



Energy and Urbanisation in Uganda: Context report and literature review

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April 2014

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List of Acronyms

- BTC – Belgian Technical Cooperation
- BMZ – The German Federal Ministry for Economic Development Cooperation
- CBD – Central Business District
- CDM – Clean Development Mechanism
- CIM – Centre for International Migration
- CRDB – Centenary Rural Development Bank
- CREEC – Centre for Research in Energy and Energy Conservation
- DED – The German Development Service
- EAP – Energy Advisory Project
- ERT – Energy for Rural Transformation
- ESIA – Environment and Social Impact Assessment
- FABIO – First African Bicycle Information Organization
- GEF – Global Environment Facility
- GHG – Green House Gas
- GIZ – German Society for International Cooperation
- GTZ – German Organisation for Technical Cooperation (now merged into GIZ)
- JEEP – Joint Energy and Environment Program
- KCCA – Kampala Capital City Authority
- MEMD – Ugandan Ministry of Energy and Mineral Development
- MLHUD – Ugandan Ministry of Lands, Housing, and Urban Development
- MWT – Ministry of Works and Transport
- NEMA – National Environmental Management Agency
- PREEEP – Promotion of Renewable Energy and Energy Efficiency Programme
- PRG – Partial Risk Guarantee
- SAMSET – Supporting Sub-Saharan Africa’s Municipalities with Sustainable Energy Transitions
- UAAU – Urban Authorities Association of Uganda
- UBOS – Uganda Bureau Of Statistics
- ULGA – Uganda Local Government Association
- UNEP – United Nations Environment Programme
- UN-FAO – Food and Agriculture Organisation of the United Nations
- UNICEF – United Nations Children’s Fund
- UPPPRE – Uganda Photovoltaic Pilot Project for Rural Electrification
- UTODA – Uganda Taxi Operators and Drivers’ Association
- UECCC – Uganda Energy Credit Capitalisation Company
- WENRECo – West Nile Rural Electrification Company

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Purpose of the document

This document is aimed at being a background resource document for the work to follow in the SAMSET project. It thus provides a context for the energy and urbanisation situation in Uganda, and then draws on a range of sources to look at the urban planning framework as such, status of any energy initiatives and any opportunities and challenges to implementation of sustainable energy options in urban areas. Specifically, it aims to answer the following questions in order to inform the way forward for the SAMSET project:

- *What are the relevant government departments and urban administrative units?*
- *What are the key issues (i.e. problems and opportunities) around sustainable energy in urban Uganda?*
- *What is the overall urban energy situation?*
- *What relevant plans are in place or approaches have been tried regarding sustainable urban energy, and to what effect?*
- *What are some specific lessons for the SAMSET project?*

Some Key Facts and Figures

Area	<i>250,000 square metres</i>
Population (2012 Estimate)	<i>36 million</i>
Growth Rate	<i>3.3 per cent</i>
Population (2020 Projections)	<i>45 Million</i>
Urban population	<i>18.1 per cent</i>
Rate of Urbanisation (2010-2020 Estimate)	<i>4.5 per cent</i>
Major Urban Areas – Population (2013 est.)	
<i>Kampala</i>	<i>1,659,600</i>
<i>Kira</i>	<i>179,800</i>
<i>Gulu</i>	<i>154,300</i>
<i>Lira</i>	<i>108,000</i>
Urban residents living in slums	<i>75 per cent</i>
Households (2012 Estimate)	<i>6.2 million</i>
Households (2020 Projections)	<i>8.0 million</i>
Shortfall in adequate housing (2012)	<i>550,000 units</i>
Projected shortfall in housing (2020)	<i>2 million units</i>
GDP (2013 Estimates)	<i>US\$612 per capita (Annual growth 3.4 per cent)</i>
GDP – real growth rate per capita	<i>0.8 per cent</i>
GDP – composition by sector of origin	<i>Agriculture – 23.2 per cent</i> <i>Industry – 26.6 per cent</i> <i>Services – 44.7 per cent</i>
Average annual household expenditure	<i>US\$ 1,118</i>
Gini Index (UNICEF 2011)	<i>42.6 (sub-Saharan Africa’s average: 44.2)</i>
Unemployment	<i>3.6 per cent</i>
Household access to the electricity grid	<i>Between 6 and 10 per cent of the population (1 per cent of households in rural areas)</i>
Installed generation capacity	<i>800 MW</i>
Installed capacity for hydroelectricity (yr estab.)	<i>630MW</i>
<i>Nalubaale (Owen Falls) (1954)</i>	<i>- 180MW</i>
<i>Kiira (2000)</i>	<i>- 200MW</i>
<i>Bujagali (2012)</i>	<i>- 250MW</i>
Thermal generation plants	<i>~100MW</i>
Micro hydro and biomass plants	<i>~50MW</i>
CO ₂ emissions/ca (World Bank 2009)	<i>0.11 metric tons</i>
Energy Opportunities	
<i>Oil</i>	<i>- Assessed 1.7 billion barrels</i>
<i>Natural Gas</i>	<i>- Limited</i>
<i>Renewables</i>	<i>- Small-scale hydroelectric & solar</i>

Figure 01: Key Facts and figures about Uganda

(Source: UBOS, unless stated otherwise)

The Urban Institutional Context

Uganda is a presidential republic, in which the President of Uganda is both head of state and head of government. Several political parties are active, but the ruling National Resistance Movement has been in power since 1986. Executive power is exercised by the government through line ministries. Legislative power is vested in both the government and the National Assembly to which the members are elected by votes from all citizens over 18 of years of age.

Line Ministries

Considering the objectives of SAMSET, the project is likely to work with five of the 14 line ministries. Those are:

- The Ministry of Local Government - the main interlocutor between central government and district/urban governments. Direction, technical support, and the disbursement of the non-conditional and conditional grants which make up the bulk of operating funds for the local government offices.
- The Ministry of Lands, Housing and Urban Development – a policy-making body which also serves to provide technical support to towns and municipalities. Directives regarding physical planning and housing standards are passed down from this ministry.
- The Ministry of Energy and Mineral Development – quite powerful institution with mandate to regulate almost all extractive industries as well as the electricity and liquid fuel markets. Several agencies and authorities dealing with energy policy and support are under this ministry (e.g. Electricity Regulatory Authority, parastatal UMEME electricity distribution corporation, etc).
- The Ministry of Works and Transport – in charge of setting national policy on small-scale infrastructure (that may be implemented by local governments) as well as planning and implementing (usually through a tender process) large-scale infrastructure projects often through a subsidiary agency or authority.
- The Ministry of Water and Environment – mandated with management of water and environmental resources. Several relevant semi-autonomous agencies report to this ministry, including: National Forestry Authority, National Environmental Management Authority, National Water and Sewerage Corporation (parastatal), and the Climate Change Unit.

Local/Urban Governance

Uganda is currently divided into 111 districts, plus the city of Kampala. Each district is led by both an elected Local Council Five (V) chairperson and a Resident District Coordinator who is appointed by the president of the republic. The case of Kampala is unique in that there is a State Minister in charge who oversees an Executive Director of the parastatal Kampala Capital City Authority.

Urban government structures are complex and involve several layers of elected and appointed officials. For now, population size and geographic extent determine whether an urban area is to be governed as a town board, town council, municipal council or city council. Each of these has varying levels of autonomy and responsibility. Figure 02 attempts to explain some of this hierarchy. The Mayor is the elected political leader or a town council or municipal council; however, the day-to-day business is carried out by the Town Clerk who is appointed by the President. The categories and parameters are currently being reviewed and a new National Urban Policy has been drafted with the support of World Bank/ Cities Alliance (see Appendix B and MLHUD 2013).

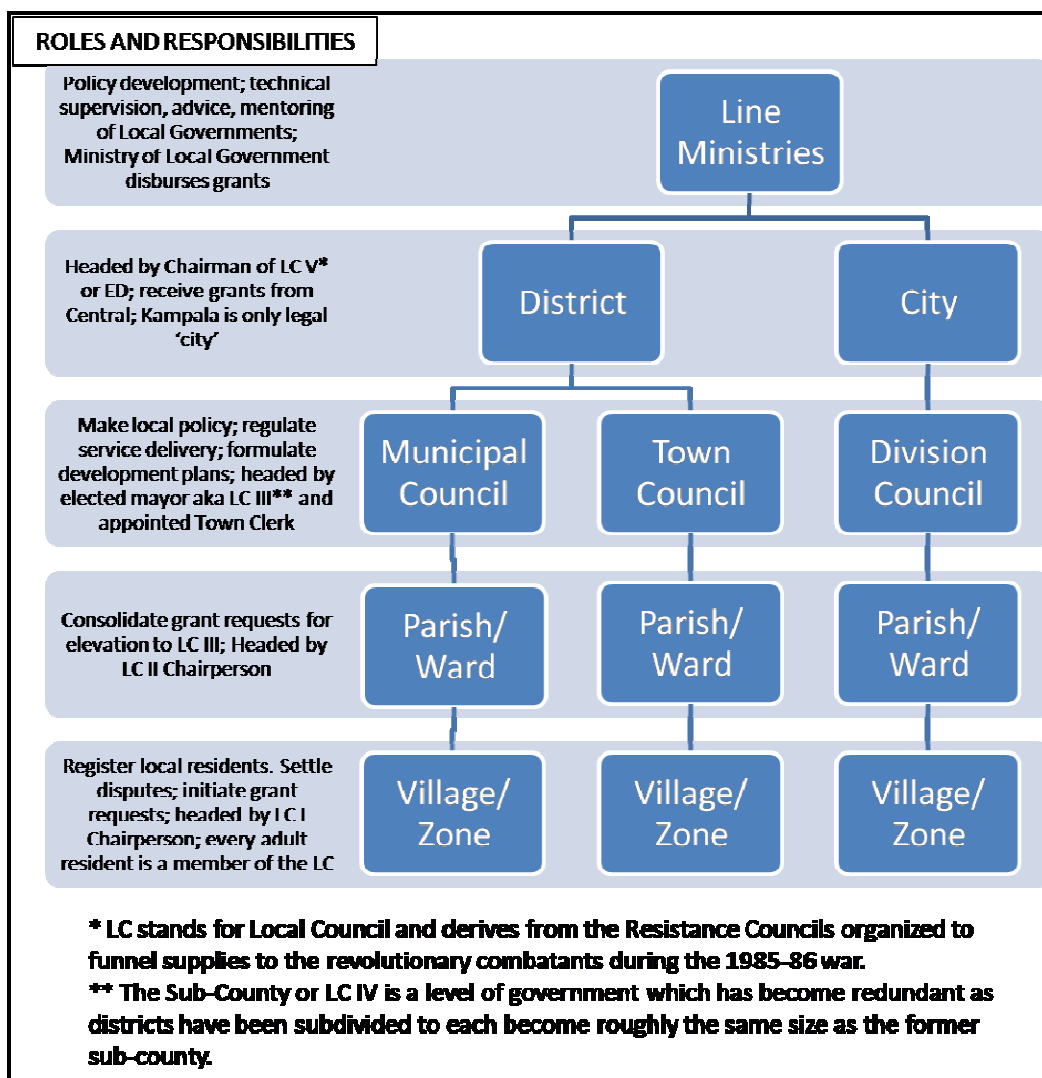


Fig 02: Local governance hierarchies in urban areas of Uganda; Various sources

Uganda technically has three separate spheres of government – national, district and local or municipal government each with its own mandate, which is largely derived from the Constitution. They are not functionally responsible for the mandates of the others, although national and district government is required to support local government in carrying out its role. Within national government, the Ministry of Local Government manages the funding to districts and Local Councils of various levels; most district and local governments derive the vast majority of their operating revenues and infrastructure investments through grants from national government. Technical support to urban governments is the responsibility of the Ministry of Lands, Housing, and Urban Development (MLHUD). The non-governmental Urban Authorities Association of Uganda (UAAU) and the Ugandan Local Government Association (ULGA) provide a coordinating function amongst local government and represent local government to national government and elsewhere on issues of relevance to them. UAAU aims to serve town and municipality governments, whereas ULGA works mostly with district and lower non-urban government offices (see hierarchies below). Financial support to these associations comes in the form of membership fees and various international development funding.

According to the Local Government Act 1997, Section 9, Local Government Councils “shall be the highest political authority within the area of jurisdiction of a local government and shall have legislative and executive powers to be exercised in accordance with the Constitution and this Act. And Section 4 of the same, states that “a municipal or a town council shall be a lower local government of the district in which it is situated.” Kampala, as the only “city” in the country, has the status of district and as of late 2012 is governed by the parastatal Kampala Capital City Authority, which is responsible

for all revenue collection, all service delivery within the central division of the city, and budget control over the remaining four divisions.

Physical plans have been written for over 60 town councils and other urban jurisdictions over the past 15 years with support from MLHUD. Some of these plans would need updating to be relevant to the current situation of rapid growth in many towns and municipalities. Most often, the plans do not take into account the financing necessary for the implementation of the planned infrastructure or the fiscal consequences of the actions. The implementation of more strategic planning frameworks is essential.

Local government is able to raise revenue from property rates and service delivery payments, amongst other sources. They are also the recipient of various conditional and unconditional grants from national government, though these are famously inconsistent in quantity and date of arrival. Municipalities are not currently able to raise loans; however KCCA has been given a mandate to do so.

As noted in earlier sections, there is great concern regarding the capacity of local government to address their service delivery mandates, particularly in the face of rapid urbanization occurring in many towns and cities. In addition, municipal finances are often under stress, both because of capacity and management issues as well as revenue shortfalls, including those linked to the inconsistency of central government grants. This exacerbates service delivery backlogs and results in inadequate attention to the maintenance and upgrading of key infrastructure such as electricity distribution systems.

The urban institutional context regarding energy is sometimes complicated and has various shortfalls. Amongst these is the fact that UMEME has a near monopoly on direct electricity distribution, which prevents the entrance of new actors such as small- and medium-scale renewable energy providers. Implementation of sustainable energy-related interventions touches on all of these areas in some way, which provides a challenge to local governments wanting to pursue a sustainable energy future in a way that may not align with, or may be more progressive than existing national or provincial plans.

Current Urbanization Situation

The current national population is approximately 36 million out of which 18.1% reside in urban areas (Uganda Bureau of Statistics, 2013). The population living in urban areas is increasing at a more rapid pace than the national average, at between 4-5 per cent a year, leading to a projected urban population in the year 2020 of 7 million, out of an expected total of 40 million. Though this represents a relatively modest annual increase in the urban share of population from 14 per cent to 17.5 per cent over this period (UN-HABITAT, 2010), it means an increase of at least 2.5 million people in only 10 years, or approximately 250,000 people each year. This increase in urbanization represents both a challenge and an opportunity for policy makers and the energy sector. It should be noted that a population census has not been completed since 2002 and current demographic figures and projections stated herein should be treated with varying levels of confidence.

Uganda is classified as a Least Developed Country with a Gross National Income per capita of US\$ 420 p.a. (UN FAO, 2013). Cities in Uganda are characterised by high unemployment (nearly three times higher than in rural areas, poor service delivery and few government controls on land use, transport modes, emissions, or building standards. Low public sector investment in infrastructure and in housing affordable to the average urban resident has led to numerous environmental and social problems, and ultimately, economic inefficiencies. The capital Kampala, and many secondary cities, are experiencing a cumulative population growth of more than 4 per cent per year, with much new development occurring in sensitive environmental areas such as wetlands and fragile slopes or sprawling along the roadways out of town. By some estimates, over 60 per cent of capital city residents live in informal settlements lacking electricity, road access, drainage, or safe water sources

(MLHUD, 2008). Individuals and families of up to eight live and often work in simple corrugated steel shacks with no ventilation, sanitation facilities, or lighting.

Political stability under the current government and the cessation of hostilities in the north have led to a marked improvement in macroeconomic indicators. Poverty rates in urban areas have remained relatively constant over the last decade, at an official 14 per cent (MLHUD 2008). Although the story of urbanisation and poverty in Uganda is far from positive, the fact that only 13 per cent of Ugandans currently live in cities (UN HABITAT 2010) means that, unlike its more urbanised neighbours, Uganda still has a high potential for setting itself on the road to sustainable urbanization - including its efficient use of energy - if appropriate technologies and timely policies are put in place.

According to the Ministry of Local Government, there exist 22 municipalities and 174 towns each governed by its respective council and an appointed town clerk (see fig 2). Eighteen of these have official populations over 50,000 (see Annex A for a complete list). Through a process of selection supported by a wide variety of local stakeholders, SAMSET Uganda has chosen to partner with one Municipal Council and one Town Council for the purposes of research and testing of relevant policies and working structures. The researchers believe that Jinja and Kasese, being unique in several ways, will provide excellent lessons which could be useful to other urban managers around Uganda, East Africa, and the entire sub-Saharan region.

Jinja Municipality

Jinja municipality is the seventh largest in Uganda after Kampala, and the energy hub of Uganda, hosting two of the country's largest power stations, Nalubaale and Bujagali. In 2012, Jinja's urban population figures were ranging from 90,000 people (UBOS 2010, see appendix A), with a large population of urban poor. Jinja played a very important role in the industrial development of Uganda, especially in colonial times and is often referred to as the second largest town in the country (which could be true in terms of infrastructure and housing stock, but not population). Though that importance has become dispersed in recent years, the municipality retains rail, water and road connections to many important regional consumer markets, agricultural (sugar, maize, tea) and extractive industries (limestone and gold), and the Indian Ocean ports. The infrastructure and urban pattern was planned with a large number of industrial and supportive land uses in mind and therefore has capacity to accommodate significant future economic development. Tourism, especially northward along the Nile River, is a sizeable contributor to government coffers and employment figures.

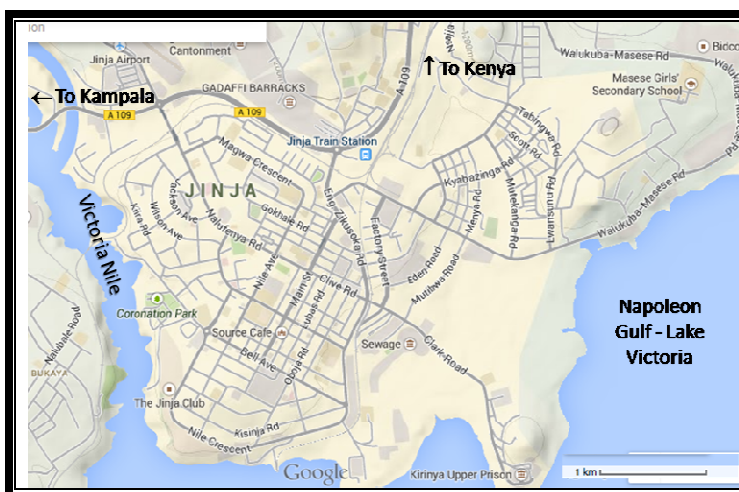


Fig 03: Map showing Jinja Municipality

Kasese Town

The town of Kasese is one of the fastest growing urban areas in Uganda (4.2 per cent, see Appendix A). This is likely influenced by factors such as improved transport links (north and south), tourism in nearby national parks, trade with neighbouring Congo and the presence of a number of development

organizations. According to Uganda Bureau of Statistics estimates for 2011), the population of Kasese town was 74,000

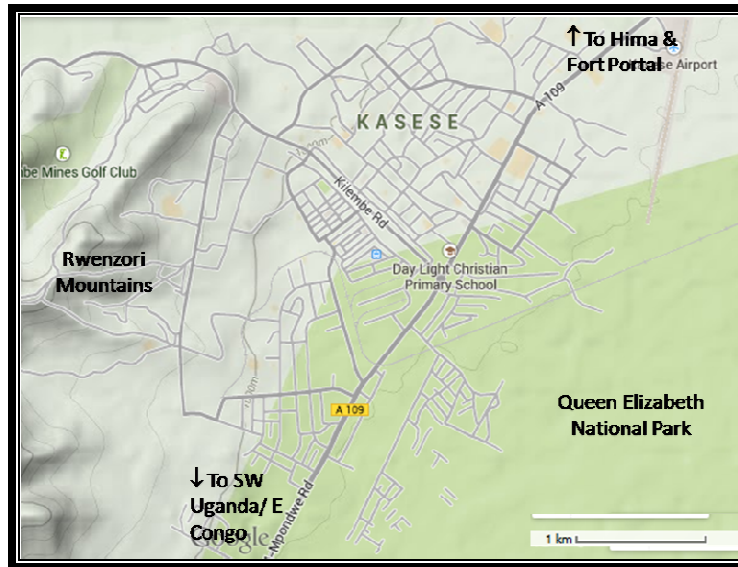


Fig 04: Map showing Kasese Municipality

In identifying the most significant urbanisation challenges in the country, it is useful to look at the urban settlements among those with highest growth rates; national statistics indicate that amongst those that have a population over 50,000, all but three have growth rates over 3% and 26 of them are above 2%, and 12 of them are growing at over 3% for the 2001-2011 period (see Appendix A). Only two are growing at over 4% for this period. To illustrate the implications of such growth rates, a 3.5% growth will lead to a doubling of population in 20 years. Given the lack of capacity in local government, it can be expected that such challenging urbanization rates will far exceed the municipality's ability to deal with the issue, with resulting stagnation or decline in welfare.

Densities and Urban Forms

The population density countrywide is roughly 137 per square kilometre (versus 101 in Ghana and 42 in South Africa). Though the capital city Kampala has the highest population of any city in the country, the area within the official city boundaries (189 km²) is large and the vast majority of structures are single story. The average density is 9,430 inhabitants per square kilometre within the city boundaries, though some researchers have estimated as low as 6,100 using remote sensing technology (Vermeiren et al. 2012). A more definitive headcount will likely have to await the next national census (postponed in 2012 without clear indication of the new schedule). Informal low-income settlements in Kampala can house as many as 30,000 within a square kilometre. For comparison, Lira in northern Uganda has an average of 11,335 per square kilometre in its built-up areas.

The form of Ugandan cities is often linear, especially in settlements that have developed since independence (1962). Many colonial town centres have changed little in their form, building stock and infrastructure and tend to feature rectilinear street patterns with single story structures making up a relatively small (1 – 2 km²) central business district (CBD). The only multi-story buildings tend to house banks or hotels, though the central axes of some towns do include rows of two-story structures combining retail with residential. In secondary towns, land use is often limited to commercial structures along central arterial roads, a small industrial quarter on the outskirts near an intercity road intersection, and residential districts with small retail filling the spaces between. Most

homesteads outside of both the grid of the CBD and the informal squatter settlements have some portion of the plots engaged in agriculture or animal husbandry.

With the exception of some mountainous areas in the southwest and west of the country (Kasese included), the gentle sloping topography and clayey soils lead to a high incidence of swampy areas unsuitable for most construction. These present a problem for civil engineers in their attempts to provide infrastructure such as roads, piped water supply, sanitary and storm sewerage systems, and even electricity. On the other hand, unmonitored wetland areas are prime territory for squatter settlements which develop in the absence of any planning, clear tenure, or service provision. Conversely, the more valuable and better serviced real estate tends to be on the tops and sides of hills.

Growing family sizes and migrations to cities have led to the subdivision of plots both within the more formal serviced urban areas as well as on the periphery in traditionally agricultural areas. This, in turn, has changed the character of the settlement form and, in the absence of any planning controls, has led to many plots lacking access to roads and other infrastructure. The official rules governing the subdivision of land are vague and vary based on the type of tenure (leasehold, freehold, or varying types of customary) and the particular point in Uganda's history in which the subdivision was made. In practice, any rule that may prohibit subdivision, a particular land use, or require extension of services can be contravened with little or no resistance from authorities either because they lack the capacity to enforce these or are willing to turn a blind eye. With the passage of the Physical Planning Act in 2010, the entire national territory has been declared a national planning area, in essence, giving wider powers to control land use to the national, district, and – to some extent - local government offices. The practical effect of these new powers has yet to be fully evaluated, though some civil society organizations claim that the government has used, or will use this to evict households to make way for public or private sector investment initiatives.

Kampala is arguably the city where the most institutional capacity exists to plan and control land use, transport, services and other urban functions. Although the municipal authority has been able to enforce some basic planning standards on the formerly public land that it now leases out or has converted to freehold status, and although it does have a planning mandate for the entire city, in practice it has not exerted its authority over the large areas of *mailo*¹ and freehold land owned by institutions such as the churches. This has led to anarchic, impromptu land development, the inefficient use of ever-scarcer land, the occupation of environmentally fragile wetland areas and the formation of large, un-serviced slum areas (Giddings, 2009).

Modes of Transport

Motorised transport represents the minority of all trips made within and between Ugandan cities. Walking, wheelbarrow, and bicycle are most frequently used to transport persons and cargo. The most common mode of internal combustion is the 100cm³ Indian-made motorbike, which consumes less than 2 liters of petrol per 100 km.

For intra-city transport of cargo, the next larger option is the half-ton Japanese-built pickup truck. Larger sizes of box and tipping trucks are used to move live cattle, construction materials, charcoal, and agricultural and consumer goods between cities. A cargo rail line reopened in 2013 and connects the north of the country (Gulu) with seaports in Kenya and points in between.

Toyota Hiace diesel minivans (known locally as “taxis”) are prevalent throughout the country and transport a legal maximum of 14 individuals and their belongings across and between settlements.

¹ The term is used in Uganda to describe a land tenure system that came into effect when the kingdom of Buganda signed an agreement with the British-administered Uganda Protectorate there in 1900. The basic unit of the *mailo* system is a square mile, hence the derivation of *mailo*, which is also equivalent to 640 acres (West 1965).

From 1986 until 2012, the Uganda Taxi Operators and Drivers Association (UTODA) had the contract to manage the two main minibus parks in Kampala. This is now the role of KCCA Engineering Directorate, however, the Association, continues to operate offices in 27 districts, hence acting as the de facto regulatory agency for taxis outside of the capital. Municipal authorities have so far been uninterested or reluctant to regulate the activities of these transport providers, however there is potential to introduce efficiencies into the system through coordination of lines and multi-modal transfers, limitation of licenses, or imposing emission standards (the vans are often old, under-maintained, and highly polluting).

New public service vehicles must be licensed by the Transport Licensing Board, an agency of the Ministry of Works. The minibuses based in Kampala are either supposed to be licensed for urban or inter-urban routes. There are, however, no limits imposed on the number of vehicles which can operate on either route and in practice vehicles seem to switch between urban and interurban services, particularly at weekends and holidays (World Bank 2005). Larger intercity buses are also ubiquitous and are often criticized for their safety record and the tendency to cause increased congestion in city centres. Efforts to even regulate highway speeds have been met with resistance and eventually abandoned.

Personal cars and taxis represent a growing minority of the vehicles on roads of Ugandan cities. Kampala currently has approximately 300,000 registered motor vehicles and countrywide roughly 8,000 new vehicles are registered monthly. The registration of private motor vehicles is carried out by the Uganda Revenue Authority since almost every new registration also involves an importation for which a sizeable duty must be paid

The National Transport Master Plan (Uganda National Roads Authority) published in 2008 mentions the overarching strategies for the road sector. These include:

- Continuing reform of the road sector, with the private sector playing the major role in transport operations, and with the central government role becoming confined to planning, policy and regulation;
- Creating semi-autonomous agencies to perform specific functions such as management of road infrastructure in a commercial manner;
- Passing to district and urban authorities the responsibility for roads in their areas, and to the local councils responsibility for community access roads; and
- Allowing market forces to determine prices for road transport services, except where urban authorities (especially in Kampala) may determine the need to meet social and economic objectives (such as control of congestion and pollution, road safety, or transport services for poorer communities);

As with many other parts of the economy, the government has chosen to reduce its role in the transport sector and instead encourage the private sector to build and operate the majority of the transport modes. For the SAMSET project, this implies a need to work at least partly with private transport operators in order to achieve energy savings in this sector.

Coordinated urban mass transit has so far failed to take hold in Kampala. A number of public-private partnerships (PPPs) based on 60-seater buses on dedicated lines have been unable to overcome challenges of the lack of planning and a perceived lack of support from taxation authorities. The latter may be related to the lobby of minivan (“taxi”) owners who see their businesses suffering from competition of larger and more efficient transport modes. Nevertheless, plans and studies are being carried out to construct the first of several Bus Rapid Transit lines in the city with the support of the World Bank. The timeline for implementation of the latter has yet to be revealed. Secondary town mayors have expressed interest in mass transit systems on a PPP model, but no firm plans are in place.

Current Energy Mix

Uganda's energy supply consists mainly (90 per cent) of biomass fuels with hydroelectricity and petroleum accounting for the remainder. The burning of wood for cooking is the most common in rural areas, whereas charcoal represents a larger share of the biomass used in cities. Wholesale charcoal prices vary from city to city depending, most likely, on the distance to the nearest stand of forest: in northern cities (Gulu, Lira, Masindi), a 50kg sack of charcoal sells for UGX 25,000 (USD 0.20 per kg), whereas in cities around Lake Victoria (Kampala, Mbarara) a sack sells for UGX 45,000 to 55,000 (USD 0.36 to 0.44 per kg).

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

Figure 05: Uganda's Energy Consumption Matrix
Source: MEMD 2012

All petroleum products are currently imported, but this could change within the next five years as domestic oil supplies are planned to be tapped and refined in-country. Three foreign companies have completed oil exploration, estimated the Ugandan reserves at 1.7b barrels, and are negotiating with the government for the approval to commence production. One point of contention between the parties surrounds the construction of an oil pipeline and refinery with a daily capacity of 200,000 barrels. The time required to bring these online implies that oil production cannot begin until at least 2018 (Tullow 2013, interviews with stakeholders). Using current global oil prices, the government of Uganda stands to earn roughly USD 50 billion over the course of production. Comparing this to the national GDP in 2011 of USD 17 billion and the annual average foreign aid of USD 2 billion, it is easy to see that the oil in the Lake Albert region could have significant impacts on the Ugandan economy. It is important to note, however, that the oil fields are not the easiest to access and considering the landlocked location of Uganda there is a significant cost associated with delivering oil (crude or refined) to international markets. The calculations of financial viability of the entire project were based on 2008-2009 oil prices (over USD 120/ barrel). As these prices begin to descend, the promise of profitability of the venture begins to dim and investors may either a) look for less expensive exploitation and conversion solutions, or b) focus on oil fields in other countries.

Fuel Uses	No.	%
Electricity	20	32
Natural Gas	2	3
Other	41	65

Diesel Generator	No.	%
Yes	4	6
No	59	94

PV System	No.	%
Yes	2	3
No	61	97

Figure 06: Household Energy Usage (Preliminary Survey Data from 63 households)
Source: EEBEA Uganda 2013

Electricity accounts for only 1.4 per cent of the national energy supply. As of 2009, electricity consumption per capita in Uganda was estimated at 69.5 kWh, significantly lower than Africa's average of 578kWh (MEMD 2011). Nationwide, the few residences (less than 7 per cent of population) and businesses that are connected to the electrical grid create a peak demand of 528MW out of which 74 per cent is used for commercial and industrial purposes. The installed capacity is reported to be 595MW, but load shedding is very common throughout Uganda resulting in large urban and rural areas remaining without power for many hours of the day. The daily shortfall is estimated to be between 130 and 190 MW (ibid).

The electricity supply chain has been mandated to a number of public, private and parastatal organizations (see figure 8). Retail distribution is the responsibility of the private company UMEME with oversight and price caps set by the National Electricity Regulation Authority. The high reliance on diesel power generation is blamed for the relatively high electricity tariffs. After government subsidies, customers currently pay USD 0.25/ kWh and as government reduces the subsidy as intended, this could rise to USD 0.32/kWh in the near future. If Uganda were to reach the continental average electricity consumption per capita, a household of five persons would have an annual unsubsidized electricity bill of USD 925. When compared to the current average annual household expenditure of USD 1,118, it is clear that stable access to grid electricity will be reserved for industry, commerce, and the higher income (urban) households for the foreseeable future.

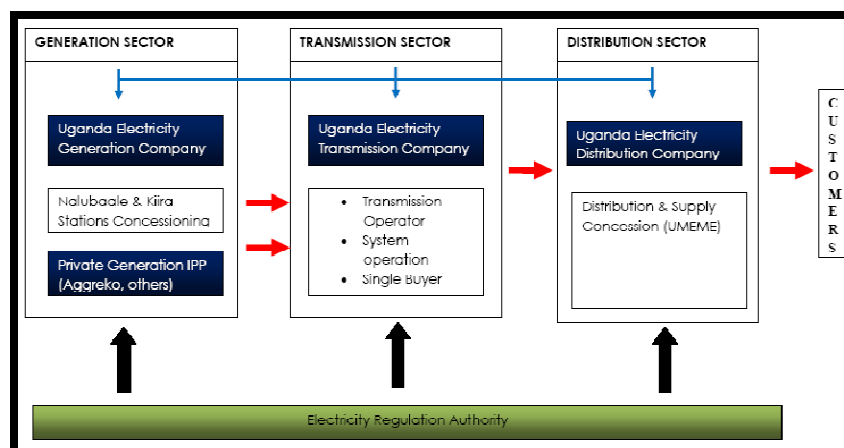


Figure 8: Actors in the Electricity Supply Chain in Uganda (Source: MEMD 2011)

Plans and initiatives are underway to bring small and large new hydroelectric plants online over the next decade. Other proposals exist to create a solar thermal plant (200MW), though details are still emerging (see forthcoming Policy Case Study) and an oil thermal plant (700MW) which would receive the partially refined crude from the Lake Albert region.

GHG Inventory for Uganda

With funding from GEF, Uganda carried out a Green House Gas inventory of sources and sinks in 1993. The study was implemented by UNEP and coordinated by the Department of Meteorology. The inventory also included general recommendations including enhancing the framework of GHG emission measurement. Due to a lack of funds, the inventory has not been updated annually, as was originally planned.

In Uganda, emissions of GHGs due to energy combustion are dominated by wood fuel combustion. According to the report, wood fuel consumption can be divided according to the following users:

- Households 75%,
- Commercial 10%,
- Industry 5%
- Charcoal production 10%.

GHG emissions due to energy combustion activities were as follows:

- Carbon dioxide (CO₂) - 708.6 Gg (Giga grams);
- Methane (CH₄) - 74.6 Gg;
- Nitrogen (N₂O) - 5.3 Gg;
- Oxides of Nitrogen (NO_x) - 269 Gg;
- Carbon Monoxide (CO) - 849.7 Gg; and
- Non-Methane Volatile Organic Compounds (NMVOC) - 5 Gg

Emissions from other sources were also calculated and per sector, GHG emissions were as follows:

ENERGY PRODUCTION & DISTRIBUTION	INDUSTRIAL PROCESSES	AGRICULTURE	LAND USE CHANGE & FORESTRY	WASTES
Minimal, as there is no natural gas pdn. or mining*	CO ₂ : 43.5 Gg	CH ₄ : 1,191.54 Gg N ₂ O: 40.38 Gg NO _x : 1,173.54 Gg CO: 16,891.85 Gg	CO ₂ : 8,874.76 Gg CH ₄ : 6 Gg N ₂ O: 0.01 Gg NO _x : 0.32 Gg CO: 17.24 Gg	CH ₄ : 2.93 Gg

Figure 08: Summary of the GHG Inventory for Uganda (MNR 1996)

* Considering that 42 per cent of the grid's electricity was produced in diesel-powered thermal plants, the GHG emissions for this sector should be revised.

Energy Work already Done (or Being Done) in Uganda

Some work has been done to understand the energy challenge and propose alternatives to the slow progress in electrification. Because Uganda remains a predominantly rural country, the focus of internationally supported projects has been to electrify rural areas and find alternatives to the deforestation caused by charcoal production. As such, there are a number of initiatives to promote Energy Efficiency and Renewable Energy technologies in Uganda carried out by numerous governmental and non-governmental organisations.

A number of these are listed below:

Promotion of Renewable Energy and Energy Efficiency Programme – The German Federal Ministry for Economic Development Cooperation (BMZ), the Ministry of Energy and Mineral Development (MoEMD): July 2008 – June 2011. Managed by GTZ (now GIZ). Includes Energy Audits of government buildings, training of staff, subsidising solar systems and energy efficient charcoal stoves.

Energy Advisory Project - German Society for International Cooperation (GIZ) provides policy advice to Ministry of Energy and Mineral Development to promote energy efficiency, rural electrification (solar PV, pico- and micro- hydropower) and improved biomass technologies. GIZ has been working in the sector since 1999 and the current funding cycle runs until 2015.

The German Development Service (DED) and the Centre for International Migration (CIM) send advisers to Uganda that are then attached to government institutions (including District and Local Governments), Research Organisations and Private Sector Companies.

Energy Efficiency Week - An annual event held annually since 2006. The Energy Efficiency weeks are organised by the Ministry of Energy and Mineral development for all stakeholders. The key activity is an exhibition for Government agencies, NGOs and companies involved in selling energy efficient appliances and other alternative power sources like Solar, LPG, and Biomass to get their message to the public.

Real Estate Expo - First held in 2008, and touted as a, dedicated one-stop centre for key stakeholders in Uganda real estate industry, including showcase of local materials, and information about best practice in design and construction.

Joint Energy and Environment Program (JEEP) - Have organised solar training workshops and seminars to acquaint communities and individuals with knowledge on solar technologies.

The Italian cooperation in collaboration with the Centre for Research in Energy and Energy Conservation (CREEC) - Have initiated **the promotion of solar energy in rural areas of Uganda**.

AHEAD Energy - Focuses on assisting established schools and medical facilities to improve their energy systems by tapping local energy resources for local use. Through these ventures, the wider community is exposed to viable energy systems, thereby spurring entrepreneurial energy development.

Uganda Photovoltaic Pilot Project for Rural Electrification (UPPRE) - Designed as a three-year pilot project, funded by UNDP-GEF, with a goal of promoting the use of solar photovoltaic technology in Uganda (1997 to 2000)

Energy for Rural Transformation (ERT) - Focus on bringing awareness to communities and providing solar products at subsidised prices. The Ugandan project aims at removing market barriers for the development of renewable-energy installations in the private sector in the rural energy and information/communication technologies (ICT) sectors.

Awareness of renewable energy technology is fairly widespread, more so than energy efficiency, which is generally limited to lighting (CFL) rather than other technologies or appliances. The level of awareness and availability of information regarding EE and RE is increasing, and becoming more available as individuals increasingly seek this information, and demand it of designers, suppliers and the construction industry. EE and RE technologies are, however, still regarded as being too expensive to use in most projects due to the relatively high upfront costs.

There has been an increase in the awareness and incorporation of these technologies in a number of projects, such as the Bernard Onyango Registry Building (2008) at Uganda Martyrs University which uses compressed earth blocks as a key construction material. Solar water heating systems (SWH) have been incorporated in most hotels. New building projects are increasingly incorporating optimised shading devices among many other interventions. In 1998, the National Environmental Management

Agency (NEMA) had noted that PVs were mainly found in large institutions and facilities managed by international Non-Governmental Organisations, however today the number of solar PV units is estimated to be well over 15,000 units, and are more in urban areas where previously this was an exception.

For the most part some of the technologies have been viewed as being for low income earners and not for the well off, as is the case with compressed earth blocks. There is also scepticism about the energy efficient charcoal stoves as they take a while to heat up, and it is perceived that it is difficult to control the cooking temperatures. Energy efficient gas and electrical stoves are not yet easily available on the market.

In conjunction with the **German Government**, and under **Promotion of Renewable Energy and Energy Efficiency Programme (PREEEP)**, the **Uganda Government** has gone a long way in installing solar PV energy systems in over 50 Health Centres across the county.

With the support from the German Government, the Ugandan Ministry of Energy and Mineral Development (MEMD) initiated the Energy Advisory Project (EAP) in June 1999 which ran until May 2008. In June 2008, the project was transformed into the Promotion of Renewable Energy and Energy Efficiency Programme (PREEEP) implemented by the Ministry of Energy and Mineral Development with the support of KfW (German Development Bank) German Technical Cooperation (GTZ), and the German Development Service (DED), who later merged to become GIZ. The overall objective of PREEEP is to improve access to modern energy services and the efficient use of energy by households and the private sector, especially in Northern Uganda. The programme is working in four main components in order to achieve this objective, namely 1) Energy Policy Advice 2) Promotion of Improved Biomass Technologies 3) Rural Electrification and 4) Energy Efficiency.

The Ministry envisions the following new and continuing interventions for 2013/2014 (Ministry of Energy and Mineral Development, 2011):

- Solar refinance: Uganda Energy Credit Capitalisation Company (UECCC) will continue to support Solar Equipment acquisition through additional refinance facilities of US\$1,000,000 through PFIs;
- Partial Risk Guarantee (PRG) for default risk on PFI loans to Solar Vendors:- This is a guarantee issued to PFIs to partially cover the default risk (up to a maximum of 50%) of the working capital loans offered to solar vendors.
- Technical Assistance: Building Capacity of Independent Power producers and Financial Institutions through the organisation of skills transfer events
- Solar Loan Product Development: Support PFIs to develop stand-alone Solar Loan product at an estimated cost of US\$130,000
- Connection Refinance Facility: UECCC will pilot a connection refinance facility with WENRECO and CRDB. The facility is aimed at connecting businesses to the grid, by addressing the barrier of the upfront connection costs.
- Transaction Advisory Services: UECCC will offer transaction advisory to independent power producers through the KfW support. The support will include; pre-feasibility studies, milestone project studies validation, ESIA/RAP validation, Business plan preparation, Economic and Financial modelling, Market and risk assessment, marketing project to PFIs and investors and valuing of projects for sale.
- ORIO Project: UECCC will carry out feasibility studies for 10 mini hydro power sites.
- CDM support: UECCC will establish a CDM Program of Activities for hydro power projects with support from BTC, and with funding support from GIZ, provide technical assistance to enable project developers access carbon financing under the CDM.
- Capitalise the UECCC: mobilise additional funding from donors and Government of Uganda to capitalise the above instruments which are inadequately capitalised.

A project is currently running with the Ministry of Lands, Housing and Urban Development with support from UN-HABITAT to improve **electrical energy efficiency** in the building sector (commercial and residential), which involves:

- Ensuring that the design of new residential and commercial structures are energy efficient
- Retrofit programmes to address existing stock (e.g. solar water heaters and LED lighting)

Some efforts are being made towards improving **transport** efficiency and travel avoidance in Kampala, which includes:

- Provision of coordinated public transport systems have met with many challenges. Feasibility studies have been completed by World Bank to implement a Bus Rapid Transit system in certain parts of Kampala. Timeline for delivery of the first line of such a system has yet to be released publicly. Also in Kampala, the Engineering Directorate of KCCA has discussed giving concessions to various urban bus operators.
- A Non-Motorised Transport Policy was drafted with the support of UN Environment Programme (MWT 2012) and was approved by Ministry of Works and Transport in 2013. Organisations such as First African Bicycle Information Organization (FABIO) have been attempting to streamline this policy into development plans and infrastructure tenders in pilot urban areas (including Jinja).

Some Specific Lessons for the SAMSET Project

It is evident that there are a number of players in this field, but what is vague is to what extent they collaborate and how far issues to do with energy are looked at from a urban point of view or in the guise of municipal capacity to influence. As such, there is an opportunity for SAMSET to advocate at both national and local levels to disaggregate the sector so as to achieve more efficient public policies.

Energy data, demographic details and municipal/urban planning future directions are all a work in progress based on projections as far back as five years ago. SAMSET's strategy may be to engage parallel (and/or mixed) methods as a way to validate some information in order to adequately influence policy.

Policy makers often cite the concept of Public-Private Partnerships for service delivery or reform as the best way to develop and manage public services traditionally. Central, district, and especially local government departments often have limited capacity to formulate and manage such agreements in a mutually beneficial way. SAMSET activities should bear in mind the trend and the limitations when proposing improvements or efficiencies in urban administration or public procurement.

Community planning or planning at grassroots level does not clearly situate its focus: whether its aim is to achieve resource efficiency or build resilience, or both. SAMSET's challenge will be to identify and prioritise the gaps within governance and how far advocacy may contribute to sustainable energy transitions that integrate interventions towards resource efficiency and resilience.

Coordination between SAMSET and the GIZ-led PREEEP programme could include capacity building activities for municipal staff with whom PREEEP is already working in their pilot districts. Though the focus for that project is not on cities, but rather district-wide, it is possible that SAMSET adapt to an urban setting the training programmes, "energy efficiency guidelines", and Terms of Reference for Environment Officers which PREEEP is already developing. FABIO, which is headquartered in Jinja, is actively working with the municipal council there to streamline the Non-Motorised Policy into development plans and online infrastructure designs and tenders. It could be possible that SAMSET work in synergy with those efforts, though bringing an energy efficiency lens to the effort. A partnership began in late 2012 between Kasese District and Worldwide Fund for Nature (WWF) aims to assist in the marketing of household-level solar lighting throughout the district (WWF 2012). The

SAMSET team looks forward to learning more about this and other local initiatives during upcoming field visits. There is also some overlap with the objectives of UN-HABITAT's efficient buildings initiative at the Housing Directorate of MLHUD. Naturally, SAMSET will continue to search out new partners and synergies as the project progresses.

Influencing the densification of urban forms and land uses as long-term energy efficiency solutions will be challenging due to the fact that plans hold little sway, but SAMSET will be searching for entry points at both national policy (MLHUD and MWT) and municipal levels. Contacts at the World Bank country office are working on reforming physical planning standards and procedures. Meeting with these will certainly yield more information and perhaps avenues for SAMSET's intervention.

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APPENDICES

APPENDIX A – POPULATION FIGURES FOR LARGEST URBAN AREAS IN UGANDA

The following table presents population figures for urban areas with Population over 50 000 (mid-year 2011) UBOS 2010.

#	City Name	District	Region	Status	2002 Population	2011 Population	% Change 2002-2011	Annual growth rate (2002 – 2011)
1	Kampala	Kampala	Central	City	1,189,142	1,659,600	40%	4.4%
2	Kira *	Wakiso	Central	Town Council	124,067	179,800	45%	5.0%
3	Gulu	Gulu	North	Municipal Council	119,430	154,300	29%	3.2%
4	Lira	Lira	North	Municipal Council	80,879	108,600	34%	3.8%
5	Mbale	Mbale	East	Municipal Council	71,130	91,800	29%	3.2%
6	Nansana *	Wakiso	Central	Town Council	62,044	89,900	45%	5.0%
7	Jinja	Jinja	East	Municipal Council	71,213	89,700	26%	2.9%
8	Mbarara	Mbarara	West	Municipal Council	69,363	83,700	21%	2.3%
9	Entebbe	Entebbe	Central	Municipal Council	55,086	79,700	45%	5.0%
10	Kasese	Kasese	West	Town Council	53,907	74,300	38%	4.2%
11	Masaka	Masaka	West	Municipal Council	67,768	74,100	9%	1.0%
12	Soroti	Soroti	East	Municipal Council	41,711	66,000	58%	6.5%
13	Njeru **	Mukono	Central	Town Council	51,236	64,900	27%	3.0%
14	Kitgum	Kitgum	North	Town Council	41,821	59,700	43%	4.8%
15	Arua	Arua	North	Municipal Council	43,929	59,400	35%	3.9%
16	Mukono	Mukono	Central	Town Council	46,506	59,000	27%	3.0%
17	Iganga	Iganga	East	Town Council	39,472	53,700	36%	4.0%
18	Koboko	Koboko	North	Town Council	29,727	51,300	73%	8.1%

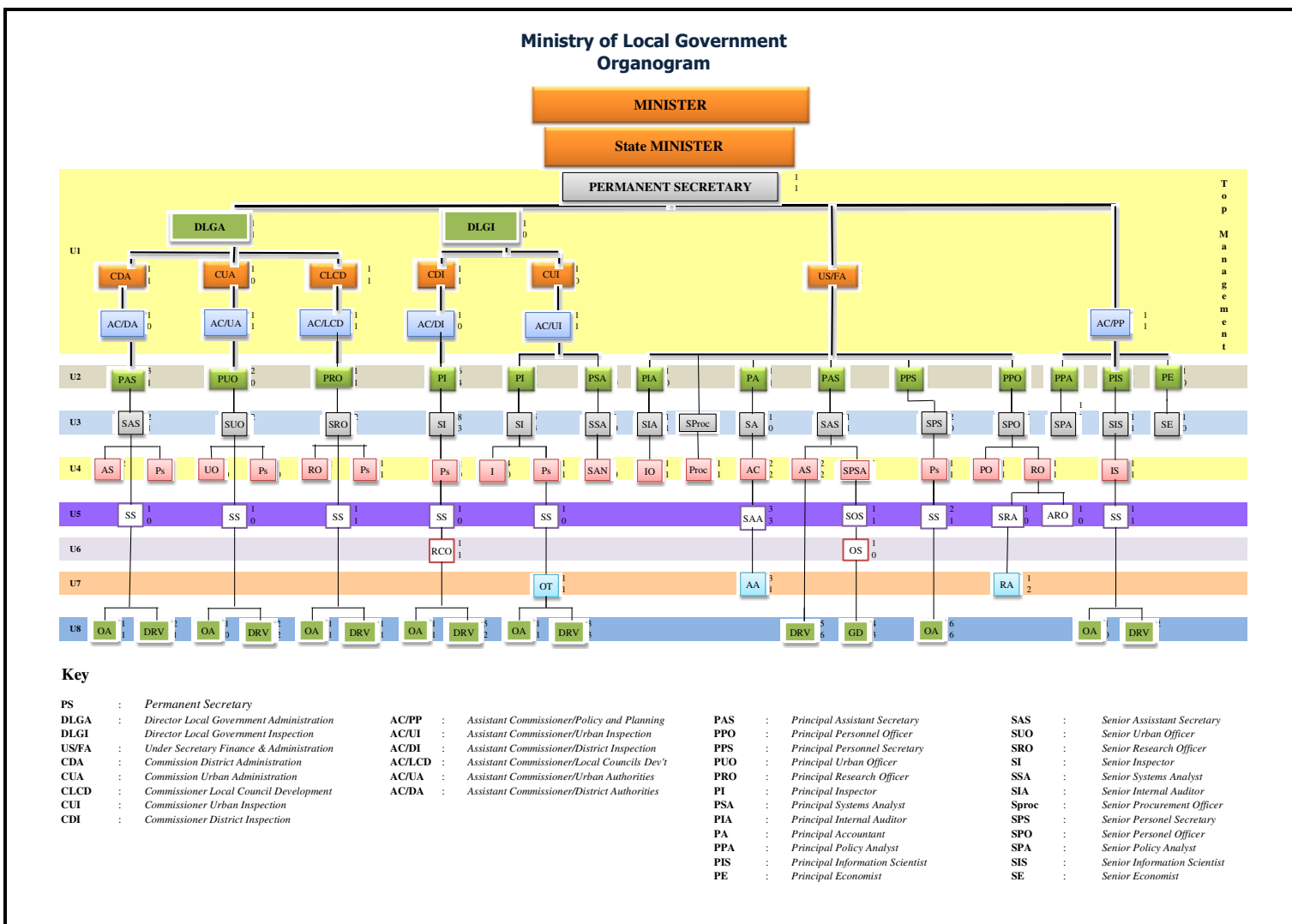
* Conurbation of Kampala

** Part of Mukono, east of Kampala

APPENDIX B – PROPOSED CATEGORIZATION OF URBAN AREAS

The National Urban Policy is now (April 2014) in the final draft stages after which it will require approval by the relevant ministries and parliamentary committees. One of the major reforms to the sector that the Policy calls for is the re-categorization of urban areas into “Regional City Growth Conurbations”, “Sub-Regional Growth Conurbations”, and “Special Functions” (the sole example of the latter is Hoima in the soon-to-be oil producing Lake Albert area). The figure below shows the proposed re-categorisation. Source: MLHUD 2013.



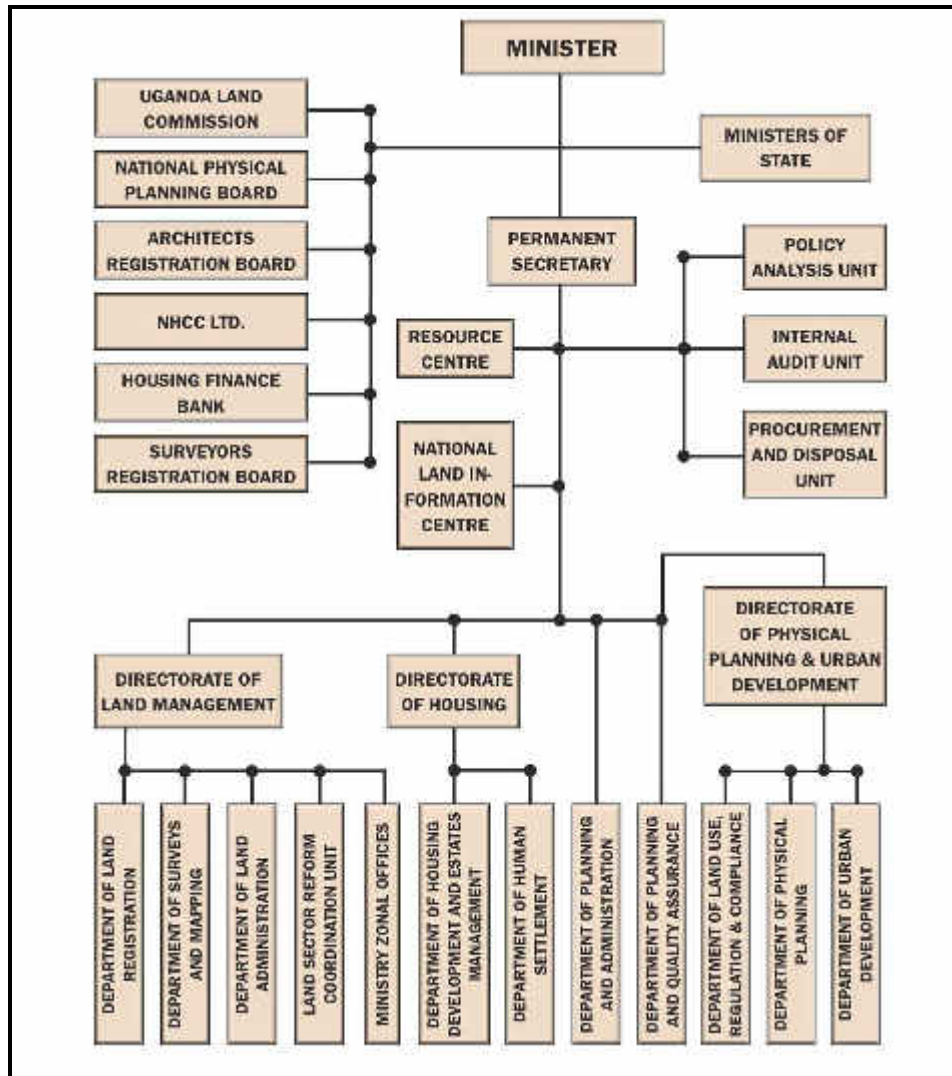


Ministry of Lands, Housing, and Urban Development

Website: www.mlhud.go.ug

Current Minister: Daudi MIGEREKO

Organogram:

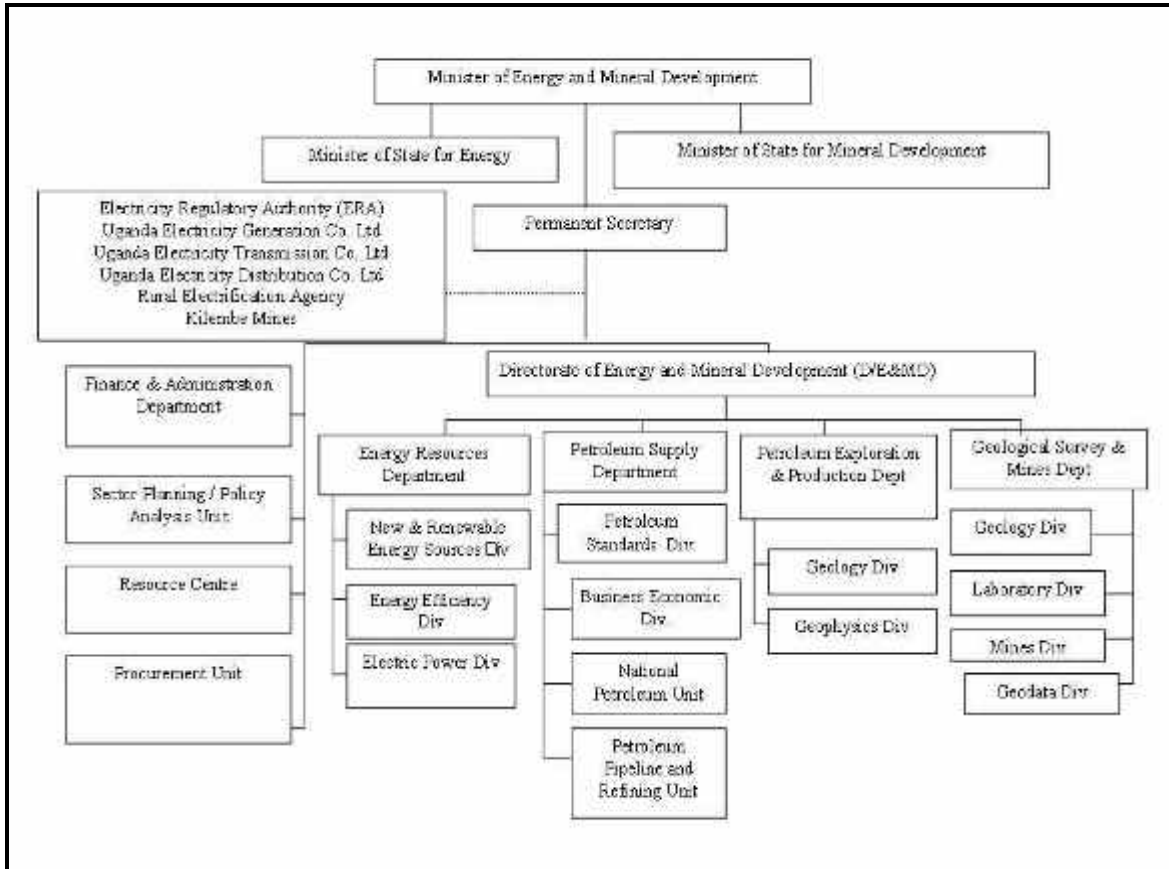


Ministry of Energy and Mineral Development

Website: www.energyandminerals.go.ug/

Current Minister: Irene MULONI

Organogram :

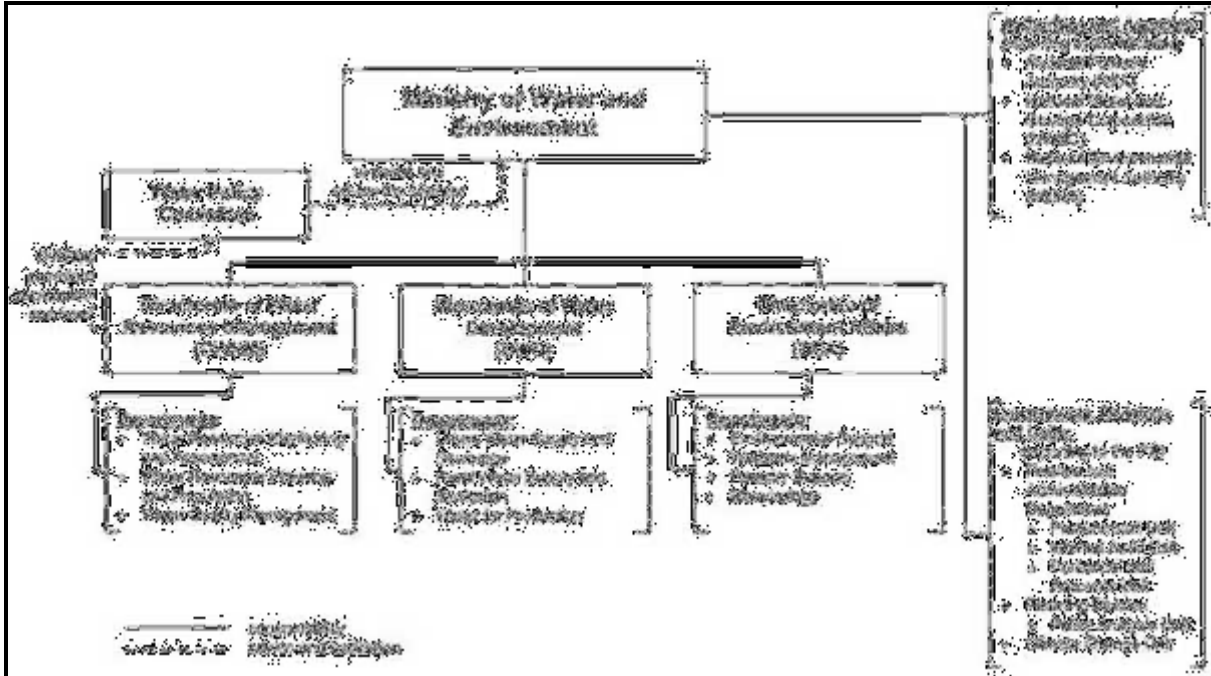


Ministry of Water and Environment

Website: <http://www.mwe.go.ug/>

Current Minister: Ephraim KAMUNTU

Organogram:

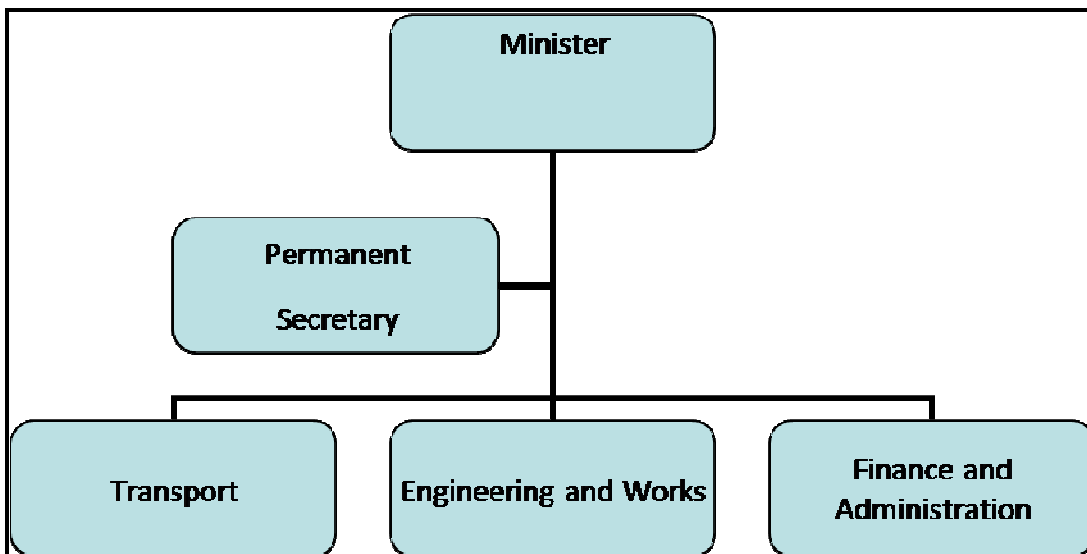


Ministry of Works and Transport

Website: www.works.go.ug/

Current Minister: Abraham Byandaala

Organogram (No official Organogram available; the following is an approximation):



This document is an output from a project co-funded by UK aid from the UK Department for International Development (DFID), the Engineering & Physical Science Research Council (EPSRC) and the Department for Energy & Climate Change (DECC), for the benefit of developing countries. The views expressed are not necessarily those of DFID, EPSRC or DECC, or any institution partner of the project.

