TECHNICAL REQUIREMENTS OF MINI-GRIDS IN CAMEROON

PRESENTATION OF CAMEROON TO THE STEERING COMMITTEE OF THE AFUR PROJECT ON
"THE INTEGRATION OF MINI-GRID TARIFF REGULATION TOOLS AND METHODOLOGY IN AFRICAN
REGULATORY AGENCIES »

Presented by ARSEL, December 1 · 2022
Summary

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Introduction

Law No. 2011/022 of December 14, 2011 was drafted to thoroughly reform Law No. 1998/022 of December 24, 1998 governing the electricity sector, which had many limitations in the valuation of the establishment mini-grids, with a view to its modernization and development.

Law No. 2013/004 of April 18, 2013 sets the incentives for private investment in the Republic of Cameroon through which the Cameroonian Government has set the tax and customs exemptions.

The objectives of this reform are:

• disengage the State in the commercial electricity service;
• reduce the financial weight of the sector on the State budget;
• improve the contribution of the electricity sector in the economy and in the social development of the country;
• increase the rate of access to electricity in Cameroon;
• Promoting renewable energies (EnR):
  • Characterization of renewable energies (solar, wind, small hydro, biomass, geothermal, and energies of marine origin)
  • Exemption from taxes on equipment for renewable energy installations;
  • the obligation of connection to the network of any producer of electricity from renewable energies who requests it.
Cameroonian regulations on mini-grids

• The 2011 Law deals with rural electrification (by extension of the network or by decentralized production). It only mentions decentralized rural electrification once to highlight the constraints.

• The 2011 Law defines decentralized production as "an electricity production unit intended to meet the electricity needs of users located far from interconnected networks and unable to connect to them in the medium term" (see Article 5 on definitions).

• This provision reflects the government's strategy which envisages that the electrification of the country should be carried out as a priority by extending the interconnected networks. Mini-grids therefore appear as temporary solutions.
Cameroonian regulations on mini-grids

1998 Act
- Authorization scheme for distributions of less than 100 kW
- Absence of specific rural electrification financing mechanism

2011 Act
- Creation of an Electricity Sector Development Fund
- Rural electrification/decentralized generation
- The obligation to connect any producer on the basis of renewable energies to the network for the sale of surplus production
- Tax and customs benefits for products, goods and services intended for the exploitation of renewable energies
- Cost-of-service pricing

2013 Act
- Tax and customs exemptions on equipment for renewable energy installations
Technical requirements

• In relation to interconnected networks
  • Article 5 of the 2011 law, in the definition of decentralized generation, indicates the priority given to electrification by extension of the interconnected networks.
  • The technical requirements specific to mini-grids, related to the equipment used during the various stages of the project, to the interconnection directives, to the quality, availability and reliability of the electrical energy produced, are not defined in the framework regulatory.
  • The concessionaire of the public electricity service, which has several mini-distribution networks in its concession, has only one normative and technical reference for their construction and operation.
  • In practice, networks made by third parties require upgrading to comply with the technical specifications of interconnected networks.

• In relation to decentralized production
  • Article 59 of the 2011 law provides that in the context of decentralized rural electrification, and taking into account the constraints linked to the protection of the environment, priority is given to decentralized production from energy sources. renewable, except in case of deficiency, prohibitive costs or insufficiency thereof;
  • A hybridization program for thermal power plants isolated from the incumbent operator's concession is underway to meet this requirement;
  • However, in the context of a connection to the Public Distribution Network (RPD), a connection agreement between the producer and the RPD Concessionaire will be drawn up, based on the technical requirements of the RPD;
Impact of technical requirements on prices

• General framework
  • The electricity tariff is calculated on the basis of the cost of service including that of the mini-grids
  • Within the framework of the public service, the profitability of the investments is guaranteed.
  • Tariffs must allow mini-grids to recover their costs (investment, operation, maintenance) and generate a return assessed on the basis of the weighted average cost of capital.

• Case of mini-grids
  • Do not benefit from the scale effects of the national transmission network and the national distribution network;
  • The construction and operation of mini-grids do not benefit from specific technical and economic standards;
  • Projects based on decentralized production from renewable energies benefit from tax relaxations.

• Impact on the mini-grid tariff
  • The unit energy costs of mini-grids is structurally higher than that of interconnections;
  • Tax relief for renewable energy generation cannot compensate for the costs generated in mini-grids. However, they help to mitigate the effects of thermal generation on costs and environmental impacts.
## Tariff of mini-grids in Cameroon

<table>
<thead>
<tr>
<th>Mini-grid</th>
<th>Technical requirements</th>
<th>Rate charged</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>02 hybrid power plants (solar + thermal) in Djoum in southern Cameroon and in Lomié in eastern Cameroon</td>
<td>Distribution network type</td>
<td>DSO tariff</td>
<td>• Plants operated by ENEO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Tariff equalization</td>
</tr>
<tr>
<td>27 isolated thermal power stations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decentralized electrification of 1,000 localities by photovoltaic solar system throughout the country with a total capacity of 11.2 MW. <strong>Currently 350 localities are already electrified</strong></td>
<td>Mini-grid type</td>
<td>CFAF 100/kWh</td>
<td>This is a rate that is not based on the cost of service</td>
</tr>
<tr>
<td>Mini hydroelectric power station of Mbakaou Carrière with a capacity of 1.4 MW</td>
<td>Distribution network type</td>
<td>CFAF 165/kWh</td>
<td></td>
</tr>
</tbody>
</table>

**GRD:** the Distribution Network Manager in Cameroon is ENEO
# DSO tariffs (ENEO)

<table>
<thead>
<tr>
<th>Low tension</th>
<th>Less than or equal to 110 kWh</th>
<th>Between 111 kWh and 400 kWh</th>
<th>Between 401 and 800 kWh</th>
<th>Above 800 kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential uses</td>
<td>CFAF 50/kWh</td>
<td>CFAF 79/kWh</td>
<td>CFAF 94/kWh</td>
<td>CFAF 99/kWh</td>
</tr>
<tr>
<td>Non-residential uses</td>
<td>CFAF 84/kWh</td>
<td>CFAF 92/kWh</td>
<td>CFAF 99/kWh</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medium voltage</th>
<th>From 0 to 200 h</th>
<th>From 201 to 400 h</th>
<th>Over 400 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between 11 p.m. and 6 p.m.</td>
<td>CFAF 70/kWh</td>
<td>CFAF 65/kWh</td>
<td>CFAF 60/kWh</td>
</tr>
<tr>
<td>Between 6 p.m. and 11 p.m.</td>
<td>CFAF 85/kWh</td>
<td>85 FCFA/kWh</td>
<td>85 FCFA/kWh</td>
</tr>
</tbody>
</table>
Process of setting up technical aspects in the regulation of mini-grids in Cameroon

- 2011 Act
- Investment Incentive Act 2013

**Institutions**
- MINED
- EAR
- ARSEL
- FDSE

**Implementation of policy instruments**
- EAR
- ARSEL
- DSO

**Deployment of mini-grids**
Process for setting up the normative and regulatory framework for mini-grids

• Assessment of the existing
  • The law mentions but does not deal specifically with decentralized electrification
  • The law favors electrification by extension of interconnected networks
  • The law and government policy place great emphasis on the development of renewable energy for power generation
  • Cameroon has not adopted any specific standard on mini-grids and it has no related regulations.
  • The development of mini-grids is done according to the specifications of their promoters (Eneo and Huawei for example)
  • This results in a high cost for the economy, in particular to ensure the compatibility of the networks

• Approach to consider
  • Define the government vision on the development of mini-grids including the technical, legal and economic conditions for their integration into public distribution networks
  • Develop the texts that materialize the said vision
  • Adopt the standards and technical specifications corresponding to the government vision
  • Adopt regulations making standards and technical specifications mandatory
  • Promote ARSEL's participation in the steering committee of the project on "the integration of tools and methodologies for the tariff regulation of mini-grids in African regulatory bodies" for the definition of a specific regulatory and tariff framework
Conclusion

• The large number of localities not electrified and far from the network makes the development of mini-grids a real opportunity for Cameroon

• The absence of a normative and regulatory framework generates a sub-optimal development of this development tool in Cameroon

• The provisions of the 2011 law on renewable energies, rural electrification and energy efficiency constitute assets likely to facilitate the definition of a vision of mini-grids

• The adoption of standards and regulations making them mandatory is of great importance

• The enhancement of ARSEL's participation in AFUR's work would ensure better profitability for mini-grids
THANK YOU FOR YOUR ATTENTION