



BENCHMARKING AFRICA'S MINIGRIDS

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Executive summary

Over the last decade, leading authorities have repeatedly heralded minigrids as essential to providing electricity to approximately half of all unelectrified communities in Africa. Despite this, investment, political buy-in, and scale have remained elusive. One of the key reasons this has been the case is that to date, national-level decisionmakers, investors and donors have had to rely on data and evidence from individuals or small groups of companies. This being because there has been a general lack of reliable, neutral information available on the sector as a whole. With this report, the Africa Minigrid Developers Association's (AMDA) and Economic Consulting Associates (ECA) present analysis of a one of a kind dataset collected from nearly all established market leaders across Africa as well as a significant sample of smaller, newer companies that together represent the vast majority of private sector minigrid companies on the continent. This report provides the most comprehensive analysis on minigrid financing, economics, regulation, service quality, & impact available to date, and also offers key insights into the barriers facing the sector and what can be done to overcome them.

Key Findings

Overall, the African minigrid market is behaving predictably both as a nascent industry, with significant price reductions emerging as investments increase, and also as a rural electrification sector, in that public funding has proven an essential catalyst to bring in private investors and kickstart cost reductions through the scale-up process. Logic holds that continued public support will see continued scale-up and price reductions.

The data demonstrates a fundamental interconnection between concessional funding, private investment, political environments and deployment of connections. AMDA's data illustrates how these different pieces of the enabling environment feed off one another to build the trust, confidence, and experience necessary to see increased delivery of energy access. These elements are so fundamentally intertwined that disruptions within the cycle can derail growth or even devolve into negative feedback loops.

AMDA's data shows the sector is beginning an impressive scale-up phase. As donor funding steadily increased over the reporting period, connection numbers did as well; going from under 2,000 connections in 2016 to over 41,000 in 2019. These connections have provided over 250,000 people, businesses and community facilities with high quality, productive energy. To date, this growth has largely taken place in East African markets, where the sector got an earlier start.

The sector's growth over 2014-2018 also coincided with a tremendous drop in costs, with the average price per connection falling from US\$ 1,555 at the beginning of our reporting period to US\$ 733 in 2019. Established developers have been able to reduce CAPEX pricing by 57% over the reporting period. Cost for new companies entering a market has reduced by 33% in the same period. Another interesting contrast between new and experienced developers is that in well-established markets, experienced firms were on average 41% less expensive than new developers in those same markets, again illustrating the logical evolution of sector as companies gain experience and scale.

Taken together, our data show that rural minigrid connections are often thousands of dollars cheaper than those of state-run utilities. With the primary concern of governments today being the higher kilowatt costs of minigrids, these enormous cost savings could easily be transferred into end-user subsidies or other cost reductions tools, and still save governments and donors billions visà-vis traditional grid expansion across the continent.

Our most alarming finding is that across the continent, regulatory compliance processes on average take more than one year per site. With the World Bank estimating that Africa requires 140,000 minigrids, regulation represents an enormous barrier to sector growth and to SDG 7. Neither will be achievable without the urgent development and adoption of more automated and bundled approval processes that allow for higher volumes of approvals at greatly increase speeds.

An unsurprising but confirmatory key finding is the challenge of low consumption. The average consumption per customer is only 6.1 kWh per month across the continent. Low consumption makes it difficult to ensure operational costs can be covered for residential consumers, let alone that a return on investment might be possible. Interestingly, the data does not show a correlation between higher average revenue per user and a higher level of consumption, utilisation rates or installed generation capacity. This is likely due to tariff pricing effects, as well as difficult operating environments where external factors and the demographic make-up of customers create large variabilities in revenue generation.

Recommendations for decision-makers:

In summary, concessional funding is working to unlock private capital and catalyse investment that is allowing the sector to grow and reduce costs as it gains experience and scale. Support is urgently needed however to address the dual issues of low demand and complex regulatory environments. Only once these issues are mitigated will the sector be able to grow quickly enough to play the role it is being called on to play in ending energy poverty for good.

With this in mind, AMDA has identified three key areas for decision-maker action based on the evidence presented in this report:

1. **Public funding has been very successful at crowding-in other investors and more is needed.** While these investments have already begun a scaling effect that is significantly lowering prices, because the sector is still in its early stages, broad, systemic public funding is still needed to bring in private investment continually and realize true economies of scale. Therefore large-scale, multi-country funding programs would be the most ideal tools to give investors and minigrid companies predictable, easy to understand pathways to invest and build across multiple geographies.
2. **Low consumption is a systemic problem that requires coordination and collaboration among all stakeholders.** Because of this systemic challenge, bankability will remain elusive until a systemic, long-term collaborative response from minigrid companies, the donor community and national governments is deployed at scale. While not based on the evidence presented in this report, experience shows that ideally, a broad-scale demand-growth program would likely need be a combination of micro-finance (for appliance purchases), micro-entrepreneurship training (ensuring appliances and small businesses are increasing

incomes) and agricultural extension work (minigrid sites and customers will remain largely agrarian for some time). Right now, systemic efforts to address this core sectoral issue do not exist, and helping fill this gap will be a key area of AMDA's work moving forward.

3. **Minigrid regulations must be made more appropriate to the projects they are regulating.** Current regulations are largely based on regulator experiences approving and monitoring small numbers of large energy projects, and must urgently be re-designed to do the inverse - approve hundreds or thousands of small projects over a short period of time. Digitizing processes as much as possible, while making use of smart- and remotemonitoring technologies will go a long way in allowing regulators to reduce up-front application burdens, as well as allow approvals to move in batches rather than one-by-one.

The lead analysts and authors of this report from Economic Consulting Associates are Almar Barja and Ester Vespasiani. Lead authors from AMDA are Jessica and Aaron Leopold.

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