Public-Private Collaboration Towards Universal Rural Electrification

Position Paper on optimising the complementarity of minigrids envisaged in the Kenya National Electrification Strategy (KNES) 2018

By

The Africa Minigrid Developers Association

April 2022
Executive Summary

- AMDA has developed this Position Paper to present to the Government of Kenya specific strategies that can be implemented to increase rural electrification, lower minigrid tariffs for rural customers, and increase investment and revenue mobilisation in the country.
- The Kenya National Electrification Strategy (KNES) 2018 was developed before enacting the Energy Act 2019 and the draft Energy (Mini-Grid) Regulations 2021. As a result, some provisions of KNES 2018 are not flexible enough to align with the new policy and regulatory environment prescribed in the Energy Act and draft Mini-Grid Regulations. AMDA describes these provisions in detail in this paper and makes recommendations to the Government on how to align them with more recent planning.
- REREC’s 5-year Strategic Plan focuses on electrification of those within 600 metres of existing transformers, but the KNES creates a 15 km buffer zone around MV infrastructure where minigrids cannot be deployed. Furthermore, it is not technically or financially feasible to electrify the 15 km buffer zone within 5 years.
- The draft Mini-Grid Regulations, 2021 specifies that when the grid arrives "(1) Where a Mini-Grid Developer opts to sell assets, ...For compensation to be payable, the Mini-Grid at the time of granting of the EOI, must have met siting requirements in the KNES or INEP". To date, the Ministry of Energy has not approved EOIs submitted for sites within the buffer zone. However, these sites would not present any financial risk to KPLC or REREC on compensation, as the draft Mini-Grid Regulations cited here de-risk potential compensation payments for such sites.
- Independent research of communities electrified through the LMCP program in Western Kenya over the last 5 years shows a connection rate of less than 15% on average, with many transformers serving 20 consumers or less. Private minigrids, on the other hand, are incentivised to maximise connections and hence demonstrate connection rates consistently close to 100% of potential customers.
- Allowing minigrids to expand within a locality enables them to build economies of scale that translate to lower tariffs. Also, on-grid arrival, minigrids are able to interconnect and purchase power in bulk from the national grid, creating a market for KPLC and bringing tariffs close to grid parity.
- KNES 2018 recommends that the Government implement a small intra-sector subsidy scheme to reduce rural minigrid tariffs. However, the intra-sector subsidy has not been implemented. Despite this, minigrid developers have on their own looked for subsidies from development partners, which have enabled them to charge significantly lower tariffs than true cost-reflective rates.
- Interconnection between minigrids and the grid will enable developers to reduce tariffs. In addition, economies of scale achieved through a larger portfolio of sites if developers are allowed to develop pockets of concentrated operating points can further reduce tariffs. Therefore, the KNES 15 km buffer zone keeps tariffs artificially high, harming consumers and reducing private investment in Kenya.
- AMDA members wish to collaborate with the Government to reduce tariffs further to ensure that all Kenyan communities have access to fully affordable power.

The actionable steps that the public and private sector can take in collaboration to ensure that tariffs can be sustainably reduced and access to be increased significantly are:
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Introduction

The *Africa Minigrid Developers Association (AMDA)* is the industry association of private minigrid developers in Africa. Founded in Kenya in 2018, AMDA currently has 35 minigrid developer-members across 15 African countries. In Kenya, AMDA’s 8 members serve over 150,000 electricity end-user customers. AMDA works with governments, development partners, and other stakeholders to ensure that as countries leverage the efficiencies of the private sector to accelerate their electrification plans through the development of minigrids, the regulatory market and sourcing available concessional finance to support the growth of a private investment. In addition, AMDA supports developers by facilitating access to finance, policy and regulatory advocacy, sector-wide data collection and analysis, and benchmarking of best practices.

Minigrids are standalone or grid-connected power generation and distribution units providing reliable access to affordable, grid-quality renewable electricity to rural communities. Kenya has more than 100 minigrids operated by private developers (most of whom are AMDA members). These minigrids provide reliable renewable electricity with over 98% uptime to more than 150,000 people in rural communities that do not yet have access to the national grid. They also provide power for productive uses that catalyse economic growth in rural areas.

Kenya has been a pioneer in off-grid rural electrification and has always been at the forefront of innovation in off-grid technologies and business models.

AMDA Kenya’s vision is to end energy poverty by collaborating with the Government to ensure Kenya has a robust blend of energy services that leverage the operational and financial experience of the private sector. AMDA supports the transition from a unidirectional (national utility-centric) energy network to a dynamic decentralised and interconnected network where smaller-scale networks can operate largely autonomously while retaining the ability to tap into a broader network to tap additional power or sell excess power.

Rural Electrification in Kenya

Kenya has made tremendous achievements in scaling up electricity connectivity, with the access rate rising from 32% in 2014 to 75% in 2018 (both from the grid and off-grid options) (KNES, 2018). Connections doubled between 2015 and 2019 through the Last Mile Connectivity Project (LMCP) campaign that involved a collaborative effort between the GoK, AfDB, and KPLC (KNES, 2018). Kenya now has the highest electricity access rate in sub-Saharan Africa, excluding South Africa (World Bank, 2018). Kenya also had the highest annual percentage gain in access rates globally between 2010 and 2017. Despite these achievements by the Government, there are still Kenyans without access to electricity due to a number of challenges.

KNES 2018 attributes these challenges to high connection charges; high costs of supplying electricity to rural and peri-urban households; lack of appropriate incentives to attract private sector investors; inappropriate technical standards; nature of settlements; weak implementing capacity; difficulties and delays in obtaining way leaves consents and rights of way; and demands for high compensation.

KPLC’s recent financial challenges have drawn attention to the sustainability of electrification efforts across Kenya and over-reliance on KPLC to supply electricity reliably to Kenyans. KPLC is a critical stakeholder in efforts to expand electrification access in rural areas. Still, the
resources required to expand to provide reliable and affordable power to all Kenyans in the near term are immense.

The significant expansion of the grid to ensure universal electrification, in conjunction with consumer prices that do not reflect the real costs for extension, could contribute to KPLC's losses and reduced grid reliability. To this end, the Presidential Taskforce on the Review of Power Purchase Agreements (PPAs) recommended that rural electrification of areas considered not commercially viable to KPLC be left to REREC and that REREC be solely responsible for rural electrification but contract out the work to KPLC, which has better capacity. In addition, this one centre of responsibility will help coordinate developing new sites between AMDA members, REREC, and the Counties.

Public-Private Collaboration

AMDA wishes to develop a strong framework for public-private collaboration to ensure rapid, affordable rural electrification in Kenya. The Government of Kenya's efforts to develop the Mini-Grid Regulations, 2021, and update the Kenya National Electrification Strategy (KNES) in 2022 demonstrates the Government's commitment to complete electrification and collaboration with the minigrid sector. AMDA wishes to strengthen this collaboration through expanded opportunities for minigrid development in Kenya.

Minigrid developers in Kenya have identified preliminary site pipelines of over 100 additional potential sites that could be electrified within 6-12 months through minigrid solutions. These significant private rural electrification investments have the potential to:

- Electrify communities that are financially unfeasible for Kenya Power and/or REREC to reach in the near-term
- Provide reliable, affordable power to tens of thousands of households, businesses, and institutions
- Increase private investment in Kenya by mobilising millions of dollars of private capital
- Enable the productive use of energy to build rural economies and increase customer incomes

A number of countries across the continent are beginning to see dynamic private minigrid markets emerge, with significant strides made in rural electrification.

KNES Buffer Zone

Some of the pipeline sites that have been identified lie within 15 kilometres of existing Kenya Power medium-voltage (MV) infrastructure. This 15 km zone has been identified in KNES, 2018 as a "buffer zone" reserved for Kenya Power and REREC to electrify in the near-term. But these zones have still not been electrified within the 2018-22 term of the KNES, meaning that they have remained just "buffer zones" for over 5 years with no connection. Such an approach leaves people unnecessarily unelectrified where AMDA members could step in and fill the void quickly.

The KNES categorises modalities for electrification into 4 categories:

- Grid expansion: Extending the medium voltage distribution network to connect housing clusters within 15 kilometres of the KPLC distribution system.
- Grid intensification and densification: Installing additional transformers on existing KPLC medium-voltage feeders and laterals to connect housing clusters within 600 meters of existing KPLC distribution transformers.
- Minigrids: To serve housing clusters too distant from the network or too small to be interconnected.
- Standalone solar photovoltaic systems: All remaining housing clusters and individual houses that the above three modalities cannot serve.

Minigrids can cost-effectively provide pre-grid solutions in target areas in the buffer zone before the communities connect to the main grid. The buffer zone results in a significant proportion of rural communities that are "under-grid" but without access. For many of these communities, even those near an MV line, power transformation and distribution network extension costs are significant and could add significantly to KPLC's financial challenges.

Minigrids provide electricity to communities' under-grid where it does not make financial sense for KPLC to step down the MV lines and build out distribution networks. These minigrids then have the ability to interconnect to the main grid when the unit economics for KPLC make more sense. In addition, minigrids prime rural customers to increase their demand for electricity over time, making them more viable KPLC customers in the future. Nigeria and India are living examples where minigrids and the grid co-exist in the same localities.

As per the Mini-Grid Regulations, 2021 (soon to be gazetted), private minigrid developers are required to align their electrification projects with the KNES. The draft Mini-Grid Regulations are very clear on risk allocation when the grid arrives, that "(1) Where a Mini-Grid Developer opts to sell assets, ...For compensation to be payable, the Mini-Grid at the time of granting of the EOI, must have met siting requirements in the KNES or INEP".

To date, the Ministry of Energy has not approved EOI sites within these buffer zones, and yet, they do not present any financial risk to the KPLC/REREC on compensation, as compensation is de-risked in the draft Mini-Grid Regulations, while Section 164 of the Act on Energy Supply Agreement opens a new avenue for such a minigrid developer. Approval by MOE of EOI sites for private minigrid development has so far been restricted to sites outside the buffer zone identified in the KNES, which, as we alluded above, is not within the letter and spirit of the Energy Act and draft Mini-Grid Regulations. This is understandable because KNES 2018 was developed before the new Energy Act 2019 was enacted.

This has affected thousands of people in developer pipelines who now may not receive access to electricity in the near future. Prior to 2019, EPRA controlled the process of EOI objections for new site developments. Reverting to EPRA's control of the EOI process, as this was the historical approach, allows for an independent assessment of site feasibility by the regulator. In its report, the Presidential Taskforce noted that the Ministry is undertaking certain roles whose responsibility is vested in other institutions in the sector. Therefore, the Taskforce recommended that the Ministry concentrate on energy planning and policy setting at the national level as provided for under sections 4 and 5 of the Act and leave the implementation of energy plans, policies, and regulation to other designated players in the sector.

The buffer zone creates a "dark zone" of unelectrified communities surrounding the grid.

The 15 km buffer zone surrounding existing MV infrastructure effectively prevents Kenya from reaching its electrification goals as quickly and, in some cases, where grid expansion is not practical, as cost-effectively as envisioned. On the other hand, private minigrid developers can quickly and cost-effectively electrify communities in the buffer zone without any financial risk to the KPLC or REREC in terms of compensation, as alluded to above.
There are estimated to be over 270,000 households within this buffer zone, situated within at least 500 distinct communities. Because of financial and geographical constraints, it is unlikely that KPLC and REREC will be able to electrify all of these households in the near-term. Communities within the buffer zone that cannot be electrified in the near future by KPLC and REREC are being unfairly barred from accessing electricity provided by private minigrid developers. Minigrid developers can raise funding quickly from both equity investors and grants as well as from impact investors that remain undeployed because of difficulties in securing EOI from the MOE, and other regulatory steps.

The buffer zone contradicts the intent of KNES, Energy Act and draft Mini-Grid Regulations.

There are a number of specific scenarios that demonstrate how the buffer zone is harmful to electrification efforts:

- Independent research of communities electrified through the LMCP program in Western Kenya over the last 5 years shows a connection rate of less than 15% on average with many transformers serving 20 consumers or less. Private minigrids on the other hand are incentivised to maximise connections and hence demonstrate connection rates consistently close to 100% of potential customers.

- Islands: Some unelectrified sites are within 15 km from MV lines, but across the water on lakes. This challenge extends to other natural barriers like hills, mountains, swamps, floodplains, and valleys that are challenging to develop grid infrastructure.

- Refugee camps: KYC requirements keep KPLC from connecting anyone under the grid lines despite running through the camps. To supply electricity to these vulnerable areas, minigrid developers should be allowed to bypass the 15 km requirement. Indeed the international humanitarian agencies find minigrids a more viable solution given the "long term temporary" nature of these refugee settlements

REREC’s Strategic Plan does not include connecting customers more than 600m away from transformers.

The Energy Act, 2019 has vested the responsibility of extending electricity in the rural areas with REREC on behalf of the national Government. To this end, REREC’s functions include overseeing the implementation of the Rural Electrification Programme and managing the Rural Electrification Programme Fund, whose objective is to accelerate electricity infrastructure in the country.

According to REREC’s latest Strategic Plan (2018/19-2022/23), one of the organisation’s strategic objectives is to increase electricity connectivity through connecting all public facilities and households within a radius of 600 metres of new transformers by 2022. However, this means that currently Kenyans without electricity beyond the 600-metre radius are not under consideration by the key national government body responsible for rural electrification. This also demonstrates the inconsistency between the 15 km buffer zone in the KNES 2018 and the 5-year Strategic Plan of REREC.

While REREC’s plan is to connect all public facilities and households within the 600m radius of new transformers, one of the challenges highlighted in the strategic plan is inadequate funding over the years leading to reduction of the planned scope. In this regard, it is doubtful if REREC will manage to connect all public facilities and households within reach of a transformer. Consequently, Kenyans without electricity beyond the 600 metre radius are likely to wait longer before REREC can consider them. Therefore, the Government needs to open up the 15 km
buffer zone to private developers as private developers have access to private funding to avoid this delay of electrification.

**Presidential Taskforce on the Review of PPAs recommends that Kenya Power not bear the full financial burden of rural electrification.**

The following recommendation from the Presidential Taskforce on the Review of PPAs 2021 give credence to the argument that the 15 km buffer zone should be eliminated so as to optimise electrification of rural communities:

- Recommendation 7.17.12a calls for an amendment to the Energy Act 2019 to enable the development of Grid Defection Regulations to provide for switching by consumers to other service providers or their own generation. The Grid Defection Regulations should also provide for the handling and reallocation of risks and obligations when such defection occurs. Here, the Taskforce envisages and recommends the existence of other electricity providers alongside KPLC, thus eliminating the need for a buffer zone if switching from one provider to another has to work.

**Developers are also being prevented from developing sites that feature on the confidential KOSAP Component 1 site list.**

In order for AMDA members to proceed with electrification efforts of this site pipeline, AMDA seeks to collaborate with the Government to ensure a smooth approval and licensing processes for the sites. In some cases, AMDA members have experienced that sites for which they submit EOs are rejected because the sites are included in the list of sites that KOSAP will reach. However, the list of KOSAP sites is not public, and is not yet fully confirmed/approved. Because of delays and changes with KOSAP and the willingness of AMDA members to invest in these sites at no cost to the Government, AMDA requests that all sites submitted by minigrid developers, even if they feature on a current KOSAP list, be considered and approved on their technical merits. AMDA members incur costs to develop these sites to a point where they are ready for EOI application, so rejection at such a late stage causes significant financial loss to the developers. In addition, KOSAP may duplicate effort and costs as there is no information sharing.

**Tariffs and Consumer Protection**

AMDA members have made major strides in technology and business innovation to consistently reduce consumer tariffs and ensure customers access affordable power. However, currently, minigrid companies do not receive the same level of public support as Kenya Power, disabling them from being able to offer KPLC-parity tariffs to customers.

With regards to subsidies, KNES states that "the MOE favors a uniform national tariff. However, extending the KPLC tariff to off-grid systems will require a clear mechanism to allocate and manage subsidies. For example, subsidies could be financed through an intra-sector mechanism such as a levy. For example, with KPLC annual sales of 7,000 gigawatt-hours, a $19.5 million annual subsidy would add $0.0028 per kWh to KPLC grid-connected consumers' cost (Table 6)." Table 6 proposes an annual subsidy of $3.4m for 35,000 minigrid connections, or about KES 900/connection/month. This subsidy would add significant value to the sector and enable developers to sustainably reduce prices.

Despite the above KNES provision, the intra-sector subsidy has not been implemented. But the developers have on their own sought subsidies from development partners and impact

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investors, which frequently cover at least 50% of a site’s CAPEX, meaning that the tariffs the minigrids are charging can be up to 50% lower than a true cost-reflective tariff. Developers also charge significantly lower connection fees than KPLC, and offer credit facilities for customers to pay the connection fee over multiple months. The developers are continuing to engage the development partners for a pan-Africa Results-Based Financing (RBF) fund that will bring more subsidies and lower the tariffs. The inter-connection between minigrids and the grid will also help bring down average tariffs. The economies of scale will add to lowering tariffs if developers are allowed to develop pockets of concentrated operating points. Therefore the KNES 15 km buffer zone does not aid in reducing rural power tariffs; it contributes to the remaining higher than necessary.

AMDA members wish to collaborate with the Government to reduce tariffs further to ensure that all Kenyan communities have access to completely affordable power. There are actionable steps that the public and private sectors can take in collaboration to ensure this is the case.

Table 1 Concrete actions to reduce tariffs

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Interconnection and Grid Integration

AMDA members aim to build a collaborative framework for commercial and technical integration with the main grid. AMDA recognizes that the Government’s grid extension plans allow for eventually achieving universal access to grid electricity in Kenya. Minigrids can serve as pre-grid electrification solutions that bring significant benefits to communities.

When the grid arrives in a minigrid community, there are three primary commercial options for integrating the private and public solutions:

**Table 2 Commercial options for grid + minigrid integration**

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<th>Technical solution</th>
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<td>Bulk purchaser/bulk distributor</td>
<td>- The developer and KPLC enter a bulk purchase agreement for a negotiated price.</td>
<td>- REREC interconnects the minigrid to the nearest KPLC transformer.</td>
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<td>- The developer owns and operates its distribution network and generation assets and retail power to customers.</td>
<td>- The generation assets are kept in place by the developer.</td>
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<td></td>
<td>- The developer applies to EPRA for a new license and tariff approval, considering the new business model.</td>
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<td></td>
<td>- Net metering or a grid feed-in-tariff can be established.</td>
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<tr>
<td>Compensation/asset sale and KPLC site takeover</td>
<td>- The parties negotiate a purchase price for the minigrid generation and distribution assets, taking into account cost and depreciation.</td>
<td>- REREC and KPLC interconnect the minigrid distribution network to the nearest KPLC transformer.</td>
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<tr>
<td></td>
<td>- KPLC and REREC take over ownership and operations of the site.</td>
<td>- Generation assets can be retained or moved to another site.</td>
</tr>
<tr>
<td>The developer becomes IPP, decommissions, or sells distribution</td>
<td>- The parties negotiate a PPA for the developer to sell power to KPLC.</td>
<td>The parties interconnect the generation plant to the grid for evacuation of power.</td>
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<tr>
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<td>- The developer decommissions distribution assets or sells them to REREC at a cost and depreciation price.</td>
<td>Distribution assets are decommissioned and moved to another site by the developer or taken over by REREC.</td>
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AMDA wishes to discuss these three options with the Government to align on the ideal strategy for achieving the Government’s electrification goals.

**Recommendations**

AMDA wishes to submit the following recommendations to expand electrification across rural Kenya rapidly:

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- AMDA recommends that the 15 km MV infrastructure buffer zone be eliminated in the KNES updated to align to the Energy Act and the draft Mini-Grid Regulations. In the meantime, AMDA recommends that the Ministry of Energy grant approval of EOIs for sites within the buffer zone as envisaged in the Act in Section 164 on Energy Supply Agreements and the draft Mini-Grid Regulations Part IV - Interconnection. This will ensure that larger site portfolios can be developed, reducing tariffs across the country.

- AMDA recommends that the EOI no objection process be controlled by EPRA instead of the Ministry of Energy, as this was the historical approach and allows for an independent assessment of site feasibility by the regulator. This is consistent with the recommendations of the Presidential Taskforce on PPAs that MOE remains a policymaker and not an implementer.

- AMDA recommends that the Government leverage AMDA and its members raise external financing for private minigrid-driven electrification funding programs in Kenya. The Government and AMDA can collaborate to mobilise financing that will increase the speed of electrification for the remaining unelectrified Kenyans and lower tariffs. External financing can also enable tariff reduction on a sustainable basis.

- AMDA recommends that the Ministry of Energy convene a meeting with AMDA, EPRA, REREC, and KPLC to discuss the commercial options for minigrid interconnection and grid integration.

- AMDA recommends that EOIs for sites that may feature on the KOSAP Component 1 planning list be released for developers with a demonstrable interest in developing minigrids at those sites, at no cost to the Government.

These five steps would significantly expand access to electricity in rural Kenya without any investment or funding required by the Government. This, in turn, would increase incomes and improve livelihoods in unelectrified communities across Kenya, contribute to domestic tax mobilisation, and build a more resilient power system in the country.

These steps would bring electricity access to rural Kenya, improving livelihoods and promoting economic development in rural communities that have historically been underserved. In addition, this promotes the Government of Kenya's and AMDA's shared goal of achieving universal energy access.