Project preparation, oversight Mechanism of large hydro-projects

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Regional meeting on Sustainable Energy
- Infrastructure Gap & Opportunities
- IBN and its Areas of works
- Failures of PPP Project & Project Finance
- IBN work flow chart
- Standard Operating Procedure of IBN for Project Implementation In PPP model
- Investment Board Nepal’s involvement in hydropower projects
- Oversight of hydropower projects: Nepal’s context
- Institutional arrangement for ensuring quality and oversight of hydropower projects
  - The Project Review Panel (PRP) body
  - The Project Monitoring Unit (PMU) body
Infrastructure Gap & Opportunities

Infrastructure Gap

- Acute Energy Crisis (per capita 132 KWH/year)
- One of the poorest road network
- Only one International Airport with single runway
- Poor tourism infrastructure
- Poor Health facility (5 bed for 1000 people)

Opportunities

- Infrastructure funding gap of $13-18 billion from 2011-2020
- Capacity to generate 83,000 MW of hydroelectricity
- Can be world best tourist destination
- Religious Circuit: Buddhist, Hindu
- Trade hub between India and China
- Mass transportation, satellite cities
Investment Board of Nepal and its Areas of Work (1)

- Created in 2011 by the Investment Board Nepal Act to promote economic development in Nepal by creating an investment-friendly environment

- Mobilizes and manages public-private partnerships (PPPs), cooperatives, and domestic and foreign private investment to accelerate industrialization and the development of infrastructure in sectors such as hydropower, chemical fertilizers and integrated solid waste management.
Investment Board of Nepal and its Areas of Work (2)

Prime Minister
Chairperson

Ministers from Key Ministries & other high level Gov’t Officials

Investment Board

Office of the IBN

Private Sector Representatives

Board Member

CEO
Member Secretary

President of the Board

CEO

Member Secretary

Board Member

Consulting
Staff

GoN Staff

Working Relationship

Working Relationship

Board Members include:
- Minister of Finance
- Minister of Industry
- Minister of Forest
- Vice Chairman, National Planning Commission
- Governor, Nepal Rastra Bank
- Chief Secretary
Failure of PPPs and Project Finance

1. Lack of project preparedness: Study not conducted to the desired level
2. Unrealistic revenue and cost estimations
3. Lack of thorough financial and economic analysis
4. Inappropriate sharing of risks
5. Poor legal framework and enforcement for social inclusiveness, quality of works and to protect public concern
6. Lack of transparent & competitive procurement
7. Weak institutional capacity to study/analyze/ negotiate
8. Public resistance (willingness and ability to pay, not assessed)

Jambia: Kasumbalesa Border Post BOT deal was $25 million for a concession period of 25 years. It was found contract price < $4 million after auditing by National Council for Construction (NCC). Then the deal was cancelled.

Nepal: Chilime HEP, no financial closure at the time of COD, Cost escalated to have better tariff rate, conflict of interest in signing the PPA
**IBN Flow Chart**

**Project Identification and Assessment**
- IBN identifies different projects based on national priorities, requirement and financial viabilities
- Further IBN also receives unsolicited proposal from investors
- IBN rigorously assesses the projects

**Promotion of the Projects and develop partnership**
- IBN promotes the identified projects to local and international investors/developers
- IBN also develops partnership with different development partners, government agencies and other stakeholders

**Negotiation and Finalization of the Project and Structure**
- IBN negotiates and finalizes the project structure, financial modalities and concessional modalities
- IBN signs concessional agreement with investors

**Facilitation for Project Implementation**
- IBN Facilitates project developers/investors in land acquisition, social, environment, engineering and other aspects
- IBN liaises with other stakeholders for the implementation of project/s
Standard Operating Procedure of IBN for Project Implementation in PPP model

(Proposed Short snaps, to be finalized after consultation with relevant line ministries)
<table>
<thead>
<tr>
<th>Project</th>
<th>West Seti hydropower</th>
<th>Upper Karnali hydropower</th>
<th>Upper Marsyangdi hydropower</th>
<th>Tamakoshi-3 hydropower</th>
<th>Arun3 hydropower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installed Capacity</td>
<td>700</td>
<td>900</td>
<td>600</td>
<td>650</td>
<td>900</td>
</tr>
<tr>
<td>Plant Factor (%)</td>
<td>47.5</td>
<td>43.96</td>
<td>43.42</td>
<td>41.8</td>
<td>45.66</td>
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<tr>
<td>Net Head (m)</td>
<td>269</td>
<td>150</td>
<td>602</td>
<td>310</td>
<td>287</td>
</tr>
<tr>
<td>Rated discharge (m³/s)</td>
<td>327</td>
<td>664</td>
<td>113</td>
<td>222</td>
<td>343</td>
</tr>
<tr>
<td>Type and height of main dam</td>
<td>195m, CFRD</td>
<td>64m, concrete gravity dam</td>
<td>81m, Rockfill dam</td>
<td>135m, Hardfill dam</td>
<td>68m, concrete gravity dam</td>
</tr>
<tr>
<td>Developer</td>
<td>CTGI (China)</td>
<td>GMR Energy Limited (India)</td>
<td>GMR Energy Limited (India)</td>
<td>Statkraft (Norway)</td>
<td>SJVN (India)</td>
</tr>
<tr>
<td>Generation (GWh/yr)</td>
<td>3086</td>
<td>3466</td>
<td>2282</td>
<td>2380</td>
<td>3600</td>
</tr>
<tr>
<td>Total estimated Cost (MUSD)</td>
<td>1075</td>
<td>1049.86</td>
<td>723.16</td>
<td>1009</td>
<td>925.28</td>
</tr>
</tbody>
</table>
OVERSIGHT OF HYDROPOWER PROJECTS: NEPAL’S CONTEXT

Gaps in existing oversight mechanism

- Responsibilities and powers are not clearly spelled out
- Inadequate resource and guidelines for validation of project specification
- No unit exclusively dedicated to oversight
- Inadequate human and financial resources to perform its functions
- Quality and safety is mentioned but no direct responsibility
- Inadequate inspection
OVERSIGHT OF HYDROPOWER PROJECTS:
NEPAL’S CONTEXT

OVERVIEW OF PROJECTS
- Slope stability of reservoir area
- Geological condition (unfavorable rock quality)
- Dam founded on old landslide material (possible foundation liquefaction under earthquake condition)
- High abrasion risk on turbines for high head projects
- Long tunnels in relatively poor geological conditions requiring extensive investigations
- Solution for dealing with sediment increase risk of turbine corrosion and slope stability

Things not considered in the project reports
- Missing plan for construction supervision and quality assurance
- Missing operation and maintenance plan
- Missing emergency preparedness plan
PDA (Project Development Agreement) puts primary responsibility of safety and quality on the owner.

To ensure the obligations on both sides (grantor of the concession and the concessionaire) are met in a timely manner.

To ensure major components and critical items completion targets are achieved.

Constant monitoring of expected progress for reducing time and cost overruns.
NEED FOR OVERSIGHT ON HYDRO PROJECTS Operation

- Sustainable management of hydropower projects lifecycle (commonly hydropower lifetime far exceeds those of comparatively sized thermal power plants)
- Mitigation of issues from propagating and deteriorating service life (due to environmental forces, and subjected to other forces, the dams and civil structures’ service life deteriorates at faster rate)
- Insure against social issues and environment problems (oversight mechanism should look at both technical and non-technical issues)
Project Monitoring Unit (PMU): members from ministries and line agencies. The high level body (PMU) will take advice from a technical support unit in the form of an engineering firm.

Project Review Panel (PRP)
Composition: General Hydropower Engineer; Geology or Geo-technical engineering; Social or Environmental Expert.
Tenure: 6 months after COD
GOVERNMENT OVERSIGHT STRUCTURE

**PRP (Project Review Panel):** Technical, Environment and Social Panel: Individuals called-upon as required for their expertise on specific issues that arise periodically. Advisory in nature.

**PMU (Project Monitoring Unit)**
*Comprising of relevant line ministries*

Government window into the projects, on-going basis. Access to reports, sites, docs, etc. approving authority in the matter of technical nature. Design change, DPR review, compliance monitoring, quality control & safety of structures, safeguard of local communities/affected people

**Technical, Social and Env.:**
Staff input from Investment Board office, Ministry of Energy and other line ministries

**consultant Engineering Firm:** Technical arm of the PMU, assuring appropriate world-class expertise, neutrality, transparency. Will help PMU gain experience as it does its work and capacity building of GON staff
OVERSIGHT BODY (PRP)

Project Review Panel (PRP)

- Independent oversight of the project appointed by the government and developer
- Core members with expertise on: general hydropower engineering with an emphasis on dam safety, geology or geotechnical engineering, and environment and social issues
- Tenure: 6 months from COD of the project

Scope of Reviews

- Engineering geology, seismic hazard assessment, hydrology and sediment management, dam design, rock mechanics, hydraulic structures, construction
- Provide independent advice both on environment and social aspects (EIA, RAP)
OVERSIGHT BODY (PMU)

Concept of Project Monitoring Unit (PMU)

- Approving authority on overall design and any design changes
- Suggest regulatory scheme for safety and quality of hydropower construction including dam safety
- Recommend norms and standards after developing them
- Monitor inspections on safety, quality of hydro structures and dam aspects

- Develop guidelines on safety and quality assurance and recommend regulatory authority
## OVERSIGHT BODY (PMU)

### DURING CONSTRUCTION PHASE
- Function of review and monitoring
- Review of report detailing all aspects of construction
- Monitoring time completion of project
- Ensure standards for safety and quality requirements of the civil components including the dam safety
- Compliance monitoring as agreed in the Plans, Env. Mgt. Plan

### DURING OPERATION PHASE
- Periodic check and balance on project structures to affirm the quality standard of constructed structures
- Monitor periodic reports of project performance
- Owner conduct periodic inspections, and provide information to the PMU and take steps to repair problems with safety plans subject to periodic testing
- Inspections after extraordinary events
OVERSIGHT BODY (PMU)

DURING HANOVER OF PROJECT
- Approving authority of Handover Plan
- Inspection of hydro property’s residual service life at Handover period
- Ensure good condition of hydro property during handover

The Process
- Company prepares a Handover Plan 2 years from COD to be approved by the PMU
- Plan updated annually incorporating PMU’s suggestion

- The PDA outlines the broad requirements for preparing the handover plan
- 3 years before the expiry of concession, Initial inspection by an independent expert
- Independent expert proposes remedial measures ‘Good Operating Condition’
- 6 months before expiry a Final inspection (condition survey) is conducted to ensure remedial measures are implemented before Hand over
Thank you!!!

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Although the concept of an autonomous, but accountable public corporation, operating on commercial lines is new to Nepal, there is growing recognition of the rationale of such arrangements for the IBN.

Successful precedents have already been set in other markets:

<table>
<thead>
<tr>
<th>Institution</th>
<th>Country</th>
</tr>
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<tbody>
<tr>
<td>Investment Board</td>
<td>Sri Lanka</td>
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<tr>
<td>Investment Board</td>
<td>Thailand</td>
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<tr>
<td>Gujrat Infrastructure Development Board</td>
<td>India</td>
</tr>
<tr>
<td>Parpublica PPP</td>
<td>Portugal</td>
</tr>
<tr>
<td>Partnerships British Columbia</td>
<td>Canada</td>
</tr>
<tr>
<td>Partnerships South Australia</td>
<td>Australia</td>
</tr>
<tr>
<td>Infrastructure UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>South Africa PPP Unit</td>
<td>South Africa</td>
</tr>
<tr>
<td>Investment Support and Promotion Agency</td>
<td>Turkey</td>
</tr>
<tr>
<td>Invest in Georgia</td>
<td>Georgia</td>
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