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Solar Pumping Experience in Nepal

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Outline

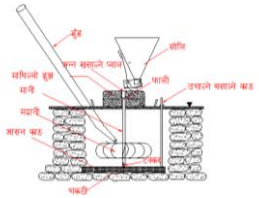
- Background
- Why Solar Pumping?
- AEPC Efforts on PVPS
- Policy and provision
- Solar Pumping for Drinking water and Irrigation
- Some Issues and Challenges
- New Model and Approach

Alternative Energy Promotion Centre

Making Renewable Energy Mainstream Supply in Nepal

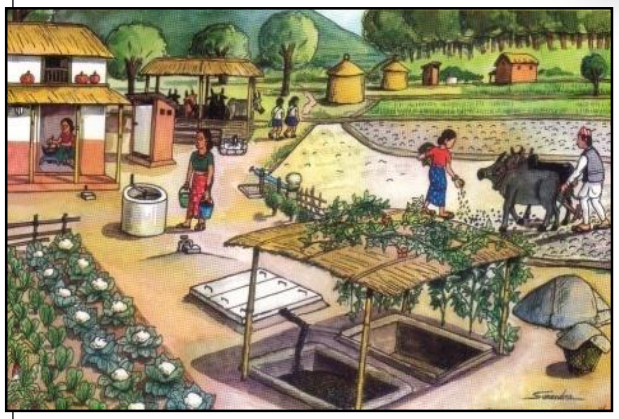
Wind

Solar
(Thermal & PV)



Hydro
(Micro, Mini, IWM)

AEPC to Promote **Renewable Energy Technologies in Nepal**



Biogas
(HH and Institutional)

Biogas bottling plant

Solid Biomass
(ICS ,Gasifiers, Briquettes)

Why Solar PV Pumping ?

- Rural areas **far from grid** and even micro hydro (Availability)
- Women spend over **4 hours** to collect A Gallon of Water (Accessibility)
- Diesel Fuel and Generator is **Expensive** (Affordability)

- Access to Clean, Safe and Reliable Water Supply is Priority and PVPS help to achieve these:
- Additionally, PVPS also contributes towards:
  - reduce the amount of water-borne diseases
  - contribute to an increase in health, hygiene and
  - help liberate time for other activities, specially for women
  - Increase agriculture production

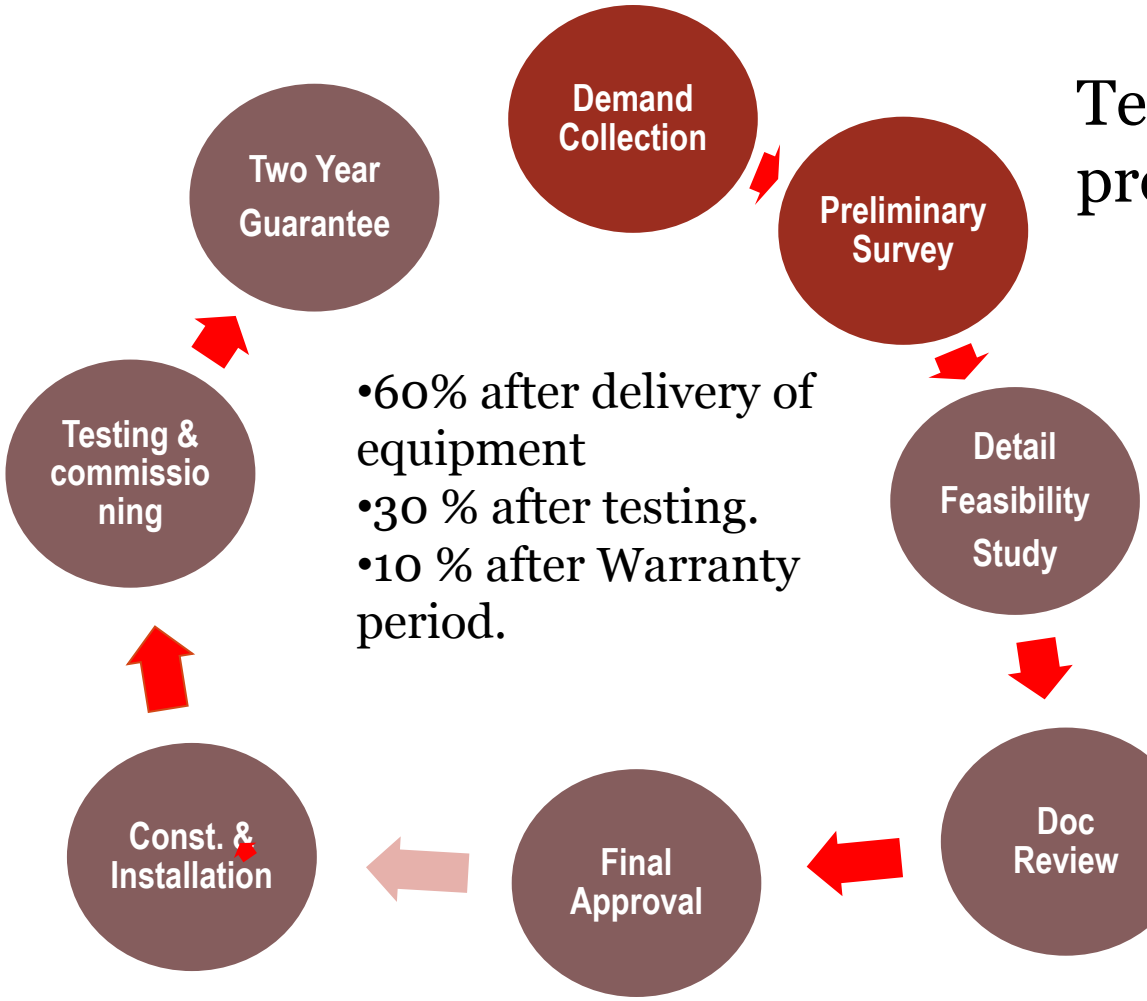
AEPC's Efforts

- **Alternative Energy Promotion Center (AEPC)** is the government focal institution for promotion and implementation of renewable energy based technologies.
- AEPC provides Policy, Planning and Technical support for RE projects
- The institution has supported implementation of over **300 PVPS** for drinking and **200** irrigation systems in rural Nepal.
- These projects provide water services to communities by lifting water ranging from **5 to 500 meters.**
- AEPC has developed **standards and guidelines for design, construction and implementation** of PVPS including drinking, irrigation and Multiuse of Water (MUS)
- AEPC **continuously assess gaps in technology and policy** to update the policy and improve effectiveness of its services
- In addition AEPC has partnered with 7 technical service providers (one in each province) to support AEPC implement pumping system and other renewable energy technology.

AEPC's Implementation Model

- **Demand Driven Approach**
- Community **Involve** and **Own** the Project
- Few Privately owned project
- Third party monitoring and verification
- Penalty system for non-compliance up to the disqualification of the companies
- **2 years** guarantee of the system
- 100% checking and verification
- Community based organizations through private companies install solar systems and charges the user a **monthly fee** for the energy it produces

Solar Drinking Water Projects



Technical Service provider

AEPC/Technical committees

Companies

•60% after delivery of equipment
•30 % after testing.
•10 % after Warranty period.

Policy provision

- Maximum subsidy amount of **up to 60%** of the total costs but not exceeding **$ 15,000** per system will be provided for PV pumping system for **drinking water** managed by community or private company. An additional subsidy of $40 per household will be provided to the "targeted beneficiary groups."

- Maximum subsidy amount of **up to 60%** of the total costs but not exceeding **$ 20,000** per system will be provided for PV pumping system for **irrigation** of agricultural land managed by community or private company.

- *Nepal has defined Subsidy and Mechanism for Solar PVPS for Drinking, Drinking and Irrigation in* ***Rural Energy Subsidy Policy 2016*** *and* ***RE Subsidy Delivery Mechanism 2016***

Issues in PVPS for Drinking and Irrigation

Technical

- **Improper System Sizing**
  - Solar Panel, cables. protection devices, earthing devices, length and size of transmission pipe.
- **Geological Conditions**
  - Precision analysis of rock, soil and landslide conditions

Financial

- **Financial Closure**
- **Extent of Subsidy**
- **Very low tariff (Nrs. 50/month) which is too low to cover O&M cost.**
- **Policy lacks subsidy for the operation and maintenance**

Institutional

- Limitation of technical man power for design and installation
- Limited PVPS Company
- Difficult in transportation due to geographical distribution
- Operation issue after two years of the warranty period
- Long project cycle

Environmental

- The source discharge is highly unpredictable (very low than predicted)
- Low discharge rate in dry seasons prevents the delivery of daily demand.
- Deforestation causing sources to dry out which brings the project to an early end.

Solar Irrigation project

- Government of Nepal has introduced subsidy policy targeting farmers since 2016/17.
- This programme specially targets supporting farmers working on cash crops.
- This subsidy programme supports individual farmers with small piece of land, community owning larger land area.
- This program also supports the project where system is owned by private company and they have agreement with group of farmers and sell water to farmers at fixed tariff rates.
- This modality also supports farmers to link with market and establish complete value chain.
- AEPC is coordinating with Department of irrigation and other relavant stakeholders to improve agriculture

Major Challenge

Challenge	AEPC approach
High Upfront Cost	GoN is providing subsidy to bring down the upfront cost
Low financing options	AEPC through CREF is providing financing options for farmers
Quality of system and its components	AEPC has developed technical standards and guidelines. In addition AEPC collaborates with Renewable Energy test Station to check quality of product
After sales services	AEPC regularly conduct capacity build up activities for private sector and manpower In addition AEPC also support local entrepreneurs to establish after sales service centers at different regions of country

AEPC is working on Principle of 3 A's of Sustainable Energy Access

Availability, Affordability and Accessibility

AEPC's New Approach: Challenge Fund

- AEPC is working on modality to promote solar irrigation project on nation wide under the concept of **"Challenge Fund"**

- Famers relying in traditional DG or rain water will be the target customer. Under this two types of system will be promoted.
  - Type 1: Solar PV Irrigation System on canal top and canal bank
  - Type 2: Solar PV Irrigation for group of farmers

Type 1: Solar PV Irrigation System on canal top and canal bank

- Private company will install solar irrigation system on canal top or canal bank in collaboration with local government.
- The system will be designed such that it will pump water for irrigation purpose and when irrigation is not required the system will feed in to national grid with PPA with Nepal Electricity Authority (NEA).
- **The size of the system will be 100 kWp to 1000 kWp**
- AEPC will provide capital grant and soft loan through bank and private company must have certain percentage of investment. Private company owning and operating system will collect tariff of water from farmers based on its investment. After agreed period of operation, company will hand over the system to local government

Type 2: Solar PV Irrigation for group of farmers

- Private company will identify and form a group of farmers having cultivable land.
- Private company in coordination and collaboration with local government will identify suitable land preferably not suitable for agriculture.
- The system will be designed such that it will pump water for irrigation purpose and when irrigation is not required the system will feed in to national grid with PPA with NEA or will supply to local industry or community center or supply of drinking water.
- **The size of the system will be 10 kWp to 100 kWp**
- AEPC will provide capital grant and soft loan through bank and private company must have certain percentage of investment. Private company owning and operating system will collect tariff of water from farmers based on its investment. After agreed period of operation, company will hand over the system to local government.

Conclusion

- Conducive Policy Environment
- Appropriate institutional mechanism
- Defined roles and responsibilities of the parties involved
- Realistic plan and a feasible implementation model
- Strong quality assurance mechanism including reward and penalty system

Individual owned solar irrigation project

Individual famer owned solar pumping

Lift irrigation projects

Thank You for Your Kind Attention!

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