

**NEA'S EXPERIENCE, LEARNING AND CHALLENGES IN DEVELOPING  
CROSS BORDER INTERCONNECTION LINKS IN PARTICULAR REFERENCE  
TO DHALKEBAR-MUZAFFARPUR 400 kV CROSS BORDER  
INTERCONNECTION**

**SOUTH ASIA REGIONAL CONFERENCE ON "CROSS BORDER RELECTRICITY  
TRADE", 4<sup>th</sup> -5<sup>th</sup> OCTOBER, NEW DELHI, INDIA**

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## OUTLINE OF PRESENTATION

- History of Cross Border Power Exchange
- Institutional Mechanisms For Nepal India Power Exchange
- Brief History, Background and initiatives behind D-M Cross Border interconnection
- Initiative towards commercial mode of interconnection
- Project features of D-M Line
- Commercial frame work of the project
- Contractual framework of the project
- Financing of Transmission Line
- Fundamentals of PSA
- Fundamental of ITSA
- Issues on commercial mode of Cross Border Interconnection and Power Trade
- Concluding Remarks

# History of Cross Border power Exchange

- Power exchange history Goes by some decades- started along with signing of Koshi treaty in 1954.

It was , however, in 1971 that Indo-Nepal Power exchange has commenced-5 Mw in initial years.

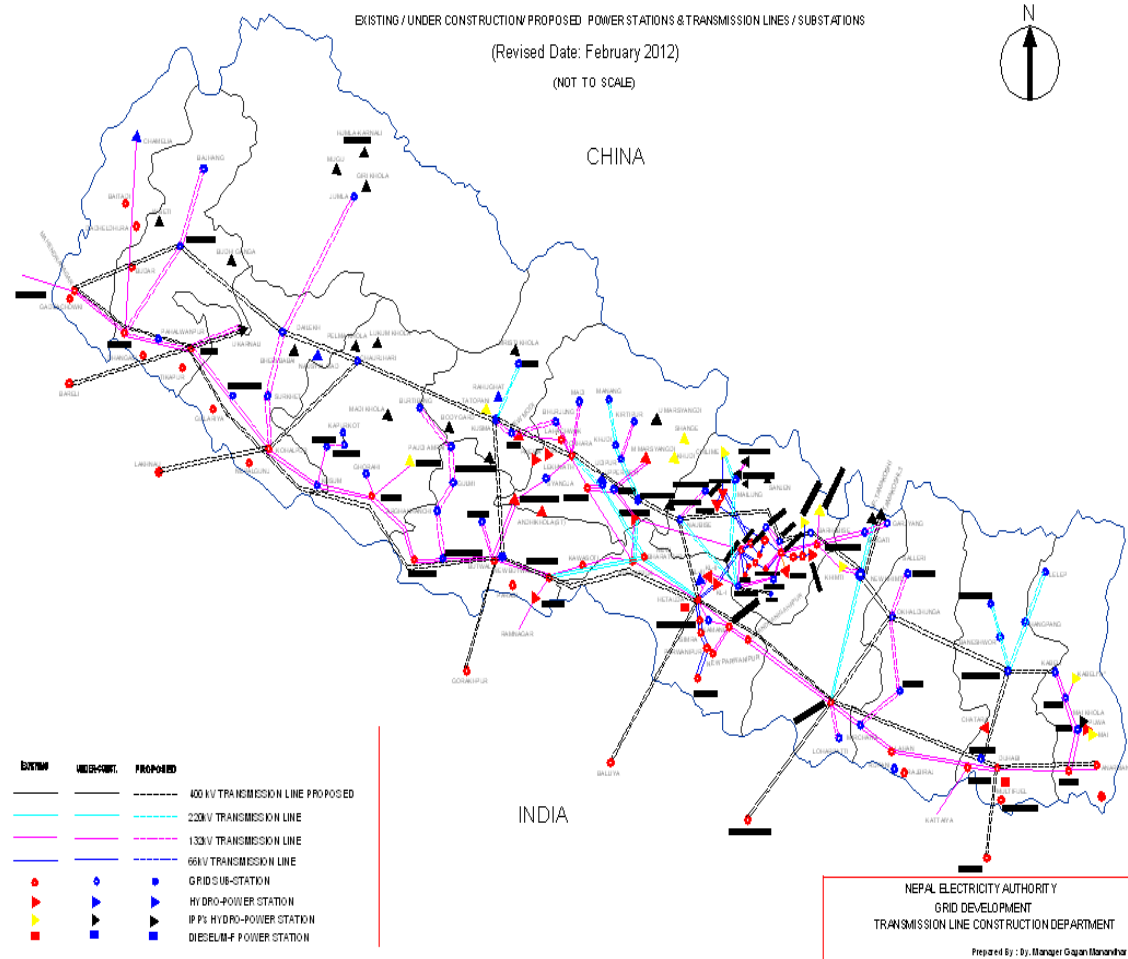
- **Current arrangement of Cross Broder Power Exchange :**
  - **River Treaty:** Koshi Treaty, Gandak Treaty and Mahakali Treaty.
  - Contiguous Border Town Exchange Program
  - Commercial Power trading with PTC India during dry seasons

## INSTITUTIONAL MECHANISMS FOR NEPAL INDIA POWER EXCHANGE

- **Power Exchange Committee (PEC)**
  - Constituted in 1992- oversee the exchange and other issues
  - To meet once a year by rotation in both countries
- **Joint Committee on Water Resources (JCWR)**
  - Constituted as per agreement of August 3, 2000
  - Headed by Energy Secretaries of both countries
  - Supposed to Meets every six months
- **Joint Ministerial Committee on Water Resources (JMCWR)** – to take up high level issues

# NEPAL-INDIA EXISTING INTERCONNECTIONS

- 132 kV level:
  - Kusaha-Kataiya
  - Gandak-Ramnagar
  - Mahendranagar-Tanakpur
- Around 14 nos of 33 kV interconnections
  - all operate radially



# **Brief History, Background and initiatives behind D-M Cross Border interconnection**

- Besides long history of power exchange – quantum of power exchange was limited
- It was merely a power exchange not a commercial power trade.
- In the 6th Power Exchange committee meeting it was discussed that over and above 50 MW , the deal would be in commercial mode.
- It was also realized that the development high capacity interconnection between Nepal and India is required in order to facilitate the mega hydro projects in Nepal.

## **Brief History, Background and initiatives....**

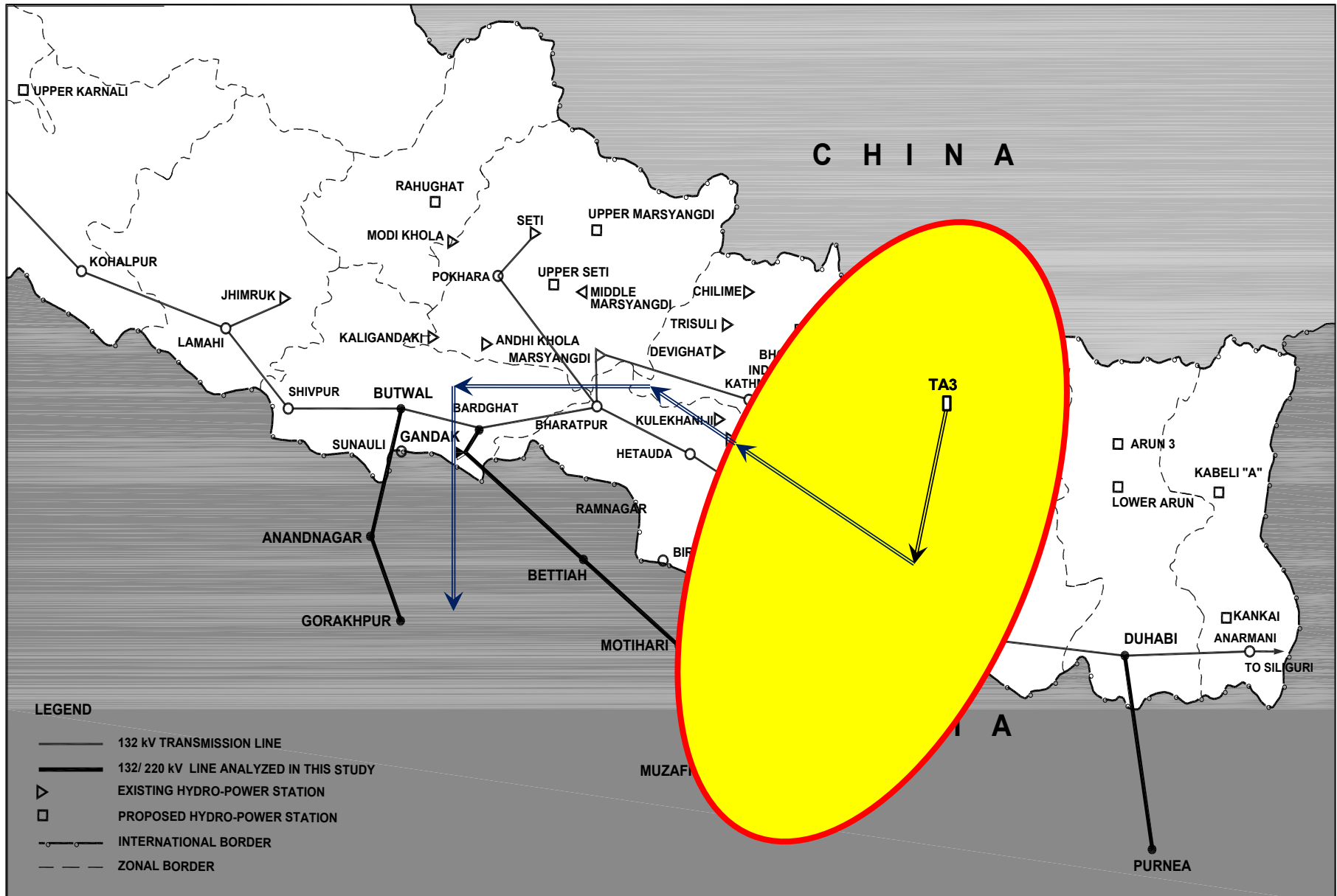
- IL&FS India, NEA in Mid 2006, with support from the then MOWR/MOF Nepal and Embassy of India, took initiative to facilitate the development of high capacity transmission interconnection between India and Nepal.
- Unlike previous intergovernmental modalities the project was decided to be developed and realized under commercial mode ; PPP Model
- Dhalkebar – Mujaffarpur (D-M) 400 kV Interconnection was considered to be developed on first phase.
- It was decided to establish Two JV companies each one in India and Nepal

## **Brief History, Background and initiatives.....**

- Consequently the JVC-Nepal called Power Transmission Company Nepal (PTCN) a joint venture company of NEA and IL&FS has been registered in Nepal as per Company Act 2063 of Nepal.
- Similarly JVC- India called Cross Border Power Transmission. Company India (CPTC) is registered in India.
- The JV companies have to develop, own, operate and maintain the transmission line in respective territory.

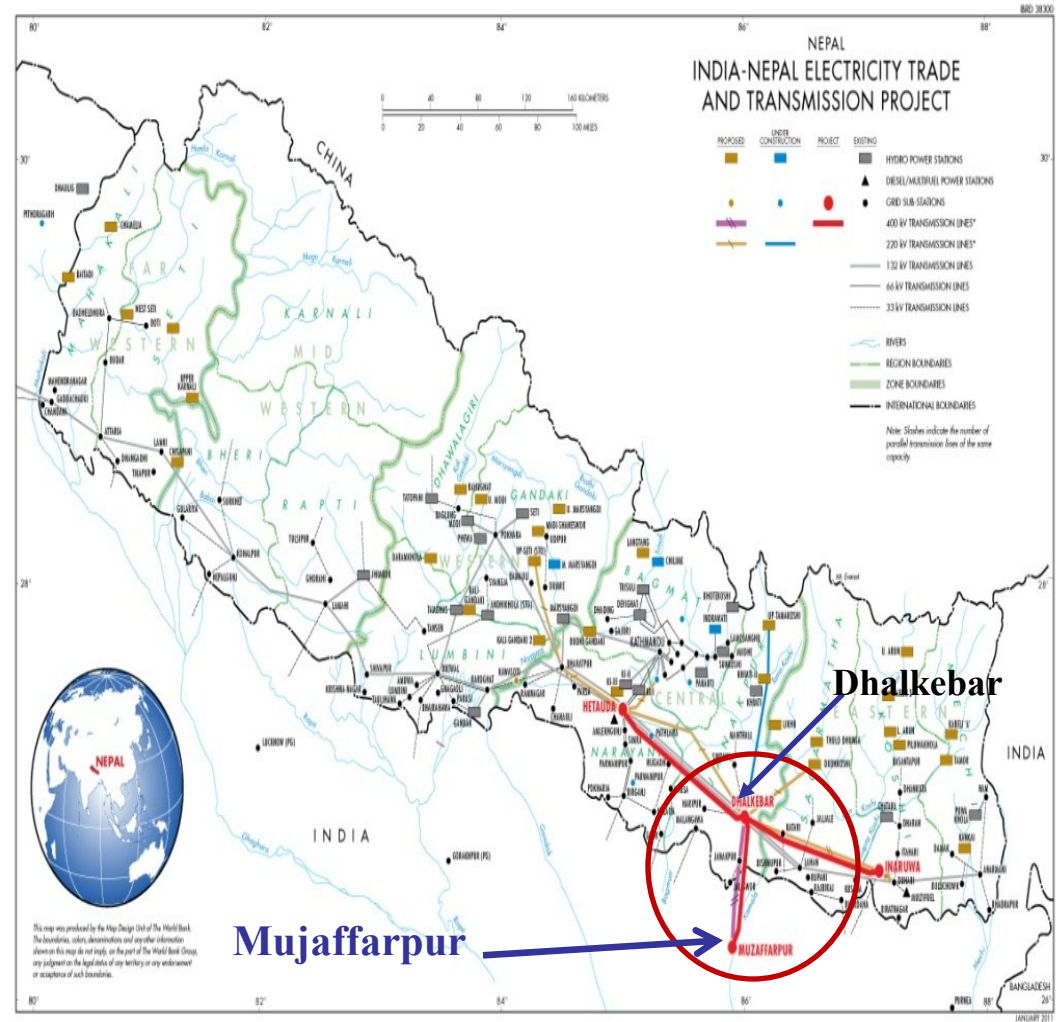


# First Project: Dhalkebar-Muzaffarpur Transmission Line



# PROJECT FEATURES

- Voltage: 400 kV ( to be initially charged at 220 kV and will be in synchronous operation with India)
- Line length: 40 Km in Nepal side and 100 Km in India side
- Project cost : 52 MUSD ( 20 MUSD Nepal side and 32 MUSD Indian side)
- Expected Commission: 2014/15



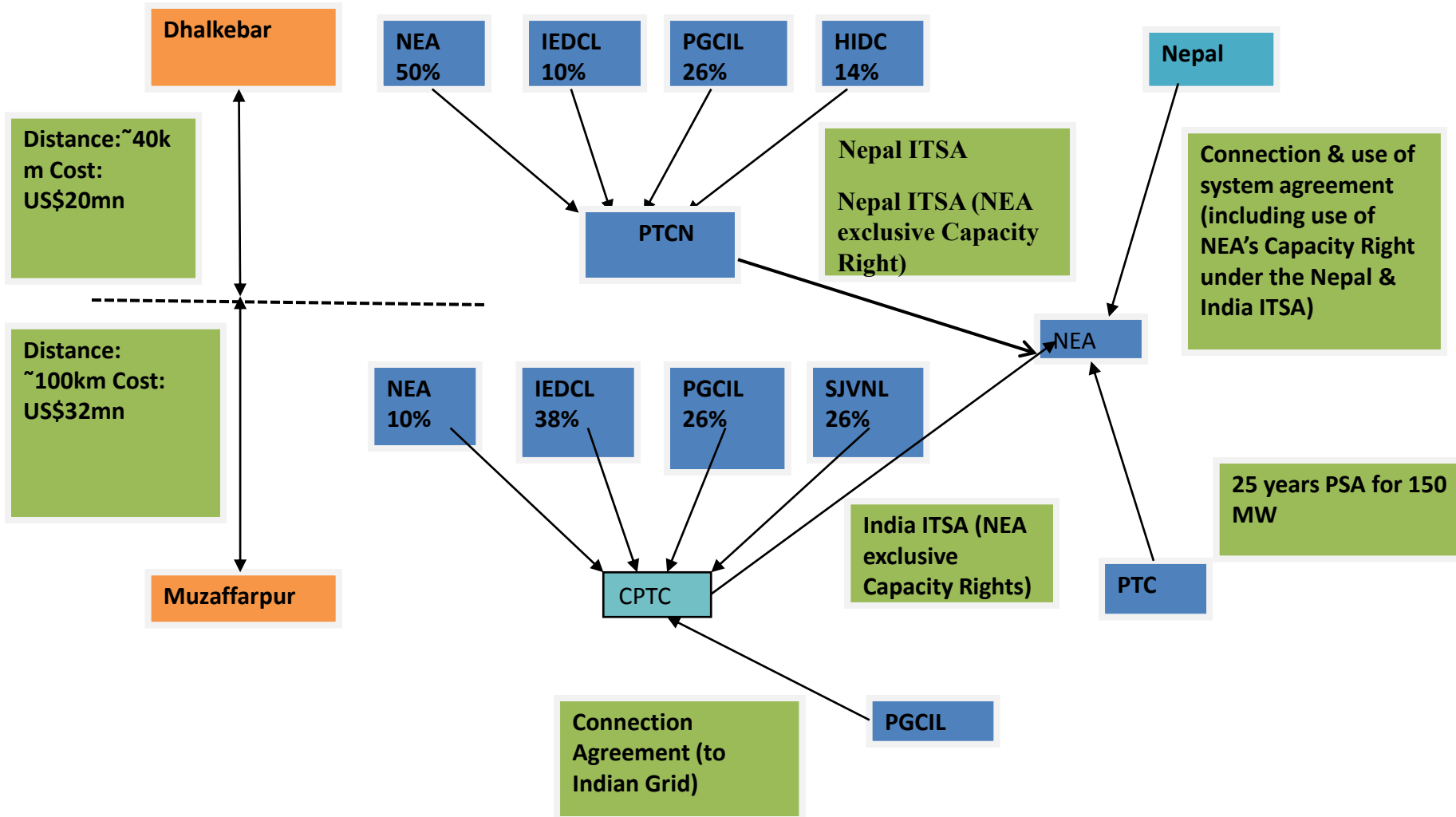
# Initiative towards Commercial mode of Interconnection

- NEA to book the whole transmission capacity of the line and pay the Transmission Service Charge (TSC) to both the JV companies.
- NEA can tie up with other users and IPPS in Nepal or India to lease the part of the reserved capacity of the line for the export and import of electric power.
- NEA to buy 150 MW from PTC India and execute PSA
- NEA to enter in to two separate ITSAs with PTCN and CPTC
- PSA was signed on 12 December, 2011 and ITSAs were signed on 13 December, 2011
- SHA of both company was signed on 9 July 2012

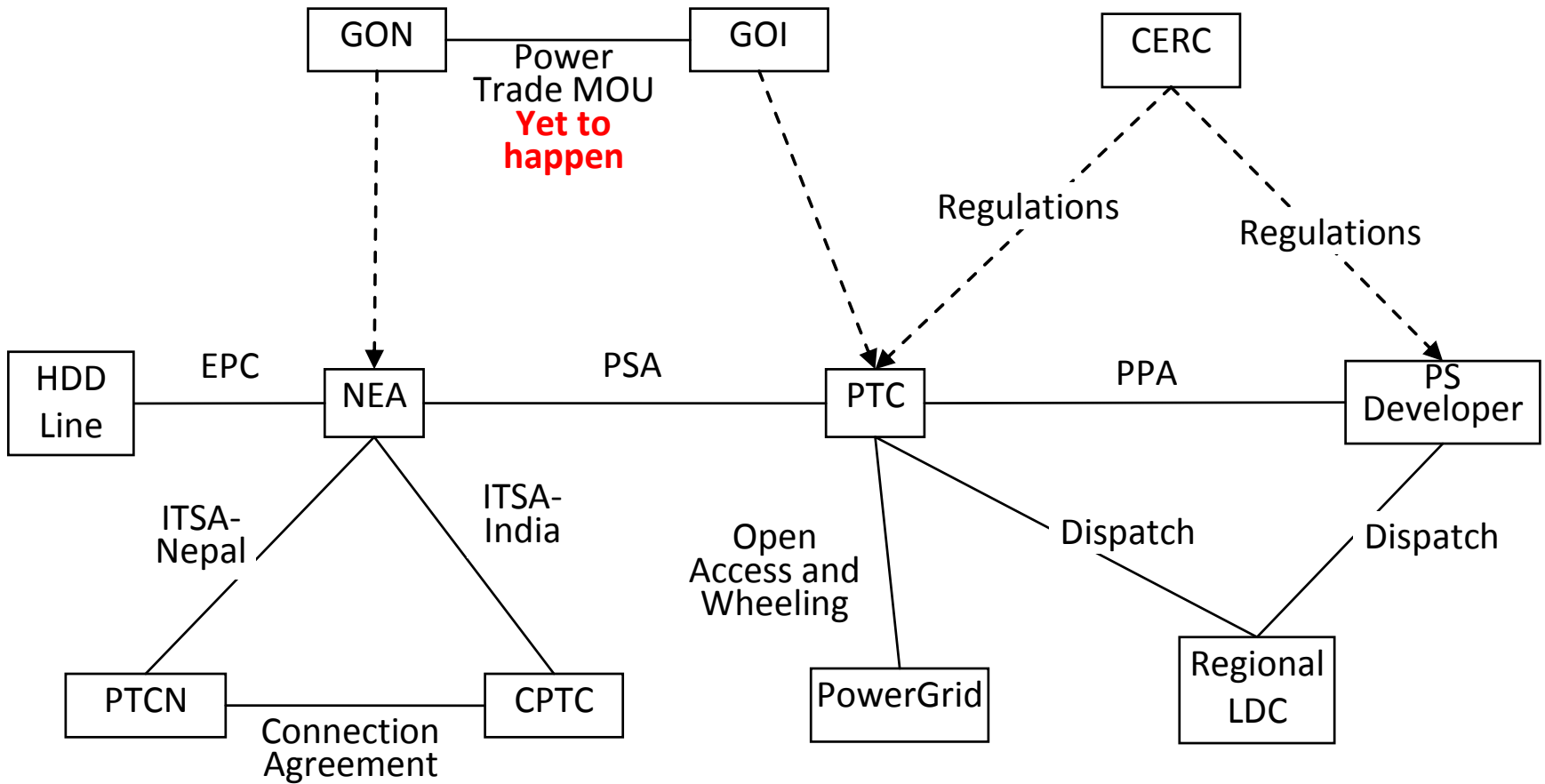
# SHARE STRUCTURE OF JV COMPANIES

PTCN		CPTC	
• NEA:	50%	• IL&FS India:	38%
• Power Grid India:	26%	• Power Grid India:	26%
• HIDC	14%	• SJVNL:	26%
• IEDCL India:	10%	• NEA:	10%

# Commercial Structure



# CONTRACTUAL FRAMEWORK



# Financing of Transmission Line

- **Estimated Cost:**
  - Nepal Portion: 1427.5 MNRS ( completed cost 2011 Price Level)
  - India Portion: 160.17 Crore INR
- **Capital Structure:**
  - Debt: 80%
  - Equity: 20%
- For PTCN portion of the line, 13.2 MUSD will be funded through Indian Exim Bank line Of credit to GoN
- Debt portion of the CPTC portion will be funded through PFC, India

# Fundamental Details of PSA

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- **Quantity**

- Contracted Capacity = 150 MW

- Minimum Guaranteed Capacity = 127.5 MW (85%)

- **Term**

- 25 years from the date the delivery

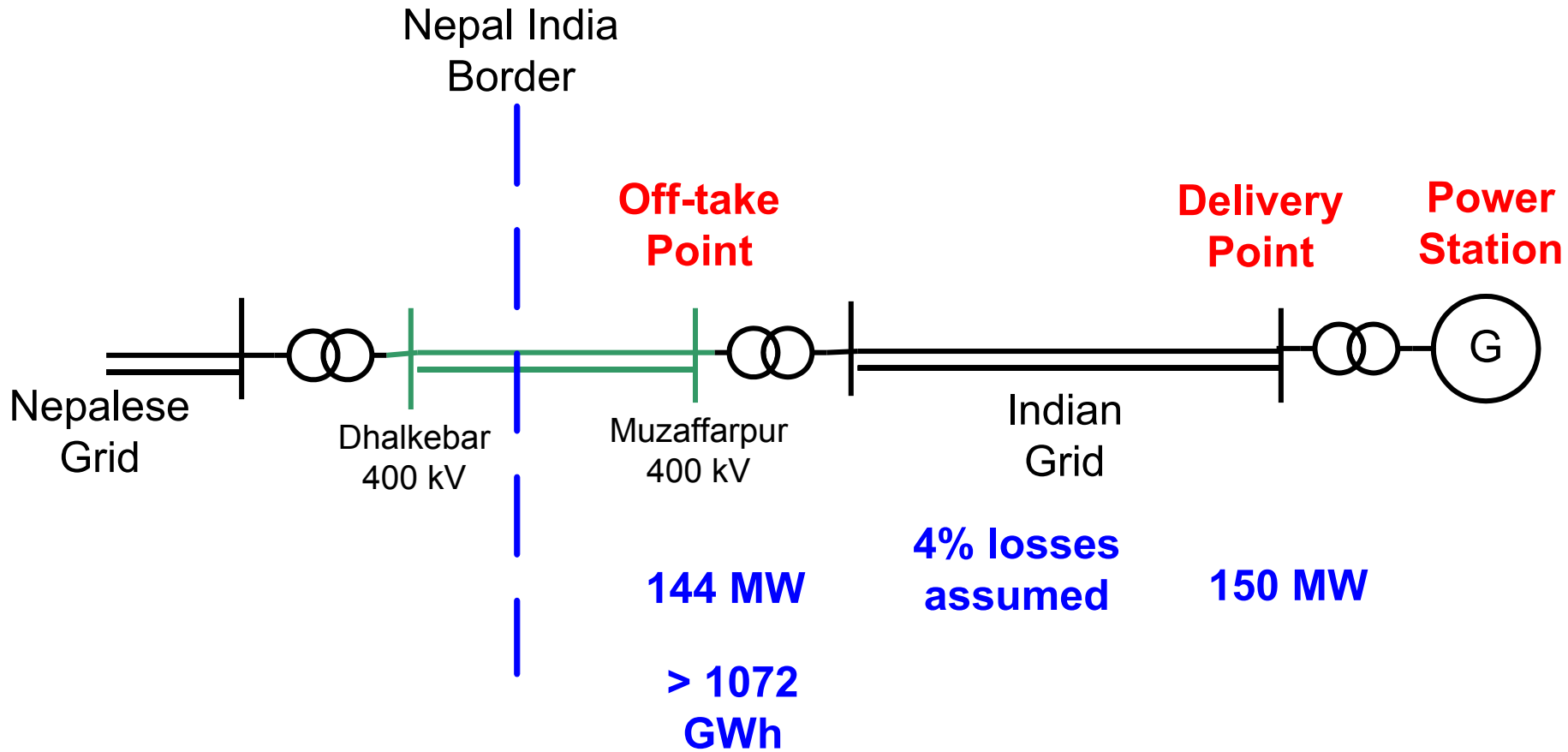
- **Commencement of Supply**

- on “Delivery Date” to be agreed by PTC and NEA

- not later than 42months after PSA is signed



# Structure of Power Sale Agreement



# Delivery of Electricity

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- **PTC delivers to “Delivery Point”**
  - point of interconnection between Power Station and CTU grid
  - measure point for PTC’s capacity and energy delivery obligations, and NEA’s corresponding payment obligations
- **Open Access**
  - PTC responsible for transmission access from Power Station Delivery Point to “Off-take Point/s” (initially, 400kV bus of CTU substation in Muzzafarpur)
  - NEA responsible for transmission access beyond Off-take Point/s to NEA grid

# Tariff (3 parts)

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## ➤ **“Capacity Charge”**

- payable on Available Capacity at Delivery Point as declared by PTC
- set annual rates per kWh specified in Schedule 2 of PSA

## ➤ **“Variable Energy Charge”**

- relates to fuel cost of Power Station
- payable on Scheduled Energy delivered to Delivery Point
- initial rate per kWh specified in Schedule 2 to be adjusted per CERC escalation criteria

## ➤ **“Variable Inland Transportation”**

- relates to inland transportation of fuel to Power Station
- set annual rates per kWh specified in Schedule 2 of PSA- to be adjusted per CERC escalation criteria

# Price (continued)

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- **“Transmission Charges”**
  - NEA responsible for paying/reimbursing PTC for its actual cost for using CTU’s network to deliver energy from the Delivery Point to the Off-take Point/s
- **Other**
  - NEA responsible for paying/reimbursing PTC for actual charges imposed by the applicable regional or state load dispatch center in India in respect of the Contracted Capacity
- **Change in Law**
  - Tariff subject to modification due to Change in Law
  - Increases capped at 20%

# Operational Details

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- **Dispatch**

- NEA to dispatch daily (no later than 16:00 hours on the prior day) on the basis of “Availability Declaration” delivered by PTC (no later than 10:00 hours on such prior day)

- **Outages**

- PTC to make all reasonable endeavors to ensure that scheduled outages occur between 1 June and 30 September of each contract year

- **Metering**

- Parties will use CERC metering, as governed by Indian Grid Code

# Settlement in case of Deviation schedule

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- **Unscheduled Interchange (UI)**
  - NEA to pay or receive as the case may be the UI charges in the event of variation between actual off-take energy and scheduled Energy.
  - PTC shall act as a member of UI Pool Account of the RLDC/RPC on behalf of NEA and settle each weekly UI Pool Accounts.
  - NEA to pay PTC 3% service charge for the UI settlement.

# Payment Security Mechanism

- NEA to provide PTC an unconditional revolving, without recourse and irrevocable Letter of Credit
- The value of LC shall be equal to the estimated average billing of 90 days multiplied by 1.10 based on Minimum Guaranteed Capacity.
- The term of LC shall be 12 months and renewed annually

# Fundamental Details of ITSA

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- **Quantity**

- 400 kV Double Circuit, Twin Moose Conductor (1200 MW)
- Initially charged at 220 kV Double Circuit (500 MW)

- **Term**

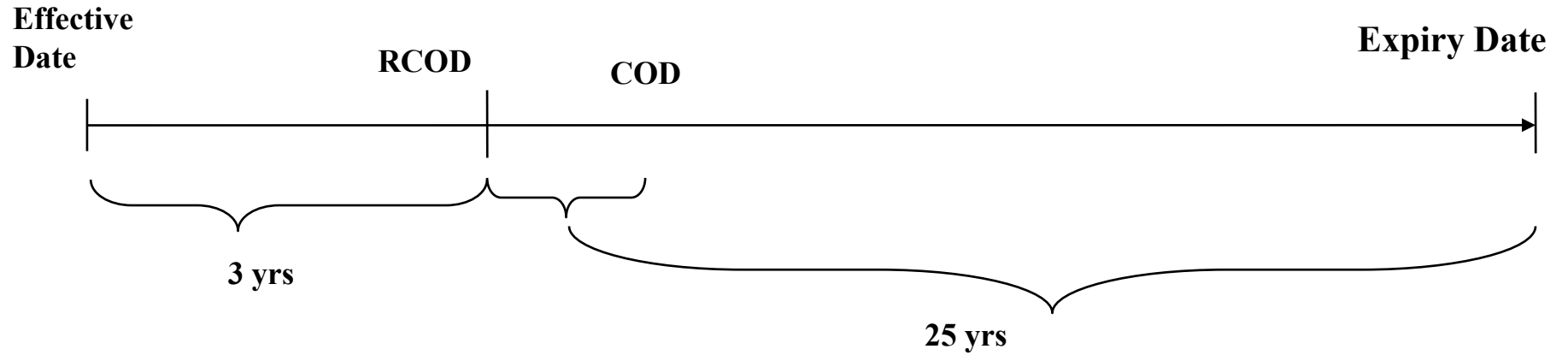
- 25 years from the Commercial Operation Date

- **Required Commercial Operation Date**

- 36 Months from the effective date or 27 Months from the date of financial closure



# Time Frame of Agreement



# Transmission Service Charge

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- To support project financing for the project, the Transmission Service Charge (“TSC”) will need to be on a “take or pay” basis:
  - NEA to pay the TSC linked to availability of the transmission line capacity regardless of whether it uses the capacity

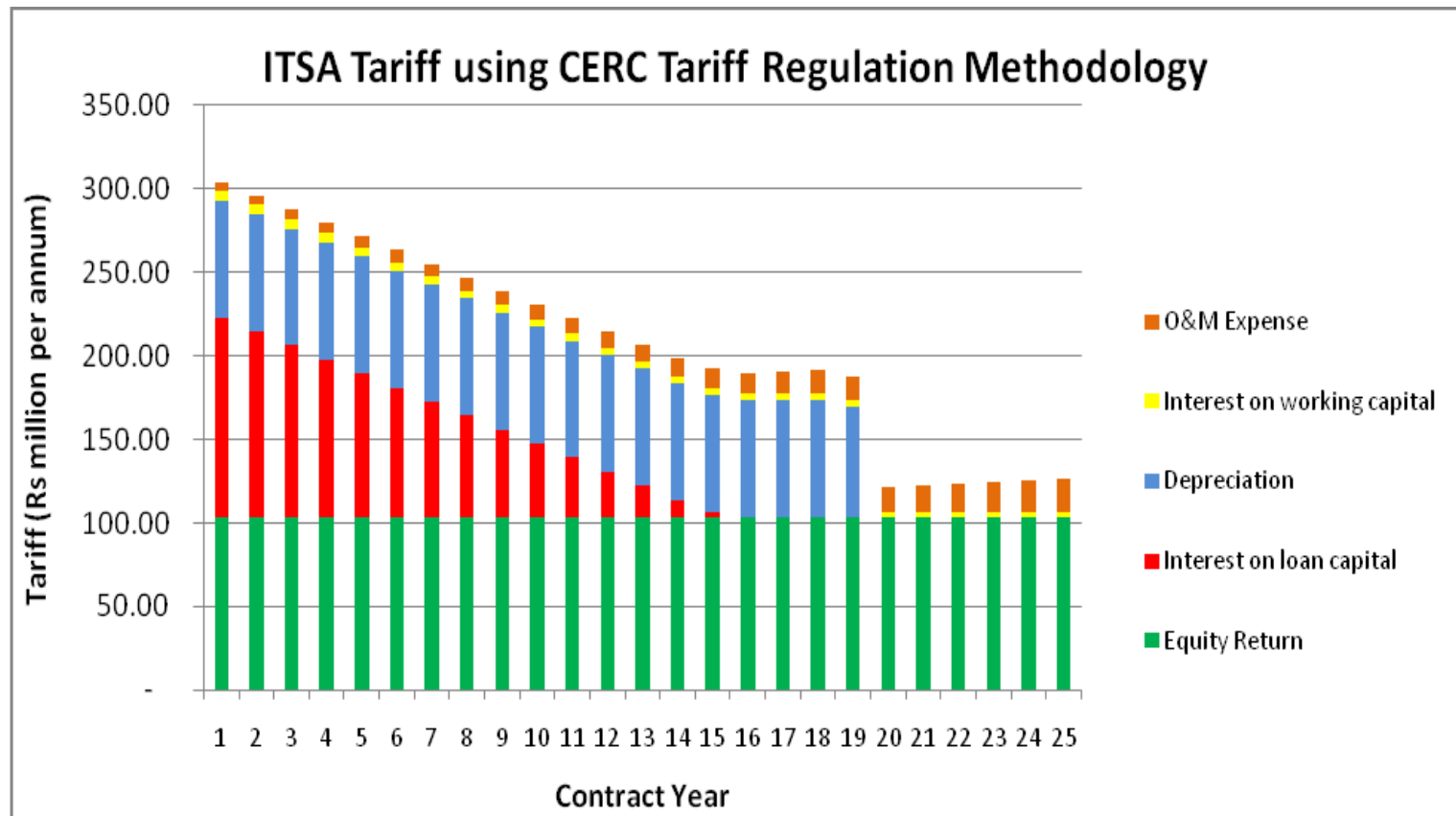
# Transmission Service Charge

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- Basis for Annual Transmission Service Charge
  - Return on Equity: 15.5% per Annum on Post Tax Basis
  - Interest on loan capital
  - Depreciation: @5.28% per annum on straight line basis till the repayment of the principal amount of the loan
  - Interest on working capital: shall be on normative basis and shall be equal to the short-term Prime Lending Rate of Bank
  - Operation & maintenance expenses : @ 1.5 % of the total Capital cost of TLP – Nepal escalated @ 5% per annum

# Transmission Service Charge

- High initial TSA tariffs reducing over term of ITSA;
- Fixed annual equity returns.



**Illustrative tariffs only using Business Plan cost estimates and current CERC regulations**

# Payment Security Mechanism

- NEA to establish the irrevocable revolving letter of credit in favour of PTCN/CPTC in a schedule Bank in Nepal /India with a value equal to 105% of the estimated value of one month's monthly TSC payment.
- The term of LC shall not be less than 12 months and shall be renewed time to time
- As a credit enhancement, NEA to furnish the Bank Guarantee valid for 12 months for an equivalent value of twelve months Monthly TSC payment

# Operational Details

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- **Outages**

- unless otherwise agreed by NEA, PTCN and CPTC may not schedule any outages during the period from 1 October to 30 May of any year
- NEA to use reasonable endeavors to schedule maintenance of interconnected components of NEA grid in a way that minimizes disruption to TLP-Nepal

# Legal Provisions of Note

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- **Cross-Termination**
  - If either ITSA is terminated for any reason, the other ITSA immediately terminates as well
- **Governing Law**
  - Nepal Law for ITSA-Nepal
  - India Law for ITSA-India

## ISSUES IN COMMERCIAL MODE OF CROSS BORDER INTERCONNECTION

- Absence of G to G umbrella agreement in cross border power trade.
- NEA to capture all major risks as an off-taker and developer.
- Bankable Legal Agreements- off-taker has to satisfy the lender's covenants
- Inadequacy of existing legal and regulatory system
- Transparency in sharing information
- No control over Power station supplying the contracted power
- Difficulty in administering legal Agreements



# ISSUES Contd...

## Operational Issues

- Synchronization between two systems
- Loop flows
- Grid code harmonization
- Security standards and operational protocols
- adequacy of load dispatch and communication facilities to handle the commercial trade of power

# Concluding Remarks

- Commercial mode of cross border interconnection is new in the region- different approach from the traditional G to G approach
- Learning by doing approach.
- The success of this modality may be instrumental in fostering commercial power trade in the region if backed by G to G umbrella Agreement.
- Will create opportunities for PPP in setting up the infrastructure.
- NEA has taken initiative towards this step by absorbing major risk
- Co-operation from every individual and stakeholder is anticipated to make this successfully happen

**THANK YOU**