



NEPAL POWER INVESTMENT SUMMIT 2016

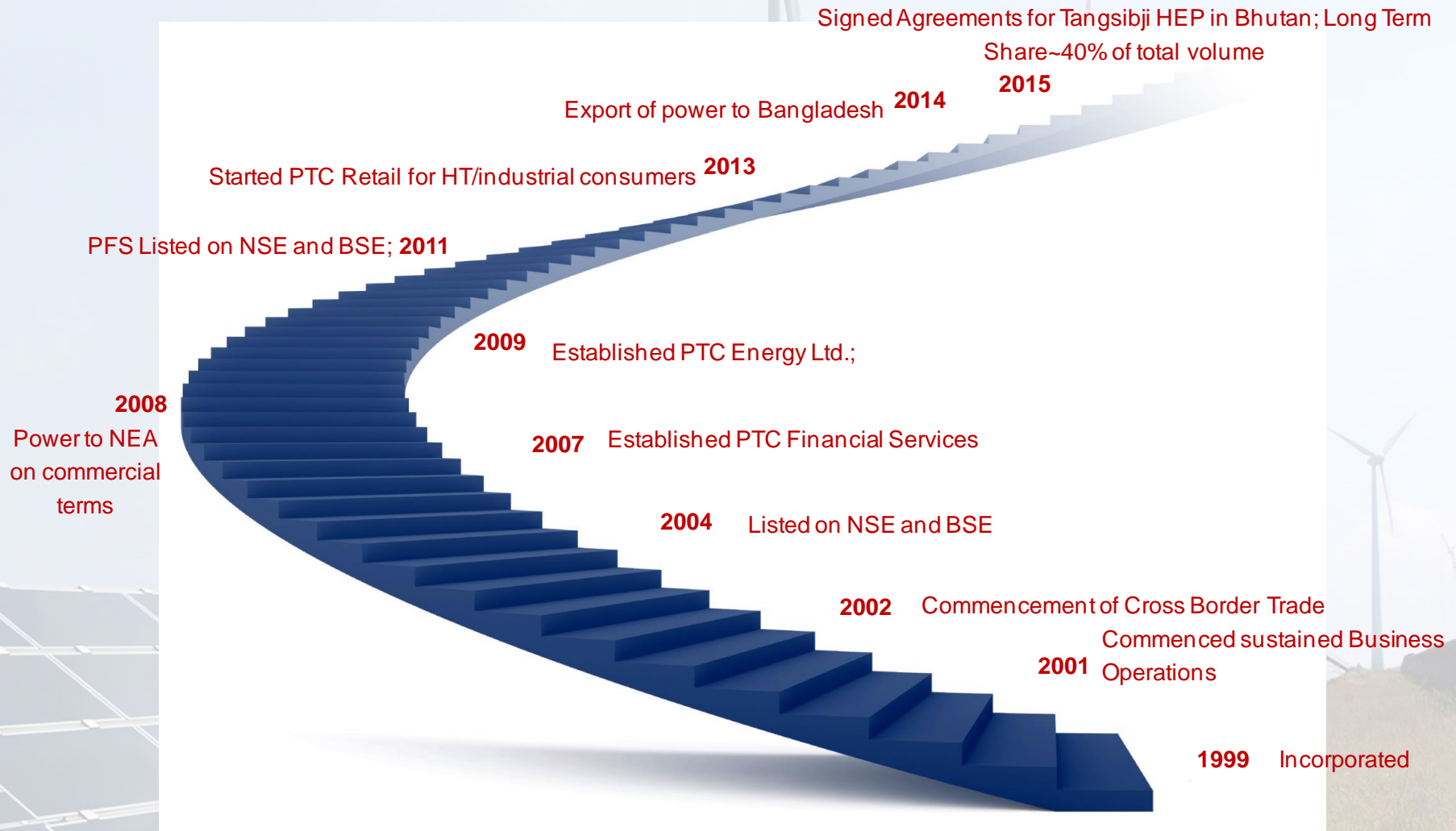
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Power Trading Opportunities and Challenges between Nepal & India

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- ❑ PTC India Ltd. (PTC), was established in the year 1999 by Govt. of India; with primary focus on
 - ❑ promoting power trading to optimally utilize existing resources
 - ❑ attract viable investments in the power sector on the strength of multi-buyer model
 - ❑ creating a Power Market in India and the neighbouring countries
- ❑ Promoted by public sector majors in the industry
 - ❑ NTPC, POWERGRID, PFC and NHPC
- ❑ Emergence of PTC and its resounding success recognized power trading as a distinct licensed activity in Electricity Act 2003
- ❑ Board with eminent persons from Government and Power Sector
- ❑ Stock listed on BSE and NSE since 2004; widely held by institutions.

PTC: Milestones



An Integrated Energy Player

Power Trading

- Domestic OTC market;
Short/Medium& Long-term trades (utilities)
Retail (Open Access consumers)
- Cross Border trade

Investments

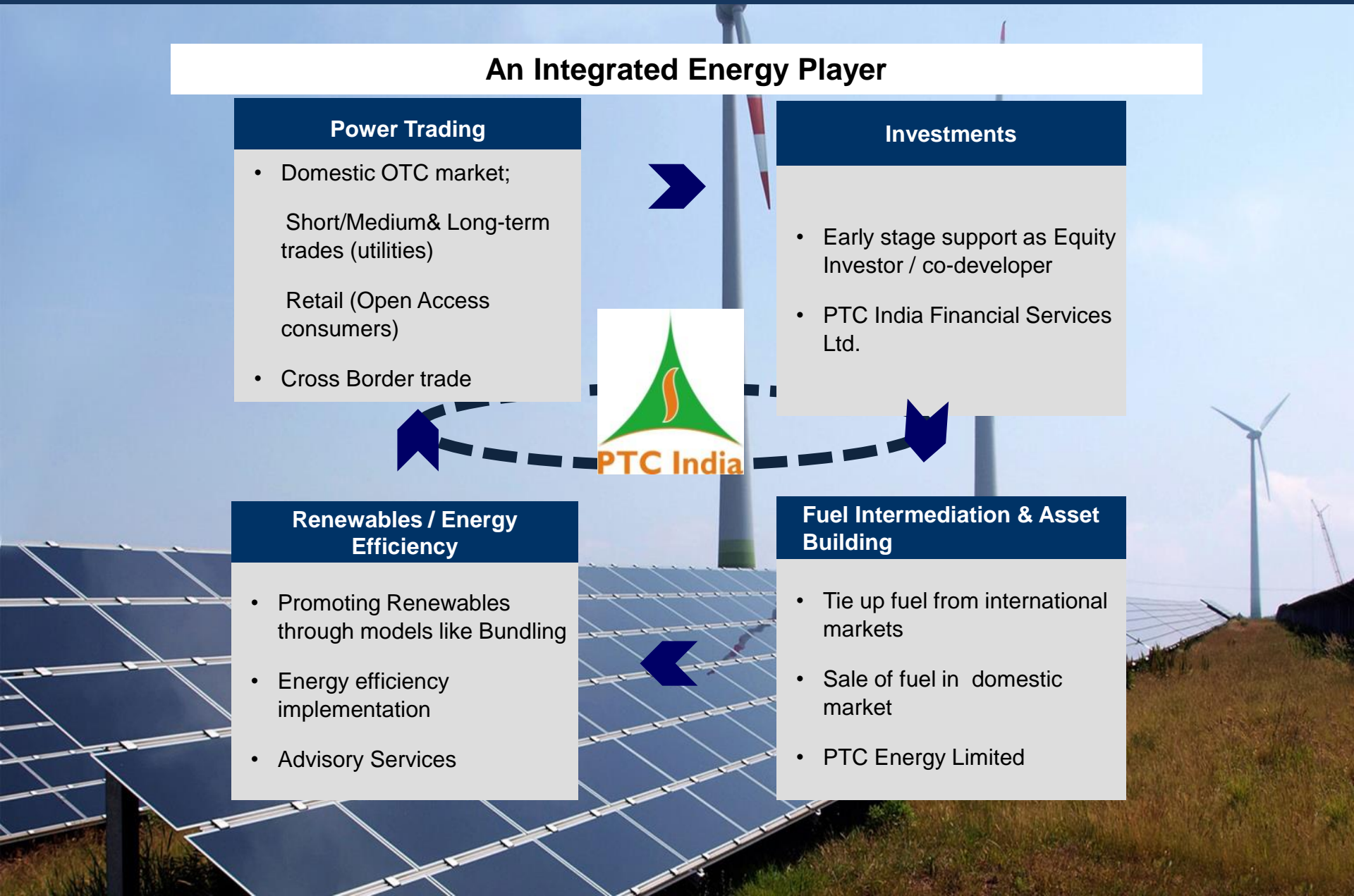
- Early stage support as Equity Investor / co-developer
- PTC India Financial Services Ltd.

Renewables / Energy Efficiency

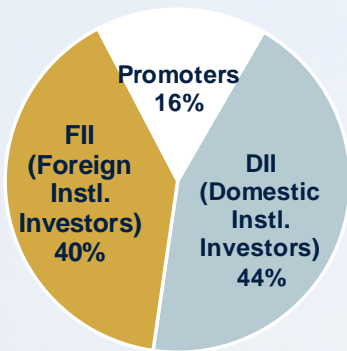
- Promoting Renewables through models like Bundling
- Energy efficiency implementation
- Advisory Services

Fuel Intermediation & Asset Building

- Tie up fuel from international markets
- Sale of fuel in domestic market
- PTC Energy Limited



Shareholding as on 31/03/2016 (%)

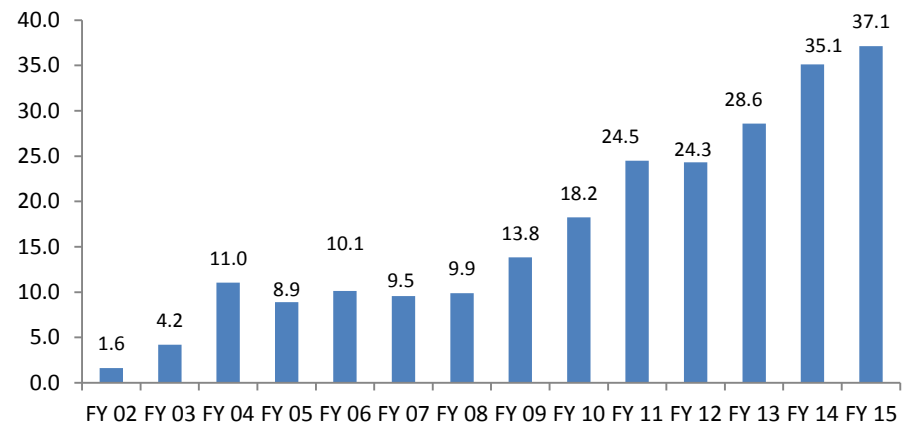


Promoted by industry participants with a credible track record and significant sector experience

- NTPC - India's largest thermal power generator
- POWERGRID - India's largest Central Transmission Utility (CTU)
- PFC – Development Financial Institution (DFI) dedicated to the power sector
- NHPC - Large hydroelectric power generator in India

PTC Today

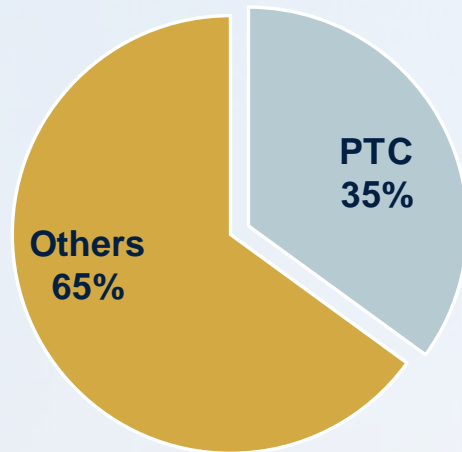
- ◆ PTC's business includes Short term, Medium term, Long term (including cross border) power trading, banking, trading of power through Power Exchanges



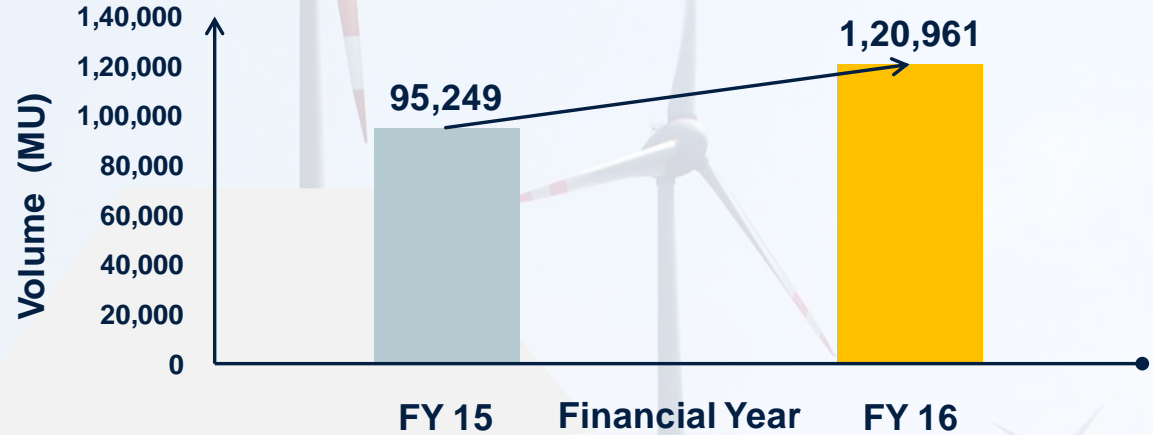
■ Total BUs traded

- ◆ PTC has now expanded its business operations and moved towards an Integrated Energy player
 - PTC India Financial Services Ltd
 - PTC Energy Limited
 - Direct investments in other identified projects

PTC Market Share - FY16



Tradeable Volumes (MU) - FY 15 and FY 16



Volumes (MU)*	Overall
PTC	42,360
Others	78,601
Market volume (MU)	1,20,961

Financial Years	Volumes (MU)
FY 15	95,249
FY 16	1,20,961
% Change	26.99%

*Including Cross Border

Prior to Power Markets

Monopoly Suppliers (SEBs, Private Licensees) ; Each SEB had an allocated share in a Central/ Jointly owned station

Generators (CGSs, IPPs and SEBs) with capacity fully tied up

Price setting by Central/ State Governments – SEBs hardly having any say

Entire sector developed on fixed rate return; Interplay of market forces remained non-existent

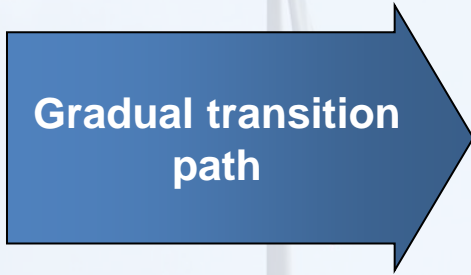
Utilities would back-down in case of low demand and resort to load shedding in case of excess demand

Power as a resource for earning revenue did not exist in this cost based regime

Objectives of Indian Power Market

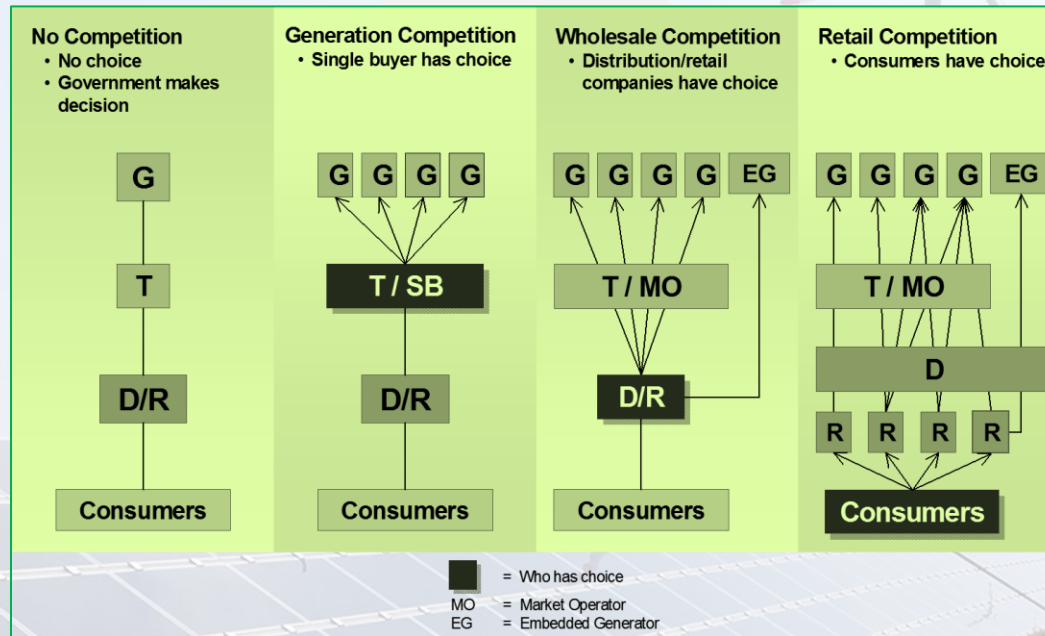
Current situation

Largely cost plus tariff systems with limited incentives for improving efficiencies



End goal

A well functioning power market leading to free competition



The power sector needs to introduce competition into the power procurement process as it gradually migrates to competitive markets across electricity value chain

Power Market

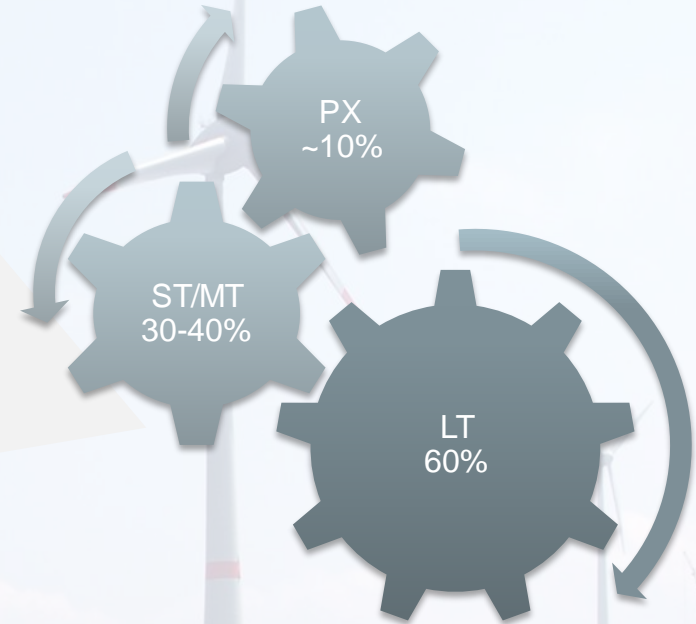
Power market has in fact become a catalyst for private investment in power sector

More than 75,000 MW under development by IPPs without any Government support

The wholesale market for electricity in India is completely voluntary by design - that none of the market participants are obliged to operate through a restricted and compulsory market.

Further, the rules regarding standards of supply are more liberal, permitting greater flexibility to utilities on demand side response

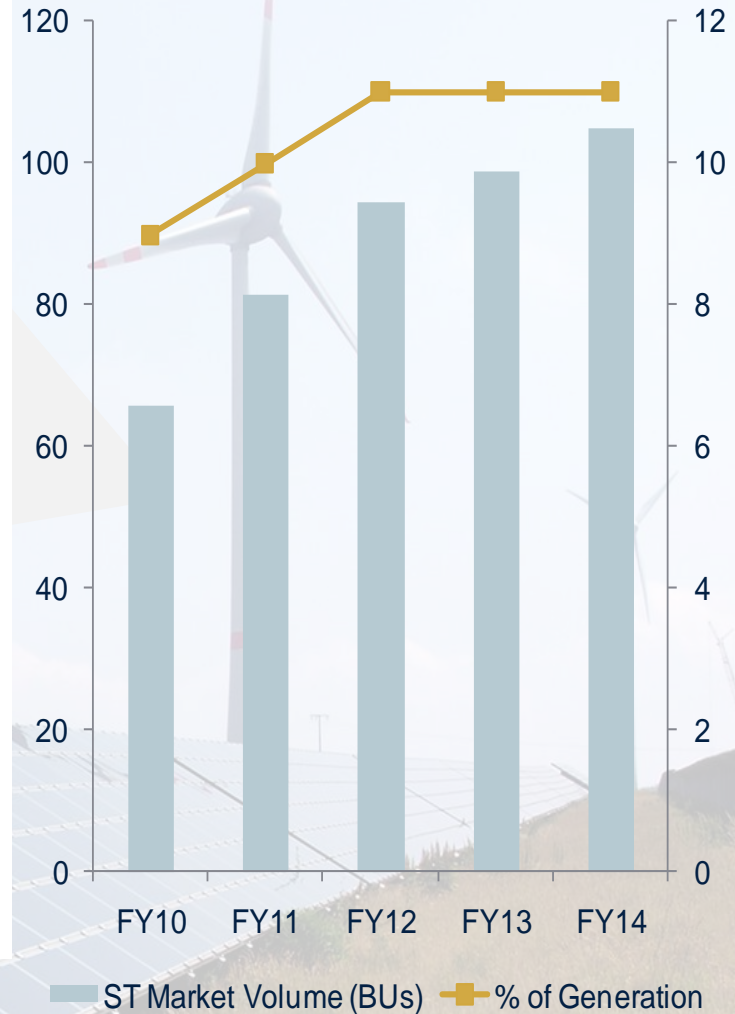
Such strong markets make capital funding easier through effective support from market intermediaries



Capacity Tie-Up

Growth in Power Trading

- Power Trading growth
 - Volume has grown from 22 BUs in 2008 to 105 BUs in FY14
 - As percentage of total generation, ST market has grown from 3% in 2008 to 11% in FY14
- Power Exchanges started in 2008
 - Two exchanges – IEX and PXIL
 - PTC co-promoter of first National PX Indian Energy Exchange (IEX) – has > 97% market share
 - Type of Trades
 - Day Ahead Market (DAM) – 95% of PX trades
 - Term Ahead Market (TAM) – 5% of PX trades
 - Renewable Energy Certificates (RECs)



Instruments

Pioneer Role - Initiated development of short term power market and introduced innovative products for customers

Transition from cost-based returns to market based returns

Creating "value" for power – market based price discovery of power

Optimal utilization of generation capacity – short-term trading

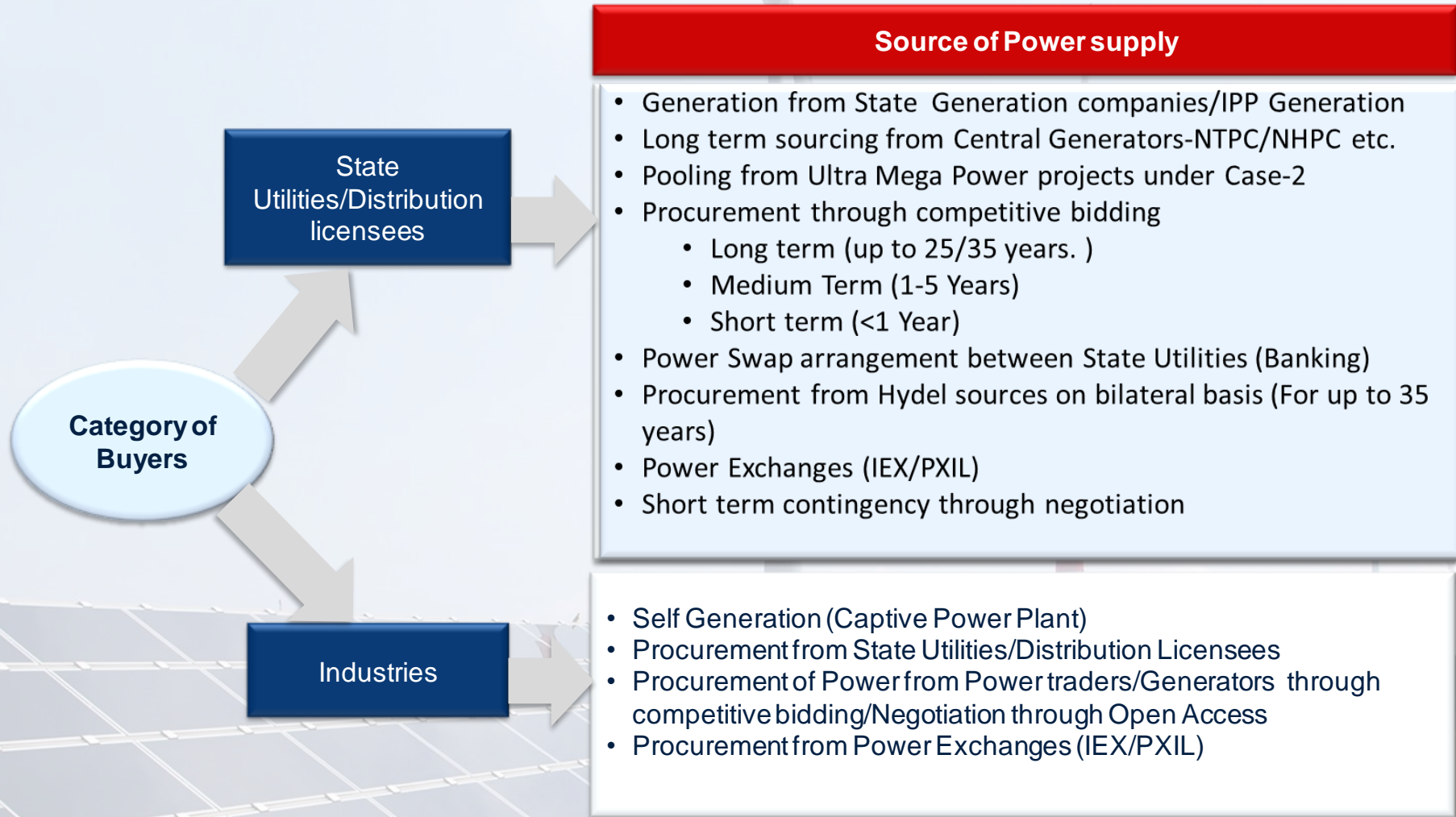
Increased generating capacity addition – long-term trading

Development of Power Exchange

Process & Execution

Mechanism

- Established the viability of concept
 - Power market can play key role in growth of sector
- Credible intermediary
 - Payment Security Mechanism
 - Weekly billing to reduce credit risks
 - Right to divert in case of default
 - Relationship of trust, transparency
- Comfort to developer of power projects –by addressing market risks
- Comfort to lender – by addressing credit risks
- A catalyst for private investment in the sector



Short Term : Type of Transactions

- Bilateral – Discom to Discom sales
 - Directly between two discoms or between a discom & a generator
 - Banking transactions
 - Direct Participation in Competitive Bidding Tenders

- Bilateral – through traders
 - Largest component of Short-term Market
 - Facilitated by traders
 - Negotiable Contracts
 - Short-term tenure up to 1 year
 - Competitive Bidding Tenders
 - Banking transactions

- Through Power Exchanges (PX)
 - >2500 participants
 - >1500 Open Access (OA) consumers
 - Day-ahead & Term ahead market, Contingency, Open Access Consumers

Particulars	Agreement Duration	Open Access Duration
Medium Term (earlier SBDs)	>1 year up to 7 years	>3 months up to 3 years
Medium Term (FOO)	>1 year up to 5 years	
Long Term (excluding Hydro)	>7 years up to 25 years	>12 years
Long Term (Hydro)	>7 years up to 35 years	
Short Term –Bilateral	Up to 1 year	For a period of up to 3 months
Short Term –Power Exchange	Day Ahead Market (1 day)	1 day (corridor left after short term bilateral)
	Term Ahead Market (up to 7 days)	Up to 7 days in advance

Existing Regional Cooperation in South Asia

- ❑ Presently, inter-country cooperation mainly on bilateral basis
- ❑ Mostly as Govt. to Govt. initiatives with an intermediary as facilitator.
- ❑ Bhutan – India
 - ❑ PTC imports ~1400 MW power annually from Bhutan
 - ❑ Single largest revenue earner for Bhutan
- ❑ Nepal – India
 - ❑ PTC facilitates power sourcing for Nepal on commercial terms(30 MW).
 - ❑ NVVN is supplying 80 MW.
- ❑ Regional cooperation now moving as a mix of Govt. to Govt. and competitive routes
- ❑ Bangladesh – India
 - ❑ 250 MW supply to Bangladesh as Govt. to Govt. Arrangement
 - ❑ 250 MW & 30 MW through competitive bidding route (PTC)

Nepal-India

- PTC facilitates power sourcing for Nepal in winters on commercial terms
- Several transmission interconnections exist between India & Nepal on Radial Mode
- 400 kV Muzaffarpur-Dhalkebar line once fully loaded will have carrying capacity of 1000 MW.

Bhutan-India

- Currently India imports about 1400 MW from Bhutan.
- Another 5000 MW likely to be added by 2020.

Bangladesh-India

- 500 MW power is being supplied from India via 400 kV HVDC Behrampur-Bheramara line.

Srilanka-India

- Proposed HVDC interconnection between Madurai (India) and Anuradhapura (Sri Lanka) through the Palk Strait
- The carrying capacity of the line will be 1000 MW

Pakistan-India

- Proposed interconnection between India and Pakistan with carrying capacity of 500 MW under discussion

The above are small but crucial steps towards formation of a SAARC power Market. But there are many more barriers required to be removed to create a vibrant South Asian Power Market place

Free Power under Major River Treaty

- Mahakali Treaty 70 Million Units/year (30MW)
- Koshi Treaty 10 MW

Contiguous border Power Exchange (with Indian SEBs)

- 50 MW

Commercial Power Trading (With PTC India Limited)

- No limit
- Limited by transmission capacity

Volume of electricity supplied by PTC

Year	Energy export to Nepal (MUs)
2008-09	50
2009-10	69
2010-11	46
2011-12	69
2012-13	79
2013-14	97

Systematic power exchange between India and Nepal began from 1992 after the first power exchange committee meeting held in New Delhi.

Laws and Regulation

- Presence of Independent Electricity Regulator can stabilize & enhance trading activities by establishing prudent settlement processes
- Formulating regulations for Cross Border trading activities would facilitate a competitive trading market
- Adequate political support & stakeholder commitment would play a significant role in hastening the trading activities

Financial / Off-taker's creditworthiness

- Financial support from multilateral agencies such as ADB, World Bank.
- Sufficient revenues certainty as a result of high regulatory risk
- Payment security mechanism and participation of private sector.
- Legally enforceable agreements with proper dispute mechanism and equitable risk sharing.

Technical / Evacuation of power

- Establishment of clear procedures for evaluating the technical impact of cross border projects
- Harmonization of Grid Codes, Connectivity Standards, Penal mechanism for Incidences of Grid Indiscipline
- Adequate monitoring and operational discipline in interconnected system and protection system

Investment and Commercial

- Regulatory certainty for investments in Power sector
- Funding requirement for creation of Generation/Transmission assets. Payment Security Mechanism, Currency transaction and translation risk.
- Clarity required on connectivity (Power evacuation system), open access and displacement of cheaper power (Merit order dispatch mechanism)

Opportunities for Trade of Power with Nepal

- ❑ *PTC has signed PSA with NEA for supply of **150 MW for 25 years** facilitating the financial closure of Dhalkebar-Muzaffarpur line (December 2011)*
- ❑ *Purchase of power from Indian Market through commercial terms*
- ❑ *Sale of power to Indian Utilities on Long term/Medium term/Short term basis.*
- ❑ *Sale & buy on India power exchange platform on day ahead basis.*
- ❑ *Explore suitable cross border banking arrangement with Indian Utilities to meet seasonal variations.*

Role of Power Traders

Year	Dry Season (MW)			Wet Season (MW)			Surplus
	Gen	Peak	Shortage	Peak	Gen	Shortage	
2013/14	641	1242	602	1217	849	368	8
2014/15	665	1357	693	1309	902	407	69
2015/16	940	1480	541	1379	1139	239	261
2016/17	1001	1612	611	1555	1363	191	404
2017/18	1694	1742	48	1680	1987	0	306
2018/19	1807	1880	73	1814	2217	0	403



Thank You

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