

# POLICY GUIDELINES FOR THE DEVELOPMENT OF PRO-POOR ELECTRICITY TARIFFS AND CHARGES

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## Consultancy services to implement harmonised regulatory/ technical frameworks and synthesised renewable and energy efficiency strategies in the EA-SA-IO region

This assignment is supporting the Common Market for Eastern and Southern Africa (COMESA), East African Community (EAC), Intergovernmental Authority on Development (IGAD), Indian Ocean Commission (IOC), and Southern African Development Community (SADC), in their collective efforts to promote the development of a sustainable regional energy market in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) Region.

## Guidelines

This document provides policy makers with guidelines for the development and operationalisation of pro-poor electricity tariffs and charges in the EA-SA-IO Region.

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## Opinions and Limitations

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# Acronyms / Abbreviations

| | |
|---|---|
| **EA** | Eastern Africa |
| **ESMAP** | Energy Sector Management Assistance Program |
| **ESREM** | Project on Enhancement of a Sustainable Regional Energy Market in the Eastern Africa, Southern Africa and Indian Ocean (EA-SA-IO) Region |
| **IO** | Indian Ocean |
| **kWh** | Kilowatt-hour |
| **SA** | Southern Africa |
| **SDG** | Sustainable Development Goals |
| **USD** | United States Dollar |

# 1 WHY PRO-POOR ELECTRICITY TARIFFS AND CHARGES ARE IMPORTANT IN THE FIGHT AGAINST POVERTY

## 1.1 Objectives of the policy guidelines

These policy guidelines are prepared as part of the European Union-funded Project on Enhancement of a Sustainable Regional Energy Market in the Eastern Africa, Southern Africa and Indian Ocean (EA-SA-IO) Region (ESREM). They build on a working paper submitted to ESREM in January 2021.

The objectives of the policy guidelines are to;

- Provide a high-level overview of the current situation with regards to pro-poor tariff setting in the EA-SA-IO region, and to provide policy makers with a broad understanding of the regulatory trade-offs when setting pro-poor tariffs and charges (Part I);
- Set out a best-practice process for pro-poor tariff setting (Part II); and
- Highlight key regulatory aspects to consider in the operationalisation of pro-poor electricity tariffs and charges (Part III).

## 1.2 Electricity as a key enabler of the Sustainable Development Goals

As part of their Sustainable Development Goals (SDG), the United Nations aims to ensure universal access to affordable, reliable, and modern energy services by 2030 (SDG 7). In addition to improving livelihoods directly, access to modern and sustainable energy services is also commonly viewed as a prerequisite for achieving most other SDGs.

A reliable supply of electricity frees up time from household labour for other economic activities that enable value creation and economic growth through productive use. As such, electricity is the gateway to a modern economy based on digital infrastructure and telecommunications, but also allows existing and potential companies in traditional industries to improve efficiency and participate in local and global markets.

In addition to its impact on economic development – improved electricity supply also has a significant impact on heath, climate and gender issues. Traditional biomass is still the primary source for cooking in most EA-SA-IO countries, with devastating consequences for the health of the population through air pollution - disproportionately harming women and children. Further, deforestation resulting from cooking charcoal, and emissions from kerosene, contribute to global climate change and have other negative environmental effects.

## 1.3 Status for electricity access in the EA-SA-IO region

While the share of households with access to electricity nearly doubled from the year 2000 to 2019, almost 380 million people in the EA-SA-IO region still have no access (IEA, 2020). Most of these households live in rural areas.

Poor, limited, or unaffordable supply may limit the usefulness of electricity. Therefore, the Energy Sector Management Assistance Program (ESMAP) has developed a technology-neutral, multi-tier framework to classify electricity access in households from Tier 0 (no access) to Tier 5 (full access). The framework includes criteria on peak capacity, availability, reliability, quality, affordability, legality, and health and safety (Bhatia & Angelou, 2015). Most connected households in the EA-SA-IO region remain in the lower tiers of this framework.

There are, however, substantial differences within the EA-SA-IO region. While some countries have reached near-universal access to electricity, others still struggle with access rates below twenty percent. This demonstrates the need to target and tailor efforts for improving the electricity access situation in each country.

## 1.4 Barriers to electricity supply for low-income households

There are a range of issues that prevent a faster expansion of electricity access and increased electricity consumption. Three of these stand out in the context of pro-poor tariffs and charges:

***1) Affordability of connection fees***

A World Bank study found that the median connection fee for urban and rural households across Africa amounts to around 70 percent and 160 percent of the average monthly household cash income, respectively (Kojima et al., 2016). For the poorest quintile in rural areas, the percentage is even higher, at about 240 percent of the monthly cash income. Considering that most low-income households live hand-to-mouth and that credit is scarcely available, these charges may pose a significant barrier to electricity access. Several measures exist to balance the poorest households´ ability to pay with the sustainability of service providers. These include direct subsidies from governments or development partners, cross-subsidies between electricity consumers, improved access to credit, and payment plans.

***2) Affordability of electricity***

The affordability of consuming electricity is another barrier to access for poor connected households. Whereas the basic electricity needs are commonly understood to be inelastic to price, a recent study found that 55 percent of respondents would reduce consumption in case of an electricity price hike, by suppressing demand or switching to other energy sources (Mpholo et al., 2019). The report concludes that: “low income households are more likely to reduce electricity consumption when faced with price increases.” This underlines the importance of ensuring that basic electricity needs are made available to all at an affordable price.

***3) The absence of incentives for service providers and authorities to connect new customers***

The availability, reliability and quality of electricity supply depends heavily on the electricity system infrastructure. Under-investment in both generation and the grid is commonly observed across the EA-SA-IO region because underfunded service providers lack the resources required to invest in strengthening and maintaining their networks. As a result, a significant share of connected households report problems with the availability and reliability of electricity. When service providers lose money with every kWh of electricity sold, they also have limited financial incentive to connect new consumers. Finally, service providers experiencing financial distress usually also have less funds available for grid expansion. This means that fewer consumers get to benefit from electricity.

There is a clear political push for lowering connection fees and electricity tariffs across the region (Multiconsult and CPCS, 2021). In one instance, the connection fee was cut by more than 80 percent to allow more people to be connected. While this certainly lowers the threshold for

connection, the regulator also noted that no comprehensive plan was put in place to address the loss of revenue for the service provider, who was already experiencing financial distress. This illustrates the trade-off between lower connection fees and the financial sustainability of the sector.

Whereas low tariffs for low-income and rural households are motivated by a legitimate desire to keep electricity affordable, a tariff schedule below cost-reflective levels directly contributes to slow progress on electrification. As a result, households - often the poorest of the poor – are left without access to electricity and have to rely on expensive and often polluting alternatives such as kerosene. Therefore, service providers must be compensated for the consequences of pro-poor tariff setting.

In conclusion, a coordinated and structured approach to pro-poor tariffs and charges are required to meet SDG 7. The key elements of such a process are outlined in Chapter 2.

# 2 HOW TO DEVELOP PRO-POOR ELECTRICITY TARIFFS AND CHARGES

Regulatory objectives in tariff setting have been the subject of extensive discussions among academics over the years (e.g. Hennessy, 1984; Eberhard et al., 1993; Jamison, 2013). Whereas the understanding and prioritisation of these objectives has evolved, three main themes can be identified:

| Regulatory principle | Explanation |
|---|---|
| **Sustainability** | End-user tariffs play a central role for the financial and economic health of regulated service providers. The generated revenues should normally cover the cost of operations and maintenance, depreciation, taxes, and provide a reasonable return on investment. The sustainability dimension can be categorised as follows:<br>• *Economic sustainability.* The tariffs should provide the service provider with the opportunity to recover all economic costs, which includes a reasonable return on the investments made.<br>• *Financial sustainability.* The tariffs should generate sufficient cash flow to allow for the appropriate development of services in each period of time.<br>Unfortunately, both the economic and financial sustainability of electricity service providers is concerning in many countries across the EA-SA-IO region. Consequently, many service providers i) underinvest in maintenance and system expansion, ii) depend on subsidies to operate from year to year, and/or iii) require bailouts, debt restructuring or debt forgiveness (Trimble et al., 2016). It follows that financial and economic sustainability is a critical regulatory objective in end-user tariff setting. |
| **Economic efficiency** | Economic efficiency is another important regulatory objective, aiming to ensure optimal resource allocation through price signals. In the context of tariff setting for service providers, one distinguishes between different types of efficiency (Eberhard and Rodriguez-Pardina, 2019):<br>• *Allocative efficiency.* For a particular amount of resource consumption, allocative efficiency results in a mix of outputs that gives society the most value. Efficient allocation of resources requires that the prices imposed on consumers reflect marginal costs of production. In the context of a power sector, this means that consumers choose an efficient level of electricity consumption, and service providers choose an efficient level of investment.<br>• *Productive efficiency.* Productive efficiency ensures that the least amount of resources is used to provide a particular level and mix of outputs, which includes x-efficiency (meaning that a company cannot produce the same output and quality at a lower cost). Productive efficiency also includes production economies such as economies of scale. In the context of the power sector, this means that service providers minimise the cost of producing a certain amount of units or maximise the amount of units given a certain level of inputs.<br>Further to the above, there are additional types of economic efficiency that should be considered but are not at the heart of pro-poor tariff regulation. |

| Regulatory principle | Explanation |
|---|---|
| **Equity** | This objective is often discussed in terms of *fairness* and *affordability.* Equity includes both the dimension of access (addressing a Universal Service Obligation), and affordability (tariffs in line with low-income households´ ability to pay).<br><br>Many low-income households have to spend a significant share of their income for basic electricity needs. This has been recognised in a variety of research – and as a result, affordability was included as a defining dimension of ESMAP´s multi-tier framework for assessing access to electricity (Bhatia & Angelou, 2015). |

The regulatory objectives presented above are interrelated, implying that the regulatory body has to balance them against each other (Eberhard & Rodriguez-Pardina, 2019; Gunatilake et al., 2008). Key examples include:

- *Allocative Efficiency versus Equity*. Affordability of electricity for low-income households is inherently at odds with allocative efficiency: The cost of providing electricity to low-income households, who consume few units per month and often are located in rural areas is generally higher. This would, according to allocative efficiency require a higher tariff for the rural, low-income households. Whereas price discrimination, i.e. a low-income, rural household paying a higher tariff than an urban and more affluent customer, is efficient, it can be unfair to customers and posit against the affordability objective.
- *Sustainability versus Equity*. Subsidies may be required to achieve equity (affordability) for certain consumers. All too often service providers across Africa have to carry the cost for these subsidies, adversely impacting their sustainability over time.

It is clear that the trade-off between equity and economic efficiency is a key consideration for supplying electricity to the poor. Most countries in the EA-SA-IO region deploy cross-subsidies to address this matter, and there is an emerging consensus among economists that if properly designed, such subsidies can serve as an efficient tool to promote access to reliable and affordable electricity services for the poor. This, however, requires a data driven approach, with the regulator taking a central role to ensure that the interests of different stakeholders, including service providers, are taken into account. The following paragraphs lays out the key elements of such a process.

## 2.1 First key element - Determine financial capabilities of poor households

Affordability refers to whether households are able to pay for their basic electricity needs. It includes a complicated interaction between i) electricity demand, ii) the price of electricity, and iii) the ability of the consumer to pay (Bhatia & Angelou, 2015).

Affordability criteria have been a focal point in many studies on energy poverty. It is typically postulated that energy´s percentage of total expenditure should not exceed 10 percent of a household's income, or 10 percent of the working hours of a household member (HEDON, 2011; Bhatia & Angelou, 2015). On this basis, ESMAP has deemed electricity to be affordable if the expenditure for basic electricity needs does not exceed five percent of a household's income.

In almost half of the reviewed countries in the EA-SA-IO region, 30kWh of electricity costs more than five percent of the monthly household income of the poorest quintile (Multiconsult and CPCS, 2021), implying that the financial capabilities of the poor are not sufficient to enable affordable electricity consumption at the subsistence level. In some countries, this share is even higher – up to 19 percent in the most extreme case.

The correct lifeline tariff level for each country is clearly for policy makers to determine, but it needs to be made based on a full understanding of poor households´ financial capabilities.

Regulators should:

a) Collect and/or consolidate income data for households with and without access to electricity. Where possible, this data collection should be embedded in the national census, or other ongoing surveys or studies.

b) Based on the collected data, a representative income for poor households in the country should be determined. The appropriate approach will depend on country-specific circumstances and policy objectives, but two approaches stand out:

- Apply household income at the national poverty line (see Mpholo et al, 2019)
- Apply average household income of poorest quintile of households

c) Calculate the monthly spending on electricity that corresponds to five percent of the income determined under b) above. Differing circumstances and policy objectives may justify a higher or lower rate.

d) Establish a mechanism for regular review to be undertaken at least once every five years.

## 2.2 Second key element – Determine basic human electricity needs in the country and calculate the indicative lifeline tariff

A number of studies have been undertaken to investigate the energy poverty line. This is “the minimum level of energy consumption necessary for human sustenance in any country” (Barnes, Khandker, & Samad, 2011, p.32).

Based on previous studies, ESMAP’s Beyond Connections considers 1 kWh of daily household consumption – or roughly 30 kWh per household per month as the consumption package that ought to be affordable to all households (Bhatia & Angelou, 2015). Other literature also commonly refers to this 30-kWh threshold.

The consumption bands supported by lifeline tariffs in many EA-SA-IO countries is far higher than this 30 kWh benchmark (Multiconsult and CPCS, 2021). Because the lifeline tariff category is usually cross-subsidised, such high thresholds drive up the electricity costs facing other consumers (typically other households) and increase the economic deadweight losses.

It is recognised, however, that the minimum electricity needs depend on a variety of factors that differ from country to country and between regions, such as climate conditions, cultural habits, economic conditions, level of development, and availability of energy-efficient appliances. Furthermore, minimum electricity needs may evolve over time, for example with the adoption of more energy-efficient lighting. As such, the basic needs should be assessed on a national scale and revisited periodically.

Regulators should:

a) Determine a national threshold for basic electricity needs, taking into consideration climate conditions, cultural habits, economic conditions, level of development, and availability of energy-efficient appliances. The data collection and analytical groundwork should, if possible, be embedded in a Cost of Service Study or other ongoing initiatives and revisited on a regular basis – at least every five years.

b) Calculate the indicative lifeline tariff. If it is given as a simple energy charge, the indicative unit cost can be found by applying the following formula:

$$Indicative\ lifeline\ tariff\ = \frac{5\%\ \text{of monthly income of poor households}}{\text{Basic electricity needs (number of}\frac{\text{kWh}}{\text{month}})}$$

## 2.3 Third key element – Determine appropriate connection charges

As outlined in section 1.4, a key barrier to connection for poor households is the often high up-front connection fees. Many low-income households live hand-to-mouth and struggle to finance connection fees that can amount to multiples of their monthly household income (Multiconsult and CPCS, 2021). This is particularly unfortunate because replacing kerosene or candles with electricity for lighting in most cases frees up resources by reducing the household´s energy expenditure (Multiconsult, 2014).

Governments, rural electrification agencies, and service providers in most countries across the EA-SA-IO region have measures in place to lower this barrier to connection, for example, payment plans for connection charges (Kojima et al., 2016). In some countries, international development partners have also established funds that cover connection fees, particularly for low-income and rural households.

Even so, the appropriate targeting of pro-poor subsidies requires that policymakers and regulators balance the affordability challenges of connection charges and electricity consumption. This needs to be done based on the specific circumstances of each country, not least in terms of their electrification rates.

An important point to recognise is that the electrification rate and the effectiveness of pro-poor consumption cross-subsidies (i.e. lifeline tariffs) are interrelated: Studies on African countries show that the share of “subsidies going to the poor is less than half their share of the population, indicating a very pro-rich distribution. This result simply reflects the fact that connections to electricity are already highly skewed toward more affluent households. A key message is that consumption subsidies will always be highly regressive as long as access is highly regressive” (Briceno-Garmendia & Shkaratan, 2011).

While the threshold for how much a poor household can be expected to pay for access to electricity will differ from country to country, it is clear that even with payment plans and the savings involved in switching to electricity for lighting, paying more than two to three times the monthly income will be extremely challenging for a household that largely lives hand-to-mouth.

Regulators should:

a) Calculate average cost-reflective connection charges for rural, peri-urban and urban households respectively.

b) Compare these connection charges against the monthly financial capabilities of poor rural, peri-urban and urban households. Where total connection charges exceed two to three months of household income for a poor family, regulators, working with relevant policy makers (e.g. line ministries) should explore the use of the following subsidy options:

   - Dedicated subsidies from development partners
   - A cross-subsidy from household consumption charges to reduce connection charges for poor households (e.g. through an electrification levy). It is recognized that such measures may require a change of regulations or even legislation.

c) Put in place one or more of the following measures to help spread connection charges out over 12 or more months for poor households:

   - Payment plans

- Facilitate improved access to micro-loans

## 2.4 Fourth key element – Work the pro-poor subsidies into the tariff schedule, analyse the financial impacts on stakeholders, and calibrate as required

Having determined the individual subsidy components, these now need to be integrated into the end-user tariff structure. Eligibility is a key question in this process. For consumption subsidies (e.g. lifeline tariffs) economic research suggests that these are best targeted if only those that consume below the threshold for basic electricity needs outlined in Section 2.2 are eligible (Hennessy, 1984). Subsidising consumption below this threshold for all consumers, as many countries in the EA-SA-IO region currently do results in a more regressive tariff structure and increased economic inefficiencies (deadweight-losses).

Further, tariffs below cost-reflective levels are, as outlined in section 1.4 a key explanatory factor for the poor state of many African electricity sectors and the low electrification rates. It is therefore imperative to ensure that pro-poor subsidies do not end up exacerbating the financial struggles of service providers.

Regulators should:

a) Determine the eligibility for pro-poor subsidies.
   - Consumption subsidies. It is recommended that only households that consume below the threshold for basic electricity needs are eligible for the lifeline tariff. Consumers that use more than the threshold should be disincentivised from registering as lifeline customers, for example by applying a very high unit cost to lifeline customers that exceed the threshold.
   - Connection subsidies. It is recommended that only households that are classified as poor (e.g. those that fall below the national poverty line) be deemed as eligible for connection subsidies.

b) Integrate the calculated indicative lifeline tariff and consumption thresholds, along with any levies to subsidise connection charges, into a cost-reflective schedule of tariffs and charges.

c) Model the impact of the proposed cross-subsidies on utilities and service providers, and as appropriate, make required changes to ensure their financial sustainability.

d) Assess the impact on consumer groups that will finance the cross-subsidy, and consider the need for phased implementation of new tariffs to avoid any negative impacts and public backlash resulting from abrupt changes.

# 3 ENABLING A GOOD REGULATORY PROCESS FOR PRO-POOR ELECTRICITY TARIFFS AND CHARGES

## 3.1 Build on national policy objectives

Pro-poor tariff setting is, as outlined above, an important stepping-stone towards universal access to electricity. To succeed, these policies need to be tailored to national conditions and priorities.

For example, the balance between connection and consumption subsidies will be different in a country with low electrification rates than one with universal access. Further, the economic costs of cross-subsidisation, in terms of efficiency losses will be vary by country. It is therefore important that the pro-poor policies are anchored to national policies. The clearer and more grounded these priorities are in actual data, the better and more efficient the subsidies will be in moving towards SDG 7.

## 3.2 Utilise existing data collection efforts to gather required information

Data collection is a costly and time-consuming undertaking. It is therefore important to ensure that information required for pro-poor tariff setting, to the extent possible, is gathered as part of ongoing efforts such as the national census, national household budget surveys, omnibus surveys or similar. Electricity regulators should engage with the census bureau and other relevant institutions to ensure that data on household budgets, energy expenditure and other key issues is collected in a format and in a manner conducive to the development of sound pro-poor electricity subsidies.

## 3.3 Ensure transparency, consult all stakeholders, and communicate with policy makers

Finally, as in all regulatory decision making, it is important to ensure that the process of establishing pro-poor subsidies is conducted in a transparent manner with inclusive stakeholder consultations. The full process should preferably be embedded in tariff setting regulations, including set intervals for when data should be collected and the subsidies updated.

Further, it is important that regulators work closely with policy makers to ensure that:

- the objectives of policy makers are well understood by the regulator and reflected in the operationalisation of pro-poor subsidies, and;
- policy makers understand the factual and analytical basis for pro-poor subsidies – including the need to ensure the economic and financial sustainability of service providers.

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