



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

SREP round table

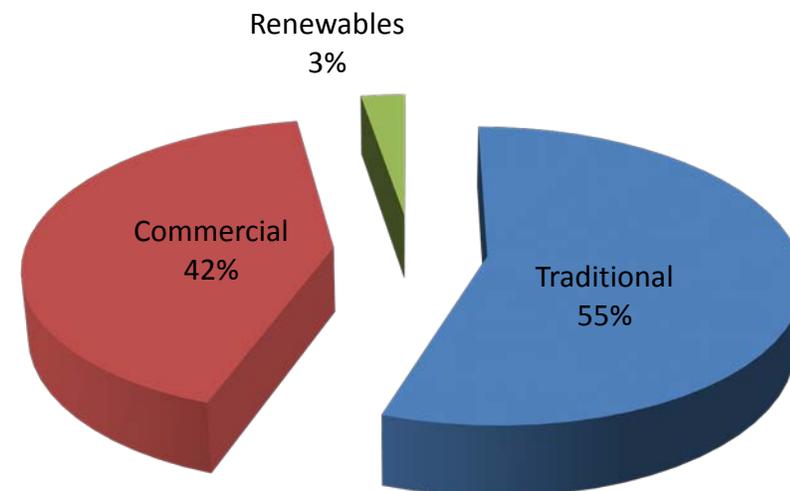
[NEPAL]

Myanmar, Feb 6, 2017



Country background

- ❑ Total Population - 28 Million
- ❑ Net Energy Imports – 15.74 % of Total Use
- ❑ Access to Electricity – 76.3 %
- ❑ Total Electricity Peak Demand 1,298 MW (Dry Season)
- ❑ NEA+IPP=37%, India=18% & Load Shedding=45% (NEA 2015)
- ❑ Energy Consumption by Fuel: 77% from Traditional Sources
- ❑ Energy Consumption by Economic Sectors: 80% in residential
- ❑ 15% of the populations have access to electricity from RE
 - Mini/Micro Hydro
 - Solar PV
 - Wind



Source: Economic Survey. MoF, 2016.



Project outline

SOLAR / WIND HYBRID MINI-GRIDS

(1) Bhorleni Solar /Wind Hybrid Mini Grid System

- ❑ **Location:** Bhorleni Village, Phaparbari VDC, Makawanpur District, Nepal
- ❑ **Capacity:** 2 Number of 5 kW Wind Turbines + 15 kW Solar PV Array
- ❑ **Beneficiaries:** 131 Households, 1-School, 1-Health Post, 1-Police Station
- ❑ Managed by “Bhorleni Wind/Solar Mini-Grid Management Committee”
- ❑ Installed in 2015



(2) Dhaubadi Solar/Wind Hybrid System

- ❑ **Location:** Dhaubadi VDC, Nawalparasi District, Nepal
- ❑ **Capacity:** 2 wind turbines of 5 kW + 2 kWp solar PV Array
- ❑ **Beneficiaries:** 45 households and a Police Station
- ❑ Installed in 2011
- ❑ Supported by ADB and Implemented by AEPC





Project outline

SOLAR MINI-GRIDS

1- Dubung Tanahu Solar Mini-grid

- ❑ Supported by UNCDF and implemented by AEPC
- ❑ 17.5 kWp Solar PV Plant, 155 Households including Shops
- ❑ Pre-paid Smart Energy Meters to all users (Meter Cost = \$35)
- ❑ NRs 400 per HH per Month (Economic Loads – 4/5 light & TV)
- ❑ NRs 900 per HH per Month (Other Loads – 4/5 light, Ref & TV)
- ❑ Household Load can be Monitored remotely



2- Khotang & Okhaldhunga Solar Mini-grids

- ❑ Phase-I: 35kWp Solar Mini-grid System
- ❑ Phase-II: 37.8 kWp Solar Mini-grid System
- ❑ Developed & Implemented by Private Company (Ghampower Pvt Ltd)
- ❑ 3-Villages Electrified (Harkapur-Okhaldhunga, and Kaduwa & Chyasmitar Khotang district)
- ❑ 24-hour reliable electricity supply to around 540 people in 83 households and 25 local PEU
- ❑ 2 Telecom Tower Powered, 155 Job Created, Diesel fuel replaced





Status

RE Potential and Contribution in Energy Access:

- ❑ 15% of rural population have got electricity access through RETs (26.3 MW MHPs, 700,000 SHS, 2300 ISPS & PVPS)
- ❑ Replacement of firewood by biogas in (350,000 HHs)
- ❑ Saving of more than 30 - 50% firewood & reduced IAP in more than (12,10,000 HHs)
- ❑ More than 1,200 SMEs in RE sector, scattered all over the country with very good rural coverage
- ❑ About 30,000 jobs in RE sector (~500 jobs added each year)
- ❑ Employment & entrepreneurship at local level (e.g., stove masters, biogas masons etc.)

RE Resources	Estimated Potential	Status	%
Hydropower	>83,000 MW	787 MW	1
Micro/Mini Hydro	>100 MW	~30 MW	30
Solar Energy	~2,100 MW (Grid connected) ~4.7 kWh/m ² /day)	20 MW (Off Grid-SHS/ISP)	1
Wind Energy	3,000 MW (assuming 10% of total feasible area is taken)	~68 kW	0.002
Biogas	>1.1 Million (Nos.)	~350,000	32
Biofuel	>1.1 Million (Ton)	negligible	



Issues

- ❑ **ECONOMIC:** Cost Vs Affordability of Mini-grid System (Subsidy policy somehow addresses this issue, but still an issue), Lack of access to capital & credit, Low penetration of productive use of energy, Too low tariff rate is an issue for sustainability but too high tariff rate still an issue for affordability thereafter project sustainability
- ❑ **POLICY & INSTITUTION:** Financial Institution, uncertain legal/regulatory framework, financial incentives
 - Policy for grid connection to be finalized of mini grid systems
 - Net-metering standard/guideline yet to be finalized
 - Strong incentive for end-user is required for larger deployment of RETs
- ❑ **SOCIO-CULTURAL & POLITICAL:** Limited awareness, Gender disparity, Political instability
 - service center/ technicians are more focused on urban regions. Technicians are less available in rural areas where mini grid systems are installed relatively higher.



Issues...

- ❑ **MARKET:** Lack of competition, Non –robust supply chain leads to procurement challenges
 - Assurance of the quality for AEPC’s promoted mini grid system can be guaranteed while in the market other than those tested by RETS may lacking the standard quality.

- ❑ **Technical:** Challenges to address future increased loads, Low Capacity factor and Intermittency of generation Solar/Wind, Lack of standards codes, certifications, etc
 - Condition of NEA’s electricity distribution system need to be assessed for grid connection of mini grid system



Questions on moving forward

- ❑ Management of Mini-grid system (Private or Community Model?)
- ❑ Private Sector investment Model – ESCO (whether private sector are really interested to invest as ESCO?)
- ❑ Scaling up in terms of capacity, geography and penetration
- ❑ Rural to urban transition to reduce burden in national grid and to contribute in the greater energy mix
- ❑ We all realize that we need to transit from subsidy based mechanism business as usual model to a market driven business model. But how do this, has been a challenge?
- ❑ AEPC envisions to test a model for forging partnership with private sector towards a more economically viable businesses oriented off-grid system development.