakeholder buy-in and in ensuring that all perspectives and interests are considered. Adequate prior engagement and consultation will secure agreement on key roles and responsibilities and mange expectations.

Actions

- Developing and defining a clear way forward;
- Development of a mapped out engagement process for energy and mineral Development related activities;
- Identify what is expected of resource companies and identify when, how and with whom engagement should occur.

(b) Building Community Capacity

There is need to identify and ensure that there are no community capacity gaps in order to effectively engage and participate in mineral exploration and development projects.

Actions/ Programmes

- Develop training programmes in relevant local expertise in negotiation skills, gender and environment issues for citizens, local governments, non-government organisations and CBOs to enable them to engage, participate in EMD reviews and negotiation processes.
- Undertake community assessments to determine their strengths, weaknesses, and core needs.

(c) Increasing Public Awareness

Knowledge leads to better decision-making. A public awareness campaign will facilitate two-way communication between the Ministry of Energy and Mineral Development and its affiliates and key stakeholders. Increasing public awareness of the opportunities in EMD will support the development of a skilled and educated EMD workforce.

Actions/ Programmes

- Develop and implement a coordinated EMD public awareness campaign to increase citizens' understanding of the associated industries, educational requirements, training opportunities and employment possibilities.

(d) Gender Mainstreaming

Both women and men play substantial economic roles in Uganda. Traditionally, women bear the brunt of domestic tasks in addition to agricultural and other productive work. Women work considerably longer hours but tend to be poorer than men due to a number of gender disparities in poverty determinants, including ownership of land (7% women versus 93% men), formal labour force participation (12% versus 88%), literacy (63% versus 77%), distribution of credit (9% versus 91%), and political participation such as membership in Parliament (24% versus 76%).

Current energy use in Uganda is dominated by traditional biomass energy sources, which make up around 92% of total primary energy consumption. More than 80% of households depend on fuel wood for cooking. At present national electricity access stands at 15%, with most concentrated in Kampala and major district towns; rural electricity access is about 7%. Kerosene (paraffin) is still the major source of lighting.Traditionally, it is women's responsibility to provide their household with fuel for cooking, and whose principal energy source is the biomass. Their current reliance on wood fuels for cooking is extremely time-consuming, human-energy intensive and exhausting work, and highly inefficient. The health effects of biomass fuel use are also increasingly becoming disastrous to the lives of people.

Whereas, the development of oil and gas resources as expressed in many reports and in the media is about the environmental sensitivity of the Albertine Graben, Government will strategically look at the effects of petroleum development activities on human settlements, livelihood activities or household needs. There are estimates for the numbers of people affected in local communities, their current levels of income or gender differences in anticipated effects such as dislocations. Consideration of local social impacts focuses on the influx of people coming for work, urbanization and unplanned growth of existing settlements and the new settlers' increased demands on resources.

The Ministry of Energy and Mineral Development (MEMD) is guided by national development policy objectives as well as energy policy, including a mandate to mainstream gender, with the long-term objective of eliminating gender inequalities. The MEMD has recognized gender concerns in some of its activities, and is seeking to further strengthen gender mainstreaming in its energy projects, as part of its mandate.

The strategic goal is to mainstream gender concerns in the energy and minerals sector. This strategy will focus on minimizing the adverse health effects of energy use on women by promoting the use of modern forms of energy in households; and ensuring participation of women in the formulation and implementation of energy interventions, and build capacity of women in the energy and minerals sector. This will help address the concerns of women in energy policy formulation and implementation.

Table 24: Strategies to Mainstream Gender and Citizen Participation in Energy and Mineral Development Programmes and Projects

Objectives	Interventions	Programmes	Activities
1. Ensure that both women and men participate in, and benefit from, Uganda's Energy and mineral Development; 2. Build Capacity for Gender and Citizen Participation Mainstreaming 3. Citizen Engagement and Community Engagement	• Establish a Gender and Citizen participation Unit • Recruit and contract a Gender and Energy focal person in the three divisions of the Ministry of Energy and Mineral Development • Develop and apply a roadmap for the implementation of Gender Action Plans in the three subsectors • Conduct environmental and social impact assessments for all energy projects • Develop Women in Energy Efficiency and Conservation Programmes	• building and strengthening capacities for gender mainstreaming in energy policies and projects • steering and supporting the Development of gender-sensitive policies within the region • promoting knowledge management, awareness creation and advocacy on gender and energy issues; • implementing gender-responsive development and business promotion in sustainable energy Development in Uganda	• Conduct Gender-focused Baseline Studies • Conduct Community Based Planning ; • Develop plans for improving access to and benefits of energy services for women; • Outline training opportunities, including leadership training, for female personnel and gender sensitisation for male personnel to create spaces for women to take up leadership positions and to support the process.
Increasing Public Awareness Increase public awareness on Energy Policy and Programmes of Government	• The Promotion of effective community participation in decision-making, the multiple uses of mineral resources, and the monitoring of energy and mineral Development • Develop a National Energy Sector Communication Plan	• Gender and Energy capacity building at local levels • Access to capital for productive uses • Proactive support and backstopping for all programme activities • Monitoring and Evaluation a. Develop a Communication Strategy b. to create awareness and acceptance among all stakeholders and the general public about the Energy Policy and Programmes of Government of Uganda c. To ensure an effective communication programme to reach all stakeholders and the general public.	• Engage Communication Expert ; • Develop ToRs for Consultancy to develop a Communication Plan; • Conduct training of Communication Officers in the Gender and Citizen Participation Unit; Conduct district level training for CSO and CBO partners

3.4.2 Environment, Energy and Mineral Development

Environmental management in Uganda is aimed at achieving national objectives and directive principles of state policy, that promote sustainable development and public awareness of the need to manage land, air, and water resources in a balanced and sustainable manner for the present and future generations as enshrined in The 1995 Constitution of the Republic of Uganda (as amended).

The vision 2040 and Uganda's second National Development Plan (NDP II) 2015/16-2019/20 is to transform Uganda to a middle-income economy. However, long-term sustainable growth, employment and prosperity cannot be achieved without sustainable utilization of the environment and natural resources including biomass energy. The NDP II also highlights challenges of poor compliance with environmental policies, laws and regulations to address degradation of environment and natural resources and weak policy and legal framework for mainstreaming of climate change into development plans at all levels. The National State of Environment Report (2008) highlighted that biomass energy constitutes over 90% of national energy sources but the biomass sub sector has not benefited from research, development funding and technology transfer. Almost all the basic needs of cooking and water heating in rural and most urban households, institutions and commerce are derived from wood, with the annual consumption of wood in the country estimated to be about 25 million tons (or about 1.1 tons per capita), out of which about 4 million tons is consumed as charcoal. The contribution of firewood and charcoal to Uganda's GDP is estimated to be UGX120 billion and 67 billion respectively.

The NCC complements and reinforces the above policies in addressing climate change by promoting the utilization and supply of clean diversified sources of energy. The production and use of energy impact on the environment and global climate in varying degrees. The exploitation of biomass for energy purposes results in deforestation, while the use of fossil-based fuels contributes to climate change. The use of inferior cooking equipment also has negative health impact. The production, transportation of crude oil, flaring of natural gas associated with petroleum production and the production of petroleum products have associated environmental risks.The strategic goal of the interventions is to ensure that energy is produced, supplied and used in an environmentally sustainable manner. This will focus on the conduct of Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) Studies and Social Impact Assessment (SIA) Studies of all energy projects, with associated adaptation and mitigation plans for environment and climate change.

The activities in the Energy and Mineral Development Sector have a profound effect on the climate and the health of the people. This is in form of Poor working environment and health conditions in the production and utilisation of energy; and the perceptible global warming conditions. The strategic activities will involve the following:-

- Producing and using environmentally friendly energy forms;
- Deploying mechanisms to limit the emission of environmentally undesirable substances from
- Using fiscal and financial incentives to promote the production and use of environmentally friendly energy forms.

Interventions to be pursued to achieve the environmental goals in the Energy and Mineral Development Sector goals are contained in the table below, which shows the strategies to mainstream environmental concern in the energy sector.

Table25: Strategies to Mainstream Environmental and climate change Concerns in Energy Development Projects

Objectives to be achieved	Key Programme and projects	Possible Financing Sources	Time-frame	Verifiable Indicators/Milestones	Responsible Agency
Ensure that in the production and use of energy adverse environmental and climate change impacts are minimized	(i) Environmental and Social Impact Assessment review of existing Energy Projects	GoU/ Private sector operators	2015-2020	• Prepare TOR for Consultancy services by June 2017 • Engage Consultant by August 2017 • Environmental and Social Impact Assessment review Report available by December 2018	Ministry of Energy and Mineral Development (MEMD)
	(ii) Creation and funding of Environmental and climate change and Social Impacts Assessment Unit in the Ministry of Energy	GoU/ Private Sector operators /Development Partners	2015-2020	• Design of Organogram for the Unit by June 2016 • Staff recruitment completed by December 2016	Ministry of Energy and Mineral Development (MEMD)
Ensure environmental, climate and social impact assessments are a major part of all energy projects	(i) Development of Environmental, climate and Social Impact Assessment Guidelines for Energy projects	GoU/ Private Sector operators /Development Partners	2015-2020	• TOR for consultancy services available by June 2017 • Consultant engaged by August 2017 • Guidelines available by December 2018	Ministry of Energy and Mineral Development (MEMD)
Maximise the benefits of Environmental Credit (Carbon Credits) mechanisms for energy projects/Adaptation fund	(i) Establishment and Implementation of Environmental Credit Facility for Development of energy project	GoU/Energy Fund	2015-2020	• Develop Concept Paper by December 2016 • Complete studies by December 2017	Ministry of Energy and Mineral Development (MEMD)/Energy Commission

Table 26: Milestones/Targets for Cross-Cutting Issues

Strategic Development Areas		Milestones/Targets					Responsible Institution
	Milestone Targets	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
1. Health, safety and Environment							
(i) Environmental Management System	Certification ISO 14001 Environmental Management Systems (1)	Documentation and establishment of systems	Documentation and establishment of systems	Establishment of environmental systems	Establishment of environmental systems	Auditing of environment management systems and certification of the Ministry.	Health, Safety and Environment Unit
(ii) Climate change mainstreaming	Strategy, manual and Guidelines in place for climate change mainstreaming (1).	Capacity building on climate change (2). Procurement of a consultant to develop a strategy for climate change mainstreaming (1). Develop a database for climate change data and information.	Capacity building on climate change (3). Development of climate change mainstreaming Manual and Guidelines and training of staff on the use of the Manual and Guidelines. Software and database and equipment to collect data and training of staff on the implementation of data collection.	Capacity building on climate change (2). Implementation of climate change mainstreaming in all ministry programmes. Collection of data and establishment of a data base.	Monitor activities of the ministry for climate change implementation.	Audit performance of programmes with regard to climate change mainstreaming.	Health, Safety and Environment Unit Planning Department
(iii) Health and Safety	Establishment of Occupational Health and safety management system (1)	Development of health and safety manuals (1) for the ministry and training of staff on the use (20).	Development of HSE induction policy for staff and visitors. Development of HSE policy, fire plan and procurement of safety	Implementation of the HSE Polices and Plans. Procurement of personal protective equipment for staff during inspection	Implementation of the HSE Polices and Plans.	Implementation of the HSE Polices and Plans.	Health, Safety and Environment Unit

Strategic Development Areas		Milestones/Targets					Responsible Institution
	Milestone Targets	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
	Health, Safety and environment annual celebrations (5). Establishment of a health management system (1)	Annual safety days celebrations (Publicity, food and beverages) Capacity building on risk assessments (3). Procure a software for carrying out risk assessments and train staff in the use Health tests for staff involved in high risk activities. Procure software and establish of a database (1). Develop an energy sector HIV/Aids policy and strategy for the Ministry (1).	equipment (Fire extinguishers, fire alarms, smoke detectors). Training of staff on HSE Policies and Plans (20). Annual safety days celebrations (Publicity, food and beverages) Capacity building on risk assessments (3). Carrying out risk assessments and establish a risk management plan for the ministry Collection of health data on all staff Develop manuals and Guidelines on HIV/AIDs for the energy sector. Mainstreaming (HIV/AIDS) in projects and programme in project.	and monitoring (300) Annual safety days celebrations (Publicity, food and beverages) Capacity building on risk assessments (2). Implementation of the risk management Plan Implementation and monitoring the mainstreaming of HIV/Aids	Annual safety days celebrations (Publicity, food and beverages) Implementation of the risk management Plan Implementation and monitoring the mainstreaming of HIV/Aids	Annual safety days celebrations (Publicity, food and beverages) Implementation of the risk management Plan And monitoring and evaluation of the risk management plan. Implementation ,monitoring and evaluation the mainstreaming of HIV/Aids	Human Resources department
(iv) Environment mainstreaming	Strategy in place for environment	Develop environment mainstreaming strategy,	Training and implementation of	Implementation of Manuals and Guidelines.	Implementation of Manuals and Guidelines.	Implementation of Manuals and	Health, Safety and

Strategic Development Areas		Milestones/Targets					Responsible Institution
	Milestone Targets	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
	mainstreaming (1). Strategic environment assessments (SEA) for Policies, Plan and programme (PPPs) Implemented.	Manuals and Guidelines. Capacity building on SEA (5) Development of SEA Guidelines for the Energy sector and training of staff on use. Purchase of environment equipment (noise & vibration and dust, water and soil quality, air pollution).	Manuals and Guidelines. Capacity building on SEA (5) Implementation of the SEA Guidelines. Raise awareness. Formation of SEA monitoring Committee.	Capacity building on SEA (5) SEA carried out for PPPs Development of SEA indicators and Monitoring of SEA implementation. Establish a helpdesk for SEA.	SEA carried out for PPPs	Guidelines and audit of the activities. SEA carried out for PPPs and monitoring and evaluation on SEA integration.	Environment Unit Planning Unit
2. Socio-economics							
Resettlement Action plans (RAP)	Resettlement action plan and land acquisition Guidelines for the energy sector	Capacity building on RAP and Land acquisition and framework Development (3). Procure a consultant to develop Resettlement action plan and land acquisition Guidelines and manual.	Capacity building on RAP and Land acquisition and framework Development (3). Development of Resettlement action plan and land acquisition Guidelines and Manual and training staff on the use.	Capacity building on RAP and Land acquisition and framework Development (3). Implementation of Resettlement action plan and land acquisition Guidelines and manual.	Software and Database for resettlement action plans establishment. Staff trained on the use of the database. Implementation of Resettlement action plan and land acquisition Guidelines and manual.	Implementation of Resettlement action plan and land acquisition Guidelines and manual. Monitoring and evaluation.	Health, Safety and Environment Unit All departments
Gender mainstreaming	Strategy for gender mainstreaming	Capacity building and awareness (50). Gender needs assessment study.	Capacity building and awareness raising (50). Implementation of the manuals and	Capacity building and awareness raising (50). Development of Gender planning tools.	Enforcement of Gender mainstreaming in projects, programmes and budgeting.	Implementation of the manuals and Guidelines on gender mainstreaming.	Gender focal persons in each department Planning Unit

Strategic Development Areas		Milestones/Targets					Responsible Institution
	Milestone Targets	**FY 2015/16**	**FY 2016/17**	**FY 2017/18**	**FY 2018/19**	**FY 2019/20**	
		Develop manuals and Guidelines on gender mainstreaming and training on usage.	Guidelines on gender mainstreaming. Development of Gender planning tools and monitoring indicators.	Enforcement of Gender mainstreaming in projects, programmes and budgeting.		Monitoring and evaluation.	

4. COSTS, FINANCING AND MACROECONOMIC IMPLICATIONS OF THE SDP

The SDP has set out the priority milestones which form the basis for defining the spending plans on annual basis for the next five years. For all these priorities to be fully realized, it is critical to undertake a detailed analysis of the required financing, what can be accommodated within the budget and the alternative sources of funding for the financing gaps. This section therefore focuses on providing detailed annual expenditures on each programme by the Government.

4.1.1 SDP and Overall Budget

The table below, shows the projected financing required on annual basis based on the priorities of the SDP. The estimates were derived through a consultative process with the sector stakeholders. Based on these estimates, the total cost of the five year SDP is estimated at UGX 15,751 billions. The cost will range from UGX2,426 billion in the first year to UGX 2,766 billion in the last year of implementing the SDP and the peak is in 2017/18 at UGX 4,348 billions. Monitoring and Evaluation of the SDP is estimated to cost UGX16.2 billion for five (5) years. This pattern of spending is in line with the overall macroeconomic fiscal stance where spending on infrastructure is expected to build up in 2017/18-2018/19 as Uganda prepares itself to competitively position itself within the East African Community, while fiscal consolidation is expected to be realized towards the end of the SDP.

Table27: Overall Budget for the SDP

Subprogram	2015/16	2016/17	2017/18	2018/19	2019/20	Total
	(UGX bn)	(UGX bn)	(UGX bn)	(UGX bn)	(UGX bn)	(UGX bn)
1.1: Enhancing Electricity Generation Capacity	667.07	319.41	457.87	328.20	191.77	**1,964.32**
1.2: Enhancing Electricity Transmission Network	1,152.81	1,341.25	1,438.39	844.72	162.88	**4,940.04**
1.3: Enhancing Electricity Distribution Capacity	37.10	70.30	39.20	37.30	39.90	**223.80**
1.4: Promoting Energy Penetration to Rural Areas	201.17	344.69	291.62	226.70	232.56	**1,296.74**
1.5: Promoting New and Renewable Energy	2.28	2.53	2.44	2.53	2.53	**12.31**
1.6: Peaceful Application of Nuclear/Atomic Energy	6.47	6.35	5.57	4.30	3.45	**26.14**
1.7: Promotion of Efficient Utilization of Energy Resources	1.00	1.68	1.70	1.76	1.49	**7.63**
2.1: Establishing the Mineral Wealth of Uganda	91.91	40.42	33.27	30.21	30.16	**225.97**
2.2: Enhancing Mineral Sector Infrastructure to Support Mineral Development and Industrialisation	41.05	171.04	234.69	184.49	279.89	**911.16**
3.1 ***Strategic Investments in Upstream***						
3.1.1 Promotion of Petroleum Exploration	1.62	1.83	1.93	2.00	2.14	**9.51**
3.1.2 Promotion of Petroleum Development and Production	2.00	2.26	2.38	2.50	2.63	**11.76**
3.2 ***Strategic Investments in Midstream***						
3.2.1 Crude Oil Refining	58.48	65.95	1,500.00	1,500.00	1,500.00	**4,624.43**
3.2.2 Development of Midstream Transportation and Storage Infrastructure.	28.28	9.33	10.36	10.36	-	37.82
3.3***: Strategic Investments in Downstream***						
3.3.1 Regulation of Petroleum Supply and Distribution	5.76	4.40	4.40	4.40	3.82	22.78
3.3.2 Development of Downstream Transportation Infrastructure.	121.20	320.70	321.30	321.30	310.00	**1,394.50**
3.3.3 Development and Restocking of Strategic Petroleum Reserves	2.50	2.30	1.30	1.30	1.30	**8.70**
3.3.4 Promotion of Liquefied Petroleum Gas (LPG) Usage.	5.70	5.15	2.34	2.34	2.25	**17.78**
Overall Total	2,426.39	2,709.59	4,348.75	3,504.41	2,766.76	15,735.38

The program that will be allocated the most resources is enhancing the electricity transmission network which will take about 28 percent of the total resources amounting to UGX4,940 billion. This is followed by strategic developments in midstream activities particularly the development of the oil refinery whose

total resources amount to UGX4,624 billion. In addition to the financing expected to be derived from the budget, these resources will not necessarily be sufficient for all the subprograms. The subsequent section therefore provides the possible sources of financing for the various subprograms.

4.1.2 Financing Options for the Energy and Mineral Development in Uganda

In order to ensure that the EMD SDP is realized, there is a need to explore new modes of financing the identified government and private sector projects. Previous energy projects have been spearheaded by the state and a decision to use public or concessional funds to support the sector represents a commitment of scarce resources to fund developments. Given the large number of programs identified in the SDP and associated development projects, this would require innovative mechanisms to fund these projects by both the public and private sector. This is at the backdrop of the undeveloped financial markets, which could provide new financial instruments as avenues to finance the sector. The challenge is to choose the appropriate financial instruments to support by maximizing the use of instruments that would deliver the greatest amount of private funding for the smallest amount of public funds and thereby achieving greatest leverage.

There are various forms of financing instruments, which can be applied to support the sector. These instruments are broadly grouped into the following categories: (i) instruments used to overcome financing barriers, (ii) instruments used to address specific risks, (iii) instruments that simultaneously address financial markets that lack sophistication to offer risk management. Consideration of the financing options would require that the EMD sector makes a deliberate effort to have bankable projects for both the private and public uptake. The combination of financing options described below can be applied for Government, Private sector or Public Private Partnership arrangements. The financing options for the programmes identified are specified and described below:

a. Grants and Long-term Loan Financing

One form of financing the sector shall be derived from grants provided through the budget. In most cases these grants shall be provided through donors including the multilateral agencies and bilateral donors. Grants shall fund part of the development costs of project, generally in an effort to reduce the ultimate financial cost in order to increase their competitiveness, capacity building, and to reduce ultimate customer prices especially for projects that are sometimes considered economically unviable but of social importance. This source of financing shall still be very critical especially for very large projects which are considered not to be economically viable but with high social returns. In addition, there are projects where government has to play a leading role before they become attractive to the private sector. This is particularly the case for the extractive industry projects. Among the programs objectives that could benefit from this form of financing include: (i) increasing electricity generation capacity, (ii) enhancing electricity transmission network, (iii) rural electrification, and (iv) promoting new and renewable energy, (v) acquisition of geo-scientific data for minerals and petroleum.

b. Sovereign Bonds

Uganda has sustained a stable macroeconomic environment for the past 15 years with growth averaging 7-8 percent. As a result the rating of Uganda by various rating agencies is currently at B by Standard and Poors and B by Fitch ratings agency. Based on this, the large projects, which have been identified in the EMD SDP can be financed by issuance of sovereign bonds through international capital markets. These

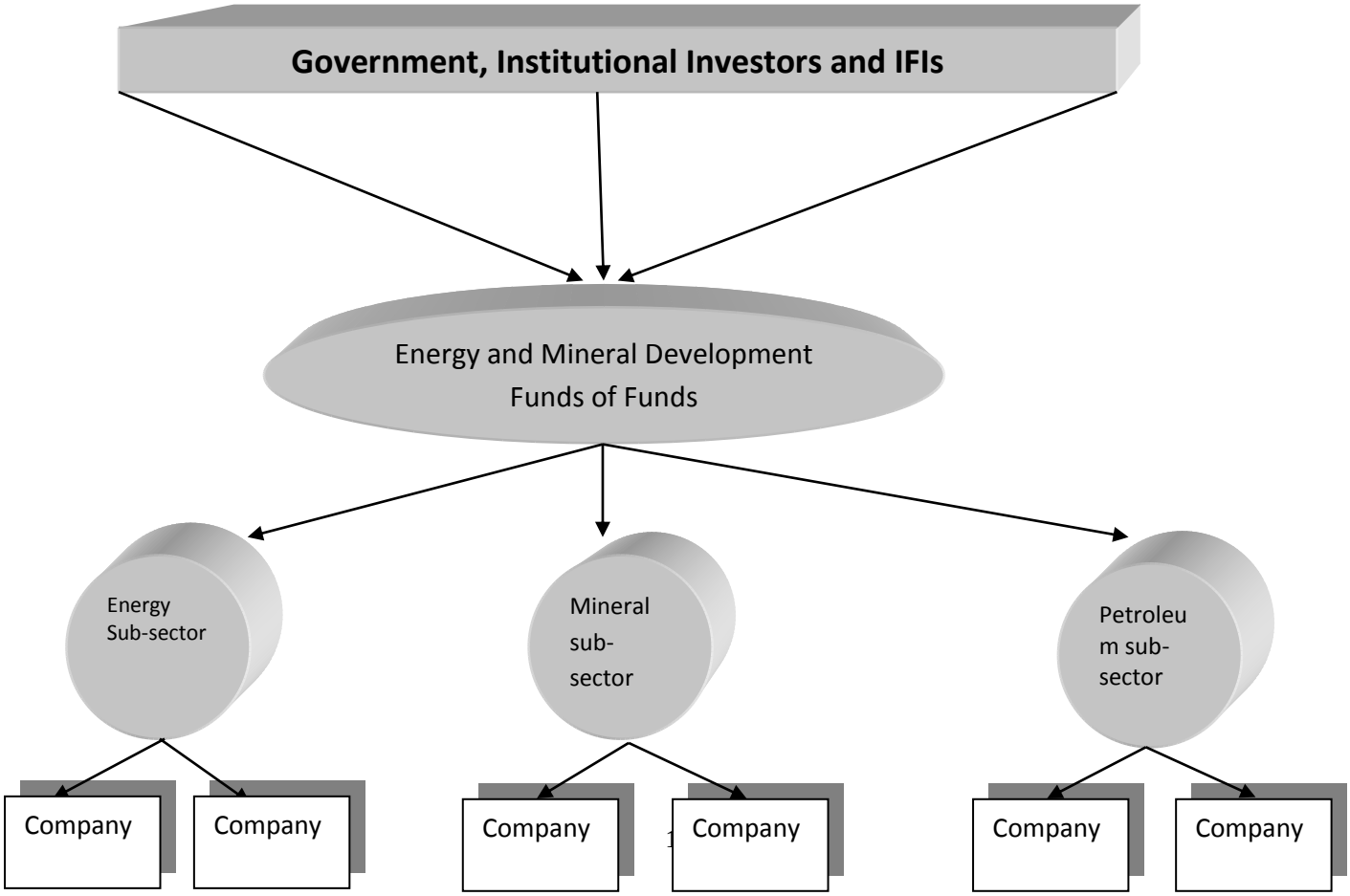
could particularly be tailored to for example the large hydropower dams, thermal power and nuclear energy Development.

c. Establishment of a pool of Funds

There has been some effort to develop the Uganda Energy Credit Capitalization Company (UECCC) for pooling resources from government, investors and Development Partners. These pooled resources are channelled to renewable energy projects. Building on the experience of UECCC, other similar funds are viable in the mineral and petroleum subsectors. For the EMD SDP a Fund could be established among other reasons to provide a stable and unified source of venture capital for the energy and mineral development sector. This fund can be capitalized initially by government, institutional investors and international financial institutions. It is proposed that Uganda considers establishing a fund of funds but adapt it to the local context with improved governance and management principles and practices. The Fund of Funds enables the government to have a stable and unified source of venture capital, which can be targeted to the entire sector expected to grow at a high rate and generate employment.

The structure of the funds would appear as shown in Figure 12. It should be noted from the figure below that the source of financing should not only be restricted to government, especially overtime. Once the government initiates the fund through providing the necessary initial resources, including financial and human resources, it should market it to other potential investors including pension funds and other institutions including international organizations. The Government in collaboration with the Capital Markets Authority (CMA) would make a decision on the initial amount of financing required based a well-structured study of the sector.

Figure 11: Energy and Mineral Development Fund of funds

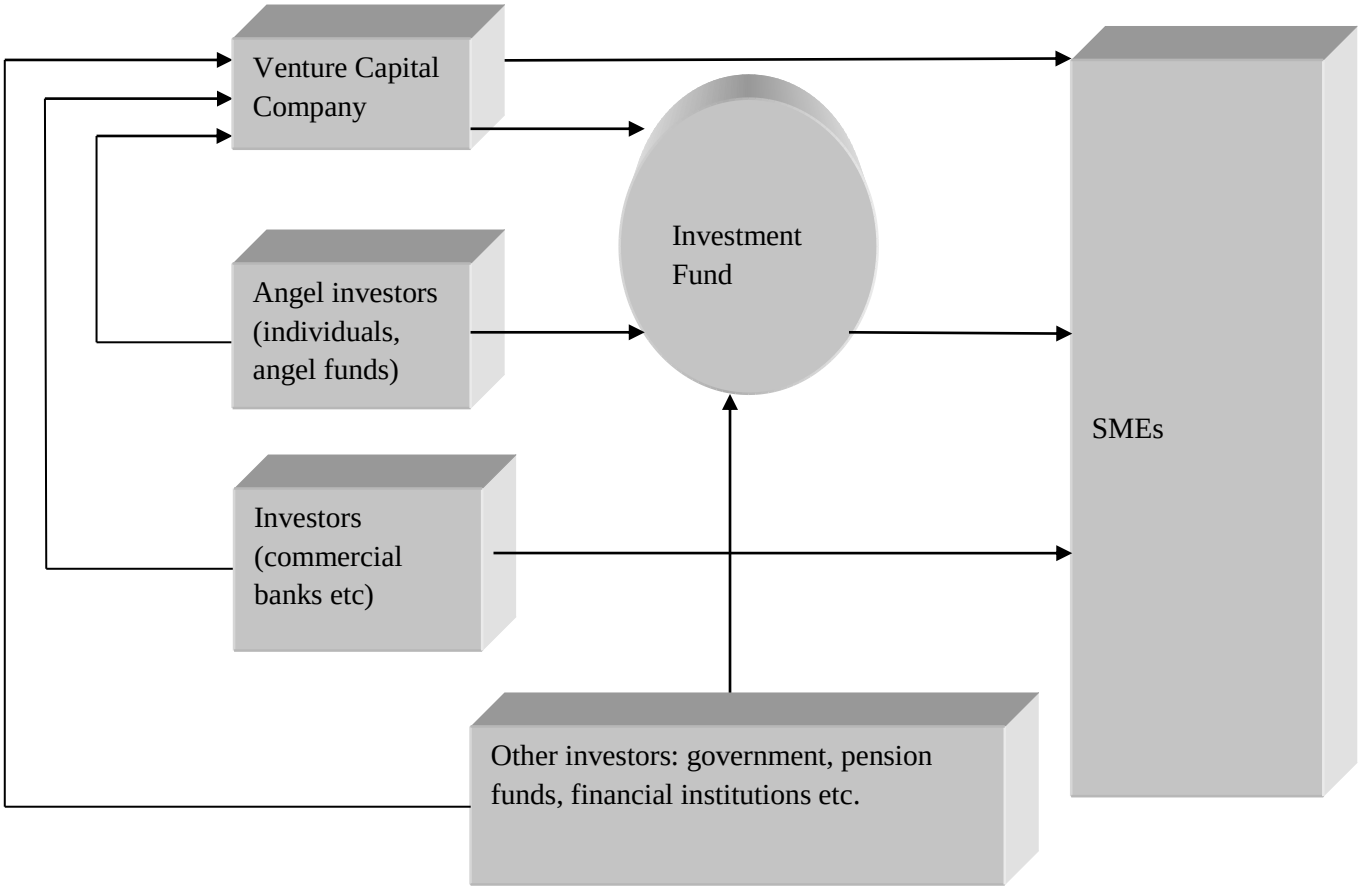


d. Private Venture Capital Financing

This type of capital financing is generally targeted at new technologies and companies with a high growth potential. It is also most suitable for start-up companies which do not have any track record of operation. In this case the financiers look to make their returns by exiting the development, typically through an Initial Public Offering (IPO) on the stock market or sale to a larger company interested in acquiring the business's technology. Therefore, this financing option would require a well-functioning stock market, which already exists in Uganda and can be used as a vehicle for exit by venture capitalists.

The nature of the mining industry usually entails small companies that are considered to be start-ups with lack of sufficient collateral for them to borrow for their green-field projects. Another challenge is that the venture capital market in Uganda is at the infant stage. While this is a challenge, there are already existing venture capital funds within the East African region, which are particularly targeting SMEs of which these could include the extractive industry. Most of these funds are based in Nairobi but with a regional focus. For instance the East Africa Capital Partners, African Agricultural Capital, Fanisi Venture Capital Fund, Citadel Capital Private Equity Fund, The Savannah Fund, among others. The SMEs in the extractive industry based in Uganda can initially benefit from these funds if information is availed to them regarding the requirements of these funds. In addition, an effort could be made to market some of SMEs in the sector to the fund managers in the region. A prospectus containing productivity, financial, and growth potential of these SMEs could be useful in this regard. As shown in Figure 13, there are various ways of promoting venture capital funds for the SMEs benefit. First, the venture capital company may invest directly in their preferred SMEs. Second, a development fund could be created where venture capital companies channel their resources to finance SMEs. The government and other institutional investors could also allocate direct resources to this development fund.

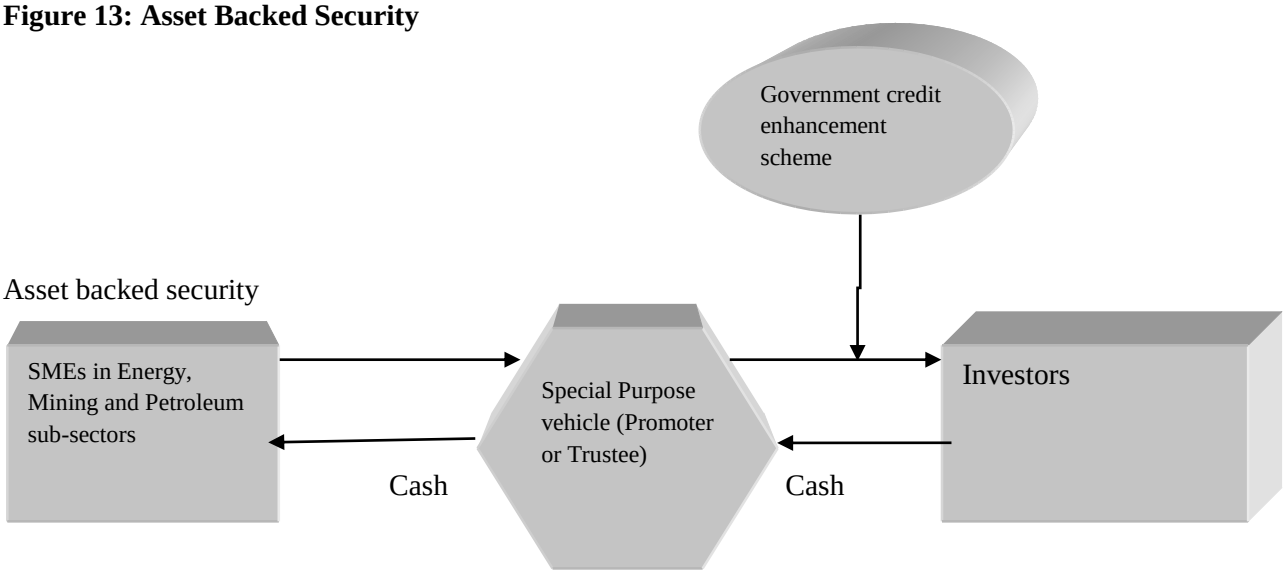
Figure 12: Venture Capital Fund



e. Asset-backed Securities

There is need to establish more financing instruments for the extractive industry. One of the options includes use of Asset-backed securities. Asset-backed securities are bonds or similar instruments, which are backed by the cash flows generated by a project or projects (rather than being corporate bonds backed by the assets of a company as a whole). These cash flows form the basis and security for repayment. The process of raising finance in this way, secured against future cash flows, is frequently termed as securitization. Asset-backed securities are generally used for refinancing projects that are generating positive cash flows, although they can also be issued in the form of project bonds ahead of construction. Such refinancing offers a potential way to free up public funds that have been committed for development, thereby allowing these funds to be redeployed to support new projects. Use of the Asset-backed securities could be applied to a group of small miners who can collectively associate to benefit from such instruments. This would require such miners to be operating formally, with registered companies, books of accounts and clear organization structures and governance principles. The role of government is to ensure that such securities are developed through capital markets development. Given the level of risk associated with green-field projects in the energy, mineral and petroleum sub-sectors, there is a need for Government to create a credit enhancement scheme in order to assure the investors in the sectors.

Figure 13: Asset Backed Security



f) Results Based Financing

This approach involves a public entity providing a financial incentive, reward, subsidy, or grant conditional on the recipient undertaking a set of predetermined actions or achieving a predetermined performance or set of results. Funds are disbursed not against individual input expenditures or contracts on the input side, but against demonstrated and verified results that are largely within the control of the recipient. This would largely apply to for example contracts that are entered into by Government through competitive biding processes.

Table 28: Framework for Development Options in the Energy and Mineral Development Sector

Sub-sector	Sector Objectives	Areas of Development	Proposed Development Options
Energy	Increase Electricity Generation capacity	(a) Construction of Karuma Hydro Power Project (600MW)	Grants and long term Loan Financing, Sovereign Bond
		(b) Construction of Isimba Hydro Power Project (183MW)	Grants and long term Loan Financing, Sovereign Bond
		(c) Ayago Hydro power Project (840MW	Grants and long term Loan Financing, Sovereign Bond
		(d) Development of Small Hydropower Projects	Grants and long term Loan, Sovereign Bond, Financing, Fund of Funds, Venture Capital
	Enhancing Electricity Transmission Network	(i) Increasing the transmission voltage from 66kV and 132kV to 220kV and 400kV by constructing Mbarara – Mirama – Birembo 220kV line; Kawanda – Masaka 220kV line; Nkenda – Fort Portal – Hoima 220kV line; Tororo – Opuyo – Lira 132kV line; Mbarara – Nkenda 132kV line; Bujagali switchyard upgrade to 220kV; Namanve South, Luzira, Mukono and Iganga industrial park substations.	Grants and Loans Financing, Sovereign Bond
		(ii) Increasing the transmission network coverage through construction of Kinyara- Kafu 220kV line; Nkenda – Mpondwe – Beni 220kV line; Ayago Interconnection project; Opuyo-Moroto 132kV Line; Mirama-Kabale 132kV; Kikagati – Mirama-Nsongezi 132kV line; Bulambuli (Atari)-Mbale Industrial parks 132kV line; and, Lira-Gulu-Agago 132kV line. Lira – Gulu – Nebbi – Arua 132kV line; Masaka-Mbarara 220kV line; Masaka-Mwanza 220kV Line; Kawanda –Bombo 132kV line. Nalubaale – Lugazi 132kV; Karuma- Nimule-Juba 400kV; Mutundwe-Kabulasoke-Nkenda 220kV.	Grants and Loans Financing, Sovereign Bond
		(iii) Increasing the number of transmission substations by upgrading the following substations countrywide: Nkenda substation, Lugazi substation, Lira substation, Kawanda substation upgrade and new substation at Mbale. Others include; Tororo substation transformer 132/33kV, 32/40MVA;	Grants and Loans Financing, Sovereign Bond

Sub-sector	Sector Objectives	Areas of Development	Proposed Development Options
		Kampala North substation upgrade; Namanve s/s, Namanve south substation, Lugogo, Nkenda, Opuyo, Kabulasoke, Mbale substations, Iganga substation; Lira substation 132/33kV,32/40MVA; Upgrade of Mutundwe substation 220/132/33kV, 150MVA	
		(iv) Construction of the following Interconnection Lines; Isimba Interconnection project; Karuma Interconnection project; Mutundwe-Entebbe 132kV line; Upgrade of Lugogo and Mutundwe substations; Upgrade of Queensway substation; Kabulasoke-Kiboga-Hoima 132kV.	Grants and Loans Financing, Sovereign Bond
		(v) Negotiating power purchase Agreements from power producers.	Grants and Loans Financing, Sovereign Bond
	Enhancing Electricity Distribution Capacity	(i) Continue the Electrification Project through the prepayment metering	Fund of Funds, Asset Backed Securities
		(ii) Replacing of Low Voltage open cables with Aerial Bundled Cables (ABCs)	Fund of Funds, Asset Backed Securities
		(iii) Refurbishing of all Medium Voltage lines to minimise technical losses.	Fund of Funds, Asset Backed Securities
		(iv) Pole-Plant Production	Fund of Funds, Asset Backed Securities
		(v) Continuous Management of Off Grid Stations	Fund of Funds, Asset Backed Securities
		(vi) Operationalisation of the Automatic Tariff Adjustment Mechanism (ATA)	Fund of Funds, Asset Backed Securities
		(vii) Energy Loss reduction	Fund of Funds, Asset Backed Securities
		(viii) Umeme Investment Review	Fund of Funds, Asset Backed Securities
		(ix) Operationalization of the Global Energy Transfer for Feed-in-Tariffs (GETFiT)	Fund of Funds, Asset Backed Securities
		(x) Monitoring and Enforcement of Compliance	Fund of Funds, Asset Backed Securities
	Promoting Energy Penetration to Rural Areas	(i) On-grid Service Expansion	Grants and Loans Financing, Sovereign Bond
		(ii) Off-grid Service Expansion	Loans Financing, and Private

Sub-sector	Sector Objectives	Areas of Development	Proposed Development Options
			sector
		(iii) Mini-grid Service Expansion	Loans Financing, and Private sector
		(iv) Solar PV (PVTMA)	Loans Financing, and Private sector
		(v) Rural Power Development	Grants and Loans Financing, Sovereign Bond
	Promoting New and Renewable Energy	i) Financial support to Uganda Energy Credit Capitalisation Company (UECCC)	Fund of Funds, Venture Capital
		ii) Solar PV generation	Fund of Funds, Venture Capital
		iii) Biogas Promotion	Fund of Funds, Venture Capital
		iv) Gasification Promotion	Fund of Funds, Venture Capital
		v) Biofuels Promotion	Fund of Funds, Venture Capital
		vi) Improved Cook Stove Promotion	Fund of Funds, Venture Capital
		vii) Briquetting Technology Promotion	Fund of Funds, Venture Capital
	Promotion and Development of Nuclear Energy	(i) Nuclear Power Infrastructure Development	Grants and Loans Financing,
		(ii) Sustainable Development of Nuclear Fuel Resources	Grants and Loans Financing
		(iii) Strengthening the Management of Radioactive waste	Grants and Loans Financing, Sovereign Bond
		(iv) Support to other Peaceful uses of Nuclear Technology	Grants and Loans Financing, Sovereign Bond
	Atomic energy Regulations	i) Strengthening the Atomic Energy Regulatory Infrastructure	Grants and Loans Financing
		ii) Expansion of Radiation Dosimetry Services	Grants and Loans Financing
		iii) Development of National Radiological Emergency Preparedness Plan	Grants and Loans Financing
		iv) Strengthening Regulatory Control of Radiation Sources	Grants and Loans Financing
	Promote efficient utilization of energy	i) Increase Awareness and Information Dissemination	Grants and Loans Financing
		ii) Conduct Education and Training in Energy Efficiency	Grants and Loans Financing
		iii) Promote Research and Development in Energy Efficiency	Grants and Loans Financing
		iv) Financial Support and Incentives	Grants and Loans Financing
		v) Development of Legislation & Framework	Grants and Loans Financing
Petroleum	Promoting Petroleum Exploration	(i) Promotion of the Country's Petroleum Potential and Licensing	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities

Sub-sector	Sector Objectives	Areas of Development	Proposed Development Options
		(ii) Initiation and Formulation of Petroleum Policy, Legislation, Standards and Codes	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(iii) Creation of New Institutions	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(iv) Capacity Building and Retention	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(v) Monitoring and Regulating of Oil Company Activities	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(vi) Field Development And Preparations For Petroleum Production	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(vii) Plan For Commercialization of the Discovered Resources	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(viii) Environmental Monitoring of Oil and Gas Operations	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(ix) Development and Implementation of the National Content Policy and Plan	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(x) Participation in Regional Initiatives	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(xi) Completion of Phase – 2 of the Construction of the Data Centre And Office Block and Commence the Third Phase	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
	Crude Oil Refining	(i) Crude Oil Transportation	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(ii) Refinery Development	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
	Development of Midstream Transportation Infrastructure	(i) Pipelines from the Central Processing Facilities to the Refinery *(both Northern and Southern CPF)*	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(ii) Refinery to Buloba (near Kampala) Pipeline	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(iii) Northern route through Turkana to Lamu Port in Kenya - 1380km long	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities

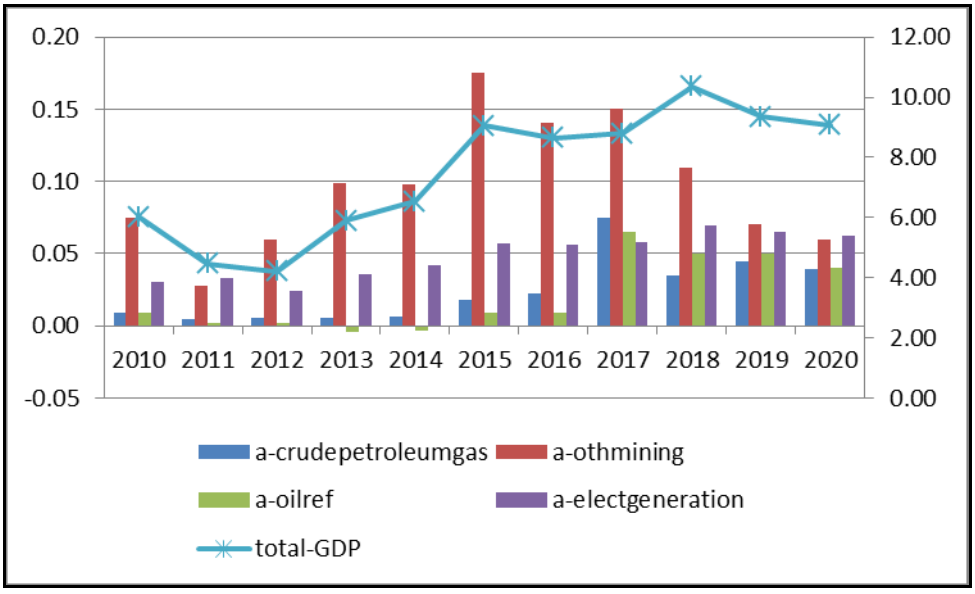
Sub-sector	Sector Objectives	Areas of Development	Proposed Development Options
		(iv) Central route through Kampala, Malaba to Mombasa - 1300km long	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(v) Southern route through western L. Victoria region through Tanzania to Dar es Salaam -1950km long	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
	Development and Regulation of Petroleum Supply and distribution	(a) Development of the Petroleum products and facilities Standards	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(b) Development and operationalisation of the National Petroleum Information System (NPIS)	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(c) Development National Policy for Downstream sub-sector	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(d) Development and operationalisation of Health Safety and Environment (HSE) for downstream petroleum	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(e) Institutional Capacity Building	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
	Development of Downstream Transport Infrastructure	(i) Kenya –Uganda (Eldoret-Buloba) Product Pipeline Extension Promoted	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(ii) Development of Kampala – Kigali Products Pipeline	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
	Development and Re-stocking of Storage Petroleum Reserves	(i) Operationalisation of Jinja Storage Tanks (JST)	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(ii) Nakasongola Storage Tank Site	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
	Promotion of Liquefied Petroleum Gas (LPG) Usage	(i) Promotion and sensitisation campaigns on LPG	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(ii) Development of common user terminals for LPG	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(iii) Development of LPG bottling plant	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
Mineral Development	Establishing the Mineral Wealth of Uganda	(i) Geological Mapping of Minerals	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities

Sub-sector	Sector Objectives	Areas of Development	Proposed Development Options
		(ii) Airborne Geological Survey and Geological Mapping of Karamoja	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(iii) Exploration and Development of Uganda Geothermal Energy Resources	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(iv) Mapping Geo-sites and Geo-parks	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(v) Gazetting Uranium Resources	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
		(vi) Exploration and Development of Rare Earth Elements (REE)	Grants and Loans Financing, Venture Capital, Funds of Funds, Asset Backed Securities
	Enhancing Mineral Exploration	(i) Strengthening of National Seismological Network Infrastructure and institutions	Grants and Loans Financing
		(ii) Mineral Data Management Infrastructure	Grants and Loans Financing
		(iii) Laboratory Infrastructure Enhancement for Mineral Value Addition	Grants and Loans Financing
		(iv) Mainstream Artisanal and Small Scale miners (ASM)	Grants and Loans Financing
		(v) Skilling and Tooling of Human Resources and the Youth	Grants and Loans Financing

4.1.3 MACROECONOMIC IMPLICATIONS OF OIL AND GAS DEVELOPMENTS IN THE ENERGY AND MINERAL SECTOR

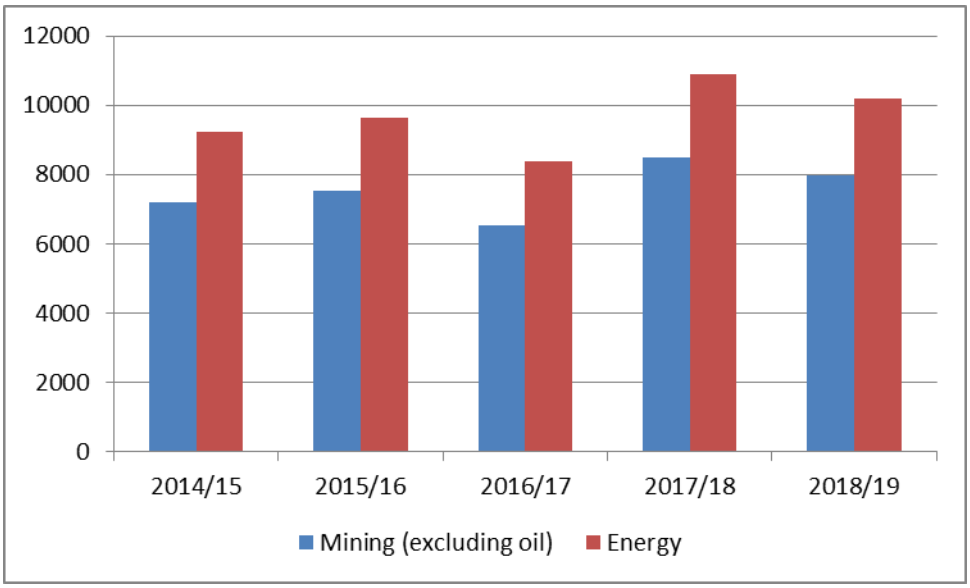
The programs and interventions outlined under this SDP are envisaged to have direct and indirect effects on the macro economy. The direct effects include the growth spill over effects of the sector interventions on other sectors. The indirect effects include generation of employment for the sectors where the interventions are affected as well as other sectors affected positively as a result of the interventions. Other direct effects would include the revenue benefits as a result of the expected revenues from the oil sector. The figure below provides a decomposition of the growth effects of the various programs on the expected total GDP growth. This chart provides the direct effects on growth of the individual subprograms without taking into account the indirect effects on other sectors. As illustrated below, it is evident that in addition to the expected growth from oil refining, harnessing other minerals particularly the iron ore and phosphates could have substantial growth dividends.

Figure 14: Decomposition of Growth by Programs



The mineral sector is increasingly becoming very important in responding to the labour needs of the country. Considering artisanal mining, there are currently over 180 groups of artisanal and small scale miners in Uganda providing employment to over 20,000 miners with indirect and induced labour numbering over 54,000. In addition the energy sector also has considerable potential in generating employment particularly for the large scale hydropower dams and electricity transmission programs. The figure 16 below, shows the projected number of jobs that will be created under all programs (excluding the oil and gas sector) totalling to about 86,000 jobs.

Figure 15: Jobs to be created under the SDP (excluding oil and gas jobs)



4.1.4 Energy Sector

One of the key objectives for this sector is to increase power generation capacity by constructing large and small hydropower plants plus thermal power plants through public and private investments. This has clearly been outlined under the Vision 2040 where capacity is expected to increase from 3885 MW in 2015 to 8,601 MW of electricity in 2020. At the current rate installed capacity of 851.5 MW, this provides a tough challenge to meet these milestones in the prescribed time frame. In addition to increasing the capacity of power generated, Government is also embarking on enhancing the electricity transmission network to meet the growing demand for electricity estimated at 10 percent annually. The various transmission networks to be developed are highlighted in Section 3. Government has also embarked on the rural electrification program with the objective of ensuring that Universal access to electricity is achieved by 2040. The Government is progressing with plans on the exploitation of both renewable energy and atomic energy for peaceful applications. Table 29 provides a summary of the key programs in the energy sector that would have direct effects on the productivity of other sector.

Table 29: Key Development Programmes of the Energy Sector

Sector Development interventions	**Potential impact on economy**
Increasing Electricity Generation Capacity	(i) Improvement in productivity of industry and services sector (ii) Reduction in cost of doing business across all sectors (iii) Potential export of excess energy supply
Enhancing Electricity Transmission Network	(i) Stimulating new demand for energy (ii) Improvement in productivity of energy sector as a result of reducing energy losses.
Enhancing Electricity Distribution Capacity	(i) Promoting new demand for electricity. (ii) Enhance industrialization especially in rural areas through value addition.
Promoting Energy Penetration to	(i) Promoting new demand for electricity.

Rural Areas	(ii) Enhance industrialization especially in rural areas through value addition.
Promoting New and Renewable Energy	(i) Reduction in cost of available energy (ii) Enhance industrialization
Promotion and Development of Nuclear Energy	(i) Reduction in cost of available energy (ii) Enhance industrialization
Atomic Energy Regulations	(i) Ensure proper utilisation for peaceful applications
Promote efficient utilization of energy	(i) Reduction in cost of available energy (ii) Enhance industrialization

To implement all these highlighted sub programmes, this would require substantial resources partly from Government and the private sector. To illustrate the importance of the energy sector and devoting more resources to the sector, we use a computable general equilibrium model to assess the impact of these interventions on the entire economy. It is assumed that the increase in spending to address these interventions would be partly derived from the oil resource revenues that are expected to be on board in 2020 and partly by the private sector financing under the PPP arrangements.

The key channel through which spending on energy projects is the impact this would have on the efficiency of the sectors which rely on electricity. These are mainly the manufacturing sectors which are affected by load shedding of electricity owing to the limited power generation. As shown in Table 30, the proposed interventions in energy lead to higher GDP growth rates compared to what would have been achieved if the status quo is maintained. The additional growth that would be obtained by only increasing spending on energy is estimated at 0.9 percent. The sources of this growth would come from all sectors with an average increase in manufacturing sector of additional 0.4 percent and services especially private which would grow on average with an additional 1 percent. Being that the manufacturing sector is partly agro-based; the higher efficiency of production for these factories would also have positive backward spillovers on related agriculture activities. As a result, the overall sector of agriculture would also grow at an average of 6.1 percent owing to the more vibrant agro-processing manufacturing sector with increased demand for the raw materials produced by the sector compared to 4.2 percent under the baseline.

Table 30: Average Sectoral Growth Rates after Scaling Up Infrastructure Spending, 2015-2020

	BASE	Energyinf	Mineral Development
Overall GDP	5.78	6.68	7.35
Agriculture	4.20	6.12	6.73
Of which			
Cereals	2.97	4.80	5.28
Root Crops	4.38	6.31	6.94
Pulses	3.29	5.24	5.76
Matooke	4.51	6.44	7.09
Horticulture	4.82	6.74	7.42
Export Crops	3.32	5.32	5.85
Livestock	4.05	5.84	6.42
Forestry	4.52	6.39	7.03
Fishing	5.66	7.63	8.39
Industry	5.33	5.73	6.31
Of which			
Mining	5.26	6.40	7.04
Manufacturing	4.93	5.33	5.86
Food Processing	5.56	6.87	7.55
Non-Food Processing	4.23	4.63	5.09
Other Industries	5.48	5.88	6.47
Services	6.66	7.88	8.67
Private	7.88	8.97	9.87
Of Which			
Trade	5.22	6.39	7.03
Hotels	16.08	18.32	20.15
Transport	2.92	1.26	1.39
Communication	5.70	6.55	7.20
Banking	5.04	4.19	4.61
Utlities	6.32	9.84	10.82
Construction	5.23	5.83	6.41
Real Estate	6.35	7.20	7.92
Public	2.33	4.25	4.67

Source: Author's Computations

As expected, the growth rate for services would mainly be driven by the private sector where the developments are taking place. Services on average would grow by 7.9 percent over the period 2015-20 compared to 6.7 percent in the baseline. On the other hand increased development spending on the energy sector would also have some growth effects on the construction sector and machinery. This is reflected in the growth of real estate would be higher by 0.9 percent compared to the baseline. This in turn would also lead to indirect increase in demand for intermediate input goods typically supplied by manufacturing. One of the main reasons why manufacturing has stagnated in Uganda is because the cost of doing business remains very high due to the highest tariffs in the region. By allocating more resources to the energy sectors would partly address this problem. Further, increased budget allocations to energy would have positive externality effects on other sectors, underscoring the dynamic interrelationships associated with public spending composition and the sectors.

4.1.5 Petroleum sector

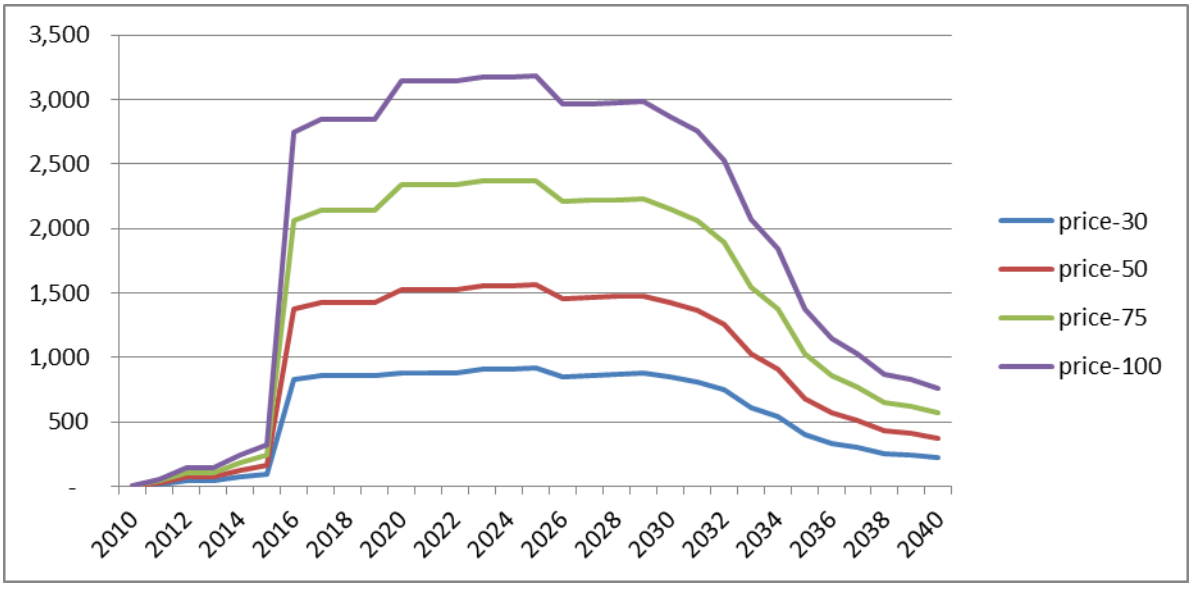
Uganda has for the last two decades prudently managed its macroeconomics well, and the prospect of the infusion of large oil revenues into the economy may test this record. The oil cash will present the county with two major macro-economic challenges. One of the challenges will be on how to manage the

volatility and unpredictability of the oil prices as this has implications for the developments in the sector and the amount of revenue expected by Government to fund the budget. Related to the above is the need to keep the recurrent fiscal balance under check in the wake of the increasing public expenditure especially on infrastructure development.

Indicative Oil and Gas Production and Revenue Forecast

The estimated time of the commencement of production will depend on the speed of negotiations with the proposed private investor, land acquisition and requisite infrastructure. It is estimated that the recoverable oil is about 1.5billion barrels. With these reserves, it is expected that production may be sustained for about 30 years. Production at peak levels has been estimated at between 120,000 and 140,000 barrels per day over a 30-year production period, in phases starting possibly in 2019/20 subject to the pace of infrastructure development. Limited production of 60,000 barrels per day is envisaged in the initial years, with full scale production likely to be reached in six to ten years. This level of reserves would put Uganda into a peer group with Chad (0.9 billion barrels), Republic of Congo (1.9 billion), Equatorial Guinea (1.7 billion) and Gabon (3.2 billion). At prices of a conservative $75 per barrel, oil revenue at peak production in 2020 are likely to generate about $2 billion (see Figure 17) per year or at least potentially contributing an estimated 10 percent of GDP.

Figure 16: At the Peak In 6-10 Years, Oil Extraction Could Add US$2 Billion to Uganda's Budget



The estimates of revenues from oil are sensitive to a number of parameters and not only the price of oil on the world market but also the changes in cost of extraction as well as variation in the level of reserves in the future as more exploration takes place. For example, given fixed costs of extraction, oil prices at US$30 per barrel, would bring Government revenue down to an average of US$ 592 million per year; at US50 per barrel annual government revenue would be US$ 1 billion but at US$100 per barrel, Government revenue would conversely go up to an average of US$ 2 billion per year. Similarly, a five-year production peak (instead of a nine-year peak) could also reduce Government revenue to US$ 1.4 billion per year. And given that only about 45 percent of the Albertine region has been, explored,

additional reserves could be discovered in the future as exploration moves to the north and south-western parts of the country, which has the potential to double the reserves and possibly Government revenue. Table 31 below shows a breakdown of the oil revenues that would be derived by government.

Table 31: Oil Revenues as Percent of GDP

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Oil revenues (Billion Ush)	0.1%	0.4%	0.6%	0.6%	0.9%	1.7%
Upstream Revenues	0.1%	0.4%	0.6%	0.6%	0.9%	1.2%
Royalties	0.1%	0.3%	0.4%	0.4%	0.4%	0.4%
Profit Share	0.1%	0.4%	0.7%	0.6%	0.6%	0.6%
Income tax	0.0%	0.0%	0.0%	0.0%	0.2%	0.4%
Dividend (from participation)	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%
Dividend withholding tax	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%
Pipeline : Pipeline revenues	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Income Taxes	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dividends	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dividend Withholding Taxes	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Refinery	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%
Income Taxes	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
Dividends	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Dividend Withholding Taxes	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%

Oil prospects bring both opportunities and challenges with profound impact on economic development, dramatic increases in Foreign Direct Investment (FDI) and domestic revenue in the medium term, and the possibility of reducing energy costs. But oil revenue also brings the so-well known challenges associated with it, in terms of institutional and macro-economic absorptive capacities. The second set of challenges relates to the management and use of a volatile, uncertain and exhaustible source of revenue. Lastly, oil may also bring inflationary pressures and exchange rate appreciation. The so-called "Dutch Disease" effect may impact the competitiveness of Uganda's agricultural exports, and it is likely to make the country's growth strategy – with an emphasis on value added, export diversification, and manufacturing – harder to achieve. This would threaten to increase, rather than decrease, the income gap. Fortunately, the National Oil and Gas Policy indicated the Government's intention to earmark oil revenue for strategic public developments especially in social and economic infrastructure, which could help to increase productivity in other sectors and thereby offset the effects of Dutch Disease.

Other Impacts of the oil resources on the Ugandan Economy

In addition to the oil sales expected from the oil, it expected that the discovery of oil in Uganda will have the following impacts on the Ugandan economy:

***Local goods and services*:** Due to the high capital requirements and the high level of specialization in the exploration phase vis-à-vis Uganda's low capital base, there is limited local content of supplies to the oilfield in terms of equipment and services needed for installation. It is envisaged that the production phase there is likely to be improved scope for consumables to be procured locally and local enterprises may be able to supply a range of services.

Direct employment: As part of the of the PSIs, exploration companies undertook to train Ugandan citizens to gradually replace expatriate staff and to train government personnel in oil operations and this was hoped will create employment for the local people and increase local content in the oil sector, though no specific timetable or quota targets were set. But while the oil exploration and production industry is capital intensive, it employs proportionately fewer workers than most other industries. While a number of unskilled workers will be needed during the development stages to construct roads, buildings and other infrastructure, these will mostly be short-term, insecure and low-paid positions. The Government in addition to sending some professionals abroad to study oil related courses, has improved on the Uganda Petroleum Institute, Kigumba (UPIK) in western Uganda into a training centre for oil professionals to prepare them for employment in the oil industry.

The study by M/s Foster Wheeler Limited shows that the construction of the refinery will require about 4,000 to 6,000 employees. And whereas most of these jobs will only be short term (for around 24 months), the time could be sufficient to develop basic skills in country that would then be transferable to future projects. It is estimated that during the operating phase the refinery will create about 664 permanent jobs operating and maintaining the refinery. And in addition there could be significant number of jobs created in industries and infrastructure required to support the refinery.

The study also estimated that the operation of the upstream facilities will require about 378 staff to operate and maintain the facility which is expected would be relatively well paid and at incomes well above the average wage in Uganda. Other jobs the study pointed to are the ones expected would be created in the surrounding communities including in supporting infrastructure such as doctors, nurses, and teachers; in waste handling like cleaners, gardeners, motor mechanics, in services and leisure such as shopkeepers, chefs, waiters etc. In total, the study estimates that about 1,500 to 2,100 jobs will be created in Uganda due to the refinery.

In comparison, the employment created if the refinery was to be the option is slightly lower. Whereas the requirements for the upstream facilities as expected would be the same as those for the refinery, the pipeline itself would require 246 staff to operate and maintain the facilities. It was estimated that the pipeline case will employ a total of 507 Ugandans. Assuming each job generates an additional 0.5-1 jobs in the local economy this would result in 750 – 1000 jobs in Uganda.

4.1.6 Mineral Development sector

The contribution of mining to the economy has not been growing as projected over the years owing to many factors including the political and economic instability. As a result, Government has embarked on harnessing the mineral sector by providing a supportive role that would harness value addition for specific minerals. Among the minerals that have been highlighted that would have significant impact on the economy include: (i) Development of the iron smelting plant which would have positive spill-over effects on steel manufacturing within the region (ii) Processing of phosphates into fertilizers which would have positive benefits especially for the agriculture sector. Table 32 below provides a summary for some of the key interventions in mineral development and the likely impact on the rest of the economy.

Table 32: Key Interventions and Impact on the Economy

Key intervention	Impact on Economy
Establishing the Mineral Wealth of Uganda	(i) Directly contributing to growth as more minerals are exploited (ii) Increased revenues to government (iii) Increased employment (iv) Improved capacity in the mineral sector
Enhancing Mineral Exploration	(i) Directly contributing to growth as more minerals are exploited. (ii) Increased revenues to government (iii) Increased employment (iv) Impact on other sectors for example agriculture if fertilizers are processed from phosphates or construction sector if iron ore is processed into steel.

The development of the iron smelting plant has been hindered by various factors. First, given the size of the investment, this would require well-coordinated availability of financing from the private sector or under a PPP arrangement. The considerable resources required for this plant limits the number of potential investors that would implement such a large scale project. Notwithstanding the challenge, this is a project which could be implemented under the PPP arrangement. Secondly, the iron smelting plant is estimated to require more than 400 MW of power which is almost half of the current generation capacity. The alternative would be to import coal from neighbouring countries which is not a viable option. Therefore, to fully benefit from the value chain of iron smelting, this would require well-coordinated actions by government particularly to provide the required energy to feed the plant. On the other hand, there has been some progress in identifying the investor to implement the Phosphate fertilizer plant. By government ensuring that these two projects are fully implemented, this would add an additional 1.6 percent of GDP. The source of this growth would mainly emanate from agriculture and industry.

5. MONITORING AND EVALUATION FRAMEWORK

The Monitoring and Evaluation effort of the EMD sector is based on the concept of a sector wide approach whereby the EMD Sector Development Plan (EMD SDP) defines the minimum sector of goals, development priorities and targets upon which EMD sector stakeholders shall have pledged and committed themselves to attain over the FY period 2015/16 to 2019/20. The concept of a SWG requires that the sector stakeholders hold themselves to the principles of mutual accountability[16] for the achievement attained EMD SDP goals, objectives and targets. Mutual Accountability requires that each stakeholder in the processing of the EMD SDP implementation commits to, and is held accountable for their actions within the framework of collective responsibility on a shared agenda. In the context of EMD SDP, the critical collective action processes have clearly been defined within a shared EMD SDP agenda and an agreed joint operational framework has been prescribed.

Furthermore, mutual accountability shall encourage peer support and learning, considering that the successful execution of one stakeholder's roles is critical to the realization of the overall shared EMD SDP agenda and overall development objectives in the sector.The concept of mutual accountability provides the broad architecture for review, dialogue and debate in the implementation of EMD SDP. Various initiatives, such as Joint Sector Reviews (JSRs), shall provide the basis for performance assessment, which is a prerequisite for effective planning, budgeting and overall policy decision-making. Furthermore, such initiatives shall provide useful platforms for stakeholders to get insights into, and influence policies and priorities in the sector.

In this regard, EMD Joint Sector Reviews shall be considered to be the appropriate platform for applying the mutual accountability principles on the implementation of EMD SDP. The EMD JSR shall provide opportunities for generating evidence-based data on the EMD SDP performance, guided by the sector M&E framework and drawing lessons and good practices at the from the three EMD SDP programmes. The EMD JSR shall also provide information for upward level performance reporting by the sector.

The primary purpose of the EMD JSR shall be to strengthen existing EMD sector monitoring, evaluation, dialogue and accountability processes. This shall involve strengthening the assessment of sector performance in light of the intended results. The EMD JSR therefore shall seek to examine the effectiveness and efficiency of the "operationalization" of the EMD sector strategic development plan and jointly agree on areas and timelines for further work by key stakeholders. While the EMD JSR shall focus more on evaluation, dialogue and accountability processes, it shall also strengthen the monitoring process by creating demand and indicating user preferences and needs for monitoring data and information.

The Mandate of commissioning an EMD JSR lies with the Accounting Officer of the key Ministry responsible for Energy and Mineral Development. The purpose, scope, scale and timing of the JSR will be determined by a committee designated by the management of the Ministry of Energy and Mineral Development in collaboration with other key strategic partners in the sector, and coordinated with inter-ministerial processes as defined by the *National Policy on Public sector Monitoring & Evaluation, 2013.*

[16] Based on the Paris Declaration on aid effectiveness: http://www.oecd.org/dataoecd/11/41/34428351.pdf

It is important to ensure that the EMD JSR process involves the participation of the appropriate stakeholders from the outset and that there is agreement on the key performance areas that will be reviewed during the reporting period. This will contribute to increased ownership of the findings of the review especially by the Ministry of Energy and Mineral Development; and all major stakeholders, which in turn will boost the likelihood of implementing the recommendations of the review.

The principles of mutual accountability and stakeholder ownership are pertinent to a successful EMD JSR process, ensuring that Government of Uganda, donors and non-state actors including the private sector and civil society are actively involved in the EMD review, dialogue and debate processes along a shared EMD development agenda, and that all stakeholders are accountable to one another – based on individual stakeholder commitments to jointly agreed results. There are two critical types of performance data that shall be relevant to mutual accountability in the EMD Sector Joint Review processes. These are:-

(a) Implementation data on outputs and outcomes - data on effective implementation of commitments made by individual donors, government and the private sector in support of the shared EMD development agenda; and
(b) Impact data—sector performance data informing the level of impact on societal goals such as poverty reduction; and, rational and sustainable exploitation and utilization of energy and mineral resources for social and economic development that are associated with successfully executing the portfolio of actions specified in the shared EMD SDP.

The detailed guideline for M&E is defined in the: ***Framework for Monitoring and Evaluation of EMD Sector Development Plan 2015/16 – 2019/20.***