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## KNOWLEDGE BRIEF STIMULATING ENERGY DEMAND IN LOW- AND MIDDLE-INCOME COUNTRIES

# Growing demand, improving wellbeing: opportunities for overcoming low electricity demand in sub-Saharan Africa

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This Knowledge Brief makes up part of a series of three exploring issues of electricity demand in low- and middle-income countries, which can be read together or as self-contained pieces. This Knowledge Brief outlines the opportunities for overcoming low electricity demand in sub-Saharan Africa. The first brief examines the key barriers to boosting electricity demand in sub-Saharan Africa and is available [here](#). The second presents historical and contemporary strategies from around the world that have been used to increase demand, and is available [here](#).

## NOTE ON METHODOLOGY

This series of three Knowledge Briefs is based on 10 semi-structured interviews with energy sector stakeholders with experience and expertise across SSA – particularly Rwanda, Kenya, Ethiopia, Uganda, Zambia, and South Africa – and a synthesis of the existing literature. The interviewed experts included academic researchers, practitioners, and consultants and representatives of electric utilities, private sector energy companies and NGOs. Where the evidence stems from literature, relevant references are cited. All other statements throughout the series are supported by the findings from the expert interviews. For readability, those findings are generally not attributed to individual experts in the text.

## Key Messages

- Integrated energy planning and targeted interventions, including subsidy schemes, are needed to boost demand and unlock the transformative potential of electricity access;
- Improving electricity service quality and affordability, combined with inclusive financial services, can enable low-income households to maximise the benefits of electricity services;
- Building markets for productive uses of energy, along with programmes offering skills and capacity development for individuals and small enterprises, can boost the positive socio-economic impacts for households, communities and entire nations;
- Re-thinking tariffs and offering incentives to domestic, commercial, and industrial customers can encourage further uptake of electricity services, including substituting the use of biomass or petrol with electricity.



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## Introduction

As discussed earlier in this series ([Knowledge Brief 1](#) and [Knowledge Brief 2](#)), solely providing access to energy systems does not automatically drive demand, nor does it produce the desired development outcomes that governments and development partners want to see. Growing electricity demand has been a persistent challenge for energy utilities ever since electricity services were extended to households, communities, businesses, and nations. Today, it continues to be a concern across sub-Saharan Africa (SSA) where public energy utilities, as well as private electricity providers, struggle to drive consumer demand, particularly in peri-urban and rural areas. This is a key challenge for utilities wanting to sustain their financial health and for governments tasked with developing and implementing viable strategies for achieving universal access to electricity ([Plutshak and Phillips, 2019](#)).

Interviewees argued that there is a scarcity of well-designed, targeted interventions and initiatives to raise end-users' awareness of the potential benefits of electricity access. Similarly, a failure to boost demand at the time of connection contributes to the low levels of energy demand we currently see across most countries in SSA ([IEA, 2023](#)). As discussed in the [first Knowledge Brief](#) there are several other compounding barriers, including poverty, the high cost of electricity, unreliable power supply, poor access to electric appliance markets and financial services, and the complex political economy of electricity provision. The [second Knowledge Brief](#) explored examples of programmes and strategies deployed by energy utilities to boost energy demand in Europe, Asia, and North and South America. Based on these collective findings, this final Knowledge Brief identifies opportunities to boost electricity demand and consumption in SSA.

## Growing demand: opportunities for sub-Saharan Africa

**Investing in improved service delivery to build confidence in electricity services is critical.** Improved reliability of the grid power supply enables opportunities for economic growth and quality-of-life improvements for residential customers. It also bolsters often-underdeveloped small businesses by enabling cost-effective production, thus supporting local economies. Poor electricity service provision also hinders utilities that may struggle with revenue collection and low consumption rates, as customers resort to alternative energy sources to satisfy their needs. In Rwanda, for example, efforts to improve the reliability of the grid have been carried out at the same time as those to extend access to new consumers (residential and commercial). Efforts have focused on rural and peri-urban areas, which experience

greater intermittency than urban areas where infrastructure is more robust. Ensuring that rural and remote energy utility service centres have tools to provide quality services should be prioritised to address ongoing service quality issues. The ongoing Rwanda Energy Access and Quality Improvement Project (EAQUIP) aims to tackle these challenges ([World Bank, 2020](#)).

**Integrated energy planning can unlock pathways to universal energy access through a more holistic, systems approach to electrification, spanning different sectors and end-uses.** Such approaches mean going beyond the least-cost energy access solutions for a given context ([SEforALL, 2019](#)). Integrated energy planning can also anchor access efforts around higher demand loads in areas where household

level consumption will likely remain low. This could also benefit surrounding communities that may otherwise not get access or be limited to small-scale decentralised solutions.

Kenya provides an example of such an approach. The Integrated National Energy Plan (INEP) ([EPRA, 2023](#)) is a cross-government initiative that aims to integrate Kenya's energy planning with its economic, social, and environmental policies. In so doing, it aims to consider a spectrum of energy needs, including in areas such as water access, healthcare, manufacturing, and livelihood creation. Importantly, it also crosses different levels of government, allowing local governments to elucidate their own energy and development needs.

The temporal aspect of integrated energy planning is critical. As policymakers develop energy planning strategies, it is paramount to have an understanding of customers' ability to pay, the potential for productive uses of energy, and how energy demand can develop over time ([GSMA, 2022](#)).

Finally, and as emphasised by the interviewees, universal access to electricity and growing demand are difficult to achieve without subsidies. It is therefore essential to build subsidy schemes into integrated energy planning. Smart subsidy design ([ESMAP et al., 2021](#)) and safety nets ([SEforALL, 2020](#)) can inform how to best structure the subsidy and what levels to set it at in order to best serve the poorest and most vulnerable.

**Financing, including utility-enabled financing, should be considered to break the financial inclusion barrier.** Access to capital and credit remains a significant barrier for many households across SSA. Formal channels, such as banks or micro-finance through established micro-finance institutions (MFIs), are one option, but access is often restricted. (In)formal community savings

groups, such as Savings and Credit Cooperative Societies (SACCOs), can be an option if available. Offering more viable alternatives to low-income, low-consumption households could help address the challenge of low appliance uptake.

Electric utilities, including mini-grid developers, are uniquely positioned to provide underserved customers with consumer financing ([Waldron and Hacker, 2020](#)). As such, an option could be on-bill financing – a mechanism that allows consumers to repay costs through their utility bills – which could be easier to access than a loan from an MFI or a SACCO. Well-paying electric utility customers could be offered credit to purchase selected approved appliances (see [Knowledge Brief 2](#)). However, this should be done with caution and following extensive consultation with local communities to maximise buy-in and appliance uptake. For example, there have been mini-grid developers in Kenya who have received external support to offer appliance financing for their consumers. However, the results have been mixed as the proposed appliance ranges did not fully respond to the needs and interests of communities.

Where utilities are unable to offer the financing themselves, they could utilise the data they collect to help facilitate third-party loans to the same customers. Such financing initiatives can benefit both the customer and the provider: the former gets access to appliances they would otherwise be unable to afford, and the latter benefits from the boost in electricity consumption and the potential unlocking of latent demand. However, developing and implementing such schemes has its barriers and challenges ([CGAP, 2020](#)). These include access to capital, operational challenges of managing credit operations, reliability of electricity provision, and the development of consumer protection measures in order to avoid customer over-indebtedness and other potentially harmful

impacts ([van Rooyen et al., 2012](#)). Careful analysis of customer payment and consumption data prior to approval of loans and credit limits could address some of these challenges.

**Fuel substitution and incentives could help increase demand where there is existing or anticipated spare power supply.** There is an opportunity to replace expenditure on petrol, gas, or biomass with expenditure on electricity, particularly in commercial and industrial applications. For example, in Kenya, many industries rely on firewood to run boilers for leather tannery processes, beer brewing, tea drying and so on. These energy-intensive activities could be performed with the use of electricity if the right incentives were in place. New or increased taxes on charcoal and other biomass fuels, for both domestic and industrial consumers, could act as a disincentive that governments could consider, thus encouraging higher electricity uptake. However, due consideration would need to be given to the potential impacts on those dependent on biomass and charcoal supply chains for their livelihoods. Electricity subsidies, or cross-subsidies, for the poorer segments of the population could help alleviate the affordability gap. More favourable electricity tariffs, for both grid and mini-grid customers, could further increase electricity uptake.

**Rethinking tariffs to boost consumption and unlock more electricity-dependent benefits to households could offer a long-term win-win scenario.** [Knowledge Brief 1](#) highlighted the barrier of high electricity tariffs. This means that remote rural communities pay some of the highest prices per unit of electricity out of all settings, even though they are often the ones with lowest ability to pay (and lowest levels of consumption). This is particularly pertinent to contexts where decentralised electricity provision has been deployed in the form of mini-grids. Mini-grid electricity tariffs, which are often

not controlled by the regulators, can make electricity prohibitively expensive to households. Crossboundary and Energy4Impact ([2019](#)) have shown that reducing mini-grid tariffs has an immediate and strong effect on rural customers' electricity consumption, suggesting that those customers have a fixed budget for expenditure on electricity. If consumption increases, mini-grid providers may be able to lower tariffs and still achieve similar revenues. This also points to the need for meaningful end-user consultations that can help inform relevant strategies with a better chance of being efficient.

Grid electricity tariffs in SSA are amongst the highest in the world. Tariffs may also require rethinking in order to boost consumption and unlock more electricity-dependent benefits to households. Where feasible, lower tariffs with on-bill financing could offer additional revenue to the utilities while offering new appliances to households. E-cooking tariffs, introduced in 2022 by the Ugandan utility ([2022](#)) and more recently in Kenya (including both e-cooking and e-mobility) ([EPRA, 2023](#)), can encourage customers to increase consumption whilst benefitting from a lower tariff.

**Offering incentives to commercial and industrial consumers can boost consumption while also contributing to job creation and socio-economic development.** For larger commercial and industrial consumers, introducing off-peak tariffs (ie reduced tariffs for night-time hours) could support management of peak hour loads. It would also encourage the establishment of commercial activities, bringing economic development and valuable revenue to the utilities. Rwanda provides an example of this approach; commercial and industrial customers can benefit from significantly lower on-grid electricity tariffs between 11pm and 7:59am (off-peak), with shoulder hours between 8am and 5:59pm (tariffs that are lower than peak

hours, namely between 6pm to 10:59pm, but higher than off-peak). In addition to these time-differentiated tariffs, the Rwandan utility offers free connections to large commercial consumers in special economic zones. This has been successful in attracting new industrial users; however, the demand for free connections has been difficult for the utility to sustain when the volume of requests can be too high to fulfil promptly.

In Rwanda and Zambia, interviewees indicated that sectors such as mining tend to be prioritised as their operations are energy-intensive and therefore bring some of the highest revenues for electricity providers. As they are often located in remote areas, rural households can piggyback on the electricity extensions that would otherwise not be possible. However, there are also potential drawbacks in having a high concentration of commercial and industrial customers. This is because, in times of lower power supply, prioritisation can affect service to domestic consumers. This could be tackled through improved load management and network planning.

**Decentralised energy technologies could get more households on the electricity ladder more quickly (and efficiently).** Decentralised solutions, such as SHSs and mini-grids, have been seen as the backbone to electrifying rural, scarcely populated areas, which are unlikely to be reached by the electricity grid ([Bhattacharyya & Palit, 2016](#); [IEA et al., 2020](#); [Zalengera et al., 2020](#)). Additionally, the cost of small renewable energy units, and in particular that of SHSs, has decreased rapidly in the last decade making it a cost-effective alternative to national grid extension ([Levin & Thomas, 2016](#)). These solutions enable households to make modest investments in their power systems, and to modify those systems according to their changing incomes and power demands. Opiyo ([2020](#)) has shown that basic SHSs can act as demand stimulators and can lead to eventual grid electrification of a given community.

As an electrification policy, governments might therefore consider seeding unelectrified areas with SHSs to stimulate power demand for eventual grid or mini-grid electrification that can support higher loads and a wider range of electric appliances.

### **Energy efficiency and local innovation**

Decentralised energy technologies can power a wide range of appliances due to the advancements in their levels of energy efficiency. Energy saving behaviour is, in a way, imposed on the end-users as the amount of energy the systems offer is limited. This might prove beneficial as users climb the energy ladder and eventually get connections to mini-grid or national grid networks, where energy efficiency will have to be not only considered, but also promoted among the consumers. This will help ease the burden of peak load management and the need to educate consumers on energy saving behaviour in the future (a need that is currently being tackled in many developed countries (eg [Bertoldi, 2020](#); [Słupik et al., 2021](#))). Additionally, as highlighted by the interviewed experts, electrical appliances offered to the consumers in SSA should be informed by local innovation so that they are both energy efficient and able to withstand weak and unreliable grids. For example, importing appliances from Europe to rural health clinics in SSA might result in appliances quickly going out of use due to damage caused by power surges. Fostering local innovation, which is responsive to local conditions, could help tackle such challenges.

**Productive uses of energy, require targeted interventions.** As highlighted by the interviewees, there are a lot of initiatives supporting productive uses of energy (PUE). However, the lack of a clear, and universally accepted, definition of PUE has created confusion in the sector. In reality, most PUE projects have focused on households and have been limited to charging phones, access to information and communication technologies, and simple household uses ([Dagnachew et al., 2023](#)).

More recently the focus has been expanded to include e-cooking ([MECS, 2022](#)). However, while interviewees generally agreed that such services can help boost demand, it was argued that PUE initiatives should specifically target businesses and directly contribute to livelihood creation and income generation. Additionally, demand stimulation and PUE initiatives do not always align due to differing interests; PUE should be economically sustainable for consumers, but these may not be the highest electricity consumers in the provider's portfolio. Agreement on a shared definition and objectives for PUE could help streamline efforts and facilitate coordination between stakeholders.

Many remote communities in SSA have limited access to markets, skills, and financing, all of which are essential to expanding productive uses of energy ([IIED, 2021](#)). Awareness raising, while crucial, is rarely enough. A more holistic approach to PUE projects could support analysis of the technologies used in the production of goods and services in a specified rural area. Such an approach would help identify community-level bottlenecks to the uptake of PUE and inform the most effective avenues for support, including

financing, skills development, business inputs, and market linkages. It will also require exploitation of near-term opportunities in well-established value chains, and the dismantling of longer-term structural issues that prevent the equitable uptake of PUE ([EnDev, 2021](#)). Additionally, it is vital that lessons are learnt from both the successes and failures of PUE initiatives. While many PUE projects have not yielded expected results, there are examples of successful interventions. In Tanzania, a mini-grid developer worked with communities in Lake Victoria, successfully supporting local business needs and the development of the fishing industry. A key factor in this project was the direct response to local demand.

According to the sector experts, there is still a paucity of effective PUE solutions. However, with higher levels of investment into metering and customer base management, efficient packaging of energy services (ie connections combined with appliances), and targeting of anchor load customers (eg restaurants, agri-processing facilities), mini-grid electricity providers have a strong foundation upon which to build robust services and test strategies to boost demand through PUE.

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## Conclusion

Low consumption among electricity customers is a critical concern for utilities and governments across SSA. Governments and utilities should focus on actively enabling positive electricity consumption habits, developing productive rural enterprises, and improving system reliability to build customer confidence in electricity supplies. Simply providing the physical infrastructure for access to electricity has not proven to be enough to catalyse socio-economic development and more holistic approaches tailored to local contexts are urgently needed. These approaches should also be cognisant of the need to build in, and

promote, energy efficiency for a sustainable energy demand growth over the long-term. Equally, energy demand should be considered at different scales and will require different, context-specific interventions depending on whether the focus is on commercial and industrial or residential customers, or on urban or rural areas. Governments and development partners should go beyond the provision of connections to implement projects that positively impact wellbeing and livelihood creation. These must offer opportunities for increased income generation, both for consumers e.g. from PUE, and providers.



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**CITATION:** Bisaga, I., Tomei, J., and Tesfamichael, M. (2024). Growing Demand, Improving Wellbeing: Opportunities for overcoming low electricity demand in sub-Saharan Africa. CCG Knowledge Brief Series: Stimulating Energy Demand in Low- and Middle-Income Countries. Vol. 3. Available at: <https://climatecompatiblegrowth.com/wp-content/uploads/KB3-recommendations-for-demand-stimulation-in-SSA.pdf>.



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