

Nepal Norway Cooperation in Hydropower Development in Nepal

Presentation to Hydropower Development Seminar
NTNU Trondheim

Pratik Pradhan
Vice President BPC

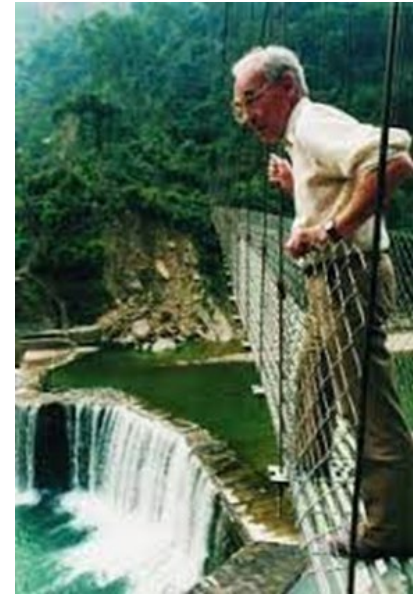
12 June 2023

Outline

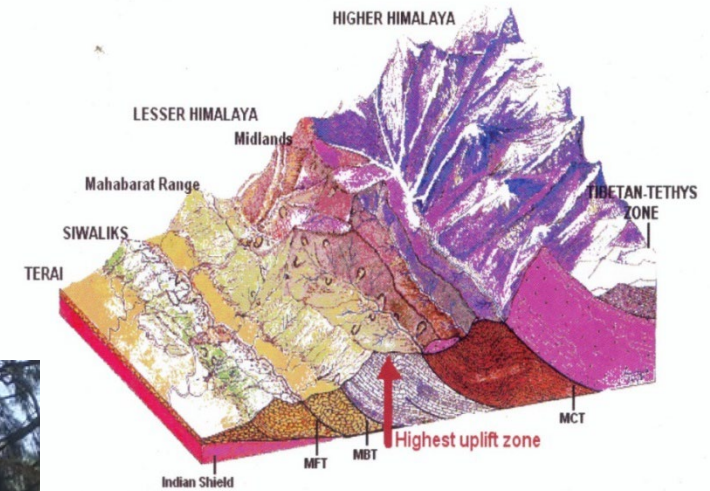
- Nepal Norway Cooperation
- Nepal BPC & Hydropower Development
- Capacity Building
- Institutions Set-up
- Future Cooperations

Nepal Norway Cooperation...

- **People to People –**
 - First activities started by personal engagements of Odd Hoftun in 1958;
 - Norway Nepal agreement in 1963 establishing BTI kicked off hydropower development
- **NORAD HPD Fellowship Program in NTNU –**
 - Education and higher learning
 - Overseas knowledge & learning experience (1st Nepali graduate in late 70's)
- **NTNU's Cooperation in Nepal –**
 - Education and training,
 - Transfer of technology,
 - Research & Development,
 - Building of capacity
- **Nepali HPD graduates from Norway –**
 - HPD course only 120+ graduates
 - Policy makers, Academics, Industries, Consultants, Contractors, Practitioners



Nepal topography and hydrology



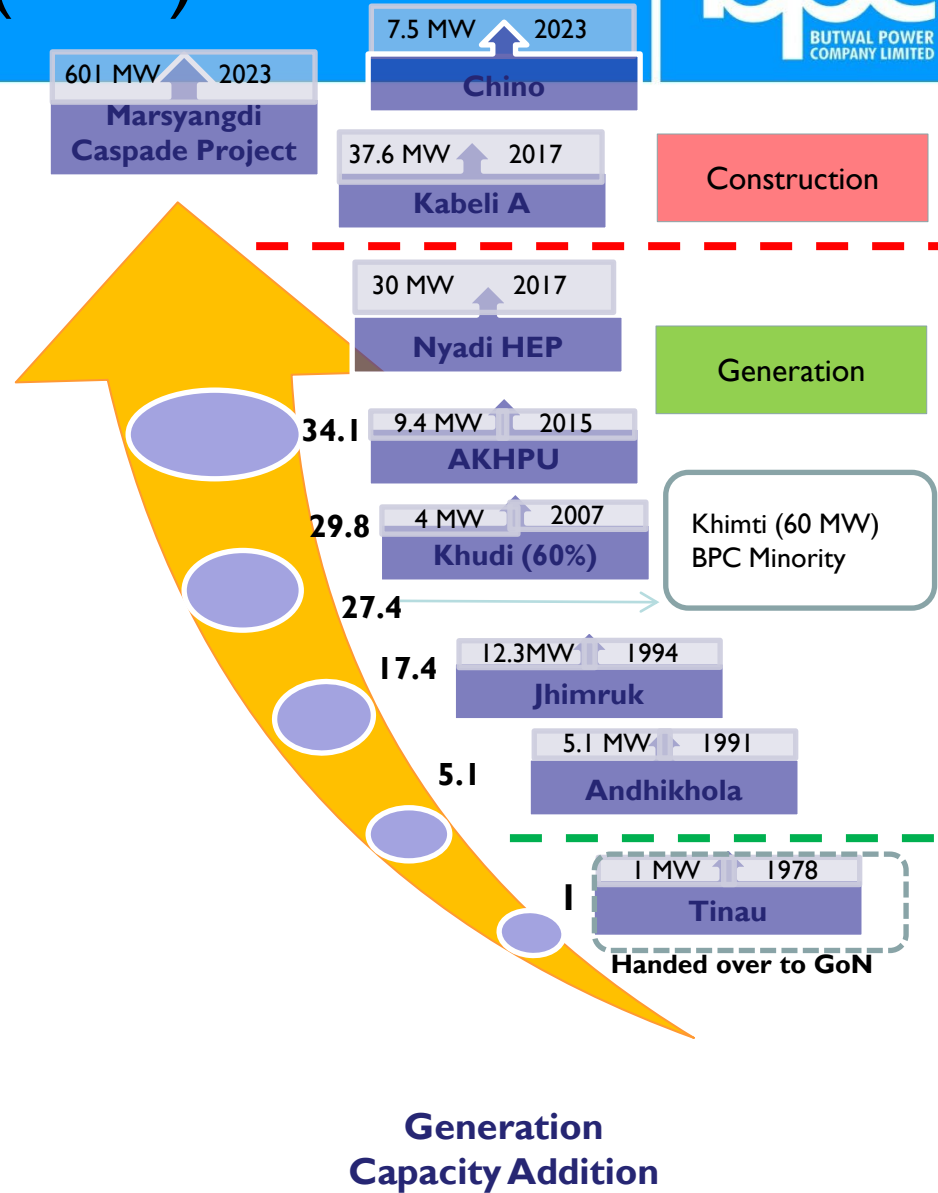
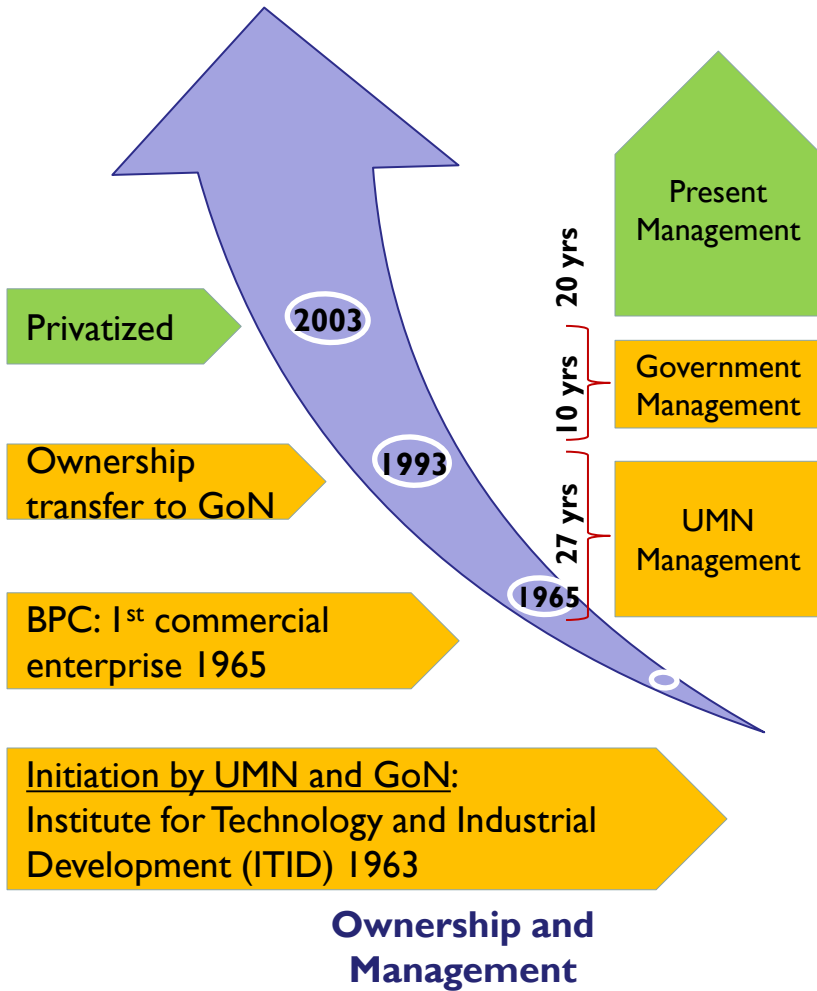
Nepal is classified in 6 physiographic zones

- Terai zone (< 200 masl)
- Siwalik zone (< 1000 masl)
- Middle mountain zone (1000 – 2000 masl)
- High mountain zone (2000-3000 masl)
- High mountain zone (>3000 masl)
- Tibetan zone

Sediment yield ranges

- Highest yield in Siwalik (5,000 – 15,000 t/km²/year)
- High mountain zone I (1,000-4,000 t/km²/yr)
- High mountain zone II (300-1000 t/km²/yr)

Butwal Power Company (BPC)



Construction of Tinau HEP & Andhikhola HEP



Objective

- Power Generation
- Butwal Township Electrification

Funding

- NORAD

Output

- Started with 50kw in 1970 to 1 MW Generation Capacity by 1978
- Butwal develops as an Industrial City



Objective

- Power Generation & Rural Electrification
- Irrigation

Funding

- NORAD
- Government of Nepal

Output

- 5.1 MW Capacity
- Annual Generation 40 Gwh
- 29,564 Rural Consumers
- Irrigated land – 300 ha

Construction of Jhimruk HEP & Khimti HEP



Objective

- Power Generation & Rural Electrification
- Enhance Nepal's capability to develop hydropower

Funding

- NORAD
- GoN

Output

- 12 MW Capacity & Annual Generation 70 Gwh
- Safeguard of cultivated fields

Objective

- Power Generation
- Enhance Nepal's capability to build large hydro

Funding

- Multilateral financing
- GoN

Output

- 60 MW Capacity & Annual Generation 350 Gwh

Capacity Building in Consulting: Hydro Consult Engineering (HCE)



Objective

- To provide innovative and competitive consultancy services in the field of hydropower, water supply, irrigation, transport and other infrastructure related sectors

Areas of Expertise

- Project Management
- Investigation and planning of Hydropower Projects
- Due diligence study, feasibility, detail design and construction supervision of the Projects
- Bankable feasibility study, financial and economical analysis of the Projects, etc.

Output

- Solu Dudhkhola (86MW), Nyadi (30MW), Khimti 60 MW), Jhimruk (12 MW), Andhikhola (5.1 MW) completed and many projects under Feasibility, detail design and supervision

HCE ...



Gura SHP (5MW) - Kenya



Jamal Turen More HEP (260MW) - Pakistan



Upper Chuwa Lurupya Khola PROR HEP



Upper Mai HEP (9.98 MW) - Ilam

Capacity Building in Hydraulic Research: Hydro Lab



Objective

- To study physical hydraulic model for small to big size of hydro projects
- To study on sediment behavior and characteristics
- To provide training and advisory facilities to hydropower professionals.

Funding

- Financial support from NORAD and technical support from NTNU, Norway.

Output

- One of its kind hydraulic physical model testing facility in the region



Hydro Lab ...



R&D Key outcome: Sediment design & Operational problems

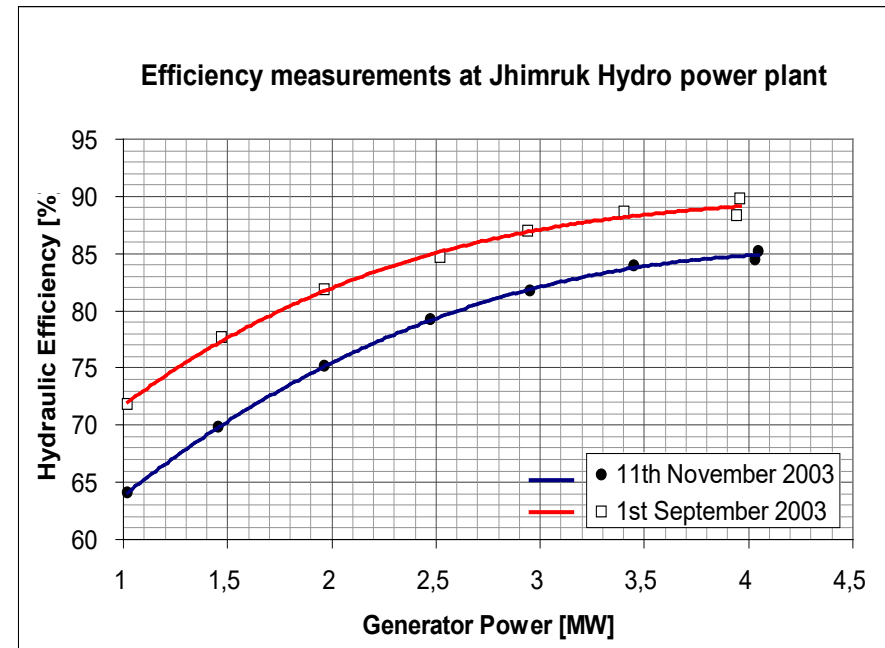
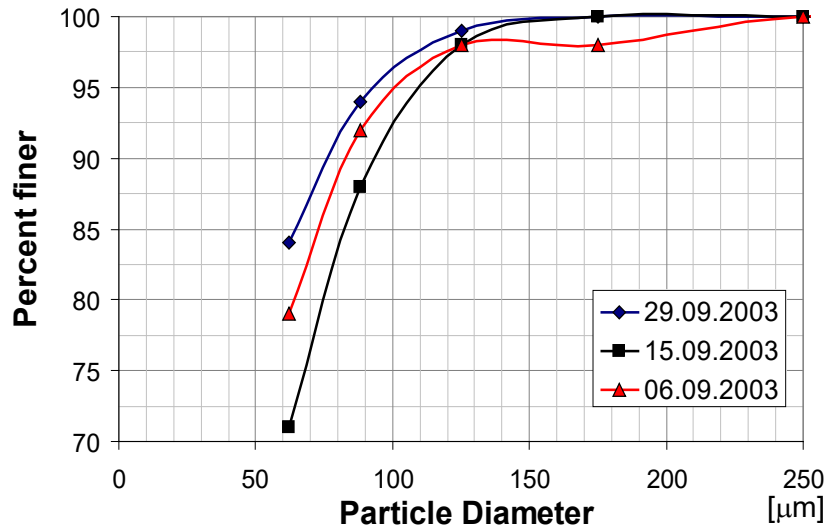
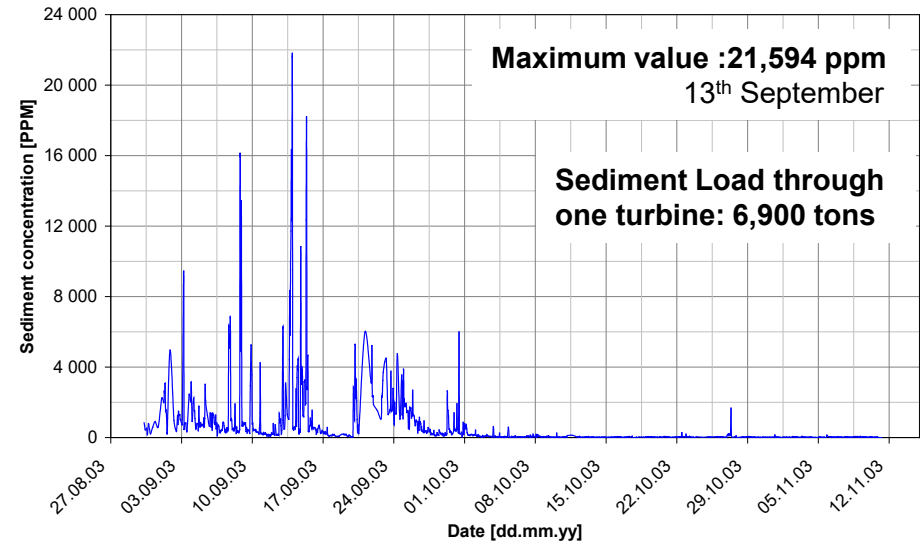
No sediment data during the design
Settling basin designed by proven technology
Design sediment criteria met
Severe sediment problems during operation



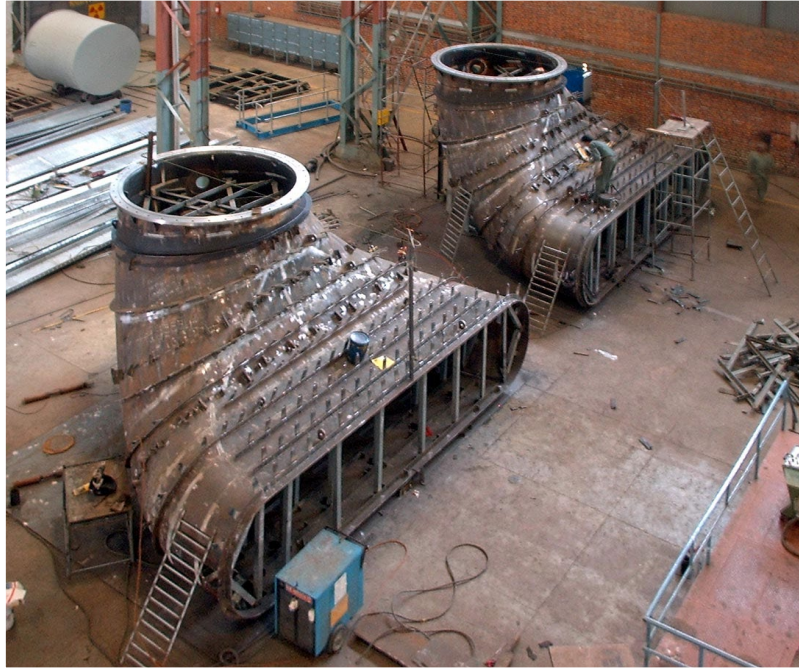
Turbine wear



Sediment/Efficiency Measurements & Analysis



Capacity Building in Manufacturing: NHE



Objective

- Manufacture, erection and commissioning of Hydro-mechanical and Electro-mechanical equipment, substation construction and heavy steel structure.

Hydro-mechanical Equipment

All kinds of hydro-mechanical works for hydropower and irrigation projects in Nepal

Electro-mechanical Equipment

Testing, commissioning and repair of all electro-mechanical works in Nepal

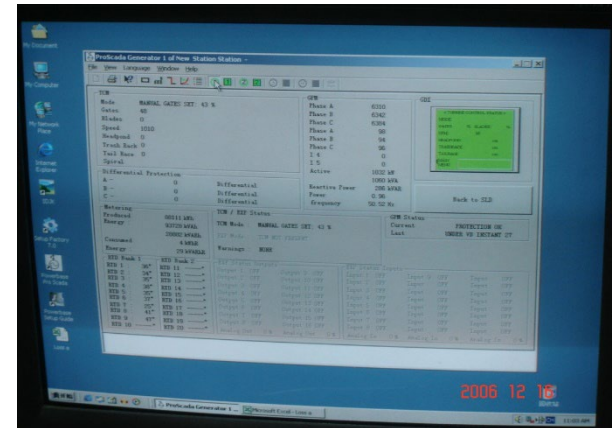
High Voltage Substation

Construction, testing and commissioning of High Voltage Substations in Nepal

Nepal Hydro Electric (NHE) ...



Capacity Building in O&M: BPCSL



Capacity Building in Rural Electrification: REEP (Rural Electrification Expansion Program)



Objective

- To improve living standard and enhance socio-economic activities of people in the project areas

Funding

- NORAD
- BPC
- Community Contribution: In Kinds



Output

- Upgrading of 25 km of 33 kV Transmission Line
- Conversion of 1 kV to 11 kV - total-86 km
- 11 kV /33 kV 3 MVA Switching Station
- Trainings to end users and potential entrepreneurs
- Establishment of Revolving Fund for needy household for electricity connection

Capacity Building in Community Development:

JIDCO (Jhimruk Industrial Development Co.)



Objective

- Carry out integrated community development programs
- Demonstrate rural technologies, conduct various skill development-training programs

Funding

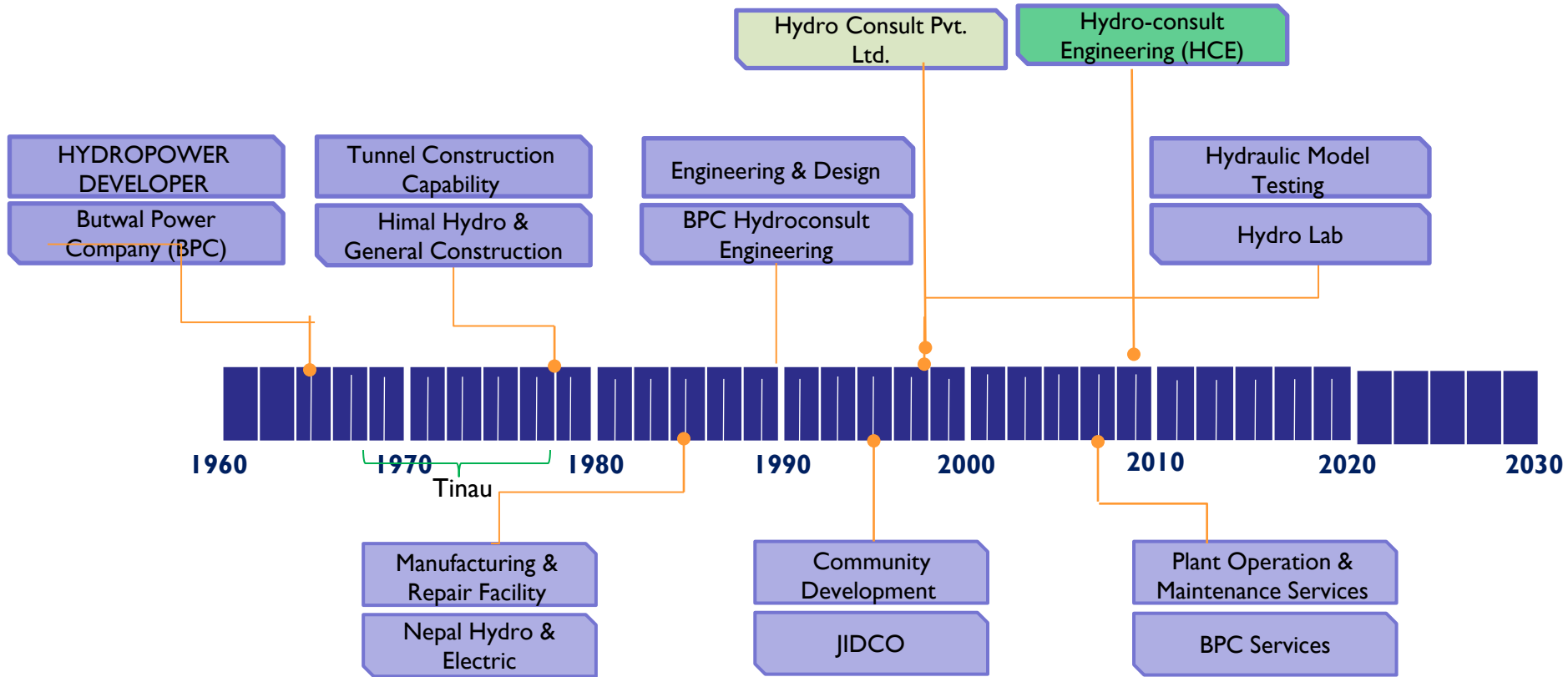
NORAD

BPC

Output

- Skill Development – Electrical Mechanical Plumbing Carpentry
- Improved awareness – Sanitation and Environment
- Promoted entrepreneurships.
- Reduced unemployment
- Improved livelihoods

Institutional Set Up



Butwal Power Company

Generation

- ❑ Nyadi Hydroelectric Plant : 30 MW
- ❑ Andhikhola Hydroelectric Plant : 9.4 MW
- ❑ Jhimruk Hydroelectric Plant : 12.3 MW
- ❑ Khudi Hydropower Plant : 4 MW
- ❑ Khimti Hydropower Plant : 60 MW

Engineering Consulting & Research

- ❑ Hydro Consult Engineering Ltd.
- ❑ Hydro Lab

Distribution

- ❑ EDC Galyang: 40,558 consumers
- ❑ EDC Darimchour: 21,000 consumers

Manufacturing & Repairs

- ❑ Nepal Hydro & Electric

Project Development

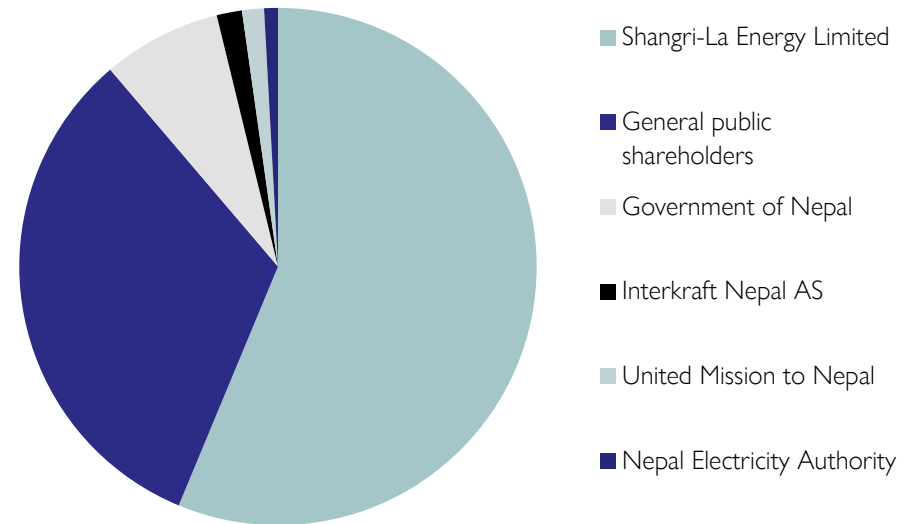
- ❑ Kabeli -A : 37.6 MW (Kabeli Energy Ltd.)
Under construction
- ❑ Chino : 7.50 MW (Chino Hydropower Ltd-)
Under construction planning
- ❑ Marsyangdi Cascades: 3 Projects 600 MW
Construction initiated
- ❑ Mugu Karnali 160 MW
Under Preparation

O&M Services

- ❑ BPC Services

BPC is a listed Company in the Nepal Stock Exchange (NEPSE) market.

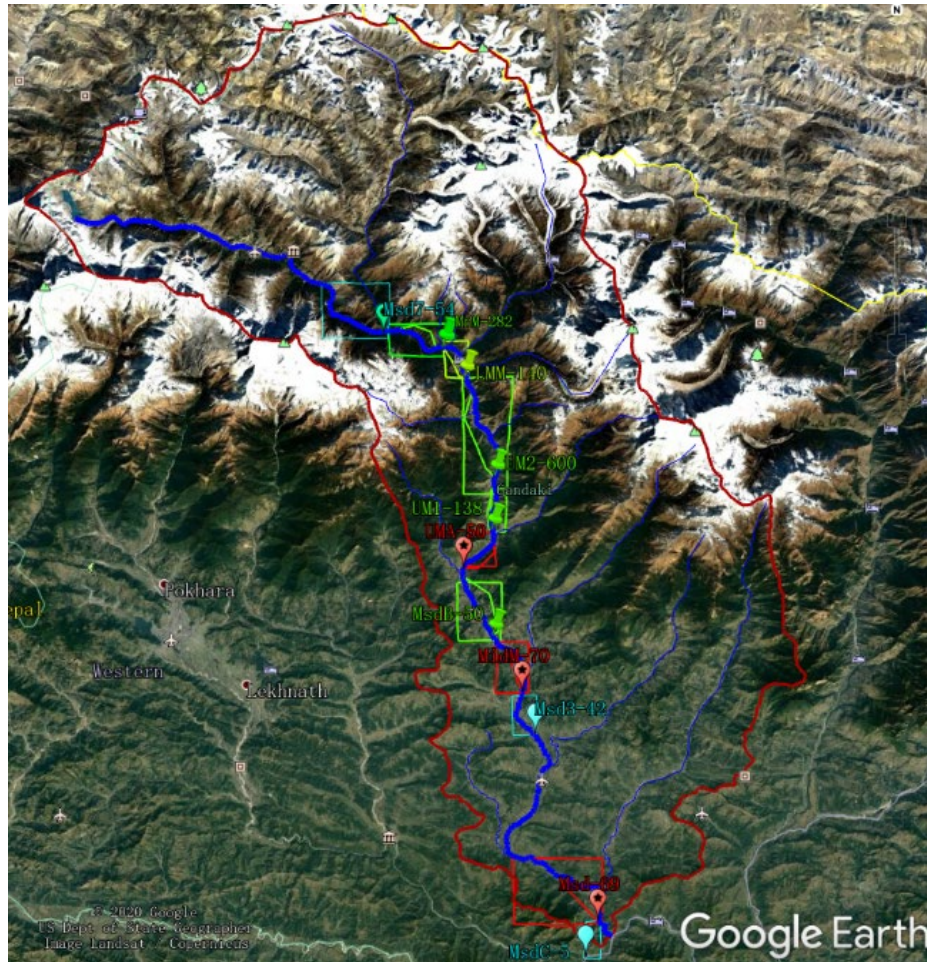
Shangri-La Energy Limited	56.30%
General public shareholders (70,000+)	32.47%
Government of Nepal	7.42%
IKN Nepal AS, Norway	1.58%
United Mission to Nepal	1.37%
Nepal Electricity Authority	0.86%



Board of Directors Total 9 Directors = 5 Private (SEL); 2 Public (1 Lady); 1 Govt.; 1 Independent

Successful Public-Private-Partnership Model

Marsyangdi Cascade Project: Snapshots



Future Cooperation with NTNU/Norway

Capacity Building (research focused)

Training and Technology Transfer

Turbine Manufacturing and Prototype Testing

Green Hydrogen

Tusen Takk!

