

FUTURE ELECTRIC POWER CONTROL CENTRES OF INDIAN POWER SYSTEM



पावरग्रिड

**POWER GRID CORPORATION OF INDIA
LIMITED**

The Central Transmission Utility of India



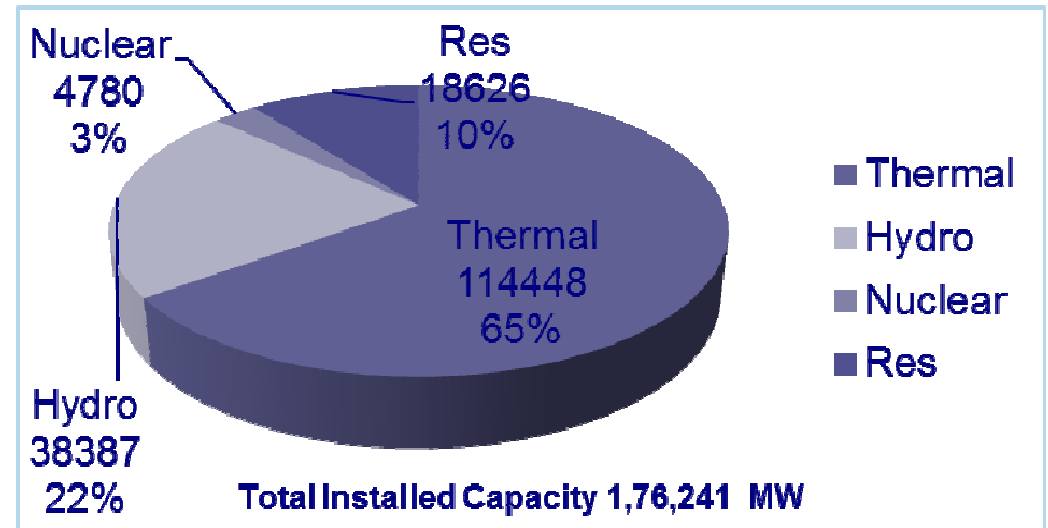
**POWER SYSTEM OPERATION
CORPORATION LIMITED**

A wholly owned subsidiary of POWERGRID



STATUS OF INDIAN POWER SECTOR

- Indian Power Sector has grown at a rapid pace from 1.3 GW in 1947 to around 176 GW as on date geographically spread over about 3.3 million sq. kms
- Generation Mix comprises



- Transmission Grid Comprises
 - 765kV/400kV Lines - 1,10,974 ckt. Kms
 - 220 kV Lines – 1,34,638 ckt. Kms
 - ± 500 kV HVDC Lines – 8,924 ckt. Kms
- At current 8-10% of economic growth, the installed Capacity requirement of the country shall be around 575 GW by the year 2027

*Data as on 01 May, 2011

Source : CEA

11th EPCC, Altea, Spain
22nd – 25th May, 2011



STATUS OF INDIAN POWER SECTOR

REGIONAL GRIDS

INSTALLED CAPACITY

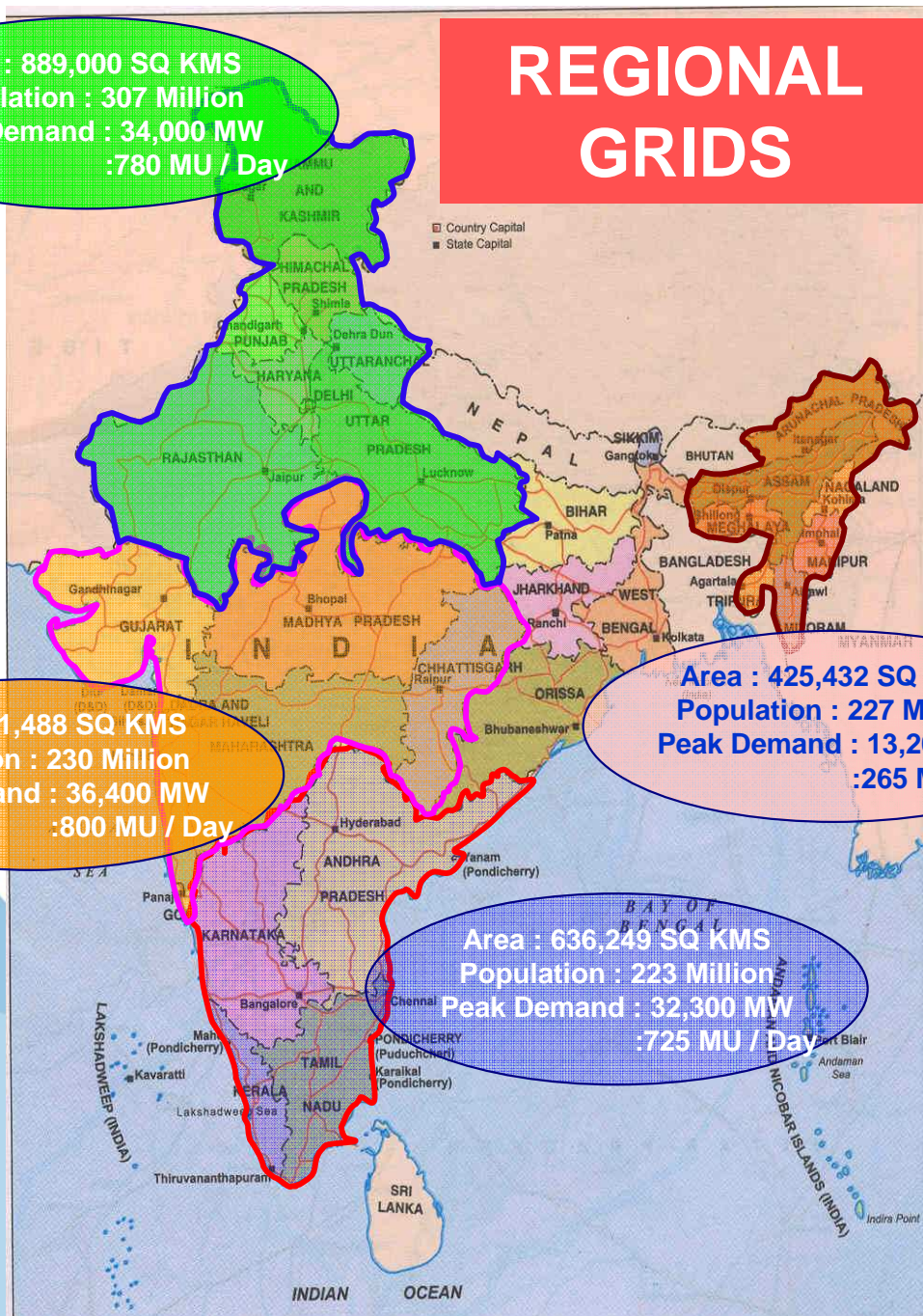
NORTHRN :-	46,989 MW
EASTERN :-	23,197 MW
SOUTHERN :-	50,164 MW
WESTERN :-	53,562 MW
NORTH-EASTERN :-	2,329 MW
TOTAL	176,241 MW

Area : 889,000 SQ KMS
 Population : 307 Million
 Peak Demand : 34,000 MW
 :780 MU / Day

Area : 951,488 SQ KMS
 Population : 230 Million
 Peak Demand : 36,400 MW
 :800 MU / Day

Area : 425,432 SQ KMS
 Population : 227 Million
 Peak Demand : 13,200 MW
 :265 MU / Day

Area : 636,249 SQ KMS
 Population : 223 Million
 Peak Demand : 32,300 MW
 :725 MU / Day





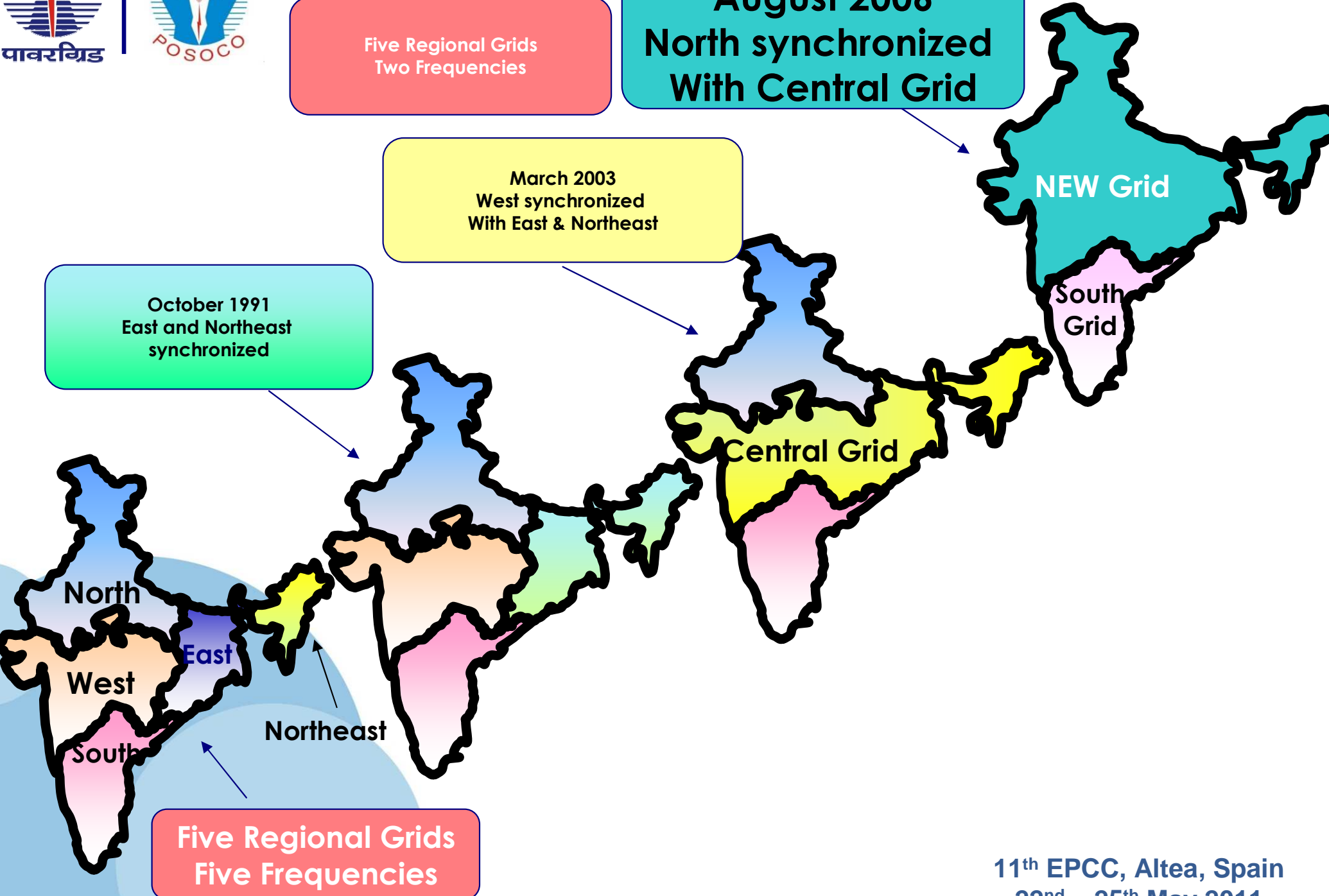
EVOLUTION OF INDIAN GRID-- Merging of Markets

Five Regional Grids
Two Frequencies

August 2006
North synchronized
With Central Grid

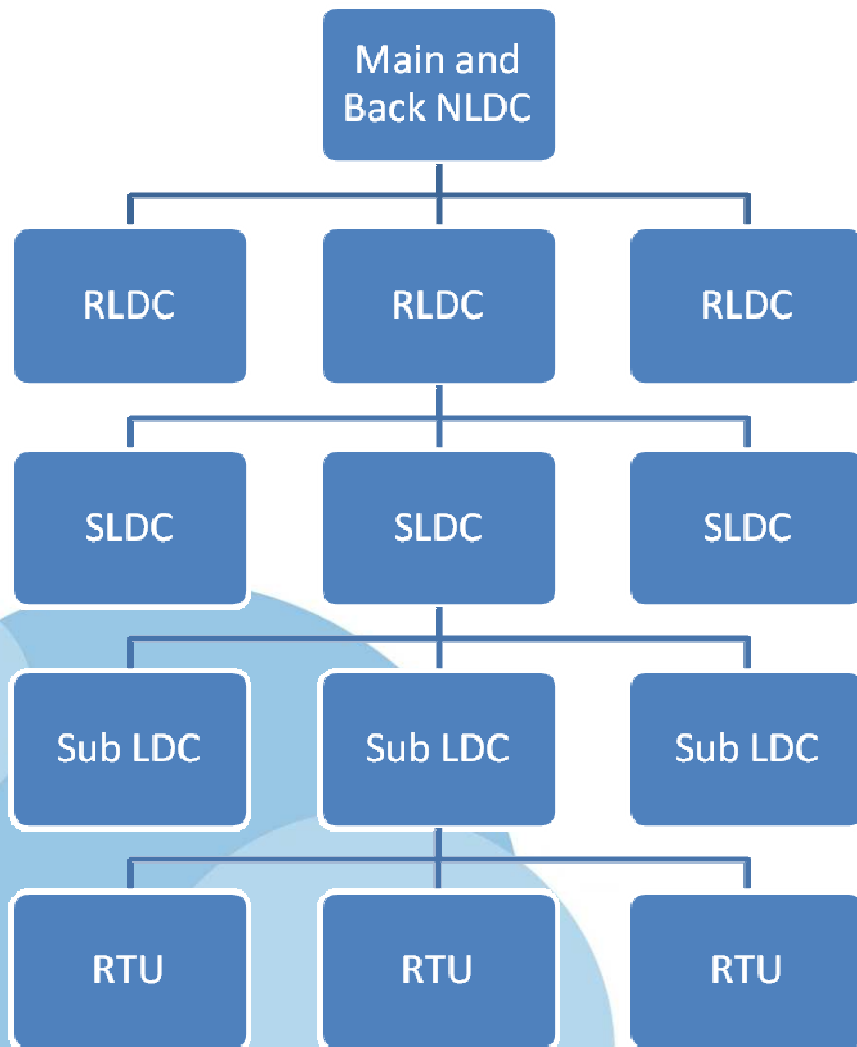
March 2003
West synchronized
With East & Northeast

October 1991
East and Northeast
synchronized



Five Regional Grids
Five Frequencies

EXISTING SYSTEM



Hierarchical system for Load Dispatch were installed between 2000-2005:

- NLDC: National Load Dispatch Centre
- RLDC: Regional LDC (5 Nos.)
- SLDC: State LDC (31 Nos.)
- Sub LDC: 51 Nos.
- RTU: More than 1200 RTUs reporting on **IEC 60870-5-101** protocol
- ICCP Protocol is used for Data Exchange between Control Centre.
- Dedicated Communication Network based on Fibre Optic, Microwave and PLCC.



NEED FOR SYSTEM UPGRADE

- Expansion of the system
- Regulatory Changes
- Unique Availability based Settlement System
- Market requirements
 - Open Access in transmission
 - Power Trading
 - Emergence of Power Exchanges
- Need for back-up Control Centres/Disaster Management
- Interoperability issues
 - Integration of diff. make RTUs.
 - Proprietary protocols
- Integration of emerging technologies such as WAMS.



CHALLENGES IN MIGRATION TO NEW SYSTEM

- Parallel Operation of Existing and New System
- Minimisation of Downtime in Existing Systems
- Reporting of existing RTUs in IEC-60870-5-104 protocol
- Minimisation of Proprietary work in Existing System
- Integration of other LDCs on different protocols/ vendors
- Portability of database and displays - Multivendor scenario
- Running of State Estimator - Centralised or Decentralised / Exchange of network model
- Integration issues of Renewable
- Integration of Market Applications
- Planning & implementation of communication infrastructure with rapid increase in market players / IPPs / distributed renewable



FUTURE CONTROL CENTRE PROJECTS IN INDIA

- Establishment of Transmission Asset Management Centre at National and Regional Level (Estimated Cost USD 54.5 million)
- 5 Nos. of RLDC Upgrade Projects (Estimated cost USD 5.5 million per RLDC)
- 31 Nos. of SLDC Upgrade Projects (Estimated cost of USD 4.4 million per SLDC)
- APDRP- SCADA/DMS Systems in 19 cities worth USD 4.45 millions



ROAD MAP FOR WAMS IN INDIA

- POWERGRID has appointed a Panel of Experts to advise upon WAMS Implementation in Indian Power System.
- POWERGRID is in the process of finalizing a “National Plan for WAMS Implementation.” Shall be released by June 2011
- POWERGRID has planned pilot projects for each region to gain experience with Synchrophasors:
 - Northern Region (8 PMUs)
 - Western Region (25 PMUs)
 - Eastern Region (25 PMUs)
 - Southern Region (6 PMUs)
 - North Eastern Region (6 PMU)



ROAD MAPS FOR WAMS IN INDIA

- Under National Plan, POWERGRID plans to cover all 400kV & above S/s with PMU based WAMS System.
- POWERGRID is in the process of upgrading its OPGW based communication infrastructure to all Central Sector Sub Station/Generating Stations.
- POWERGRID is developing Analytical functions in house:
 - Optimal Placement of PMU
 - CT/CVT Calibration & Model Validation using PMU Data
 - Dynamic State Estimator/Monitor.
 - Supervised Zone-3 Blocking.
 - Model Validation using PMU data



THANK YOU FOR YOUR KIND ATTENTION PLEASE

Rakesh, Deputy Manager

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