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Targeting and Subsidizing Electricity Connection:
The case of a Hybrid Financing Framework in Uganda

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EXECUTIVE SUMMARY

Grid electricity coverage gap remains large in most of Uganda's sub-regions. Although the sub-regions with large coverage gaps could be targeted for intervention, the financing framework will primarily impact the areas with Umeme network footprint. This brief examines different subsidization regimes as applied in UDBL's hybrid financing framework to ascertain the level of support required, based on the extent to which affordability is impacted, to realize significant electricity connection in Uganda. The results show that under business-as-usual (no-subsidy) regime where households would have to pay the standard 720,883 Uganda shillings for connection, there is a high likelihood that the existing grid coverage gap will remain.

The first subsidization regime (requiring households to pay 470,000 shillings) would increase affordability rate by 5 percentage points compared to the no-subsidy regime, falling short of realizing the target connections of 550,000 households. It is the second subsidization regime, where households are required to pay a connection fee of 200,000 shillings, that improves household's affordability rate by 36 percentage points, enabling 2.73 million households to gain affordability. The second subsidization regime is thus key in supporting the attainment of the energy development programme objective of increasing; access and utilization of electricity, adoption and use of clean energy, and per capita energy consumption. This is an important contribution towards the agenda for socio-economic transformation. However, policy efforts should as well emphasize the stimulation of productive energy use to drive the acceleration of socio-economic development through energy investments.

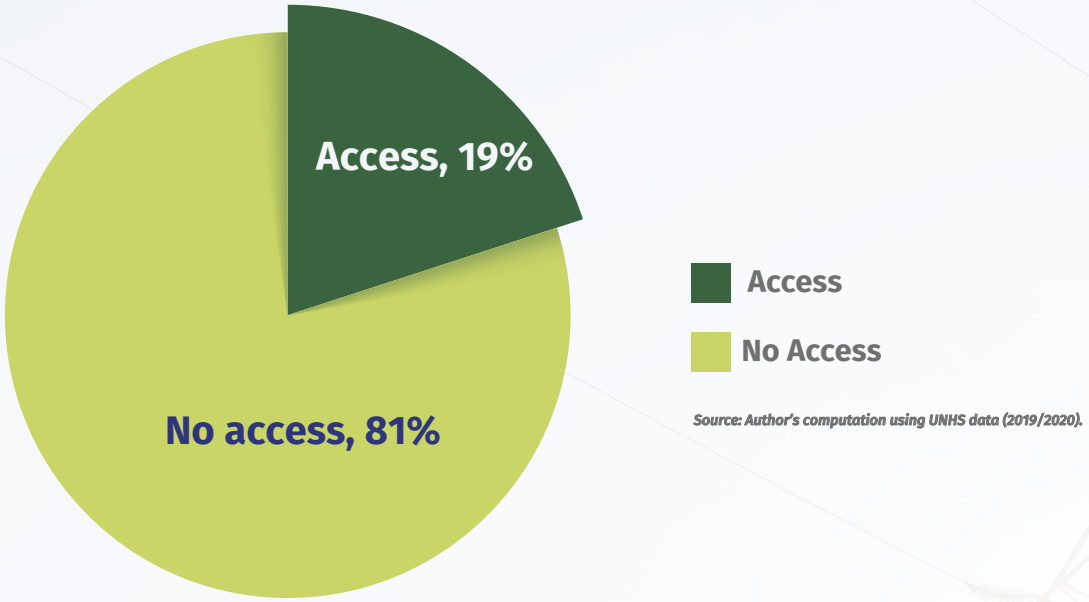
1.0 Introduction

Access to reliable energy is at the core of socio-economic development. Accordingly, energy development is high on Uganda's agenda, and is one of the programs in the current National Development Plan (NDPIII), as well as on global development agenda – the Sustainable Development Goal (SDG) on universal access to affordable, reliable, sustainable and modern energy. It is an indispensable connector of economic growth and social equity, and generally creates necessary conditions for economies to thrive (Lee et al., 2020). It follows that energy drives economic growth as evident in different studies which find that growth in per capita Gross Domestic Product (GDP) is positively correlated with electricity consumption (World Bank, 2018; Bezzera et al., 2017; Republic of Uganda, 2020).

Electricity access is therefore a critical pathway for improving the quality of life and/or driving socio-economic development. Better socio-economic outcomes are attained through electricity access because it paves the way for; accessing potable water, health facility improvement, improving learning outcomes, food security, illumination and information access. It also reduces time spent in collecting and using unclean traditional sources of energy (e.g., firewood and crop residues). Furthermore, electrification releases the population from time-consuming hard work and increases productive working time and opportunities for self-employment by supporting the establishment of income generating undertakings. Electricity connection also propels the growth of Micro, Small and Medium scale Enterprises as well as industrial development as power is one of the key inputs to production and manufacturing industries. This in turn creates jobs, increases household income, and reduces poverty.

In Uganda, household access to electricity, especially the grid, is still very low - millions of people live their day-to-day lives without electricity. Pertaining to grid electricity in particular, less than 20% of the households have access to it (Figure 1). Uganda also has one of the lowest electricity consumption per capita across the globe, at only 100 kWh (Republic of Uganda, 2020). This poses a serious barrier to socio-economic development. The absence of household electrification denies households from engaging in activities that are vital in the process of socio-economic transformation, including; easy access to lighting, which is key for domestic chores as well as studying; power for phone charging and other uses; and engaging in a range of new on and off-farm small business activities as a source of livelihood (Lee et al., 2020). Consequently, the absence of electricity represents a fundamental barrier to progress in achieving a wide array of development outcomes.

Figure 1: Households with access to grid electricity, %



Source: Author's computation using UNHS data (2019/2020).

To address the pressing development challenge of households living lives without electricity, investments in energy infrastructure is paramount as a development intervention. It should, however, be noted that even when the infrastructure is developed, access can remain low when the connection cost is high as is the case for Uganda. To address the challenge of high connection cost, the Uganda Development Bank Limited (UDBL) recently launched an initiative for financing household electrification using a financing innovation – the "Hybrid Electricity Customer Connection Credit Framework". The innovation is designed by the UDBL in collaboration with major energy sector actors in the economy – Umeme, Electricity Regulatory Authority, and Ministry of Energy and Mineral Development. The innovation is a subsidized financing framework that offers a solution for households to access grid electricity in a no-pole connection arrangement, which aims to bring down the cost of connection from the unsubsidized amount of 720,883 shillings to 470,000 shillings. Further, the framework offers an option of a lower initial connection fee of 200,000 shillings. The remaining 270,000 shillings is covered by UDBL in form of credit and is to be recovered at zero interest as part of electricity purchase over a period of up to eight years under the credit framework. The minimum recovery amount is 15% of each purchase of electricity. The innovation targets electrification of 550,000 households.

In this briefing note, we profile Ugandan households that are not connected to grid

electricity, and discuss their ability to pay for grid connection under the financing innovation and/or subsidized financing framework. We consider the initiative of lowering the grid connection cost as a subsidization effort. Ability to pay is analyzed in the scenarios of business-as-usual (no subsidization), and in the two subsidization regimes of 470,000 (first subsidization) and 200,000 shillings (second subsidization). The brief provides insights for understanding the households that are potential beneficiaries of the financing innovation, the extent of affordability of connection cost, as well as the extent to which the subsidization regimes of the innovation change household's ability to pay. The brief also highlights the likely areas that will be impacted by the financing innovation, and potential gaps that will remain. These insights are important in discussions pertaining to targeting the intervention, as well as for design of future initiatives.

We analyze micro data from the socio-economic and housing condition modules of the last Uganda National Household Survey (UNHS 2019/2020)[3]. We also use Umeme network footprint data from the 2021 annual report of Umeme. The combination of the household and footprint data was used to map households without access to grid electricity in the areas with and without Umeme footprint. In our analysis, we use weighted estimates of parameters of grid electricity access level (grid coverage) and ability to pay for electricity connection.

In the brief, ability to pay for connection is a proxy for affordability of electricity access (initial connection cost) under the unsubsidized and subsidized arrangements. The measurement of affordability to access is based on electricity affordability or burden concept in the framework of the World Bank and European Bank for reconstruction and Development (see Fankhauser & Tepic, 2005; Estache, Foster & Wodon, 2002), and Energysage . The measure captures the ability of consumers (households in this case) to pay for a minimum level of electricity connection service. Alternately, it is measured as electricity burden, which is the share of gross annual household income spent on electricity[4]. In our analysis, household consumption expenditure is used instead of income. We annualize the data on household consumption expenditure and adjust for inflation using the Consumer Price Index (CPI) statistics of 2019 and 2022[5]. We assume that electricity connection fee is a one-off payment in a year. The threshold for affordability is 6%, which is considered a low electricity connection burden on households (see ACEEE, 2020; and Drehobl et. al., 2020; Fankhauser & Tepic, 2005; Estache, Foster & Wodon, 2002). According to the threshold, a high energy burden (electricity in this case) is one that consumes more than 6% of household income (i.e., unaffordable), and a severe burden exceeds 10% (i.e., severely or extremely unaffordable).

[3] This is a nationally representative survey implemented by the national statistical body – Uganda Bureau of Statistics (UBOS).
[4] The UNHS data does not capture the cost of wiring homes or houses. Therefore, we do not account for the cost of wiring homes or houses in the analysis of ability to pay connection cost.
[5] Data on CPI is from the CPI reports by Uganda Bureau of Statistics, for the respective years.

2.0 Household grid electricity coverage: targeting to close the coverage gap

This section highlights household electricity coverage based on grid electrification rate, and discusses the potential areas for targeting and/or where emphasis can be placed to increase electrification guided by the coverage gap that has been identified.

The statistics show a relatively high household grid electrification or coverage rate in the sub-regions of Kampala, Buganda North, Buganda South, and Busoga (Figure 2). The top five sub-regions with the largest grid electricity coverage gaps are Karamoja, West Nile, Acholi, Teso, and Bukedi (Figure 2). Grid connection intervention aimed at curtailing large coverage gaps (holding other factors constant – e.g., ability to pay for connection) can be targeted to cover the sub-regions with the largest gaps - i.e., the top grid coverage gap areas.

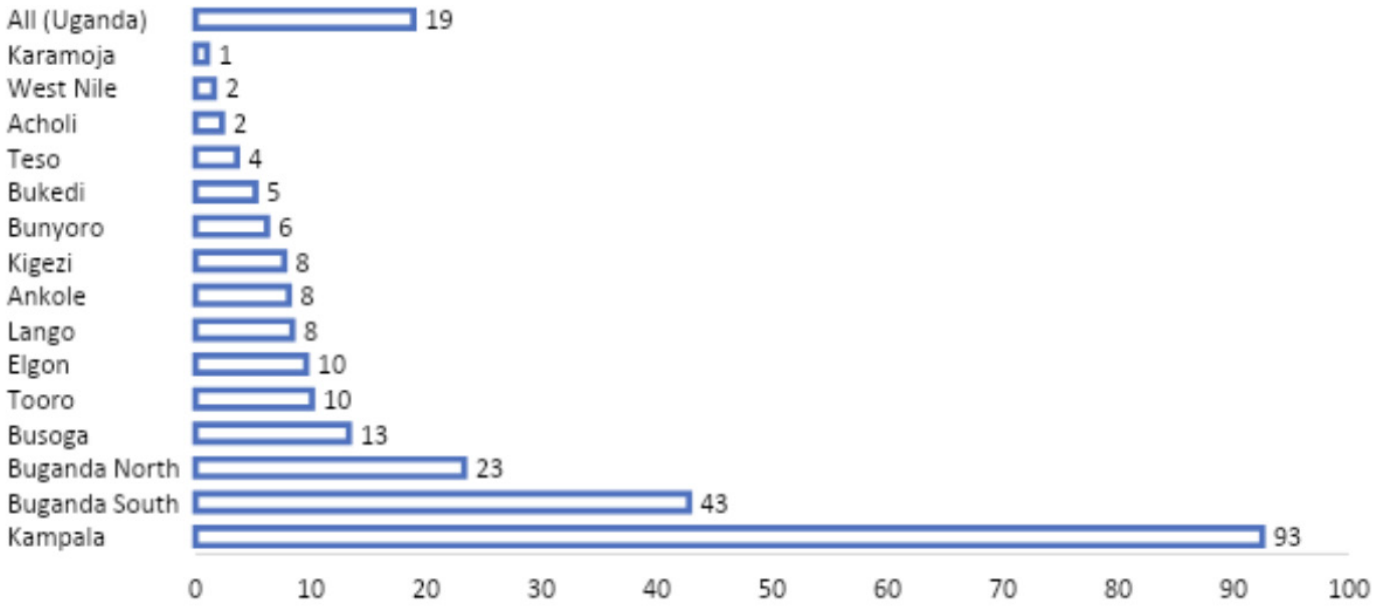


Figure 2: Grid electricity coverage by sub-region – households with access, %

Source: Author's computation based on UNHS data (2019/2020).

2.1 Targeting high coverage gap within UMEME network footprint

Although the statistics clearly show the areas with sizeable coverage gaps that can be targeted by the intervention, it may not be feasible to intervene and close the gaps in all those areas under the financing framework. This is because some of the areas do not have the network footprint of Umeme. This sub-section highlights the areas with large grid electricity coverage gaps that intersect with Umeme network footprint. This is key in answering questions pertaining to the most feasible areas associated with large coverage gaps that can be targeted for immediate connection to grid under the financing framework, due to presence of Umeme footprint.

As shown in the map (Figure 3), the largest grid coverage gap is in the sub-regions of Karamoja (99%), West Nile (98%), Acholi (98%), Teso (96%), and Bunyoro (94%). However, some of these sub-regions do not have Umeme network footprint as shown by the green colour ramp in Figure 3 – for example, Karamoja and West Nile. The sub-regions with the largest grid coverage gap that have presence of Umeme network footprint are; Acholi, Bunyoro, Teso, Lango, Elgon, Ankole, Kigezi, Bukedi, and Toro (Figure 3). These sub-regions provide the most feasible options in terms of areas for connection under the subsidized financing scheme, given the presence of the network footprint in them – i.e., being associated with large grid coverage gaps but with availability of Umeme network footprint.

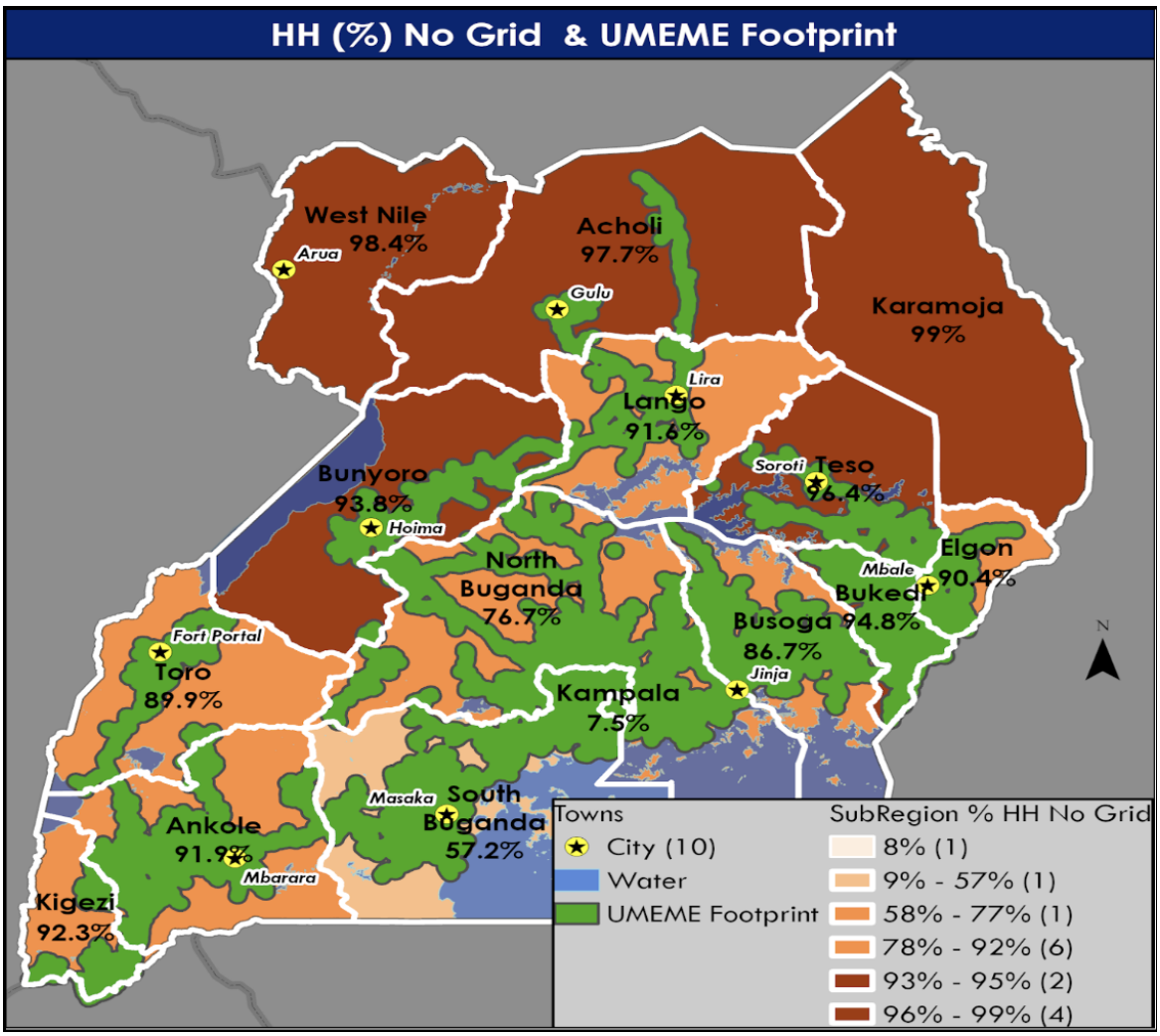
Sub-regions such as Busoga and North Buganda also have relatively high grid coverage gaps (87% and 77% respectively) and presence of the footprint, as shown in Figure 3. They are thus potential intervention areas in addition to those with the largest coverage gaps within the network footprint. These are the areas where the innovation will possibly impact the most. Results in terms of improved access to sustainable energy by households are expected to be realized in the areas with existence of electrification facilities. In this case, therefore, household's improved access to grid electricity is likely to be observed in the sub-regions with Umeme network footprint. In future interventions, there may be a need for deliberate targeting effort to close the grid coverage gaps in sub-regions without Umeme network footprint, to promote equitable access to grid electricity by households across the entire country, or to promote access to

[4] Not reported in this brief – see UNHS report, 2019/2020.

other forms of electricity to close this gap. Such interventions can benefit from collaborations with service providers outside Umeme network – for example West Nile Rural Electrification Company (WENRECO) in West Nile.

Therefore, it is likely that the impact of the connection initiative on access to grid electricity under the framework will be experienced primarily in the areas with Umeme network footprint. However, from an inclusive policy stance, striking a balance is key - interventions in the areas without Umeme network footprint are of great importance for enhancing equitable access or promoting the universality agenda of Sustainable Development Goal on energy and its domestication in the NDP.

Figure 3: Grid electricity coverage gap and Umeme network footprint by sub-region



The statistics show that high initial cost of connection remains a key barrier to grid connection among unconnected households – unconnected households in all sub-regions are affected by this, although there is variation in the magnitude of the problem. For example, of the areas with the largest coverage gaps within Umeme network footprint, those with the most affected households - i.e., faced with high initial cost of connection as a major barrier to grid access are; Acholi, Elgon, and Bukedi.

About a third or more of the unconnected households here report high initial connection cost as the major barrier. This illustrates that for households to be connected to grid (whether in an unsubsidized or subsidized arrangement), it is important to make considerations about their ability to pay for the initial connection cost. Accordingly, we analyze the actual ability to pay under the different connection cost scenarios and discuss the results in the sub-section that follows.

* Not reported in this brief – see UNHS report, 2019/2020.

3.0 Ability to pay for electricity connection: unsubsidized and subsidized financing framework

This sub-section discusses ability to pay for connection at two levels. The first is ability to pay in a business-as-usual environment at an initial connection cost of 720,883 shillings (i.e., in an unsubsidized scenario). The second is ability to pay in a subsidized financing framework. The subsidized financing framework is characterized by two subsidization regimes. The first regime is the initial level of subsidization that lowers the cost of connection from 720,883 to 470,000 shillings. The second regime is the next level of subsidization that lowers the cost of initial connection to 200,000 shillings.

The analysis here is a projection that sheds light on the extent of affordability, and how or the extent to which the different subsidization regimes are likely to impact household's ability to pay and thus incentivize grid electricity connection at household level.

3.1 To what extent can the subsidized financing framework influence ability to pay?

Here, we highlight the likely effect of the hybrid-financing framework based on projected changes in household's ability to pay for grid connection under the business-as-usual through the first and second subsidization scenarios or regimes. The households considered in this analysis are still those that are not connected to grid electricity (unconnected households).

As shown in Table1 and Figure 5, only about 0.14 million (or slightly less) unconnected households (representing the 1.93%) have the ability to pay for the initial cost of grid connection of 720,883 shillings (i.e., under the business-as-usual situation). The cost of grid electricity connection in the business-as-usual scenario is therefore prohibitively high, hence constraining grid access and making households not to meet their energy or electricity needs. Clearly, without an intervention to improve household electrification, majority of the households are not in position to privately finance grid electricity connection due to hefty "energy burden" associated with the business-as-usual scenario. Although there are efforts to extend power to some of the areas with large coverage gaps, for example - the power line from Karuma to West Nile, which is underway, household affordability challenges may continue to affect grid access. The prohibitive cost of initial connection is not peculiar to Uganda – it is a development challenge for the energy sector in most developing countries, as evident in studies by the World Bank (2002) and Shirley (2018), among others.

The projection results show that the first subsidization regime is associated with close to a four-fold increase in the level of affordability, depicted by an increase in the estimated number of households with ability to pay from about 138,000 to 489,485 (Figure 5). However, we observe from the statistics that the first subsidization regime is unlikely to yield the target number of households under the financing framework – by the projection, it falls short of the target by close to 61,000 households. This suggests that establishing and implementing the next subsidization regime is essential for improving ability to pay the connection cost, in order to realize the targeted 550,000 households. The results of the projected ability to pay under the second subsidization regime is overwhelmingly confirmatory. Specifically, the results indicate that the second subsidization regime can potentially introduce an additional six-fold increase in affordability, as observed in the estimated number of households with the ability to pay rising to 2.73 million from 0.49 million (Figure 5). Overall, the second (last) subsidization

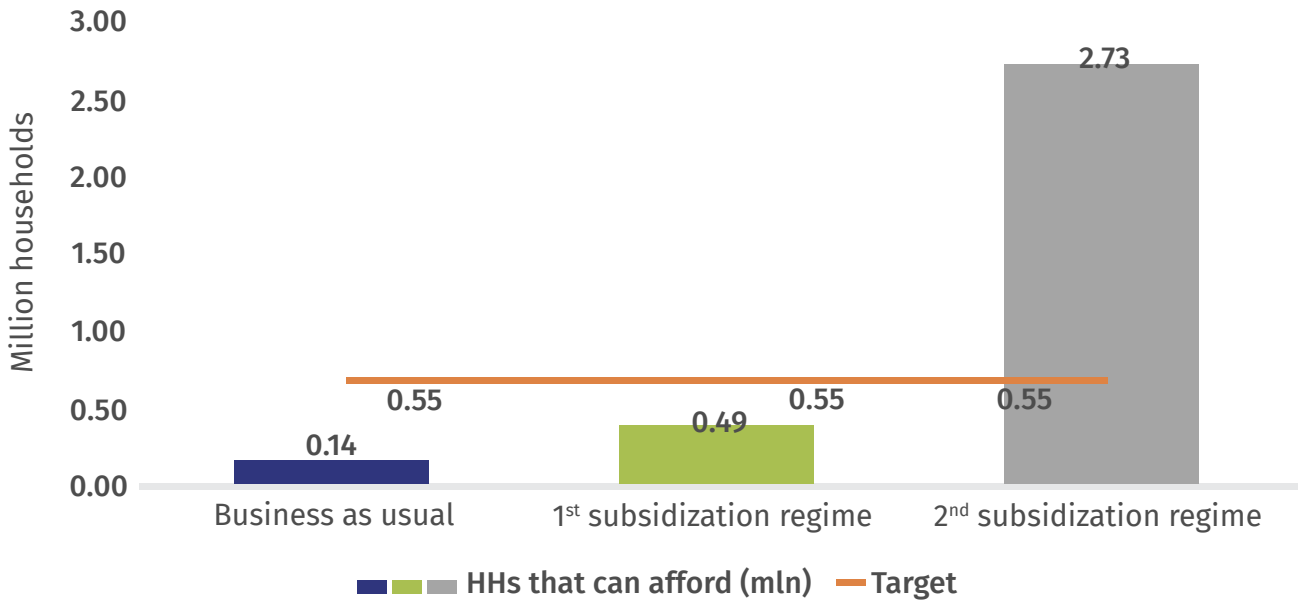
regime is associated with an increase in ability to pay by almost twenty-fold, from 0.14 million to 2.73 million households that can afford the initial connection cost (Figure 5). These results demonstrate that application of the second subsidization regime of 200,000 shillings under the financing framework can potentially improve household's affordability rate by 36 percentage points from 1.93% to 38.23%. By implication, the second regime is paramount in unlocking household's energy burden, hence creating a pool of households more than the targeted number by almost five times, that can benefit from grid electricity connection. Accordingly, attaining the target of connecting 550,000 households is more feasible when the second subsidization regime of the financing framework is applied. Emphasis should therefore be placed on utilization of the second regime by unconnected households.

Table 1: Affordability rate among unconnected households, %

	Business-as-usual (Cost= Shs. 720,883)	1st subsidization (Cost= Shs. 470,000)	2nd subsidization (Cost= Shs. 200,000)
All households (%)	1.93	6.85	38.23
Kampala	2.34	13.56	52.07
Buganda South	3.49	10.98	47.97
Buganda North	1.49	6.4	37.37
Busoga	1.27	3.88	32.7
Bukedi	2.46	6.68	33.8
Elgon	2.66	11.65	54.62
Teso	2.33	6.52	49.64
Karamoja	0.23	0.93	9.84
Lango	1.44	6.99	37.48
Acholi	0.56	0.86	8.25
West Nile	2.03	6.43	43.32
Bunyoro	2.87	9.17	47.56
Toro	1.59	7.01	38.2
Ankole	2.56	9.89	46.67
Kigezi	0.56	3.31	25.04
Weighted households without access to grid (N=7,142,932)			

Source: Author's computation based on UNHS data (2019/2020).

Figure 5: Number of households with the ability to pay for grid connection under different subsidization regimes



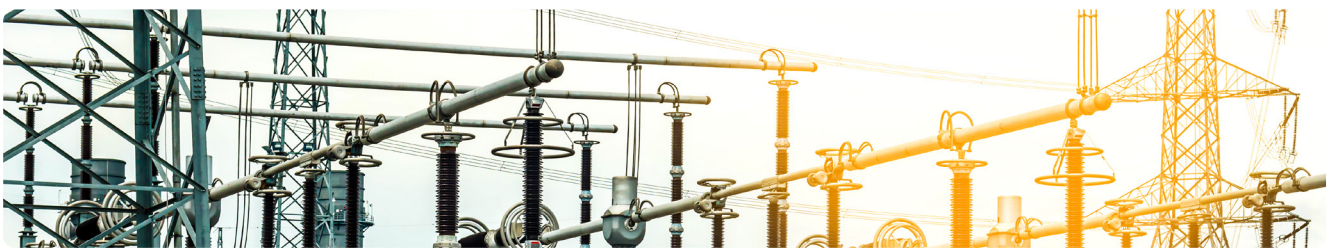
Source: Author's computation based on UNHS data (2019/2020).

4.0 Conclusion and policy implication

There is an enormous grid electricity coverage gap in most sub-regions in Uganda. Of the sub-regions with the largest gaps, those that do not completely have Umeme network footprint are; Karamoja and West Nile – they are covered by relatively smaller service providers that suffer from intermittent power black-outs, for example, WENRECO for West Nile. Those associated with large grid coverage gaps but with Umeme network footprint are; Acholi, Bunyoro, Teso, Lango, Elgon, Ankole, Kigezi, Bukedi, and Toro. Although the sub-regions with large coverage gaps could be targeted for intervention, the financing framework will primarily impact the areas with Umeme network footprint.

Under business-as-usual (zero subsidy), the existing grid coverage gap is likely to remain, due to the low affordability rate associated with it. Only 1.93% of the unconnected households can afford to pay the initial electricity connection cost under business-as-usual scenario, an indication that the cost of grid electricity connection in this scenario is prohibitively high, constraining household grid access and hence the need to meet their energy need. To attain a target of 550,000 unconnected households, emphasis on the second subsidization regime of the financing framework is key. It can potentially improve household's affordability rate by 36 percentage points compared to a zero-subsidy regime, enabling 2.73 million households to gain affordability, making the target feasible. The first regime alone is unlikely to yield the target number of households, since it falls short of the target by 61,000 households – it potentially enables 0.489 million households to gain affordability, compared to the targeted 0.55 million.

Given the potential to enhance ability to pay for grid connection and ultimately improve access, the hybrid financing framework - especially through the second subsidization regime, is therefore crucial in supporting the achievement of NDPIII's energy development programme objective of increasing access and utilization of electricity as well as increasing adoption and use of clean energy including per capita energy consumption. This is an important contribution to make towards the socio-economic transformation agenda. However, to accelerate socio-economic development, policy should also stimulate productive electricity or energy use by households, beyond creating access.



Source: Author's computation based on UNHS data (2019/2020).

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