Department of Industrial and Management Engineering
Indian Institute of Technology Kanpur

Forum of Regulators

3rd Capacity Building Programme for Officers of Electricity Regulatory Commissions
23 – 28 August, 2010

Open Access in Inter State Transmission System

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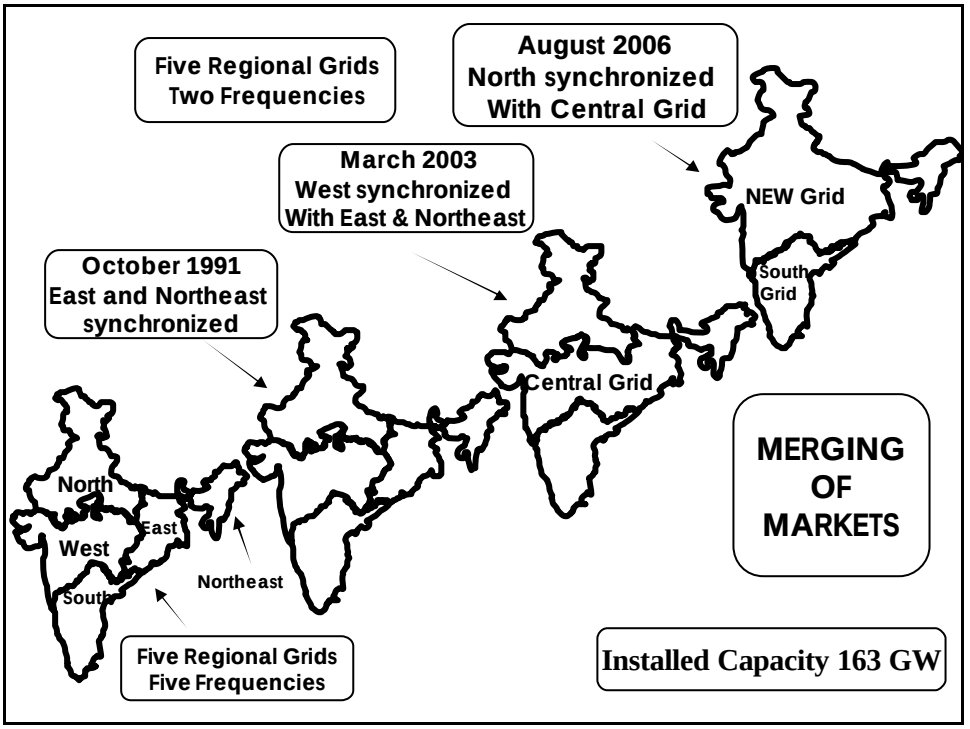
DGM, GM, NRLDC

Open Access

Presentation Outline

- –Overview of Indian Power Market
- –Open Access – Other areas
- –Provisions of Electricity Act 2003
- –Open Access in Inter-state Transmission
  - •Bilateral
  - •Collective
- –Congestion management in PX
- –Connectivity, LTA and MTOA

Indian Power Market – An Overview

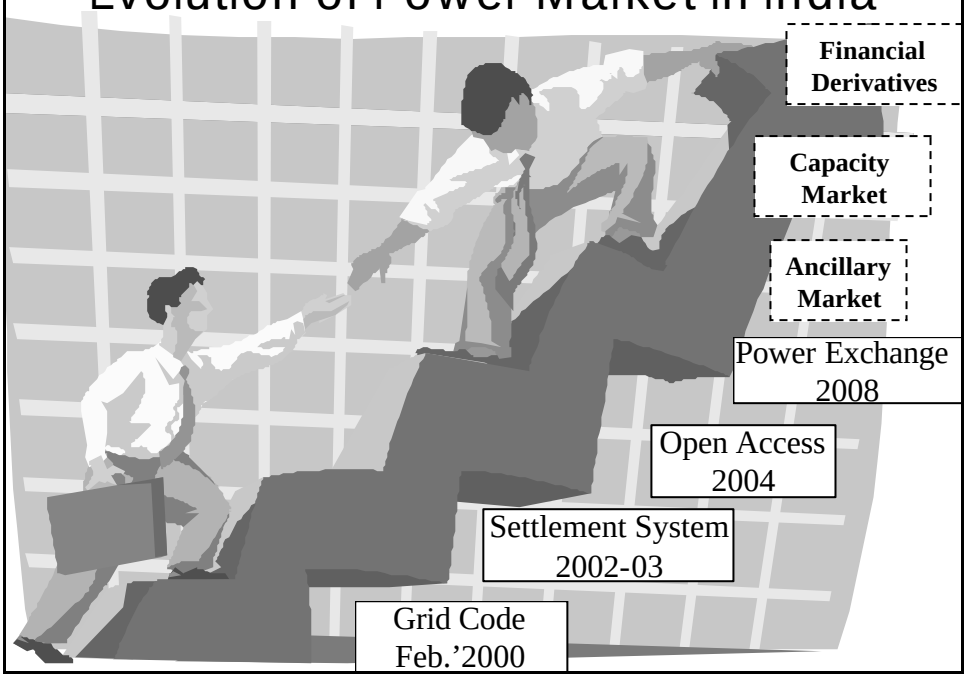


INDIAN ELECTRICITY MARKET

ENABLERS
Legislation Indian Electricity Act 2003
National Electricity Policy 12-Feb-2005, Para 5.7.1(d)
Regulation IEGC-Feb 2000 ABT Order-Jan2000 Open Access-May-2004 PX Guidelines –Feb.'07 Connectivity, LTA, MTOA - Aug-09 UI Regulations – Mar-09 Real time Congestion reg. – Dec-09 Power Market reg. – Jan-10
Execution **CTU/STU, NLDC/RLDC/SLDC** ABT settlement: in stages 2002-03

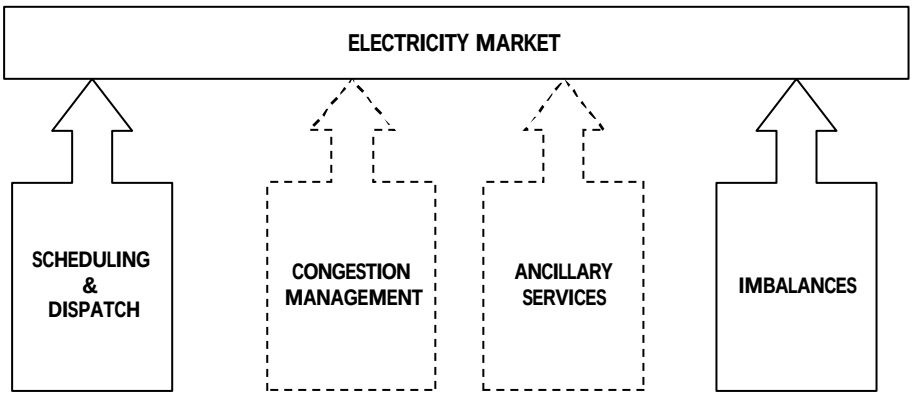
STRUCTURE
Balancing Mechanism Frequency linked Unscheduled Interchange
Intra-day STOA
Day-ahead PX
Short-term Bilateral Day-ahead First-come-first served Three-month ahead
Medium-term Bilateral
Long-term Bilateral Shared resources (ISGS) Own resources

Evolution of Power Market in India

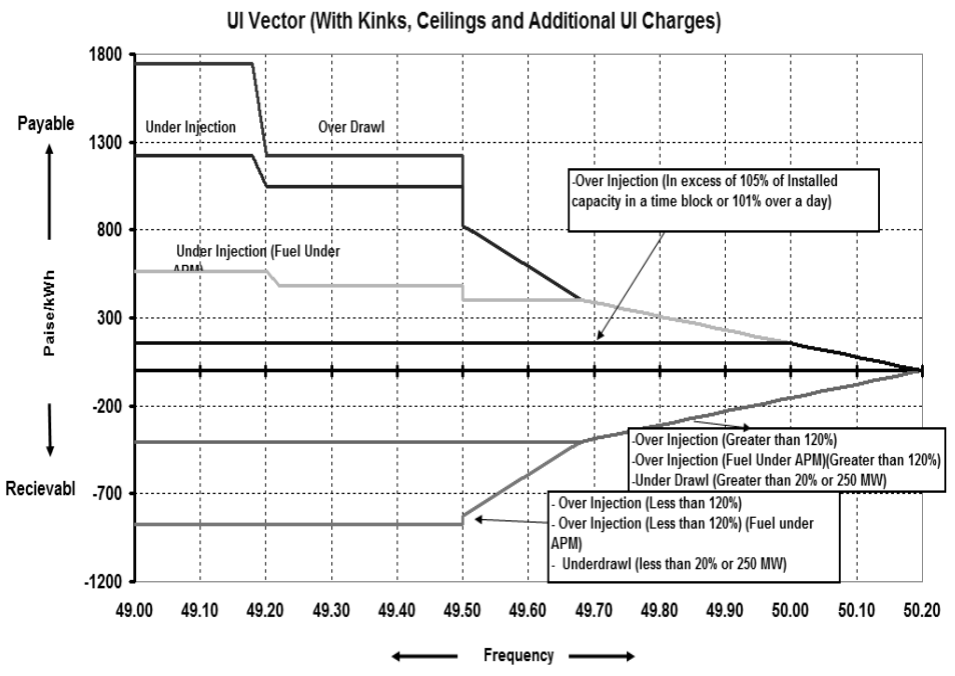


Market Design

Four Pillars of Market Design



"Making Competition Work in Electricity",
Sally Hunt



UI mechanism

- Maximizes social welfare
- Transparent, neutral & rigging proof
- Diffuses market power
- Ultimate open access
- Facilitates reforms in the sector
- Encourages trade and bilateral exchanges
- Facilitates exchanges (arbitrage) between regional power pools

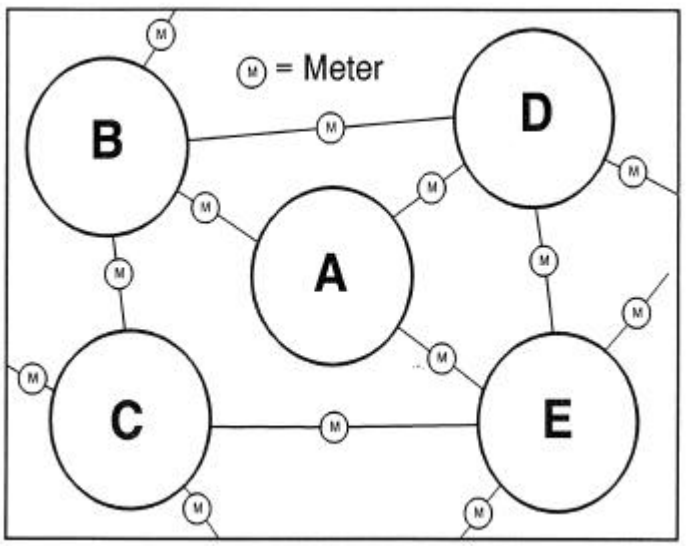
Power market in India

S No	Dimension	India	International
1.	Trans. Infrastructure	Coordinated planning	Market oriented
2.	Market	Energy only	Capacity, Energy Ancillary
3	Losses	Socialized, Paid in kind	SO procures
4	Balancing	Frequency-linked UI	Explicit mkt
5	Settlement period	15- minute time block	Hourly / half hourly
6	Settlement cycle	Weekly	
7	Transmission charge	Long-term: postage stamp Short-term bilateral: Contract path Collective: Point of connection	Zonal / Nodal
8	Trading	Physical	Physical, Financial

Definition of Control Area (IEGC)

- **an electrical system bounded by interconnections (tie lines), metering and telemetry which controls its generation and/or load to maintain its interchange schedule with other control areas whenever required to do so and contributes to frequency regulation of the synchronously operating system**

Control Area



Source: NERC Control Area Concepts and Obligation, July 1992

Open Access in Other Areas

- Research publications, papers, books, journals
- Areas of Natural Monopoly e.g.
  - Gas Pipeline
  - Oil Pipeline, Storage
  - Communication network

DEFINITION OF "OPEN ACCESS" IN THE ELECTRICITY ACT, 2003

"The non-discriminatory provision for the use of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the regulations specified by the Appropriate Commission"

Functions of CTU

38(2)(d) to provide non-discriminatory open access to its transmission system for use by-

(i) any licensee or generating company on payment of the transmission charges; or

(ii) any consumer as and when such open access is provided by the State Commission under sub-section (2) of section 42, on payment of the transmission charges and a surcharge thereon, as may be specified by the Central Commission:

Similar provisions in Sec. 39(2)(d) for STU and Sec.40(c)for transmission licensee

Duties of Distribution Licensee and Open Access

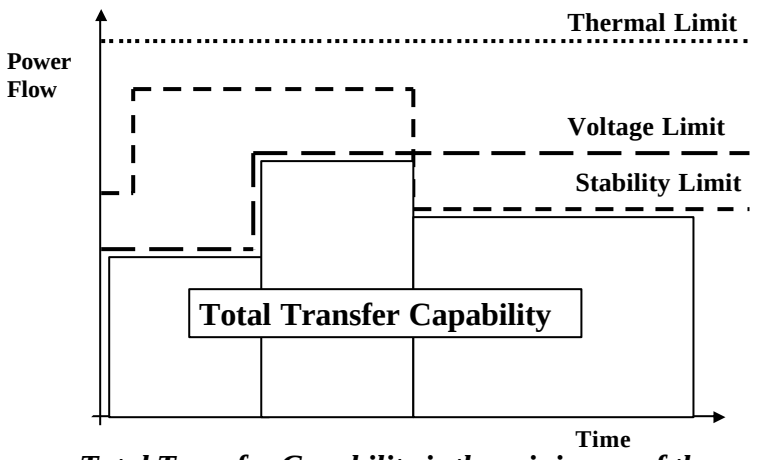
42 (2) The State Commission shall introduce open access in such phases and subject to such conditions, (including the cross subsidies, and other operational constraints) as may be specified within one year of the appointed date by it and in specifying the extent of open access in successive phases and in determining the charges for wheeling, it shall have due regard to all relevant factors including such cross subsidies, and other operational constraints:

Provided that such open access shall be allowed on payment of a surcharge in addition to the charges for wheeling as may be determined by the State Commission:

Open Access in Inter-State Transmission

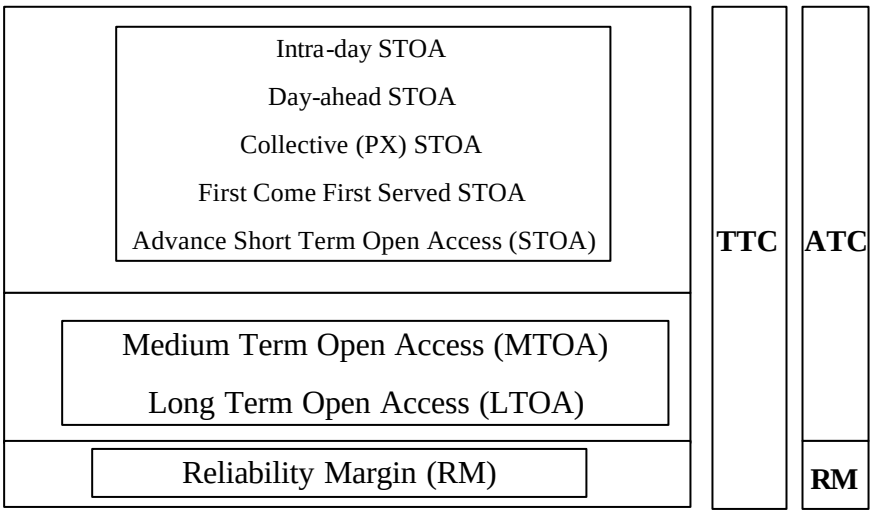
- Short-term open access granted depending upon
  - Inherent design margin
  - Margins available due to variations in power flows
  - Margins available due to in-built spare transmission capacity created to cater to future load growth

Total Transfer Capability



Total Transfer Capability is the minimum of the Thermal Limit, Voltage Limit and the Stability Limit

Total & Available Transfer Capability



Transmission Capacity vs Transfer Capability

	Transmission Capacity	Transfer Capability
1	Is a physical property in isolation	Is a collective behaviour of a system
2	Depends on design only	Depends on design, topology, system conditions, accuracy of assumptions
3	Deterministic	Probabilistic
4	Constant under a set of conditions	Always varying
5	Time independent	Time dependent
6	Non-directional	Directional
7	Determined directly by design	Estimated indirectly using simulation models
8	Declared by designer/ manufacturer	Declared by the Grid Operator
9	Understood by all	Frequently misunderstood
10	Considered unambiguous & sacrosanct	Subject to close scrutiny by all stakeholders

Total Transfer Capability as defined in the Congestion charge regulations

- "Total Transfer Capability (TTC)" means the amount of electric power that can be transferred reliably over the inter-control area transmission system under a given set of operating conditions considering the effect of occurrence of the worst credible contingency.

Available Transfer Capability as defined in the Congestion charge regulations

- "Available Transfer Capability (ATC)" means the transfer capability of the inter-control area transmission system available for scheduling commercial transactions (through long term access, medium term open access and short term open access) in a specific direction, taking into account the network security. Mathematically ATC is the Total Transfer Capability less Transmission Reliability Margin.

Reliability margin as defined in Congestion charge regulations

- "Transmission Reliability Margin (TRM)" means the amount of margin kept in the total transfer capability necessary to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions;

Open Access in Inter-State Transmission

- Implemented w.e.f. 6-May-2004
- Revised Regulations w.e.f 1st April 2008
- Further amendment w.e.f. 15th June 2009
- Products –
  - Monthly bilateral
    - Advance
    - First Come First Serve
  - Day ahead bilateral
  - Collective Transactions through Power Exchange
  - Intra day bilateral
- Permits usage of spare transmission capacity through a transparent process
- Offers choice and freedom to buy & sell power

CERC Open Access Regulations, 2008

- Effective 01.04.2008
- Regulations cover Short-term Open Access
- Transactions categorized as Bilateral and Collective (through Power Exchange)
- Earlier Products of Short-Term retained under Bilateral Transactions
- Nodal Agency
  - Bilateral : RLDCs
  - Collective : NLDC
- Transmission Charges moved from "Contract Path" to "Point of Connection" for Collective Transaction

CERC Open Access Regulations, 2008

- Both Buyers and Sellers of Collective transactions to bear transmission charges and absorb transmission losses
- Inter-Regional links -No Separate treatment.
- Emphasis on "Scheduling" rather than "Reservation"
- SLDC consent mandated along with application
- In case of Congestion – e-Bidding without Price Cap
- Exit Option provided with payment of up to 5 days open access charges.
- Transmission Charges collected shall be disbursed to CTU(25%) and long term customers(75%)
- Moving towards empowerment of SLDCs

Open Access Regulations, 2008: Provisions For Collective Transactions

- Thrust on Empowerment of SLDCs
- SLDC Concurrence [Clause 8(2)]
  - NOC/Standing Clearance to be obtained by State Utilities/Intra-State Entities from the SLDC for trading through PX
  - SLDC to respond within 3 days
  - SLDCs may charge appropriate fee for such NOC/Standing Clearance (as per SERC or Rs. 5000 if not notified by SERC)
  - Provision of deemed consent

Open Access Charges

	Bilateral Transactions	Collective Transactions
Nodal Agency	Recipient RLDC	NLDC
Application Fee – non refundable	Rs.5000/-	Rs.5000/-
Scheduling Charges	Rs. 2000/- each RLDCs involved	Rs. 5000/- for each Regional Entity to NLDC (inclusive of RLDC charges)
Transmission Charges*	Rs.80/- per MWh in case of intra-region Rs. 160/- per MWh in case of adjacent regions Rs.240/- in case of wheeling through other region *25% - to be retained by CTU Balance 75% to be disbursed to Long Term Customers	Rs.100/- per MWh both Buyer and Seller *25% - to be retained by CTU Balance 75% to be disbursed to Long Term Customers

Open Access in Inter-state Transmission Regulations, 2008

- Short Title, Commencement and Application
- Definitions
- Scope
- Detailed Procedure
- Nodal Agency
- Submission of Short Term Open Access Application

Open Access in Inter-state Transmission Regulations, 2008 (Contd.)

- Application Fee
- Concurrence of State Load Despatch Centre for bilateral and collective transactions
- Procedure for Advance Scheduling for bilateral transactions
- Congestion management
- Procedure for scheduling of bilateral transactions on first-come-first-served basis

Open Access in Inter-state Transmission Regulations, 2008 (Contd.)

- Procedure for scheduling for day-ahead transactions
- Procedure for scheduling of transactions in a contingency
- Revision of Schedule
- Curtailment in case of transmission constraints
- Transmission Charges
- Operating Charges

Open Access in Inter-state Transmission Regulations, 2008 (Contd.)

- Payment of transmission charges and operating charges
- Default in payment of open access charges
- Unscheduled Inter-change (UI) Charges
- Reactive Energy Charges
- Special Energy Meters
- Transmission losses
- Compliance of Grid Code

Open Access in Inter-state Transmission Regulations, 2008 (Contd.)

- Collection and Disbursement of transmission charges and operating charges
- Redressal Mechanism
- Information System
- Savings and Repeal

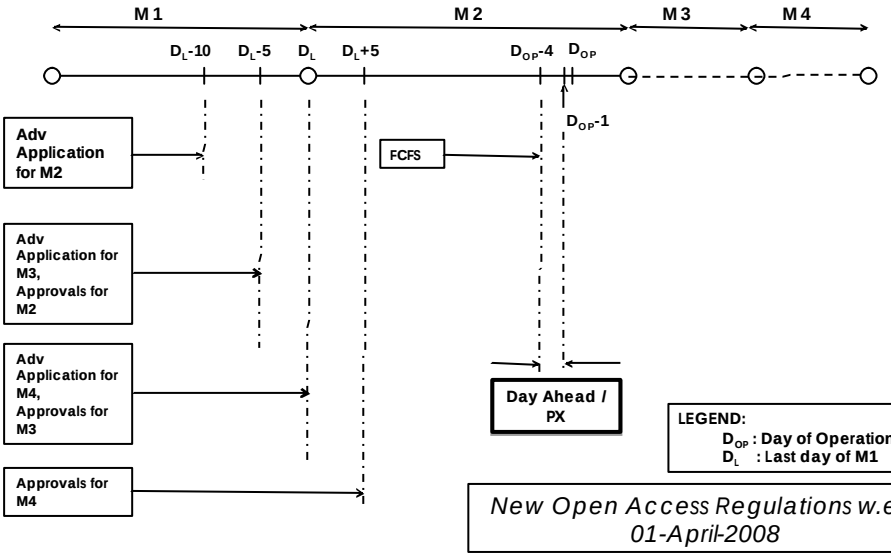
Comparison of CERC Regulations on Short-Term Open Access (Regulation 2004, Amendment 2005 and Regulations 2008))

S. No.	Old Regulations (06.05.2004 to 31.03.2005)	Amended Regulations (w.e.f. 01.04.2005)	Regulations, 2008 (w.e.f. 01.04.2008, amended in 2009)
1.	Transmission Charges a. Intra Regional – 25% of Long Term Charges b. Inter Regional – 25% of Long Term Charges	Transmission Charges a. Intra Regional – 25% of Long Term Charges b. Inter-Regional - 50% of Long Term Charges	Transmission Charges: Bilateral: - Rs.80/MWh – intra- regional - Rs.160/MWh – Between adjacent regions - Rs240/MWh – Wheeling through one or more region Collective Transactions (Px): -Rs. 100/MWh for each point of injection and drawal
2.	Retention by CTU a. Intra Regional – 25% of Charges collected b. Inter Regional – 25% of Charges collected c. Balance disbursed to States	Retention by CTU a. Intra Regional - 25% of Charges Collected b. Inter Regional - 12.5% of Charges collected c. Balance disbursed to States	Retention by CTU - 25% by CTU - Balance 75% to be disbursed to States

3.	**RLDC Charges** **a. Application fee – Rs. 5000/ -** **b. Scheduling Charges** **– Rs. 3000/day for each RLDC involved** **c. Handling &Service Charges** **- 2% of total charges**	**RLDC Charges** **a. Application fee – Rs. 5000/ -** **b. Scheduling Charges** **– Rs. 3000/day for each RLDC involved** **c. Handling & Service Charges** **– Nil**	**RLDC Charges :** **Bilateral:** **a. Application fee – Rs. 5000/ -** **b. Scheduling Charges** **– Rs. 2000/day for each RLDC involved** **c. Handling & Service Charges** **– Nil** **Collective Transactions:** **a. Application fee – Rs. 5000/ -** **b. Scheduling Charges** **– Rs. 5000/day to NLDC for each State involved** **-NLDC to Share with RLDCs**
4.	**Open Access Duration** **- Up to One year maximum** **- single application possible**	**Open Access Duration** **- Up to Three Months max.** **- single application possible**	**Open Access Duration** **Bilateral** **-Up to 3 months** - **separate application for each month** - **Collective:** - **Only Day ahead**

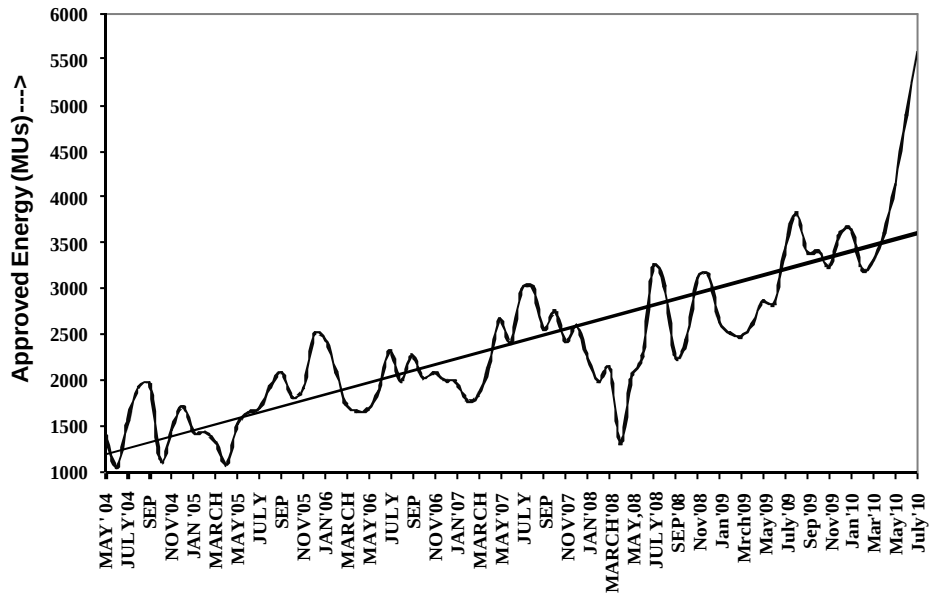
5.	**ST Rate** **- in Rs/MW/Day** **- Min. Charges for one day**	**ST Rate** **- in Rs./MW/Day** **-Charges as per continuous block of upto 6 hours, 12 hours and more than 12 hours**	**Rate** **-in Rs/ MWh** **- Based on Scheduled Energy**
6.	**Congestion Management** **- E-Bid without price cap**	**Congestion Management** **- E-Bid with price cap**	**Congestion Management** **Bilateral:** **- E-Bid without price cap** **Collective:** **- NLDC in coordination with Px**

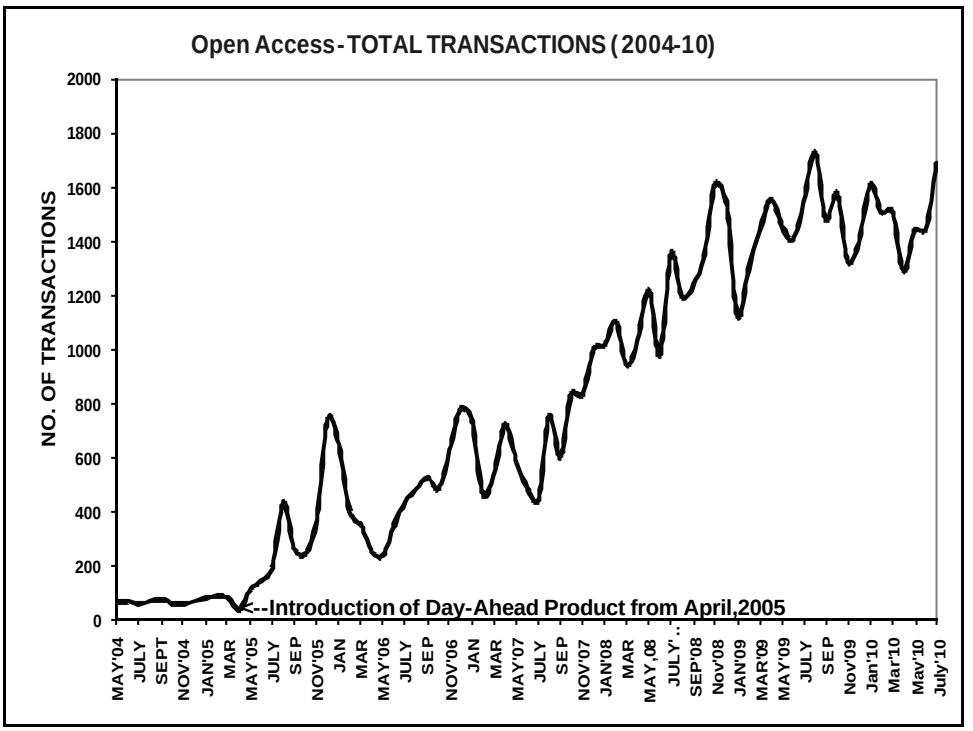
Time Line For Open Access

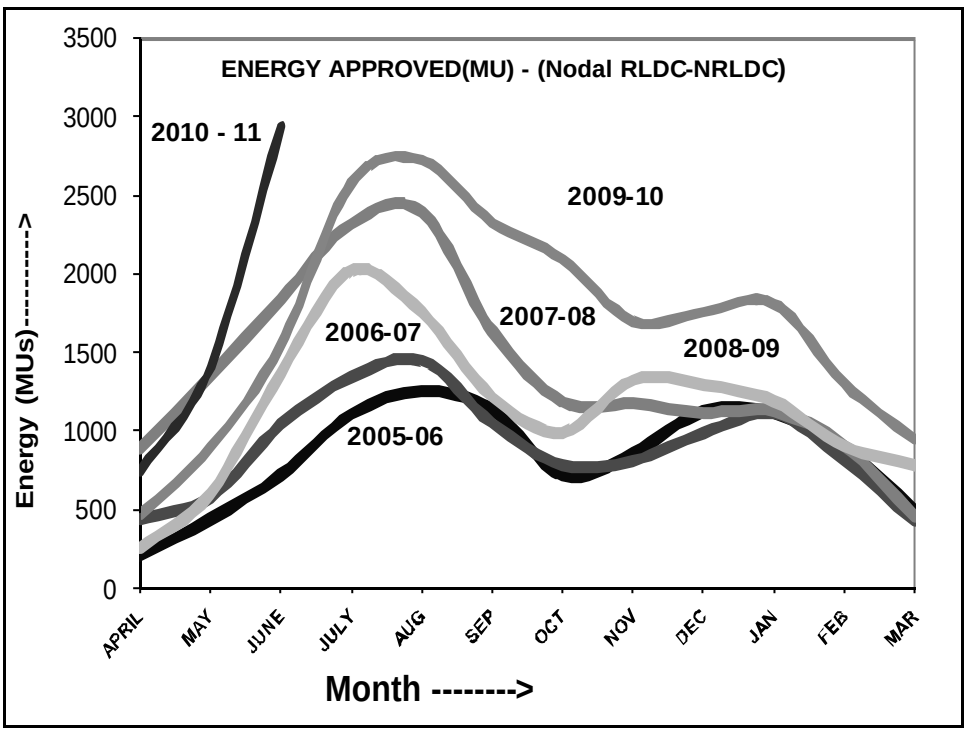


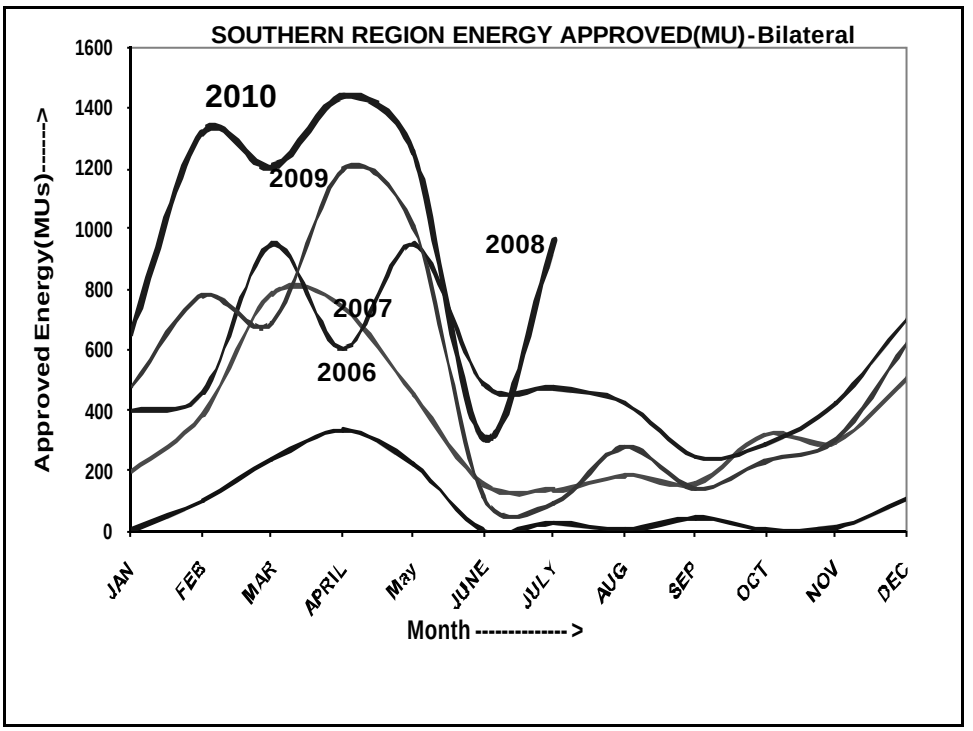
New Open Access Regulations w.e.f. 01-April-2008

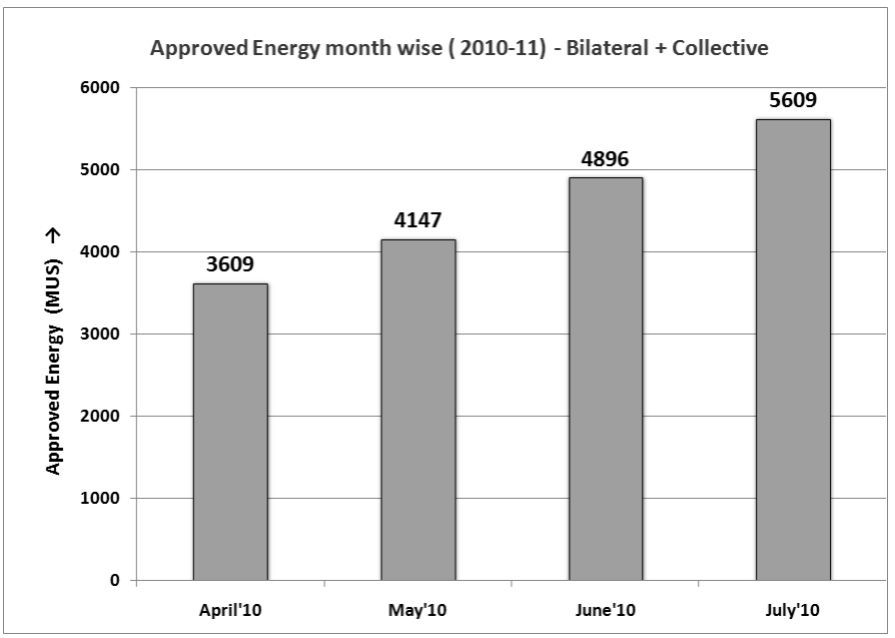
Increasing trend of STOA - Approved Energy (MUs)



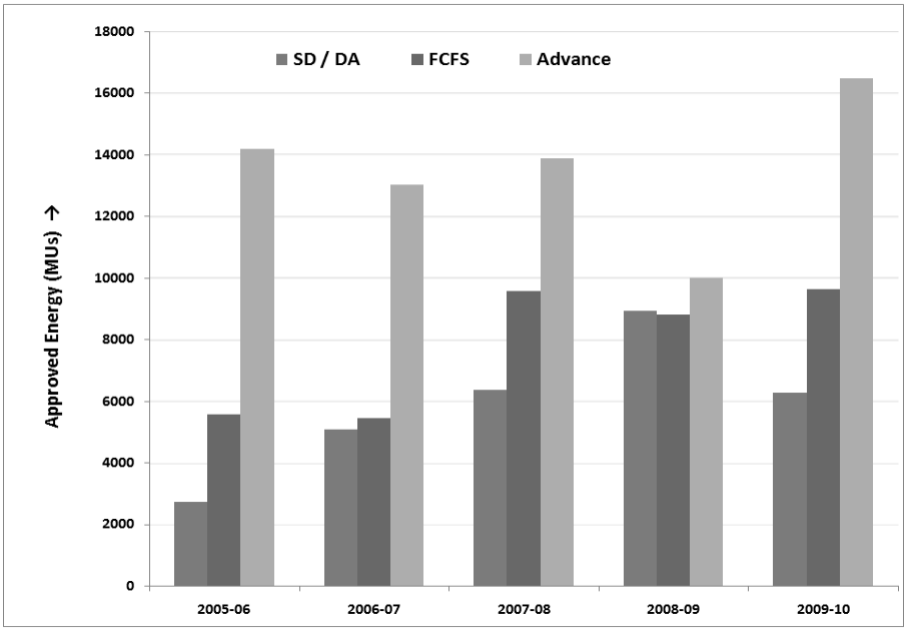

Open Access-TOTAL TRANSACTIONS (2004-10)
NO. OF TRANSACTIONS
2000
1800
1600
1400
1200
1000
800
600
400
200
0
<--Introduction of Day-Ahead Product from April,2005
MAY'04
JULY
SEPT
NOV'04
JAN'05
MAR
MAY'05
JULY
SEP
NOV'05
JAN
MAR
MAY'06
JULY
SEP
NOV'06
JAN
MAR
MAY'07
JULY
SEP
NOV'07
JAN'08
MAR
MAY,08
JULY'..
SEP'08
Nov'08
JAN'09
MAR'09
MAY'09
JULY
SEP
Nov'09
Jan'10
Mar'10
May'10
July'10


ENERGY APPROVED(MU) - (Nodal RLDC-NRLDC)
Energy (MUs)-------->
3500
3000
2500
2000
1500
1000
500
0
2010 - 11
2009-10
2007-08
2006-07
2008-09
2005-06
APRIL
MAY
JUNE
JULY
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
Month ------->

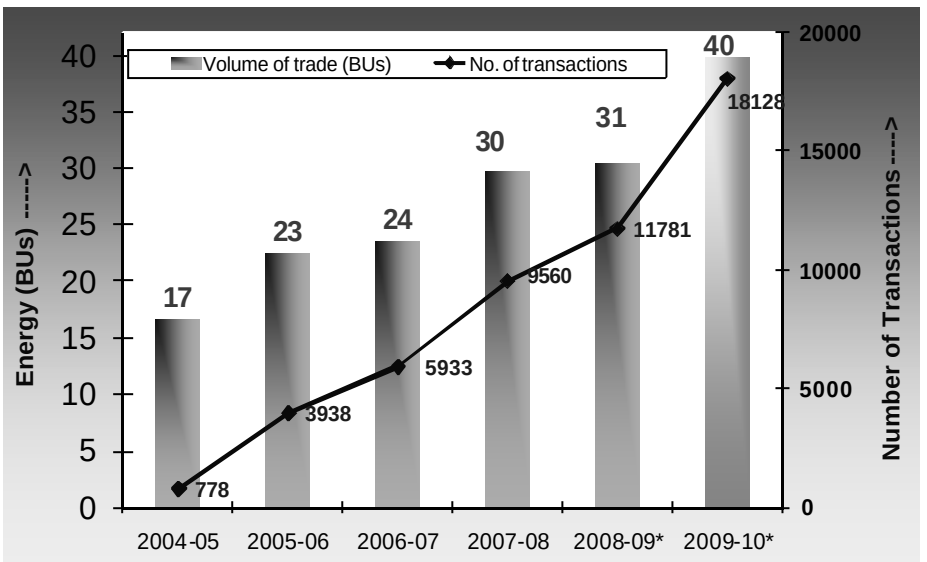

SOUTHERN REGION ENERGY APPROVED(MU)-Bilateral
Approved Energy(MUs)----->
1600
1400
1200
1000
800
600
400
200
0
2010
2009
2008
2007
2006
JAN
FEB
MAR
APRIL
May
JUNE
JULY
AUG
SEP
OCT
NOV
DEC
Month ---------- >


Approved Energy month wise (2010-11) - Bilateral + Collective
Approved Energy (MUS) →
6000
5000
4000
3000
2000
1000
0
3609
4147
4896
5609
April'10
May'10
June'10
July'10

Types of Transactions- STOA (Bilateral)

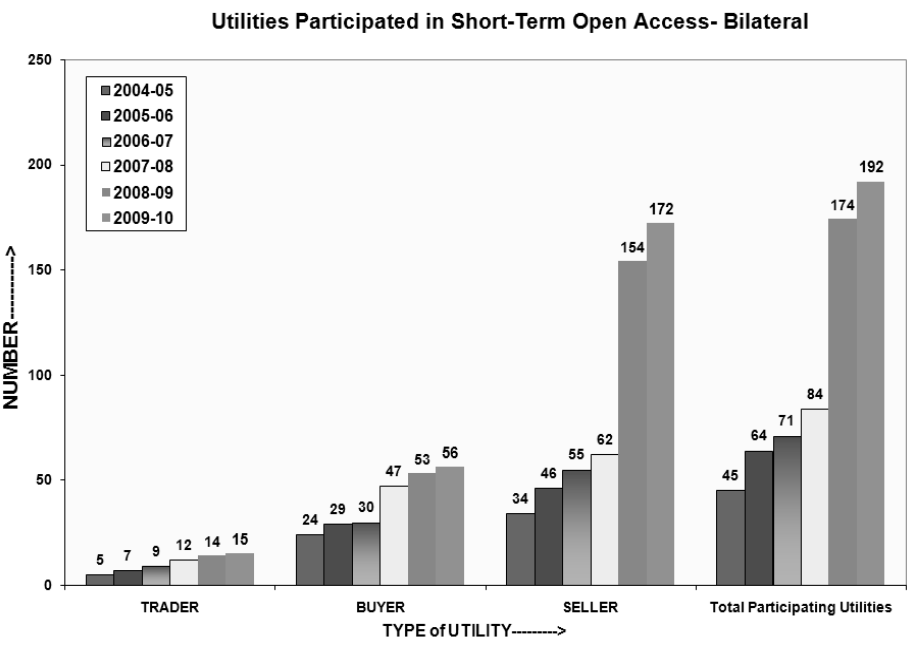


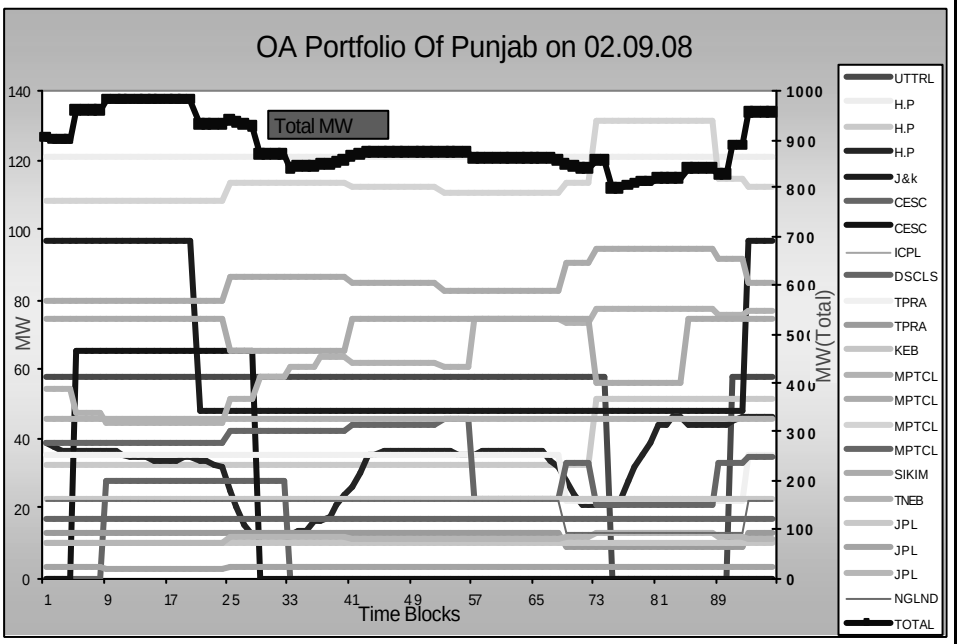
Trade under Short-Term Open Access



*Includes Bilateral + Collective transactions

1 Licence has been surrendered in 2006-07,1 Licence has been cancelled in 2008-09 and 4 Licences have been cancelled in 2008-09





A typical day OA (Bilateral) schedule for Punjab (02.09.2008)

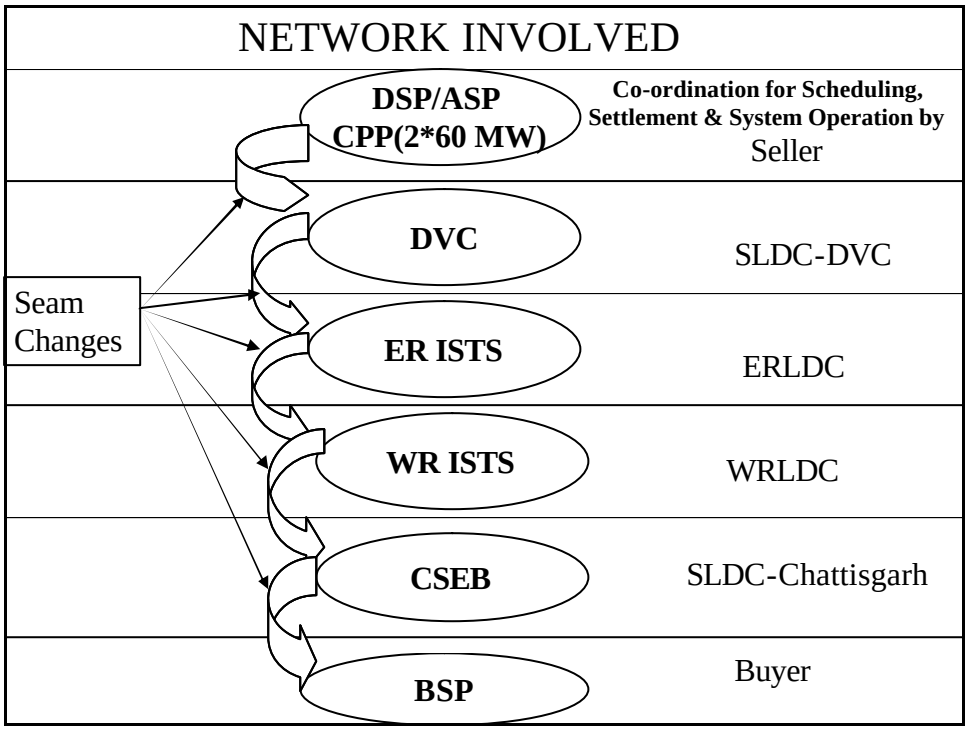
- **Total No. of Applications : 19**
- **Direct – 1**
- **Traders – 18**
  - RETL, PTC &LANCO -3each, NVVL– 4,
  - TPTCL, Adani, JSW, Venergy – 1 each
- **Availed Opportunities under Advance/FCFS and Day ahead product**
- **All five regions**
  - **NR (Uttaranchal, HP, J&K)**
  - **WR (MP, JPL-Chhattishgarh)**
  - **SR (Tamilnadu, Kerala)**
  - **ER (CESC-West Bengal)**
  - **NER(Tripura)**
- **Time diversity gainfully utilised**

Illustration of a typical Bilateral Transaction

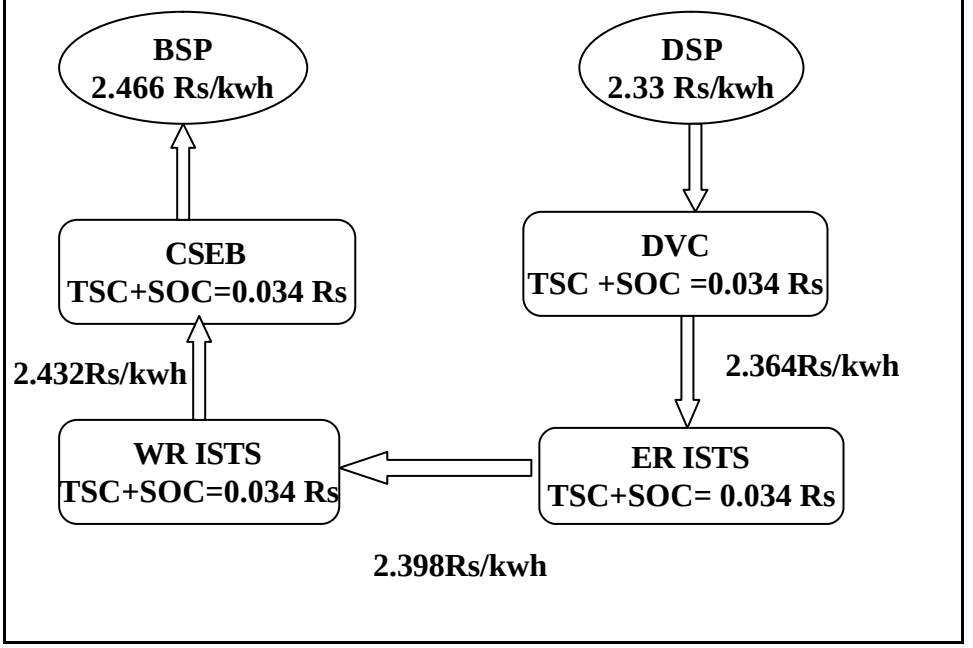
Injecting Utility : **SAIL Durgapur Steel Plant (DVC),ER**

Drawee Utility : **SAIL Bhilai Steel Plant (CSEB),WR**

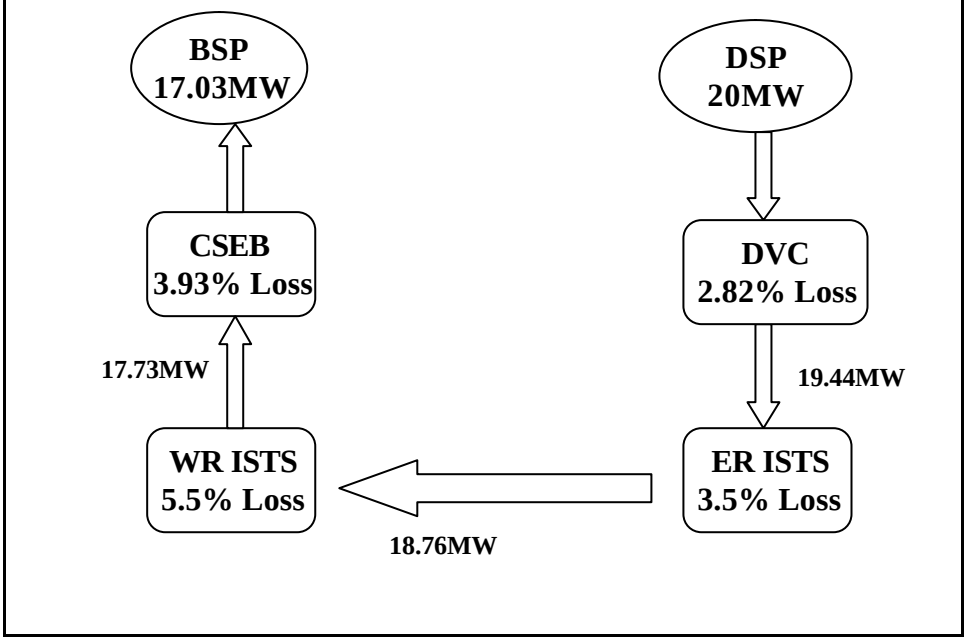
Quantum : **20 MW**



Transmission & System Operation Charges



Transmission Losses



Scheduling of Collective Transactions Through Power Exchange

Salient Features of PX Implementation

- Voluntary participation
- Day ahead
- Energy only
- Physical delivery only
- Double sided bidding
- Hourly bids
- Uniform pricing
- Multiple exchanges
- Congestion Management using 'Market Splitting'

Background

- CERC Regulations on Open Access in inter-State Transmissions, 2008
  - **CTU to issue Detailed Procedure (Para 4)**
    - Prior Approval of Commission
    - To cover relevant and residual matters
- CTU submitted draft Procedure on 12.02.2008
- CERC Letter (May'08)
  - CTU to review and submit revised Procedure
- CTU submitted revised Procedure on 06.06.2008
- CERC Approved the Procedure on 13.06.2008

General

- NODAL Agency (at Regional Level) - NLDC
- All buyers within a State shall be clubbed together and all sellers within a State shall be clubbed together
  - Each group considered as a single entity for the purpose of scheduling and operating charges at Regional Level
  - SLDC shall count each point of drawal / injection separately for the purpose of Scheduling and operating charges
- Information Exchange
  - Dedicated Communication Channel between NLDC and PX, NLDC and RLDCs
- PX to ensure
  - Necessary infrastructure for information exchange with NLDC/RLDCs/SLDCs
- PX to indemnify all SLDCs/RLDCs/NLDC at all times

Eligibility Conditions

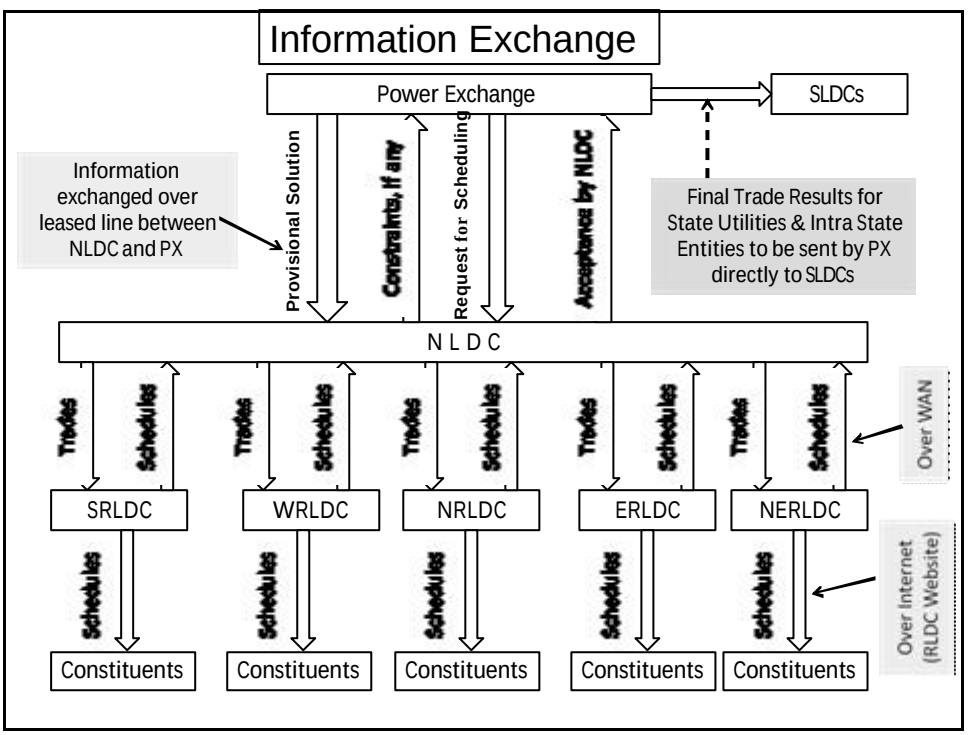
- Entities scheduled by RLDCs
  - **Deemed Regional Entity**
    - Entities whose metering and energy accounting done by RLDCs/RPCs
  - **New Entities**
    - **To Satisfy conditions**
      - as laid down in CERC Order 58/2008 dated 07.05.2008
    - **Obtain Prior Approval from RLDCs/RPCs**
- Entities scheduled by SLDCs
  - **SLDCs to assess TTC/ATC for their State system**
  - **Prior Consent from respective SLDCs**
  - **Standing Clearance / NOC**
    - **<u>As per format in detailed procedure</u>**

Scheduling Process - Steps Involved

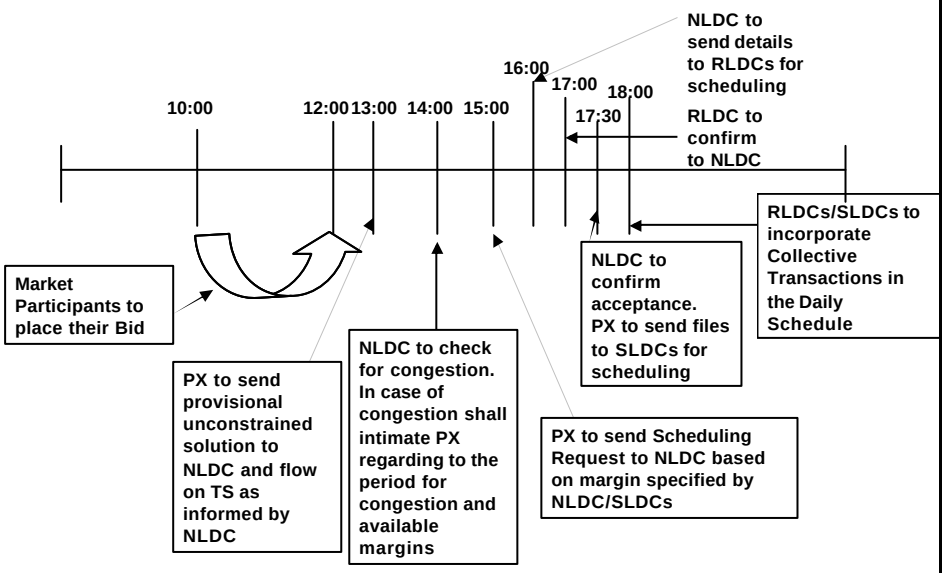
- NLDC to indicate list of interfaces/control areas/ regions likely to face congestion, if any
- Power Exchange to submit flows on interfaces, control areas, regions based on unconstrained solution.
- NLDC shall check provisional solution for congestion at any of the interface/control area/regions.
- In case of congestion, NLDC shall intimate to Power Exchange
  - Duration (Time blocks) during which congestion is there
  - Available Margins on different transmission system during the period of congestion

Scheduling Process - Steps Involved

- Power Exchange to honour all the constraints and send Request for Scheduling of Collective Transaction
- NLDC will once again check if the constrained solution is within the margin intimated
- NLDC will send the file to RLDCs for scheduling.
- NLDC shall inform Power Exchange about acceptance of the Scheduling Request.
- Power Exchange to send files directly to the SLDCs for scheduling (intra-state entities/state utilities) with detailed break up of each point of injection and drawal.



Time Line for scheduling of Collective Transaction



SUBMISSION/PROCESSING OF APPLICATION

- Application for scheduling : **Format-PX-II**
  - **Summary of Collective Transaction**
  - **Declarations**
- Scheduling Request: **Format- PX-III**
  - **Each Region**
  - **IR corridor**
  - **At Regional entity Periphery**
  - **Other Bid Area, Sub-Bid Area – if required.**

TREATMENT OF LOSSES

FOR COLLECTIVE TRANSACTION

- Both Buyers and Sellers to absorb losses
  - Buyer
    - draw less than Contracted Power

    (Contracted Power – losses)
  - Seller
    - inject more than Contracted Power

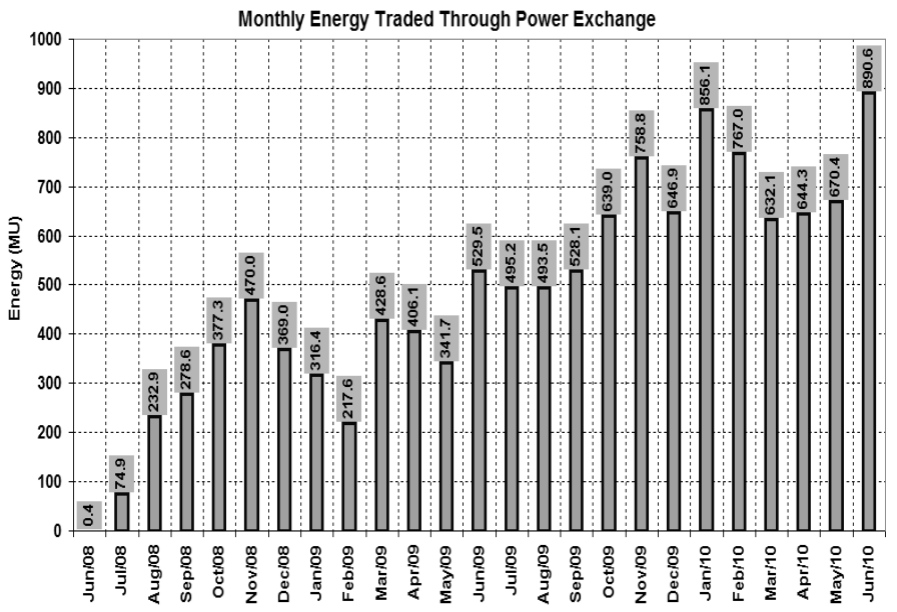
    (Contracted Power + Losses)
- Average Transmission Losses of the Region where the Entity is geographically located
- Additional Losses for Wheeling, if necessary
  - To be notified in advance by NLDC
  - Only for Injection

Real Time Congestion Management

- During Transmission Constraint
  - Curtailment to relieve the transmission constraint
- Curtailment by - NLDCs/RLDCs
  - At Regional Entity Periphery
  - Within State boundary – SLDCs to decide
- Refund in Case of Curtailment
  - Pro-rata (only Transmission Charge)
- Settlement
  - Directly between PX and Participants
  - No Role of NLDC/RLDCs

COMMERCIAL CONDITIONS

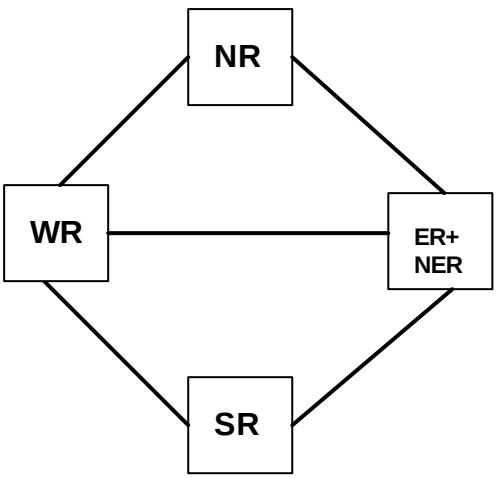
- All Open Access Charges known upfront
- Application Fee – Rs. 5000/- per Application
  - Payable along with the application
- Transmission Charge
  - For ISTS – Rs.30/MWh to NLDC
  - For State Network - directly to State
- Operating Charge
  - Rs. 5000/ per transaction to NLDC (for All RLDCs)
  - Buyers & Sellers in a State to be clubbed separately
  - Each Group to be counted as One Transaction by NLDC
  - Each point of injection and drawal to be counted separately by SLDCs
- Payment by PX to NLDC
  - By next working day
  - To NLDC for use of ISTS – Electronic Transfer



Congestion Management in PX

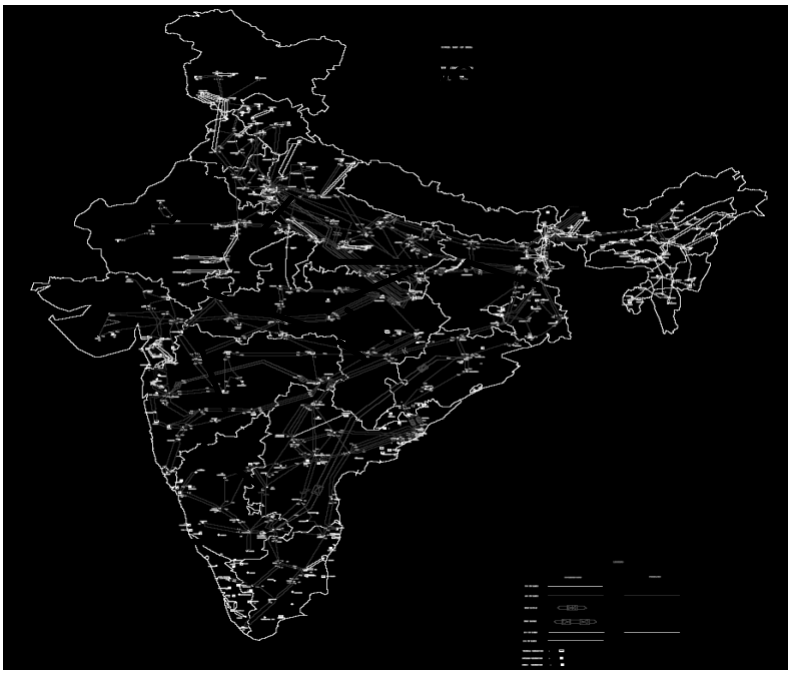
SKEWED LOAD GENERATION BALANCE

Skewed Load-Generation Balance



Scenarios:

1. 4S
2. 3S + 1D
3. 2S + 2D
4. 1S + 3D
5. 4D



Types of congestion in Indian context

- 3 / 2 / 1 month (s) ahead – advance
- First come first served
- Day ahead PX
- Day ahead bilateral
- Contingency transaction
- Real time

Reasons for congestion in India

- Fuel / resources related constraints
  - Long haulage of power
- Physical network limitations
  - Fast growing network, transition, mismatch
- Inadequate compliance to reliability standards
  - Inadequacy in Safety net
- Market Design/Interplay and behavior of players

Causes of congestion

- Inadequate transmission – including outages
- Inadequate reactive support
- Weather diversity, seasonal demand variation
- Skewed generation availability – monsoon, planned / forced outages
- Uneven purchasing power of utilities in a shortage scenario
- Compulsion to meet load at all costs (agriculture, festival, election etc.) – Aggressive buying
- Economy (cheaper generation to replace costlier generation)
- Inflated sale / purchase requirement – Pseudo congestion
- Inter play with UI mechanism – Bids based on anticipated UI price

Congestion visible to the market

- Congestion does not necessarily mean that
  - Load is not being met
  - Generation is not being evacuated
- Congestion implies that an entity willing to pay is not able to access cheapest source of power
- Existing transmission system was not planned with short-term open access in mind
- Congestion
  - Sign of growth and vibrant market
  - Natural corollary to Open Access

Congestion Management: Bid Area

Area	Region	States
N1	North	JK, HP, CHD, PUN, HAR
N2	North	RAJ,DEL, UP, UTT
W1	West	MP, CHTG
W2	West	MAH,GUJ, GOA, DD,DNH
S1	South	AP, KAR, GOA
S2	South	TN, KER, PONDY
E1	East	WB, SIK, BIH, JHAR
E2	East	ORISSA
A1	North-East	TRIP, MEGH, MANI, MIZO
A2	North-East	AS, AP, NAGA

Discovery of Multiple Prices & Interplay

- Prices discovered in Power Exchange
  - Reflection of anticipated demand-supply position for the next day
- Multiple Prices
  - Collective Transactions:
    - Two prices – one for each exchange
  - Two Grids – two UI Prices
  - In case of congestion, market split
    - Area prices
    - Multiple exchanges

Congestion Management in Multi Exchange Scenario

Multiple Power Exchange Operation

- First Power Exchange : 27th June 2008
  - Indian Energy Exchange
    - Promoters – Financial Technologies (India) Ltd., MCX, PTC.
- Second Power Exchange : 22nd October 2008
  - Power Exchange of India (PXI):
    - Promoters – NSE, NCDEX
- Third Power Exchange in the offing
  - Promoted by NTPC, NHPC, TCS

Congestion Management in Multi Exchanges Scenario (1)

- ISSUE: Sharing of available margins
- Methods:
  - Priority Based Rules
    - Lowest MCP
    - Highest MCV
    - Highest MCP X MCV
    - Maximization of Social Welfare, consumer surplus, etc.
    - May not lead to an overall economy

Congestion Management in Multi Exchanges Scenario (2)

- Explicit Auctioning amongst Exchanges
  - Inter-dependencies in the Indian scenario
  - Difficult to implement
- Merging of bids obtained by each Power Exchange
  - Equivalent to system operator interfacing with only one Exchange
  - Confidentiality issues

Congestion Management in Multi Exchanges Scenario (3)

- Pro – rata rationing of available margins
  - Simple to implement
  - Sub-optimal method
  - Possibility of over-estimation of capacity
  - Further complications
    - Arising out of inter-dependencies in the Indian scenario

Implementation in India

- Worldwide, one Power Exchange dealing with physical delivery in one market
- Pro-rata sharing of available margins
  - Applied on cleared trade volumes on each area and each corridor
  - Interim arrangement
  - Debate on for a more optimal method

Case Study

- No congestion till onset of severe winter
- Occasional congestion after 12th Dec 08
  - Foggy conditions in Talcher area
- Case of 12th Dec 2008
  - Period of Congestion: 0500 – 0600 Hrs
  - Congested Corridor: Total import to SR
  - TTC to SR reduced from 4000 MW to 3600 MW
  - Total provisional requisition: 1430 MW
  - Total trades cleared: 1091 MW
  - Market split into NEW Grid and SR Grid
  - MCP *[IEX website]*:
    - NEW Grid: Rs. 4.80 per kWh
    - SR Grid: Rs. 6.00 per kWh
  - Cost of Transmission discovered
    - Rs. 1.20 per kWh

Transparency - Information Sharing

- Information dissemination through websites
- Available Transfer Capability (ATC) -3 months ahead
- Past & Current Transactions
- Injection & Drawal Schedules
- Un-requisitioned Surplus
- Frequency Trend
- Urgent market information – unit tripping, load crash, contingencies
- 52 week ISTS pooled losses
- Procedures for capacity reservation

STOA – Encouraging facts

- Transactions between extreme corners of the country
  - Kerala to Punjab
  - Nagaland, Arunachal, Tripura to Maharashtra, UP
- Most of the States participated.
- Market Players – Simultaneous Buy & Sell on same day
  - Delhi – Buy in Peak, sell in off-peak
- Transactions from few MW to hundreds of MW
  - 2 MW (JP Cement Rewa,MP – JP Cement, Ayodhya,UP)
  - 800 MW (BSES Rajdhani to UP)
- Surplus during Weekend/Holidays utilised
  - Budge-Budge of CESC : National Award for PLF of 99.6% in 2005-06
- Improved performance of Generating Plants
- Diversity being gainfully utilized

STOA – Success Story

- **Developed in consultation with all stakeholders**
- **Applications Processed (Since Beginning) > 25,000 No.**
- **Volume (Approved Energy) (Since Beginning)> 100BUs**
- **Applications Approved > 95 %**
  - **Refusal/Non-consent by SLDCs > 3 - 4 %**
  - **Refusal due to system constraints < 0.5 %**
- **Curtailment in real time < 1%**
- **Near Dispute free implementation**
- **Logistics/infrastructure -In-house**
- **Confidence Building & Dissemination of knowledge**

Open Access: Key Success Factors

- Control area demarcation & boundary metering
- Robust transmission system
- Assessment of Transfer Capability
- Balancing mechanism
- Methodology for transmission charge sharing
- Treatment of transmission losses
- Streamlined scheduling and settlement mechanism
- Transparency and non-discriminatory implementation
- Compliance
- Dispute redressal mechanism
- Congestion management

Typical Reasons for Denial Of Open Access

- Balancing Mechanism
- Consent by STU/SLDC
  - Telemetry
  - Metering
  - Scheduling
- Functional Autonomy of SLDC
- PPAs

Connectivity, Long Term Access and Medium Term Open Access

Connectivity to ISTS

- Generating stations/ CPPs of exportable capacity > 250 MW
- For Bulk consumer > 100 MW
- CTU to plan lines for connecting TPS > 500 MW and HPS > 250 MW
- Tripartite agreement for connectivity with other ISTS licensee
- Compliance with CEA (Technical Standards for Connectivity to Grid) Regulations

Provisions relating to LTA

- For 12-25 years
- Flexibility of applying before contact is firmed up
- Bank guarantee to avoid frivolous applications
- Grant of LTA– identification of augmentation, estimated transmission charges
- Flexibility to extend term or to relinquish access subject to payment of compensation
- Compensation to be used for reducing transmission charges

Provisions relating to MTOA

- No system augmentation
- Applications for longer term have higher priority
- Information to RLDC and SLDCs on grant of MTOA
- Dedicated line may be constructed by applicant at its own cost & risk
- No overriding preference for renewal
- Exit option by giving advance notice

Challenges ahead.....

- Designing Market that complements Reliability
- Focus on Reliability of physical system
    - Adequacy, Security, Dependability
- System Operation – A facilitator for an Efficient Electricity Market
    - **Empowering SLDCs**
- Market Mechanism System
    - Deployment of technology
    - Automation, Information exchange
- Rapid growth
    - Harmonization
    - Jurisdiction
- Capacity building
    - Inclusive, sustainable, broad based
    - Human Resource
- Ancillary, Capacity, Derivatives ...

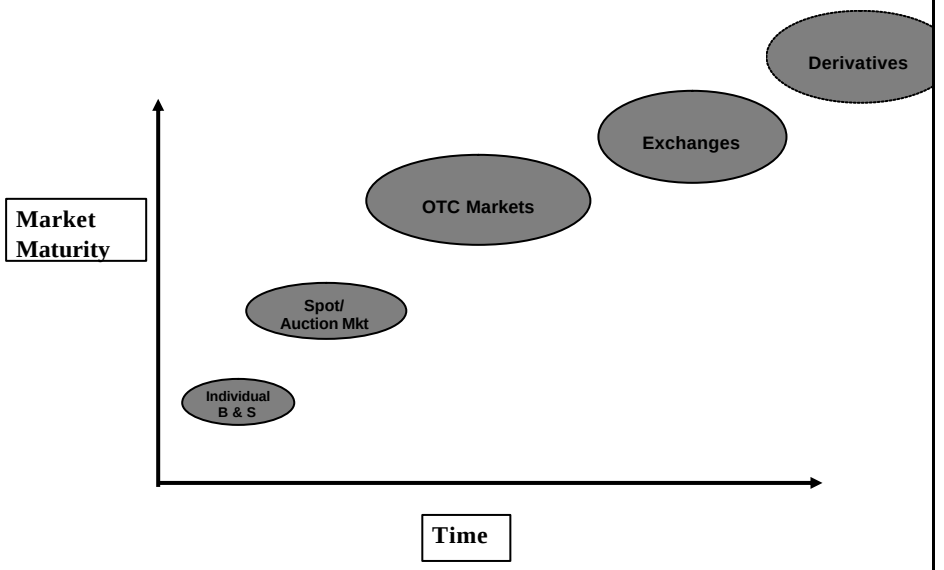
Expectations

- Focus on reliability of the physical system
- Designing markets that complement reliability
- System Operation an important function
  - Allocation of resources
  - Automation
  - Capacity building
- Grid security comes before Economics
  - No economic theory, no legislation, no regulation can repeal the Laws of Physics

Learning's from the experience

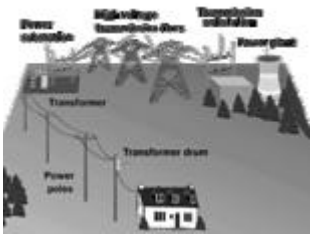
- Revision of Schedules
  - Contract → Options
- Evils of Pro-rata
- "No Show" – "Use it or loose it"
- Behavior of Market Participants changes with Market Rules
- Single part Vs Multi-part settlement
- Separation of Content and Carriage

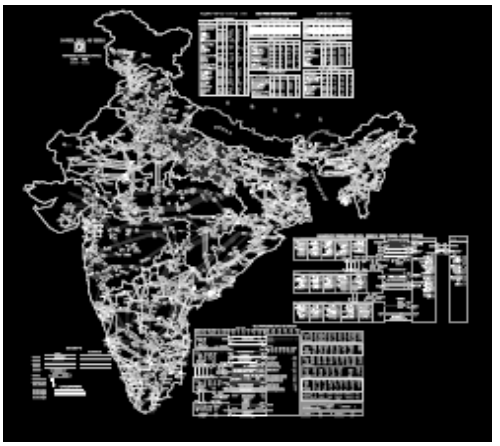
Market Development



Issues .....

- Transmission Pricing
- Transmission Losses
- New Actors in the market
  - Aggregators
  - Professional Members
  - Changing Role of Traders
    - Energy to Capacity
- Capacity Market
  - Issues
  - Right time





Larger the footprint..... Larger the complexities involved.

Thank you