Private Sector led solar micro-grids in remote and rural Nepal

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energy for all

Gham Power

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Gham Power: Solar Project Developer, Social Enterprise

• Started in 2010
  – Provide Solar PV systems at costs below diesel
  – Focus on businesses and productive use

• 1.2 mw installed; 832 Projects:
  – Possible Health Bayalpata Hospital (12 KW)
  – Maiti Nepal Shelter for Trafficked Girls (8 KW)
  – EVK2 Lab @ Mt Everest base camp (10 KW)
  – US Embassy for Nepal (23 KW)
  – UNICEF (42 KW)

• 2016 target pipeline: 4 mW
• Pilot developed for 3 villages (Okhaldhunga & Khotang district)
  – Total size: 35 kw initially; increased to 72 kW in phase 2
  – 25 businesses, 83 households
  – Technical assistance from Asian Development Bank (ADB)

• Funding Sources:
  – Equity investment from Community and Gham Power
  – Debt financing from NMB Bank
  – Financial and technical assistance from ADB, AEPC and Winrock

• Implementation Model:
  – Project owned by a SPV with community representation
  – Gham Power provides EPC + O&M services for 10 years
  – After 10 years, project ownership transferred to community
Rural microgrid: Site selection criteria

- Services necessary in target areas
- Current energy consumption
- Ability to pay for the services
- Grid Extension possibilities
- Availability of Road network
- Sun path/shading issues
- GPS information of the load centers
Rural microgrid project: Technical components

- Top quality components, expandable design
  - Grade A components
  - Smart meters to control usage
  - Mobile money to facilitate payment
  - Internet connection to facilitate monitoring
  - NEA grade transmission: can integrate with national grid in future
Rural microgrid project: Sustainability

- For HH’s → energy costs < displaced kerosene costs

- Optimum utilization of produced energy
  - Higher capacity factor through productive end use (PEU) loads
  - Greater revenue generation

- Mobile Pay-as-you-go (PAYG) option enables new businesses (recharge cards, mobile banking, etc.) and connects markets

- Regular O&M
  - Internet connectivity facilitates remote monitoring
  - Trained technicians and Microgrid managers at each site
  - Sense of ownership ensures accountability
Rural microgrid project: Financial Viability

• Total Investment: $231k
  – Aggregation of projects helped lower the transaction cost

• Funding Sources:
  – Local Community: $35,000
  – Gham Power: 10% of installation costs
  – Assistance / Grants: ADB + DOEN foundation
  – Debt Financing from a local commercial bank

• Pilot project is viable with some assistance
  – Without assistance, projects losses over 10 years = $(108,803)
  – With a 46% assistance, total project profits = $70,732
    • Investor IRR = 12%
    • EPC margin = 10%
Rural microgrid project: Productive end use (PEU) loads

- Grinding Mill – 1.8 kW
- Computer Center – 2.5 kW
- Petrol Pump – 3.5 kW
- BTS tower – 0.8 kW
Rural microgrid project: Phase 2

- Phase 2: Add 37 kW to power mobile towers + add’l load
  - Availability of power incentivized tower operator
  - Partnership with NCell (Nepal’s leading private telecom)
  - 2 mobile towers + ~146 households + ~20 businesses
  - GSMA M4D Grant award
  - Enhance connectivity and power
  - Mobile signal to 5 VDC’s (population > 20,000)

*VDC = Village Development Committees
Benefits

To telecom operators:

• Access rural market with lower operational costs
• Fixed PPA + Service Level Agreement (SLA) more desirable compared to owning/maintaining power backup options (solar + diesel)
• Electricity at homes to charge mobile phones
• People will use mobile data to access Internet

To microgrids:

• Fixed monthly PPA with Ncell provides financial stability to Microgrid (“Anchor Client”)
• Telecom more “bankable” off taker to raise project financing
Rural microgrid project: Future Directions

• What do we hope to learn from the pilot?
  – Practical ways to cut system costs and increase project revenue
  – Impacts on community: economy, environment, and access to energy
  – Alternate options for debt and equity financing
  – Optimal mix of debt, equity, and assistance for sustainable projects
  – Policies and implementation mechanisms needed to provide assistance

• Attract other developers and EPC’s to develop RMG projects
  – More than 3000 telecom towers

• Gham Power’s focus: develop larger RMG portfolios and invite other EPC’s for implementation
  – 2017 Goal: 305 kW
  – 1 mW in next 3 years
Thanks!

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