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"International Conference on Micro Perspective for Decentralized Energy Supply"

"Mini-Grids as New Market Opportunities: Experiences from Science and the Private Sector"

February 26th 2013, Berlin

"A Community Managed Micro Hydro Connected Mini Grid in Nepal- Challenges and Opportunities"

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Contents

- Nepal's Energy Scenario
- Need of Micro Hydro Connected Mini Grid
- Pilot Mini Grid Project
  - Technical aspect
  - Managerial aspect
  - Financial aspect
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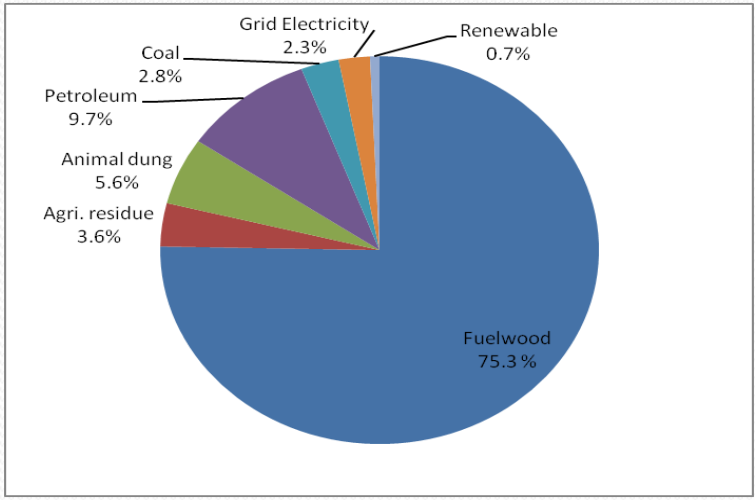
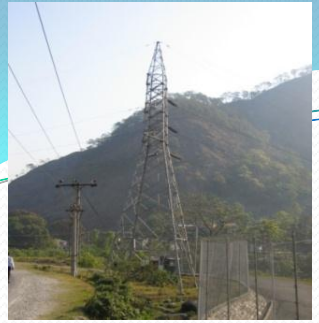
- Conclusions and way forward

Energy Situation of Nepal

- **83% population** live in **rural areas** (among national population of 26.6 million)*
- Total annual energy consumption **11.9 M ToE & per capita energy consumption is 14 GJ** where as electricity consumption **120 kWh**
- **56%** population have **access to electricity** including **10%** from **Renewable Energy Technologies (RETs)**
- **Only 3% of the total energy** consumed is **electricity mainly Hydropower**.
- High dependency in **traditional source and petroleum products** but no proven reserves of fossil fuel



*Source:*Census 2011, Economic survey , MoF, 2011*



Rural Electrification (only to 48.5% of total population)

Nepal Electricity Authority (NEA) - Grid extension (Ministry of Energy)

- State owned utility (Transmission, Distribution and Generation)
- Supply deficits (720/1026 MW*) (Load shedding upto 16 hours/ day)
- Rural Electrification is not a priority
- 45% have grid electricity access

Alternative Energy Promotion Centre (AEPC) - Off-grid RETs (Ministry of Science, Technology and Environment)

- Nodal organization for RETs promotion (MH, Solar, Biogas..)
- National executing organization for RE Programmes and Projects (Different projects with different modality including RERL)
- RERL-decentralisation, community mobilisation and holistic approach

*NEA annual report 2012

Micro Hydro Status in Nepal

- Grid expansion is technically and financially not viable
- Micro Hydro (<100 kW) is appropriate due to available water resources and suitable terrain and cost effective
- Local capacity to operate and manage

- Total installed capacity: 22 MW (2500 nos., potential 100 MW)
- AEPC (ESAP and REDP/RERL): 16 .4 MW, 168,000HHs, 1,100 nos.
- AEPC/New NRREP target : 25 MW (150,000 HHs)*
- Guidelines, Standards, Subsidy delivery policy and mechanism, institutional set-up , RE Policy are already in place
- Regional Centre of Excellency in Micro Hydro in South East Asia

Source: *AEPC/NRREP document

Why Mini Grid?

Major problem faced by Micro Hydro (MH)-

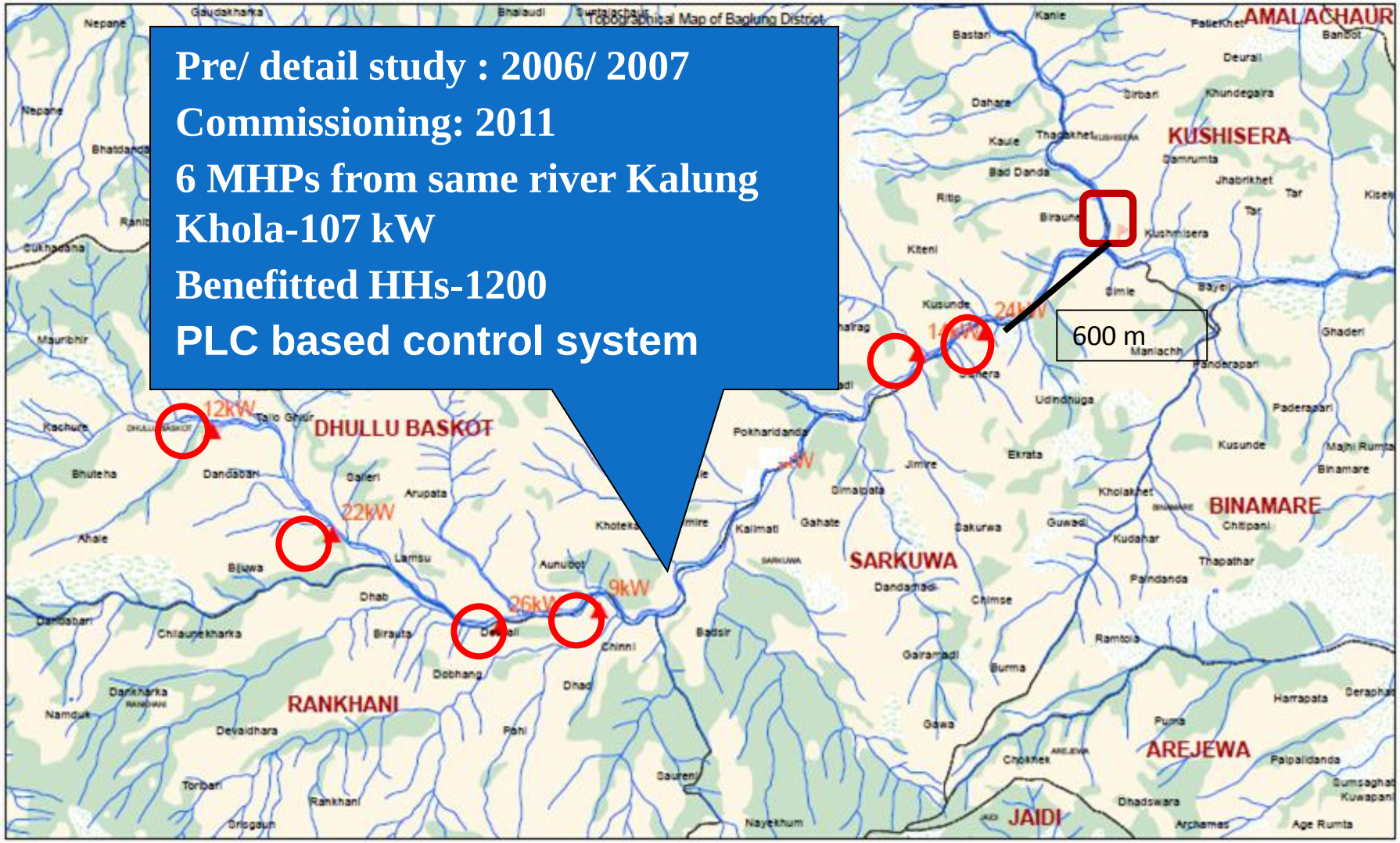
- Low load factor (around 20%), reliable services
- Lack of integrated plan for rural electrification
- Grid expansion has created great threat to MHPs
- NEA being sole grid operator shows unwillingness to connect MHP into Grid

- Optimization of Electricity Generation from MHP
- Reduce the possibility of abandonment of MH after grid
- Interconnection into national grid

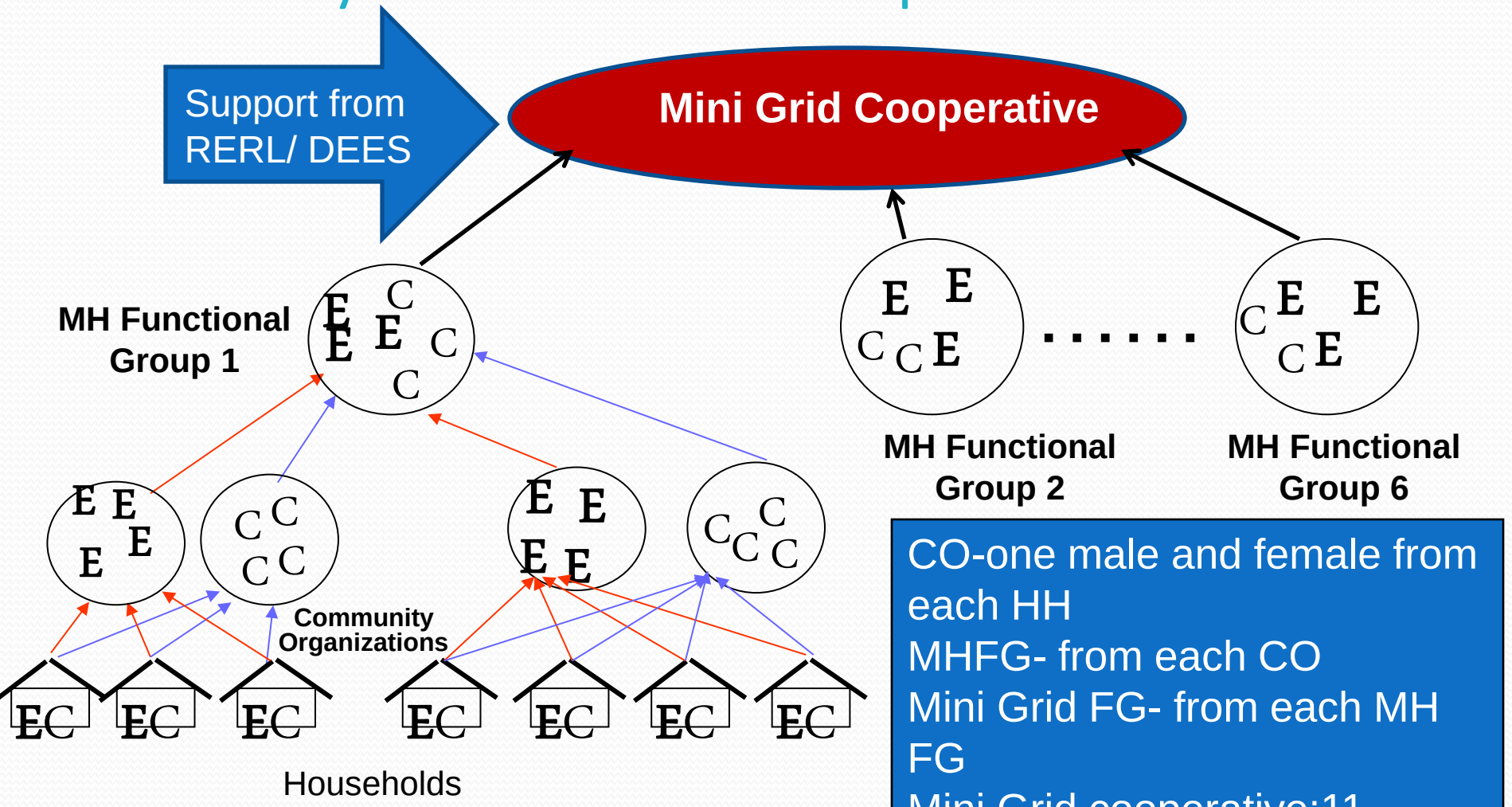
"Micro Hydro connected Mini Grid is the local grid that connects more than one MHPs (generators) to operate in parallel mode and sharing the load in equal proportion of its capacity "

MiniGrid_Benifits_720p.mp4

Pilot Mini Grid Project (in Energy Valley, Baglung)

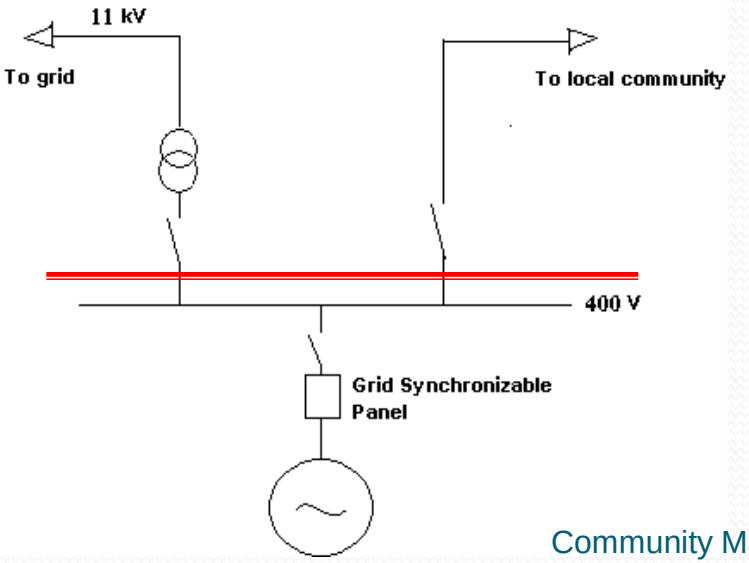


Management structure:
Community Institutions Development Mechanism



CO-one male and female from each HH
MHFG- from each CO
Mini Grid FG- from each MH FG
Mini Grid cooperative:11 member executive member

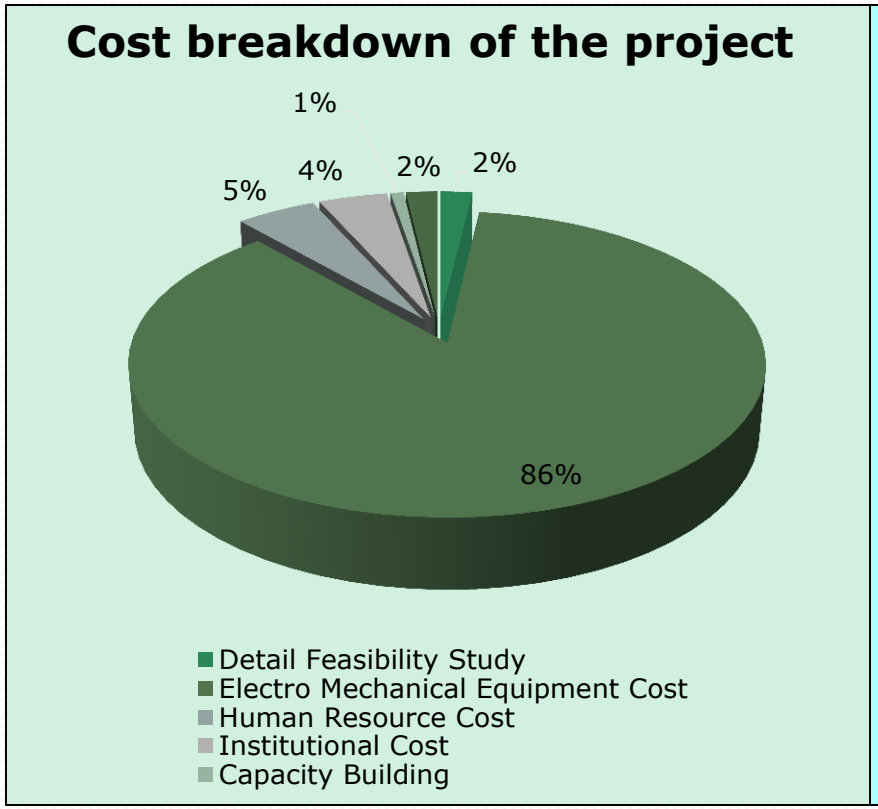
Independent Power Producer (IPP) model

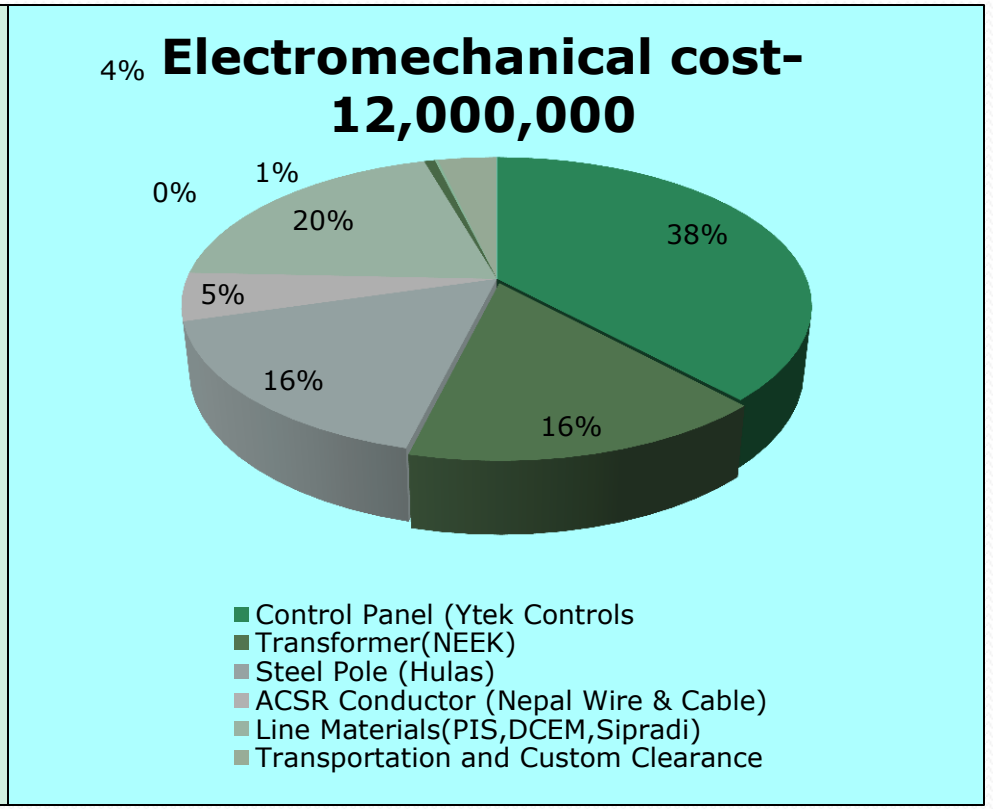


- MG Cooperative is responsible for the transmission and distribution of electricity
- Each MHP function as IPPs generate electricity
- Power Purchase Agreement (PPA) (buying US cent 5.3/unit and selling: USD 8.82 for 12 unit and 8.2 cent/unit afterwards)
- Strong ownership on individual plant and mini-grid as well

Financial status

- Total Project Cost of Mini Grid: NRs. 15,029,500.00 (USD 176,000.00) (USD 1,334/kW, USD 200/kW-Plant)
- Supported by UNDP/RERL & Community





Advantages

- Technical :
  - Quality, Availability and Reliability of electricity improved
  - Easier starting for motor and bigger load
  - Better safety & protection
  - Plant factor doubled (17 to 34%)
- Financial:
  - Increment of MHPs income by 20 to 60%
  - Income of Entrepreneurs increased by 5 to 30%
  - New Enterprise established (33 to 52)
- Social:
  - Community confidence level has increased-empowered
  - Behavioral change in electricity use (lighting to productive end use)
  - Sense of ownership and unity among community
  - Easy for consensus decision and resource mobilisation (water rights, right of way, human and financial resource-40%)

Issues

- Sustainability of the system
  - Management of grid by community
  - Human resource for Repair and Maintenance
  - Promotion of end-uses
  - Load Management
  - Technology transfer and cost reduction
- Interconnection with national grid

Conclusion and Way forward

- Mini Grid is found to be technically feasible, financial viability depends on different factors (capacity, plant factor, distance)
- Mini Grid could be the permanent source of electricity supply in areas far away from national grid and could be connected with grid if it is nearby
- Local community are capable to operate and manage the complex Mini Grid system
- Capacity building and coordination, understanding among community is major step for sustainable operation
- Baglung Mini Grid is becoming a research place and has built confidence for replication

Thank You!

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