

Off-Grid Solar

Economics of solar and solar-hybrid mini-grids

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Rural Energy Experts

- **Venture-backed, Mekong-based** renewable energy specialists
- **15+ year track record** in off-grid, remote areas; Myanmar presence since mid-2014
- **Internationally-focused** throughout 30+ countries in ASEAN, Pacific islands, Africa and India
- **Deep experience** in world's most challenging rural environments
- **Approach to longevity:** high-quality technology paired with local training and capacity building



Non economic viable I

Situation

- Ban Houaypha, rural village in Luang Prabang Province
- 42 km from nearest grid connection
- 83 households, 498 people
- \$41.50 – average household monthly income (\$1.38/day)

Solution: Solar PV village grid

- AC coupled 6.5 kWp hybrid
- \$1.25 – \$3.75 monthly options

Local Training and O&M

- VETs, VEC, maintenance fund

Only possible w/ donor role



Non economic viable II

Situation

- Ban Nam Kha1, rural village in Xienkhuang Province
- 28 km from nearest grid connection
- 92 households, 506 people

Solution: Hybrid village grid

- Hydro/ PV solar/ Gen set (total 35KW)
- Tariff 0.24USD/KWh

Local Training and O&M

- VETs, VEC, maintenance fund

Low load factor



Non economic viable III

Situation

- Ban Nam Kha II, rural village cluster in Luang Prabang Province
- 28 km from nearest grid connection
- 605 households, 2800 people
- Hydropower Mini-Grid PPA (client EDL)

Solution: 3-phase hydro mini-grid (185 kWp)

Local Training and O&M

PPA tariff too low for micro site



Condition for economic viable Mini grids

- Mini grids have to be implemented under **Public -Private - Partnership** scheme (at least in SE-Asia),
- An **anchor client** has to be included (e.g. Telco operator, Resort or Hotel)
- **Alliances** have to be created (e.g. ESCO, Traders, Capacity provider) for sustainable operation of mini grids
- Only **hybrid mini grids** are economically viable

Current Barriers for Mini grids I

- **Insufficient household cash** available for monthly tariff payments (low load factor)
- **Mismatch of tariffs** between on and off-grid customers
- Higher **up-front costs** than Pico-PV and SHS solutions (End-user income can't cover capital costs)
- **Low bankability** in eyes of foreign investors
- Meeting customers' expectations of **load limits**
- **Grid arrival** – bet for it, or against it?

Current Barriers for Mini grids II

- **Underdeveloped electricity laws, frameworks, regulations**
- **Costly import duties and taxes** on solar-related components (batteries, inverters, cables etc)
- **Lack of *accurate awareness*** from public, policymakers and potential customers
- **Negative perceptions** due to previous bad experience with low-quality
- Little chance of longevity without **community-based O&M models**

Economic viable I

Situation

- Hankin village, rural village in Shan State
- 67 km from nearest grid connection
- 154 households,

Solution: Solar PV village grid

- AC grid (15KW)
- 80% of initial investment donor
- 20% of initial investment villagers

ESCO collect fixed monthly fees



Economic viable II

Situation

- Paotai and Paonuea village, Houphan province
- 118 km from nearest grid connection
- 225 households,

Solution: Solar PV /Hydro village grid

- AC grid (80KW in total)
- 70% of initial investment donor
- 30% of initial investment ESCO

ESCO collect monthly fees from villagers
Donor pays additional monthly fee to
ESCO for period of three years.



Economic viable III

Tower + Community ESCO (Anchor client)

- **Community energy services:** ESCO sells excess energy to nearby communities via Energy Hub or into Village grid

Benefits

- Electricity fundamental to economic growth
- Operators/tower co's viewed as "enabler"
- Increased community trust and improved in-country reputation
- Potential increase in customer base and mobile phone usage
- Risks held by ESCO

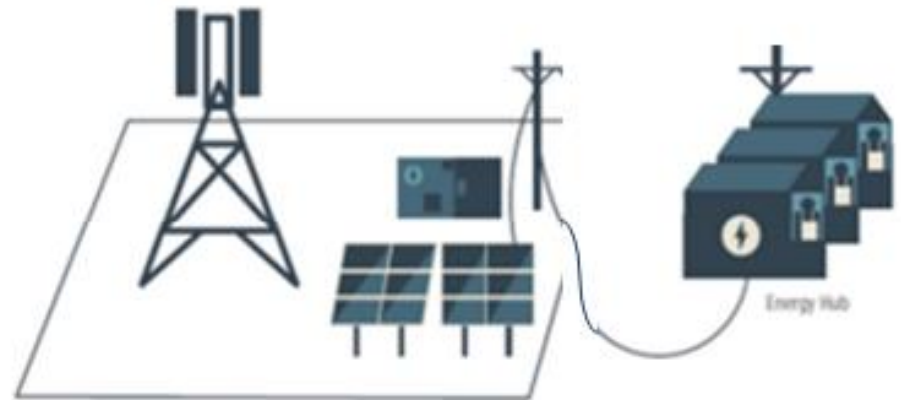


Image: GSMA – Mobile Enabled Community Services, “Services Over Technology” report. January 2013.

Thank You

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