



# Open Access, Electricity Trading and Challenges in Organizing Electricity Trading Through A Power Exchange in India

By

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CERC

# Overview

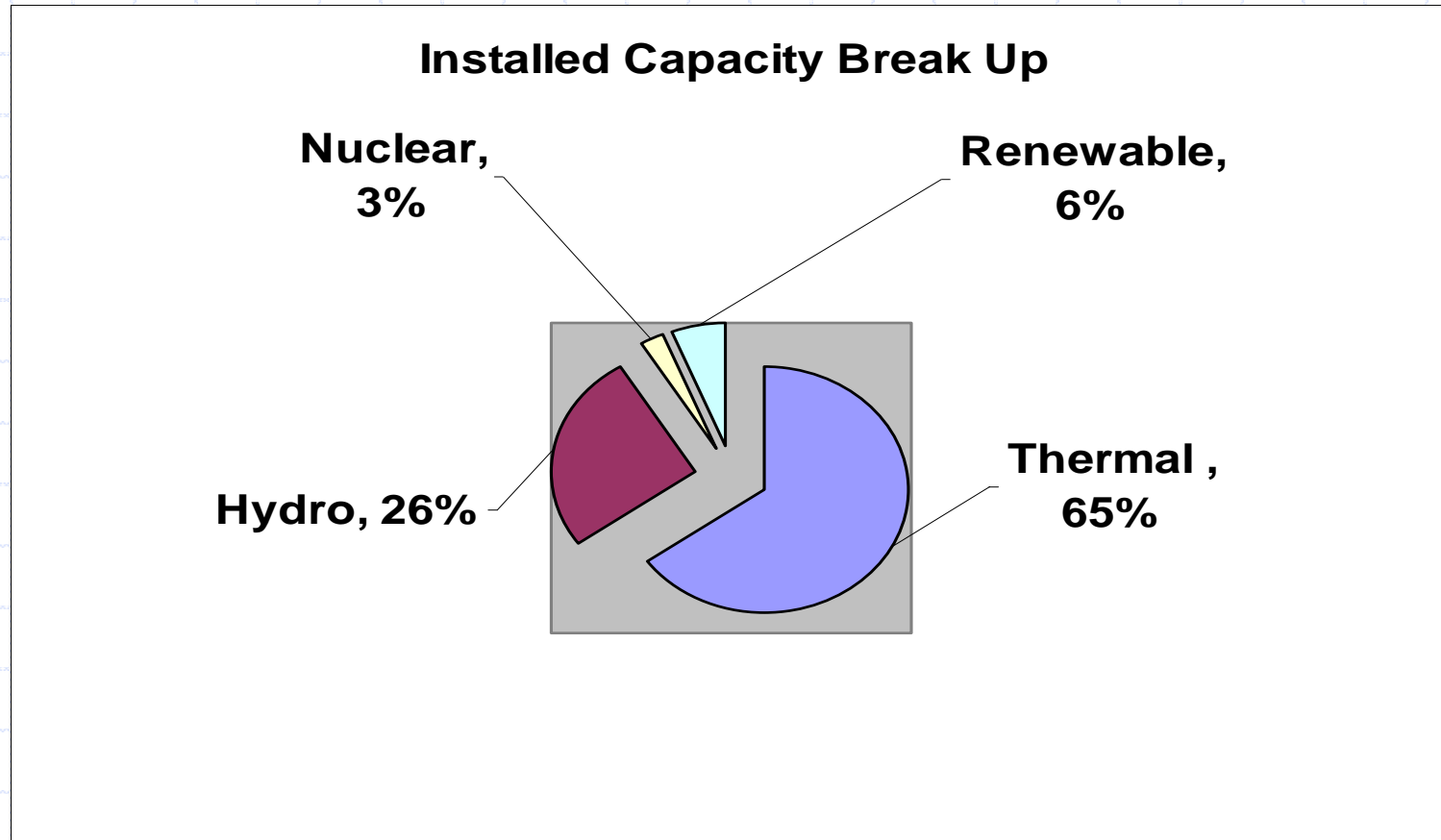
- ◆ Overview of Indian Power Sector
- ◆ Electricity Act -2003 Features
- ◆ System Operation
- ◆ Open Access
- ◆ Current Trading scenario
- ◆ Real Time Settlement (UI Mechanism)
- ◆ Trading Mechanism in the making
  - ◆ Power Exchange (PX)
- ◆ Challenges in formation of PX



# Overview of Indian Power Sector

# Overview of Indian Power Sector

## - Installed Capacity – 132 GW



**Installed Capacity targeted – 200 GW by end of year 2011-12**

# Overview of Indian Power Sector

## ◆ Transmission Lines

- 220kV/400kV/765kV/HVDC - 194563 Ckt-Kms

## ◆ Power Situation

	Demand	Met	Surplus/Deficit
◆ Energy in MUs.	572812	519656	-9.3%
◆ Peak Demand in MW	100403	86425	-13.9%
◆ Per Capita Consumption	-	606 kWh/annum	



# Electricity Act 2003 - Features

# Electricity Act – 2003, Salient Features

- ◆ **Unbundling of SEBs.**
- ◆ **Further distancing of government from regulation**
- ◆ **More powers to regulators**
- ◆ **Delicensing of Generation**
- ◆ **Non-discriminatory open access**
- ◆ **Trading licences to be issued by regulators**
- ◆ **Promotion of competition and electricity trading including market development.**
- ◆ **Transparent policy regarding subsidy**
- ◆ **Tariff discovery through competitive bidding.**

## Related Statutory Provisions of the Electricity Act - 2003

- ◆ **Section 60 : Preventing market domination is the responsibility of the Regulators.**
- ◆ **Section 62 : Authorizes Commission to determine the tariff for:**
  - Supply of electricity by a generating company to a distribution licensee
  - Transmission of electricity
  - Wheeling of electricity
  - Retail sale of electricity
  - Provision of parallel distribution license in the same area
- ◆ **Section 63 : Appropriate Commission shall adopt the tariff determined through transparent process of bidding**
- ◆ **Section 66, 178 : Market Development is the responsibility of the Electricity Regulators.**
- ◆ **Mandate for developing a Power Exchange given to CERC in the National Electricity Policy.**

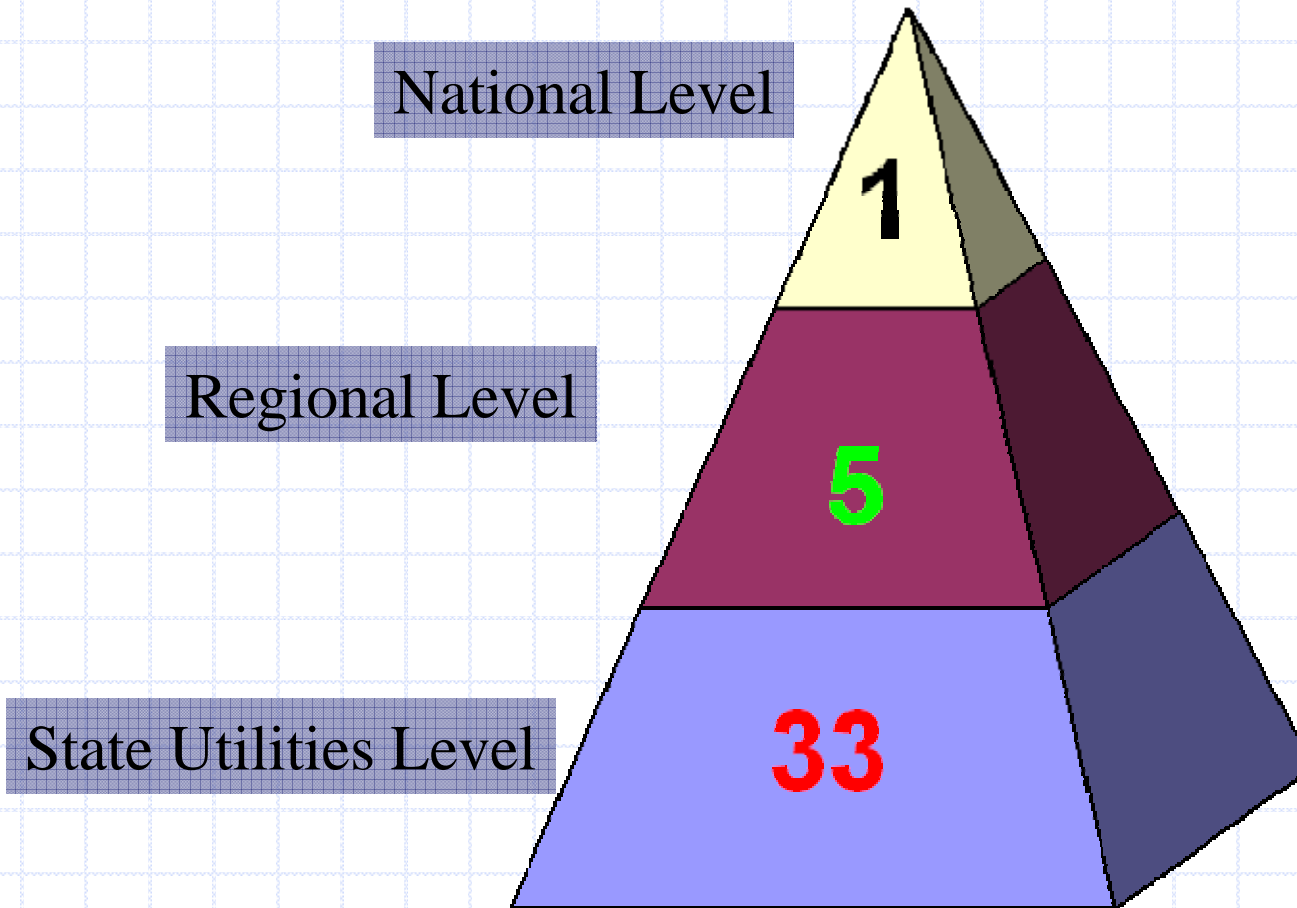
# Building Blocks for Developing Electricity Market

- ◆ **Grid Code**
- ◆ **Experienced System operators**
- ◆ **Day ahead scheduling and dispatch procedures**
- ◆ **Reliable Energy Accounting systems**
- ◆ **Real time price and settlement mechanisms (UI Mechanisms)**
- ◆ **Electricity traders dealing in short term and long term contracts**
- ◆ **Adequate transmission system**
- ◆ **Open Access regulations**
- ◆ **Bilateral trading through physical forward contracts**
- ◆ **The coming up of merchant power plants**
- ◆ **Possibility of a day ahead power exchange etc.**



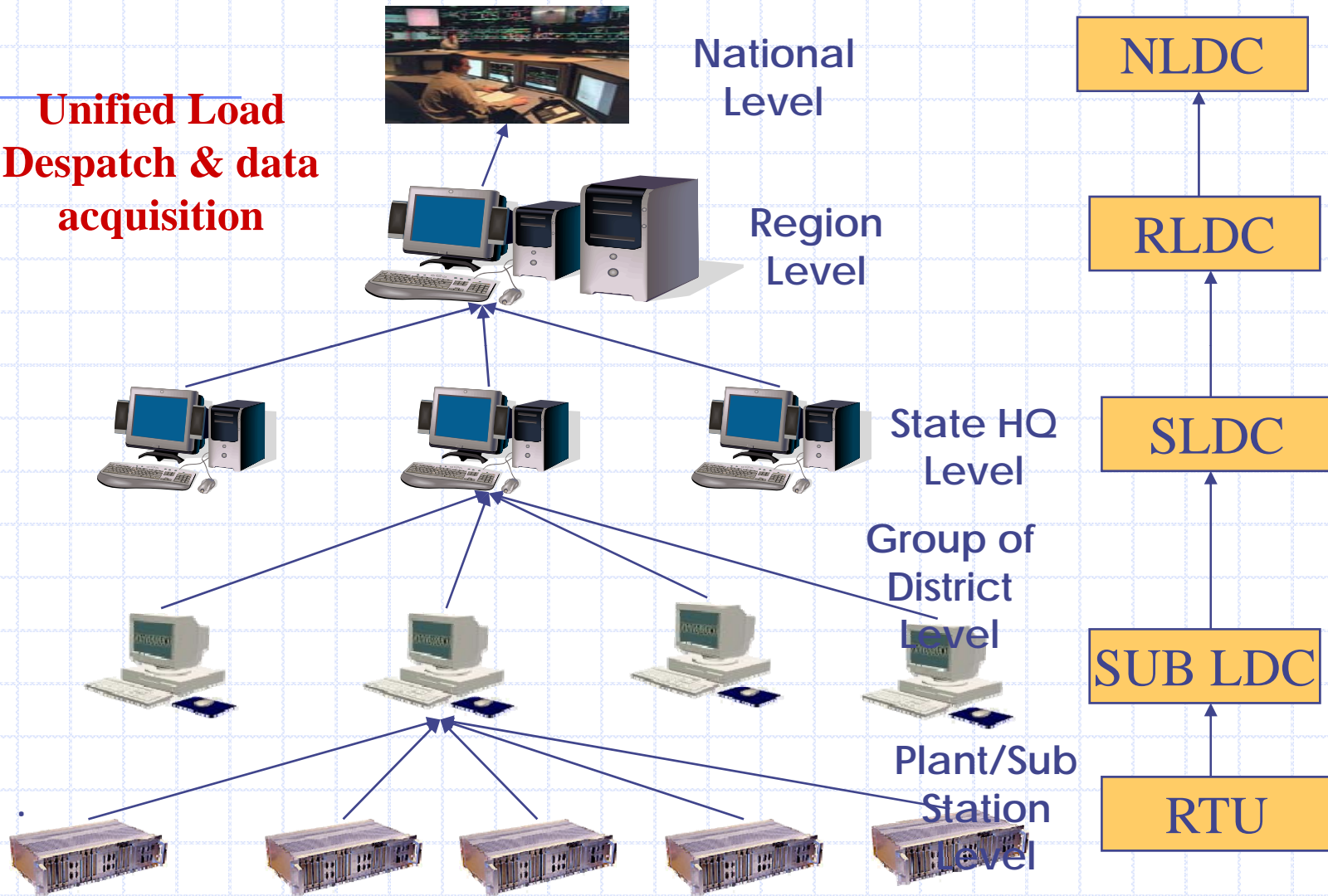
# System Operation

# Hierarchy Of Grid Management

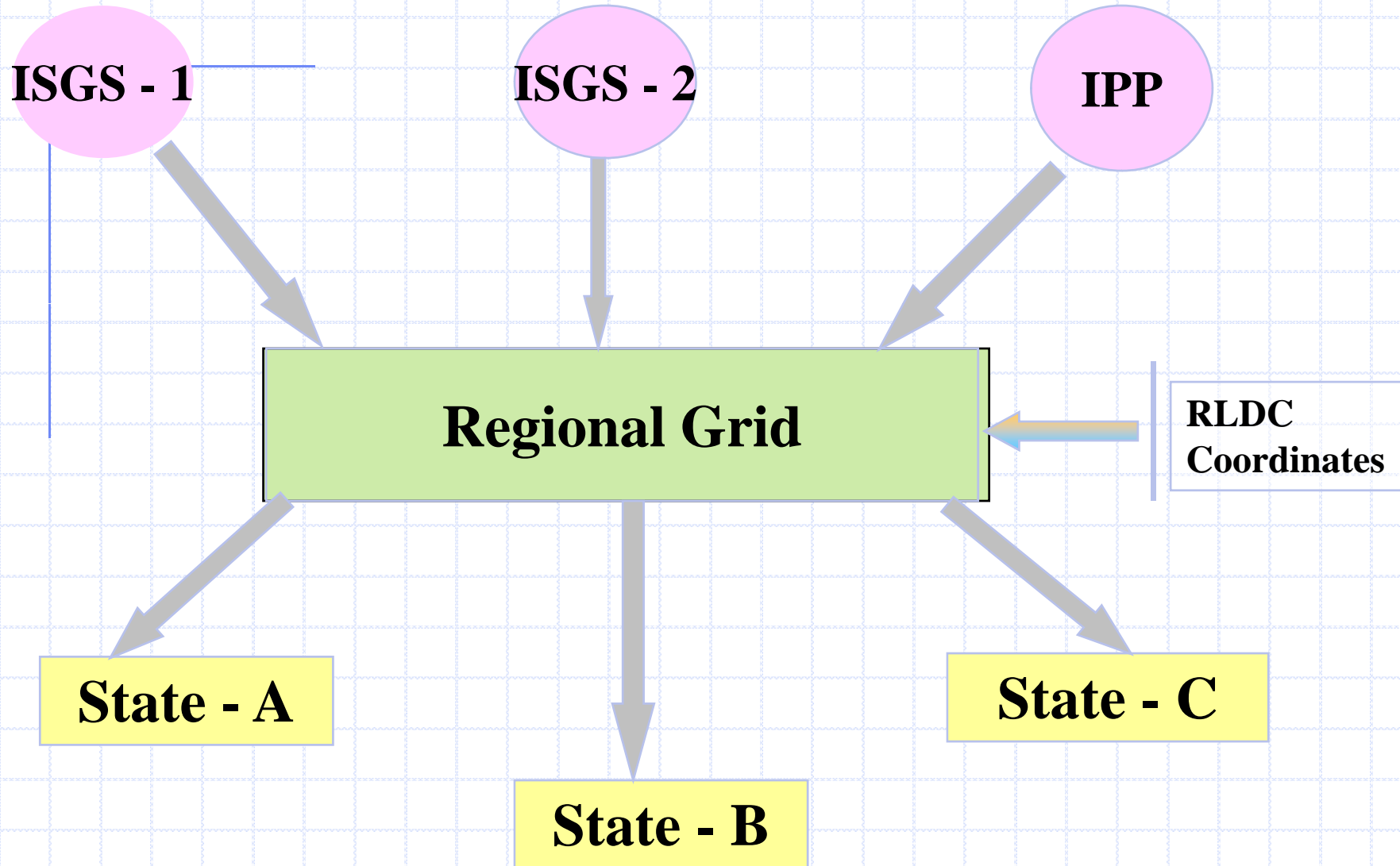


# Information Flow hierarchy

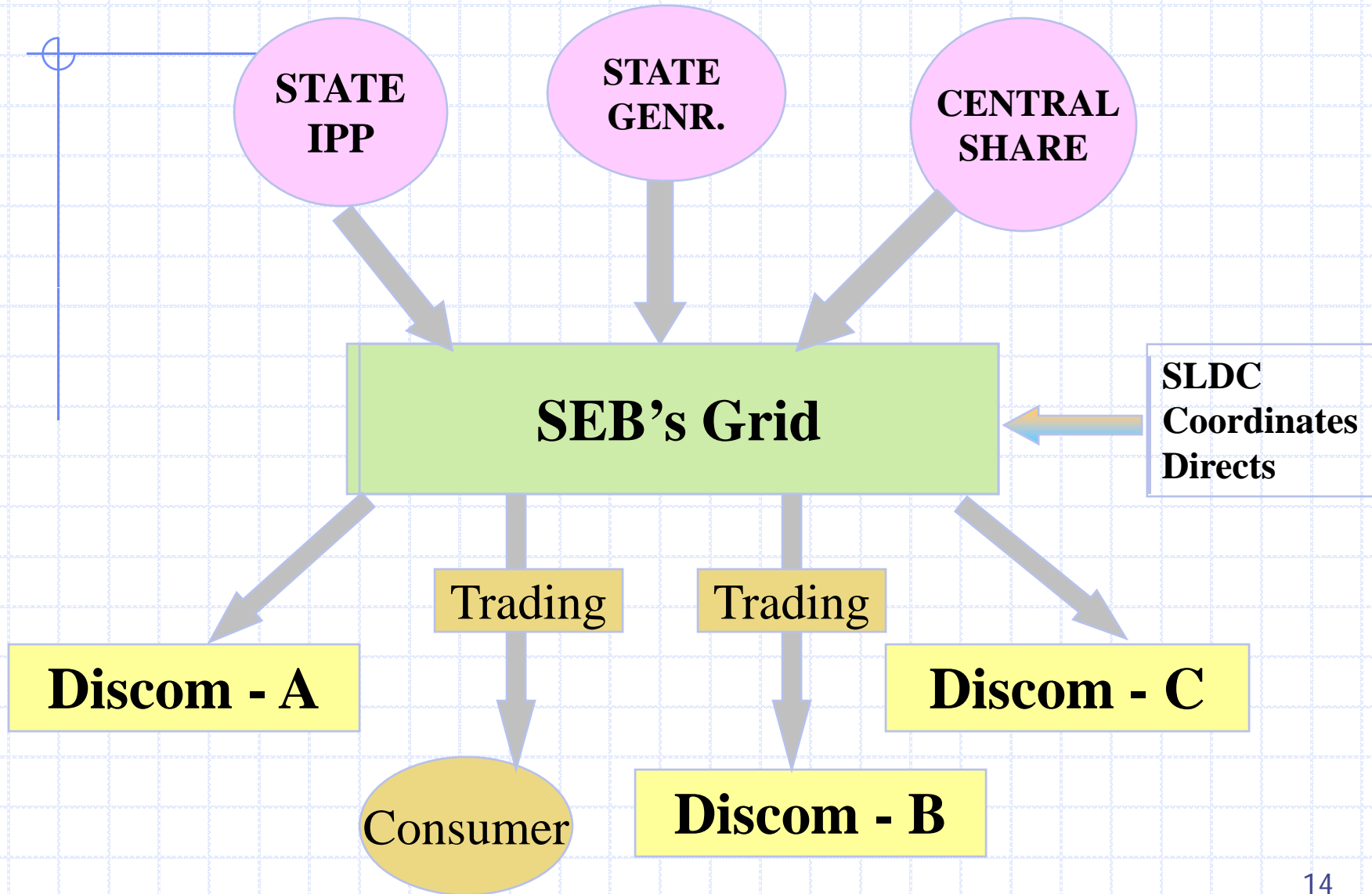
**Unified Load  
Despatch & data  
acquisition**



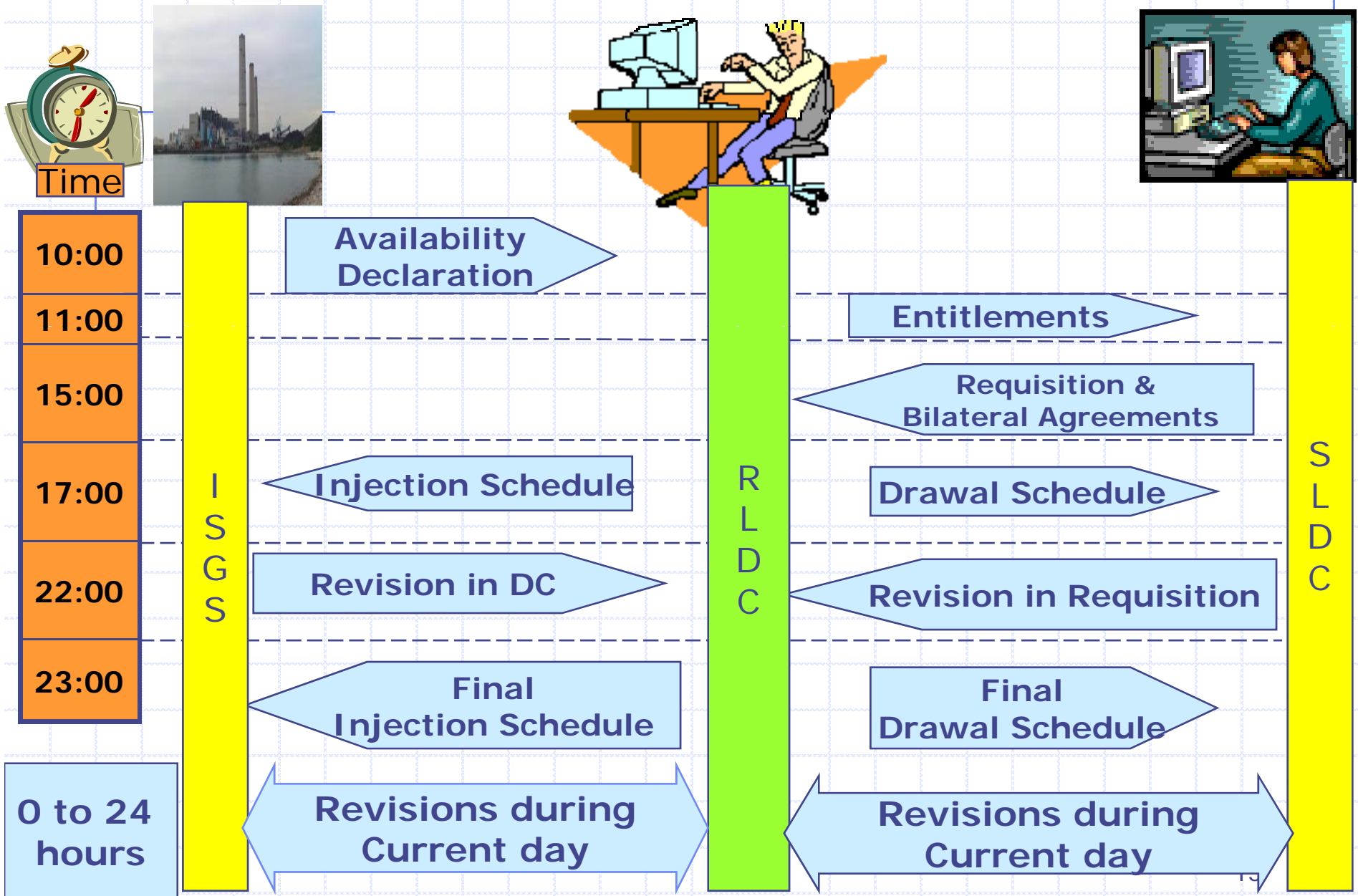
# Interstate Grid



# Intrastate Grid



# Decentralised Scheduling





# Open Access

# Regulations: calendar of events

- ◆ Open Access concept paper - Aug 2003
- ◆ Regulations in force - May 2004
- ◆ Amendment in regulations || - Feb 2005  
and Dec 2006
- ◆ Trading regulations for grant of license in force - Feb 2004
- ◆ Amendment in trading regulations - Apr 2006

# CERC's Open Access Regulations for Inter-State Transmission

## Two Types of Transmission Service to meet the need for energy market development

- ◆ *Long Term Service*
- ◆ *Short Term Service*
- ◆ A *long term customer* will be allowed access based on transmission planning criteria stipulated in the Indian Electricity Grid Code.
- ◆ Access to *short term customer* shall be allowed subject to availability of transmission capacity.

# Nodal Agency

- ◆ Nodal Agency for arranging long term access:  
Central Transmission Utility (POWERGRID), if its system is used. Otherwise the nodal agency shall be the transmission service provider in whose system the drawl point is located.
- ◆ The nodal agency for short term access:  
Regional Load Dispatch Centre (RLDC) of the Region where the drawl point of electricity is situated.

# Features of Long Term Service

- ◆ Firm point to point Transmission Right
- ◆ Exit Option
- ◆ Long terms BPTA to facilitate investment
- ◆ Higher priority in allotment
- ◆ Last to be curtailed
- ◆ Assured recovery for Transmission Service Charges

# Types of Short Term Service

## Four Types of Services:

- ◆ Advance Reservation upto 3 months.
- ◆ Current Reservation upto 1 month
- ◆ Composite Service for next day.
- ◆ Composite Service for the same day.



# Salient features of Short -Term Service

- ◆ Point to Point Service
- ◆ Exit Option
- ◆ Revenue recovery reduces the payment obligation of long term customers and provides additional revenue to the Transmission Licensee.
- ◆ Part day charges.
- ◆ Non-transferable.
- ◆ Bidding in case of congestion.
- ◆ Subject to "Use-it-or-loose-it" clause.
- ◆ Rs./MW/Day rates for each stamp are known in advance and total charges are very simple to calculate.

# Transmission Charges for Short Term Access - Uncongested

## Transmission Charges

- ◆ Inter-regional System
  - **ST\_Rate =  $0.50 \times (\text{TSC}/\text{CIR})/365$  Rs./MW/Day**
- ◆ Intra-regional System
  - **ST\_Rate =  $0.25 \times (\text{TSC}/\text{Av\_Cap})/365$  Rs./MW/Day**
- ◆ Up to 6 Hrs. in a day 25% of ST\_Rate
- ◆ More than 6 Hrs. and up to 12 Hrs. in a day 50% of ST\_Rate.
- ◆ More than 12 Hrs. and up to 24 Hrs. in a day equal to ST\_Rate.

## Operating Charge

- ◆ Inter-regional System
  - **Rs. 3000 /day or part of the day/transaction**
- ◆ Intra-regional System
  - **Rs. 1000 /day or part of the day/transaction**

# Bidding Procedure for Short Term Access

- ◆ ST\_Rate shall be the floor price.
- ◆ No permission to quote price more than 5 times intraregional Transmission system and more than two and half times the floor price in case of interregional Transmission system.
- ◆ Reservation of capacity in decreasing order of price quoted.
- ◆ Pro rata allocation of capacity in case of equal prices quotes.

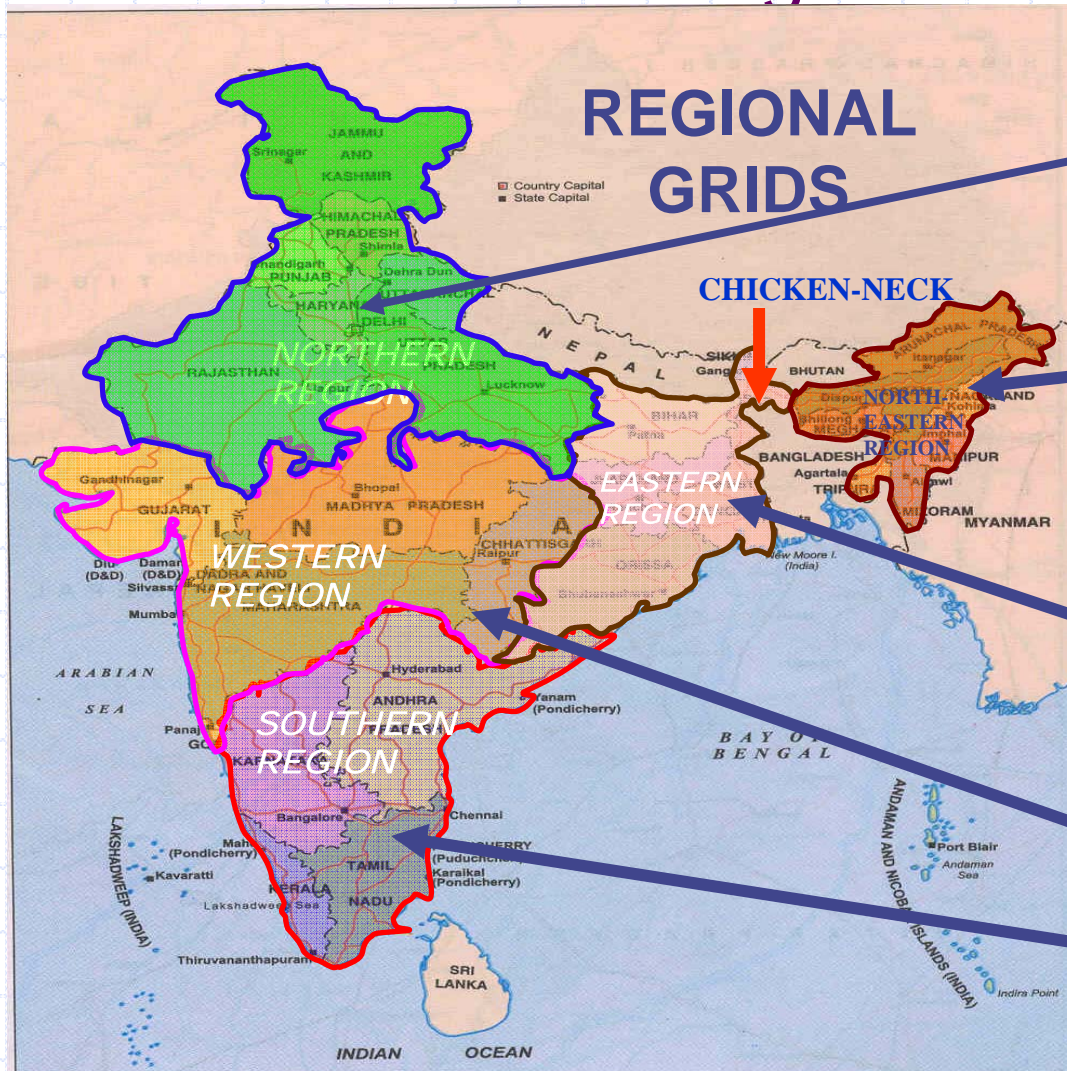
## Trading Through Exclusive Open Access

- Open Access Regulations have facilitated power trading in an orderly manner.
- Energy agreements and transmission clearance have to be arranged separately.
- Revised open access regulations facilitate advance reservation for transmission as well as day ahead reservation for trading.
- Open Access charges are reasonable and simple to apply.



# Trading

# Peculiarities of Regional Grids in India



**Deficit Region**  
 Snow fed - run-of-the-river hydro  
 Highly weather sensitive load  
 Adverse weather conditions: Fog & Dust Storm

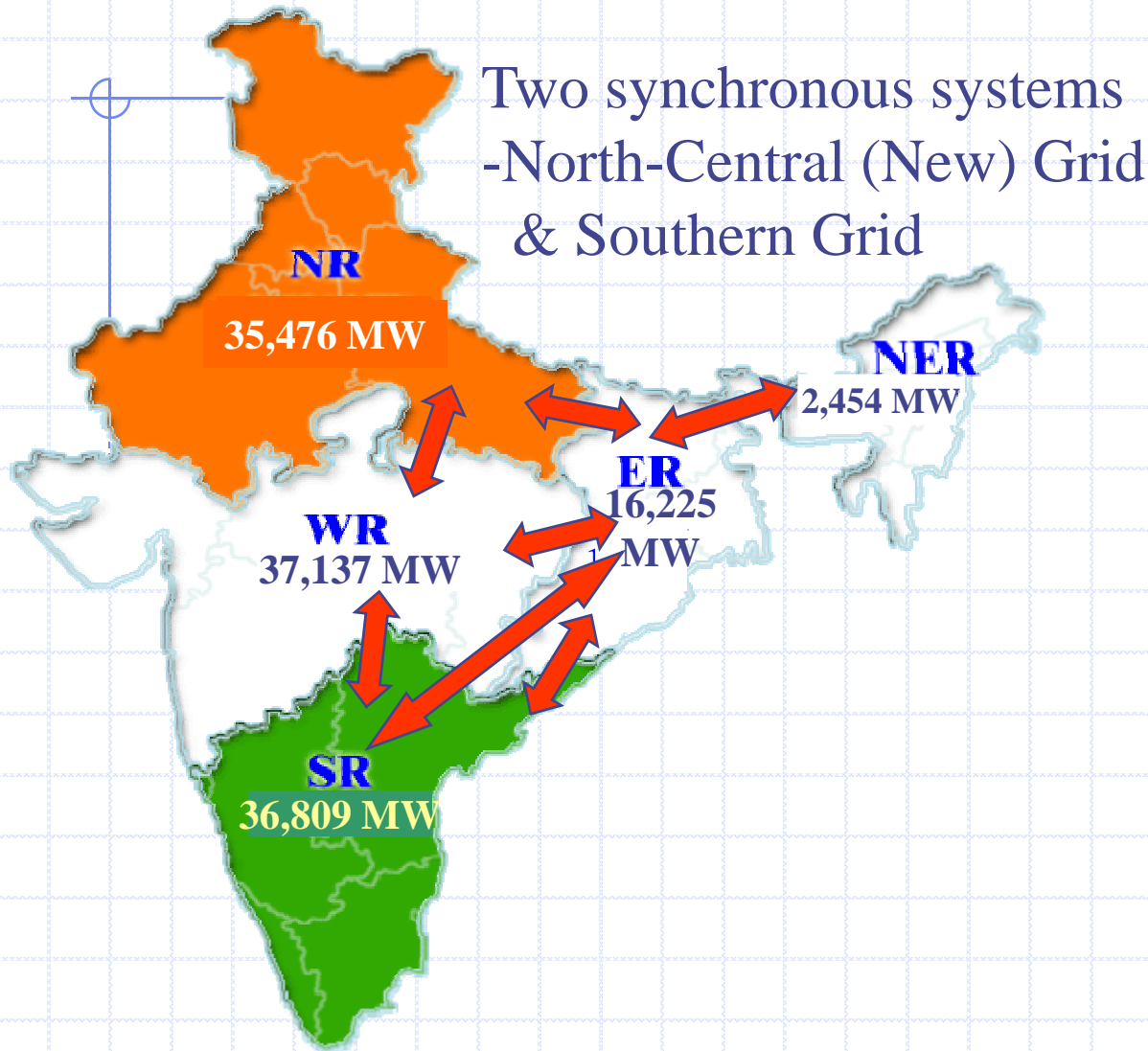
**Very low load**  
 High hydro potential  
 Evacuation problems

**Low load**  
 High coal reserves  
 Pit head base load plants

**Industrial load**

**High load**  
 Monsoon dependent hydro

# Inter-Regional Transmission capacities



Inter regional Link	MW capacity
NER-ER	1,850
ER-NR	2,700
ER-SR	1,200
ER-WR	1,650
SR-WR	1,200
WR-NR	900
Talcher Kolar HVDC Bipole	2,000
<b>Total as on date</b>	<b>11,500</b>
<b>Target for 2012</b>	<b>37,150</b>

*Figures as on 31-Jan-2007*

# Current Scenario

- ◆ Suppliers call for bids from buyers/traders
- ◆ Traders compete in the auctions to win the supply bids
- ◆ Buyers have no option but to buy from the trader having the supply contract
- ◆ Prices of traded electricity have been going up
- ◆ Most of the bilateral trading is inter-regional;
- ◆ ER, NER are suppliers
- ◆ NR, WR are buyers

# Current Scenario

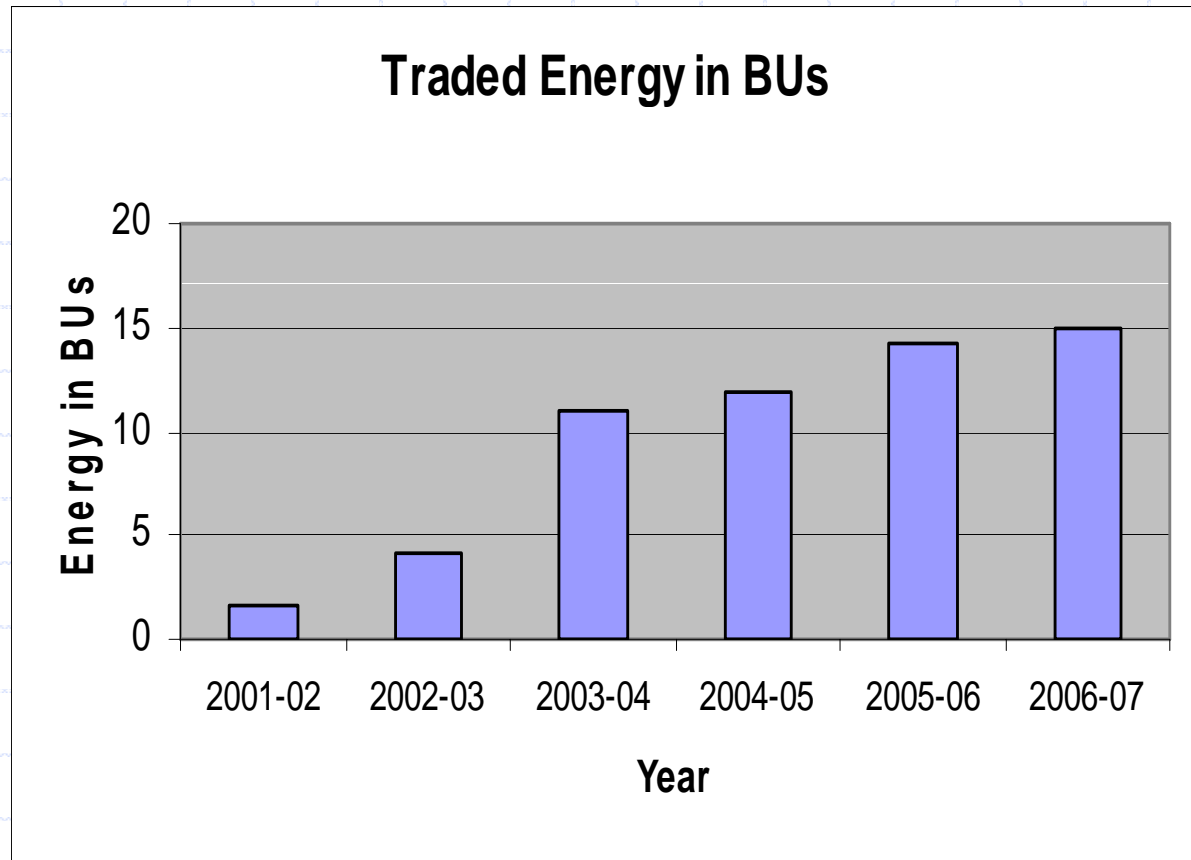
- ◆ Most of the supplies are tied up in long term PPAs: Mostly, regulated two-part tariff: Ideal for investment promotion as well as price security for Discoms
- ◆ Short term trading constitutes 2 to 3 % of the total supply
- ◆ Trading essentially between surplus & deficit distribution utilities
- ◆ Intra-state trading barriers

# Current Scenario

- ◆ Adequate Inter-state transmission system, but needs strengthening
- ◆ Established scheduling, dispatch and energy accounting procedures
- ◆ UI accounting system for real time deviations from schedules
- ◆ Established RLDCs; SLDCs to be strengthened

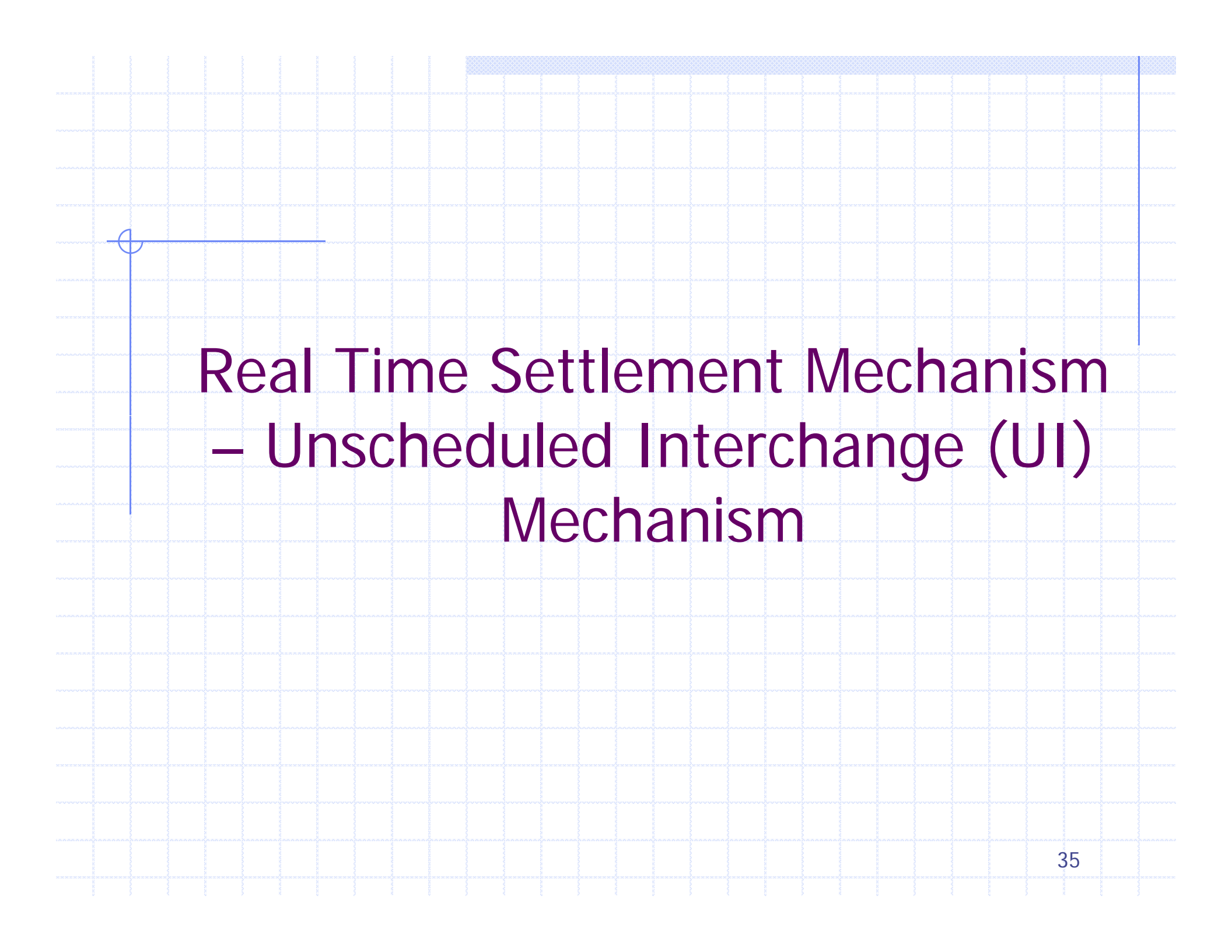
# Short-term Trading Volume

Year	BU
2001-02	1.61
2002-03	4.17
2003-04	11.02
2004-05	11.84
2005-06	14.18
2006-07	15.00



# Trading License – Eligibility Criteria

Sr. No.	Category of Trading License	Volume of Electricity to be traded in Mus	Net Worth in Rs. Crores	License Fee in Rs. Lakh
1	A	Upto 100	1.50	1.00
2	B	100-200	3.00	2.00
3	C	200-500	7.50	5.00
4	D	500-700	10.00	7.00
5	E	700-1000	15.00	10.00
6	F	Above 1000	20.00	15.00

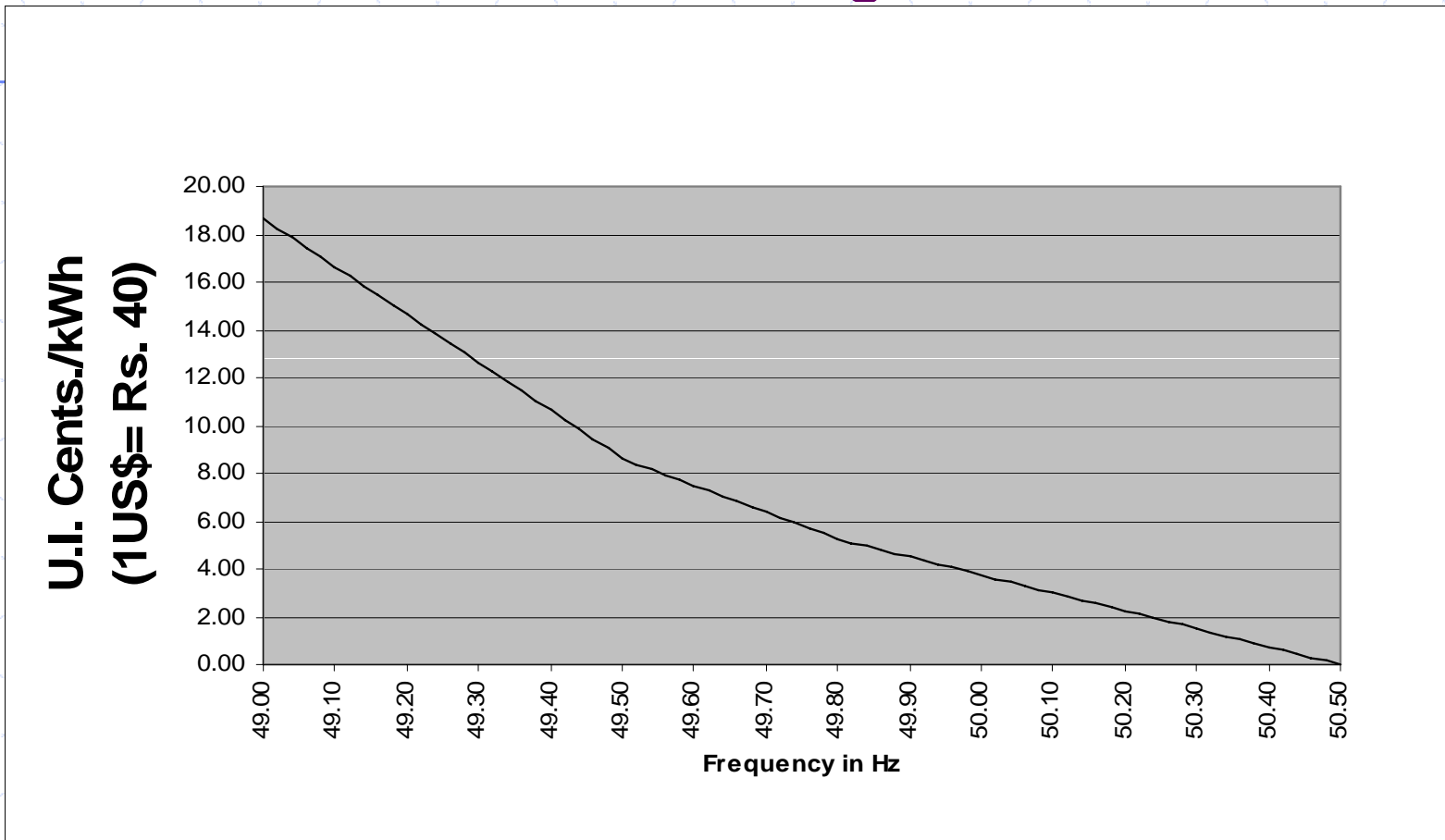


# Real Time Settlement Mechanism – Unscheduled Interchange (UI) Mechanism

# U. I. Mechanism - Features

- ◆ Linkage between frequency and price.
- ◆ Helps maintain reliability standards.
- ◆ Every utility reacts to floating frequency in real time and adjusts its generation/demand accordingly. This helps in achieving equilibrium.
- ◆ Induces frequency linked dispatch of generating stations. Induces real time merit order in generation.

# Real Time Price For Unscheduled Interchange



U.I. @ 49.00 Hz 18.625 Cents/kWh  
@ 50.50 Hz 0.00 Cents/kWh

Increment of 0.15 Cents/0.02Hz in frequency from 50.50 Hz to 49.80 Hz

0.225 Cents /0.02 Hz from 49.80 Hz to 49.50 Hz

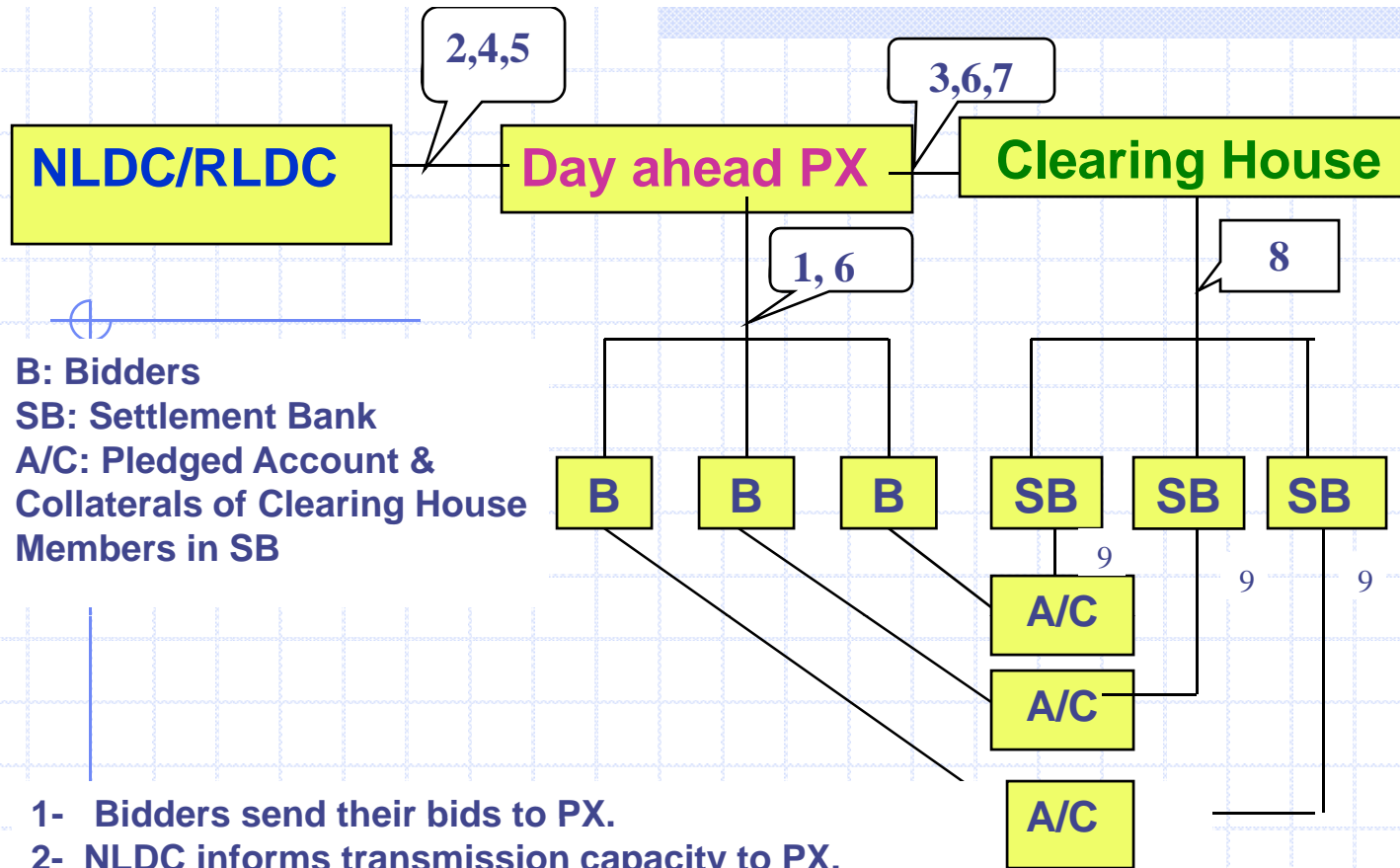
0.40 Cents/ 0.02 Hz from 49.50 to 49.00 Hz



# Market Mechanism (In The Making) – Power Exchange

# Road Map For Future

- ◆ Need to organize short term trading on a transparent, equitable and efficient platform
- ◆ Need to increase the supplies/depth
- ◆ Need to bring surplus captive generation into the grid
- ◆ Need to encourage peaking power plants and merchant generation
- ◆ For optimum resource management, need to simultaneously clear energy contracts & transmission paths
- ◆ Need to modernize trading through electronic platform

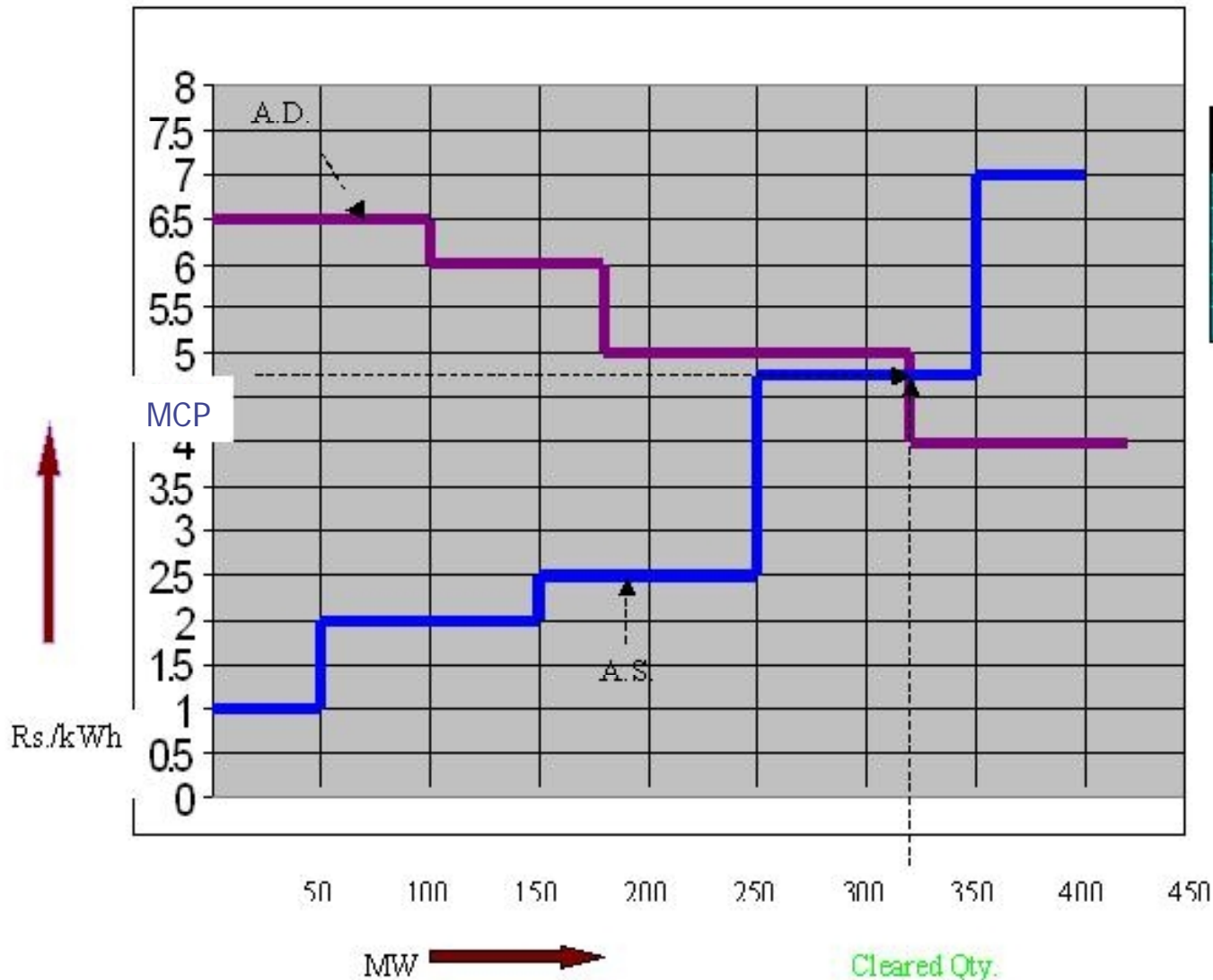


B: Bidders  
 SB: Settlement Bank  
 A/C: Pledged Account &  
 Collaterals of Clearing House  
 Members in SB

- 1- Bidders send their bids to PX.
- 2- NLDC informs transmission capacity to PX.
- 3- Clearing House confirms adequate collaterals of clearing agents.
- 4- PX obtains NLDC concurrence before releasing day ahead Trade schedules.
- 5 - RLDCs issues day ahead generation & dispatch schedules for PX participants.
- 6 - PX issues day ahead trade schedules.
- 7 - PX issues rolling collateral requirement.
- 8 - After settlement period Clearing House issues Invoice/Credit Notes .
- 9- Settlement Banks debit/credit the appropriate amounts.

*Function Diagram in Staff Paper*

# Double Side Bidding



Buyer's bid		Seller's offer	
MW	Rs/kWh	MW	Rs/kWh
100	6.50	50	1.00
75	6.00	100	2.00
150	5.00	100	2.50
100	4.00	100	4.75
		50	7.00

# STEPS TAKEN BY CERC

- ◆ Staff Paper released in July, 2006 for public comments
- ◆ Public Hearing held on December 19, 2006 in which 150 persons participated
- ◆ CERC issued Orders summing up the deliberations and conclusions on January 18, 2007
- ◆ CERC issued guidelines for setting up Power Exchange on February 6, 2007.

# Issues in PX design

- ◆ National power exchange Vs many power exchanges
- ◆ Mandatory Vs Voluntary participation
- ◆ Double side bidding Vs Supply side bidding
- ◆ Uniform pricing Vs Discriminatory pricing
- ◆ Day-ahead exchange Vs Same day exchange
- ◆ Congestion management

# CERC GUIDELINES ON PX –Basic Principles

- ◆ PX to be a voluntary platform
- ◆ PX would be alternative to bilateral trading and UI mechanism
- ◆ No existing contracts or PPAs to be disturbed
- ◆ CERC not to get involved in the day to day functioning and PX design.

# Highlights of CERC Guidelines on PX

- ◆ PX to be de-mutualized form of Organization
- ◆ Reliable, effective and impartial management
- ◆ Ring-fencing between ownership, management and participation
- ◆ Transparency in operation and decision-making
- ◆ Computerized trading and clearing system
- ◆ Efficient financial settlement and guarantee system
- ◆ Effective trade information dissemination system

# CERC GUIDELINES ON PX – Legal

- ◆ The PX to comply with Electricity Act, 2003, IEGC and Forward Contract Regulation Act, 1952 to the extent applicable.
- ◆ PX to function in public interest and comply with conditions to be specified by the Commission.
- ◆ The Commission to issue permission to the PX ***(and not a license, since PX is viewed as a facilitator for trading by providing a platform and not a Trader per se).***

# CERC Guidelines On PX -General

- ◆ The Promoters will have the freedom to develop, manage and operate the Power Exchange according to approved rules, bye-laws and procedures.
- ◆ Any company registered under the Companies Act or a consortium of companies would be eligible to apply.
- ◆ RLDCs not to be unduly burdened

# CERC GUIDELINES ON PX- Role of CERC

The Commission to focus on the following:

- ◆ Scrutiny of the Rules and Bye-laws of the PX
- ◆ Whether and how to assign transmission capacity to the PX
- ◆ Apportionment of transmission charges and losses
- ◆ Procedure for handling transmission congestion
- ◆ Monitoring of the functioning of the PX to the extent of preventing speculation, collusion and unfair gaming
- ◆ Ensure that procedures are laid down for streamlined and mutually satisfactory interaction between RLDCs and PX

# CERC Guidelines On PX –Project Report

The applicant's Project Report to contain the following:

- ◆ Constitution of the proposed PX
- ◆ Funding sources
- ◆ Management structure
- ◆ Infrastructure facilities
- ◆ Clearing and settlement mechanism
- ◆ R&D facilities
- ◆ Products to be traded
- ◆ Physical delivery system
- ◆ Time line

# Challenges Ahead In Formation Of PX

- ◆ Inadequate volume due to division of trade
- ◆ Suppliers may avoid PX
- ◆ Harnessing captive generation
- ◆ Power exchange may stimulate demand without matching supplies
- ◆ Compatibility with the existing framework
- ◆ Facilitating additional supplies to PX
- ◆ Providing transmission for power trading



# Thank You

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