

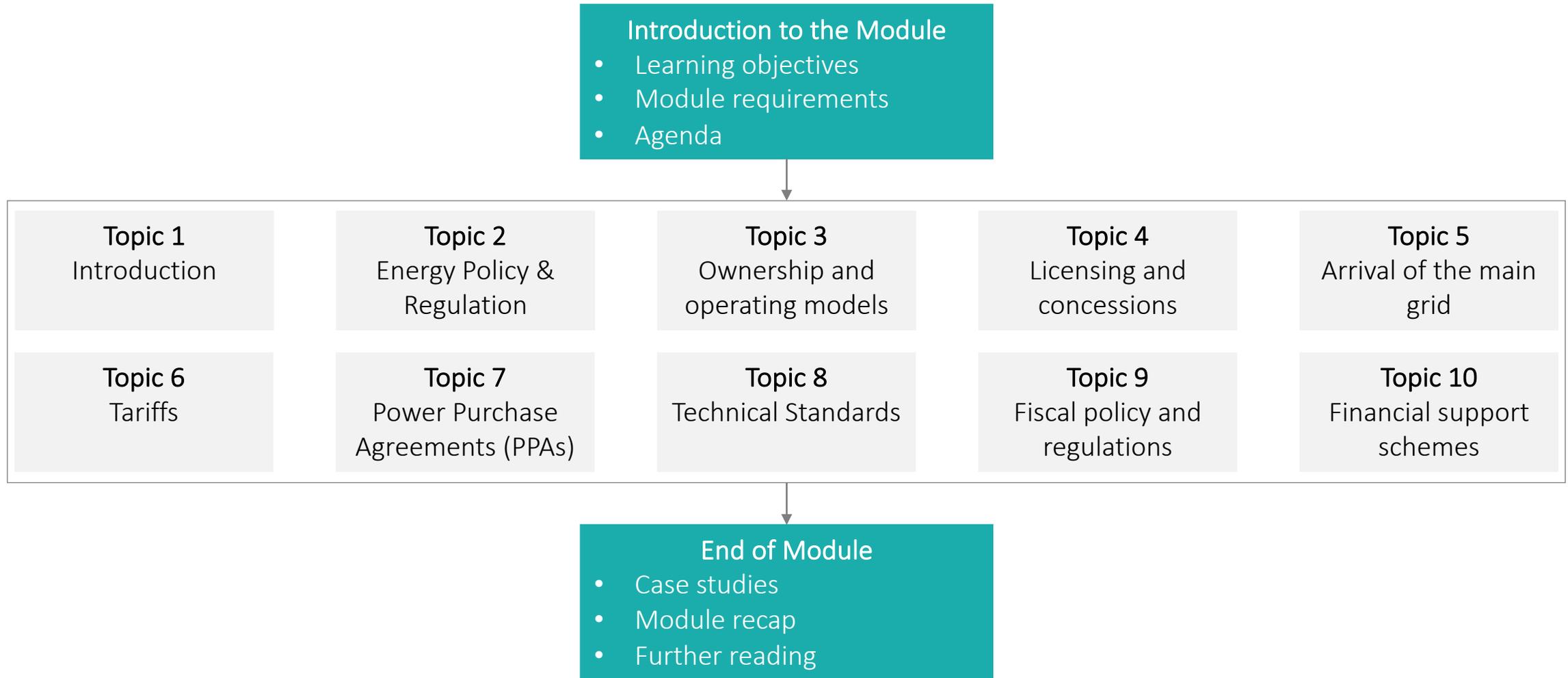
Module 8



Mini-grid Policy and Regulation

April 2020

Module overview



Objectives & Requirements

Learning Objectives

- Learn about the role of mini-grids in national energy policy in Africa
- Learn about the key regulatory building blocks for a private sector mini-grid market.
- Discover the differences between licences, concessions, and permits.
- Learn why financial compensation for mini-grids is needed when the main grid arrives.
- Learn about the importance of cost-reflective tariffs for mini-grids.
- Understand the mechanisms behind different financial support schemes.

Module Requirements

- This module is targeted at mini-grid developers and operators at all stages of development.
- They are expected to have a basic understanding of rural, off-grid energy markets in developing countries.
- No prior knowledge of mini-grid policy and regulations is required.

NOTE: This module was prepared by Energy 4 Impact and Inensus. However, we would also like to acknowledge the inputs from Economic Consulting Associates in preparation of some slides

Agenda

1. Introduction
2. Energy policy and regulation
3. Ownership and operating models
4. Licencing and concessions
5. Arrival of main grid
6. Tariffs
7. Power Purchase Agreements (PPAs)
8. Technical standards
9. Fiscal policy and regulations
10. Financial support schemes
11. Case studies



Why is mini-grid policy needed?

Support from policymakers and regulators is critical if private mini-grids are to provide reliable, affordable and sustainable energy access.

Key policy conditions:

1. Legalise private mini-grid operation
2. Allow cost-reflective mini-grid tariffs
3. Streamline licencing and permitting processes
4. Provide compensation if mini-grid is eventually connected to main grid



Image: Regulator sponsored community training session.

Source: Energy 4 Impact

Policy versus regulation

Policy	Regulation
<p>Definition: System of principles to guide decisions and achieve rational outcomes adopted by a governance body within an organisation.</p>	<p>Definition: Legal restrictions by a government authority to implement policy in a market and make people comply and behave in a certain manner.</p>
<p>Policies are general in nature and made to help an organisation achieve its goals.</p>	<p>Regulations are administrative in nature and allow for smooth operations in an organisation or a department.</p>
<p>Policies are made by individuals, organisations, and even governments.</p>	<p>Regulations are made by the executive branch of the government.</p>
<p>Policies may be unwritten but help in guiding the organisations to achieve their long term goals.</p>	<p>Regulations are restrictive in nature and impose sanctions upon people and companies.</p>

Energy policy and regulations

National electricity policy

- Set goals e.g. “universal access to electricity”
- Provide guidance how goals will be achieved e.g. % off-grid versus on-grid
- Are there explicit policies and regulations for mini-grids? Many African governments do not have any or the policies are old

Rural electrification strategy and master plan

- Goals
 - Deliver least-cost energy access options for consumers
 - Provide consumers with best possible level of service based on their location and demand
- Master plan defines rural areas to be electrified
 - How will they be electrified ? e.g. extension of national grid, mini-grids, or distributed solar home systems (SHSs)
 - Visibility on potential mini-grid sites e.g. GIS study
 - Procurement policy for mini-grids
 - Facilitate market for mini-grids
 - Timetable for implementation

Energy policy and regulations

Legislation

- Primary or framework legislation
- Secondary legislation or legally enforceable regulations

Regulations

- Tools for implementing policy and legislation
- Outline mini-grid market conditions
- Create enabling framework for private investments in mini-grids



Image: Electrified small business
Source: Energy 4 Impact

Project initiation and procurement

Solicited proposal (government-driven)

- Government entity procures a certain **number of micro-grids** or a certain **capacity of electricity generation** through a **public tender or call for projects**, typically with set of eligibility requirements for bidders and types of projects
- **Sites pre-identified** (pre-feasibility, land access, permits, community MOU, permits), but further due diligence and site visits still required by developers
- **Bidding model** e.g. fixed price or competitive
- See slide on government tenders

Unsolicited proposals (developer-driven)

- National government and relevant regulatory bodies seek to create an **enabling environment** for mini-grid expansion but are agnostic regarding the location of micro-grids or the technology used
- **Developers responsible** for selecting the sites, acquiring all permits and licences, engaging with community, designing the system and implementing it.
- **Lower cost** for government (administratively or otherwise)
- Leaves level of electrification and its equitable distribution in hands of private sector which is likely to pursue projects based on risk-adjusted returns for invested capital
- See slides on Licencing

Ownership and operator models

- Ownership and management of generation and distribution.
- No perfect ownership model, but public-private partnership (PPP) is the most scalable.
 - Public
 - Private
 - Community
 - PPP

	Type A	Type B	Type C
Private partner	Provides operation and maintenance under contract with public partner	Installs assets at its own cost, operates and maintains systems, collects tariffs on behalf of public partner or on its own account through electricity sales to end customers	Invests in, installs, operates and maintains generation assets. Sells electricity to end customer
Public partner	Grant funding. Procures equipment and installs generation and distribution assets itself on turnkey basis	Grant funding. Procures and owns both distribution and generation assets	Grant funding. Procures and owns distribution assets



More private sector engagement and investment, less grant funding, higher tariff

Different Types of PPP based for mini-grids on the level of engagement of the private partner

Source: Energy 4 Impact and INENSUS (2016)

Licences and permits (1)

- Licences grant mini-grids **right to exist**
- Lay out **rights and obligations** of licence holder to carry out electricity activities (generation, distribution, supply)

Key questions

- What is the licencing application process?
- Do requirements vary according to the size of the project?
 - What exemptions for smaller sites e.g. less than 100 kW or 50 kW
- Is there site exclusivity?
- What is the duration of licence?
 - Is it time limited? Is it extended automatically after expiry and under what conditions?
- How often is it renewed? Some countries renew annually.
- What termination conditions?
- What are the costs of licencing?
 - Licencing fees – how much? Is it one time or annual?
 - Environmental Social Impact Assessment cost

Licences and permits (2)

Best practice on licences

- Be clear, simple, transparent and streamlined
 - **Combine licences** and permits for generation, distribution and electricity supply
 - **Standardise permitting** processes for projects with similar technical characteristics (e.g. technology, size, location)
 - **Tiered licencing** – vary licence requirements by size of project
- Define **roles** of government agencies clearly to avoid overlapping responsibilities
- Set application and **licencing fees** at reasonable levels
- Ensure **duration of licence** is long enough for investors to have reasonable chance of getting return on their investments

Concession agreements

- Grant private entities **exclusive right** to implement and operate mini-grids for a **specified period of time** in a **specified geographic service area**
- **Oblige** private entity **to invest** a certain amount of private funds and/or **connect** a certain **number of people** within a fixed time period
- Concessions are usually awarded through **competitive bids** to deliver lowest overall **cost** for highest number of **connections**
- Concessions particularly common in West African countries e.g. **Mali, Mauritania, Senegal**. Other countries consider more mini-grid concessions e.g. Nigeria (north) and Lesotho
- Mixed results – private investors concerned that they may not be able to **make a return** on their investments **before handing over assets to government**. More difficult to extend concessions than licences

Permits across project life cycle

Project life cycle	Permits / certificates
Development	<ul style="list-style-type: none"> Certificates of incorporation Ownership agreements Land rights Environmental social impact assessment Water rights (hydro project only)
Construction	<ul style="list-style-type: none"> Construction permits Way leaves Health and safety
Operation	<ul style="list-style-type: none"> Generation, distribution and supply licences Concession agreement Tariff agreements with regulator Environmental Health and safety Government confirmation letters

Arrival of grid

- Encroachment of national grid is **one of main risks** for mini-grid investors.
- Licences and permits should provide adequate **legal protection** for private investors and have appropriate **financial compensation** mechanisms for mini-grid owners.
- They should **compensate** owners for **current value of** privately financed **assets** and any **lost revenues**, allowing them to make **fair return** on their investment.
- In many African countries, the **rules** are **not clear**.

Key questions

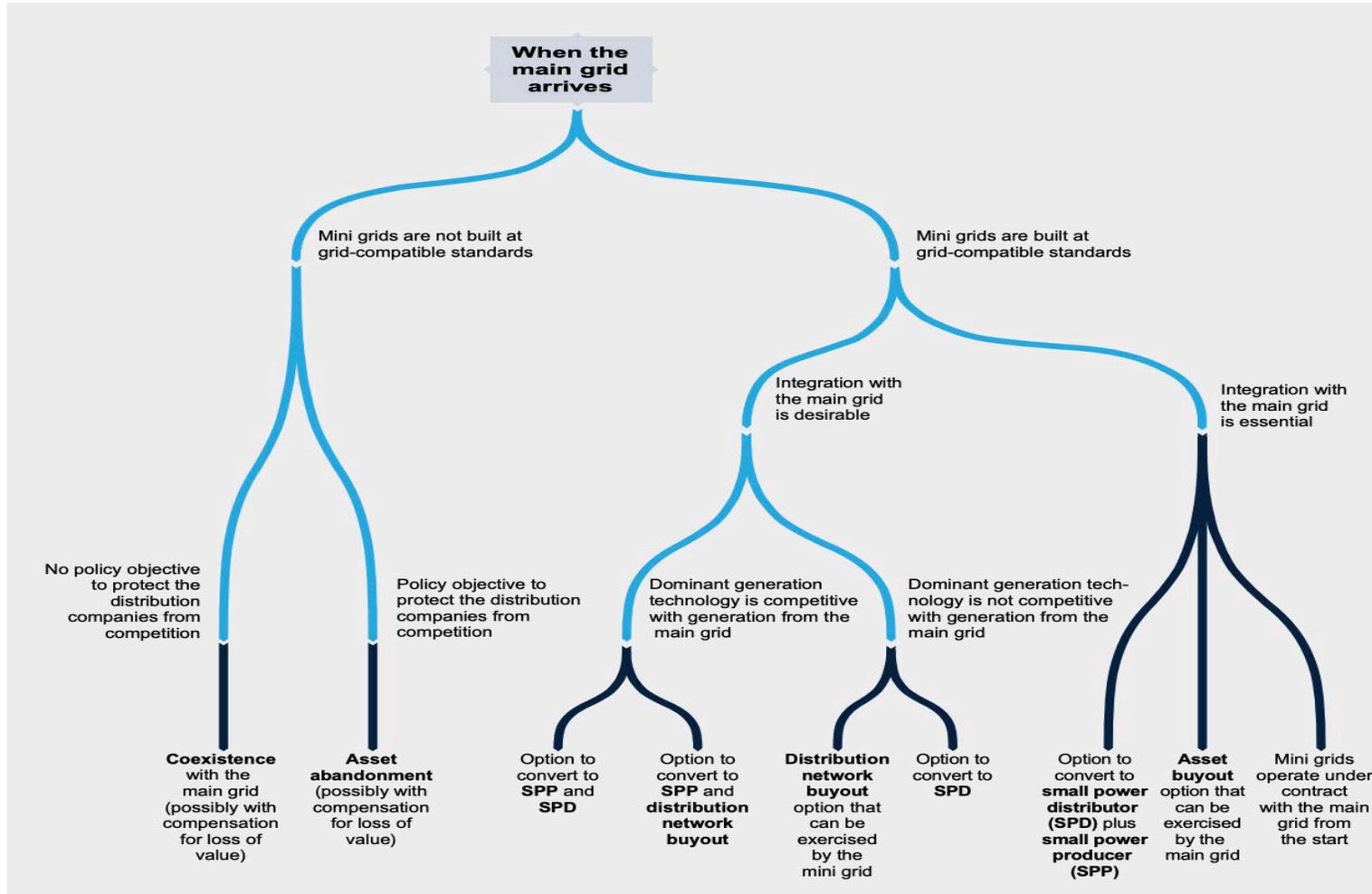
- What technical requirements?
 - Match standards of main grid for systems over certain size threshold
 - What lighter standards are acceptable? Does this affect ability to interconnect?
- What business models are allowed to continue?
- Selling assets to the utility
 - Is it allowed?
 - Is sale obligatory for either party?
 - How is price determined?
 - Agreed regulatory value of assets becoming common
 - Is there an arbitrator?

Arrival of grid

Four models for mini-grid integration with the main grid

- **Distributor model:** Mini-grid buys wholesale electricity from national grid and supplies retail electricity to local customers.
- **Generator model:** Mini-grid sells electricity to national grid or another off-taker, but stops selling to local customers. It sells the distribution assets to the national grid or another public entity.
- **Distributor/generator model:** Mini-grid converts from isolated mini-grid to an operator of a distribution network integrated with the national grid. It buys wholesale electricity from the national grid and supplies retail electricity to local customers. It maintains the existing generator and may add a few new ones, and provides backup for the main grid and retail customers.
- **Buyout model:** Developer sells either the whole mini-grid (both distribution and generation) or just the distribution, transferring the generation equipment to another site

Arrival of grid



Decision tree for determining what happens to mini-grids when main grid arrives

Source: ESMAP (2019)

Tariffs

Cost reflective tariffs

- Government policy usually clear on this
- Many governments advocate **national uniform tariffs**
- Difficult for developers to operate at national tariffs
- **Top up subsidies** may be proposed, but rarely seen in action and **difficult** to work

Types of tariff

- What is allowed?
 - Some regulators require “traditional” **energy-based** tariffs, with or without fixed charges
 - What about **flat-rate** tariffs?
 - How can **connection charges** be recovered?

Allowed revenues

- Standard formulae using “**building blocks**” approach.
Recovery of costs:
- **Opex**
 - Benchmarked?
- **Depreciation**
 - Over what period?
 - What about grant-funded assets?
- **Financing**
 - How to measure costs? There is little consensus on this
 - Constant WACC?
 - Mitigating FX risks
 - What about grant-funded assets?

Power Purchase Agreements

- PPAs are **long-term off-take agreements** which outline the legal **rights and obligations of the seller and buyer** of electricity, including tariffs and offtake arrangements.
- They are typically used for **larger mini-grids** (> 1 MW), selling to a national utility or large industrial anchor user.
- They are relevant for mini-grids that are **connected to the national grid** and plan to sell (excess) electricity to the grid or buy electricity from the grid.



Technical standards

Technical standards for products and services

- Power quality
- Power availability
- Power reliability
- Health and safety
 - Consumer protection
 - Mini-grid operations
- Customer service
- Environmental

Two types of technical regulation and standard

- **Type 1** defines minimum **technical specifications** of mini-grid components
- **Type 2** defines the **quality of service, health and safety** standards, and **environmental** controls on electricity generation, distribution and sales

Controlling standards

- Mandatory standards for all mini-grid operators enforced (e.g. **permits issued once compliant with standards**)
- Incentives for mini-grid operators to meet certain standards (e.g. **linking disbursement of grants to application of certain standards**)

Enforcing standards

- Regular checks by experts
- Developer feedback to regulator

Fiscal policy and regulations

Fiscal incentives can be used to attract investment in mini-grids:

- Make mini-grid components exempt from **import duties, taxes and fees**
- Make components **purchased** inside country **VAT exempt**
- Make mini-grid **electricity sales VAT-exempt**
- Reduce tax on mini-grid **corporate profits** through tax holidays, adjusted depreciation periods or simply reduced tax rates BUT this does not help mini-grids until they start making profits
- Allow **repatriation** of mini-grid profits and do not charge **withholding taxes** on money leaving country



Financial support schemes

Grant and subsidies

- Up-front payment of grants or subsidies
- Public investments, usually in mini-grid **distribution assets**
- Payments based on results (**results-based finance** or RBF)
- **Competitive tenders**, which include a public investment or grant element (the Pre-Developed Mini-Grid Tender)
- **Tariff subsidies** to bridge the viability gap
- **Repayable grants** which are repaid prior to distribution of dividends or sale of assets

Other support

- **Concessionary loans** (single digit rates if possible)
- **Longer-tenor loans** (to allow time for demand to build up and to match the project payback period, which may be 7-15 years)
- **Local currency loans** (reflecting the fact that the revenues are in local currency)
- **Guarantees** to de-risk projects
- **Index local currency tariffs** to hard currencies

Please refer to Module 6 for more on funding

Results-based financing

- Links payment of subsidies based on results
- Fixed grant per customer connected
- No upfront payment
- RBF suitable for both government and developer-initiated projects
- Developers initially have to raise their own financing
- Should make bridge financing easier because RBF grant can be used to repay loan



Key success factors	Common complaints
<ul style="list-style-type: none"> ▪ Clear, suitable objectives ▪ Relatively simple design and application process ▪ Based on results that are easy to verify ▪ Other success factors linked to government tenders 	<ul style="list-style-type: none"> ▪ Too slow ▪ Less disbursed than the amounts expected ▪ Changing rules

Government tenders

Mini-grid tenders are increasingly being used for initiating projects. Key success factors:

- Clear and realistic objectives
- Pre-tender bidders' workshops
- Simplified pre-qualification criteria
- Pre-identified mini-grid sites and clusters
- Results-based payments
- Allow alternative revenue streams and cost-reflective tariffs
- Provisions for grid

Case study: Rwanda mini-grid policy and regulation

Regulatory component	Description
Key public players	Ministry of Infrastructure (MININFRA), Rwanda Energy Group / Energy Development Corporation Limited (REG/EDCL), Rwanda Utilities Regulatory Authority (RURA), Bureau of Standards
Policy target	Universal access to electricity by 2024 (current level = 51%). Target to be achieved 52% on-grid and 48% off-grid. Map of off-grid areas to be published soon.
Public vs. private	Private mini-grids allowed. No clarity over strategy for PPPs.
Project initiation	Both government tenders and unsolicited proposals from private developers.
Licencing	No licence currently required for mini-grids under 50 kW. Licence required for MGs of 50 kW to 1 MW
Tariff regulation	Cost reflective tariffs under 50 kW. Tariffs for larger projects need to be approved by RURA and possibly by a soon to be appointed government commission as well.
Grid	Private developer now responsible for distribution grid, although EDCL may build distribution grids in future. No clear mechanism for financial compensation for arrival of main grid. Minimum technical standards for mini-grids

Case study: Rwanda mini-grid support schemes

MG support scheme	Donor	Implementer	Description
REF	World Bank (SREP)	BRD and local banks	\$49m concessionary loan scheme for SHS and MGs. Channelled through local banks. Banks also supported by loan guarantees from other donors. Technical assistance to the banks. Finishing in 2023.
Endev	Various European donors	GIZ	RBF for MGs and SHS
SOGER	Sida	E4I	Capex grants for new private or community-owned MGs and productive use appliances. TA for MG developers. Finished on September 30, 2019.
SEFA/AfDB	Various European donors	EDCL	Feasibility studies for 30 micro hydro sites, with EDCL in the lead. Development of implementation plan for new tender for MGs.
Enabel	Enabel (Belgium)	BRD	Support BRD on REF and other energy initiatives. Feasibility studies for 30 MG sites, with private developers in the lead.

Case study: Togo mini-grid policy and regulation

Regulatory component	Description
Key public players	Ministry of Mines and Energy (MME) – Energy Department (DGE), Ministry of Economy and Finance (MEF), Ministry of Environment and Forest Resources (MEDDPN), Electricity Regulatory Authority (ARSE), Togolese Agency for Rural Electrification and Renewable Energies (AT2ER), Electric Energy Company of Togo (CEET)
Policy target	Electrification strategy in place. Target 70% electrification by 2030. Strong focus on renewable energy as rural electrification framework is based on recent RE law (2018). Selected 317 villages/localities to be electrified by mini-grids
Public vs. private	Few public mini-grids exist. Private mini-grids shall be implemented through public tender in the next years
Project initiation	Only government tenders. Developers must obtain authorisation to install and operate from ARSE
Licencing	All mini-grids require a licence. Licences are attributed by public tender for pre-defined “mini-grid” lots
Tariff regulation	Tariff regulation not defined yet. Government wants to impose national grid tariffs but this has not been institutionalised yet and discussions are still ongoing
Grid interconnection	Regulation-by-contract will be applied and is currently in draft form. Isolated mini-grids with a licence can either convert and become an Independent Power Producer (IPP) or sell their assets to CEET and get compensation for the residual value of privately financed assets, the privately financed project development costs and the equivalent of the last 12-months of earnings

Case study: Togo mini-grid support schemes

MG support scheme	Donor	Implementer	Description
Ticket d'Entrée for the Bidder	WADB	AT2ER	\$30m concessionary loan to Togolese government for implementation of a mini-grid roll-out plan targeting 129 mini-grid sites The debt portion may not exceed 70% of the total cost of Phase 1 of the project. For the rest of the localities, the developer will be responsible for mobilising the financing in consultation with the Project Owner within a period to be notified.
RBF	AfDB	AT2ER	Currently under discussion/evaluation: ~\$12m grants to developers in order to support and address overall project bankability.
CIZO-Grants	AfDB	GIZ	Currently under evaluation total funds of \$11,2m of which ~\$1m grants for MG developers (with 50% subsidy and 50% equity capital), located under the CIZO umbrella, which focuses on solar pumps and SHS promotion.
ProEnergie	German Govt.	GIZ	Technical assistance and transaction advisory for implementation of the mini-grid tender including lots with approx. 130 MGs under a PPP approach for Phase 1.

Case study: Nigeria mini-grid policy and regulation

Regulatory component	Description
Key public players	Federal Ministry of Power, Works & Housing (FMPWH), Nigerian Electricity Regulatory Commission (NERC), Rural Electrification Agency (REA), Nigeria Investment Promotion Commission (NIPC)
Policy target	Access to electricity targets of 75% by 2020 and 90% by 2030, with min. 10% renewable energy by 2025. Map of off-grid areas available for five states and in development for entire country. Currently c. 95m people in Nigeria lack electricity access
Public vs. private	Majority of mini-grids are private, few public mini-grids exist. Some will be concessioned to private sector
Project initiation	Both government tenders and unsolicited proposals from private developers. Developers must enter into agreements with communities which are approved by NERC
Licensing	“Mini-Grids” defined as having capacity of < 1 MWp. No licence required for projects under 100 kWp. Licence needed for projects between 100 kWp and 1 MWp
Tariff regulation	Tariffs for mini-grids > 100 kWp need to be approved by NERC and are cost-reflective. The Multi-Year Tariff Order (MYTO) Tool* is used to set tariff level. A mini-grid specific tool is under development.
Grid interconnection	Isolated mini-grids with a permit can convert to become a Small Power Distributor (SPD) or sell their assets to the Distribution Company (DisCo) in return for compensation equalling the remaining value of assets after depreciation for mini-grids that have been operational for > 5 years. If < 5 years, project dev. costs are also part of the compensation

*Source: NERC (2005)

Case study: Nigeria mini-grid support schemes

MG support scheme	Donor	Implementer	Description
Nigerian Electrification Programme (NEP)	World Bank	REA via Rural Electrification Fund (REF)	<p>\$350m sovereign loan for NEP which aims to scale up investment in mini-grid and offgrid (SHS) solutions. \$150m of funding is for mini-grids. Target of 330,000 connections (300,000 households + 30,000 businesses) through mini-grids by 2023.</p> <p>Main components:</p> <ol style="list-style-type: none"> 1) Viability gap subsidies to private mini-grid developers through two funding windows: minimum subsidy scheme for pre-selected sites and performance-based grants for sites of developers' choice. Initial evaluations in Q3 2019 2) Performance-based grants incentivising SHS companies and mini-grid developers to sell and distribute energy efficient productive use appliances to off-grid communities <p>There is also budget for technical assistance for private and public stakeholders</p>
NEP	AfDB*	REA via REF	\$200m sovereign loan to Nigerian gov. for NEP. Funding mainly for 2 components above.
Mini Grid Acceleration Scheme (MAS)	EU / German Govt.	GIZ	EUR 6m programme of in-kind grants for distribution assets plus technical assistance, distributed across 6 zones. Target 21,000 connections. Winners to be announced in Q3 2019
IMAS	EU / German Govt.	GIZ	Interconnected Mini-Grid Acceleration Scheme – EUR 3m programme in form of in-kind grants for equipment plus technical assistance, distributed across the 10 DisCos. Target 15,000 connections. Winners to be announced in Q4 2019.

*Source: African Energy Portal, February 2019

Module recap

- Mini-grid policy and regulation is one of the biggest challenges to the growth of the private mini-grid sector in Africa.
- Many African countries do not have dedicated mini-grid policy and those that do are often not appropriate.
- The 4 key components of private mini-grid policy are: legalisation of private mini-grids, cost-reflective tariffs, a streamlined licencing and permitting process and compensation for arrival of the main grid.
- Some countries allow for projects to be initiated by the government and private developers, while others are more restrictive i.e they only allow government projects.
- The level of financial support for mini-grids varies a lot between countries. Examples of financial support include government tenders, RBF schemes, and fiscal incentives.
- Another challenge for mini-grids is the lack of clear or appropriate technical standards e.g on power quality, health and safety, consumer protection.

Further reading

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