CLEAN ENERGY SOLUTIONS CENTER
ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

INTERNATIONAL SOLAR ALLIANCE

Best Practices for Regulatory Frameworks for Solar Powered Mini-Grids - Part 2

In partnership with the Clean Energy Solutions Center (CESC)

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Supporters of this Expert Training Series

Overview of the expert

Factor is an international group, specialized in providing global, innovative and sustainable solutions in areas such as climate change, energy, sustainability, trading and innovation.

Our key value is our people. We have offices in six countries, where our interdisciplinary team works for public and private stakeholders, international organizations and non-profit entities.

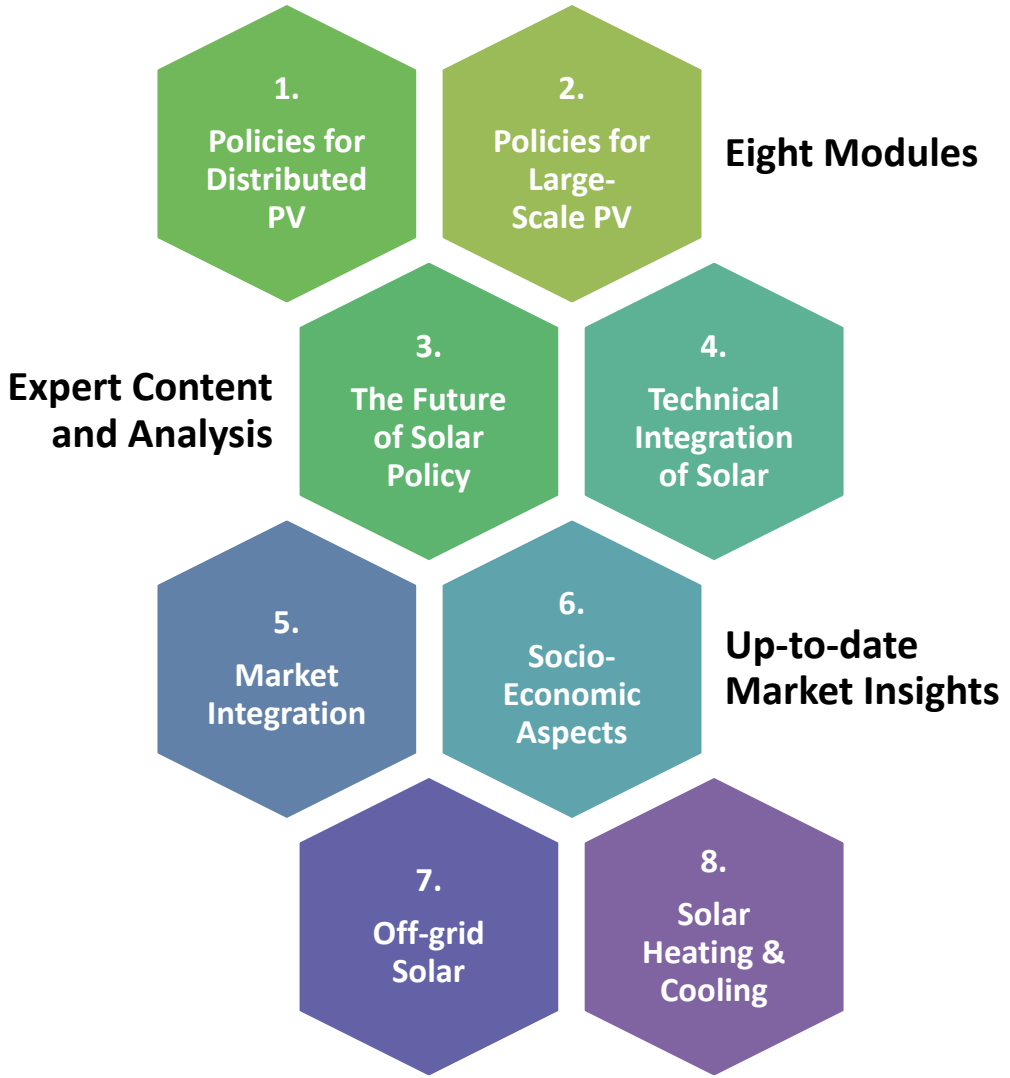
Our own history and experiences are based on constant innovation. This helps us target our services, by combining academic knowledge, technology and practical experience.

Factor
Ideas for change

Hugo Lucas Porta
Head of Energy Dept, Factor
20 years in RE Sector
- Worked for governments and private sector on energy transition strategies

Training Course Material

This Training is part of Module 7, and focuses on the Policy and Regulatory Frameworks of Mini Grids, Part 2



Overview of the Training

1. Introduction: Learning Objective
2. Understanding Mini-Grids
3. Main body of presentation
4. Concluding Remarks
5. Further Reading
6. Knowledge Check: Multiple-Choice Questions

1. Introduction: Learning Objective

Learning Objective

This module provides:

1. Customer and Environmental Regulation
2. License and Contract Regulation

Energy Sector Governance

3. Financial Support
4. Technical Assistance

Support Instruments

2. Understanding Off-grid Solar Markets

Understanding Mini-Grids

A (solar) **mini-grid** is a set of **small-scale electricity generators** and possibly energy storage systems interconnected to a distribution network that supplies the electricity demand of a limited number of customers.

It can operate in **isolation from national electricity transmission networks** and supply relatively concentrated settlements or remote industries with electricity.

Source: worldbank.org

3. Main Body of Presentation

Main Body of Presentation

1. Energy Sector Governance: Customer and Environmental Regulation

2. Energy Sector Governance: Licenses and Contract Regulation

3. Support Instruments: Financial Support

4. Support Instruments: Technical Assistance

Energy Sector Governance – Customer and Environmental Regulation

C1

Technical Regulation

- Minimum technical standards, including
  - Minimum safety requirements
  - Allowable voltage and frequency variation / harmonic distortion
- Operating and maintenance requirements
- Interconnection between the utility and the mini-grid

Technical standards should be **specifically designed for rural context**.

Regular **control of compliance** with codes and standards is required.

Source: EUEI PDF & GIZ, 2014

Energy Sector Governance – Customer and Environmental Regulation

C1 International Standards

The General

IEC 62257

- Technical and organizational aspects
- Design, installation, maintenance
- Checklist for good practices

The Technology Specific (Solar PV)

IEC 61215

- Crystalline silicon terrestrial photovoltaic (PV) modules
- Design qualification and type approval

IEC 61646

- Thin-film terrestrial photovoltaic (PV) modules
- Design qualification and type approval

IEC 61730

- Photovoltaic module safety qualification
- Part 1: Requirements for construction
- Part 2: Requirements for testing

Source: ARE & USAID, 2014

Energy Sector Governance – Customer and Environmental Regulation

C2

Quality of Service Regulation – Three Dimensions

Quality of Product	Quality of Supply	Quality of Commercial Service

- What dimensions of quality of service will be **regulated**?
- What **minimum levels of service** will be required for each quality-of-service
- dimension?
- **Who** sets the **standards**?
- How are the standards **monitored**?
- How are the standards **enforced**?

Source: Tenenbaum et al,, 2014

Energy Sector Governance – Customer and Environmental Regulation

C3

Environmental Policy and Regulation – the Impacts

Direct Impacts	Indirect Impacts	Cumulative Impacts
• Land use and land use change • Localized air, water and soil pollution • Battery waste pollution • Water diversion	• Material production • Fuel source production • End-user industry	• Air pollution • Waste production • Fuel sourcing • GHG emission of power generation and supply chain activities

Source: USAID.gov

Main Body of Presentation

1. Energy Sector Governance: Customer and Environmental Regulation

2. Energy Sector Governance: Licenses and Contract Regulation

3. Support Instruments: Financial Support

4. Support Instruments: Technical Assistance

Energy Sector Governance – Licences and Contract Regulation

D1

Generation and Distribution Permits and Licenses

- Licences or permits give the **non-exclusive right** to generate, distribute and sell electricity.

- Permits and licences can include **pre-conditions**, e.g.:
  - land leases/permits
  - environmental impact assessments
  - specify operating conditions

- **Permanent exemption** from obtaining a licence or permit for small mini-grids reduces transaction costs and thus increases financial viability of projects.

Source: EUEI PDF & GIZ, 2014

Energy Sector Governance – Licences and Contract Regulation

D2

Concession Contracts and Schemes

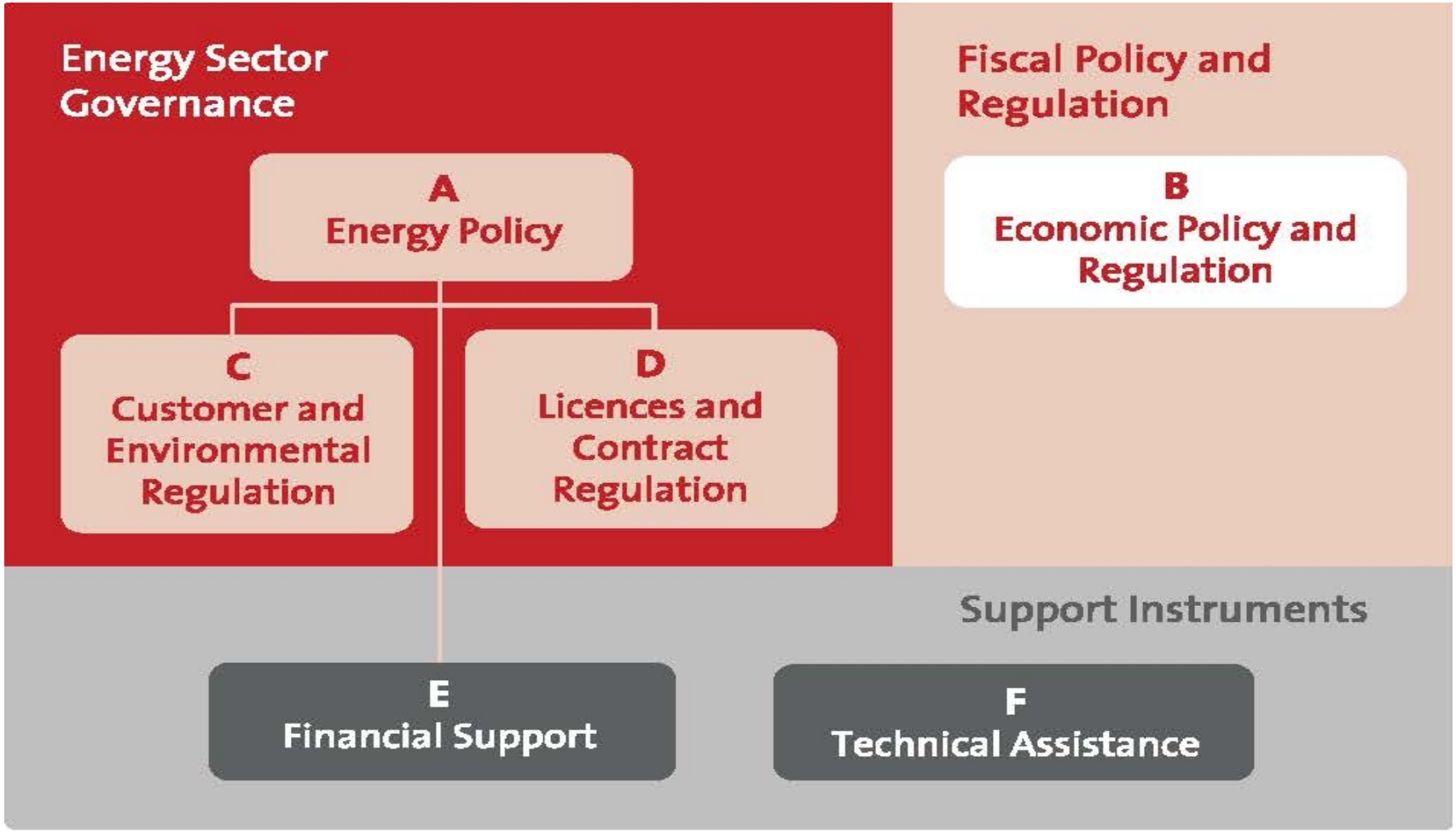
- A concession is a contract between a public and private entity granting the **exclusive right**
  - to invest, operate and maintain the distribution assets and
  - to sell electricity to end-users for a given number of years in specified geographic service areas.

- A concession **binds the operator to deliver** a specified quality of service and a certain number of connections.

- **Project aggregation** through concessions for larger areas can lead to increased efficiency in planning, financing, administration, equipment supply, O&M.

Source: EUEI PDF & GIZ, 2014

Regulatory Frameworks – Policy and Regulatory Instruments



Source: EUEI PDF & GIZ, 2014

Main Body of Presentation

1. Energy Sector Governance: Customer and Environmental Regulation

2. Energy Sector Governance: Licenses and Contract Regulation

3. Support Instruments: Financial Support

4. Support Instruments: Technical Assistance

Support Instruments – Financial Support

E1

Grants and Subsidies

- **Incentives for actors** to provide electricity in regions and to population groups that lack the financial means to afford the full costs of electricity.
  - Subsidies should be as low as possible, but as high as necessary.

- **Subsidies** can be provided during:
  - Planning Stage => Capital subsidies, connection subsidies
  - Operational Stage => Operational subsidy or tariff top-up

- Subsidies can be **results-based**.

Source: EUEI PDF & GIZ, 2014

Support Instruments – Financial Support

E2

Loan Support and Risk Mitigation Instruments

Access to debt as a key challenge for project developers.

Available mechanisms and instruments include:

- Public backed debt facilities
- Loan guarantees
- Political risk insurance
- Currency exchange risk mitigation
- Other insurance measures

Source: EUEI PDF & GIZ, 2014

Main Body of Presentation

1. Energy Sector Governance: Customer and Environmental Regulation

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3. Support Instruments: Financial Support

4. Support Instruments: Technical Assistance

Support Instruments – Technical Assistance

F1

Technical Needs and Technical Assistance

Capacity Building through Technical Assistance on three levels: (1**) Individual**; (2**) Organizational**; (3) **Enabling Environment**

Technical Assistance can be provided to:

General Public	Workforce	Developers	Finance Institutions
• Awareness rising	• Vocational training	• Guidelines	• Lender awareness

Source: EUEI PDF & GIZ, 2014

Support Instruments – Technical Assistance

F1

Technical Needs and Technical Assistance

Awareness

- Information on cost, technologies, products and plans.
- When happens what?

Capacity

- The Government has to facilitate Human capacity development.

Data

- Data on grid extension plans and local socio-economic situations are needed.
- Renewable resource surveys..

Public Institutions

- Technical assistance is required to build institutional capacity.
- Financial resources and qualified staff are needed.

Source: EUEI PDF & GIZ, 2014

Support Instruments – Technical Assistance

F1

Technical Needs and Technical Assistance

Public Networks

- Regular meeting of public institution involved in mini-grid sector.

Developer

- Specific guidelines for project developer formed through consultative processes.

Reporting Standards

- Reporting requirements by for example international financiers need to be met with standardized reporting structures.

Community

- Assistance for developing a community centered approach to mini-grid development.

Source: EUEI PDF & GIZ, 2014

4. Concluding Remarks

Concluding Remarks

1. The Mini-grid policy and regulatory framework comprises the binding rules, strategies, institutions and associated processes that govern the mini-grid sector.

2. Standards guaranteeing quality of service and minimizing adverse environmental impacts are important for mini-grid sector development.

3. Financial Support and Technical Assistance are required to overcome support business models in inadequate enabling environments.

Thank you for your time!

5. Further Reading

ARE & USAID, 2014. HYBRID MINI-GRIDS FOR RURAL ELECTRIFICATION: LESSONS LEARNED.
https://ruralelec.org/sites/default/files/hybrid_minigrids_for_rural_electrification_2014.pdf

EUEI PDF & GIZ, 2014. Mini Grid Policy Toolkit: Policy and Business Frameworks for Successful Mini-grid Roll-outs. http://www.euei-pdf.org/en/recp/mini-grid-policy-toolkit

Tennebaum et al. 2014, From the Bottom Up : How Small Power Producers and Mini-Grids Can Deliver Electrification and Renewable Energy in Africa.
https://openknowledge.worldbank.org/handle/10986/16571

Usaid.gov, Mini-Grid Support Toolkit. https://www.usaid.gov/energy/mini-grids

6. Knowledge Checkpoint: Multiple Choice Questions