

The Performance of the Free Electricity Connection Policy in Uganda

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Abstract

This study provided an analysis of the free electricity connection (FEC) in Uganda's household and to describe how electricity reforms in Uganda will enhance the country to achieve universal electricity. Ugandans on the electricity grid in the country is still low in spite of the policy due to high costs experienced during house wiring, acquiring a wiring certificate and inspection paid to Umeme as the electricity distributor in the country. The study used an exploratory research design to explore the level of access to electricity in both rural and urban areas given the growth in population in Uganda. The data used was secondary and it was obtained from UMEME and World Bank development indicators. The analysis involved descriptive statistics, an independent t test, correlation, Spearman's rank correlation, and Pearson's correlation. The results indicated that, Rural Electrification Agency (REA) strongly managed to make more connections (138,895) at a rate of 231.5 USD, under REA, it took 94 waiting days to make 138,895 connections, the number of electricity connections made through the no pole and pole services had different variances from January to July 2020 as indicated by a P-value of 0.000 which is below 0.05 level of significance, access to rural electricity increased to 38.02% in 2018 from 24.41% in 2017 recording a percentage of increase of 13.61%, the growth in population has a strong positive and significant association with access to electricity in rural areas of Uganda ($r=76.9\%$, $P\text{-value}<0.01$), there is a significant and positive strong relationship between population growth and urban access to electricity ($r=85\%$, $p\text{-value}<0.01$). The findings indicate that the free connection policy has played a significant role towards improving access to electricity in Uganda.

Keywords: free electricity connection policy, Uganda

Background of the Study

Uganda has considerable power asserts, specifically renewable and other hydrological asserts, so far there is extensive poverty in the energy sector across the nation. The nation's energy zone suffers extensive issues together with severe power deficiencies, improved demand, and a delay to authorize the new power-generation establishments. Global warming has had an influence on hydropower production; while venture in other arrangements of renewable assert energy is vulnerable with the high initial technological costs like solar energy. The increasing oil prices internationally makes thermal power production expensive, while fuel-supply restraints prevent thermal power production. Besides, prolonged procurement procedures interrupt the operation of energy assert establishments in the country. In early 1997, the Ugandan government prepared a Strategic Plan to improve the energy assert industry. The initiative was led by the Ministry of Energy and Mineral Development (MoED) with the aims of: increase efficiency in the energy sector, to cater for the growing electricity demand and coverage, stimulate electricity quality and reliability, captivate entrepreneurs and private capital to enhance the commercial performance of the sector and exploit the export opportunities (Tumwesigye et al. 2011).

Recently, Ugandan government disseminated a relevant law including the new Electricity Act. This followed the creation of an independent ERA, accomplished the objective of financial sustainability of the sector with a good track record. The former government-owned Uganda Electricity Board was privatized into three isolated units accountable for generation Uganda Electricity Generation Co. Ltd (UEGCL),

transmission Uganda Electricity Transmission Co. Ltd (UETCL) and distribution Uganda Electricity Distribution Co. Ltd (UEDCL), of the distribution and generation facilities were franchised to the private investment sector. The percentage of Ugandan homes with access to electricity connection installations has improved. The Ugandan government has continuously encouraged off-grid and private-sector-led grid rural electrification and recognized a Rural Electrification Agency (REA). Investments were made to offer suitable and consistent service. The government of Uganda cooperated with the East African Region on power interconnectedness with shared benefit to all stakeholders through alternative supply sources and dropping investment costs through enjoying economies of scale.

Notwithstanding the accomplishments of the ruling party since 1997, the energy sector still endured problems. Forecasting for contemporary energy supply, electricity especially, has been inadequate largely to semi-urban areas and urban. The power distribution systems continued to be insufficient and wasteful, due to underdeveloped in production dimension, transmission remains poor and delivery infrastructure and poor marketable utility processes. The energy sector seriously requires significant investment and sensible to utility customs. It's not easy to achieve sustainable development in Uganda, since it mismatches with the poverty levels widespread in the country. The state had a problem of increasing affordable access, adequate and reliable electricity supplies as one of the ways to address poverty challenges in the country.

The energy sector is the link to the other segments of the economy, and is a vibrant contribution for many other sectors. It contributes to revenue, and choices taken in other sectors have a straight orientation on the presentation of the performance of other sectors. In order to solve the impending energy in Uganda, the government enacted a free electricity connection policy in 2018 was in line with the Poverty Eradication Action Plan (PEAP) to reduce poverty and implement Plan for Modernization of Agriculture (PMA) in Uganda since 35% still leave below the poverty line.

In Uganda six out of ten people fear to go to the electricity distribution company (Umeme) because of the high connection installation fees and seven out of ten people perceive access to affordable electricity is bad (UBOs 2015, Blimpo, McRae, and Steinbuks 2018) because of lack of money to pay connection installation fees which range from 98,000 UGX to 326,000 UGX. Therefore, one of the ways to improve modernization was to ensure increased access to electricity hence the free electricity connection policy (Wesonga 2016). The policy intended to increase access to electricity services within the distribution network for electricity. Since 2018 Umeme has connected to a tune of about 243,310 consumers on the grid compared to 70,000 since 2017. The major aim of the policy was to ensure universal access by 2035 (REA 2020) and government of Uganda engaged stakeholders to fund this project which included; World Bank, European Union, African Development Bank, the German Development Bank, Islamic Development Bank, French Development Agency, GIZ-ENDEV, USAID, Norwegian government, Power Africa and the Exim Bank of China and utility companies across the country that include; Umeme, Kilembe Investments Limited, WENRECo, UEDCL, Kyegegwa Rural Electricity Cooperative Limited (KRECS), Pader Abim Multipurpose Electric Cooperative Society (PACMECS), Bundibugyo Energy Electric Cooperative (BECS), Kalangala Infrastructure Services (KIS) (REA 2019).

EFP requires that Ugandans to wire their houses and pay for a wiring certificate before they submit their requests for free power connection. The wiring certificate should be awarded by a certified wiring electrician by ERA. The target according to the minister in charge was 1.28 million new service connections in short term, by 2020 the aim was to achieve 22% compare to 15% in 2017/2018 of Ugandans on the grid and by 20140 achieve universal electrification (Mulono 2018). According to Umeme a utility company, applications for power connection installation have increased by 53.8% this is ascribed to ECP were Ugandan government demands that 0.3 million Ugandans should be connected on a yearly basis. Umeme receives a tune of 1000 applications which far above by 22% recommended by ECP. On a daily basis they receive 650 hence Ugandans welcomed the policy as the utility companies expand on the infrastructure lines, transformers and substations. The government intends to increase access from 24% in 2020 to 60% by 2027 (Ladu 2019). Umeme has suspended power distribution connections for ECP due to lack of funds

by June 2020 Umeme demanded \$25 million from ERA for customers already connected on the grid and enjoying power (Kasemiire 2020, Babungi 2020, Kauju 2020).

Electricity Regulatory Authority (ERA) approved 2700 certified electricians authorized to install electricity wiring in premises (ERA 2020) in accordance to Electricity Act, 1999, Section 88 (GoU 1999) and own a Wiring Permit (WP). This number of certified electricians is less given the launch of the free electricity connection policy in 2018 and the expected increase (1854.2 MW) in power generation the country needs up to 4000 electricians to meet the demand. The electricians are expected to have a minimal of a certificate training and further training is offered at no cost as long as they possess a driving permit for class D and C. This campaign goes along with a slogan of #PawaKapo that aims to increase 60% electricity access by 2040 and its reducing the number of Kamyufus (in local language-black market electricians who provide poor quality electrical installations and connections and work closely with formal Umeme staff to give a free service at a cost) (ERA 2020). The districts intended to benefit from this project include Kapchorwa, Madi Okollo, Kibuku, Kassanda, Isingiro, Kumi, Otuke, Omoro, Adjumani, Kyegegwa, Kiboga, Kibaale, Kanungu, Bundibugyo, Rakai, Bugiri, Manafa, Nakasongola, Kiryandogo, Luwero, Alebtong, Amuria, Soroti, Mbale, Manafwa, Serere, Ngora, Bukedea, Kaliro, Iganga, Luuka, Gulu and Nwoya by 2019/2020 (REA 2019).

The free electricity connection policy (ECP) was introduced in Uganda to improve on access to electricity in all parts of country due to low access¹ rate from the national grid. In 2018/2019 financial year, the policy made a tremendous electricity connection contribution where 149,831 households were connected to the national grid which was far above the target of 120,457 connections thus increasing access to electricity to 28%². However, before the introduction of the free electricity connection policy, Uganda had interventions like rural electricity project which was also geared towards extending electricity to rural areas throughout the country. Thus, the current study made an attempt to assess the extent to which the free connection policy has improved access to electricity connection in Uganda.

Purpose of the study

The study was generally aimed at assessing the extent to which the free connection policy has improved access to electricity connection in Uganda.

Specific objectives

- i. To assess the influence of connection charges on the level of electricity connection under Electricity Connection Policy (ECP) in Uganda
- ii. To examine the effect of waiting connection days on the number of electricity connections made under Electricity Connection Policy (ECP) in Uganda
- iii. To establish whether there is a mean difference between the number of electricity connections made through the no pole and pole services under the Electricity Connection Policy in Uganda
- iv. To examine the relationship between population growth and access to electricity in rural areas of Uganda.
- v. To establish the relationship between population growth and access to electricity in urban areas of Uganda.

Research questions

- i. What is the influence of connection charges on the level of electricity connection under Electricity Connection Policy in Uganda?
- ii. What is the effect of waiting connection days on the number of electricity connections made under Electricity Connection Policy in Uganda?

¹ <https://www.pmldaily.com/news/2018/10/free-electricity-connection-policy-set-to-kick-off.html>

² UN Women. (2019). How Gender and Equity Responsive is the Energy Sector? BMAU G&E Briefing Paper

Study Hypotheses

The following alternative hypotheses guided the study;

Ha₁: There is a significant mean difference between the number of electricity connections made through no pole and pole services under the ECP in Uganda

Ha₂: There is a significant relationship between population growth and access to electricity in rural areas of Uganda.

Ha₃: There is a significant relationship between population growth and access to electricity in urban areas of Uganda.

Literature Review

Context of utility reforms

Uganda Government approved the liberalization economic through an economic policy in the early 1990s and by 1992, Uganda had over 140 state-owned companies. In 1993, the government of Uganda enacted a statute to enable legislation to create room for utility reforms and implementation of privatization commonly known as Public Enterprises Restructuring & Divestiture (PERD) Statute 1993. The objective of PERD statute was to design strategies for divestiture and reforms in utility enterprises, classify public enterprises, design institutional framework to guide implementation of policy and to enable Ministry of Finance and Economic (MoFED) Development implement the Privatization Program and Utility Sector Reform Project (PUSRP) which resulted into 113 state owned companies being privatized (D'Ujanga 2020).

Synopsis of the power sector

Precedent to the establishment of reforms in the power sector, it was subjugated by an upright unified utility board commonly known as the Uganda Electricity Board (UEB). UEB performed both a governing role and a monopoly of production, transmit and distribute electric power to Ugandans. Additionally, the board had export arrangements with the neighbouring countries. Presently, about 9% Ugandans are connected on the grid which totals up to 220,000 households. A number of reasons validated the need for power sector reforms; the need to end monopoly as a result of the establishment of Private Sector Led Economic growth, low power efficiency i.e., undependable and inconsiderable quality that inhibited business growth and high losses cited by 40% as a result of power thefts, need for private investment, low grid access coupled with low coverage of electricity, failure to service the utility debts, wrong billing, delayed connections, irregular service, frustrated export potential and customer dissatisfaction (D'Ujanga 2020, Mawejje, Munyambonera, and Bategeka 2013).

Strategies for power sector reform

In 1999, government of Uganda introduced PSRPS with the aim of ensuring efficiency in the sector and financial viability, meet the growing demands and improve coverage, end monopoly in the electricity sector, involve private investment, regulation in the electricity sector Electricity Regulatory Authority (ERA), to implement privatization, increase quality and consistency in supply of electricity, acquire isolated capital and investors and opportunities for exports (Mawejje, Munyambonera, and Bategeka 2012).

The legal, regulatory and institutional framework

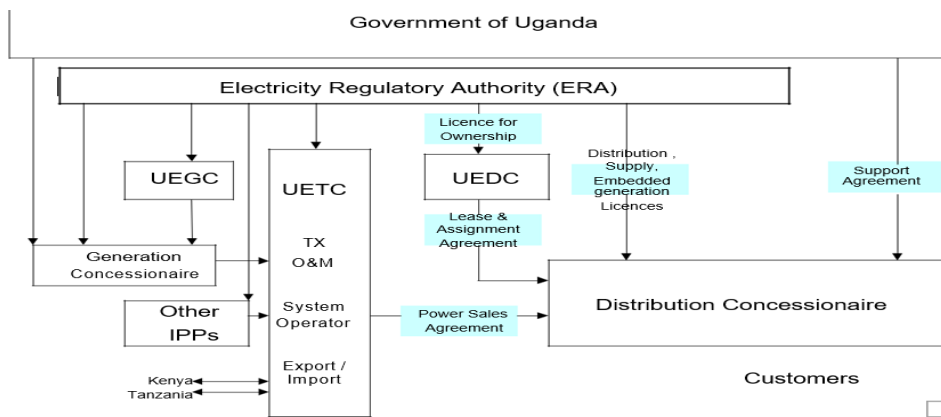
- a) The 1964 Electricity Act
- b) The PERD Statute, 1993
- c) The 1999 Electricity Act
- d) The Utility Reform Unit (URU) under MFPED
- e) The Divestiture & Reform Implementation Committee (DRIC) with a team of Cabinet Ministers.
- f) The Electricity Regulatory Authority (ERA) was established in April 2000.

The sale of UEB

- a) There was need for economic, legal and conservational viability study; Register and assessment of UEB liabilities and asserts;
- b) Allocation and broadcasting asset need investigation;
- c) Income and tariff modelling;
- d) Account for regulations, licenses, franchise and sale agreements for power.

Successor companies to UEB

The sale of UEB began on 1st April 2001 as begun with Uganda Electricity Generation Co. Ltd (UEGCL) that owns the two major hydro-power plants at Nalubaale (180 MW) and Kiira (200 MW), Uganda Electricity Transmission Co. Ltd (UETCL) which retains and functions with the transmission infrastructure above 33 kV, Uganda Electricity Distribution Co. Ltd (UEDCL) that possesses and works on the distribution network at 33 kV under Uganda Electricity Board (Statutory Corporation) for wind up purposes, Ugandan government adopted the methodology of privatizing UEGCL & UEDCL through long-term concessions and UETCL that assists as the power super highway is to continue with Government for the time being (D’Ujanga 2020).



The Contractual Structure

An outline of generation concession

Umeme was given a 20-years Concession agreement through Eskom (U) Ltd (the Concessionaire) to sustain and run the Nalubaale and Kiira hydroelectric power stations owned by UEGCL. In addition, the Concessionaire agreed that; pay an upfront transaction fee to Government. Dedicated to a settled investment programme, pay a monthly concession fee to UEGCL to take care of the assets it runs, obtain from UETCL a scheduled monthly bulk payment for the power it sells. Umeme Ltd., was established by a Consortium; Globeleq and Eskom Enterprises and concession included Umeme and other parties inward bound of a number of arrangements/ contracts including but not limited to: lease and Assignment Agreement with UEDCL, ssustenance Agreement with Government of Uganda, power Sales Agreement with UETCL and licence by ERA for distribution, supply, and entrenched generation (D’Ujanga 2020).

The Agreements

The Lease/tenancy and Task Agreement included features such as; 20 year contractual period to operate the distribution network owned by UEDCL and collection of revenues from all associated customers grounded on the tariff set by the Electricity Regulatory Authority (ERA),responsibility to make minimum annual investments/income in the current operating system for restoration and strengthening, the obligation to give back the regulated assets, plus all invested new capital, to UEDCL at the end of the lease, but with a payment for any un-devalued new properties, a responsibility for UEDCL to finish the assert investments

previously financed and currently under operation (e.g. African Development Bank Urban Power Rehabilitation Project) (D'Ujanga 2020).

The supply and distribution licenses

Limited rights to provide electricity in an areas up to one kilometre circular distance from the current supply lines, with additional firms being permitted to contest to supply electricity outside this area, a responsibility to offer service within the area of exclusiveness, in the Electricity Act the tariff structure and relations of distribution are arranged by ERA, applications for tariffs they wish to charge are filed and approval is done basing on the inflation, foreign exchange and fluctuations, stakeholder consultations i.e., hearing public in the review process, approval of licenses is done on quarterly basis, approval of a license is done by wide consultation of stake holders and all based on revenue requirements and loses (D'Ujanga 2020).

Rural electrification

At the end of the electricity reforms, rural electrification was assumed by a Rural Electrification Board (REB) that achieves a Rural Electrification Fund (REF). The secretariat of the REB is the Rural Electrification Agency (REA). The source of funds REF includes annexation by parliament, surplus from operations of the regulator (ERA), Charge on broadcast of bulk acquisitions of electricity and gifts, grants, loans and donations.

Position of competition in the electricity sector

Competition was announced into the sector by licensing of independent power producers (IPPs) in Uganda and a number of IPPs currently obtained operational Permits from ERA to carry out viability studies on locations with the possibility to produce mini-hydro power.

Table 1

Milestones from Power Sector Reform

Strategy	Year
Power Sector Restructuring and Privatization Strategy (PSRPS)	June 1999
Electricity Act Passed by Parliament	Nov 1999
Commencement of the Implementation of the Uganda Electricity Board (UEB) Privatization	April 2000
Appointment of Commissioners of the Electricity Regulatory Authority (ERA)	April 2000
Unbundling of the UEB and Establishment of Generation, Transmission and Distribution Successor companies	April 2001
Issuing of Final Request for Proposals (RFP) with Transaction Documents	April 2002
Signing of Electricity Generation Concession proposal	July 2002
Signing of Electricity Distribution Concession	May 2004
Expected transfer of distribution concession	October 2004

How to get connected

Ugandans are expected to wire their houses and acquire a wiring certificate from the certified electrician by ERA then go to the utility company Umeme and pay inspection fees worth 20,000 UGX with documents such as a passport photo, National identification card, proof of ownership, letter from the local council, then the customer should ensure that the neighbours are connected to electricity and the applicant is within 60 metres from the connected electricity pole then wait for one month to enjoy the service (Albert 2019).

Wins in the Electricity sector

- a) Liberalization of power sector welcomed private investment in the sector which lead to growth of the economy
- b) Rivalry and competition were stimulated in the electricity sector

- c) Rural Electrification has increased access of electricity to rural communities
- d) There is increased accountability, efficiency and transparency in operations and service delivery and this is expected to improve further.

Wins for ECP

- a) Increased number of customers connected on the electricity grid
- b) Increased grid extension to 20,000 km compared to 6000km network coverage by ERA
- c) Increased donor support to achieve electricity for all or Energy Access Scale-Up in including European Union the African Development Bank, World Bank (WB), the German Development Bank (KfW) the Islamic Development Bank, the French Development Agency (AFD), GIZ-ENDEV and the Exim Bank of China.
- d) Availability of electricity has increased students' revision which will later impact on the performance.
- e) Customers are only required to pay inspection fees of 41,300 UGX to get power connection installation and the inspection fees have further been reduced to 20,000 UGX following complaints from Ugandans that it is still expensive and many can't afford to pay.
- f) Reduced illegal connections in both rural and urban areas.
- g) Reduced marginalization by exposing Ugandans to modern forms of electricity hence improve productivity
- h) Scale up multi-technology
- i) Increase utility companies avoid monopoly
- j) Reduce on the number of Ugandan who use Kerosene and firewood to reduce deforestation
- k) In support of the national vision 2040 which will help transformation of Ugandans from peasant to modern economy.
- l) Improved energy efficiency in the country as a result of increased generation.
- m) Electricity availability will activate commercial activities in agriculture, service industry, ICY and manufacturing hence economic growth
- n) The project has reinforced power capacity in the country
- o) Reliable and affordable power in the country as a result of increased customers on the grid
- p) Reduced power losses (currently at 17%) as a result of improved technology i.e., prepaid electricity metering (Yaka meters).
- q) Improved reporting, transspecies and accountability in the industry

Challenges ECP

- a) Governance and operational issues especially in implementation schedules
- b) Inadequate human resources
- c) The deviation between implementation agencies and agreements ie., utilities companies, government policy and REA
- d) REA is clear on which Ugandan qualify for ECP its general hence a state of confusion especially when customers apply and they are told they don't qualify.
- e) According to the development partners involved the service provided for is no pole service or one pole service but customers request for power that requires three and above poles.
- f) Disappointed Ugandan who don't qualify for the service
- g) Shortage of surveyors and the Utility company Umeme requires an additional 200 surveyors to be able to meet the demands of government.
- h) Over worked employees who claim that they work seven days than five day without allowances and no annual leave.
- i) In rural areas houses are far apart not close to each other like it is with Kampala and Wakiso hence vehicles are not enough to facilitate movements of surveyors

- j) Delay to release payment to the utility company Umeme which leads to long service level agreements caused by REA's auditors since they have to audit every application and move to the field to confirm the power connections on ground.
- k) Power line construction disrupts land use, clearing land and deals away with water systems if electricity projects are to succeed.
- l) Delayed compensations of acquired land by government.
- m) Delayed release of matters by Uganda National Bureau of Standards (UNBS) slow the government policy and initiative.
- n) ERA has delayed to consider approval of the purchase of vehicles to facilitate timely movement for easy power connection installations in line with the impact it has on the tariff and the utility capacity to fund.
- o) Increased costs of business to the utility companies i.e., Umeme recruited additional 100 technicians in order to meet the government targets on ECP
- p) Wiring costs, inspection fees remain high for most Ugandans thus government should house wiring affordable
- q) Umeme has obsolete power transformers, new sub stations, power evacuations-powerlines, sub-stations and transformers, new networks across the country, and switchgears and there is need for new ones given the increased demand
- r) Failure to complete projects timely
- s) Risk for returning the un used funds to donors unless approval is granted for extension
- t) Risk of withdrawing funds
- u) Slow project performance hence exposing the project at risk.
- v) Resistance to change by staff
- w) Reduced cases of electrocution

Methodology

The study used an exploratory research design to explore the level of access to electricity in both rural and urban areas given the growth in population in Uganda. The data was obtained from UMEME and World Bank development indicators. The preliminary analysis involved describing the behaviour of the variables using descriptive statistics (mean, maximum, minimum). To answer the hypotheses, an independent t test and correlation analysis were employed. Spearman's rank correlation analysis was applied where variables were not normally distributed while Pearson's correlation was employed when analysing variables which followed the normal distribution. The study also employed descriptive analysis to provide answer to research questions.

Findings

The findings are presented in light with the specific objectives of the study. The first step presents the descriptive statistics of the study variables to ascertain whether they follow the normal distribution or not.

Descriptive statistics of the study variables

This section presents the distribution of the variables in the study using descriptive statistics as shown in Table 1 below;

Table 1

Descriptive Statistics of the Study Variables

	N	Minimum	Maximum	Mean	Normality test
Total Population (millions Annual)	12	29.5	42.7	35.514	0.840*
Rural access to electricity (%age of rural population)	12	1.86	38.02	11.5583	0.014
Urban access to electricity (%age of urban population)	12	45.00	57.50	51.9144	0.429*

**Normally distributed at 5% level (P-value>0.05)*

Source: Author's own computations from World Bank development indicators (2020)

The results from table 1 show that population growth and urban access to electricity were normally distributed from 2007 to 2018 at 5% level of significance. The findings reveal that the maximum level of rural access to electricity from 2007 to 2018 was at 38.02% while in urban was standing at 57.50%. This implies that between 2007 and 2018, people in urban areas had much more access to electricity from the national grid compared to people in rural areas.

The influence of connection charges on the level of electricity connection under ECP in Uganda

The study made an investigation to find out how the connection charges affect the number of electricity connections made in Uganda based on different service providers. The findings are presented in Table 2 below;

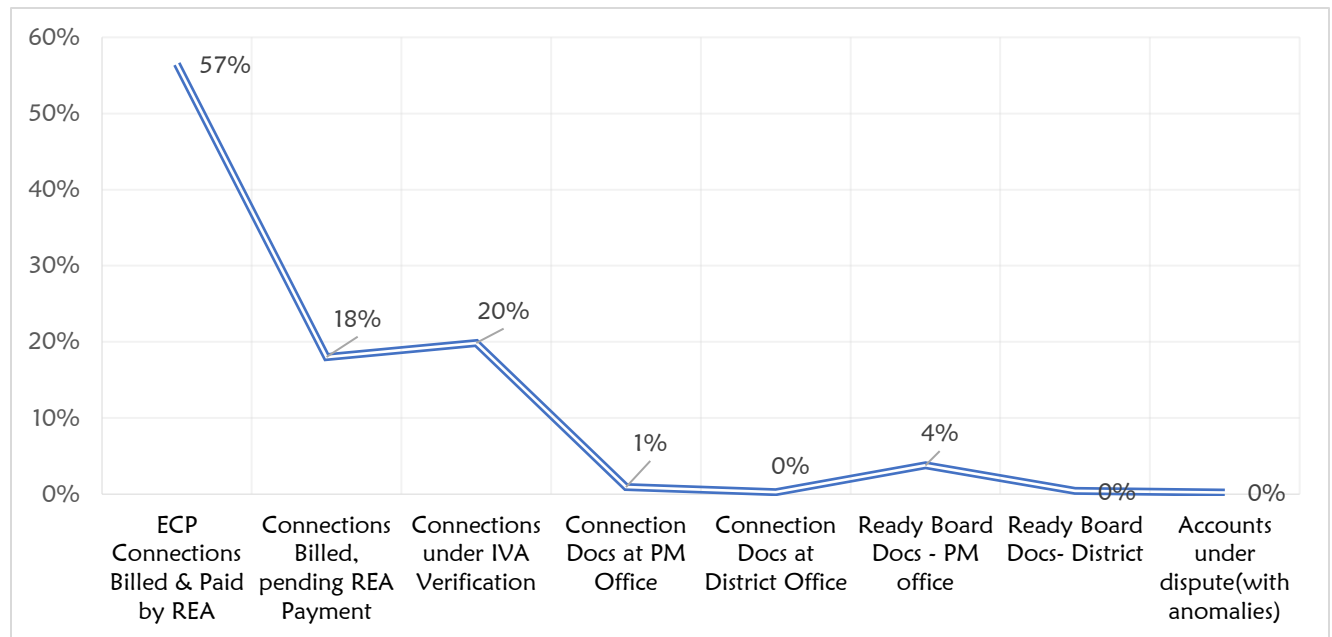
Table 2

The Number of Electricity Connections Verses the Value of Connection under the ECP (by the end of July 2020)

Service providers	Number of electricity connections	Net Value of electricity connection (USD)	Unit Cost of electricity Connection (USD)
ECP Connections Billed & Paid by REA	138,895	32,154,185	231.5
Connections Billed, pending REA Payment	44,300	11,078,452	250.1
Connections under Independent Verification Agency (IVA)	48,824	11,495,345	235.4
Connection Docs at PM Office	2,264	688,612	304.2
Connection Docs at District Office	668	203,177	304.2
Ready Board Docs - PM office	9,282	1,583,965	170.6
Ready Board Docs- District	1,081	184,472	170.6
Accounts under dispute (with anomalies)	517	89,172	172.5

Source: Author's own computations from UMEME (2020)

The results from Table 2 above indicate that at a net value of 32.2 million USD, Rural Electrification Agency (REA) strongly managed to make more connections (138,895) at a rate of 231.5 USD. Meanwhile, the unit cost of electricity connection under IVA, prime minister's office, and district was high given the few connections made. The findings imply that the number of electricity connections made under ECP depends on the unit connection cost and type of service provider. For instance, the connections which were made under REA were very many and at a lower connection rate as compared with that made under PM office and district.



Source: Author’s own computations from UMEME (2020)

Figure 1: Share (%) of electricity connections made by different service providers under ECP (by the end of July 2020)

The results reveal that connections billed and paid by REA contributed 57% of the electricity connections, followed by connections under IVA at 20% while the connections under district office contributed approximately 0%. This implies that the connections under REA contributed the highest proportion of electricity connections compared to other service providers.

The effect of waiting connection days on the number of connections made under ECP in Uganda

The study made an investigation to ascertain whether the waiting connection days had an influence on the number of electricity connections made under ECP in Uganda. The results are presented below;

Table 3

Results Showing the Effect of Waiting Days on the Number of Electricity Connections Made under EPC in Uganda

Selected service Providers	Number of connections	Waiting days	Waiting days per 10, 000 connections
ECP Connections Billed & Paid by REA	138,895	94	7
Connections under IVA Verification	48,824	81	17

Source: Author’s own computations from UMEME (2020)

The findings reveal that through REA, it took 94 waiting days to make 138,895 connections while IVA took 81 waiting days to make 48,824 connections. The evidence from the study shows that to make 10,000 connections, it takes REA 7 waiting days while IVA takes 17 waiting days to make 10,000 connections in Uganda. This implies that REA takes fewer waiting days to make more connections as compared to its

counterparts. The findings also imply that the number of electricity connections under ECP depends on the number of waiting days, for instance fewer waiting days generates more electricity connections as compared to more waiting days.

Establishing whether there is a mean difference between the number of electricity connections made through the no pole and pole services under the ECP in Uganda

The free connection policy was mandated to provide free electricity connection for no pole services, for instance it was supposed to provide electricity connection only with no electric pole services. However, with support from partners the policy ended up extending services to pole services. Thus, this study examines whether there is a significant mean difference between the number of electricity connections made through no pole and pole services under ECP in Uganda. The findings are presented below using an independent sample t test;

Table 4

Independent Sample t-test Examining Mean Difference between the Number Of Electricity Connections made through the No Pole and Pole Services under ECP in Uganda (January-July 2020)

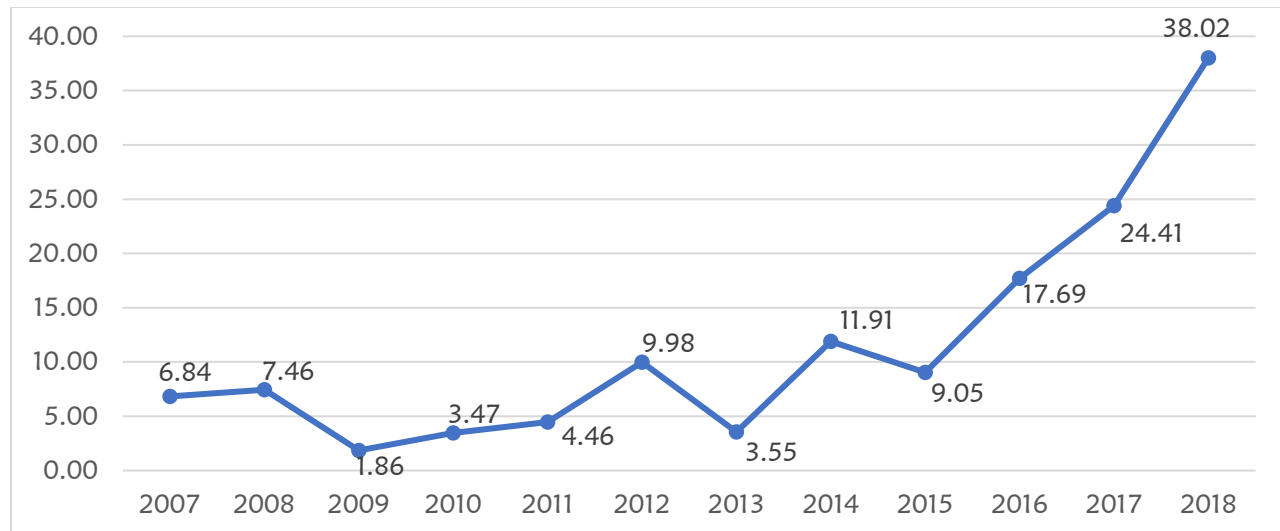
		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Number of electricity Connections	Equal variances assumed	75.616	.000	-2.006	12	.068	-5146.429	2565.46
	Equal variances not assumed			-2.006	6.592	.087	-5146.429	2565.46

Source: Author's own computations from UMEME (2020)

The results from the Levene's test for equality of variances shows that the number of electricity connections made through the no pole and pole services had different variances from January to July 2020 as indicated by a P-value of 0.000 which is below 0.05 level of significance. This indicates that we use the lower row for equal variances not assumed to make interpretations. The results from an independent t test for equality of means shows that there was no significant mean difference between the number of electricity connections made through no pole and pole services under ECP in Uganda at 5% level (P-value=0.087) from January to July 2020. This implies that the average number of electricity connections that were made from January to July 2020 through no pole and pole services were almost the same. Initially, the free connection policy was providing no pole services but later the pole services were added due to support from partners, therefore this could be the reason why the average number of electricity connections made between the no pole and pole services was almost the same from January to July 2020 under the connection policy.

The relationship between population growth and access to electricity in rural areas of Uganda

The study sought to investigate whether the free connection policy improved on access to electricity in rural areas of Uganda given the increase in population in the country. The study also presents the trend on access to electricity in rural areas from 2007 to 2018.



Source: Author’s own computations from World Bank development indicators (2020)

Figure 2: Trend on access to electricity in rural areas of Uganda from 2007 to 2018 (%age of rural population)

It is observed from figure 2 above that Uganda recorded a tremendous growth in access to electricity in rural areas of Uganda from 2007 to 2018. The results reveal that access to rural electricity increased to 38.02% in 2018 from 24.41% in 2017 recording a percentage of increase of 13.61%. The tremendous growth in access to electricity in rural areas of Uganda may be attributed to the free connection policy which provided both pole and no pole services thus increasing connection on the national grid.

Table 5

Correlation Results Showing the Relationship between Population Growth and Access to Electricity in Rural Areas of Uganda

		Population in (millions)	Rural access to electricity (%age of rural population)
Spearman's rho	Population in (millions)	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	12
	Rural access to electricity (%age of rural population)	Correlation Coefficient	0.769**
		Sig. (2-tailed)	0.003
		N	12

** . Correlation is significant at the 0.01 level (2-tailed).

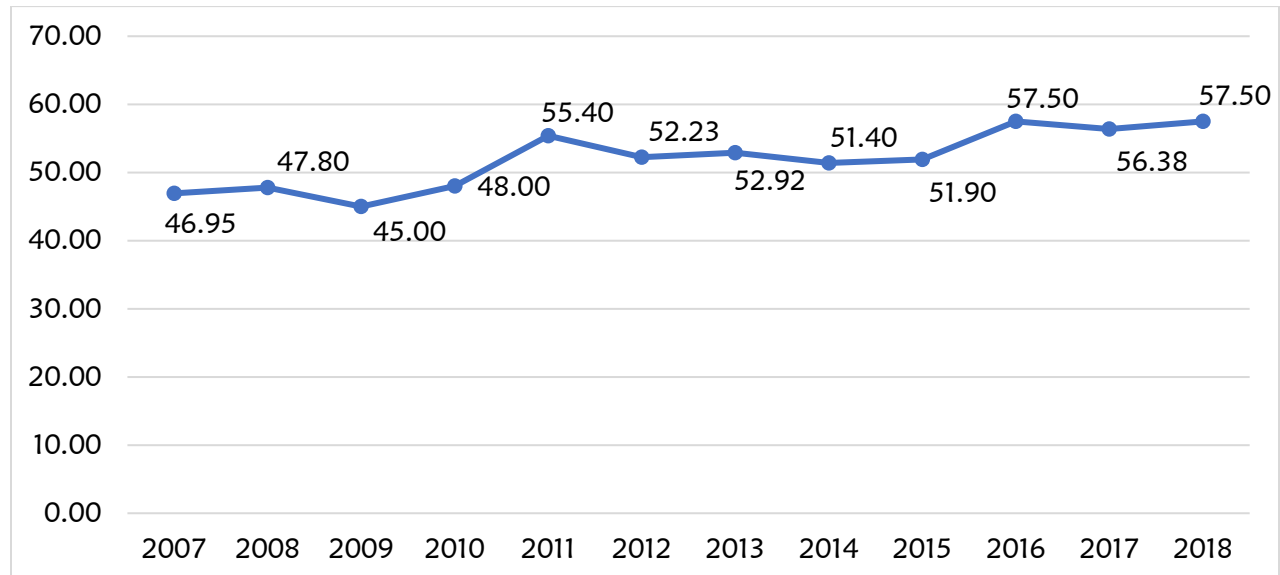
Source: Author’s own computations from World Bank development indicators (2020)

The results from Table 5 above indicate that the growth in population has a strong positive and significant association with access to electricity in rural areas of Uganda (r=76.9%, p-value<0.01). The findings may imply that as the population grows in Uganda, the level of access to electricity by the rural population

increases. The increase in access to electricity in rural areas given the growth in population is attributed to electricity interventions implemented by government and development partners like rural electrification project and free connection policy funded by several international donors.

The relationship between population growth and access to electricity in urban areas of Uganda

The study also made an attempt to investigate how the free connection policy has affected access to electricity in urban areas given the population growth in the country. The study also presents the trend on electricity access in urban areas of Uganda from 2007 to 2018.



Source: Author's own computations from World Bank development indicators (2020)

Figure 3: Trend on access to electricity in urban areas of Uganda from 2007 to 2018 (%age of urban population)

The findings in figure 3 reveal that access to electricity in urban areas has been increasing steadily from 2007 to 2018. The evidence indicates that access to electricity in urban areas stood at 57.5% in 2018 compared to 56.38% in 2017. The findings may imply that although urban access to electricity was greater than that of rural areas, the free connection policy may be greatly benefiting the rural areas than urban centres. For instance, it was evident that access to electricity in rural areas increased by 13.61% from 2017 to 2018 as compared to 1.12% growth rate in urban areas in the same period.

The study findings in Table 6 show that there is a significant and positive strong relationship between population growth and urban access to electricity ($r=85\%$, $p\text{-value}<0.01$). This means that as population grows in Uganda, access to electricity in urban areas increases greatly because there is easy electricity distribution. In addition, the increase in electricity access in urban areas is also attributed to free connection policy which enabled many households have free access to electricity.

Table 6

Correlation Results Showing the Relationship between Population Growth and Access to Electricity in Urban Areas of Uganda

		Population in (millions)	Urban access to electricity (%age of urban population)
Population in (millions)	Pearson Correlation	1	.850**
	Sig. (2-tailed)		.000
	N	12	12
Urban access to electricity (%age of urban population)	Pearson Correlation	.850**	1
	Sig. (2-tailed)	.000	
	N	12	12

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Author's own computations from World Bank development indicators (2020)

Conclusions

The study concludes that the number of electricity connections made under ECP depends on the unit connection cost and type of service provider. For instance, the connections which were made under REA were very many and at a lower connection rate as compared with that made through PM office and district.

The study revealed that the number of electricity connections made under ECP are determined by the number of waiting connections days, for instance the study established that fewer waiting days generate more electricity connections as compared to more waiting days. In addition, the study results indicated that the average number of electricity connections that were made from January to July 2020 through no pole and pole services were almost the same.

The findings indicate that the free connection policy has played a significant role towards improving access to electricity in Uganda. The study established that the policy has contributed greatly in rural areas where electricity access increased by 13.61% from 2017 to 2018 compared to the growth rate of 1.12% in urban areas in the same period. Similarly, it was revealed that growth in population of Uganda every year significantly improves on electricity access in both rural and urban areas of Uganda. Despite the tremendous contribution of the policy, still the proportion of access to electricity in rural areas is still below that of urban areas, thus need for more efforts in implementing the policy as well as other interventions like rural electrification project.

There is need to provide some subsidies to the electricity connection service providers in that they are in position to reduce on their connection rates. The study found that a service provider with lower connection rate makes more connections than those with higher rates.

The study suggests that there should be reduction in the number of waiting days taken by service providers since they affect the number of electricity connections made. The study found that fewer waiting days increase electricity connection as compared to more waiting days.

The study recommends that there should be improvement in the electricity connections made through pole services such that the connection number reaches that of no pole services. This can be done through getting more development partners and donors to provide support through increased funding to enable Uganda

achieve a middle-income status through electricity provisions which will improve livelihoods in many aspects of life.

There is need for sensitization of people in rural areas to embrace the free connection policy intervention since this may reduce on the level of electricity theft as well as improve on their economic activities through value addition. Majority of Ugandan are not aware although this being an election session the policy will be used by the ruling party to send the message across all Ugandan but the challenge remains in wiring houses and acquiring a wiring certificate. Electricity equipment needed to wire houses are very expensive and majority of Ugandans can't afford the cost hence need for government to remove taxes on electricity equipment in the country if Uganda will achieve universal electricity.

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