



Upscaling Mini-grids for Least Cost and Timely Access to Electricity Services

SREP round table

[Rwanda]

May 24 2016



Country background

Country Context

Country:

- Total land area of 26,338 km² and a population of 11.7 millions. It is the most densely populated country in Africa with approximately 480 people per km.
- The population is forecast to grow at 2.5% per year, reaching 17.8 million people by 2030.

Economy:

- GDP growth increased from 4.7% in 2013 to 7.0% in 2014, and it is projected to rise to 7.5% in 2016
- 83.0% of Rwandans live in rural areas. Progress has been made promoting spatial inclusion, with the share of rural households living in integrated and economically viable planned settlements increasing from 37.5% in 2012 to 53.0% in 2014.



Energy sector background

Energy Sector Context

- **Electricity Access:**

Energy access to electricity is 23% on grid at the national level of which 5% is in rural areas.

Low per capita electricity consumption of 42 kWh p.a.

Energy sector Environment

- Energy Policy Framework: The GoR has ambitious plans for increased generation capacity and energy access by 2018.
- In 2013 the GoR endorsed its five-year plan (2013-2018) for the Second Economic Development and Poverty Reduction Strategy (EDPRS-II) to achieve the country's long term development aspirations as embodied in the Rwanda Vision 2020.
- This set the basis for the Rwanda Energy Policy (REP) and updated Energy Sector Strategic Plan (ESSP) which were adopted in March 2015.
- The ESSP sets an electricity access target of 70% by 2018, of which grid extension should reach 48%, and off-grid (including mini-grid) access should reach 22%.
- The recently concluded rural electrification strategy that was adopted in this month (May 2016) zooms into the ESSP the role of off-grid stand alone systems and Mini grids.



Mini-grid sub-sector background

- Rwanda's abundance of small hydro resources and solar irradiation, coupled with population patterns and economic growth dynamics makes mini-grids competitive in comparison to alternatives
 - 333 small-hydro sites identified with individual capacity between 50 kW and 1 MW
 - Over 192 pico-hydro sites identified with individual capacity below 50 kW
- Limited experience in mini-grids, few informal mini-grids (mostly pico-hydro) running at low technical standards with frequent break-downs
- About 10 companies have constructed pico-hydro plants, most of them developed by self-taught entrepreneurs.
- UNIDO constructed four micro village grids, running as community-based cooperative business model which has not proven to be very successful, with utilization rates as low as 6%
- Mesh Power – under EnDev mini-grid program – developed 15 solar-powered pico-grids that serve 300 customers and secured financing to reach 2,000 customers in 70 sites
- Colorado State University is planning mini-grid pilots as part of its Smart Village Micro-Grid Project
- SEFA TA green mini-grids conducting feasibility studies in 20 sites, standardize agreements, etc.



SREP-funded project outline

- **USD 50 million SREP Investment Plan was approved in November 2015 to enhance private sector investment in off-grid and mini-grid solutions based on renewable energy.**
- Project under preparation (expected in 2017)
- Implementation through Renewable Energy Fund (REF) – to be created by GOR
- Designed to respond to market demand for (i) off-grid stand-alone solar systems, and (ii) mini-grids
- Key aspects of proposed (ii) mini-grid facility:
 - Help demonstrate potential for privately-led, financially sustainable, and scalable mini-grid business models
 - Provides financing support (e.g., loan, capital subsidy buy-down), capacity building and technical assistance, and enhances enabling environment for private investments
 - Technology neutral, but likely focus on hydro and solar
 - Prioritize areas farther away from the grid and high potential for productive uses
- Project preparation grant will address capacity constraints (e.g., commercial banks), assess market potential, detect pipeline of potential projects, identify business models and viability gaps, etc.



Issues

- Mini-grids are nascent sub-sector in Rwanda – experience limited to few and small systems < 50kW
- Untested simplified licensing regulatory framework for mini-grids
 - Tariff setting (cost-reflective, reasonable return)
 - Options for private operators when the grid arrives
- Perceived risk among private developers around grid expansion plans
- Access to finance (viability gap financing, commercial debt)
- Low demand in rural areas
- Hydro resources far away from demand
- Technical and institutional capacity of private developers, Government institutions, and commercial banks



Questions moving forward

- How do we deal with competition between stand alone-systems and mini-grids considering cost reductions of the solar systems?
- Should people serviced by mini-grids receive subsidies to level their tariff to the national tariff?
- Best practices to address concerns from private developers to the issue “when the grid arrives”. How do regulatory frameworks in other countries deal with this concern? How “prescriptive” shall the different options for private developers be? How do they address the lower negotiating power from developers vis-à-vis the national utility?
- Best practices for the promotion of productive uses of electricity in rural areas