



An Overview of India's Current Power Market Structure

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Colombo, Sri Lanka

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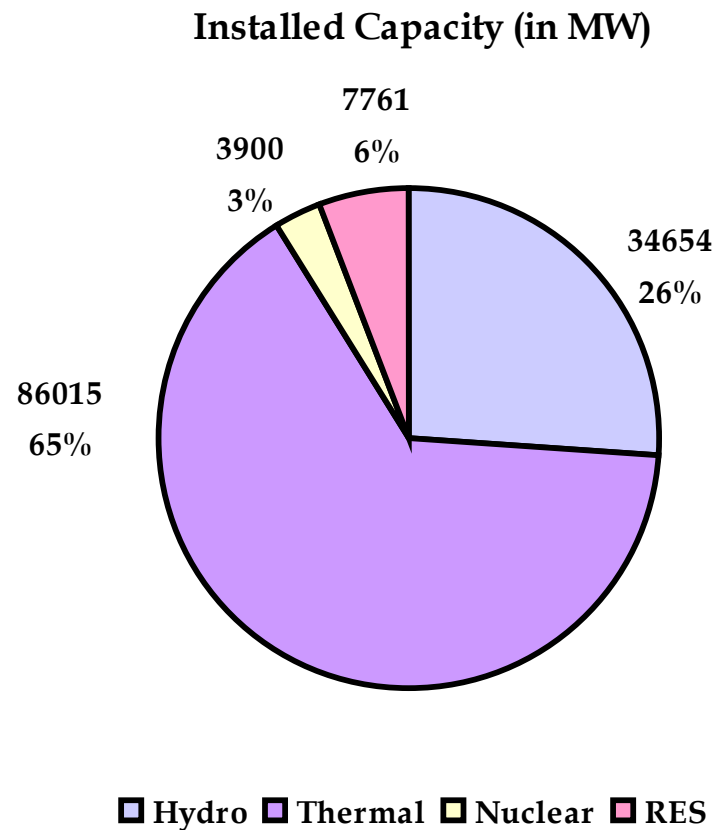


Overview of Indian Power Situation



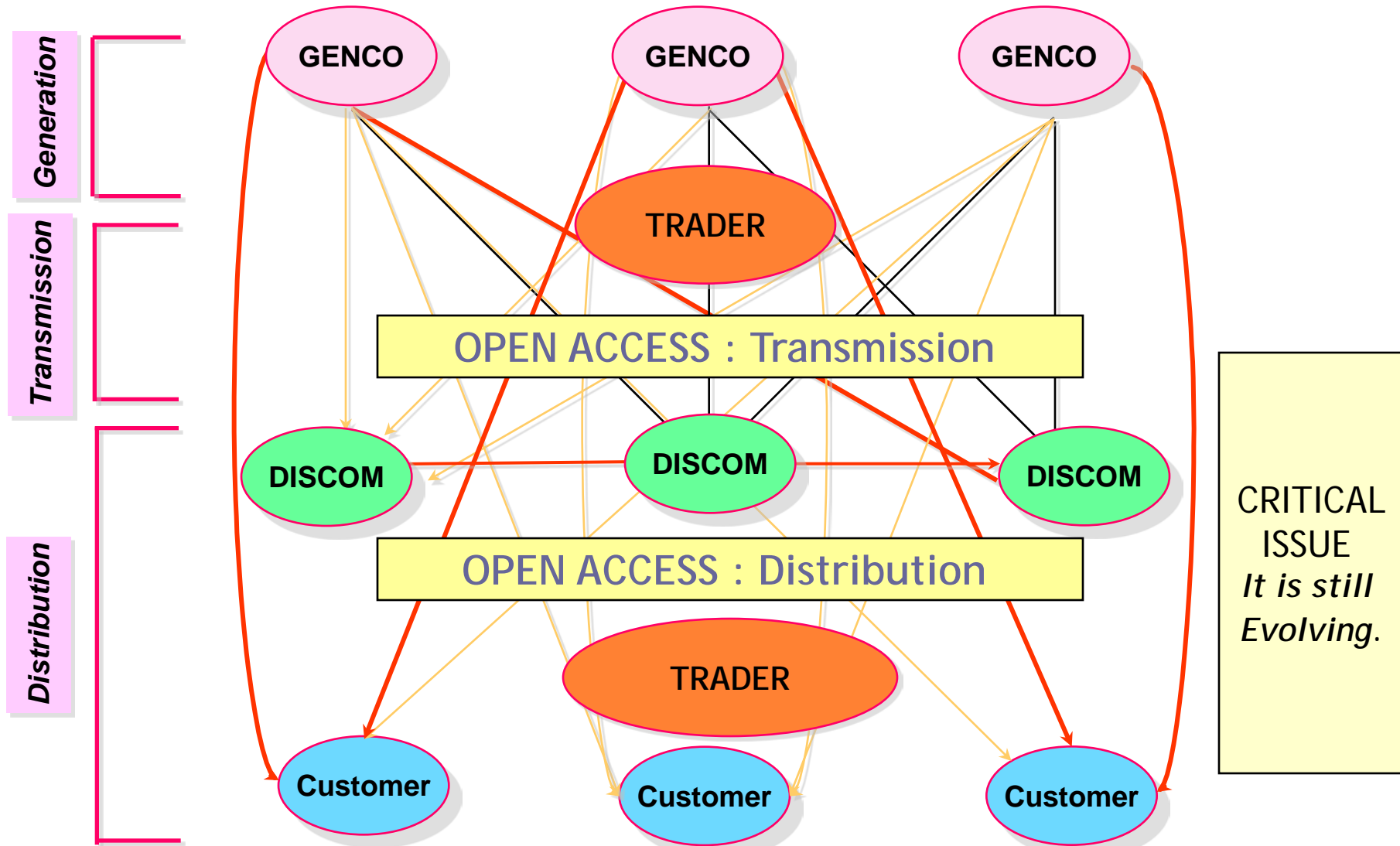
- Indian power sector is the third largest in Asia after China and Japan
- 9% energy shortage and 15% peak demand shortage
- Unmet planned targets in generation capacity addition
 - In last 3 Plan periods, target versus achievement ~ 50%
- Share of hydro declining in the generation mix
- Aims for **“Power to All”** by the year 2012
- Domestic energy resources not adequate to meet the total requirement
- Need for diversification of energy resources and regional cooperation - for energy security

Total Installed Capacity: 132330 MW



- Monopoly Suppliers (SEBs, Private Licensees)
- Generators (CGSs, IPPs and SEBs) with capacity fully tied up
- Each SEB had an allocated share in a Central/ Jointly owned station
- 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**

Emerging Industry Structure



Emerging concept of trading in electricity



- Prior to trading as a business concept, there were power exchanges between the States mostly for emergency support but without any commercial arrangements
- The exchanges were further limited due to lack of transmission inter-connection
- Sustained shortages, both in energy and peak demand, discouraged initiatives – skepticism about success of trading was widespread
- PTC formed in 1999 as a pioneer initiated development of short term power market and introduced innovative products for customers
- Efforts lead to sustained trading during 2000-01 aided by increased inter-regional transmission capacity – 1.6 Billion units
- Exponential growth in trading successfully established the concept and resulted in identifying trading as ‘distinct activity’

What is Electricity Trading??



Trading as per Electricity Act 2003 is defined as **“Purchase of electricity for resale thereof”**.

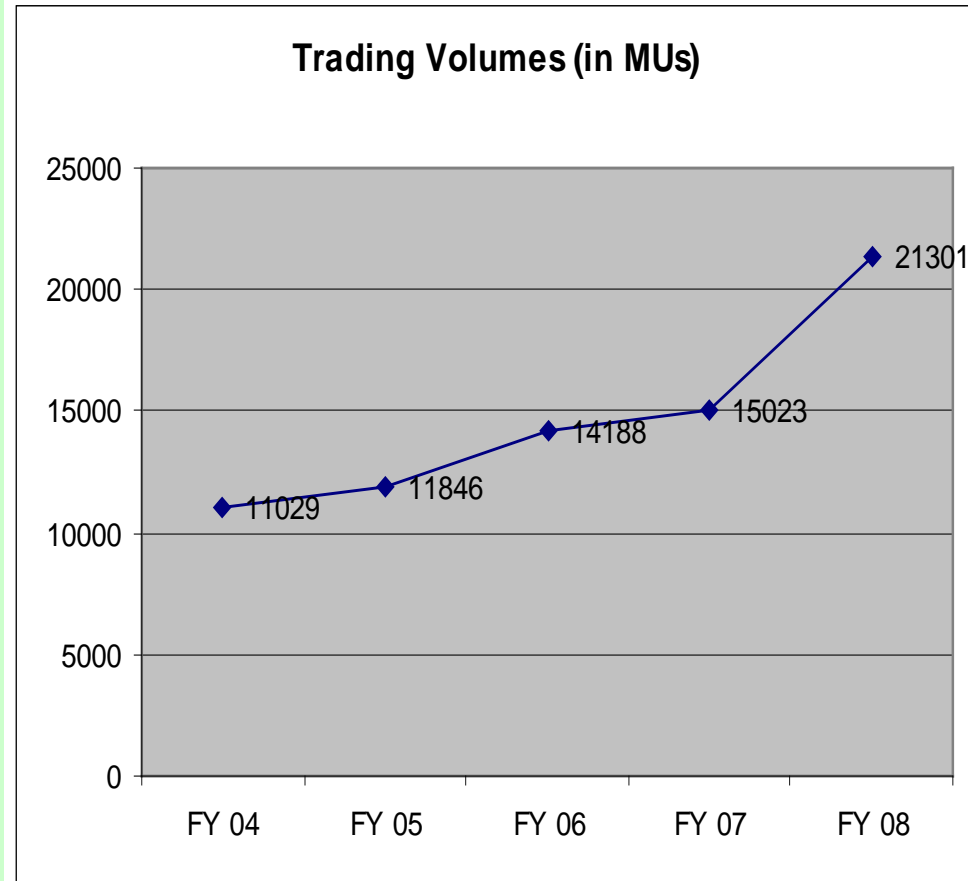
■ Short Term Trading of Electricity

- Power system in India developed on state/regional basis. Eastern/ North Eastern /Northern /Southern /Western region.
- Surplus Power in Eastern and North Eastern region almost through out the year. Southern region is surplus for some part of the year at least in off peak hours, Western Region is surplus during monsoon period.
- Deficit in other regions
- Seasonal surpluses exist in almost all regions
- Due to demand diversity, possibility of short-term trading

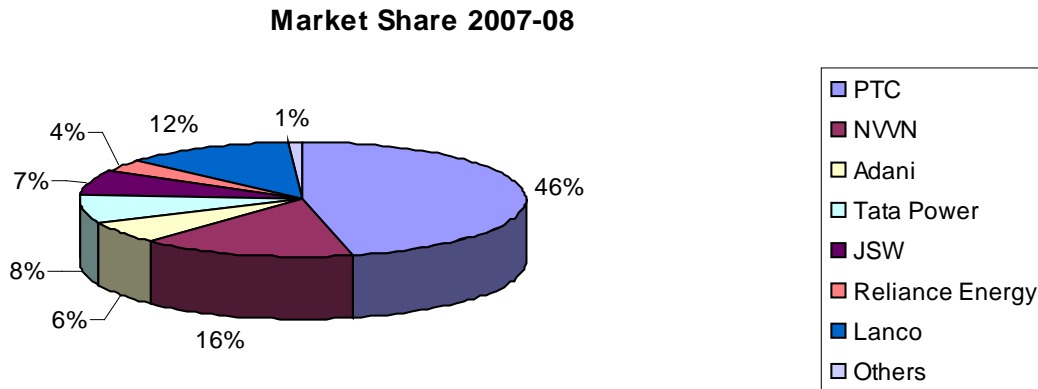
Power Trading Scenario In India



- Trading as per EA 2003 is a licensed activity
- Inter-state trading licenses (25 Years validity) in the purview of CERC
- Twenty Six (26) Trading licenses issued by CERC
- Volume of exchanges is very low (about 3% of energy generation)
- Total short term market approximately 21 billion units in 2007-08



Key Players and Market Share (2006-07)



Trading Licensees	Volumes (MU)
PTC #	9889
NVVN	3324
Adani	1322
Tata Power	1682
JSW	1479
Reliance Energy	776
Lanco	2600
Others	229
Total	21301

■ EA 2003

- Recognized Trading as a distinct activity
- Development of Power Market – Electricity Act 2003, Section 66, “**The Appropriate Commission shall endeavor to promote the development of power market...**”, **guided by the National Electricity Policy**

■ National Electricity Policy 2005 – Para 5.7

“ To promote market development, a part of the new generating capacities, say **15%** may be sold outside long term PPAs. As the power markets develop, it would be feasible *to finance projects with competitive generation costs outside the long term PPAs....this will increase the depth of power markets....and in long run would lead to reduction in tariff*”

- Short & Medium Term transactions for peak/off-peak load balancing: **different products brought in the market**
 - Duration of Transactions (Few hours to 3 years)
 - Hours of Supply
 - Round the Clock
 - Evening Peak / Morning Peak
 - Night Off Peak / After Noon Off Peak
- “As and When Available” Power for balancing Scheduled Interchanges
- “Weekend / Holiday Power”
- Banking of Power
- Continuously evolve innovative products for short term market e.g. HP Model – **Portfolio Management**
 - Other States/Utilities adopting this Model: Chattishgarh, NDMC, WB, J&K

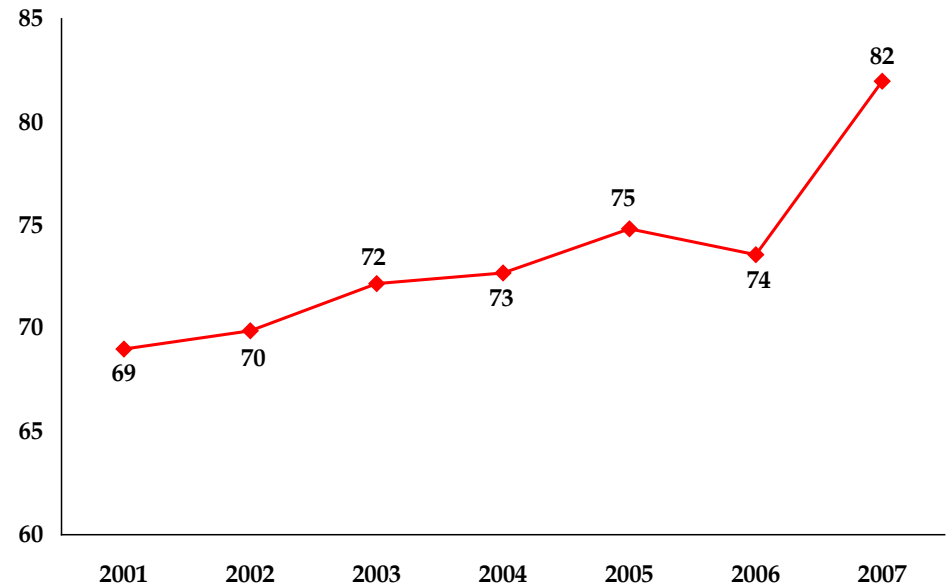
***Continuous
development of
new products as per
market requirements***

Benefits of Trading (1)

⇒ Increasing realization among utilities of power as a source for revenue earning

- Improved PLF, particularly of State Power Utilities
 - An example: DVC - a rise of 5% in PLF
- No backing down
- Reduction in load shedding

⇒ Rapid capacity build-up

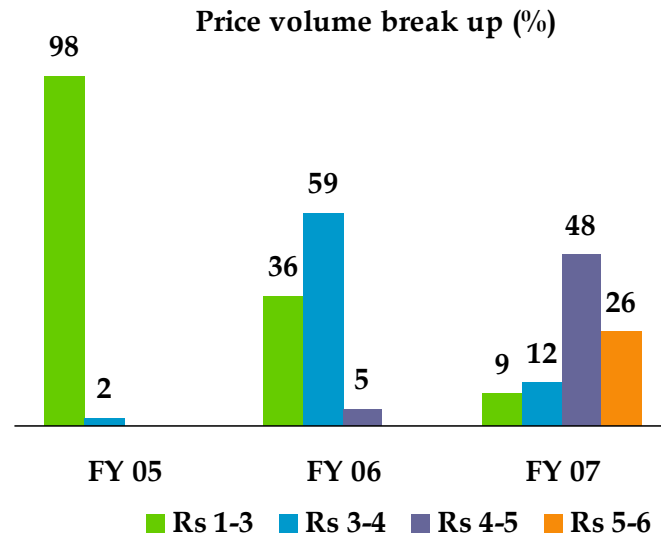


All this results in optimization of resource utilization

Benefits of Trading (2)



- The short term market has created “**value**” for power. There is a distinct shift towards higher revenue realization
- Traded volumes are rising (3% of total energy generation in the country)



Power as a resource for earning revenue did not exist

Benefits of Trading (3)



- Encouraged IPPs to invest in generating assets- spurt in investment based on **competitive tariff** due to widening demand –supply gap
 - Market-based returns
 - No sovereign/ government guarantee
- Large merchant capacity is being funded
- States Governments of Chhattisgarh, Jharkhand, Orissa, Himachal Pradesh, J&K, Uttaranchal, etc. have recognized “ **Power as Resource**”
- Planned rapid capacity additions – *have devised policies to become Power Hubs*
- MoU with *developers for* Capacity addition
 - Jharkhand 9,110 MW
 - Chhattisgarh 30,000 MW
 - Orissa 17,000 MW
 - Tamil Nadu 10,000 MW

*A paradigm shift from Cost plus return regime to “**market determined returns**”*

- A fledgling, nascent market – needs to be nurtured

- Limited growth of volumes of short term traded market due to
 - Overall deficit scenario
 - Limited number of active players
 - Liquidity crunch

- During the initial phase of growth and deepening process, market has to undergo:
 - Pains
 - Distortions
 - Abuses

- Market depth to be increased
- Power Exchange
- Open Access Implementation
- New Segment of prospective participants need to be included in this market such as
 - Industry
 - HT consumers
 - Group Captives
 - Merchant generators
- Capacity building of manpower- much needs to be done
- Limited transmission corridor, transmission pricing issue-pan-caking

Steps to overcome the challenges



- Reform in power sector to continue (unbundling of SEBs, Intra-state ABT) thereby providing easy access to all segments in the sector
- High traded volumes in power exchange
 - *Real* open access (target up to 1 MW by January 2009 – Industry, SEZ, Malls etc.)
 - Accelerated generation capacity addition
 - More Participants
 - Price signal
 - Liquidity
 - New Products – week ahead, fortnight- ahead, month-ahead, year ahead etc
- Sufficient transmission capacities required for a vibrant power market
 - Government to initially support through ‘**viability gap funding**’

Direct bi-laterals and PX to co-exist to serve the power market well

Cross Border Power Trade

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22nd August, 2008

- Govt of India has nominated PTC as a Nodal agency for exchange of power with Bhutan and Nepal
- PTC enters into contracts with the concerned organizations in the neighboring countries on commercial basis
- PTC also co-ordinates with Central Transmission Utility, generating companies and state utilities in India, which are bulk customers of power
- PTC is supportive of cooperation in regional energy trade in terms of optimizing the installed capacity by way of utilizing the diversity in peak demand, sharing the spinning reserve, optimizing the overall generation mix as also addressing energy security issues.

- PTC purchasing surplus power from following three projects in Bhutan:
 - Chhukha HEP
 - Kurichhu HEP
 - Tala HEP

- An illustrative case: 1020 MW Tala Hydro-Electric Project
 - Agreement signed between the two Governments on 5th March 1996
 - Validity of PPA : 35 years
 - The Agreement provides for:
 - Surplus power i.e. all the power over & above that required for use in Bhutan shall be sold to Government of India (GOI) and GOI is committed to purchase all the surplus power
 - Initial tariff determined based on mutually agreed terms and conditions
 - The tariff to be reviewed at the end of each 3 year period

Tala Project: Salient Features



- Installed Capacity: 6X170 MW (1020 MW)
 - Run of the River Scheme
 - Peaking Power Availability: 4 Hrs
 - Annual Energy Injection: 3962 MUs
 - Transmission Interconnection: 400 kV(Two Double Ckts.)
- Allocation of power (85% of 1020 MW) is as under:
 - West Bengal : 45%
 - Bihar : 30%
 - Jharkhand :13.48%
 - DVC :6.52%
 - Orissa :5%
 - 15% unallocated share is being given to NR States in India

Salient features of PPAs with Bhutan

- Wheeling charges & losses upto delivery point is payable by Bhutan
- The quantum of energy received by India in a month is the actual energy delivered by Bhutan at delivery point after apportionment of losses
- Bhutan raises bill on monthly basis by 10th of succeeding month
- India makes direct payment to Bhutan within 30-45 days
- Guaranteed payment to Bhutan (through PTC)
- The payment is made in INR through telegraphic transfer in a designated account. Bhutan having direct claim on this account for any default in payment

Energy viz-a-viz Revenue to RGoB



Year	Energy sold to India (MUs)	Revenue to RGoB (Rs. Mn.)
2003-04	1751	2691
2004-05	1735	2708
2005-06	1762	3452
2006-07	2963	5695
2007-08	5234	9778

- PTC -the nodal agency identified by GoI for Power Exchange with Nepal
- An active member of Indo-Nepal Power Exchange Committee
- Pursuing opportunities for short term and long term trade in electricity for mutual benefits
- Acting as facilitator for transmission inter-connection between the two countries- Investment in transmission capacity
- Arranged 25 MW RTC power to NEA.
- Initialed PPA with SMEC West Seti for purchase of 750 MW power
- Proposing to facilitate formation and partner in a company in Nepal for accelerating hydro power development.

A. 750 MW West Seti HEP (Under development)

- Long Term PPA
- To generate average energy of 3300 GWh per annum
- Peaking Power: 8 Hrs
- Off-take by PTC

B. 309 MW Arun III (BRASPOWER)

- MoU signed
- To generate average energy of 2500 GWh per annum
- Run-of-the river
- Off-take of by PTC.

Market values power with peaking support and flexibility in operation

- MoUs signed between India (IL&FS) and Nepal (NEA) for construction
- Following lines identified for the purpose of Import/Export of power :
 - Butwal - Gorakhpur
 - Duhabi-Purnea
 - Dhalkebar - Muzaffarpur
 - Anarmani-Siliguri
- 400 KV Dhalkebar- Muzaffarpur line shall be taken up first for construction as a pilot project
- SPVs have been formed in both the countries for the project

Emerging ways for Cooperation (1)



- Development of Hydro Projects and associated Infrastructure
- Joint Ventures
 - Public-Private Partnership
 - Private Participation
- Supply of materials and Equipments
- Financing :
 - Equity Participation
 - Debt Syndication
- Skilled Manpower

Emerging ways for Cooperation(2)



- Trading of larger volume of power under
 - Short Term, Medium Term and Long Term
 - A combination of above
- Prospective buyers could be Utilities of
 - Northern Region
 - Western Region and
 - Southern Region
- Challenge: Tariff Competitiveness
 - Landed cost of power to be competitive
 - Intervening Transmission charges and losses add to the landed cost

Competitive landed cost will be key to success.

- Nepal may import power during dry season from India till it goes surplus after adequate addition of generation

- Action to be taken for import of power:
 - Indication of Firm Quantum and Duration
 - Market driven tariff
 - Scheduling on first charge basis
 - Weekly payment through Letter of credit
 - Adherence to schedule to avoid UI

- Nepal may import on short term / medium term basis.

**TRADING ON PX
(Indian Energy Exchange)**

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Launch of 1st Power Exchange



- As per National Electricity Policy, CERC have the mandate to promote power market and Power Exchange
- CERC approved operation of the first Power Exchange of our country, The Indian Energy Exchange Ltd.
- Detailed procedure issued by Central Transmission Utility (CTU)
- PTC India is Co promoter of this National Level Power exchange
- PX started its operation on 27th June,2008- domestic transactions only
- Volumes started showing rising trends with increasing number of participants

Benefits of Power Exchange



- Neutral and unbiased platform
- Transparent price discovery mechanism
- Promotes competition among participants
- PX to act as legal counter party
- Empowers demand side response to price signals and more economic grid operation

Membership Category:

Proprietary Member

Client Member

Membership – Fee Structure

(Rs. in lacs)

Member	Admission Fees	Security Deposit
	35.00	25.00

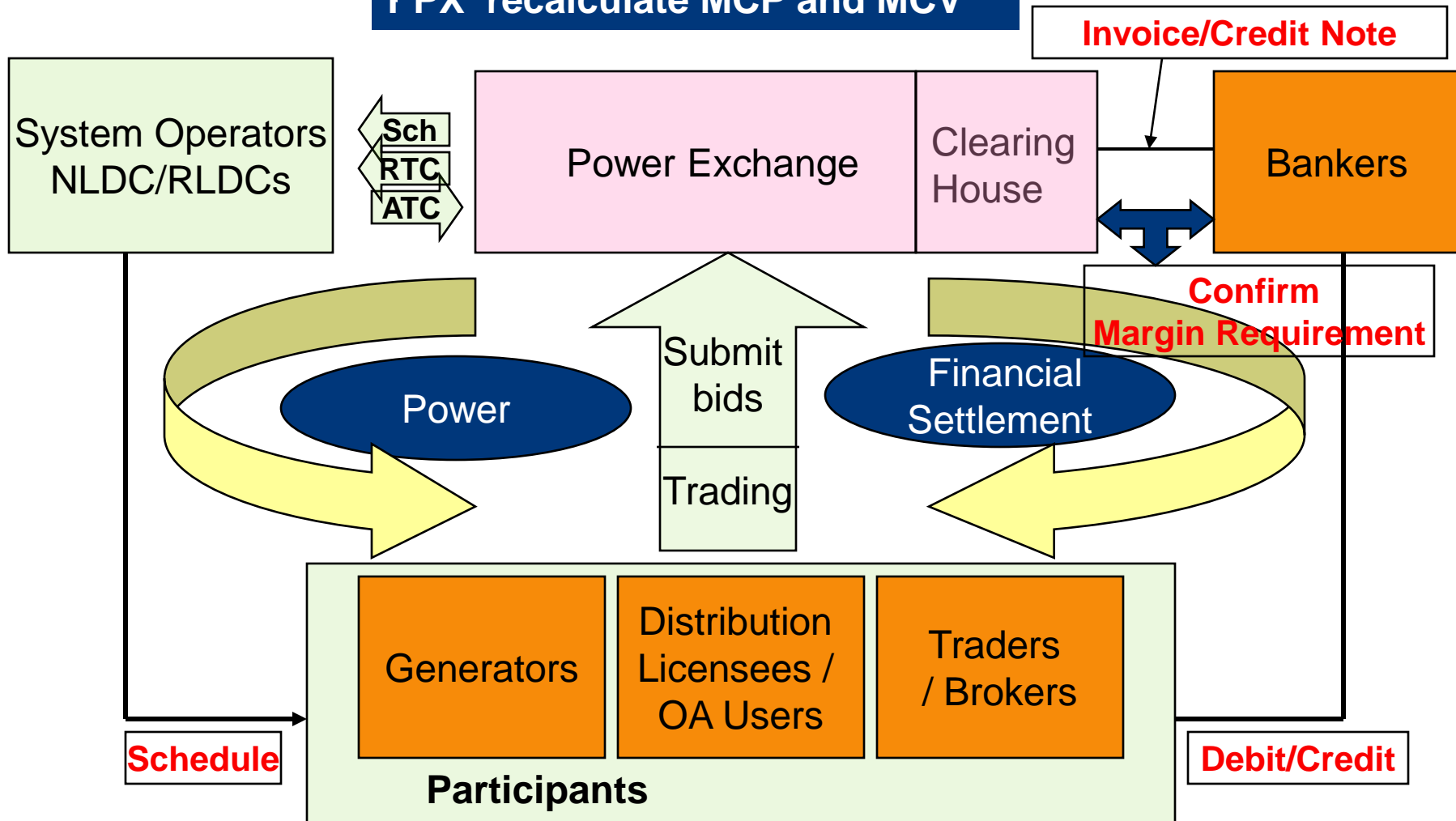
- Processing fee – Rs 10,000/-
- Annual subscription fee – Rs 5 Lakh (for Proprietary Member)
- Annual subscription fee – Rs 1 Lakh (for each Client Member)
- Transaction charges
- Hardware charges and Lease line connection charges

Current fee structure is applicable w.e.f 1st April, 2008

Day Ahead Market Operations



I PX recalculate MCP and MCV



6 - RI DCs issues day ahead generation & dispatch schedules for PX

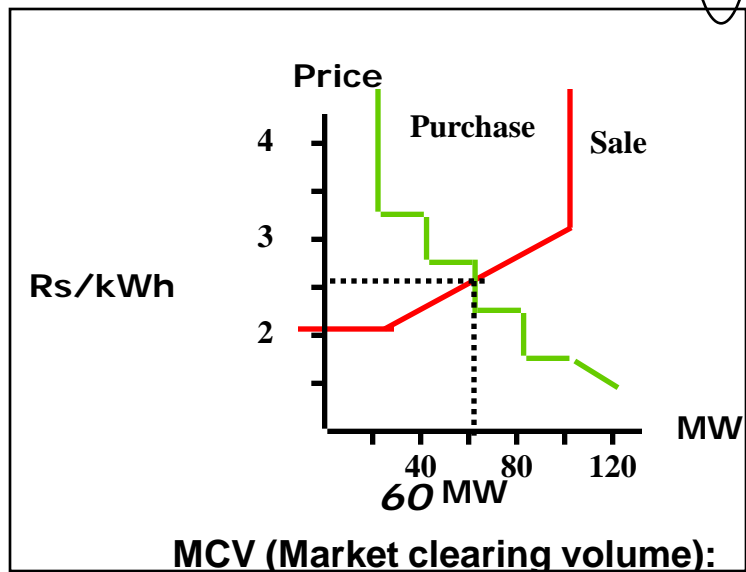
8- Settlement Banks debit/credit the appropriate amounts. dit Notes . ulation

Price Calculation Algorithm ...each hour



Price(Rs./kWh)	0	1	1.1	2	2.1	2.5	3	3.1	4	4.1							20
Portfolio A, MW	20	—				20	20	0	—								0
Portfolio B, MW	60	—	60	40	40	40	40	40	20	—						20	
Portfolio C, MW	40	20	0	0	-40	-60	-80	-81	-120	—						-120	
SUM, Purchase	120	100	80	80	60	60	60	40	40	20	—				20		
SUM, Sale	0	—		0	-40	-60	-80	-81	-120	—					-120		
Net transaction	120	100	80	80	20	0	-20	-21	-80	-100	—				-100		

MCP:
2.5



Salient Features: New Open Access Regulation



- Power exchange preference
- Cancellation/ downward revision in OA schedule can be done
 - by giving 5 days advance notice and
 - payment of charges up to 5 days.
- Bilateral, Intra-regional – Rs. 30/MWh
- Bilateral, Adjacent region – Rs. 60/MWh
- Bilateral , Intervening regions – Rs. 90/MWh
- **Collective transactions – Rs. 30/MWh**
(for each buyer and seller)

Comparison between Bi-lateral and PX



	<u>Bilateral Transactions</u>	<u>Collective Transactions</u>
-Open Access	Advance Scheduling from 3 months up to day ahead	Only day ahead
-Tr. Charges	Rs/MWH(30,60,90 Rs/MWH)	Rs/MWH(30 Rs/MWH)
-Tr. Losses	Regional Postage stamp method	Apportioned losses for each point of injection & drawal
-Schedules	- Nodal RLDC (Coordinator) -Firm schedules. Charges for 5 days payable in case of cancellation	-NLDC (Coordinator) -Firm schedules on day ahead basis
- Operating charges	- Rs. 2000/- per day for each RLDC/SLDC	-Rs. 5000/- per day for each state on cumulative as NLDC -Rs. 2000/- per day for SLDC for each pt. of transaction

Comparison of charges in IEX platform



	Direct Member ship	Client Member of PTC
01. Admission fee	Rs. 35 Lakhs	Nil
02.Security Deposit	Rs. 25 Lakhs	Nil
03.Processing fee	Rs. 10000	Nil
04. Annual Subscription fee	Rs. 5 Lakhs	Nil
05. Annual Subscription fee	Nil	Rs. 1 Lakh
06. Hardware Charges+ Installation+ lease line application	Rs. 1.7 lakhs	Nil
07. Margin Money	To be maintained by Member.	To be maintained by PTC
08. Lease line recurring expenses	As per actuals	Nil
09. Manpower required for trading terminal	05	Nil
10. Training of Manpower	Lumpsum charges	Nil
11. Infrastructure for Trading work station & manpower	As required for S.No. 06 & 07	Nil
12. Bank accounts required with electronic clearing	02	01
13. Time given to meet payment obligations	Within 2 and ½ hours daily including holidays & sundays	Payment to be made after 5 days of receipt of bill
14. IEX transaction charges	1 paisa per unit	1 paisa per unit
15. PTC professional fee	Nil	4 paisa/unit

Typical Power Exchange Market Clearing Price



Market Clearing Price for the period 12/08/2008 to 19/08/2008

Typical Comparison of PX versus UI (1)



Date:	IEX Rate in	UI RATE	FREQ
19/07/2008	Rs/Unit		
1	8,076.09	9.73	49.03
2	8,059.63	9.73	49.03
3	8,059.17	9.73	49.03
4	8,043.78	9.73	49.03
5	8,043.48	9.01	49.11
6	8,051.17	9.01	49.11
7	8,050.99	9.01	49.11
8	8,050.95	9.01	49.11
9	8,058.55	9.01	49.11
10	8,271.77	8.11	49.21
11	8,289.10	8.11	49.21
12	8,289.10	8.11	49.21

**Typical
Comparison
Of
IEX rate
Vs
Average UI rate**

Typical Comparison of PX versus UI (2)

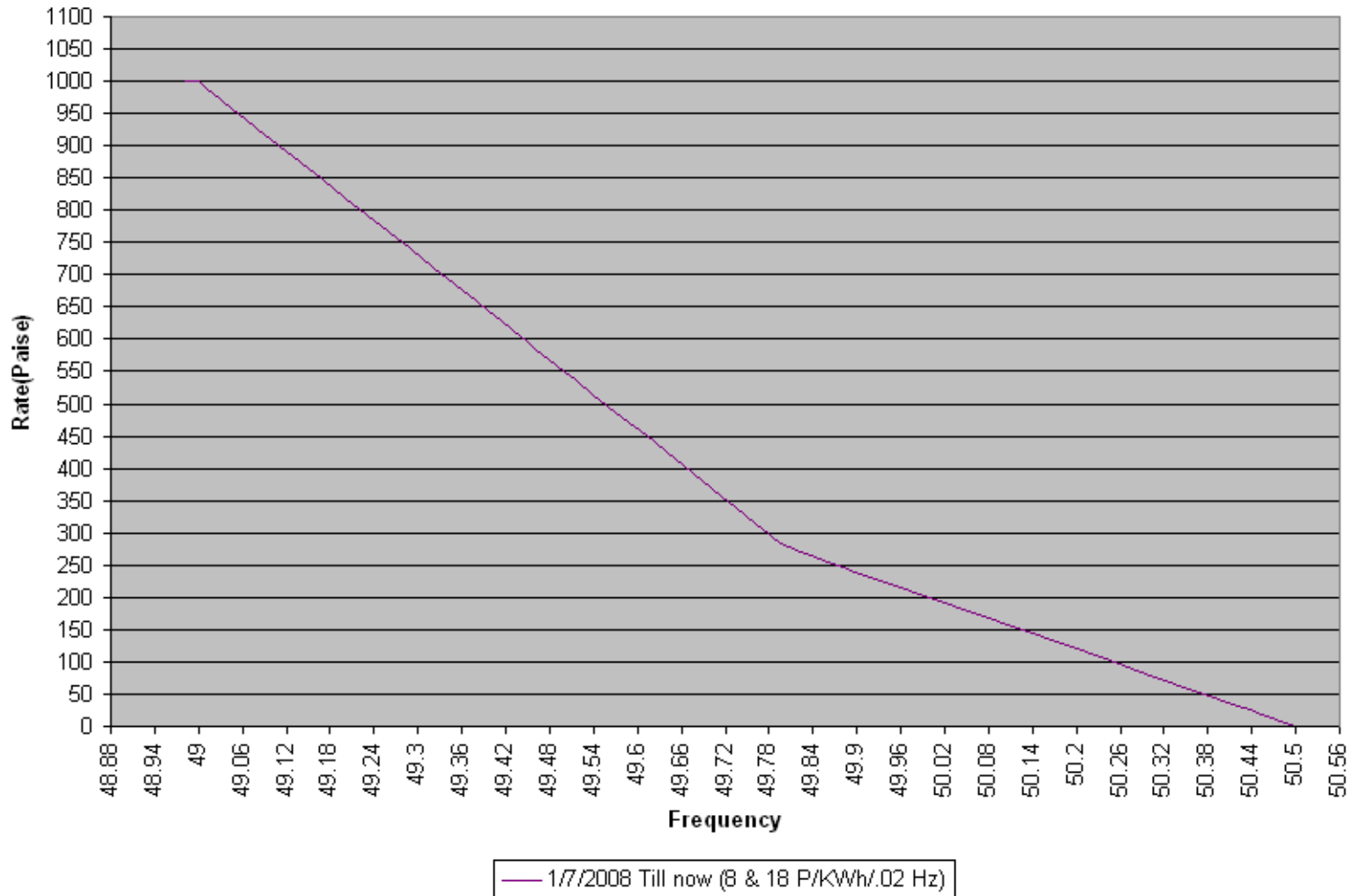


**Typical
Comparison
Of
IEX rate
Vs
Average UI rate**

Date: 19/07/2008	IEX Rate in Rs/MWH	UI RATE	FREQ
13	8,289.10	8.11	49.21
14	8,289.10	8.11	49.21
15	8,300.88	8.11	49.21
16	8,300.88	8.11	49.21
17	8,300.88	7.84	49.24
18	8,529.99	7.84	49.24
19	8,533.05	7.84	49.24
20	8,534.32	7.84	49.24
21	8,534.32	7.84	49.24
22	8,534.32	9.46	49.06
23	8,300.91	9.46	49.06
24	8,091.48	9.46	49.06

Prevailing UI Rates

UI CHART



- Multiple power exchanges envisaged in coming years
- Volumes of short term traded market and merchant capacity to shift to power exchanges
- New products based on physical delivery in power exchange like
 - Intra day
 - Week ahead
 - Month ahead
 - Year ahead
- Financial products and derivatives
- Integrated Energy Policy, Planning Commission encourages regional energy trade
- Electricity from SAARC countries could be traded on PX in future



Long Term Goal : A vibrant regional power market

Present Issues in Power Market : A Traders' Perspective

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Key Role of Electricity Trader (1)



- Unlike intermediary, a trader assumes all the risks of the transaction especially the payment risks & completion of transactions
- Brings substantial level of comfort to buyers & sellers by providing counter party credit risk
- Provides a single point specialized service and accepts liability and responsibility for the transaction
- Enters into long term power purchase agreement which gives comfort to project developers/lenders, thereby catalyzing capacity addition

Key Role of Electricity Trader (2)



- Plays an important role for large number of open access consumers looking for alternate sources of supply
- Better utilization of existing capacities, in effect creating virtual capacities
- Traders, contribute significantly in the value chain of power market development.

Thus, in a nascent competitive market, the role played by traders can be central to successful market evolution

- Exposure to regulatory changes
- Fixing of trading margin:
 - 4 p/kWh (Short term transactions- matter sub-judice)
 - Adverse impact on market
 - Growth slow down
 - Reduced risk appetite
 - Regulators to intervene only when competition is adversely affected and there is evidence of market abuse
- Ban on trader to trader transaction(Act does not prohibit -matter sub-judice)
- Uncertainty in Long term contracts regarding trading margin
 - $LT \Leftrightarrow ST / LT \Leftrightarrow MT / LT \Leftrightarrow LT$
- 4% cap on sale tariff of generator
- Inconsistency in approach by different state electricity regulators
 - Intra-state ABT
 - Open Access charges/losses etc.
 - Subsidies and cross-subsidies
- Lenient trading license criteria

- As per EA 2003, non-discriminatory open access is to be provided in transmission and distribution system subject to:
 - Spare capacity and
 - Payment of service charges
- Implementation is slow and not in true spirits
 - Mostly limited to Inter-state system
- Opening up of open access to 1 MW or above customers running late
 - Target: January 2009 -Pave way for industries/SEZs/Real Estate/Captive etc.
- Open Access – only two categories:
 - Short term (up to 3 months)
 - Long term (25 years and beyond)
- Need for medium term open access
 - Imported coal supply agreements vary from 10-15 years
 - Combined cycle gas generators having plant life around 15 years
 - IPPs/Buyers not committing tariff for 25 years
- Limited Short term open access corridor-enhance margins for UI/ security

- Limited redundancy/spare capacity in transmission
- Slow decision-making process in building new transmission/strengthening existing schemes
 - Transmission Utilities averse to risk
 - Seek prior commitments from all market players for payment of **transmission charges for the life of the project**
 - Lack of funding ability – Government may provide viability gap funding
- Lack of level playing field in transmission/ grid connectivity
 - Insist on upfront declaration from IPPs as to who will be the buyers
- Pan-caking of transmission charges and losses
- Merchant generators' connectivity

- Commercialization of sector
 - Subsidy regime to go
 - Free power impacts the financial viability of distribution utilities
- Slow market development
 - Regulators have a key role to play
- Huge gap in demand –supply resulting in price distortions
- UI – whether a ‘trading mechanism’ or a tool for “grid discipline”
- Traders perceived as ‘profiteers’ rather than ‘market makers’
- Lack of discipline by some trading licensees
- Sub-judice matters taking time for settlement- uncertainty
- Intermediary role under pressure – traders to continue to remain relevant through:
 - Innovation
 - New products and services as per emerging market requirement

Power Market –Ripple Effect



Power trading share is 2.5% of India's total energy generated – but its indirect impact on the power sector is several times bigger

- A Government of India Initiative
 - Cabinet decision to set up as a **non-government company** for incentivising market based investments to the Power Sector, specially from the private sector
 - Formed in the year 1999 by Central Government Public Sector Undertakings, Viz., NTPC, PFC and POWERGRID (NHPC joined later)
 - PTC set out its journey with the following objectives:

- *Facilitate development of Power Projects particularly through private investment*
- *Promote Power Trading to optimally utilize the existing resources.*
- *Develop power market for market based investments into the Indian Power Sector.*
- *Promote exchange of power with neighbouring countries*.*

- Main Role has been “ **Development of Power Market**”
- *Nodal Agency for Cross-Border Trade with Bhutan and Nepal

PTC India – A Profile (2)



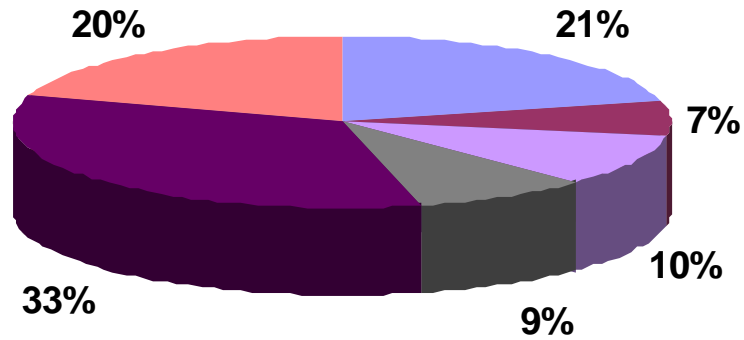
- Paid-up Capital: Rs.227.4 Crores
- Net worth: ~ Rs.1480 Crores
- Current Market Capitalization:
 - **US\$ 550 Millions**
- Original promoters NTPC, POWERGRID, PFC and NHPC hold 5.1% each totaling 20.4%
- Shareholding is diversified with GoI FIs, PSUs and Promoters together hold 37% stake while balance is with Institutions and public
- A **Public Private Partnership** Company

Rs. Crores

Segments	FY 08	FY 07
Total Income	Rs. 3949.02 Cr.	Rs.3785.72 Cr.
Income from operations	Rs. 3906.15 Cr.	Rs. 3766.66 Cr.
PAT	Rs. 48.70 Cr.	Rs. 35.09 Cr.
EPS (Rs)	2.93	2.34

**Listed in both the national stock exchanges:
BSE and NSE**

PTC Shareholding Pattern



Promoters
FI & Banks
FII

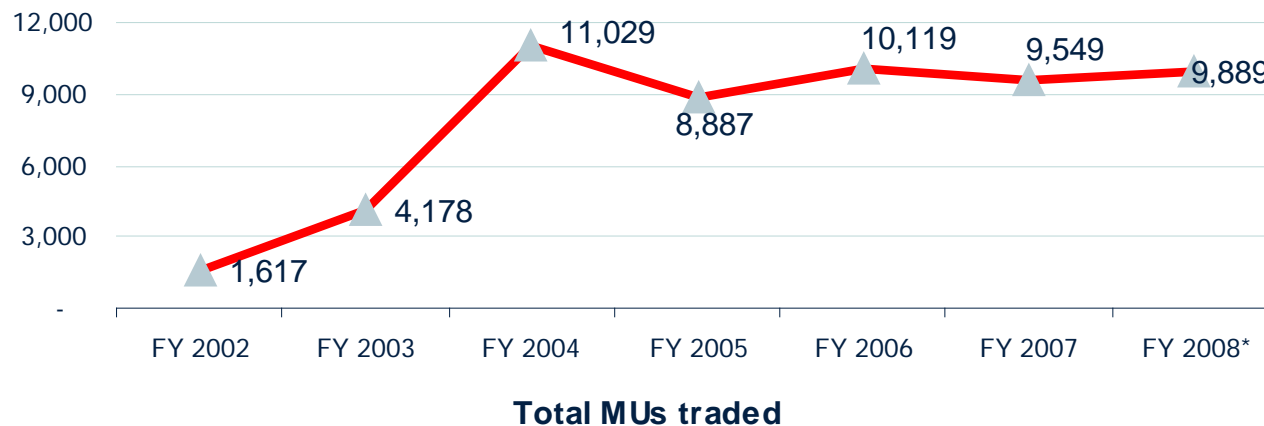
Mutual Funds
Insurance Companies
Others (including Individuals)

- PTC Board comprises of:
 - Two Joint Secretaries, one each from MoP and MEA, Government of India
 - Four nominees of Promoters, one each from NTPC, NHPC, POWERGRID and PFC
 - Four independent directors of professional repute
 - Retired Secretaries from Government of India
 - Retired CMDs of Public Sector Banks/FIs
 - CMD, an ex IA&AS Officer
 - Two senior officers as Whole Time Directors on deputation from IAS and IRS

- Pioneer in power trading in India
 - Market leader with 49% market share (~ 9.9 billion units in 2007 – 08)
 - National Footprint

Turnover increased 10 times from Rs. 366 Crores to 3949 Crores in 7 years (FY 2001-02 to FY 2007-08) with aggregate sale of power during this period > 15,000 Crores

PAT (2007-08) : Rs. 48.70Cr.



- PTC has successfully contributed to power market development-which is one of the main thrust of the **Electricity Act 2003**
- PTC trying to further deepen the market by new trading products and promoting trade through Power Exchange.
- Power Exchange to signal:
 - Price
 - Demand
 - Liquidity

Co-promoter of the **1st National Level Power Exchange** in India i.e.,
Indian Energy Exchange (IEX)

- PTC is **repositioning** itself to combat the challenges on holistic basis:
 - Long-term intermediation
 - Promoting holding companies for projects' development to increase volume for PTC
 - Short-term trading
 - Financial Services including equity and loan syndication
 - Fuel Aggregation
 - Advisory Services

Value Proposition by PTC



- A single window service
- In case of PPAs signed with PTC, it takes full responsibility for
 - Selling of power beyond delivery point:
 - Identifying customers
 - Risk Spread
 - Signing PPAs
 - Adequate Payment Security
 - Coordinating with Transmission Utility for:
 - Construction of transmission inter-connection
 - System strengthening, as required
 - Open Access in transmission system
- PTC may participate in equity in select cases through
 - PTC India Financial Service Ltd. (PFS), a subsidiary of PTC (India) Ltd.
 - Joint Ventures (JVs)

oThank You

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