

**Challenges and Opportunities in
Small Hydro Development
&
Discussion on Innovative
Development &
Investment/Financing Model**

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1.1 License Status (upto 5 MW)

- Survey License Applied
 - Below 1 MW 1 project/0.67 MW
 - Upto 3 MW 1 project/0.67 MW
 - Upto 5 MW 3 projects / 12 MW
- Survey License Received
 - Below 1 MW 15 Projects / 10.74 MW
 - Above 1 to 3 MW 7 Projects / 16.35 MW
 - Above 1 to 5 MW 23 Projects / 83.939 MW
- Generation License Applied
 - Below 1 MW 1 project / 0.485 MW
 - Upto 3 MW 1 project / 0.485 MW
 - Upto 5 MW 5 projects /18.775 MW
- Generation License Received
 - Below 1 MW 25 projects / 19.63 MW
 - Upto 3 MW 42 Projects /59.69 MW
 - Upto 5 MW 77 projects /218.533 MW

Operating Projects

- Below 1 MW
15 /11.24 MW ;
- Above 1-5 MW
41 /143.59 MW
Total 155.83 MW

1.2 Investment Status

- Investment in Survey and Design
 - NRs. 158 Cr. for 361.287 MW
- Investment in Production
 - NRs. 3428 Cr. for 155.83 MW

License Cancelled

Number of Projects 87

Total Capacity 296.578 MW

**Approximately 200 MW can be
designed as PROR**

Total Small Hydro Capacity upto 5 MW identified are 211 having installed capacity 516 MW estimates the production of 2500 GWh that replaces 85% Carbon emission compared to other dirty sources annually and will contribute 2000 Cr. Rupees in rural economy

1.3 Pre-COVID-19 Baseline of IPP's Operating Projects

(Based on data as of Ashadh 2077)

- Out of 66 IPP's Projects (172.5 MW)
 - Four Hydropower Companies received 35 days loan clearance notice and in the process of blacklisting the major promoters.
 - 30 projects are sick and 21 projects are in poor fiscal status.
 - 30 Projects having 112 MW capacity are not able to regularize their interest and principle from their income.
 - The average Production per MW is 3.9 GWh per anum.
 - Average Annual Sales Loss due to Outage >18 % of total Income (only in 33 and 11 kV lines)
 - Hydrological Flow Loss 7.5% to 25% (in Q₄₀ Design –natural and Manmade)
 - Average annual AD Penalty upto 14 % of total Income
 - Average Sales is 35%-86% of Contract Energy.
 - The Annual loss ranges from 2-12 Cr. for projects <10 MW.
 - The un-served interest and principle of sick projects(30 Projects) is approximately 45 Cr. as of Ashwin 2076. Likely to increase to 100 Crores as of Chaitra 2076

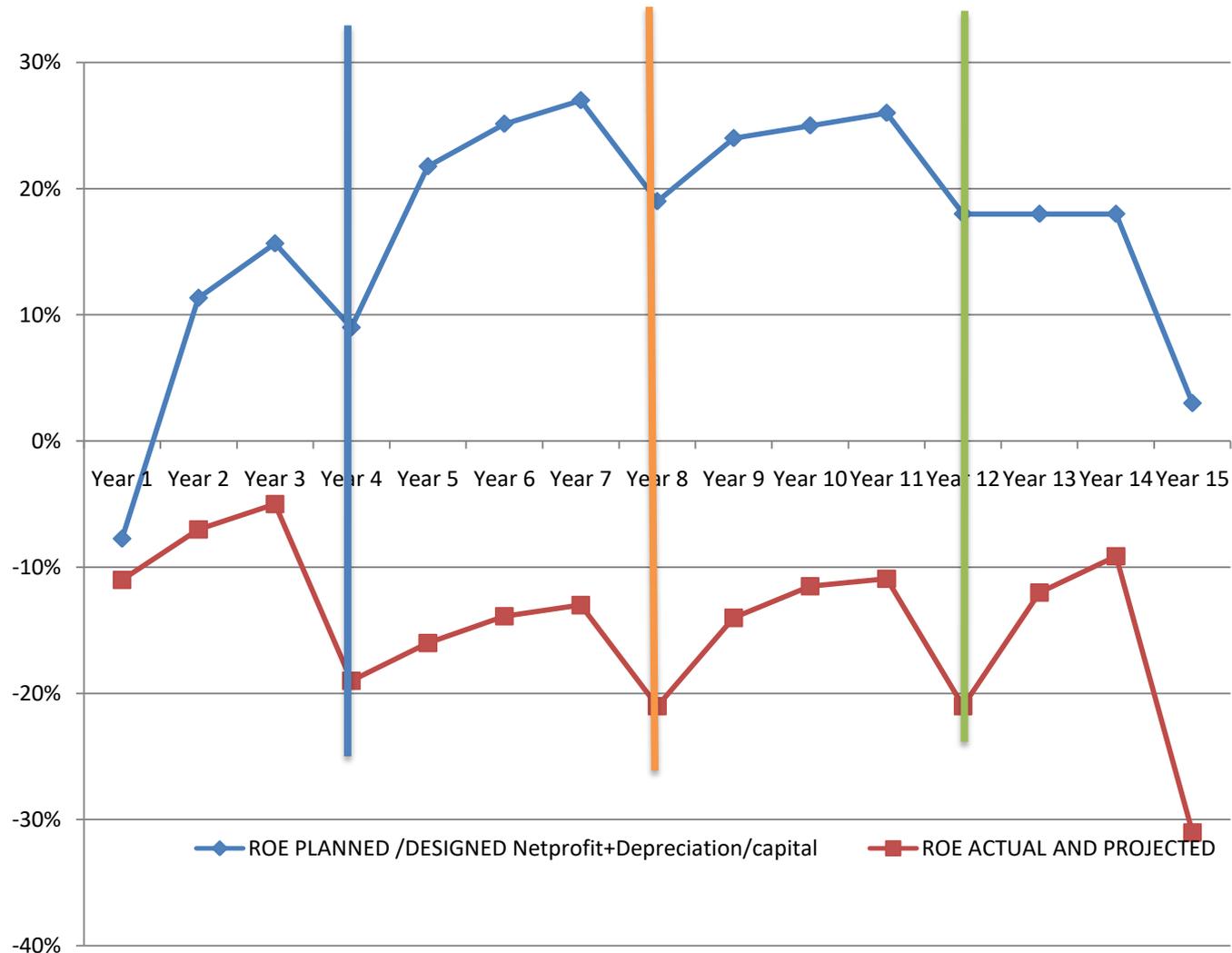
Pre-COVID-19: Problem Statement

- 2072 Earthquake, Blockade /Fuel Crisis and JANAUDDHA / 2063 People's Movement /TERAI ANDOLAN and series of Nepal BANDHAs (impacted 15-25 % in Direct Cost and 25-35% in overall Fiscal Status)
- Power Evacuation Problems (1990s Transmission System)
 - Unhealthy Transmission Lines (33 kV and 11 kV)
- Poor Hydrology
 - No sufficient data for Hydrological study
 - Irrigation and Drinking water system constructed upstream of the projects
- NRs 50 Lakhs per MW subsidy not disbursed (२०७१ को बजेट भाषण)
- Continuation of AD Penalty (राष्ट्रिय ऊर्जा संकट निवारण तथा विद्युत विकास दशक सम्बन्धी अवधारण पत्र, २०७२ को दफा ६५ अनुसार १० मेगावाट भन्दा साना आयोजनाहरुमा Availability Declaration (AD) मा हर्जाना नलाग्ने ।)
- Lack of Corporate Governance in IPPs and
- No Regulatory Authority to monitor the governance and transparency (PPA, PDA, subsidies, electricity tariff, promotions etc..)

Performance of IPP's Projects under 5 MW

(12% int rate, 60% sales returns and PPA rate 4.25 and 4/7)

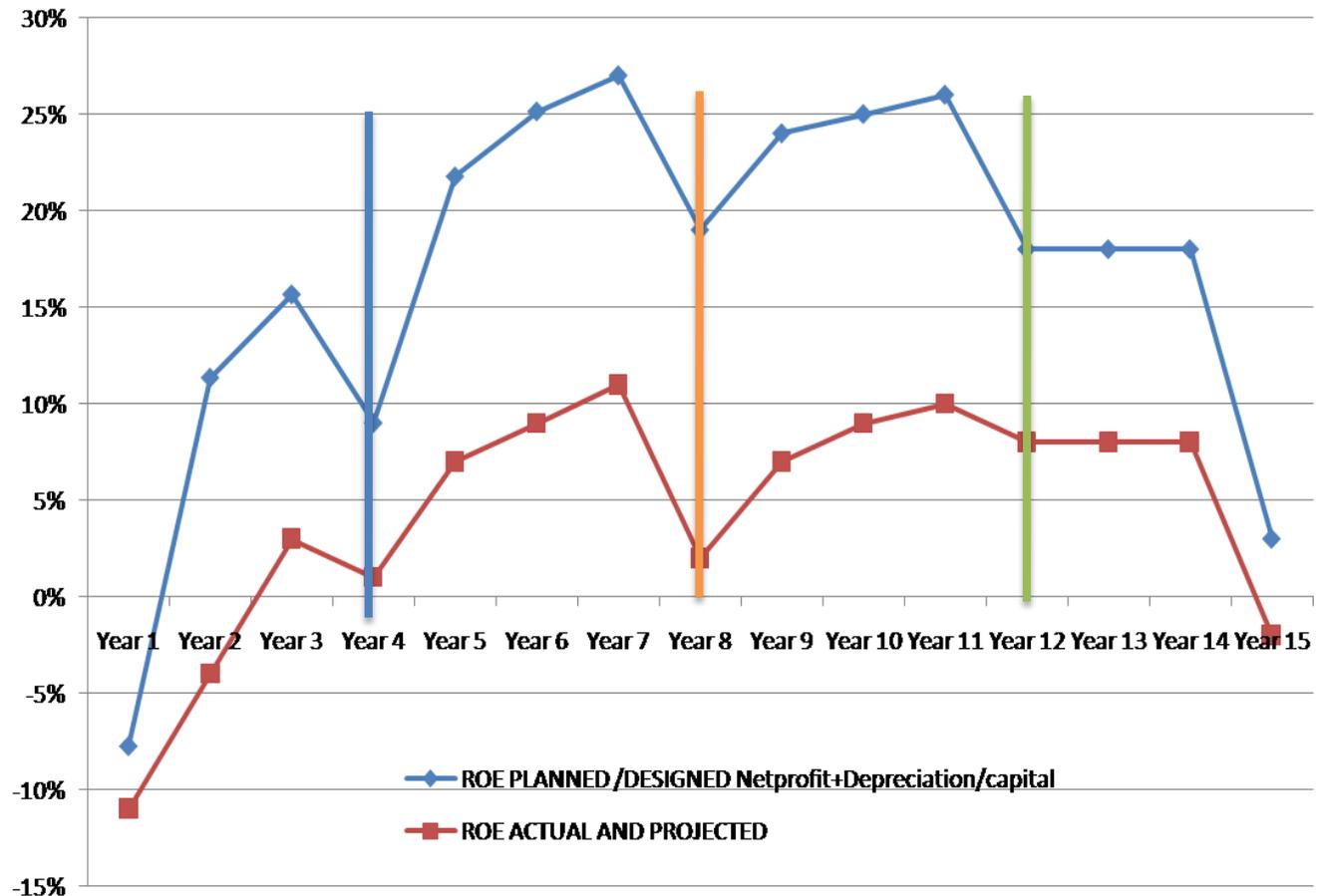
- Average Project cost / MW before 2071-2063 is < 17 Cr. (Min 13 Cr. And Max ~19 Cr.)
- Average Project cost / MW after 2069-2075 is < 21 Cr. (Min ~19 Cr. And Max ~26 Cr.)
- Hydro is loss making business
- At present, most of the project's Net worth per share is less than Rs. 50 few of them have negative value
- L-Curve Prolonged



Performance of IPP's Projects (5-10 MW)

(12% int rate, 60% sales returns and PPA rate 4.8/8.40)

- Average Project cost / MW before 2071-2063 is < 17 Cr. (Min 13 Cr. And Max ~19 Cr.)
- Average Project cost / MW after 2069-2075 is < 21 Cr. (Min ~19 Cr. And Max ~26 Cr.)
- Hydro is loss making business
- At present, most of the project's Net worth per share is less than Rs. 50 few of them have negative value
- L Curve starts from 16th Year of Operation
- Income drops in every 4th year due to replacement of major maintenance and equipment replacement.



Impact of COVID-19 Lock Down

- Personnel Hygiene
 - Not every projects has safe and hygienic working environment
 - Difficulty to supply/maintain foodstuffs and medical facilities
- Major Operation & Maintenance of Project Structures normally planned during Baishakh and Jestha
 - Pre-Monsoon started
 - Unexpected loss of sales and damage of project structures during monsoon.
- Import of Spare parts and Foreign Expert's Visit
 - Shutdown of two projects due to O&M problem (Totaling ~8 MW)
 - Generation loss of approximately 19 MW reported since Chaitra & will increase if the lockdown period increases.
- Cash Flow (Force Majeure Clause activated by purchasing party)
- Small Projects are vulnerable and roughly estimates 10-15% loss in Generation /Sales in FY 2076/077.

Recommendations: Immediate Action

- 35 days notice issued/published for loan repayment to be withdrawn.
- Provide Interest subsidy of 5 % for Sick projects for the remaining loan tenure.
- Posted rate for all projects less than 25 MW for the period a until scientific tariff structure is studied and issued by ERC (Among the Sick project, only 11 projects total capacity 24.89 MW are not getting posted rate)
- Disburse the Subsidy NRs. 50 Lakhs/MW (नेपाल सरकारको बजेट बक्तव्य २०७१/०७२ मा घोषणा भए बमोजिम) for the project commissioned within 2074/075. Similarly an annual disbursement plan to develop for other projects too.
- Resolve the issue of Penalty imposed on AD and Late COD by NEA specifically for <10 MW Projects
- Resolve Un-dispatched energy cost due to Transmission Outage and Transmission Bottlenecking.
- Provide Compensation to the projects suffering from alternative arrangement of Power Evacuation that limits their production.

**“We will make electricity so cheap
that only the rich will burn
candles.”**

— Thomas A. Edison

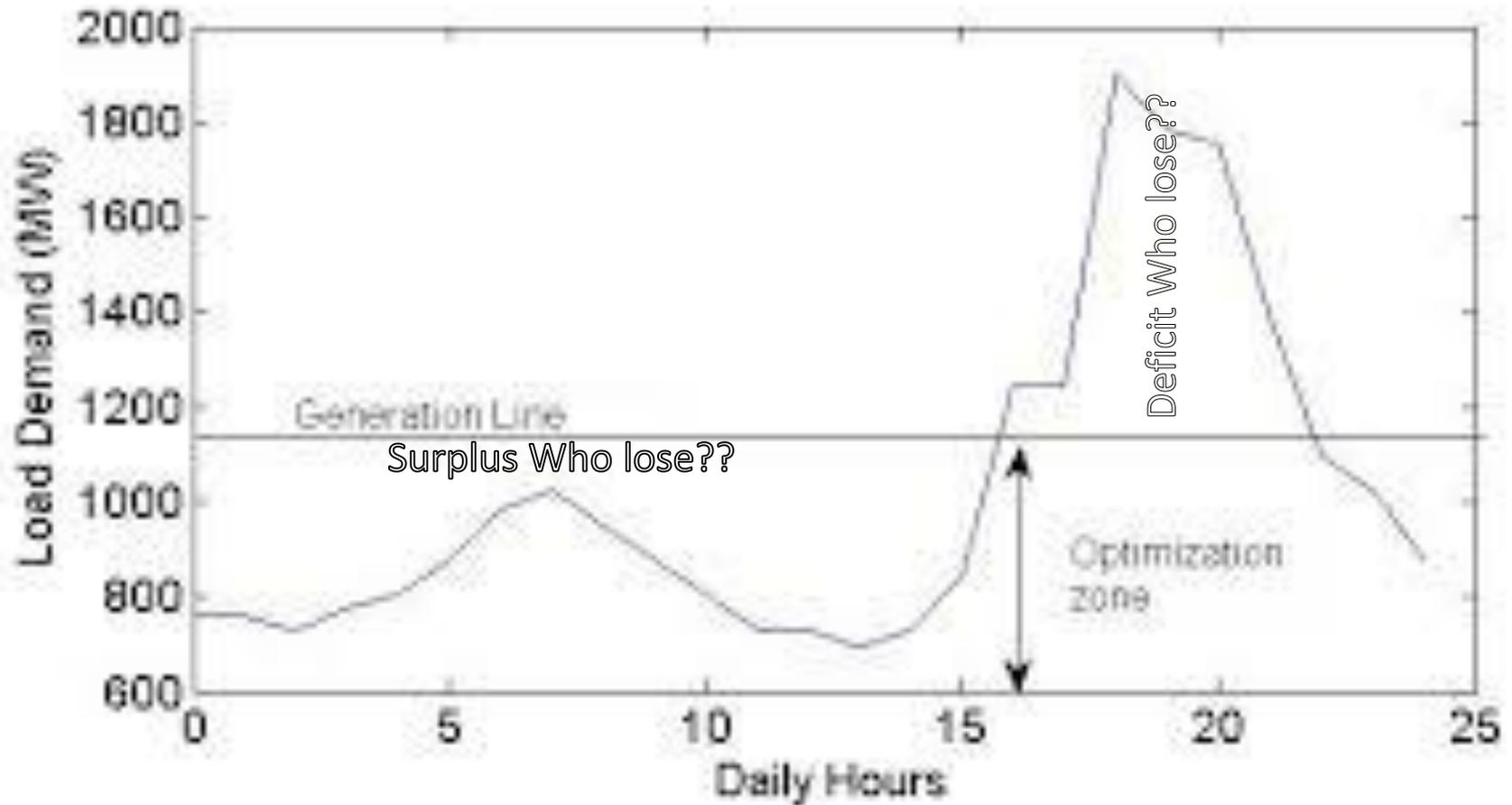
is it possible in Nepal??

Lets say “Small is Beautiful”

Don't Say;

Small developers are “FOOL”

Demand and Supply versus Investment Economics



Recommendations:

- Establish “Rescue Fund” of 200 Cr. with the support from DONORs/GON/IPPs for immediate relief package for sick projects
- Formation of Team to study the risks associated on Electricity Generations from IPPs and Public Sector (Donors, IPPs, ERC, Bankers, NEA, DoED etc.)
- Formation of Study Team to study on Development and Financial Modality of Hydropower for its Sustainable development

4.1 Development Model

- Principle
 - Local Development (Water, Women and Watersheds) for Local Energy Security
 - Capacity Building and Employment Generation
 - Enterprise Development (Operation and Maintenance Workshop and Agro-based Industries)
 - Public Participation
 - Corporate Governance / Autonomous Management
- Public Company (Before or After??)
 - Major Promoters (51%)
 - Local Government share (19%)
 - General Public Share (30%)
 - Two Part Tariff (Installed capacity and Energy Production)
- EPC/EPCF/Item rates and Design BuiltContract Model ??
- Project will be operated by a Public Company forever
- The base year Project Cost NRs. 5 Cr. /GWh (Contract Energy) plus 3 year(Construction Period) annual escalation on project cost as per NRB.

4.2 Investment/Financing Model

- Project Financing / Loan repayment in 7 years
- Financing Structures (85% soft loan : 15% Equity)
 - Donor's Agency's soft loan 50% (3% interest rate)
 - Local Financial institutions loan 35% (less than 7% interest rate)
- Creation of Small Hydropower Development Fund (IPPs/Donors/Local Government)
- Donor's support as Grant will be equity share for Local Government
- No Royalty upto 5 MW or energy less than 5 GWh per MW projects (NR5MG) or Constant Royalty (Nrs. 100/kW and 2 % in Energy upto license Period)
- 0% VAT for all type of procurement during Construction.
- Interest rate of Local Financial Institutions should be $\leq 7\%$ upto Loan Repayment Period.
- If need to compete with floating interest rates and existing PPA rate; a viability gap funding is to be exercised.
- TAX applicable after generation (No Tax Holiday)
- Sales return 75% of the Contract energy
- Feed-in-Tariff System / TL outage of 2.5% considered
- Major Maintenance /equipment replacement in every four years