CLEAN ENERGY SOLUTIONS CENTER
ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

INTERNATIONAL SOLAR ALLIANCE

Thinking in Ecosystems: People, Money, Technology and Policy

In partnership with the Clean Energy Solutions Center (CESC)

Hugo Lucas Porta

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.

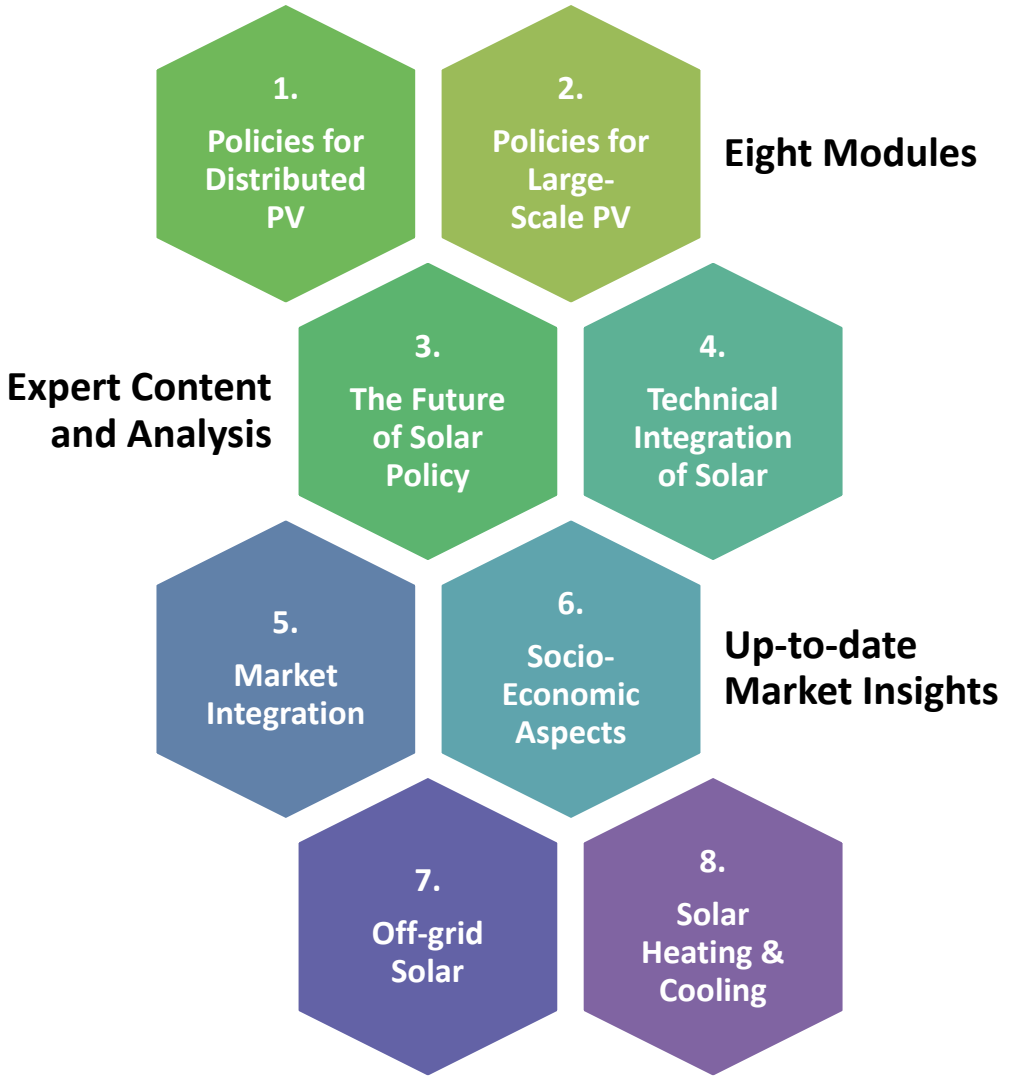
Our own history and experiences are based on constant innovation. This helps us target our services, by combining academic knowledge, technology and practical experience.

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 evaluates Off-Grid Solar through an Ecosystem Perspective



Overview of the Training

1. Introduction: Learning Objective
2. Understanding Solar Off-Grid
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:

Within the Off-Grid Solar Ecosystem…

- How are Policies and Regulations to be designed?
- What are Challenges around Financing?
- What are Viable Business Models?
- How does Technology Development / Innovation happen?
- Why do we need HR Development / Capacity Building?
- Where can we find and use Cross Sector Linkages?

2. Understanding Off-grid Solar

Understanding Off-grid Solar

In **2017**, the global **off-grid solar** sector is providing improved electricity access to an estimated **73 million households**, or over **360 million people**.

Despite these strong advances in energy access, the **size of the potential market**, in terms of people to be served, has remained **largely unchanged**.

This is by virtue of a **complex set of dynamics** that will maintain a substantial potential market for at least a decade.

Source: GOGLA, 2018

Source: businessgreen.com

3. Main Body of Presentation

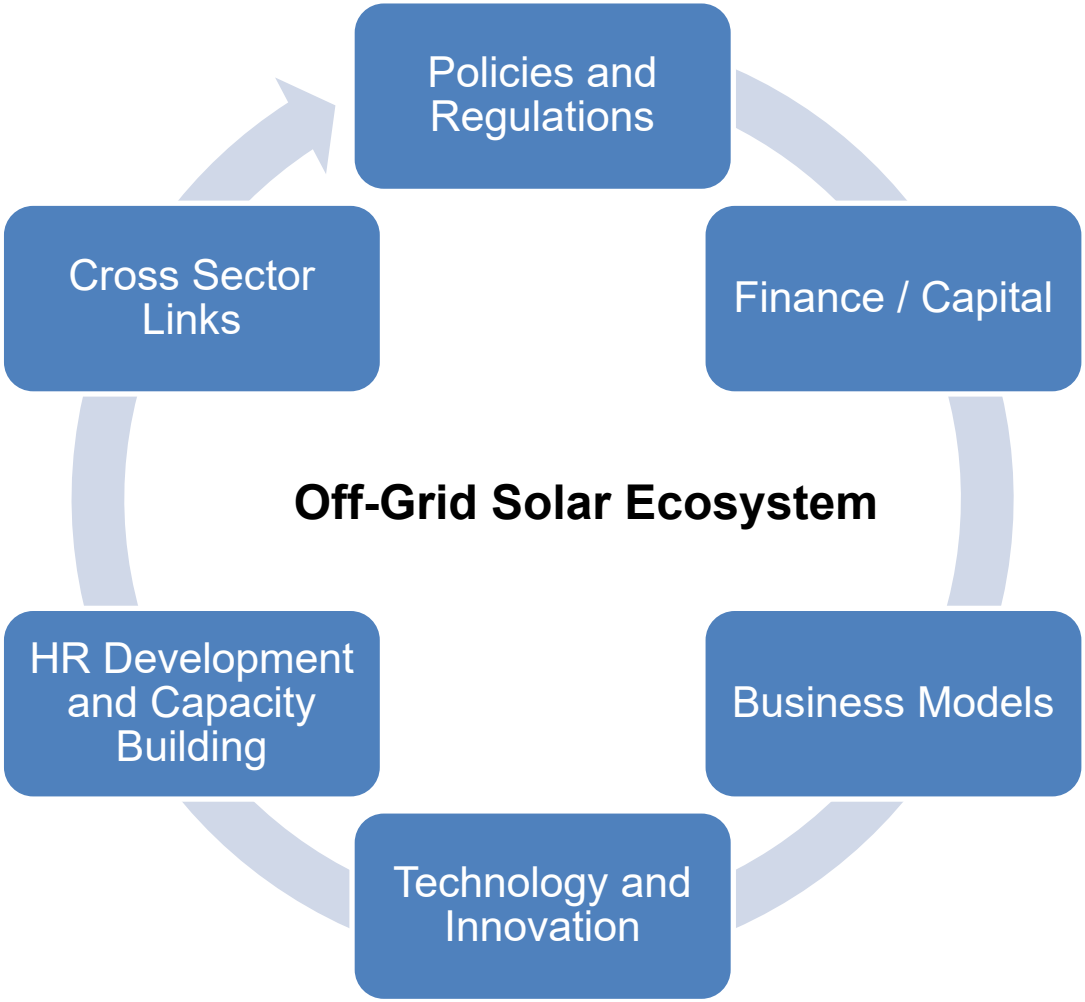
Main Body of Presentation

1. **Introduction to the Off-Grid Solar Ecosystem**

2. **Main Elements of Off-Grid Solar Ecosystems**

- Policies and Regulations
- Challenges around Financing
- Viable Business Models
- Technology Development / Innovation
- HR Development / Capacity Building
- Cross Sector Links

Introduction to the Ecosystem – The Need for an Enabling Environment



Introduction to the Ecosystem – The Need for an Enabling Environment

What is the **Solar Off-Grid Ecosystem**?

An **enabling environment** - the core for sustainable innovations and enterprises to thrive:

1. The **absence** of functional ecosystem is the **root cause** for failing social enterprises
2. Only viable support are **holistic** sustainable energy **solutions**

⇒ Technology alone will not ensure the success of off-grid solar

Source: SELCO Foundation

Main Body of Presentation

1. **Introduction to the Off-Grid Solar Ecosystem**

2. **Main Elements of Off-Grid Solar Ecosystems**

   - Policies and Regulations
   - Challenges around Financing
   - Viable Business Models
   - Technology Development / Innovation
   - HR Development / Capacity Building
   - Cross Sector Links

The Off-Grid Solar Ecosystem – Designing Policies and Regulations

Policies need to be designed for **sustainable market development**. Existing frameworks need to be **adapted**.

Participation of private sector needs to be promoted through **public support**.

For entrepreneurial planning, **stability** with respect to regulation is imperative.

Mini-grids require special regulatory due diligence.

- For more information: **See Webinar on Mini-Grid Policy Design**

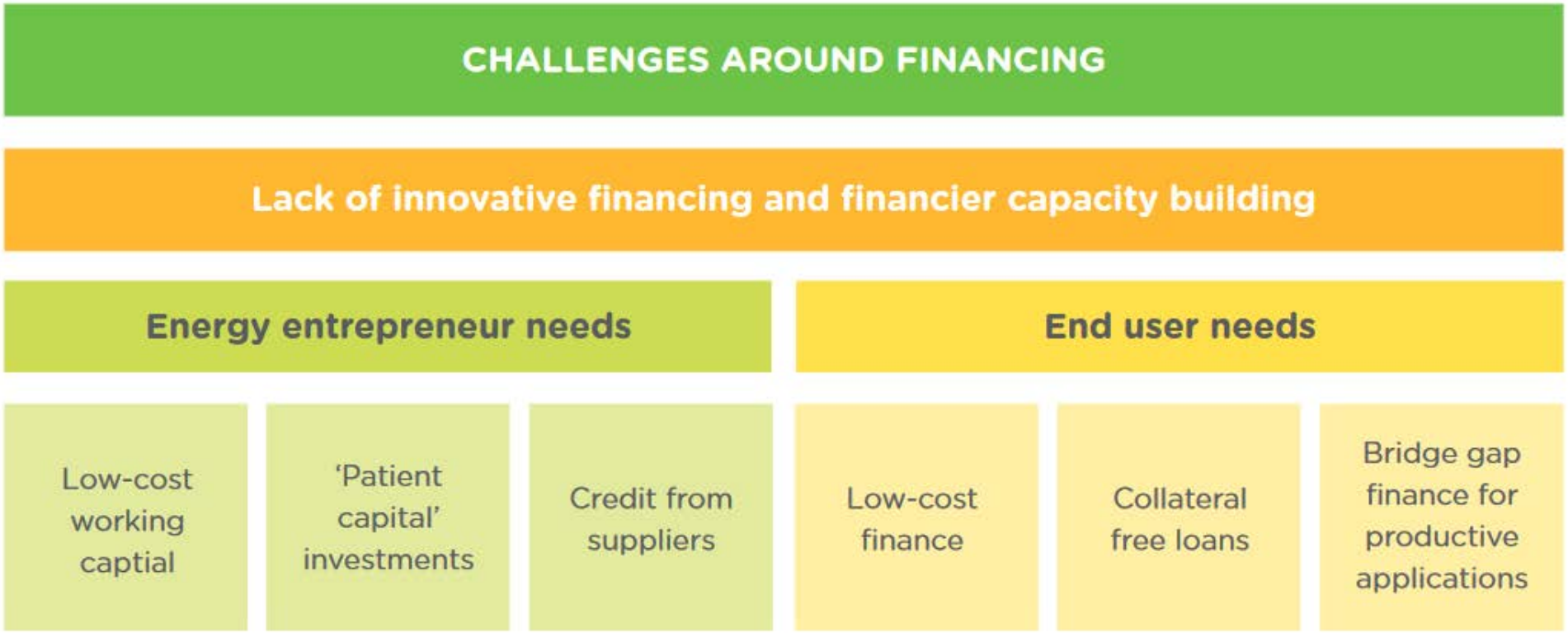
No one regulation fits all settings.

The Off-Grid Solar Ecosystem – Designing Policies and Regulations: Tanzania Case Study

Tanzania's regulator framework is stimulating private sector involvement:

- Standardised Power Purchase Agreements
- Annual Tariff Adjustments
- Segmented Licencing
- Technology Specific Tariffs

The Off-Grid Solar Ecosystem – Challenges Around Financing



Capacity building and the adoption of **innovative financing schemes** are vital.

Source: Hande et al., 2015

The Off-Grid Solar Ecosystem – Challenges Around Financing: SVN MFI Case Study

Micro Finance Institutions (MFIs) often partner with solar home service companies.

Case Study from **SVN's work in Cambodia**:

- Fostering the adoption of solar solutions, where systems are mostly **not affordable** to consumers.
- Programme has **partnered with MFIs** and credit agents networks => Consumers can finance solar systems
- Additionally: private sector **results-based incentive fund** reinforcing MFI's role and quality standards

The Off-Grid Solar Ecosystem – Viable Business Models

A strong **business case** makes the operational model **sustainable**.

Bottom-up & community-driven approaches are likely to provide the flexibility and adaptability for complex settings.

Profitability remains a huge issue which requires innovation to reduce operational costs.

Public-Private Partnerships (PPPs) to redistribute responsibility and risk most efficiently.

Incubators for **local innovation** require (financial) support.

The Off-Grid Solar Ecosystem – Viable Business Models: PAYG Case Study

Mobile Money: Consumers top up mobile credit, buy prepaid usage, receive code to unlock device.

Service Provision Control: When prepaid usage is used, consumer receives message to top up, otherwise devices locks.

Data: Huge amount of data generated, facilitates operations and investment decisions.

Source: FIBR Project

The Off-Grid Solar Ecosystem – Technology and Innovation

Specific local problems, in special and harsh environments, **require tailor made technology solutions** and **adapted design.**

- For Off-grid Solar, the difficulty lies in developing capable systems and efficient appliances while maintaining **affordable price levels**.
- **Quality assurance** and standards for local environments are needed.
- **Local entrepreneurial** support and **local R&D** need to be backed.

Source: Hande et al., 2015

The Off-Grid Solar Ecosystem – HR Development and Capacity Building

HR Development at **all organizational levels**:

- Operations
- Sales
- Finance
- Servicing
- R&D
- Community Involvement

Meeting these skill development needs **privately is not viable** for business models.

Photo Credit: http://offgrid-electric.com/

Source: Hande et al., 2015

The Off-Grid Solar Ecosystem – Cross Sector Developments

Agriculture	Health Care
• Rural economies largely depend on agricultural value chains • Important pathway for **poverty alleviation** • Off-Grid RE (e.g., solar irrigation) can improve **crop yield and resilience**	• Health-care facilities in rural settings often have **no access to electricity** • This can result in high maternal **death rate** and ruining of vaccines • Access to electricity for health care can **save lives**

The Off-Grid Solar Ecosystem – Cross Sector Developments: PUE

Productive Use of Energy (PUE):

PUE is understood as "**agricultural, commercial and industrial activities** depending on energy services as a direct input to the production of goods or provision of services."

PUE promotes **socio-economic development** by enabling and/or increasing income generation.

PUE can be differentiated from '**consumptive use**' (i.e. the use of energy services such as household lighting, cooking and private entertainment), and the use of energy for '**community services**' (such as health and education).

Source: GIZ, 2016

Source: Shell Foundation, 2018

4. Concluding Remarks

Concluding Remarks

1. The concept of off-gird solar ecosystems reveals the complexity of the access challenge, but also its opportunities.

2. Dividing the system into connected components urges to think outside the box.

3. Synergies can be leveraged where components of the ecosystem reinforce each other.

Thank you for your time!

5. Further Reading

FIBR Project, How Flexible Financing, Solar Panels and Data Could Be Key to Financial Inclusion. https://medium.com/f4life/how-flexible-financing-solar-panels-and-data-could-be-key-to-financial-inclusion-9221a5274106

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GOGLA, 2018a, Off-Grid Solar Market Trend Report 2018. https://www.sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/2018_Off_Grid_Solar_Market_Trends_Report_Full.pdf

Hande et al., 2015, Energy for the Poor: Building an Ecosystem for Decentralized Renewable Energy https://www.brookings.edu/wp-content/uploads/2015/01/renewable-energy_ch7.pdf

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https://www.selcofoundation.org/ecosystem-mapping/

Shell Foundation, 2018, Accelerating Access to Energy. http://www.shellfoundation.org/Our-News/Reports-Archive/Latest-Shell-Foundation-Reports/Accelerating-Access-to-Energy

SNV, Solar Microfinance Program (Cambodia)
https://www.ruralelec.org/project-case-studies/snv-solar-microfinance-program-cambodia

6. Knowledge Checkpoint: Multiple Choice Questions