

Working paper



An overview of recent developments and the current state of the Ugandan energy sector



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June 2020

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AN OVERVIEW OF RECENT DEVELOPMENTS AND THE CURRENT STATE OF THE UGANDAN ENERGY SECTOR



Report 1 of the LSE International Growth Centre (IGC) funded project
Uganda's energy sector: A fiscal risk

Menno Jan van der Ven
June 2020

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List of abbreviations

A.i.a.	Appropriation in Aid
AFD	Agence Francaise de Developpement
BEL	Bujagali Energy Limited
CSO NRCP	Civil Society Organisations to the National Resources Committee of Parliament
EESL	Eskom Enterprises SOC Limited
ERA	Electricity Regulatory Authority
EUL	Eskom Uganda Limited
FY	Fiscal Year
GDP	Gross Domestic Product
GOGLA	Global Off-Grid Lighting Association
GoU	Government of Uganda
GWh	Gigawatt-hour
HFO	Heavy Fuel Oil
IMF	International Monetary Fund
IPO	Initial Public Offering
IPPs	Independent Power Producers
KWh	Kilowatt-hour
Ltd	Limited
LV	Low Voltage
MoFPED	Ministry of Finance, Planning and Economic Development
MTEF	Medium-Term Expenditure Framework
MV	Medium Voltage
MW	Megawatt
NBFP	National Budget Framework Paper
NDP I	First National Development Plan
NDP II	Second National Development Plan
NDP III	Third National Development Plan
NPA	National Planning Authority
PERD	Public Enterprises Reform and Divestiture Act
PPA	Power Purchase Agreements
PPP	Public Private Partnerships
REA	Rural Electrification Agency
UBOS	Uganda Bureau of Statistics
UEB	Uganda Electricity Board
UEDCL	Uganda Electricity Distribution Company Limited
UEGCL	Uganda Electricity Generation Company Limited
UETCL	Uganda Electricity Transmission Company Limited
UGX	Uganda Shilling
USD	US Dollar
WENRECO	West Nile Rural Electrification Company
ZAR	South African Rand

1. Introduction

In January 2020, the government of Uganda released its third National Development Plan, which includes a program to expand the infrastructure of the energy sector. The main objective of the plan is to “increase average household incomes and improve the quality of life of Ugandans” (NDP III, NPA, 2020, page 35). The government designed eighteen programs in support of this objective which it will implement between the release of the plan and June 2025. One of these programs aims to further develop the energy sector as the government believes that increased accessibility to energy will contribute to the country’s economic development.

Infrastructure expansion in the energy sector has been a central point of interest in all documents that detail the government’s strategy and plans for economic development.

Whereas Vision 2040 and the first two national development plans mainly focused on the expansion of the installed energy generation capacity, the third plan aims to make this generated energy better available to households and businesses. As part of the first two plans, the sector (nearly) finalized its two flagship projects: the construction of the Karuma (600MW) and Isimba (183MW) hydropower dams. The installed generation capacity more than doubled from 601MW in 2010 to 1,252MW by the end of 2019 and is expected to further increase once the Karuma dam is fully operational in November 2020 (ERA, 2019; NDP III, NPA, 2020; MoFPED, 2020b). Unfortunately, the installed capacity is not fully utilized because of gaps in the transmission and distribution infrastructure.

According to the government, one of the lessons learnt from previous developments plans is the need to optimize the use of existing infrastructure. “Additional investment in infrastructure should only be targeted to address gaps” (NDP III, NPA, 2020, page 8). Therefore, most of the projects under the energy sector development program of NDP III are focused on addressing current gaps and have the objective to expand the national transmission grid. The government still plans to construct one more hydropower dam to increase the sector’s installed energy generation capacity to 3,500MW. In the national budget for fiscal year 2020/2021, the enhancement of the transmission and distribution networks are announced as priorities for investment (MoFPED, 2020a). The Minister of Finance listed the construction of the large-scale hydropower dams, the electrification of industrial parks and the efforts to increase rural electrification as some of the major achievements of the Ugandan energy sector in his recent budget speech (MoFPED, 2020b).

This note helps to put the government’s latest plans for the energy sector into perspective. The first section introduces the main reforms that have been implemented in the sector over the past twenty years, the government’s efforts to increase the involvement of the private sector and an overview of the current state and structure of the sector. The second section reviews the existing documentation which outlines the development agenda of the government. The following three sections provide more detail on the three sub-sectors: generation, transmission and distribution. For each subsector, the main players, important interactions and outputs are presented. Lastly, the electricity tariff setting methodology and current tariff structure are introduced.

2. The focus on privatization and the sector's current key players

After a long history of nationalizations under the Obote and Amin regime, the government of Uganda adopted a privatization approach at the end of the 1980s. Under the Public Enterprise Reform and Divestiture (PERD) Act, which was enacted in 1993, the government agreed on projects and programs with the objective to reduce “Government equity holding in the public enterprises and thereby [...] relieving the Government of the financial drain on its resources and the burden of their administration and raising revenue by means of divestiture, including, where necessary, liquidation or dissolution of public enterprises and by promotion, development and strengthening of the private sector” (Government of Uganda, 1993).

As part of the privatization reforms, the government decided to shift the energy sector's state-dominated structure to a system in which the private sector plays an important role. In 1999, the government adopted the Ugandan Power Sector Restructuring and Privatization Strategy and implemented the Electricity Act. The Act transformed the sector into what it has become today and provided the legal basis for the establishment of the various players. Three reforms have been particularly significant:

- **First, the Act provided the legal basis to split the government's energy monopoly into three state-owned companies and introduced competition in the sector.** Historically, the Uganda Electricity Board (UEB) operated as a state monopoly and had responsibility for the electricity supply of Uganda. The state chose to retain full control over the transmission sector, through the state-owned Uganda Electricity Transmission Company Ltd (UETCL). The generation and distribution sectors however were opened up to competition as the Act allowed for private investment. Consequently, independent power producers and distribution companies entered the market. Although there are currently more than twenty independent power producers (IPPs) in Uganda, there is only one private distribution company, Umeme Ltd, which was responsible for almost all energy distribution at the end of 2018. Nevertheless, the state has not relinquished all control over generation and distribution: the state-owned Uganda Electricity Generation Company Ltd (UEGCL) and Uganda Electricity Distribution Company Ltd (UEDCL) are – increasingly – active in the generation and distribution markets.
- **Second, the Act established the Electricity Regulatory Authority (ERA) as the independent regulator.** The ERA supervises the generation, transmission and distribution of energy, and oversees Uganda's energy import and export. The ERA increasingly reaches out to neighbouring countries on behalf of the government of Uganda to strengthen cooperation in energy generation.¹ The authority is also responsible for the issuance of licenses, license terms and conditions, and regular review of the tariff structure. In addition, the ERA is responsible for safeguarding the interests of different stakeholders and the promotion of competition in the electricity sector.

¹ The authority's ten-year plan (2014/15-2023/24) describes this cooperation in detail (ERA, 2014).

- **Third, the Act obliged the government to ensure rural electrification.** These so-called rural electrification programs were intended to contribute to a more equitable regional distribution of electricity, grid extensions and the development of off-grid solutions, as well as innovations from suppliers. The Minister of Energy and Mineral Development was also tasked to establish and oversee the Rural Electrification Fund. An act of Parliament established the Rural Electrification Agency. Next to government contributions as appropriated by Parliament, the fund consists of external contributions (donations, grants and loans) and income from a levy on energy sales collected by the Electricity Regulatory Authority.

The reforms improved the energy sector's performance. According to the IMF (2013), the reforms and privatization under the 1999 Electricity Act led to notable improvements, including increased power supply (annual increase of over 9 percent), lower distribution losses (38 percent in 2005 to 27 percent in 2011), increased grid coverage (41 percent more consumers reached between 2006 and 2011) and enhanced financial sustainability in the sector due to a near doubling of tariffs. With the steps taken, the government has followed a typical path that many other developing countries have followed as well (see Box 1).

While the government has increasingly allowed the private sector to participate in the energy sector, it maintains a large presence in the sector. Various strategic entities are still owned by the state and many entities rely on government's financial support and guarantees for investment. Next to direct government costs - such as capital injections - these policy interventions in the energy market bring contingent liabilities for the central government. Well-known contingent liabilities are explicitly-guaranteed loans of state-owned enterprises. Less known are power purchase agreements between the independent power producers and UETCL, where demand and payment guarantees may be involved. These contingent liabilities could have a substantial impact on the sustainability of Uganda's public debt. This impact is studied in the second paper of this project: 'Fiscal risks from the Ugandan energy sector' (van der Ven, 2020).

In NDP III, the government wants to increase the role of the state again. Under the first two development plans, the private sector was considered as the main driver of growth. However, "under NDP III the role of the state in guiding and facilitating development will be strengthened [...] the government will invest either wholly or jointly with the private sector and the communities in strategic enterprises to crowd in the private sector in order to spur growth in a balanced manner across the country" (NDP III, NPA, 2020, page 8). It is still unclear how this will impact the earlier privatization efforts of the government and the transformation of the energy sector, and whether some of the reforms will be reversed. However, Uganda's Cabinet discussed on the 10th of September 2018 the "alignment" of public entities and agencies in order to limit wasteful expenditures. A bundling of UEGCL, UETCL, UEDCL under the Ministry of Energy and Mineral Development was listed explicitly as one of the approved reforms (Cabinet of Uganda, 2018). The decision resulted in widespread criticism and was not forwarded to Parliament. The government of Uganda has not taken further action to take the decision forward.

Box 1. Past reforms in the Ugandan energy sector: in line with the blueprint?

The World Bank completed a study in the 1990s on the extent to which developing countries have reformed their energy sector. According to the study, “energy sector reform requires a number of facilitating steps, but the final goal is to introduce private ownership where possible and competition in the parts of energy industries that are not natural monopolies, with monopolistic elements being regulated” (Bacon, 1999). The progress of countries was measured by scoring 115 countries on six facilitating steps towards privatization that were considered as milestones.² Uganda’s agenda for energy sector reform has followed every step of the World Bank milestone scorecard.

	Milestones of the World Bank study	Energy sector reforms in Uganda
1.	The commercialization and corporatization of the state-owned utility enterprise	Already in 1933, the government of Uganda allowed for the commercialization of the generation, distribution and supply of electricity in Uganda. In 1948, the Uganda Electricity Board was established.
2.	Ratification of legislation supporting the energy sector reforms. Legislation has to allow for the unbundling of the state-owned company and entry of private sector participants in the energy market	Enactment of the Electricity Act in 1999.
3.	Operationalization of an independent regulatory body for the energy sector (separate from the state-owned utility enterprises and Ministry of Energy), which should be allowed to implement regulation	Operationalization of the Electricity Regulatory Agency in 2000.
4.	Restructuring (unbundling) of the core state-owned utility enterprise(s), both through vertical and horizontal separation	Unbundling of the Uganda Electricity Board in 2001, into three separate companies responsible for the generation, transmission and distribution of electricity (UEGCL, UETCL and UEDCL).
5.	Establishment of private sector investments in greenfield sites (in operation or under construction)	The Bujagali hydropower plant in Jinja, Uganda, was funded through private sector investments (being among the first large-scale hydropower projects in Africa to be privately financed).

² The survey only covered countries with an energy sector that had not been entirely under private ownership for the past ten years. The World Bank and the United Nations Development Programme’s Energy Sector Management Assistance Programme developed the scorecard and defined the six milestones.

6.	Privatization of state-owned utility assets	Concession agreements between: <ol style="list-style-type: none"> 1. UEGCL and Eskom Uganda Ltd for the operation and maintenance of the Kiira and Nalubaale hydropower dams. 2. UEDCL and Umeme Ltd for the distribution of electricity.
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The results of the study show that only a small number of developing countries completed most of the reform steps and that the regional differences were large. While many state-owned utility enterprises in Sub-Saharan Africa were already corporatized (31 out of 48), only half of the number of countries had laws enacted that were supportive of reforms and only some had an independent regulator. At the time of the study, Uganda was however ahead of the regional curve and had implemented or was planning to implement the World Bank scorecard.

The World Bank also studied the presence of IPPs in developing countries. These producers would bring in expertise, drive innovation and serve as an example for other (state-owned) market players. The World Bank found that countries that brought in IPPs were also further ahead with the implementation of the other milestones (Ebenhard, et al., 2016). These countries seemed to embrace privatization in the sector more generally and Uganda is arguable a textbook case.

Diagram 1 shows the current structure of the sector, with the key players and agreements that are in place. The Ministry of Energy and Mineral Development has the overall mandate to manage Uganda's energy and mineral resources. The Ministry provides policy guidance in the exploitation and utilization of resources, and aims to create an enabling environment for investments in the sector. In addition, the Ministry monitors the main players in the energy sector, including the three state-owned enterprises responsible for the generation, transmission and distribution of electricity. The relationships in the energy sector can be subdivided as follows:

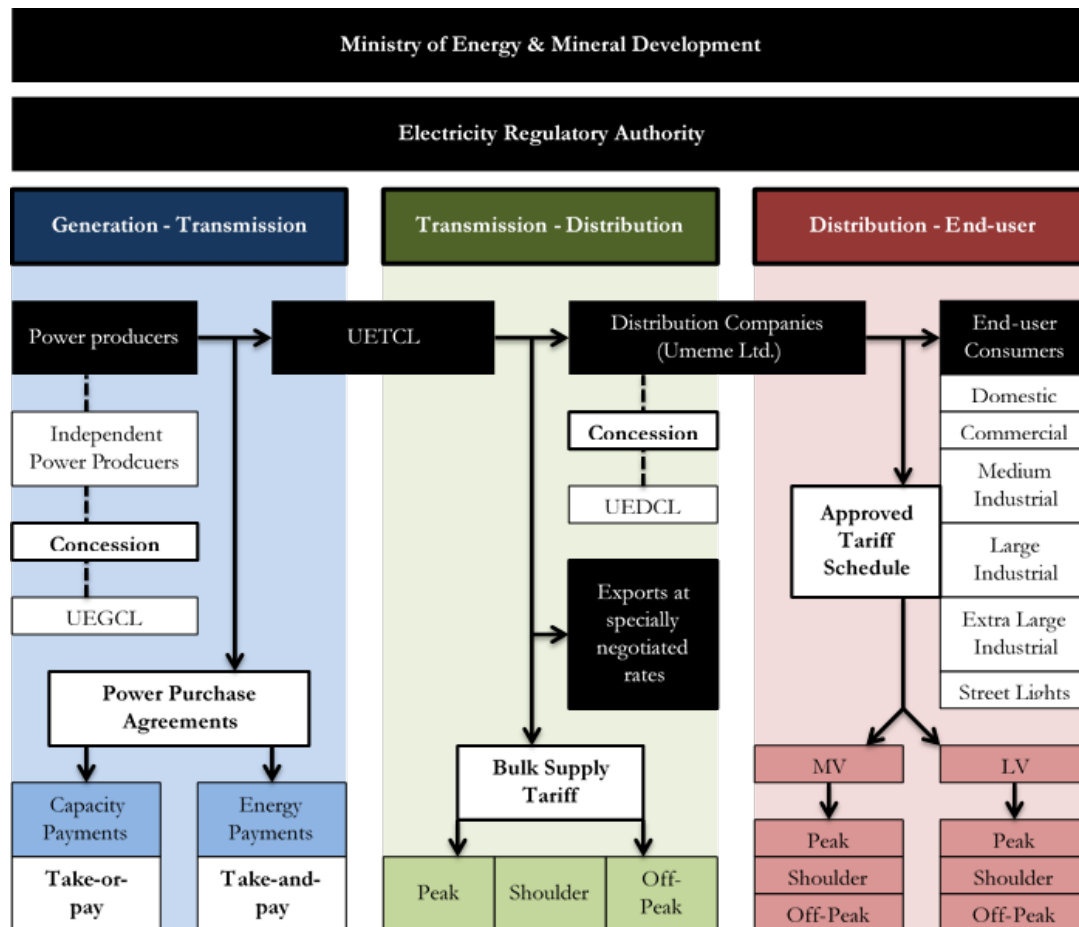
- (1) Electricity generation entities providing electricity to the transmission network operator;
- (2) The transmission network operator providing electricity to distribution companies; and,
- (3) Distribution companies delivering electricity to end-users.

Various players are active in the generation, transmission and distribution subsectors.

IPPs generate electricity. They mostly operate their own plant, except for Eskom Uganda which holds a concession to operate the two plants of UEGCL. UEGCL has started to generate its own electricity again since the new Isimba hydropower became operational in March 2019 (UEGCL, 2019). The IPPs and UEGCL sell their generated electricity to UETCL. The mutual obligations for these transactions are detailed in power purchase agreements between UETCL and the IPPs. UETCL makes either capacity payments (fixed payments, not fluctuating with the amount of electricity purchased by UETCL) or energy payments (a price per kWh of electricity that is purchased by UETCL) to the IPPs. Subsequently, UETCL transmits the electricity to distribution companies. More than 90 percent of the market is controlled by Umeme Ltd, which holds the concession for most of the distribution infrastructure of UEDCL (Umeme, 2018). The

distribution companies pay a bulk supply tariff to UETCL, which varies with demand (peak, shoulder or off-peak). UETCL also imports and exports electricity to neighbouring countries at negotiated rates. Finally, the distributors sell the electricity to consumers according to the approved tariff schedule. Rates differ according to the type of consumer (e.g. domestic, commercial and industrial), the level of voltage (medium/high or low), and time of demand (peak, shoulder or off-peak). See chapter 7 of this paper for more information on the electricity tariff structure.

Diagram 1. Current structure and main players of the on-grid energy sector.



* Information from the websites of the different players is used to establish this diagram. The diagram focuses on electricity that is transmitted through the national grid and does not cover off-grid electricity supply.

3. Review of government's plans and strategies for the development of the energy sector

The Comprehensive National Development Planning Framework guides the government of Uganda in decision-making on development issues and project prioritization. The high-level development objective of the government is to “transform Ugandan society from a peasant to a modern and prosperous country within 30 years” (NPA, 2007). The framework consists of a 30-year vision (the so-called Vision 2040), to be realized through six five-year national development plans, sector investment plans, local government development plans, annual work plans, and budgets. The National Planning Authority coordinates the production of these documents. All documents cover ambitions and plans of the government for the energy sector.

3.1. Vision 2040

The government developed Vision 2040 to operationalize the transformation of Uganda into a modern, middle-income country and includes plans for the energy sector. The vision sets goals and targets, but does generally not provide details on project prioritization for individual sectors. However, the vision does spell out quite some detail for projects in the energy sector.

The vision focuses on the development of infrastructure for energy generation and specifies detail on plans for the generation from different energy sources. The government of Uganda targets to generate 41,738 MW of energy by 2040 (from 1,254 MW in December 2019). This increased capacity is necessary to achieve the vision's other economic development and industrialization targets. Furthermore, the vision specifies a breakdown of generation targets from different energy sources (see Table 1). Next to the ongoing development of sustainable and clean energy sources, like hydropower, the government expects to source more than half of the country's energy from nuclear sources by 2040. Uranium mining is considered a prerequisite for nuclear generation in the country. To achieve the targets for nuclear power generation, the government plans to invest “massively” in the field and the vision emphasises the need for investments in human resources, technologies and research capacity (NPA, 2007, page 74).

Table 1. 2040 target and actual generation from different energy sources.

Source generation	Target for 2040 (in MW)	Actual in December 2019 (in MW)	Actual in December 2014 (in MW)
Hydropower	4,500	1004,3	695
Geothermal (cogeneration)	1,500	96,2	37
Nuclear	24,000	0	0
Solar	5,000	50.8	1.6
Biomass	1,700	0.043	0
Peat	800	0	0
Thermal (HFO + diesel)	4,300	102.7	100.3
Total	41,800	1,254	833.9

Source Table 1: Electricity Regulatory Authority and Vision 2040.

More recently, progress seems to be made with the government's plans for the development of nuclear power generation. During the implementation of the first two national development plans, the government has focused on the expansion of installed hydropower capacity with the construction of the Karuma and Isimba dams. Progress with the development of uranium mining and nuclear power plants has been limited. The government reported in its recent third National Development Plan for 2019/2020 – 2024/25 that it will finalize the construction plans for nuclear power plants (NDP III, NPA, 2020). According to Uganda's Ministry of Energy and Mineral Development, the country has large reserves of uranium that can be used in the nuclear power generation. In September 2019, Reuters reported that the Russian state-owned nuclear corporation Rosatom has agreed to support Uganda in the development of nuclear power generation (Biryabarema, 2019). In May 2018, the government of Uganda came to an understanding with the Chinese state-owned China National Nuclear Corporation to jointly develop Uganda's nuclear power sector. Detailed plans of the Ugandan Ministry of Energy and Mineral Development are unknown to-date.

In addition, the government aims to increase access to the national grid to 80 percent of the population by 2040. The vision does not reflect on the current coverage of the grid or on the large amount of resources required to expand the grid. It simply states that additional transmission lines will have to be constructed and rural electrification programme will need to be accelerated.

This electrification target in the vision might prove to be challenging due to a number of reasons. Firstly, the current grid coverage is low. In 2016, 22 percent of Ugandan households used grid-energy for lighting, compared to 12 percent in 2009 (UBOS, 2018). Moreover, differences between cities and rural areas are significant: 57 percent of households in cities have access to the grid compared to 8 percent in rural areas. Additionally, regional differences are large. While in Kampala 86 percent of the households have grid-energy lighting, only 1 percent do so in the Karamoja sub-region. Most of the energy generation plants are located along the river Nile and the focus of the government is on large-scale generation projects (UBOS, 2018). Furthermore, connecting 80 percent of households to the grid requires large investments in transmission lines, because the majority of Ugandans live in rural and remote areas, spread-out over the country. While the government included its aim to make energy affordable and accessible, the vision does not consider the high investment costs of transmitting and distributing the energy. Nor does the vision consider the need to recover part of these investment costs through subsidies or higher tariffs to keep the electricity affordable. Unfortunately, no ambitions are provided for grid-access versus local (off-grid) solutions, while the latter are generally considered to be more cost effective for rural areas.

3.2. Third National Development Plan

In January 2020, the government of Uganda presented its third national development plan which will be implemented between fiscal years 2020/21 and 2024/25. The main objective of the plan is to “increase average household incomes and improve the quality of life” for Ugandans (NDP III, NPA, 2020, page xiv). The government identified the agriculture, tourism, oil and gas, and knowledge sectors as the sectors with the highest potential to generate

employment. It will therefore invest most in these sectors and will continue to invest in infrastructure to make the Ugandan business climate more competitive. Investments will also target increased connectivity for those areas that are still disconnected.

The government announced the implementation of eighteen development programs which are expected to contribute to the envisioned results, including one for the energy sector. The government expects that the successful implementation of these programs will result in an average economic growth of 7 percent per year, middle-income status for the Ugandan economy by 2025 and a decline in poverty to 15.4 percent of the population (from 21.4 percent at the end of 2019). The energy program consists out of fourteen projects which will have to contribute to (see Table 2 for a list of the projects):

- Increase access to electricity from 21 percent to 60 percent of the population;
- Increase installed generation capacity from 1,254 MW to 3,500 MW;
- Double the size of the transmission grid from 2354 km to 4354 km;
- Increase electricity consumption per capita from 100 kWh to 578 kWh;
- Increase the use of clean energy for cooking from 15 percent to 50 percent;
- Lower the costs of electricity, to USD 5 cents per kWh; and,
- Increase grid reliability to 90 percent (unknown what the current reliability is).

Table 2. NDP III core projects under the energy sector development program.

Project	Sub-sector	Status
Ayago hydropower plants	Generation	Concept
Industrial substations upgrades	Transmission and distribution	Ongoing
Masaka - Mwanza 220 kV	Transmission and distribution	Feasibility
Nkenda - Mpondwe - Beni 220 kV	Transmission and distribution	Ongoing
Olwiyo - Nimule - Juba 400 kW	Transmission and distribution	Feasibility
Karuma - Tororo 400 kV	Transmission and distribution	Ongoing
Kampala metropolitan transmission system improvement	Transmission and distribution	Ongoing
Isimba interconnection line	Transmission and distribution	Feasibility
Karuma interconnection line	Transmission and distribution	Ongoing
Grid extension in North East, Lira and Buvuma islands	Transmission and distribution	Ongoing
Kabaale - Mirama transmission line	Transmission and distribution	Ongoing
Masaka - Mbarara transmission line	Transmission and distribution	Ongoing
Ayago - Olwiyo	Transmission and distribution	Feasibility
Karamoja 132 kV	Transmission and distribution	Unknown

Source: NDP III, NPA, 2020 (page 47).

More priority is given to the improvement of the energy transmission and distribution networks, while the construction of a new generation plants is also planned. During NDP I and NDP II, the government has given priority to the development of energy generation plants. No specific projects for the development of the transmission and distribution infrastructure were considered. On the one hand, this has resulted in some of the new plants not sufficiently being connected to the grid. On the other hand, the installed generation capacity is currently higher than the demand of all entities that are connected to the grid. Expansions of the transmission and

distribution infrastructure need to connect new businesses and industries throughout the country to the (newly-established) energy generation plants. At the same time, improvements in the functioning of especially the distribution network has to limit losses on the grid. Energy losses were in 2019 with 16.8 percent half of the losses in 2007, but are still high and costly.

Compared to the previous development plans, the state gets to play a more significant role in NDP III. The government revisited its approach to the role of the state versus the role of the private sector in achieving the country's development goals. "The market alone is unlikely to drive Uganda's development process" and therefore a "quasi market approach is required" (NDP III, NPA, 2020, page xvii). According to the government, the energy sector is a good example of where the involvement of the private sector has not resulted in the efficient allocation of resources: "In sectors like energy or transport, the state is more ideally suited to invest, as it can invest for the long term and is not seeking immediate short-term gains" (NDP III, NPA, 2020, page 38). The government therefore wants to either invest on its own or together with the private sector (under PPP arrangements) to limit market failures and make use of strategic competitive advantages. A restructuring of the energy sector is listed as one of the key implementation reforms under the energy sector program which should "reduce the multiplicity of players, lower costs, increase efficiency and improve coordination" (NDP III, NPA, 2020, page 140). How this will impact the governance structure of the energy sector exactly is still unknown.³

Box 2. Achievements under the previous national development plan (NDP II).

The main goal of the second national development plan (NDP II) was for Uganda's economy to achieve middle-income status by 2020 (NPA, 2015). This goal has not been achieved. The 5-year implementation period of NDP II are characterized by peace, macroeconomic stability and an rebound of economic growth. GDP per capita increased from USD 844 in 2011/2012 to USD 878 in fiscal year 2018/2019, despite the high population growth rate (NDP III, NPA, 2020).

Achievements have also been made in the energy sector. NDP II prioritised further investment in energy infrastructure, in part continuing the implementation of (delayed) core projects under the first development plan. Access to electricity increased from 11 percent in 2010 to 24 percent in June 2019. The cost of electricity decreased, with the electricity tariff for large and extra-large industries reducing from USD 9 and 16 cents in 2012/2013 to USD 8 and 9.8 cents in September 2018.

Over the past 5 years, the government focused on infrastructure for energy generation. The Isimba dam became fully operational and the development of the Karuma dam is nearly finalized and scheduled for commissioning in November 2020 (MoFPED, 2020b). However, the government has with 1,254 MW installed generation capacity at the end of 2019 not achieved its target of 2,500 MW. The 2040 target of more than 40,000 MW is still far away. Furthermore, the development of nuclear power plants seems to be delayed and specific projects in the field are unknown.

³ A full overview of the current structure and main players in the energy sector are presented in the second paper of this project: 'an overview of recent development and the current state of the Ugandan energy sector' (van der Ven, 2020).

In addition, while the energy sector did construct 629 km of new transmission lines over the past 5 years, the grid is currently inadequate. The government of Uganda explicitly recognized the importance of energy transmission projects in NDP II. However, similarly to Vision 2040, the plan did not specify specific projects for transmission and grid extensions. The planned resources for transmission extensions proved to be insufficient. “Access to [...] energy is still low due to constrained electricity transmission and distribution infrastructure. [...] Constraints in transmission and distribution limit the use of existing supply” (NDP III, NPA, 2020).

Lastly, the government wanted to improve the energy sector’s policy, legal and institutional framework to limit delays in project implementation and mobilize new financing sources.

Listed interventions included addressing policy gaps, reviewing existing policy and the legal framework, and formulating a PPP framework. Progress has been made and new financing modalities have been accessed, including PPPs. However, according to the Energy Sector Semi-Annual Budget Monitoring Report FY18/19, a major reason for project delays are disputes over right of way and land acquisition (MoFPED, 2019a). NDP II did not specify plans to overcome these land disputes.

Table 3. Key energy and mineral development infrastructure projects and their phasing (in USD millions).

	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total	% of total
Karuma and Isimba hydropower plants	773	836	545	217	96			2,467	53%
Ayago hydropower plant							711	711	15%
Hoima oil refinery				202	167	167		535	11%
Other oil-related infrastructure		100	100	121	230	137		688	15%
Grid extensions and transmission lines				27	61	95	103	286	6%
Total	773	936	645	567	554	399	814	4,687	

Source Table 3: Second National Development Plan (NDP II, NPA).

The government of Uganda allocated a large budget to the development of the energy sector under NDP II. Over the 5-year NDP II implementation period, UGX 16,455 billion (USD 4.4 billion) was allocated to the energy and mineral development sector which averaged 13.3 percent per year of the total annual budget of the government.⁴ Table 3 shows that the completion of the two dams accounted for 53 percent (USD 2.5 billion) of the sector’s infrastructure development budget. Given the projected high returns of infrastructure projects, the borrowing for (energy) infrastructure projects was allowed to be on concessional, semi-concessional and non-concessional terms (whereas the borrowing for many other sectors, including social sectors, is restricted to concessional terms only)⁵. Non-concessional borrowing accounted for more than 80 percent of the total budget

⁴ The exchange rate used throughout the paper is 3700 UGX for 1 USD.

⁵ The Public Debt Management Framework 2018 of the government of Uganda states: “Government shall continue to pursue concessional borrowing as the preferred means of meeting external financing requirements. Otherwise, depending on the level of concessionality, the following guidelines shall apply: (a) Social Service projects shall be financed at concessional terms, (b) consideration for non-concessional borrowing will only be for financing of projects that will provide an economic rate of return greater than the interest rate changed [...]” (MoFPED, 2019b). According to the government’s Medium-Term Debt Management Strategy 18/19-21/22, the government has decided to adopt a

resources for infrastructure projects. Consequently, the projects in the energy sector under NDP II have contributed significantly to the non-concessional debt portfolio of the government.

3.3. The National Budget for Fiscal Year 2020/2021

Due to COVID-19, the national budget of the government of Uganda for fiscal year 2020/2021 will be adjusted. The Minister submitted the budget as outlined in the National Budget Framework Paper (NBFP) FY20/21-24/25 to Parliament in December 2019 (MoFPED, 2020a). Parliament approved the budget at the end of January 2020.⁶ Therefore, the approved budget doesn't consider the outbreak of the COVID-19 virus or any related public spending. Also, the medium-term macroeconomic and fiscal outlook of the NBFP are outdated. In his budget speech mid-June 2020, the Minister acknowledged that “the recent emergencies, especially the Corona Virus pandemic, have necessitated additional interventions and recourse allocations after the budget was approved. Consequently, the budgets of all ministries, agencies and local governments will be revisited [...]” (MoFPED, 2020b). Table 4 shows the different resource envelopes as announced in December 2019 versus June 2020.⁷

Table 4. Budget envelope according to the NBFP versus the budget speech (in UGX billions).

	NBFP FY20/21	Budget Speech June 2020	Difference	NBFP FY19/20
Total resource envelope	39,640.8	45,493.7	+14.8%	34,304.7
Domestic revenue	21,545.2	21,810	+1.2%	18,375.5
Domestic financing	3,051.6	3,560.3	+16.7%	534.9
Project support (external financing)	6,612.3	9,515.3	+43.9	7,704.0
Budget support	862.6	2,906.7	+237%	477.8
Expenditure	30,843	37,792	+22.5%	26,442
Recurrent	16,415	19,787.8	+20.5%	12,489
Development	12,887	18,004.2	+39.7	12,696

Source Table 4: NBFP FY19/20 (MoFPED, 2019d), NBFP FY20/21 (MoFPED, 2020a) and the Budget Speech (MoFPED, 2020b).

Still, the NBFP provides some indication of planned spending per sector. Non-COVID-19 related expenditure might be largely unaffected, because the Minister of Finance announced in his budget speech that “the crises we have recently faced cannot, however, distract us from our long-term development strategy” (MoFPED, 2020b). Contrary to previous years' budgets, no

strategy in which “external financing is dominated by concessional borrowing (30%) and semi/non-concessional (25%). [...] New infrastructure projects will mainly be financed from non-concessional and commercial sources” (MoFPED, 2018a).

⁶ As warranted by the 2015 Public Finance Management Act, Article 9, Section 5: “the Minister shall, with the approval of Cabinet, submit the Budget Framework Paper to Parliament by the 31st of December of the financial year preceding the financial year to which the Budget Framework Paper relates.” Section 8 stipulates that: “Parliament shall review and approve the Budget Framework Paper by 1st February of the financial year preceding the financial year to which the Budget Framework Paper relates.”

⁷ While most governments expect their domestic (tax) revenue collection to decline as a result of the economic impact of COVID-19, the government of Uganda expects to collect an additional 1.2 percent.

new energy generation projects are listed as a priority investment and more attention seems to be given to the development of the transmission and distribution networks. The government stated “investment in evacuation of power from completed hydroelectricity plants, the transmission infrastructure and associated substations” as a priority (MoFPED, 2020a, page xxv). However, still more than thirty percent of the sector’s total budget (which includes resources for the development of the oil industry) is allocated to “large hydro power infrastructure”. In the budget speech, the Minister highlighted the government’s continuous efforts to implement the Karuma hydropower dam (which is scheduled for commissioning in November 2020) and announced the resumption of the construction of the Nyagak III power project. Budgets for transmission and distribution infrastructure remained unspecified.

An analysis of the framework paper shows that a large part of the planned expenditure for the energy sector will be financed through external (borrowed) financing. The energy sector’s budget share has decreased over the past two fiscal years, with larger shares allocated to interest payments and security. The government allocated 8.2 percent of the total budget to the energy and mineral sector, amounting to UGX 2,468 billion (USD 667 million). However, from this budget allocation only UGX 668 billion (USD 181 million) comes from government revenue while the majority of funds has to be borrowed externally (as shown in Table 6). Civil society organizations raised red flags before over the energy sector’s dependency on external financing to the natural resources committee of the Ugandan Parliament and pressured government to address this issue (CSO NRCP, 2019).

Table 5. Sector allocations in the budget for fiscal year 2020/2021 (in UGX billions).

	2018/19	%	2019/20	%	2020/21	%
Works and Transport	4,786.6	19.1	6,404.6	19.6	5,952.5	19.7
Interest Payments	2,514.1	10.0	3,145.2	9.6	3,599.9	11.9
Education	2,781.1	11.1	3,397.6	10.4	3,286.5	10.9
Security	2,068	8.2	3,620.8	11.1	2,863.6	9.5
Energy and Mineral Development	2,438.2	9.7	3,007.2	9.2	2,468.4	8.2
Health	2,310.1	9.2	2,589.5	7.9	1,550.4	5.1
Other sectors	10,264.13	40.9	14,117.2	43.3	13,310.4	44.2
Sub Total	25,094.23	100	32,661.3	100	30,168.1	100
Grand Total (including debt repayments, domestic refinancing and appropriation in aid)	32,702.82		40,487.9		39,640.8	

Source Table 5: NBFP FY19/20 (for 2018/19 data; MoFPED, 2019d) and NBFP FY20/21 (for 2019/20 and 2020/21 data; MoFPED, 2020a).

Table 6. GoU domestic resources versus external financing for budget of the energy and mineral development sector in fiscal year 2020/2021 (in UGX billions).

		18/19	19/20	20/21	MTEF budget projections			
		Outturn	Approved budget	Proposed budget	21/22	22/23	23/24	24/25
Recurr ent	Wage	27.514	59.938	59.938	59.938	59.938	59.938	59.938
	Non-wage	111.569	131.063	131.063	157.276	188.731	226.478	271.773
Dev't	GoU	484.996	588.928	476.818	476.818	476.818	476.818	476.818
	Ext. Fin.	1,115.156	2,227.254	1,800.573	1,759.082	1,526.172	999.456	144.773
	GoU total	624.079	779.930	667.820	694.033	725.488	763.234	808.530
	Total GoU + Ext. Fin.	1,739.235	3,007.184	2,468.393	2,453.115	2,251.660	1,762.690	953.303
	A.i.a.	34.968	0	0	0	0	0	0
	Grand total	1,774.203	3,007.184	2,468.393	2,453.115	2,251.660	1,762.690	953.303

Source Table 6: NBFP FY20/21 (MoFPED, 2020a).

The sector's budget share from domestic revenue is projected to steadily increase over the next four fiscal years. However, the government made the same projection in previous national budget framework papers as well and kept dependent on external financing for the sector's resources. In last year's budget, the government even expected the share of the externally financed budget to fall to zero by FY 2023/2024 (MoFPED, 2019d). Especially the delays in the construction of the Isimba and Karuma hydropower dams and the announcement of new projects have kept the government reliant on additional external funding. Furthermore, these projections assume no further delays in project implementation and oil extraction, as well as the realization of projected returns on investment in the energy sector. The civil society organizations argued to Parliament that government should desist from frontloading expenditure in expectation of revenues from the oil sector, because these may backfire in case of delayed oil production or in case of future fluctuations of oil prices (CSO NRCP, 2019).

The government has relied on a small number of creditors to provide the significant shares of the externally funded budget. Table 7 shows the projected external financing of the energy and mineral development sector per creditor in this (2019/2020) and next (2020/2021) fiscal years. This year, almost two-thirds of the financing was sourced from Chinese creditors (almost 34 percent) and from French and German development agencies (together 31.28 percent). With the completion of the Isimba dam and near completion of the Karuma dam (both financed with Chinese loans), the dependency of Chinese creditors will diminish to less than 14 percent in fiscal year 2020/21. The government signed a new financing agreement for a project in the energy sector with the World Bank and still has to finalize funding arrangements for a number of projects (which are included in 'Unspecified'). Large disbursements under these arrangements are scheduled for over the next four fiscal years. Generally, the government's strong dependency on single creditors might pose risks in case of an upward revision of financing terms.

Table 7. Projected external financing of the energy and mineral development sector per creditor for the four-year periods FY 2019/21 – FY 2023/24 and FY 2020/21 – FY 2024/25.

	NBFP FY 2019/20 Financing for period FY2019/20- FY2023/24		NBFP FY 2020/21 Financing for period FY2020/2021 -FY2024/25	
Creditor	External financing (UGX billions)	Percentage of total financing	External financing (UGX billions)	Percentage of total financing
China	1,732.03	33.89	869.38	13.95
France AFD	1,011.95	19.80	109.56	1.76
Germany	535.42	10.48	349.78	5.61
India Export Import Bank	468.93	9.18	523.82	8.55
World Bank	323.41	6.33	1,489.91 ⁸	23.92
Islamic Development Bank	161	3.15	19.32	0.31
Japan	42.43	0.83	0	0
Arab Bank for Economic Development in Africa	17.49	0.34	10.43	0.17
OPEC Fund for International Development	17.49	0.34	10.43	0.17
Abu Dhabi	12.82	0.25	7.65	0.12
African Development Bank	11.26	0.22	0	0
Global Environment Facility	9.73	0.19	4.8	0.08
Spain	0	0	90.62	1.43
Unspecified	767.08	15.01	2,744.32 ⁹	44.05
Total	5,111.04	100%	6,230.02	100%

Source Table 7: NBFP FY19/20 (MoFPED, 2019d) and NBFP FY20/21 (MoFPED, 2020a).

3.4. Other planning and strategy documents

1. **The Public Investment Plan sets out in detail the planned investments of the government of Uganda for the medium term** (MoFPED, 2018b). In the latest plan for fiscal years 2018/19 until 2020/21, more details were provided for transmission projects. 20 out of the 28 energy projects in the plan relate to the development of transmission infrastructure (see Annex 1 for an overview of all projects). This prioritization seems to follow criticism around the time of drafting of the plan that the development of transmission infrastructure did not receive enough government attention. Consequently, the additional energy generated by newly commissioned generation plants was not distributed.
2. **In the MoFPED Strategic Plan 2016-2021, the Ministry of Finance recognizes that given low domestic revenue mobilization, the level of public investments is limited.** This has resulted in “continued heavy reliance on donor aid and external borrowing for

⁸ The World Bank agreed to finance the Energy Access Scale-up Project which will commence in fiscal year 2020/21 and will be implemented over a five-year period. Total project costs amount to USD 400 million (World Bank, 2019).

⁹ The creditors for the Hoima Oil Refinery project (total forecasted disbursements in fiscal years 2020/21 until 2024/25 amount to UGX 1,914.08 billion) and the East Africa Crude Oil Pipeline (total forecasted disbursements in fiscal years 2020/21 and 2021/22 amount to UGX 830.24 billion) are unspecified.

critical investments such as in the transport, energy, education and health sectors” (MoFPED, 2017). While the Ministry has recently finalized a domestic revenue mobilization strategy, the Ministry does not specify how it plans to finance the additional resource requirements for projects in the energy sector, nor does it stipulate how it will mitigate risks from the current financing practices.

3. **The government also targets increased electricity accessibility in rural areas in the Rural Electrification Strategy and Plan 2013-2022 of the Rural Electrification Agency (REA).** Access in rural areas has to increase to 26 percent by 2022 (from around 10 percent in 2014). According to the REA, the plan has to result in 1.415 million new connections on grid and off-grid. Next to grid expansions, mini-grids are considered for concentrated rural settlements, and standalone systems for dispersed and isolated areas (including solar home systems) (REA, 2013).

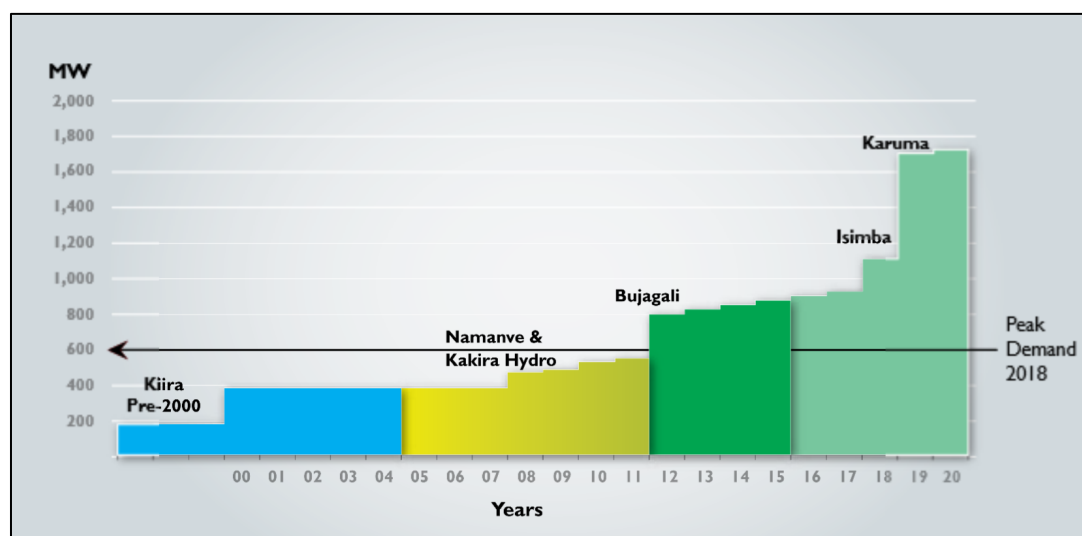
4. Power generation: state-owned company versus independent power producers

The state-owned UEGCL was established in 2001 and was made responsible for the energy generation activities of the defunct Uganda Electricity Board (UEB). Therefore, all generation-related assets and liabilities were transferred from UEB to UEGCL, including the 180 MW Nalubaale and 200 MW Kiira hydropower stations. At the same time as the establishment of UEGCL, reforms of the legal and policy framework for the energy sector entered into force that facilitated market entry of independent power producers.

The South African state-owned enterprise Eskom was one of the first to make use of the easier entry to the market. In April 2003, the government of Uganda approved a twenty-year concession agreement between UEGCL and Eskom Uganda Ltd. In return for an annual concession fee, Eskom operates and maintains the Nalubaale and Kiira plants. Consequently, UEGCL stopped generating its own energy and has merely been monitoring Eskom. The responsibilities of UEGCL have expanded since and now also include managing the development of new generation plants such as the Karuma and Isimba hydropower dams. With the operationalization of the Isimba plant in March 2019 and the Karuma dam in November 2020, UEGCL has become responsible for energy generation again (UEGCL, 2019).

The other power plants in the country are owned, operated and maintained by (mostly foreign) independent power producers. UEGCL is not involved in the operations of these producers and the producers have contracts about energy sales with the Uganda Electricity Transmission Company Ltd (UETCL) instead. The energy that is generated by the producers is sold to UETCL and mostly transmitted through the national grid. These arrangements are formalized in power purchase agreements (PPAs). The ERA monitors all generation activities, including the activities governed by the PPAs. See Annex 2 for an overview of all IPPs and their power plants.

Figure 1. Evolution of the electricity generation capacity, both installed and planned.



Source Figure 1: Umeme Limited, Annual Report 2018.

The installed power generation capacity of the energy sector has increased more than six-fold since the early 2000s, reaching 1,254MW of installed capacity in December 2019 (ERA, 2019). Since the introduction of the reform agenda, UEGCL and independent power producers have installed numerous power generation plants. The installation of large-scale hydropower dams has contributed most significantly to the increased capacity, accounting for eighty percent of the total installed generation capacity in 2019 (see Figure 1 and Table 9). The installed capacity comfortably met the country's peak demand for electricity in 2018, raising concerns about oversupply. **New large-scale hydropower dams, like Karuma, coming online is expected to significantly increase the installed capacity in the short term.**

Table 9. Sources of energy generation: target for 2040 and actual for May 2019.

Source generation	Target for 2040 (in MW)	% of target for 2040 total	Actual in December 2019 (in MW)	% of December 2019 total	Actual in December 2019 as % of 2040 target
Hydropower	4,500	11%	1,004.3	80%	22%
Geothermal (cogeneration)	1,500	4%	96.2	8%	6%
Nuclear	24,000	57%	0	0%	0%
Solar	5,000	12%	50.8	4%	1%
Biomass	1,700	4%	0.043	<1%	<1%
Peat	800	2%	0	0%	0%
Thermal (HFO + diesel)	4,300	10%	102.7	8%	2%
Total	41,800		1,254		

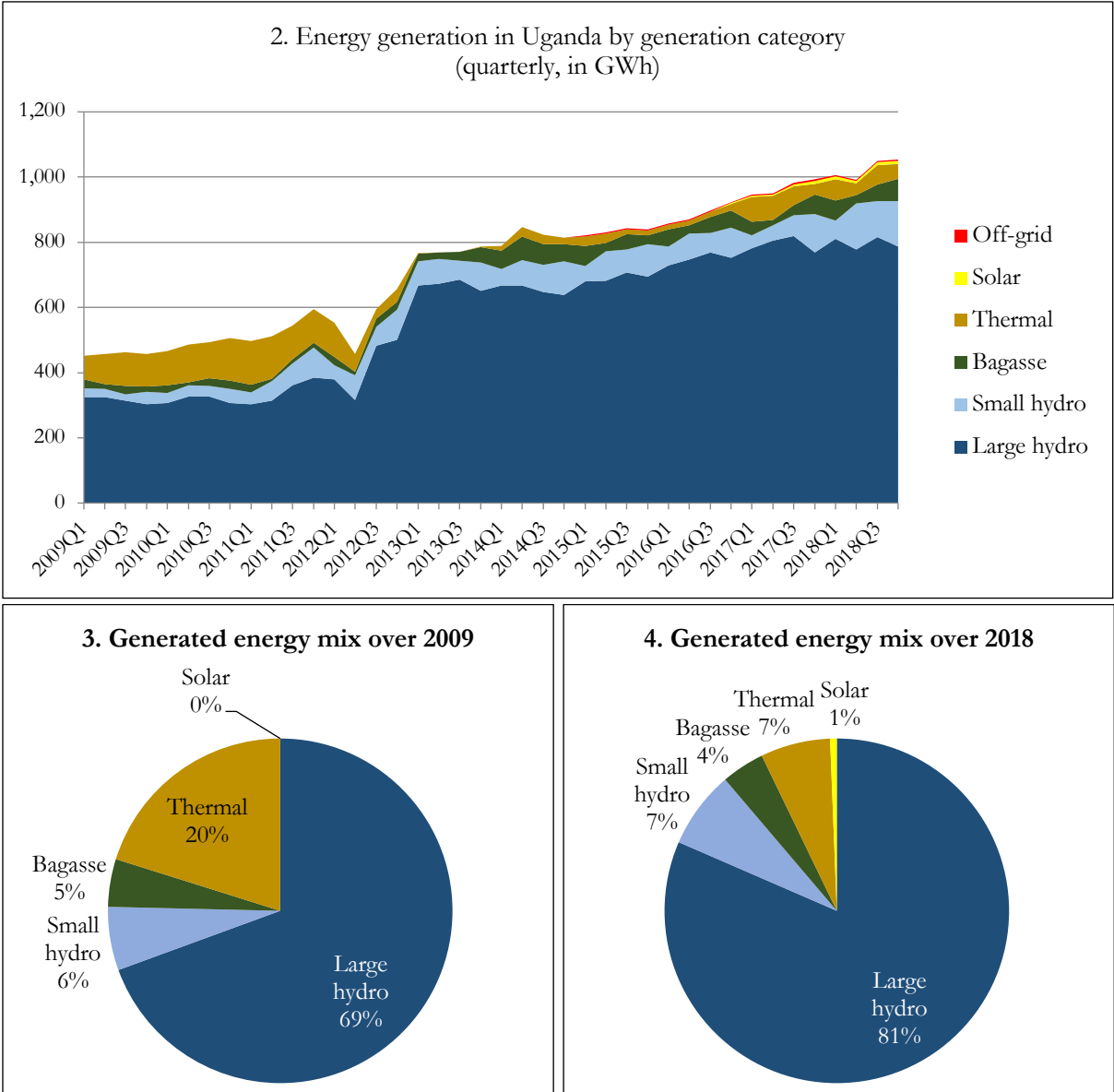
Source Table 9: Electricity Regulatory Authority and Vision 2040.

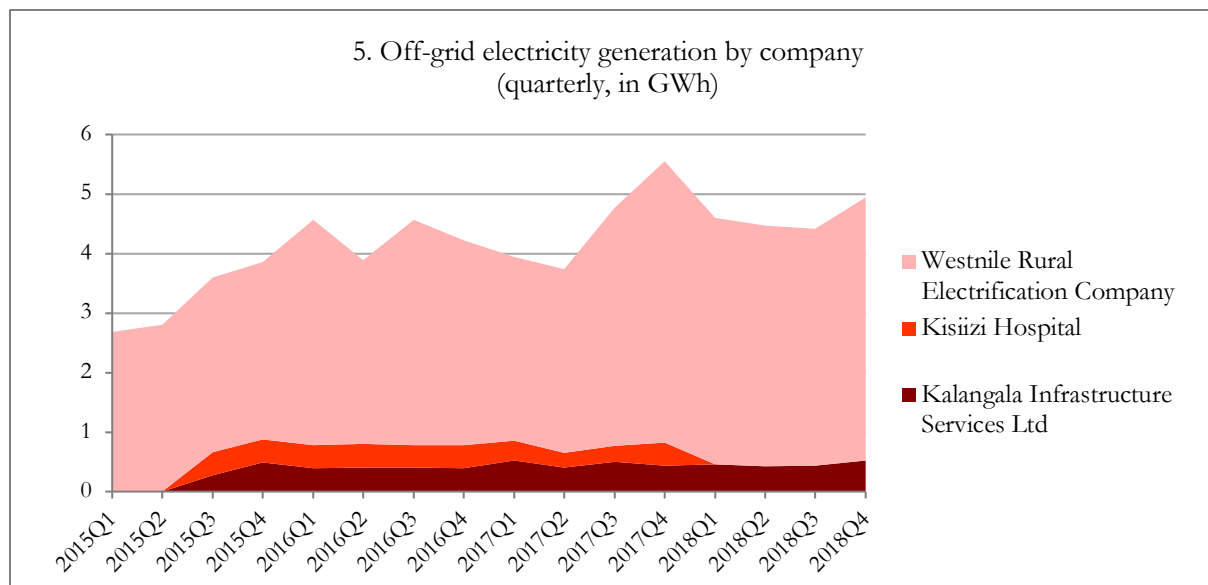
Furthermore, the government has ambitious plans to generate 41,800 MW of energy by 2040 (Vision 2040, NPA, 2007). According to the government, this increased capacity is necessary to achieve the government's economic development plans and industrialization targets. While hydropower plants are responsible for most of the energy generation at the moment, they only play a secondary role in the government's 2040 Vision. By 2040, the government foresees to generate 57% of its energy from nuclear and 12% from solar power plants. Hydropower plants are envisioned to become the third largest source of energy generation and will produce only 11% of all electricity (compared to 79% at the moment). The hydropower sub-sector has been most developed since the government's adopted Vision 2040 and the plants meet 21% of their 2040 target. No other source comes close to its 2040 target, with geothermal plants scoring second and producing 6% of the targeted output. Further significant transformations in the sector are needed to meet these 2040 targets.

Comparing the installed energy generation capacity and the actual realized generation figures shows that the generation plants have not been operating on full capacity. Weather events and droughts, malfunctioning equipment and production pauses for maintenance limit the use of all of the installed capacity (Herrera-Estrade, et al., 2018; Kwesiga, 2017; UEGCL, 2015;

UEGCL, 2017; UEGCL, 2019). In addition, not all installed capacity may need to be utilized, as demand falls short. Furthermore, incomplete transmission infrastructure has hindered UETCL from utilising all capacity as the transmission operator is unable to evacuate power from all installed plants yet (UEGCL, 2015a; UEGCL, 2017; NDP III, NPA, 2020).

Nevertheless, actual energy generation (as opposed to installed capacity) also increased significantly. Actual generation doubled between the beginning of 2009 and the end of 2018 (see Figure 2). While Uganda has a diverse mix of power plants, including large- and small-scale hydropower, thermal, solar, as well as bagasse (a residue from sugar production) plants, most generation originated from the large-scale hydropower dams. Figure 3 and 4 show the energy generated by source in 2009 and 2018.



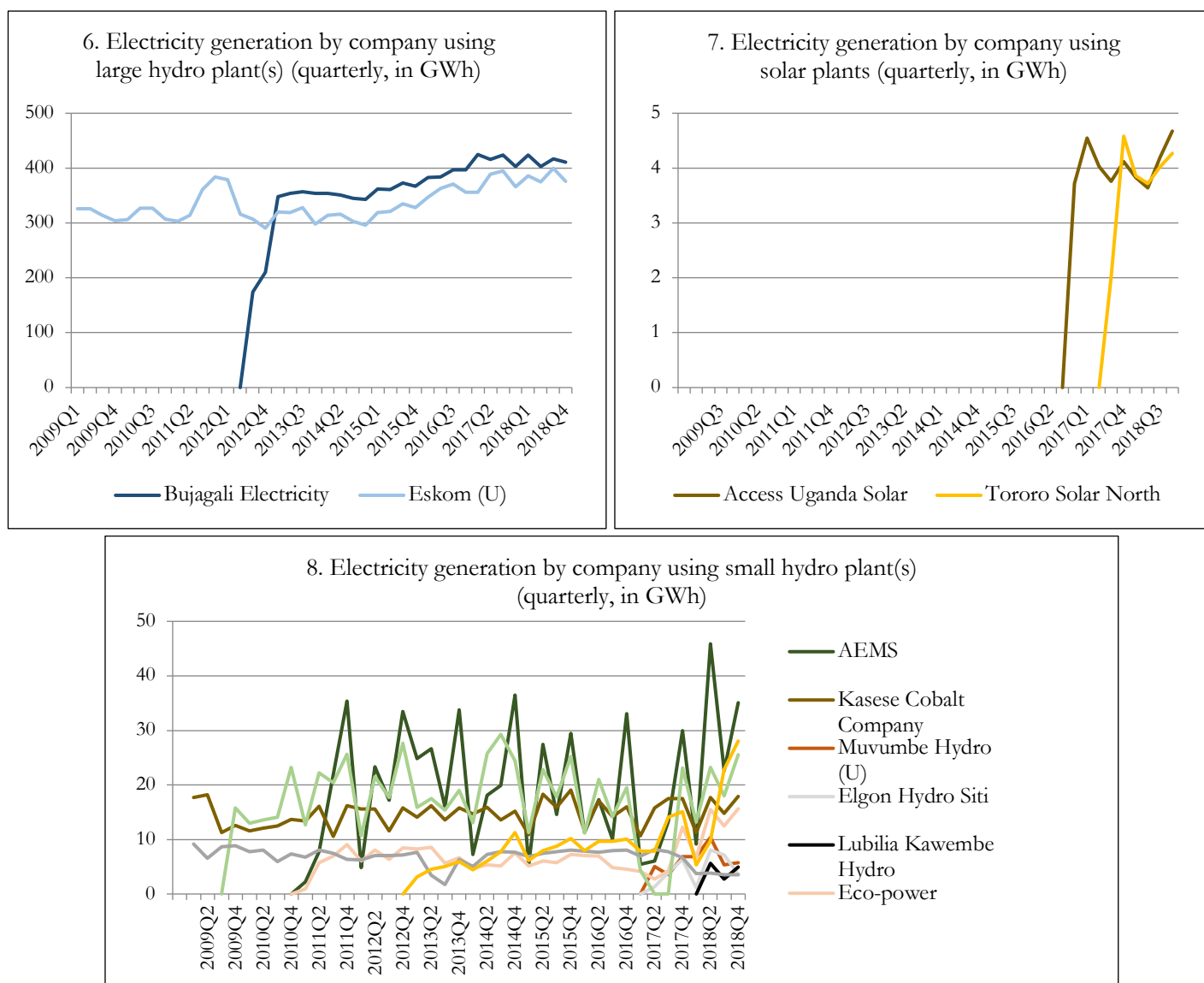


Source for Figure 2-5: Electricity Regulatory Authority (2018).

From 2009 to 2019, generation increased gradually, with a relatively rapid increase after the opening of the 250 MW Bujagali hydropower dam mid-2012.¹⁰ Off-grid generation also increased, but at the end of 2018 only accounted for less than 0.5 percent of total generation in Uganda (see Figure 2 and 5).¹¹ End-2018, the three operational large-scale hydropower dams generated most of Uganda's energy. Eskom operates the 180 MW Nalubaale and 200 MW Kiira dams (see Box 3 at the end of this section for more information on Eskom's role in Uganda) and Bujagali Energy Ltd operates the 250 MW Bujagali dam (see Figure 6). Once fully operational, the 184 MW Isimba and 600 MW Karuma hydropower dams will significantly increase the energy capacity of Uganda, but will make generation even more dependent on large-scale hydropower. While the generation from these plants has been fairly consistent, varying water levels and delayed maintenance continue to pose risks to energy generation (Herrera-Estrade, et al., 2018; Kwesiga, 2017; UEGCL, 2019). Droughts result in challenges for the energy sector worldwide. Research in advanced economies shows that fossil fuel plants had to replace hampered hydropower dams temporarily (Herrera-Estrade, et al., 2018).

¹⁰ Noteworthy: The 250 MW Bujagali dam is one of the first and only large-scale hydropower dams in Sub-Saharan Africa that is financed by the private sector. The dam is developed, owned, operated and maintained by Bujagali Energy Limited (BEL), a single purpose company. BEL has various shareholders, including large private investment firms and the government of Uganda (the latter owning 10 percent of the shares). After 30 years under BEL management, the government of Uganda will become the owner of the dam and BEL will have to transfer the dam to the government for the symbolic amount of USD 1.00.

¹¹ Data on off-grid generation is available from the ERA from 2015 onwards. According to the data, three entities were licensed for the generation of off-grid electricity, only two generated electricity in 2018. The West Nile Rural Electrification Company (WENRECO) generated the majority of the off-grid energy. WENRECO generates electricity in the West Nile sub-region of the Northern Region of Uganda. Most of the off-grid energy in Uganda is generated by small-scale hydropower and thermal plants.

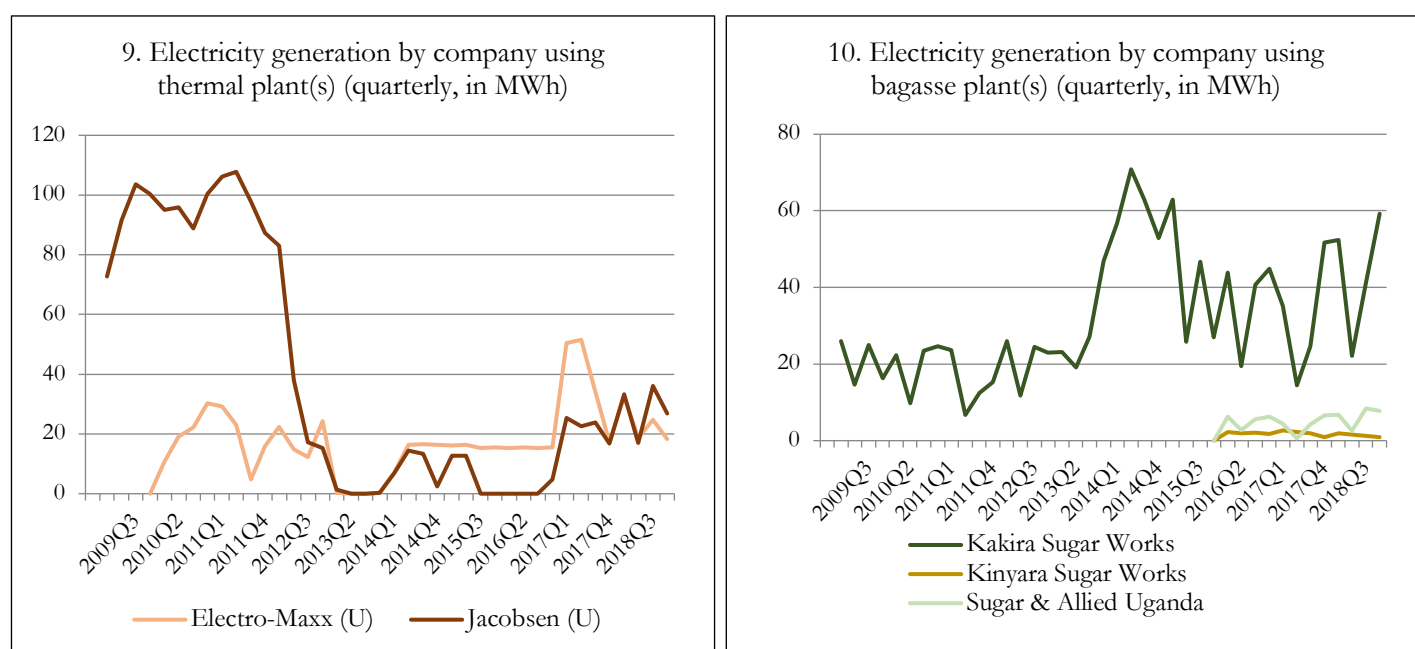


Source for Figure 6, 7 and 8: Electricity Regulatory Authority (2018).

Over the past decade, the capacity of other types of generation stations also increased, but this increase is marginal in comparison with increases in hydropower generation.

- Figure 7 illustrates how producers using solar power plants entered the market only recently. Their generation fluctuations reflect seasonal difference in the amount of sunshine. Solar is an interesting alternative for energy generation in Uganda, given the amount of sunshine during the year. In particular, solar can provide an attractive off-grid alternative, offering a solution for the most rural (and dry) areas. Next to two on-grid solar power farms, households increasingly deployed Solar Home Systems, which are stand-alone systems that can fulfil basic domestic electricity needs. While the Rural Electrification Agency recognizes the potential of these stand-alone systems and has targeted their increased utilization, only 300,000 households used one in 2017 (Cardoso, 2018). The stand-alone systems are very popular in numerous low-income countries, and especially in the East African region. Kenya holds the lion-share of the total number of installed systems in the region and has recorded strong growth rates systems. Relatively, the quarterly growth rate of newly installed systems in Uganda has fluctuated more (GOGLA, 2019).

- Figure 8 shows that generation by small-scale hydropower dams has been highly volatile, reflecting seasonal fluctuations and the dependency of some plants on high water levels and rainfall.
- Figure 9 illustrates the energy generation by companies using thermal plants. The two thermal plants use heavy fuel oil and have been constructed to solve a pressing energy shortfall in the 2010s (Adeyemi & Asere, 2014). Since 2012, thermal generation has declined due to high fuel prices and increased electricity generation from hydro-sources. Especially the operationalization of the Bujagali hydropower dam resulted in a decline of their use.
- Figure 10 illustrates the generation from bagasse plants. The bagasse plants have been built by sugar producers. Uganda has a large sugar industry and factory owners installed energy plants on-site. The plants use the residue of sugar cane for energy generation after the sugar juice has been extracted in the factories (the residue is referred to as bagasse). Whereas electricity is primarily generated for sugar production, the producers sell their surplus to UETCL. The surplus fluctuates depending on the sugar season and harvest quantity.



Source for Figure 9 and 10: Electricity Regulatory Authority (2018).

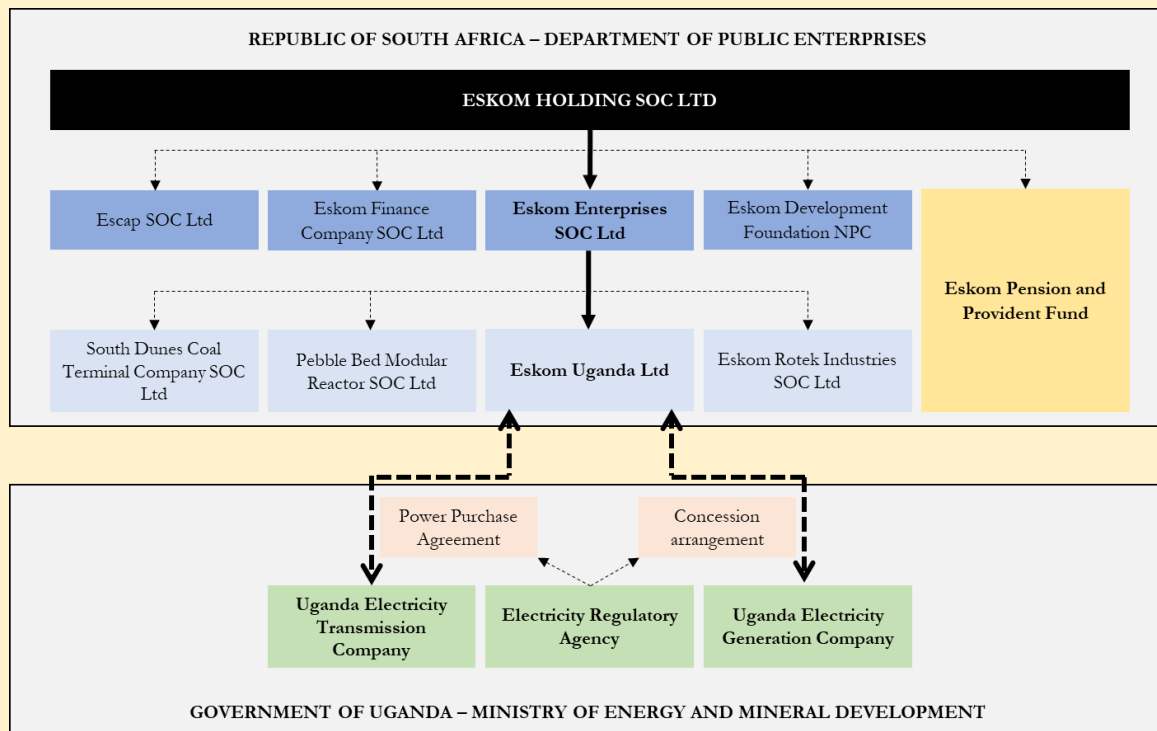
Box 3. The role of Eskom in the Ugandan energy market

Eskom is a state-owned enterprise of the Government of South Africa and that country's primary electricity supplier. The Department of Public Enterprises is the shareholder ministry, but Eskom also answers to the Department of Mineral Resource and Energy (responsible for energy policy) and the National Treasury (responsible for financial oversight). Eskom generates more than 90 percent of electricity used in South Africa and around 40 percent of electricity used in Africa as a whole (Eskom, 2019). The Eskom holding has four wholly-owned subsidiaries and a pension fund. Eskom Uganda Ltd has been incorporated in November 2002 under the Eskom Enterprises SOC Ltd (EESL) subsidiary.

EESL is the holding's investment arm and provides maintenance support, network protection and capital expansion funding.

Eskom entered the Ugandan energy market with the establishment of Eskom Uganda Ltd (EUL) and holds a concession for two of UEGCL's power stations. EUL and UEGCL agreed a twenty-year concession arrangement for the operation and maintenance of the Nalubaale and Kiira hydropower stations, which will lapse in 2023. EUL sells all generated electricity to UETCL. The obligations between EUL and UETCL are defined in power purchase agreements. The ERA monitors the concession and power purchase arrangements. UEGCL, UETCL and the ERA report to the Ministry of Energy and Mineral Development of the government of Uganda.

Diagram 2. The relationship between the governments of South Africa and Uganda in the energy sector.



The relationship between Uganda and South Africa can come under pressure when one of the state-owned enterprises finds itself in financial difficulties. The diagram above shows the relationship between the governments of South Africa and Uganda through various public entities. The central governments, through their ministries of energy and finance, may be required to provide additional capital to prevent their enterprise from defaulting. Given the economic importance of utility enterprises, governments may be (publicly) expected to intervene and save the enterprise. As South African President Ramaphose said lately, Eskom is “too vital” to fail (Roelf, 2019).

However, the incentives for ensuring good (financial) performance and preventing EUL and UEGCL from defaulting differ significantly for the two governments. EUL is

contractually obliged to pay UEGCL an annual concession fee for the use of the two Ugandan hydropower stations. UETCL needs to pay EUL for all generated electricity. The government of Uganda will ensure that UETCL will fulfil its obligations to EUL, because Uganda's economy depends to a large extent on EUL's electricity output. However, EUL's performance is not of a similar importance to South Africa's economy. The Eskom holding can decide to discontinue its operations in Uganda and terminate EUL's operations. This would not directly affect the electricity availability in South Africa. A further weakening of the financial performance of EUL or the Eskom holding is a risk for the government of Uganda, because the holding is already under a lot of financial pressure. After years of large financial losses and needs for government rescue, the government of South Africa announced extensive business restructuring plans for Eskom, including an unbundling of the business, like Uganda did with UEB in the early 2000s (South African Government News Agency, 2019).

While the Eskom holding is known to make significant financial losses, EESL has been making profits (the investment arm of the group to which EUL belongs). Whereas the holding made a loss of ZAR 21 billion during the last financial year (which ended on the 31st of March 2019), EESL made a profit of ZAR 226 million (Eskom, 2019). It is unclear to what extent the holding invests in the activities of the Eskom subsidiaries or considers them cash cows. The holding can instruct subsidiaries to distribute profits and therefore the profits of EESL can cover some of the losses in the holding. Unfortunately, the financial statements of Eskom do not provide separate information on the performance of the Ugandan subsidiary or information on upstream capital flows from subsidiaries to holding level.

UEGCL has also been making losses over the past years, partly because it wasn't able to bill Eskom all costs under the concession arrangement as a result of ERA policy.

According to UEGCL's financial statements, the revenue from the concession fee is expected to cover operational expenses at a minimum. UEGCL has the right to bill EUL for debt service, depreciation, return on equity and administrative costs. However, UEGCL has only billed Eskom for administrative costs, because the ERA's tariff methodology does not allow for it to charge other costs (UEGCL, 2015; UEGCL, 2017; UEGCL, 2019). Therefore, the concession fee has been low and failed to cover the operating costs of UEGCL, which damaged its financial performance. In the 18-month period up to the 30th of June 2017, the concession fee amounted to almost UGX 15 billion (USD 4.1 million), whereas the operating expenses amounted to more than UGX 31 billion (USD 8.4 million). In addition, Eskom has outstanding payments to UEGCL amounting to UGX 2.1 billion (USD 568,000).

The ERA has not changed its tariff methodology to allow UEGCL to charge other costs, because it would result in a higher electricity tariff. The government of Uganda wants to keep the tariff low to keep electricity accessible for households and industries (NDP III, NPA, 2020). The EUL has thus been making use of two of UEGCL's generation stations without covering all costs of this use. The financial performance of the state-owned UEGCL is negatively influenced by political interference from the regulator ERA.

Moreover, questions have been raised as to whether EUL has complied with the maintenance and repair requirements as specific in the concession agreement. The

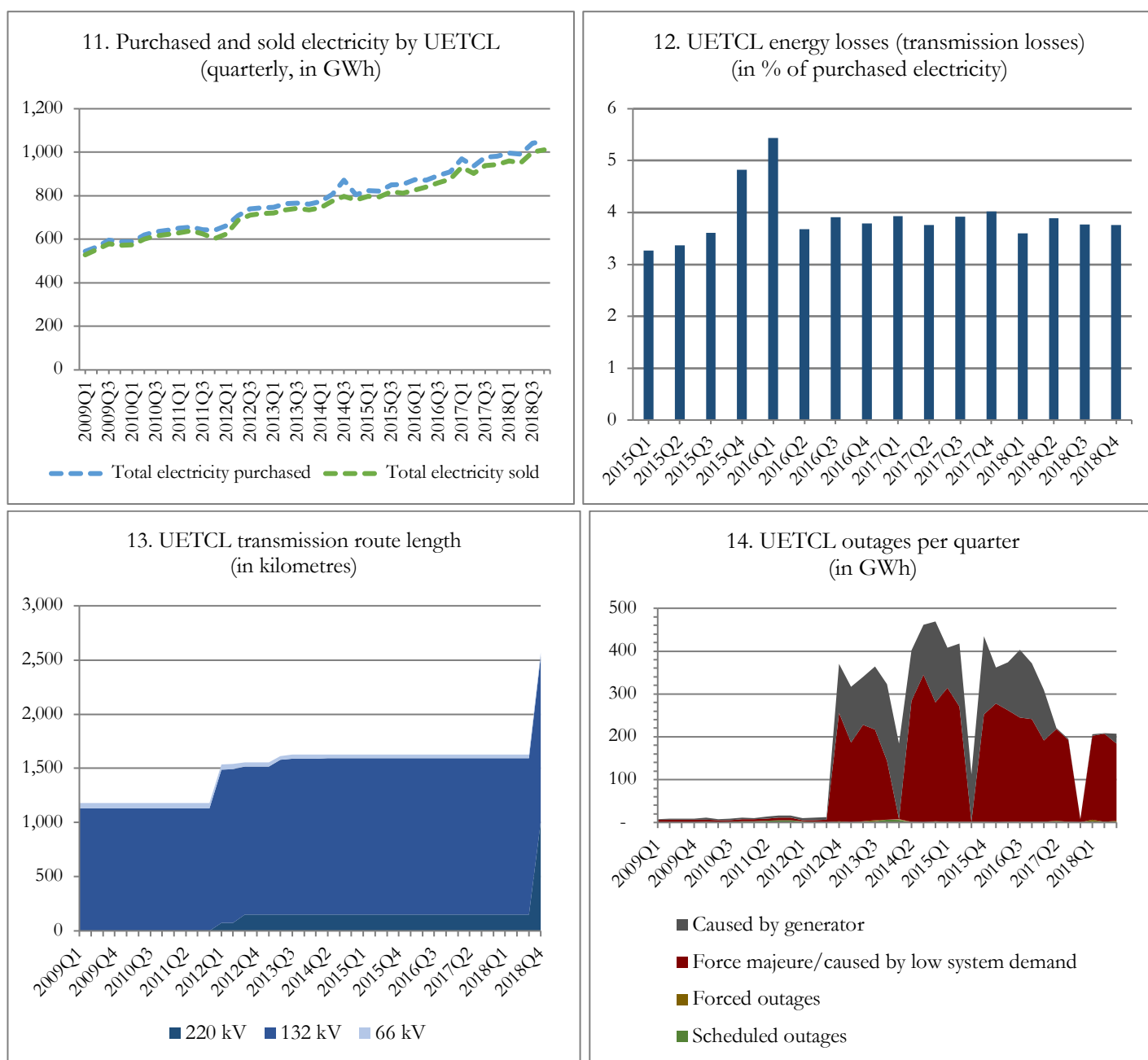
Auditor General of the government of Uganda noted in 2017 that UEGCL had found instances of non-compliance by EUL. These included non-repair works and delayed project executions.¹² However, UEGCL has not enforced compliance by EUL. According to the Auditor General, UEGCL therefore faces the risk that the two dams may not be in proper working conditions when returned at the end of the concession agreement. UEGCL expects that it will need to complete refurbishment works after the concession period, as stated in both their 2015 and 2017 annual reports. However, the option of discontinuing the operations of the dam is also discussed. The 2017 report states that a feasibility study for the refurbishing works will have to be completed. The CEO of UEGCL stated in 2018: “We are going to carry out a cost benefit analysis of the Nalubaale dam. It will help us determine whether to abandon it or not” (ESI, 2018). In the company’s 2019 annual report, UEGCL states that it has “embarked on a plan to permanently address the problems at Nalubaale HPP which shall increase the life of the power station by 40 years as well as optimize and increase the plant factor of Kiira HPP from 40% to a value greater than 60%. A feasibility study in this regard is on-going” (UEGCL, 2019, page 10).

In the meantime, the government of Uganda has focused on projects in the energy sector to limit dependencies on foreign independent power producers. It has increased the human capacity and expertise of UEGCL. Furthermore, the government of Uganda has prioritized the development of other generation plants, which will be operated and maintained by UEGCL. Uganda’s energy generation will therefore be decreasingly dependent on EUL’s performance and increasingly dependent on UEGCL’s performance.

¹² Noteworthy, less than half of the joint installed capacity of the two dams has been used as a result of –varying water levels and non-operative turbines due to damages and non-maintenance. The installed capacity of the two dams is 380 MW and the average capacity generated during 2017 was 178 MW (and 138 MW in 2015).

5. Power transmission: the state-owned monopoly

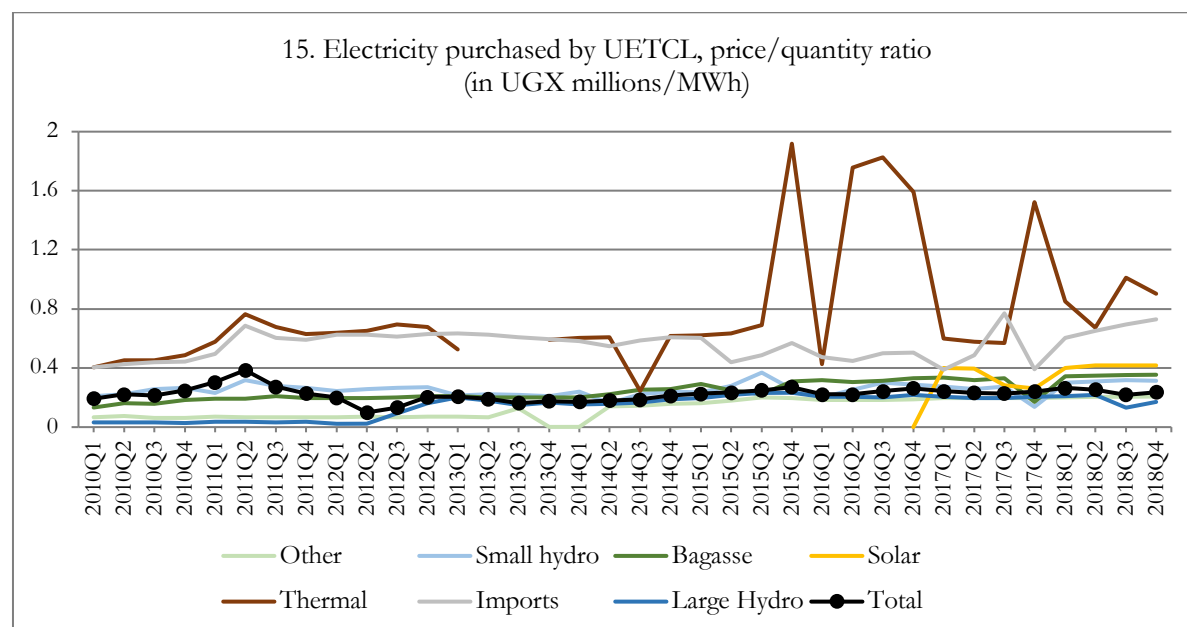
The state-owned UETCL holds the monopoly for energy transmission. Next to owning, operating and maintaining the national grid, UETCL develops grid expansions to meet electricity demand and evacuate power from newly installed plants. UETCL purchases electricity from (independent) power producers and imports electricity from Kenya and Rwanda. The purchased electricity feeds into the national grid and is sold to distribution companies or exported to neighbouring countries. Over the past decade, the electricity purchased and sold by UETCL almost doubled, to over GWh 1,000 in the last quarter of 2018 (see Figure 11). In the transmission process, between purchasing and selling power, UETCL generally loses between three and four percent of the purchased electricity (see Figure 12).



Source for Figure 11-14: Electricity Regulatory Authority (2018).

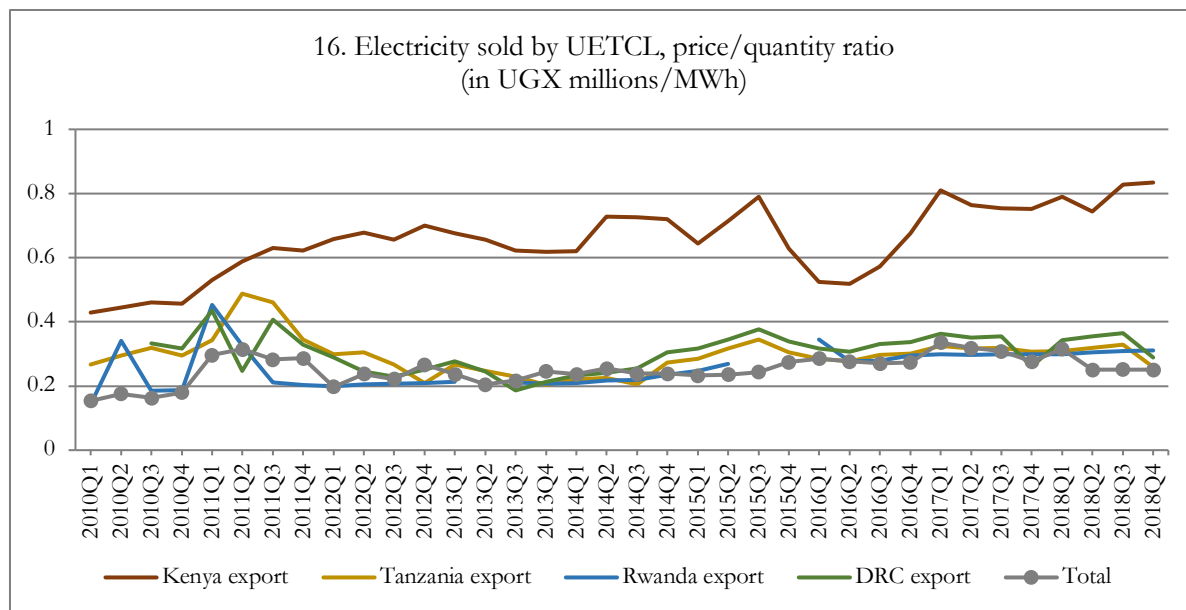
UETCL more than doubled the length of the transmission network over the past decade, but the expansions have not been sufficient and lead to underutilization of power plants More expansions of the grid are necessary to evacuate the additional capacity from newly-developed plants (NDP III, NPA, 2020). Furthermore, large (rural) areas of the country are still not connected to the grid. Therefore, UETCL has proposed several additional large-scale grid extensions (see Annex 3 for a map with the current and proposed infrastructure). These proposals are outlined in UETCL's Grid Development Plan 2018-2040. According to the plan, UETCL must make major investments if the electricity supply targets of NDP II and Vision 2040 are to be reached, especially in the early years of the plan until 2025.¹³ UEGCL will have to develop additional plants to meet the generation targets and these plants have to be connected to the grid. In addition, investments in the maintenance and upgrading of the current infrastructure are necessary, because UETCL has faced large-scale transmission outages (see Figure 14).

Currently, UETCL purchases electricity from independent power producers and, since the commissioning of the Isimba dam, from UEGCL. Purchase arrangements are recorded in power purchase agreements, which in most cases include a price per kWh and specify whether UETCL has to buy all generated power or only the power that it requires. The price differs between producers and is related to the type of generation plant that is used. Figure 15 shows the prices that UETCL has paid for electricity from different sources. Most purchased power originated from large-scale hydropower dams, which are consistently priced below (but around) the average. Thermal power and imports have been the most expensive. In some quarters, the price of thermal power was seven times the average, driven by high oil prices. Imports cost two to four times the average price, with Kenyan power at least twice as expensive as imports from Rwanda.



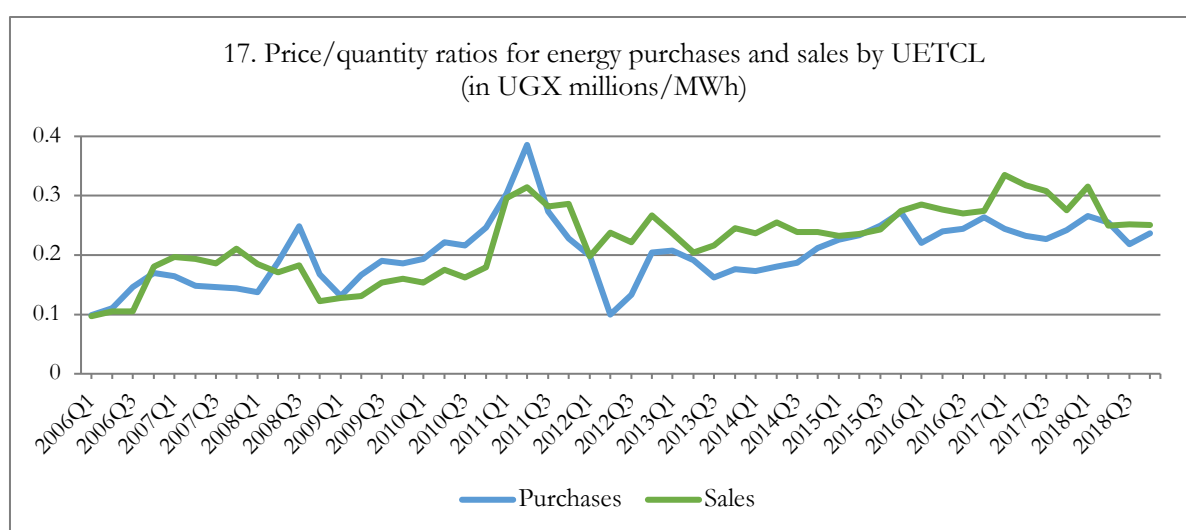
Source for Figure 15: Electricity Regulatory Authority (2018).

¹³ In the plan, UETCL considers three scenarios and associated expansion proposals: (1) base case (business as usual), (2) reaching NDP II targets in 2020, and (3) realizing the Vision 2040 ambitions in 2040.



Source for Figure 16: Electricity Regulatory Authority (2018).

Both the nominal purchase and sales prices of UETCL per MWh have doubled since 2006 and the price margin has been positive since 2012. The prices increased from below UGX 100,000 at the beginning of 2006 over UGX 230,000 at the end of 2018 (see Figure 17). However, the real price of electricity end-2018 is only UGX 91,270 when correcting for inflation between 2006 and 2018.¹⁴ Thus, relative to other prices in the economy, the price of electricity decreased. Furthermore, UETCL paid a higher price to producers than it collected from distributors in some quarters. Between 2008 and 2012 in particular, the price margin was largely negative due to the reliance of UETCL on producers using expensive thermal plants. However, since the beginning of 2012, the purchase price has been almost consistently below the sales price, which is mainly a result of the increased capacity from the hydropower dams and the diminished generation from thermal plants.



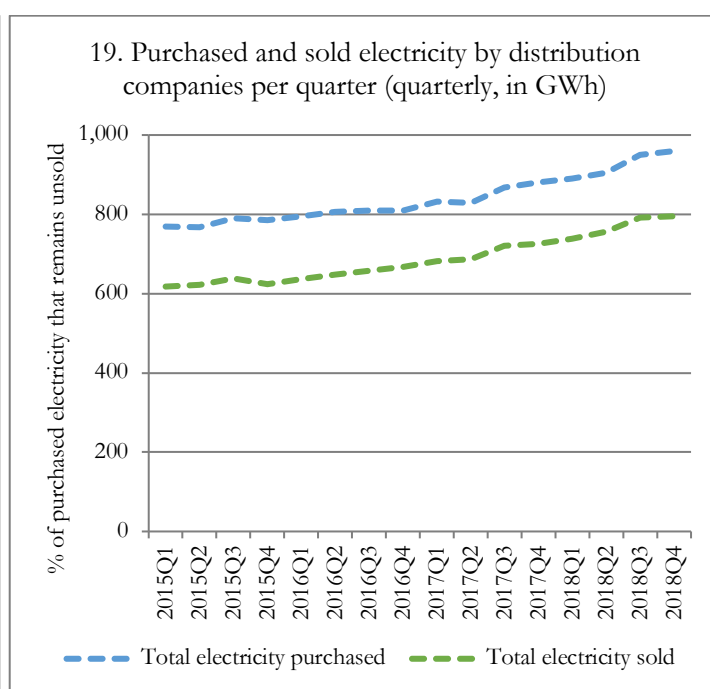
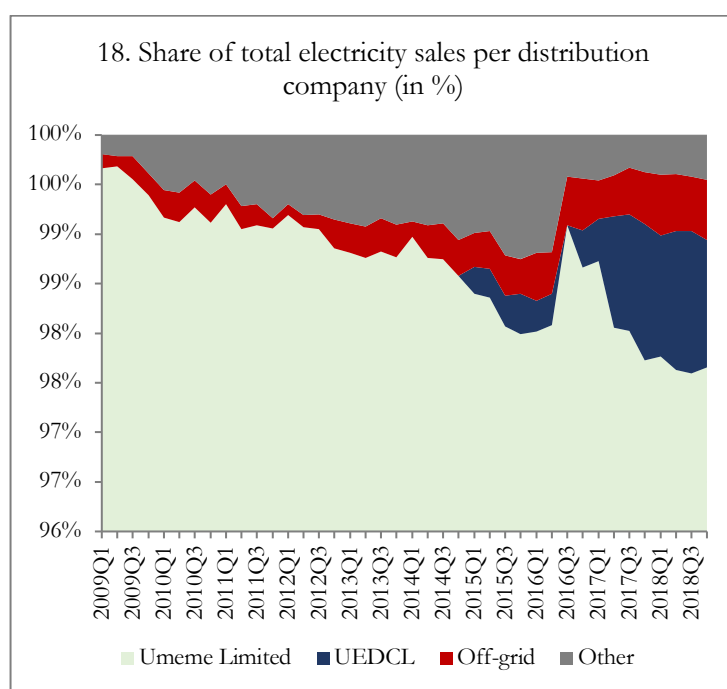
Source for Figure 11-17: Electricity Regulatory Authority (2018).

¹⁴ According the Bank of Uganda, the Ugandan consumer price index is 252 in December 2018 with base period January 2006.

6. Power distribution: low, but increasing, coverage

At the same time as UEGCL and UETCL were established, UEDCL became responsible for the distribution activities of the former UEB state monopoly. The ownership of the electricity distribution network was transferred from UEB to UEDCL. In 2005, the government of Uganda privatized the activities of UEDCL through a 20-year concession arrangement with Umeme Limited.¹⁵ Umeme Limited is listed on the Uganda Securities Exchange and cross-listed on the Nairobi Securities Exchange. As of end-2018, the National Social Security Fund of Uganda is the largest shareholder of Umeme Limited, holding 23.2 percent of issued capital.

The concession of Umeme includes the distribution of electricity to consumers and Umeme has to operate, maintain and upgrade the distribution infrastructure. Umeme also provides retail services to consumers. At the end of 2018, Umeme was responsible for the distribution of 97.6 percent of the generated electricity in Uganda (compared to nearly 100 percent in 2008). Figure 18 shows the dominance of Umeme in the distribution sector, but also reveals that UEDCL has started to distribute electricity again and that the share of off-grid distributors has been (slowly) increasing.

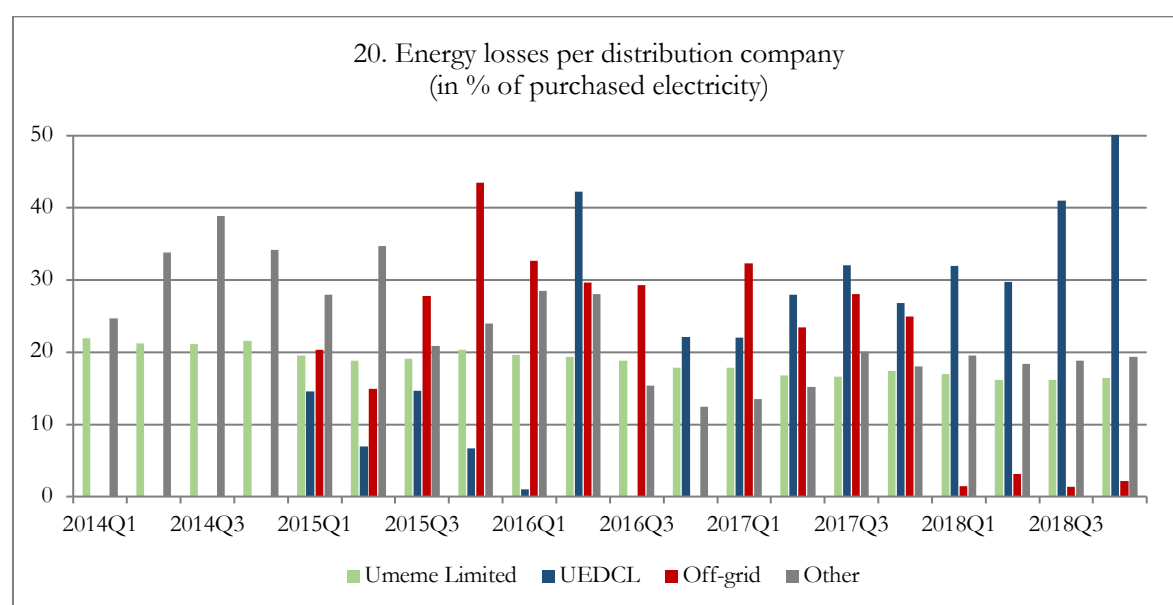


Source for Figure 18 and 19: Electricity Regulatory Authority (2018).

While the amount of electricity sold to consumers increased by more than a quarter between 2014 and 2018, the distribution sector is still characterized by high energy losses. Most distribution companies purchase their electricity from UETCL and sell the electricity

¹⁵ Initially, the Ugandan government signed a concession agreement with a consortium owned by Globaleq (56 percent) and Eskom of South Africa (44 percent). Umeme Limited was established after a restructuring of the consortium, with Globaleq becoming the sole owner. In October 2012, Umeme Limited was listed on the Uganda Securities Exchange in an initial public offering (IPO). The purpose of the IPO was to generate resources to allow for an expansion of the distribution network and for the payoff of debt. In December 2012, the company has also been cross-listed on the Nairobi Securities Exchange.

onwards to consumers, except for some off-grid suppliers who take care of their own generation. Total electricity sold to consumers increased by more than a quarter between the beginning of 2014 and the end of 2018. However, not all purchased electricity gets sold to consumers (see Figure 19. No data is available for the distributors' purchases from UETCL before 2014). The difference between electricity purchased and sold is referred to as energy losses, which put pressure on the sector's financial results. Between the beginning of 2014 and the end of 2018, energy losses accounted for 15 to 22 percent of total purchased electricity. Figure 20 presents the energy losses for Umeme, UEDCL, off-grid distributors and the other distributors.¹⁶ UEDCL and off-grid distributors lose most energy, with UEDCL losing more than half of its purchased energy in 2018Q4. UEDCL loses an increasing share of energy while expanding its distribution activities. In contrast, the losses of Umeme are fairly consistent and have slowly fallen to 16.5 percent at the end of 2018.¹⁷

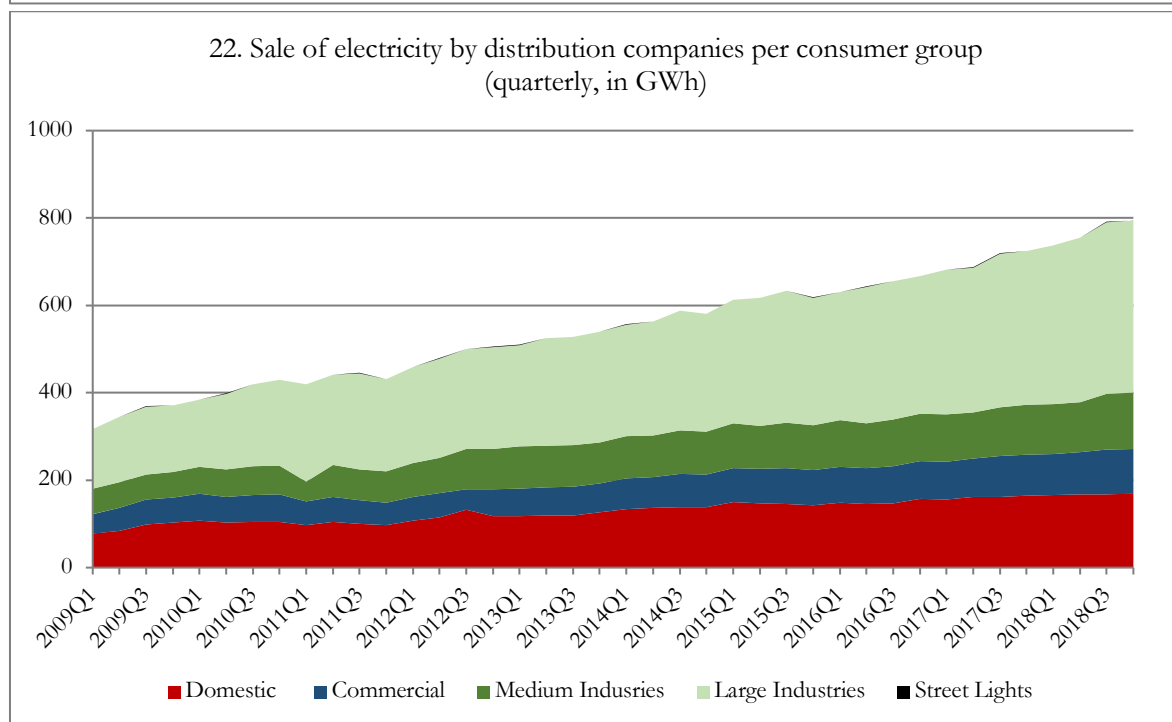
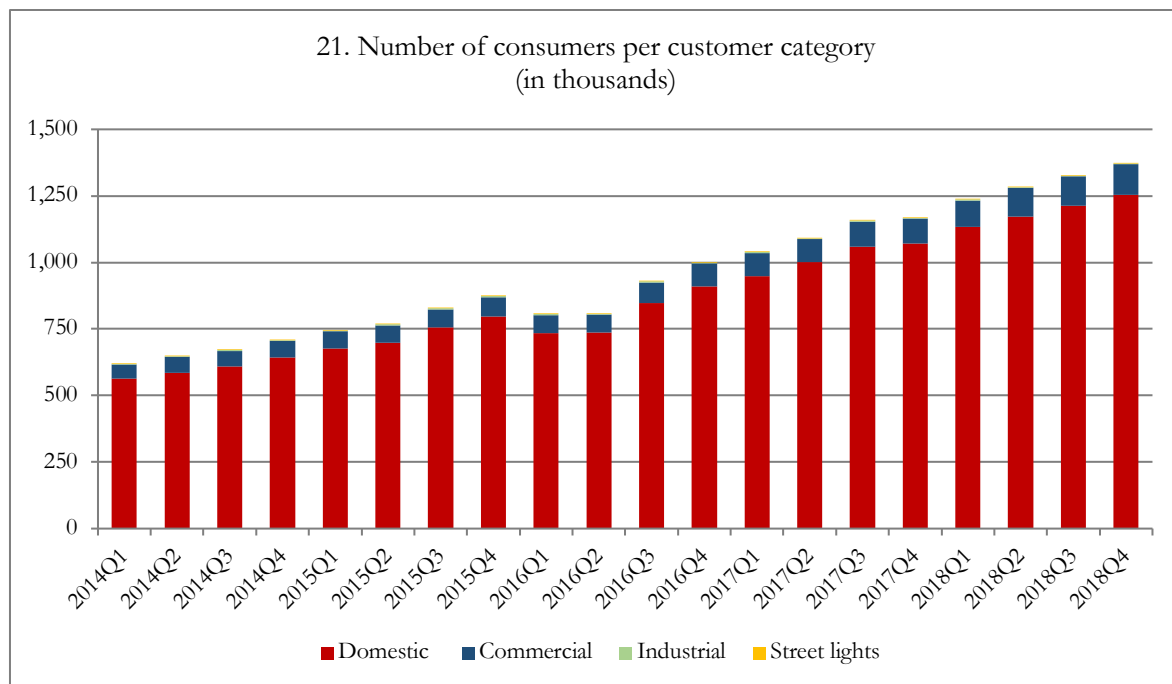


Source for Figure 20: Electricity Regulatory Authority (2018).

At the end of 2018, distribution companies sold electricity to more than 1.3 million consumers, twice the amount of four years earlier but still a small part of the population (see Figure 21). Moreover, the increase is marginal when considering the high population growth of above 3 percent per year. Out of a population of 40 million, only a very low share of people has access to electricity. Distribution is concentrated around urban and semi-urban areas, leaving large (rural) areas of the country untouched. While the vast majority of current customers are households, commercial and industrial entities consume relatively most electricity. Furthermore, their share of total consumption increased quickly over the past years. At the end of 2018, the 40 largest industrial plants consumed as much as all households combined. See Figure 22 for the electricity sold per consumer group between the beginning of 2009 and the end of 2018.

¹⁶ No data for 2018 is available for one of the off-grid distributors (Kiisizi Hospital), which accounted for the largest off-grid losses before 2018. This explains the drop-in losses for off-grid distributors in 2018.

¹⁷ According to Umeme, this reduction has been achieved through investments in distribution infrastructure which limited technical losses as well as through the implementation of a commercial losses reduction strategy.



Source for Figure 21-22: Electricity Regulatory Authority (2018).

7. Electricity tariff setting and methodology

According to the ERA, the main objectives of the electricity tariff structure and methodology are to ensure that prices remain fair and reasonable, and that the sector remains financially and operationally secure. The Electricity Regulatory Authority (ERA) developed the 2003 Electricity (Tariff Code) Regulations in line with Section 75 of the 1999 Electricity Act. The regulations established the tariff structure and the methodology for calculating tariff revisions. Companies in the sector should be provided with a reasonable return and profit. The structure has to give confidence to current investors and attract more investment in the energy sector. Price stability is not listed as a specific objective of the current structure and methodology.

The tariff structure provides prices for the three main transactions in electricity supply:

1. The electricity prices paid by **the transmission company to the generator**, which are determined during negotiations between the power producers and UETCL and set in power purchase agreements.
2. The electricity prices paid by **the distributors to the transmission company**, which are referred to as the bulk supply tariff. UETCL can also export electricity at negotiated rates, but the Electricity Regulations forbid the state-owned company to do so below the average or marginal cost of electricity purchased from generation companies.
3. The electricity prices paid by **the consumers to the distributors**.

The tariffs are set through a formula, which takes the revenue and profit requirements of the energy companies into account. The companies submit their revenue requirements to the ERA every year, which they in turn base on various cost elements, including financing, operating and maintenance costs, as well as concession fees and lease obligations. The companies have to provide details about their (financial) performance, which enables the ERA to assess the submissions. Furthermore, the ERA consults the public on the companies' revenue requirements and consequent tariff revisions. The profit requirement has to be in line with the company's license, concession agreement or other contract with the ERA. For example, the concession contract of Umeme specifies a twenty percent fixed rate of return. In addition, the formula takes into account a set of performance indicators, including operational losses, operating and maintenance costs and bad debts.

The ERA allows tariffs to be adjusted quarterly through an Automatic Tariff Adjustment (ATA) mechanism. This mechanism ensures that tariffs are adapted automatically to macroeconomic developments, including foreign exchange rate fluctuations, inflation, and oil price changes. The tariff adjustment is capped at a maximum of ten percent per quarter. The structural incentive for energy companies to improve their performance (by considering performance indicators), the involvement of the wider public and the ATA mechanism are unique features in Sub-Saharan Africa.

When comparing the three average tariffs in Uganda, it becomes apparent that the distribution companies command the highest margins. UETCL paid on average USD 7.5 per kWh to the generation companies, the distribution companies paid on average USD 8.2 per

kWh to UETCL (price margin of USD 0.7 per kWh) and the end-consumer paid on average USD 15.89 per kWh to the distribution companies (price margin of USD 8.39 per kWh). The price margin of the distribution companies is higher than the price that generation companies receive for the generation of the electricity. The government does not directly subsidize the tariffs anymore – apart from a lifeline tariff for households' first 15 kWh – but did do so in the past. Box 3 discusses former power tariff subsidies of the Ugandan government.

Box 3. Past power tariff subsidies of the government of Uganda.

The government of Uganda subsidized electricity supply through explicit budgetary support in the past. Between 2005 and 2012, the explicit subsidy increased steadily and the government mainly provided financial support to UETCL, because the bulk supply tariffs paid by distribution companies to UETCL were below UETCL's cost-recovery levels. UETCL's capacity payments to thermal power producers in particular required large subsidies. The plants were constructed as an emergency measure, partly due to lower than expected generation from hydropower because of droughts. In 2011, the government's annual explicit subsidy to the energy sector reached 1.1 percent of GDP, amounting to around USD 175 million (IMF, 2013).

Between 2005 and 2012, the government took action to limit the financial pressure from the energy sector on public finances. The end-user tariff increased in 2006, which was deemed possible politically after the elections had taken place. The first two tariff increases amounted to 41 percent and 35 percent. However, the increases were insufficient to cover UETCL's costs, due to the rising fuel price and the country's dependence on (more expensive) thermal power. In order to avoid a hike in the end-user tariff, the government decided to increase its budgetary support to UETCL and compensated UETCL for the capacity payments to the thermal units. According to a study by the World Bank, the government had by the end of 2012 provided subsidies worth of UGX 1,048 billion (USD 283 million) to UETCL and low-income households to ensure that its tariffs remained comparable to those of neighbouring countries.

The use of government funds for these subsidies sparked public debate, but the tariff was still further reduced in 2009. Only a relatively small (and wealthy) proportion of the population had access to the subsidized electricity. After parliamentary investigations into ERA's tariff setting in 2009, the tariff was reduced by 10 percent at the end of 2009, which many consider to be politically expedient rather than financially sound decision-making.¹⁸

According to various papers, the tariff nearly allowed costs to be recuperated in 2012. The Bujagali hydropower dam came online in that year, UEDCL's debt was restructured and the tariff itself was increased by 46 percent. The available generation capacity of the Bujagali dam provided the

¹⁸ Furthermore, several parliamentary committees investigated the concession agreements in the energy sector around that time, with most attention going out to the agreements with Umeme and Eskom. In 2012, a committee advised the government to terminate the concession agreements, because of their impact on public finances and on the performance of the sector. In particular, the committee considered Umeme's 20 percent return on investment controversial given the large-scale government support that the sector required. The government did not follow up on the committee's advice, partly due to the strength of the contractual agreements between the government and Umeme, which made it difficult and potentially expensive for the government to terminate the concession. Support for Umeme from the highest political levels and their improved performance results over the years are other possible reasons for Umeme's survival.

government with an alternative to the expensive power from thermal plants. Nevertheless, the government is (still) required to make capacity payments to the thermal producers, offsetting them for the initial construction costs. The government removed most subsidies in that year, with the exception of financial support to low-income consumers through lifeline tariffs and to UETCL for thermal capacity payments.

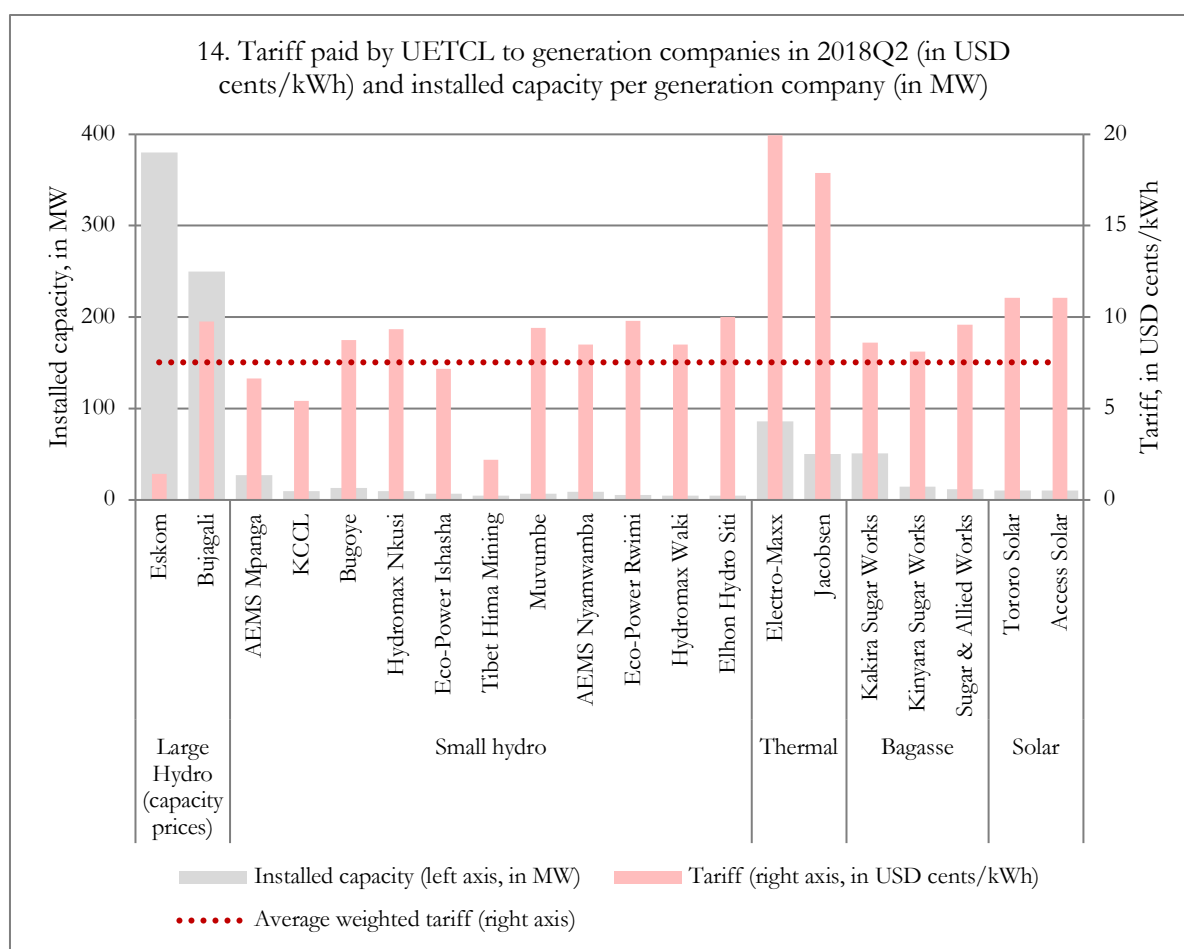
7.1. Tariff paid by the transmission company to the generator: PPAs

The setting and revision procedures for the tariff paid by UETCL to power producers are specified in power purchase agreements. Mid-2018, the average weighted tariff was USD 0.075 per kWh (see Figure 14 for all tariffs).¹⁹ Five power producers using hydro plants sell electricity below this average tariff and, given their large installed capacity, put significant downward pressure on the average price. The difference between UETCL's tariff payments to the generation companies and UETCL's receivables from the distribution companies largely determines UETCL's profits or losses.

The relatively low tariff that UETCL pays to Eskom is noteworthy. This tariff has been kept low by the ERA because the regulator does not allow UEGCL to pass on all of its costs to Eskom through the concession fee. A higher concession fee would have fed into the tariff through the revenue requirement, because Eskom would have been (partly) able to recover the costs from UETCL. As Eskom has not invested much in maintenance and repairs, the tariff merely covers the operating costs of the Kiira and Nalubaale dams.

Furthermore, the tariffs that the thermal power producers receive are more than double the average tariff. Electro-Maxx receives USD 0.19 per kWh and Jacobsen USD 0.18 per kWh. Both producers operate thermal plants with a shared capacity of 136 MW. While the government has installed these plants to provide emergency power in the 2010s, the government still has to pay capacity charges to recover the initial investment costs and other fixed costs of the two companies. Besides, the tariff for the small hydro producers fluctuates close to and around the average (between USD 0.0221 and USD 0.101 per kWh). These two thermal producers have negotiated different rates with UETCL, while the regulator has established a standard tariff structure for all small-scale renewable energy plants (referred to as feed-in tariffs).

¹⁹ The ERA does not publish historic data for these tariffs, as it does for other tariffs. Therefore, only the 2018Q2 tariffs are presented.

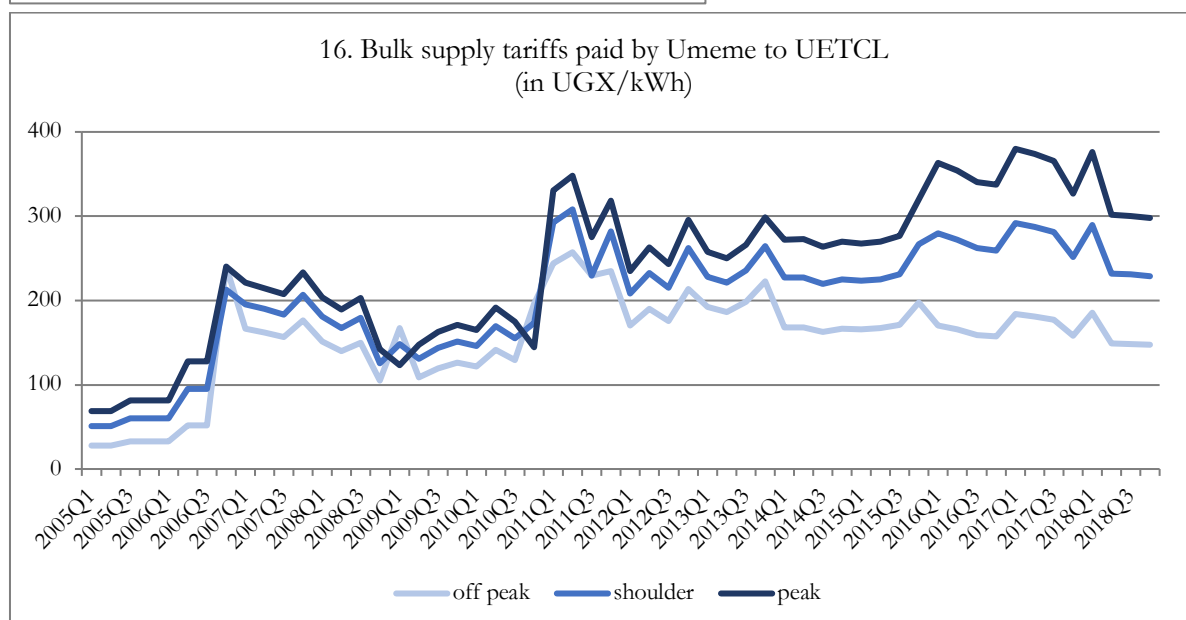
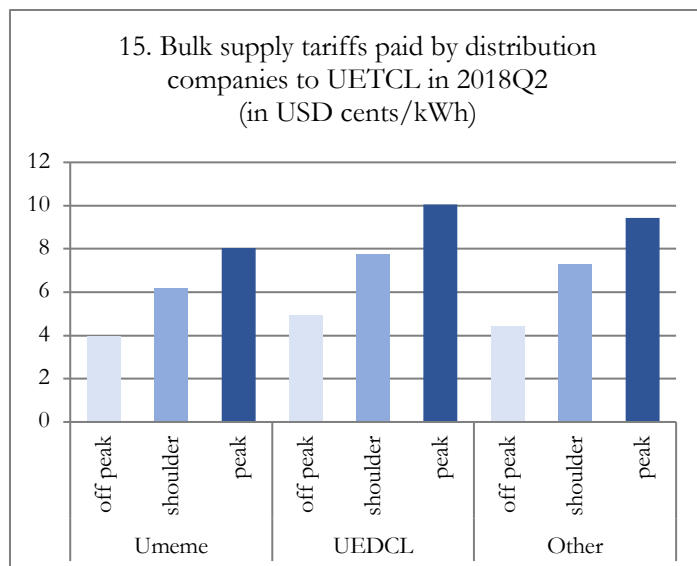


Source Figure 14: Electricity Regulatory Authority (2018).

7.2. Tariff paid by the distributor to the transmission company: bulk supply tariff

The distribution companies pay a bulk supply tariff to UETCL for their electricity. The ERA has introduced different tariffs for the peak, off-peak and shoulder periods of the day to incentivize a shift in demand for electricity to the off-peak and shoulder periods (even though generated capacity has comfortably met peak demand since the commissioning of the Bujagali dam). Figure 15 shows that Umeme paid the lowest and state-owned UEDCL the highest tariffs (during peak, off-peak and shoulder periods) in the second quarter of 2018.²⁰ Figure 16 shows the trend of the bulk supply tariff paid by Umeme to UETCL since the beginning of 2015. Although the overall trend of the tariff is upward, it has decreased in the beginning of 2018. Besides, the differences between the tariffs for each of the three demand periods in the day have increased since 2012.

²⁰ Data for all distribution companies is available since 2017Q3 (quarterly data). The ERA has only published data on the bulk supply tariff for Umeme for over more than a decade.



Source Figure 15 and 16: Electricity Regulatory Authority (2018).

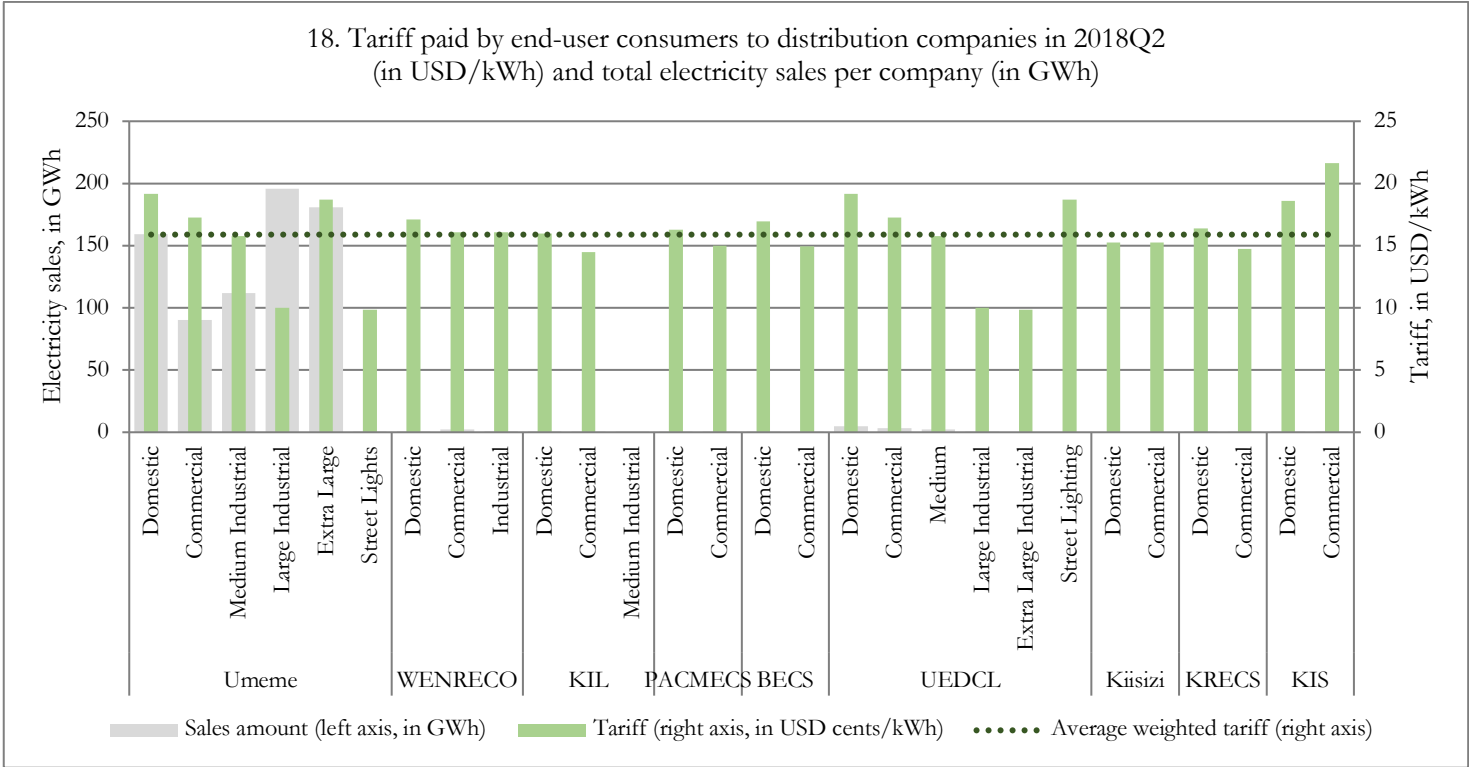
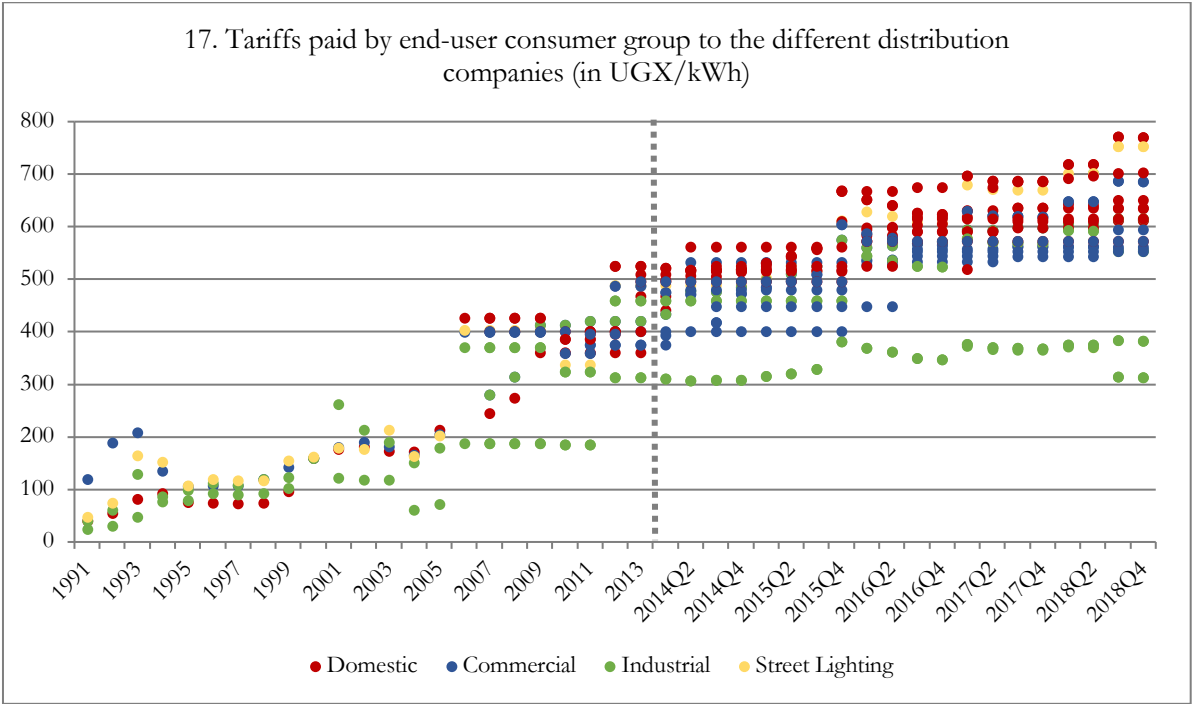
7.3. Tariff paid by the consumers to the distributors: tariff schedule

The ERA allows the distribution companies to charge different tariffs to different consumer types (domestic, commercial, industrial, and street lighting).²¹ Figure 17 shows the tariffs paid by end-user consumers to the different distribution companies – excluding life-line consumption – between 1991 and end-2018 (annual until 2014, quarterly from 2014 onwards). Generally, the tariff for industrial consumers has increased least over time and the distribution companies have charged industries the lowest tariff on average. Especially since 2012 the tariff increases for industries have lagged behind the increases for other consumer groups. Commercial consumers have consistently paid a higher average price to the distribution companies, but still below domestic consumers. Domestic consumers pay the highest average price of the three

²¹ The 1999 Electricity Act allows the ERA to prescribe different tariffs for different consumer groups.

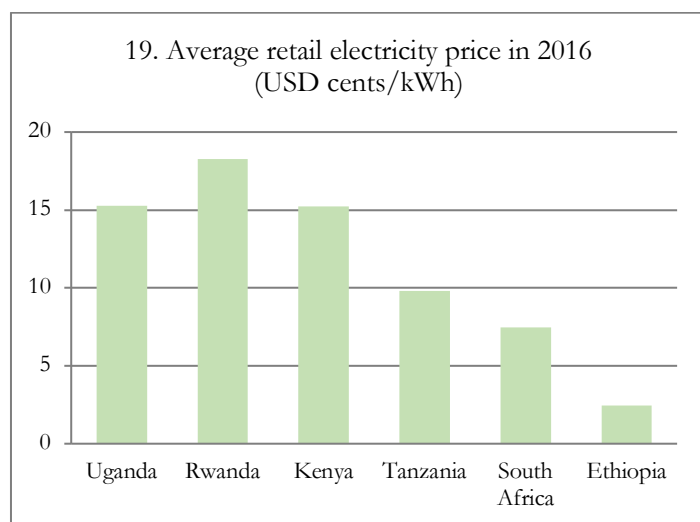
consumer groups, with the exception of the even more expensive street lighting tariff (but the electricity consumption used for street lighting in Uganda is marginal).

A lifeline tariff is in place for households’ first fifteen kWh electricity consumption per month. The lifeline tariff allows low-income households to consume a minimal amount of electricity at a subsidized rate. In 2019Q4, Umeme charges UGX 250 per kWh for the first fifteen kWh and UGX 752.5 per kWh for subsequent household consumption.



Source Figure 17 and 18: Electricity Regulatory Authority (2018).

The distributors charged the various consumer types different tariffs and they each follow different patterns. Figure 18 shows the tariff charged by the different distribution companies for each consumer group, together with their respective consumed quantities in 2018Q2. Umeme charges the extra-large industries a high tariff, while UEDCL charged extra-large industries its lowest tariff. Industries in general consumed most of the electricity, with Umeme charging different industry sizes wide-ranging tariffs; large industries were charged Umeme's lowest rate, while extra-large industries paid one of the highest tariffs and medium-sized industries paid a near-average tariff.



Source Figure 19: Electricity Regulatory Authority (2018).

Electricity in Uganda is not the most expensive but also not the cheapest compared to other Sub-Saharan African countries. Figure 19 shows the average retail power tariff in 2016 in a number of Sub-Saharan African countries. The average tariff in Uganda in 2018Q2 was USD 15.89 per kWh and Umeme's tariffs are the most important drivers of this average price given the fact that Umeme is responsible for more than 90 percent of sales. Uganda's electricity price was below Rwanda's and Kenya's tariff, but above the tariff of Tanzania, South Africa and Ethiopia.

8. References

- Adeyemi and Asere, 2014. A review of the energy situation in Uganda. *International Journal of Scientific and Research Publications*, 4/1. Retrieved from: <http://www.ijsrp.org/research-paper-0114/ijsrp-p2517.pdf>
- Bacon, R. (1999). A scorecard for energy reform in developing countries. *Public Policy for the Private Sector*, Note No. 175. Washington, D.C.: World Bank Group. Retrieved from <http://siteresources.worldbank.org/EXTFINANCIALSECTOR/Resources/282884-1303327122200/175bacon.pdf>
- Biryabarema, E. (2019, September 18). Uganda says Russia to help it develop nuclear power. *Reuters*. Retrieved from <https://www.reuters.com/article/us-uganda-russia/uganda-says-russia-to-help-it-develop-nuclear-energy-idUSKBN1W328N>
- Cabinet of Uganda. (2018). *Cabinet decisions taken during the Cabinet meeting held on Monday 10th September, 2018 at State House, Entebbe*. Retrieved from <https://www.theelephant.info/documents/uganda-cabinet-decisions-taken-during-meeting-held-on-10th-september-2018/>
- Cardoso, D., Mugimba, C., & Maraka, J. (2018). *Fiscal policy analysis. An assessment of the tax and subsidy options to accelerate solar home systems in Uganda*. Kampala, Uganda: Uganda Off-Grid Energy Market Accelerator. Retrieved from <https://shellfoundation.org/app/uploads/2018/12/Uganda-Fiscal-Policy-Analysis-Nov-18.pdf>
- Civil Society Organisations to the National Resources Committee of Parliament (CSO NRCP). (2019). *CSO mineral development position paper on the Uganda national budget framework paper FY 2019/20: What MPS should consider when debating the mineral development budget FY2019/20*. Kampala, Uganda: Government of Uganda. Retrieved from <http://csbag.org/wp-content/uploads/2019/02/CSO-position-paper-on-energy-sector-fy-2019-20.pdf>
- Ebenhard, A., Gratwick, K., Morella, E., & Antmann, P. (2016). *Independent power projects in Sub-Saharan Africa: Lessons from five key countries*. Washington, D.C.: World Bank Group. Retrieved from <https://openknowledge.worldbank.org/handle/10986/23970>
- Electricity Regulatory Authority (ERA). (2014). *Strategic plan 2015/15 – 2023/24*. Retrieved from <https://www.era.or.ug/index.php/resource-centre/publications/plans>
- Electricity Regulatory Authority (ERA). (2019). *Installed capacity*. Retrieved from <https://www.era.or.ug/index.php/stats/generation-statistics/installed-capacity>
- ESI. (2018). *Uganda: gov to regain operator status over power infrastructure*. Retrieved from: <https://www.esi-africa.com/industry-sectors/generation/ugandan-government-acts-regain-power-infrastructure/>
- Eskom. (2019). *Integrated report 31 March 2019*. Retrieved from http://www.eskom.co.za/IR2019/Documents/Eskom_2019_integrated_report.pdf
- GOGLA (Global Off-Grid Lighting Association). (2019). *Global off-grid solar market report semi-annual sales and impact data*. July-December 2019, Public Report. Retrieved from https://www.lightingglobal.org/wp-content/uploads/2020/04/global_off_grid_solar_market_report_h22019.pdf
- Government of Uganda, 1993. *Public enterprises reform and divestiture act*. Kampala, Uganda: Government of Uganda. Retrieved from <http://extwprlegs1.fao.org/docs/pdf/uga132676.pdf>

- Herrera-Estrade, J.E., Diffenbaugh, N.S., Wagner, F., Craft, A., & Sheffield, J. (2018). Response of electricity sector air pollution emissions to drought conditions in the western United States. *Environmental Research Letters*, 13/124032. Retrieved from: <https://iopscience.iop.org/article/10.1088/1748-9326/aaf07b/pdf>
- International Monetary Fund (IMF). (2013). *Energy subsidy reform in Sub-Saharan Africa: experiences and lessons*. Washington, D.C.: International Monetary Fund.
- International Monetary Fund (IMF). (2019). *Global financial stability report: lower for longer*. Washington, D.C.: International Monetary Fund. Retrieved from [file:///C:/Users/P99915458/AppData/Local/Packages/Microsoft.MicrosoftEdge_8wekyb3d8bbwe/TempState/Downloads/text%20\(1\).pdf](file:///C:/Users/P99915458/AppData/Local/Packages/Microsoft.MicrosoftEdge_8wekyb3d8bbwe/TempState/Downloads/text%20(1).pdf)
- Kwesiga, P. (2017, February 7). Small dams operate low capacity rivers run dry. *New Vision*. Retrieved from https://www.newvision.co.ug/new_vision/news/1445730/dams-operate-capacity-rivers-run-dry
- Ministry of Finance, Planning and Economic Development (MoFPED). (2017). *Strategic plan 2016 – 2021*. Kampala, Uganda: Government of Uganda. Retrieved from https://www.finance.go.ug/sites/default/files/Publications/MOFPED%20STRATEGIC%20PLAN%202016_2021%20printed.pdf
- Ministry of Finance, Planning and Economic Development (MoFPED). (2018a). *Medium term debt management strategy 2018/19 – 2021/22*. Kampala, Uganda: Government of Uganda. Retrieved from <https://www.finance.go.ug/sites/default/files/Publications/The%20Medium%20Term%20Debt%20Management%20Strategy%202018-19%202021-22.pdf>
- Ministry of Finance, Planning and Economic Development (MoFPED). (2018b). *Public investment plan FY2018/19 – 2020/21*. Kampala, Uganda: Government of Uganda. Retrieved from <https://budget.go.ug/sites/default/files/National%20Budget%20docs/PIP%20FY%20201819-FY202021.pdf>
- Ministry of Finance, Planning and Economic Development (MoFPED). (2019a). *Energy sector semi-annual budget monitoring report financial year 2018/2019*. Kampala, Uganda: Government of Uganda. Retrieved from <https://www.finance.go.ug/sites/default/files/Publications/Energy%20Sector%20Semi-Annual%20Sector%20Monitoring%20Report%20FY2018-19.pdf>
- Ministry of Finance, Planning and Economic Development (MoFPED). (2019b). *Public debt management framework FY2018/19-FY2022/23*. Kampala, Uganda: Government of Uganda. Retrieved from <https://www.finance.go.ug/sites/default/files/2018%20PDMF%20final%20for%20print%2022.07.19.pdf>
- Ministry of Finance, Planning and Economic Development (MoFPED). (2019c). *Budget speech financial year 2019/20*. Kampala, Uganda: Government of Uganda. Retrieved from <https://www.finance.go.ug/sites/default/files/Budget/FY%202019-20%20Budget%20Speech.pdf>
- Ministry of Finance, Planning and Economic Development (MoFPED). (2019d). *National budget framework paper FY2019/20 – FY 2023/24*. Kampala, Uganda: Government of Uganda. Retrieved from <https://budget.go.ug/sites/default/files/National%20Budget%20docs/National%20Budget%20Framework%20Paper%20FY%202019-20.pdf>

- Ministry of Finance, Planning and Economic Development (MoFPED). (2020a). *National budget framework paper FY2020/21 – FY2024/25*. Kampala, Uganda: Government of Uganda. Retrieved from https://budget.go.ug/sites/default/files/National%20Budget%20docs/National%20Budget%20Framework%20Paper%20FY%202020-21_0.pdf
- Ministry of Finance, Planning and Economic Development (MoFPED). (2020b). *Budget speech financial year 2020/2021*. Kampala, Uganda: Government of Uganda. Retrieved from <https://www.finance.go.ug/publication/budget-speech-financial-year-202021-stimulating-economy-safeguard-livelihoods-jobs>
- National Planning Authority (NPA). (2007). *Uganda vision 2040*. Kampala, Uganda: Government of Uganda.
- National Planning Authority (NPA). (2015). *Second national development plan (NDP II) 2015/16 – 2019/20*. Kampala, Uganda: Government of Uganda. Retrieved from <http://npa.go.ug/wp-content/uploads/NDPII-Final.pdf>
- National Planning Authority (NPA). (2020). *Third national development plan (NDP III) 2020/21 – 2024/25*. Kampala, Uganda: Government of Uganda. Retrieved from <https://www.fowode.org/publications/research/40-national-development-plan-3/file.html>
- Roelf, W. (2019, June 20). South Africa's Ramaphosa says Eskom too vital to fail. *Reuters*. Retrieved from <https://www.reuters.com/article/us-safrica-politics/south-africas-ramaphosa-says-eskom-too-vital-to-fail-idUSKCN1TL2E2>
- Rural Electrification Agency (REA). (2013). *Rural electrification strategy and plan 2013 – 2022*. Kampala, Uganda: Government of Uganda. Retrieved from <http://www.rea.or.ug/resources/strategy%20and%20plan%202013-2022.pdf>
- South African Government News Agency (2019). *Restructuring of Eskom a priority: Nxesi*. Retrieved from <https://www.sanews.gov.za/south-africa/restructuring-eskom-priority-nxesi>
- Uganda Bureau of Statistics (UBOS). (2018). *Uganda national household survey 2016/2017 report*. Kampala, Uganda: Government of Uganda. Retrieved from https://www.ubos.org/wp-content/uploads/publications/03_20182016_UNHS_FINAL_REPORT.pdf
- Uganda Electricity Generation Company LTD (UEGCL). (2019). *Annual report for the 12 months period ended June, 2019*. Retrieved from <https://www.uegcl.com/publications/annual-reports.html>
- Uganda Electricity Transmission Company LTD (UETCL). (2018). *Grid development plan 2018-2040*. Retrieved from <https://www.uetcl.com/images/final%20gdp%202018-2040b.pdf>
- Umeme. (2018). *Annual report 2018*. Retrieved from https://www.umeme.co.ug/umeme_api/wp-content/uploads/2019/05/Umeme-Limited_Annual-Report-2018_compressed-1.pdf
- World Bank. (2019). *Project information document (PID)*. *Uganda Energy Access Scale-up Project*. Retrieved from https://www.umeme.co.ug/umeme_api/wp-content/uploads/2019/05/Umeme-Limited_Annual-Report-2018_compressed-1.pdf

Annex 1. Planned projects in the Public Investment Plan FY18/19-20/21 (in billion UGX)

Name of project	Project value	Type of project	17/18 budget			18/19 MTEF projections		
			Domestic funding	Donor funding	Total	Domestic funding	Donor funding	Total
Promotion of renewable energy and energy efficiency	57	General/renewable	3.807	29.050	32.857	3.807	0	3.807
Bujagali interconnection project	150	Transmission	4.689	0	4.689	4.527	0	4.527
Karuma interconnection project	54	Generation and transmission	9.360	0	9.360	29.290	0	29.290
Mputa interconnection project	211.7	Transmission	1.200	0	1.200	2.500	0	2.500
Mbarara-Nkenda/Tororo-Lira transmission lines	300	Transmission	8.195	0	8.195	10.650	0	10.650
NELSAP: Bujagali-Tororo-Lessos and Mbarara-Mirama-Birembo transmission lines	103.8	Transmission	7.000	0	7.000	2.500	7.560	10.060
Hoima-Kafu interconnection	7.8	Transmission	2.340	0	2.340	1.000	0	1.000
Electricity sector development project	300	Transmission	4.672	47.826	52.498	23.100	62.297	85.397
Opuyo Moroto interconnection project	202	Transmission	3.000	0	3.000	4.000	37.802	41.802
Electrification of industrial parks project	350	Transmission	5.040	94.990	100.030	25.000	94.583	119.583
Kampala-Entebbe expansion project	79.680	Transmission	25.688	4.466	30.154	22.100	13.042	35.142
2*220KV Kwanda Line Bays at Bujagali substation	10	Transmission	0.818	0	0.818	0.200	0	0.200
Mbale-Bulambuli transmission line and substation	265	Transmission	0.500	0	0.500	4.950	0	4.950
New Nkenda substation	55.4	Transmission	0.500	0	0.500	0.200	0	0.200

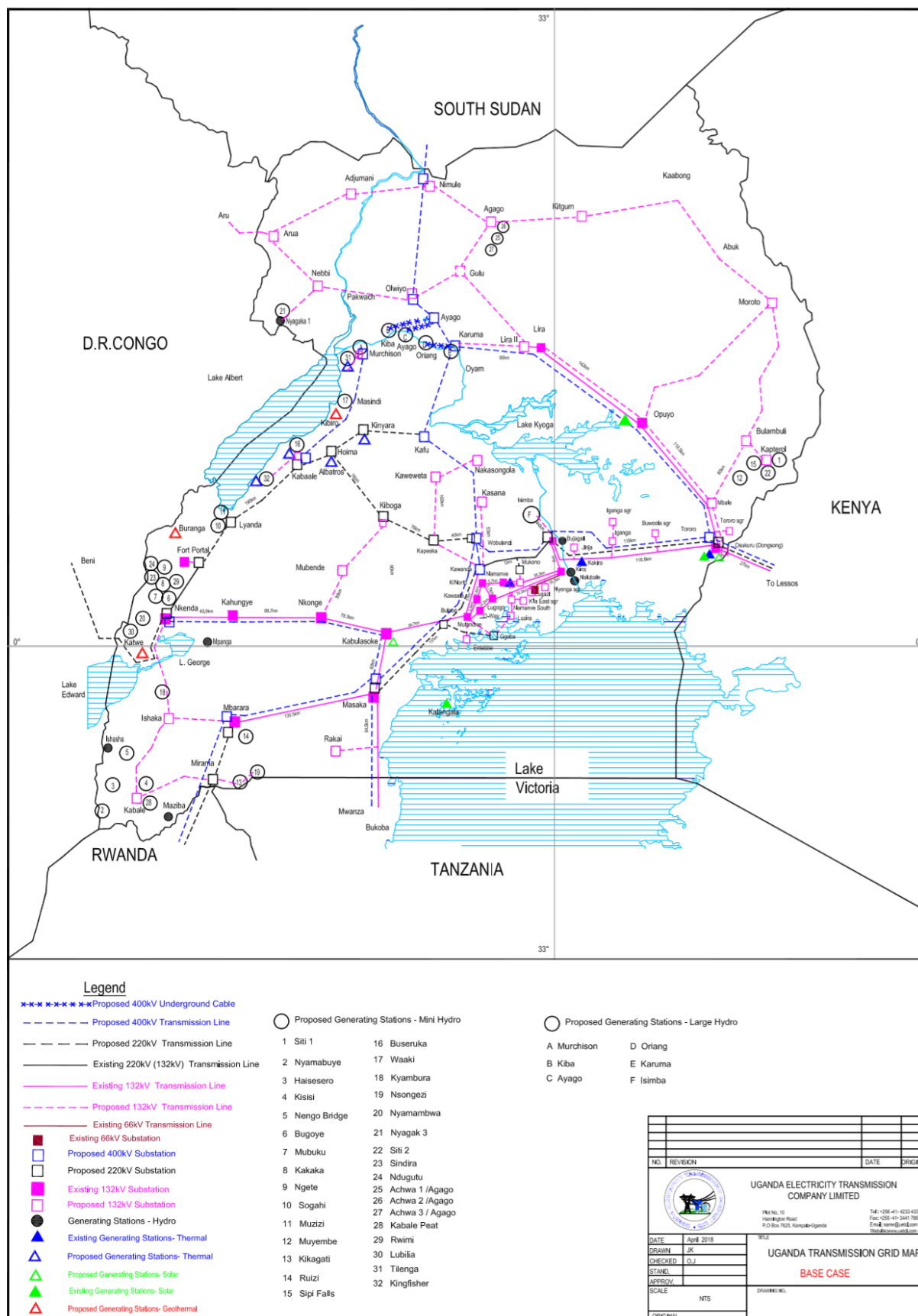
Network manager system and emergency control center	22	General	0.200	0	0.200	0.200	0	0.200
Lira-Gulu-Agago transmission project	66	Transmission	0.950	0	0.950	0.200	0	0.200
Nuclear power infrastructure development project	81.4	Nuclear	3.000	0	3.000	3.000	0	3.000
Mirama-Kabale transmission project	253,007	Transmission	7.200	39.535	46.735	7.200	101.120	108.320
Grid expansion and reinforcement project Lira, Gulu, Nebbi to Arua Transmission line	382	Transmission	10.200	38.931	49.231	13.300	139.828	153.128
Energy for rural transformation phase III	249.6	Generation	5.267	6.700	11.967	5.267	31.300	36.567
ORIO mini hydro power and rural electrification project	145	Generation and distribution	1.000	0	1.000	8.000	0	8.000
Kampala metropolitan transmission system improvement	485.5	Transmission	1.765	23.500	25.265	7.500	46.874	54.374
Masaka-Mbarara grid expansion line	475.5	Transmission	2.000	23.500	25.500	7.000	101.309	108.309
Construction of Isimba hydro power dam and the Isimba-Bujagali transmission line	1,764	Generation and transmission	19,937	418.550	438.487	19.937	0	19.937
Construction of Karuma hydro power dam and the Karuma-Kawanda transmission line	5,400	Generation and transmission	27.142	762.836	789.978	27.142	576.749	603.891
Muzizi hydro power project	319	Generation	4.517	66.446	70.963	4.517	122.395	126.912
Nyagak III hydro power project	67.150	Generation	2.293	0	2.293	0.293	0	0.293
Institutional support to Ministry of Energy	80	General	12.805	0	12.805	9.805	0	9.805
Total	264,690.53		172,119.97	1,556,330.00	1,728,549.97	246,093.09	1,334,859.00	1,580,952.09

Annex 2. Overview of power generation plants and independent power producers

Name of company (GENCO)	Name of plant	Technology	Energy capacity (MW)	Year commissioned
Kakira Sugar Works	Kakira	Bagasse	51.1	2009
Kinyara Sugar Works	Kinyara	Bagasse	14.5	2010
Sugar & Allied Uganda	Sail Kaliro	Bagasse	11.9	2015
Sugar Corporation of Uganda	Sugar Corporation of Uganda	Bagasse	9.5	1998
Mayuge Sugar	Mayuge	Bagasse	9.2	2015
Bujagali Electricity	Bujagali	Large hydro	250	2012
Eskom (U)	Nalubaale	Large hydro	180	1954
	Kiira	Large hydro	200	2000
UEGCL	Isimba	Large hydro	183	2019
Berkeley Energy	Achwa II	Large hydro	42	2019
AEMS	Mpanga	Small hydro	18	2011
	Nyamwamba	Small hydro	9.2	2018
Eco-power	Rwimi	Small hydro	5.5	2017
	Ishasha	Small hydro	6.6	2011
Elgon Hydro Siti	Siti I	Small hydro	5	2017
	Siti II	Small hydro	16.5	2019
Hydromax	Nkusi	Small hydro	9.6	2018
	Waki	Small hydro	4.8	2018
	Kabalega	Small hydro	9	2013
Tronder/Bugoye Hydro	Bugoye	Small hydro	13	2009
Muvumbe Hydro (U)	Muvumbe	Small hydro	6.5	2017
Tibet Hima Mining	Mubuku I	Small hydro	5	1956
Kasese Cobalt Company	Mubuku III	Small hydro	9.9	2008
Lubilia Kawembe Hydro	Lubilia	Small hydro	5.4	2018

Mahoma (U)	Mahoma	Small hydro	2.7	2018
Butama Hydro-Electricity	Sindila	Small hydro	5.3	2019
Ziba (U)	Ziba Kyambura	Small hydro	7.6	2019
Ndugutu power company limited	Ndugutu	Small hydro	5.9	2019
Access Uganda Solar	Soroti	Solar	10	2016
Tororo Solar North	Tororo	Solar	10	2017
MSS Xsabo Power	Kabulasoke	Solar	20	2018
Emerging Power (U)	Mayuge	Solar	10	2019
Electro-Maxx (U)	Tororo	Thermal	50	2010
Jacobsen (U)	Namanve	Thermal	50	2008

Annex 3. Map with the current and proposed infrastructure of UETCL



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