

National Workshop on Project Financing on Renewable Energy and Energy Efficiency

Organized by
**Promotion of Renewable Energy, Energy Efficiency and
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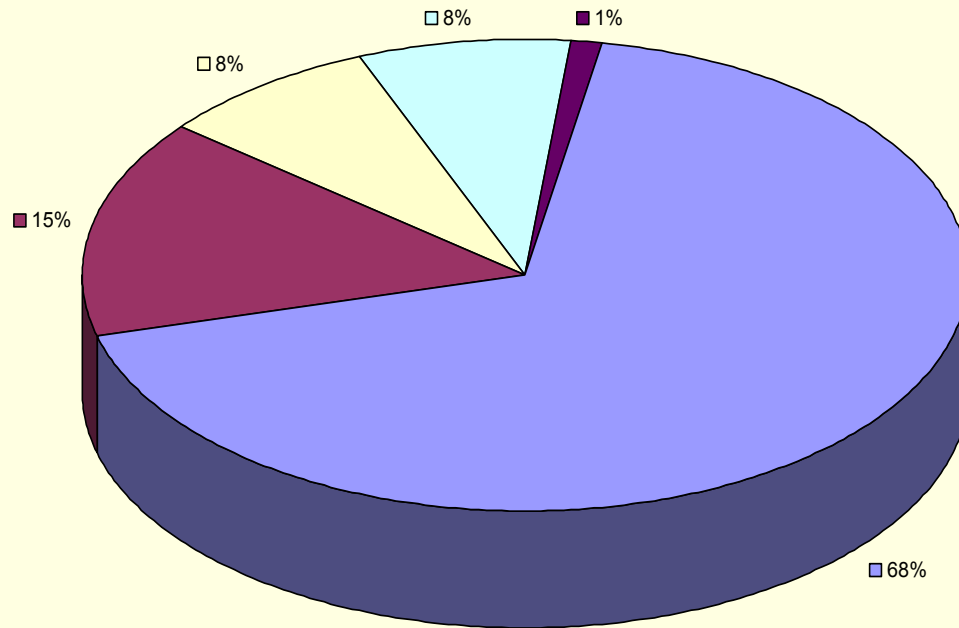
Renewable Energy Technologies, Present Status and Target

	Current/ 9 th Plan	10 th Plan Target (2002-2007)
Large Hydro/NEA	527.5 MW	842 MW
Micro hydro	6MW	10 MW
Bio gas	0.1 M installations	0.2 M
Solar Energy units	38,000 units	89,000
Wind energy		20 MW
Access to electricity:	40%	55%
Grid	33%	43%
Alternative source	7%	12%

Sources: Tenth Plan Document

Current Mix of Energy Consumption (2003)

Mix of Energy Sources



Fuel wood Agricultural wastes Animal dung Fossil fuel Electricity

Institutional Framework for Renewable Energy

- Ministry of Water Resources (MOWR)/Department of Electricity Development (DoED)
 - Nepal Electricity Authority for large hydro
- Ministry of Science and Technology (MoST)
 - Alternative Energy Promotion Center (AEPC)
 - Energy Sector Assistance Programme (ESAP)
 - Rural Energy Development Programme (REDP)
 - Biogas Support Programme (BSP)

Power Sector

Current Situation

- Total installed capacity 609 MW
- Hydro dominated— hydro accounts for 93% of the total installed capacity
- Demand increasing annually at about 10%
- Less than **1%** of the economical hydro-power potential is developed to date.
- About 60 kWh per capita of electricity consumption
- Due to the high variation of peak load and base load, and the natural variations of the flows in the river do not match load profile-- there is a deficit in the peaking capacity in the dry season and a surplus of energy in the wet season, which is mostly spilled.
- The present tariff rate is one of the most expensive in South Asia and is beyond the affordability of the majority of the people.

Current Situation (*cont...*)

Rural Electrification/Rural Energy

- Grid-based RE—issues

1. Terai and hills are the areas accessed by grid.
2. About 35% of the population can potentially be electrified by grid
3. Current level of electrification is 22% (NEA estimate)
4. Connection costs and high cost of electricity inhibiting access

- Off-grid options—Issues

1. Reliability
2. Productive end use
3. Affordability

Current Situation (*cont...*)

Issues related to hydropower:

1. High cost of development
2. Small market size
3. Lack of sufficient investment capital
4. Investment climate of Nepal

Current Situation (*cont...*)

Alternative Energy Promotion Centre (AEPC):

- AEPC is responsible for the promotion and development of renewable energy technologies including solar photovoltaic, micro-hydro, ICS, bio gas, improved water mills, to meet energy needs in the rural areas.
- AEPC is a regulatory and implementation agency within the Ministry of Science and Technology

Current status (*cont...*)

Rural Electric Cooperatives

- Government in the budget of FY 2060/61 put forward the policy and programs of providing 80% grants for the extension community managed distribution systems.
- As part of the government policy of involving local communities in rural energy provision, NEA has begun to invite proposal from CBOs to operate rural distribution networks.
- Community Electricity Distribution By-laws 2060 governs management of these community managed distribution systems.
- Already 8 community based rural electrification entities have been approved, and 11 community based O&M units have got licenses.
- A total 233 applications received by the end July 2004.

Energy Efficiency Promotion

Past efforts

- Industrial Energy Management Program, under Nepal Power Sector Efficiency Project (PSEP) and funded by the World Bank/IDA Credit. (November 1994-December 1995 ; November 1996- April 30, 1998).
- Activities covered:
 - Lighting audits and retrofits in hotels
 - Electricity load management-- furnace/kiln efficiency audits and retrofits in industries
 - Boiler and steam audits in industries
 - Co-generation studies in a sugar mill and a distillery.
 - Capacity building in energy audits
 - Outreach programs in efficient use of energy

Energy Efficiency Promotion

ESCOs

- Under the phase I of SARI/E program efforts were made to promote ESCOs in SA countries for energy efficiency promotion.
- As part of this effort support was provided in establishment of ESCOs in Nepal technical capacity building and M&V protocol.
- The M&V protocol was designed to provide an operational framework for independent verification of the energy savings and benefits from energy efficiency projects and ESCO contracts in the industrial and commercial sectors.
- Provided support to **ESCO Nepal (P.) Ltd.** in preparing a proposal for distribution loss reduction activity.
- ESCO Nepal provides performance-based contract structures—“Guaranteed Savings” and “Shared Shaving” as part of the Energy Service Agreement.

Energy Efficiency Promotion

Environmental Sector Programme Support (ESPS):

- Under ESPS, the Energy Efficiency Sub-Component provides support in the area of prevention, minimization, and control of pollution from the industrial and urban sectors in Nepal.
- The main services of the ESPS – Energy Efficiency Sub-component include the following:
 - Help firms save energy and increase profitability
 - Identify inefficient use of energy and provide corrective measures
 - Provide retrofits and training to key personnel;
- ESPS makes funds available to end-users at **0%** interest rate against a bank guarantee.
- Over the three years until 31 December 2004, ESPS efforts estimated to have resulted in a reduction in CO₂ emissions by about 45 thousand tons from 177 industries and hotels. The total CO₂ abatement potential is estimated to be 82 thousand tons from 316 industries and hotels.

Financing Hydropower Projects

Issues

- Long gestation period
- Large upfront cost
- Environmental concerns
- Lack of infrastructure support
- High cost of development
- Limited internal market size
- Present security situation

Financing Hydropower Projects

Current Financing Approach/requirement:

- In the past, as much as **80%** of all investment requirements came from multilateral and bilateral donor assistance in the form of loan or grant. Out of the remaining **20%**, NEA covered about **75%** and the rest was covered by government funds.
- An estimate of investment requirements over the next fifteen years (from 2000), to meet a GDP growth rate of **6.5%**, is around 4 billion US\$ at present price level.

Financing Hydropower Projects

- Standard PPA's for HEP Projects up to 5 MW:

 - Rs 3.5 per unit– during wet seasons (Baisakh-Mangsir, i.e., mid April-mid December)

 - Rs 4.25 per unit– during lean seasons (Poush to Chaitra, i.e., mid December-mid April)

- For other higher size projects, PPAs are negotiated.

Financing of Off-grid Micro/Small Hydro

- Current subsidy regime in Micro hydro
 - 75% of electrical component costs in remote areas
 - 50% of the electrical component costs in other areas.
 - In general the present level of subsidy covers 20-30 percent of the total plant costs.
- Budgetary provision for grant funding hydropower plants up to 500 kW @Rs 75,000 per kW to be developed by community groups.

Subsidy

Coverage and Issues:

- In the case of alternative energy technologies such as micro hydro, biogas and solar, subsidies are given for capital investment
- These subsidies are financed from the government's budgetary allocation and from donors' contribution.
- Targeting has been poor, mostly rural elites are the ones to get maximum benefits

Risks Associated with HE Projects in Nepal

Risks determined by the following:

- Political risks
- Environmental risks
- Technical risks
- Country risks
- Hydrological risks
- Security situation
- Lack of sufficient debt financing with adequate maturity

Local Financial Market

Potential and Limitations:

- NRB directives do not cover financing a infrastructure project of long-term nature like hydropower
- No provision for non-recourse financing
- Limits on single borrower investment--also applicable in the case of consortium financing.
- Local financial institution/banks have an estimated capacity to fund up to Rs 1000 million in consortium. This amount is adequate to fund about 10 MW capacity.
- Response to the recent primary share issue of Butwal Power Co. indicates that there does exist a significant resource available with the public willing to invest in hydropower, if the projects are attractive.
- For the larger-size project, foreign investment is necessary.

Power Development Fund (PDF)

- A long-term financing facility to support private sector hydropower development
- Will provide long-term financing for private sector for small and medium-sized hydropower development
- Capitalized by US\$ 35 million from IDA
- PDF is intended to:
 - Compensate for lack of sufficient debt financing for private-sector hydropower projects
 - Compensate for inadequate maturity of available debt financing
 - Provide comfort to private investors in investing in hydropower development

Power Development Fund (PDF)

PDF will finance:

- **Window one:** One medium sized scheme of about 30 MW [Kabeli A (30MW), or Rahughat (27 MW)]
 - Sub-loans would be provided in foreign and local currencies, interest rates LIBOR plus at time of sub-loan negotiations, with maturity up to 20 years plus construction period
- **Window two:** Small hydro schemes of various sizes in the range of 1 to 10 MW with an aggregate size of about 25 MW
 - Sub-loans would be in local and foreign currencies at interest rates equal to average deposit rates of commercial banks at the time of sub-loan negotiation, maturity of about 15 years plus construction period.
- **Financing up to 60% of development costs.**

Micro-Hydro Village Electrification

- A component of Power Development Project funded by IDA
- AEPC the implementing agency
- Builds on the successes achieved under Rural Energy Development Program (REDP)
- Intends to scale-up community-based micro-hydro village electrification of about 2.5 to 3.0 MW to electrify 30,000 new rural consumers
- **Total project cost:** about USD 8.9 million of which IDA grant financing covers about USD 5.5 million.

Hydropower Development in Nepal– Some Barriers

- Lack of internal resources to finance the huge investment needs of the power sector
- Lack of proper infrastructure facilities like access roads and transmission network
- Conditions of difficult terrain and isolated load centres
- Fragile geological conditions and hydrological variability including sparse hydro-meteorological network and short duration data
- High cost of hydro-power production and transmission leading to high tariff beyond the affordability limits of the majority of the population
- High risks in terms of market risks, currency depreciation, production risks and foreign exchange risks
- Export market beyond the control of Nepal
- Weak institutional capability and over lap of policy, regulatory and operation functions of existing institutions to attract private capital and to promote power trade



THANK YOU!