

**WATER AND POWER ISSUES
IN NEPALESE CONTEXT**

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GENESIS

- **One complete century of generation and use of electricity in Nepal**
 - Complete information on evolution of Power Sector not available in single document.
- **All rivers flowing through Nepal ultimately enter into India**
 - (a) These river waters are used for irrigation, drinking and other human necessities by large populations on both sides of the political border.
 - (b) There have been appreciations/grievances, agreements/disagreements as well as understandings /disputes on specific issues related to use of these waters.
 - (c) Both sides have their traditional positions on these issues set by first generation of technocrats/ bureaucrats/diplomats/politicians that is already retired.
 - (d) New generation of technocrats/ bureaucrats/diplomats/politicians needs to be updated with the history and positions created by those veterans.
 - (e) One should be capable to participate in a bilateral meeting on the very next day of his joining the office.
 - (f) A single document on history and traditional position to enlighten the members and team leader of delegation before going for bilateral talks is missing.
 - (g) During the process of creating such a document, I gathered information to put before you.

SECTION 1: HOLE PUNCH

- **HUMAN ASCENT TO USE OF ELECTRICITY -1 slide**
- **DEVELOPMENT OF HYDROPOWER- 1 slide**

ASCENT OF MANKIND TO ELECTRICITY

Invention of Electric Bulb by T A Adison

Discovery of Electro-dynamic Principle of Self-excitation

Discovery of Electromagnetic Induction by Faraday

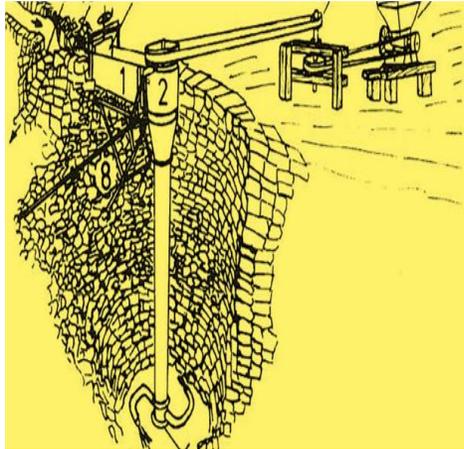
Discovery of Internal Combustion (IC) Engines

Discovery of Steam (External) Combustion

Fall of Constantinople to Ottoman Turks

50,000 yrs/ 8,000 yrs/ Discovery of Fire

DEVELOPMENT OF WATER POWER



SECTION 2: NEPALESE POWER SECTOR

- STATUS: 1 slide
- POSSIBLE FINANCING MODALITIES AND THEIR ANALYSIS: 5 slides

NEPALESE POWER SECTOR

- **Already more than a century**
- **For about 75 years Nepal depended on grants and gifts from development partners**
- **Only recently Nepal started to develop by investing through loans**
- **We have ample potential for hydropower but facing acute shortage of power because we could not develop it**
- **Basic bottleneck for developing hydropower has been the financing**
- **Availability of financing, financial feasibility had been main issues**
- **Let us examine different modes of financing and there viability**

FINANCING MODES

	IFI Sovereign Loan (1)	Exim Soft Loan (2)	Intl. Commercial Loan (3)	Domestic Financial Market (4)
IFI Sovereign Loan (1)	11=1	12	13	14
Exim Soft Loan (2)	21	22=2	23	24
Intl. Commercial Loan (3)	31	32	33=3	34
Domestic Financial Market (4)	41	42	43	44=4

IFI AND EXIM SOVEREIGN LOANS (public sector)

Loan and Characteristics	Domestic Purpose	Export Purpose
<p>IFI Loans for Public Sector</p> <ul style="list-style-type: none"> • Interest Rate Cheaper • Long term loans • IFI Procurement Guide Line • Stringent Safeguard Measures • Exposure to FOREX Risk 	<ul style="list-style-type: none"> • Revenue in local currency repay in dollars • Effective p. u. generation cost due to FOREX Risk but can be absorbed for economic growth 	<ul style="list-style-type: none"> • If PPA in USD at cost plus basis, it can work otherwise, • Effective p. u. cost will increase due to FOREX Risk. • Negative difference between the selling price in export market and effective p. u. cost to be absorbed by country.
<p>Exim Loan for Public Sector</p> <ul style="list-style-type: none"> • Cheaper Interest Rate • Long term loans • Donor's Procurement Guide Lines and Limited Bidding • Exposure to FOREX Risk 	<ul style="list-style-type: none"> • Revenue in local currency repay in dollars • Effective p. u. generation cost due to FOREX Risk but can be absorbed for economic growth 	<ul style="list-style-type: none"> • If PPA not in USD at cost plus basis, it can work otherwise, • Effective p. u. cost will increase due to FOREX Risk. • Negative difference between the selling price in export market and effective p. u. cost to be absorbed by country.

INTERNATIONAL COMMERCIAL LOANS (Public/Private Sector)

Loan and Characteristics	Domestic Purpose	Export Purpose
<p>Intl. Commercial Loan (Public /Private)</p> <ul style="list-style-type: none"> • High Interest Rates • Relatively shorter term of loan • Difficult due diligence • High Exposure to FOREX Risk 	<ul style="list-style-type: none"> • Costlier due to high interest rate • Local currency revenue repay in USD • Effective p. u. generation cost due to FOREX Risk high but can be absorbed for economic growth • This will be least priority for public and second in priority for private sector after domestic financing 	<ul style="list-style-type: none"> • PPA needs to be in USD. Otherwise • Effective p. u. cost will increase due to FOREX Risk. • Negative difference between the selling price in export market and effective p. u. cost to be absorbed by developer. • Repatriation of Foreign Currency may be a problem.
<p>Domestic Financial Market Loan</p>	<p>Best but liquidity may be problem Floating interest rates increase with liquidity crunch No project financing</p>	<p>Good but liquidity may be a problem Floating interest rates increase with liquidity crunch No project financing</p>

ANALYSIS OF FINANCING MODEL

Purpose	Issues	Preferred Financing
For Projects of Domestic Use	Minimal exposure to FOREX Risk	<ul style="list-style-type: none"> • Domestic Financing for smaller ROR Projects by IPPs • A mix of domestic and IFI or EXIM Sovereign Loan for larger ROR projects by Public or PPP Projects • A mix of all for multipurpose storage projects of domestic use by public or PPP • Any financing acceptable but on merit order
For Projects targeted for export or have huge surplus for Export	<ul style="list-style-type: none"> • Country may have negative gains due to FOREX Risk if by public sector and no USD PPA • Repatriation may be a problem for private developers if no USD PPA • Risk very high in international commercial financing 	<ul style="list-style-type: none"> • DISCUSSED FINANCING MODELS POSE RISKS ALTHOUGH SUCH PROJECTS WILL BE GIFT AFTER 25 YEARS • IF NO OTHER OPTION, WE HAVE TO LIVE WITH THESE FINANCING MODELS WITH A MIX FOR MINIMUM EXPOSURE TO RISK

But many countries having resource are developing their resource. How? Let us examine that.

WHAT MODELS ARE IN PRACTICE?

COUNTRIES	POPULAR FINANCING	EXCEPTIONAL FINANCING
ASEAN and African Countries	Using EXIM Loans especially from China Exim Bank for domestic use projects	Multipurpose storage projects for domestic use are using even the International Commercial Financing
Laos	Intl. Commercial Loans and Sovereign Loans for export projects but has the advantage of USD denominated PPA with Thailand	With suitable PPA, any kind of financing is feasible
Bhutan	Market and Financing guaranteed by India. Ngultrum is equivalent to IR. No problem of negative gain or repatriation.	Bhutan may also access to Indian Commercial Loans.

Options for Nepal:

- a) Ask India for USD denominated tariff in all markets which is unlikely
 - b) Or sell it to Bangladesh in USD denominated tariff but transmission?
 - c) Or develop few thousand megawatts from Joint Projects in Bhutan Model
- Pancheswar is deemed as joint project but not in Bhutan Model of financing.
- In past, we have been rejecting Bhutan Model. Indo- Nepal Co-operation follows:

**SECTION 3:
INDO-NEPAL COOPERATION IN POWER-2 SLIDES**

INDO-NEPAL COOPERATION IN POWER

- Joint Development of River Projects including hydropower component. Certain provision related to power or quantum allocated to Nepal from such project.
 - Kosi and Gandak Projects are commissioned. Tanakpur is also commissioned as a component of Mahakali Treaty. Development of Pancheswar Multipurpose Project under Mahakali Treaty is underway.
- India has made grant contribution for Trishuli, Devighat and Fewa hydropower projects and their associated transmission lines in Nepal.
- Similarly in the later phase India has been providing soft loans to Nepal through EXIM Bank of India for development of generation and transmission facilities.
- In absence of a high capacity X-border transmission line, India and Nepal have been making transaction of power in radial mode. This exchange of power has developed in different phases as mentioned in following slides.
- Recently a Power Trade Agreement has been signed between the two countries opening avenues for larger cooperation.
- Construction of 400 k V D-M Line will provide infrastructure for substantially large volume of transactions in synchronized mode.

INDO-NEPAL POWER EXCHANGE

Phase	Objective	Period
Phase 1	Supply to Nepalese localities neighboring the JP site	Mid sixties to mid seventies
Phase 2	Supply to towns of Terai close to Indo-Nepal Border (various 33kV and 11 k V lines)	Mid seventies to Eighties
Phase 3	Meeting deficits in INPS (Kataiya – Duhabi and Tanakpur – M/ nagar lines)	Nineties
Phase 4	Larger cooperation in ambit of PEC closed after 7 th meeting of PEC Trading in Radial Mode (8 th Meeting of PEC)	First decade of 21 st century
Phase 5	Synchronizing or Systems Coupling (D-M Lines) Market Coupling (PTA)	Under development (by 2015)
Phase 6	Sub-regional and regional integration (SAARC Intergovernmental Framework Agreement)	Deemed

Five decades of relations in power sector but not effective for substantial development of hydropower. Relations mostly limited to import power from India to meet Nepal's immediate deficits. No long term agreements, implementation and development.

Reason? WATER.

SECTION 4
INDO-NEPAL COOPERATION CONCERNING WATER

INDO-NEPAL RELATIONS CONCERNING WATER

Period	Event	Remarks
1920 (British India)	Exchange of letters regarding Sharada Barrage	Nepalese entitlement defined but not the Indian entitlement. Connotation that rest is Indian entitlement.
Fifties and sixties of twentieth century	Kosi and Gandak Agreements on control and regulation of waters for flood protection and irrigation.	Nepal got some irrigation and power benefits Gandak project eclipsed trans-basin uses of water.
Seventies	Discussion on various other joint projects including Chisapani, Pancheswar, West Rapti etc. started for development as joint projects	Slowly a discontent emerged in Nepal regarding the disproportionate benefits from Kosi and Gandak. Nepal felt discomfort in Joint Project development in Kosi and Gandak Model owing to <ul style="list-style-type: none"> Proposed location of projects Investment and benefit allocation Impact of JPA on upstream uses of water Nepal took a twist and preferred to develop small projects by its own purely for domestic use.
1980	Historical Secretary level meeting	Nepal exposed their sovereign position on issues related to these joint projects

INDO-NEPAL RELATIONS CONCERNING WATER

Period	Event	Remarks
Eighties	Negotiations on proposed joint projects continued with firm position taken by Nepal	Negotiations on the proposed joint projects retarted and came to full stop. Many other issues of grievances tabled by both sides related to use and control of these waters.
Nientees	Formation of JCWR and discussions continued.	Discussion focused more on complaints on use and control of waters rather than joint project developments. Unilateral construction of Tanakpur by India and expression of grievances by Nepal. Mahakali Treaty signed.
First Decade of 21 st century	Talks on implementation of Mahakali Treaty but no progress.	A dissatisfaction in Nepal similar to that after Kosi and Gandak in seventies. No progress on negotiations related to other projects.
Second ongoing decade	Little progress on formation of Pancheswar Development Authority	But no physical progress to believe on implementation.

MAJOR ISSUES AND POSITIONS

Area	Issue	Nepalese Position	Indian Position
Rivers	Common River vs. Rivers flowing from Nepal to India	Border Rivers Common Others flowing from Nepal to India	All common
Border or Common Rivers	Principle of investment and benefit allocation in JP	Equal investment equal benefit, trading of benefits in real time. (changed position in Mahakali treaty)	Benefit allocation according to actual requirement and investment on pro-rata to benefits
Other Large Rivers	Consultancy for DPR/ Financing Location Calculation of net benefits Basin and trans-basin uses in upstream	International consultants International Financing At the site of project Protection of upper riparian rights (refer each project case)	Indian consultants and financing Existing downstream benefits to be deducted No impact to project
Small Rivers	New upstream schemes Existing down stream uses Embankments by India Flood Protection works	Traditional uses Not aware Impact beyond the border Can't direct waters to opposite bank	Fresh diversions Objection on fresh diversions Regulators provided in embankments Can work jointly

SOLUTIONS: Understanding for issues related to other large and small rivers required not interception.

PROJECT TYPE POSITIONS

TYPE OF PROJECT FOR JOINT DEVELOPMENT	NEPALESE PREFERENCE	INDIAN PREFERENCE
<p>ROR/PROR Purely power generation No agreement on control and regulation of water</p>	<p>Can meet the domestic requirement Seasonal surplus export Dry season deficit shall continue Affected with increased use of upstream water or hydrological problems</p>	<p>May supply wet season energy Do not affect the lean season water flow But do not augment lean season flows and hence do not solve potential conflict of water use in lean season for other purposes</p>
<p>Multipurpose Storage Provision for control and regulation of water</p>	<p>Can meet domestic requirement in all seasons Surplus can be exported Upstream uses can be managed Multiple benefits More the location in north more the regulated water in lean season and possibility of other uses</p>	<p>Supply of energy Augment lean season flows Mitigate potential conflict on upstream use of lean season flows More the location on South, more it will solve flood problem</p>

A multi purpose storage project between Mahabharat to Siwalik range could be best proposition.

SECTION 5
INDO-NEPAL POWER TRADE

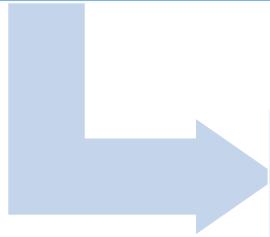
INDO-NEPAL POWER TRADE : New Paradigm

- Power Trade Agreement: Genesis
- Ill-fated PTA of 1997
- PTA of 2014

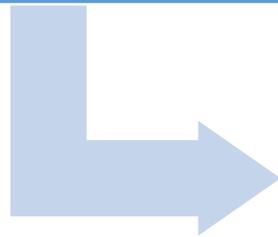
- Wrong understanding of PDA

CONCLUSION

Understanding on
water related issues



Formulation of Joint
Project Modality



Implementation of Joint
Project

Reminiscences of Nepal's Journey through **water & power**



Sher Singh Bhat

Reminiscences of Nepal's Journey through **water & power**

Sher Singh Bhat



Sher Singh Bhat is a known name in Nepalese Power Sector for his involvement in various national and regional pursuits related to power sector. He is a reformed speaker at national and SAARC level programs related to power sector.

Mr. Shriprasad Bachelor of Technology in Electrical Engineering from G. B. Pant University of Agriculture and Technology, Pantnagar, India and Executive MBA from Panchajanya University (Nepal). For last 33 years, he has been working with NEA (formerly NEE) in the area of electricity generation, transmission, distribution, system operation and testing.

He represents NEA as director in the Board of Sikkim Chyula Electric Company, Upper Tamakoshi Hydropower Company, Chitwan Hydropower Company and Chairperson of Saram Hydropower Company.

Mr. Bhat has travelled Canada, Sweden, Norway, Luxembourg, Austria, Belgium, Germany, South Africa, Zimbabwe, China, Philippines, Laos, Singapore, Malaysia and Thailand etc.



THANKS