

# Policies to promote rural electrification through off-grid renewable energy systems

## **Introduction to IRENA**



- Intergovernmental agency, headquarters in Abu Dhabi, United Arab Emirates. Innovation and Technology Centre in Bonn, Germany
- Established: April 2011
- Mandate: Promoting the widespread and sustainable use of renewable energy worldwide
- Membership: 141 Members; 31 Signatories/States in accession



## Diversifying approaches: Off-grid systems



Nearly 60% of additional generation required to achieve universal electricity access is estimated to come from off-grid installations (stand-alone and mini-grids)



#### Off-grid Renewable Energy Systems: An Opportunity



0.60 🗺 IRENA **Diesel-fired electricity cost range** 0.50 0.40 2013 USD/kWh 0.20 0.10 Fossil fuel-fired electricity cost range in OECD 0.00 Biomass CSP CSP Geothermal Hydro Small Geothermal Onshore wind Offshore wind Solar PV: large Solar PV: small Hydro Small Hydro Large Onshore wind Solar PV: large Solar PV: small Biomass Hydro Large OECD Non-OECD

LCOE ranges and averages

Note: assumes a 10% cost of capital

www.costing.irena.org

Source: IRENA

#### Off-grid Renewable Energy Systems: An Opportunity



#### **Stand-alone solutions**

- Modular in nature
- Customised to local needs and capacity
- Rapid deployment
- Cost-effective replacement for kerosene-based lighting

#### **Mini-grid solutions**

- Potential for scale-up in energy services: beyond basic needs
- Tap into diverse resources (including hybrid systems)
- Long-term alternative to fossil-fuel, grid-based options
- Centralised ownership, financing and O&M

**Challenge:** Tapping into this massive opportunity, identifying the right solutions and scaling-up energy access efforts <u>sufficiently</u> enough to meet the set goals

#### Off-grid Renewable Energy Systems: An Opportunity





#### Objective

- Identify key barriers and drivers for stand-alone and mini-grid RE system deployment
- Platform to share experiences, lessons learned and best practices

#### IOREC 2012 : Accra, Ghana





#### **IOREC 2014 : Manila, Philippines**



Conference outcome papers available at: www.iorec.org





### **Enabling environment for off-grid RE deployment**



Source: IRENA

## Policy and Regulatory Frameworks



- Supporting the development of a 'sustainable' market
- Ensuring that systems deployed are able to operate efficiently and reliably
- Leveraging on local enterprises and capacities that contribute to improved sustainability, promote local ownership and allow retention of value locally (jobs, income, know-how, etc.)
   – Capacity Building and Technical Assistance are crucial elements.
- Integrating off-grid renewables into the national rural electrification strategy
- National grid- where and when?

✓ Identifying areas to be covered through grid extension or off-grid solutions✓ Informing communities of real time frames for national grid arrival

- Stable policy frameworks
  - Several rural electrification programmes have succeeded after years of learning and course correction
  - Policies, including support schemes, need to be tailor-made and dynamic in order to effectively and efficiently support the growing market

## Policy and Regulatory Frameworks



- Flexible tariff-setting for mini-grid projects to allow commercial viability and cost recovery
- 'What happens to the mini-grid when the national grid arrives'?
  - ✓ Different regulatory options are available
  - $\checkmark$  It should be clarified at the initial stage
- Encouraging innovation

 $\checkmark$ In technology design, financing and business models

- Role of fossil fuel subsidies
- Standards (safety and quality)
  - ✓ Safety
  - ✓ Quality



- Clearly defined roles and responsibilities of different institutions. This helps give developers certainty about administrative procedures and institutional interlocutors
- Minimised and streamlined administrative procedures. This reduces the transaction costs incurred by developers, for instance in procuring licenses, permits or financial support
- Ensuring institutions have the necessary capacity (technical, financial and human) to effectively design and implement the rural electrification strategies based on off-grid RE (crucial role of technical assistance)
- Cooperation and coordination between national and international (public, financing, research, etc.) institutions involved in rural electrification as well as in other sectors (e.g. water/agriculture, healthcare, telecommunication)



What are the three most critical challenges for the uptake of off-grid RE? (as % of total respondents)



Access to affordable finance (end-users and enterprises)



#### Bridging the financing gap and ensuring sustainability

- ✓ Combination of different support instruments
- ✓ Effective 'source to end-use' financing delivery mechanisms
- ✓ Risk-sharing mechanisms

#### **Stand-alone solutions**

- ✓ Customised financing schemes
- $\checkmark$  Outreach to rural areas
- $\checkmark\,$  Stringent quality control and aftersales service
- ✓ Leveraging technology platforms

#### **Mini-grid solutions**

- ✓ Different financing needs at different project phases
- ✓ Tariff design
- ✓ Leveraging local enterprises and capacities
- ✓ PPPs (e.g. public sector financing the local grid and other 'non-generation' assets)
- ✓ Role of productive uses

## Perception of Technology as a Challenge



What are the three most critical challenges for the uptake of off-grid RE? (as % of total respondents)





- Awareness about characteristics, reliability and real-world project costs of off-grid RE solutions
- Integration of innovative technologies in system design
  (mobile payment, smart metering, remote control, etc.)
- Standards and quality assurance mechanisms
- Power variability and grid stability
- Electricity storage

**MARKA** 

Electricity Storage and Renewables for Island Power

A Guide for Decision Makers









## Thank you

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