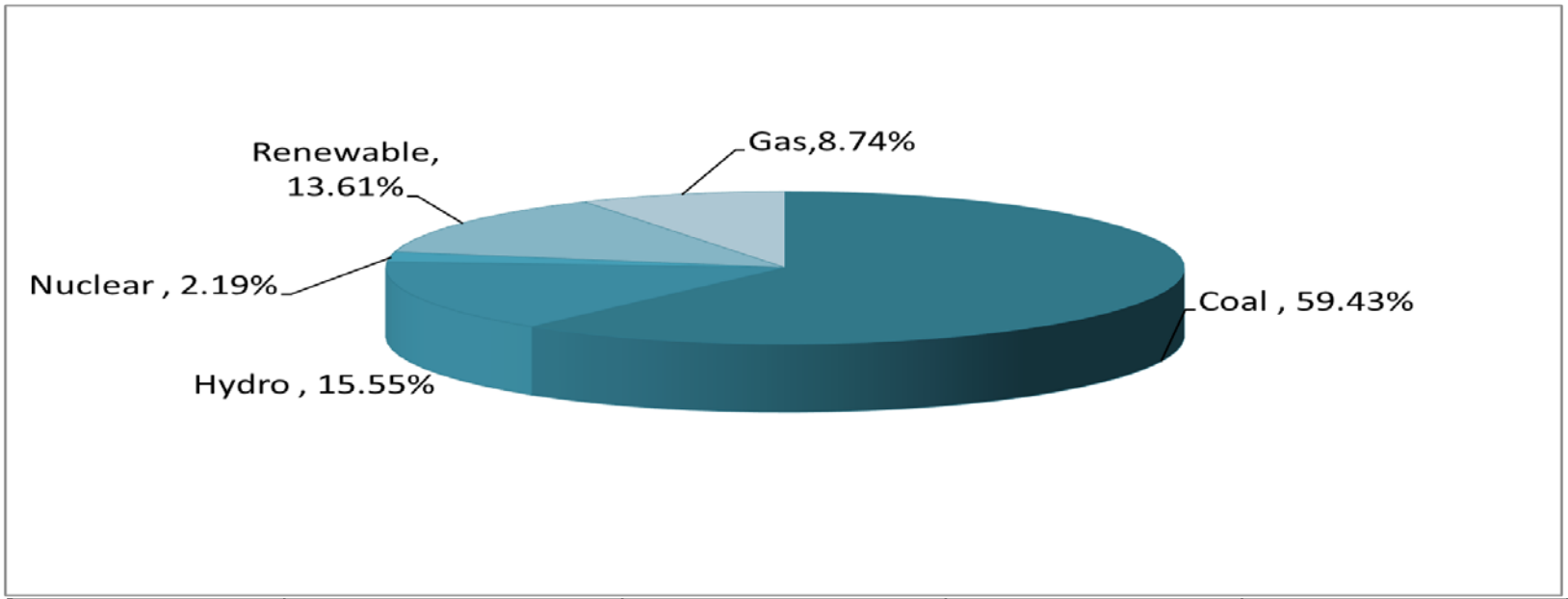
Wind Energy Outlook in India
and
Policy Framework

J. K. Jethani
Principal Scientific Officer
Ministry of New & Renewable Energy
Government of India

Indian Power Sector

- Total Installed Capacity- 2,76,082 MW

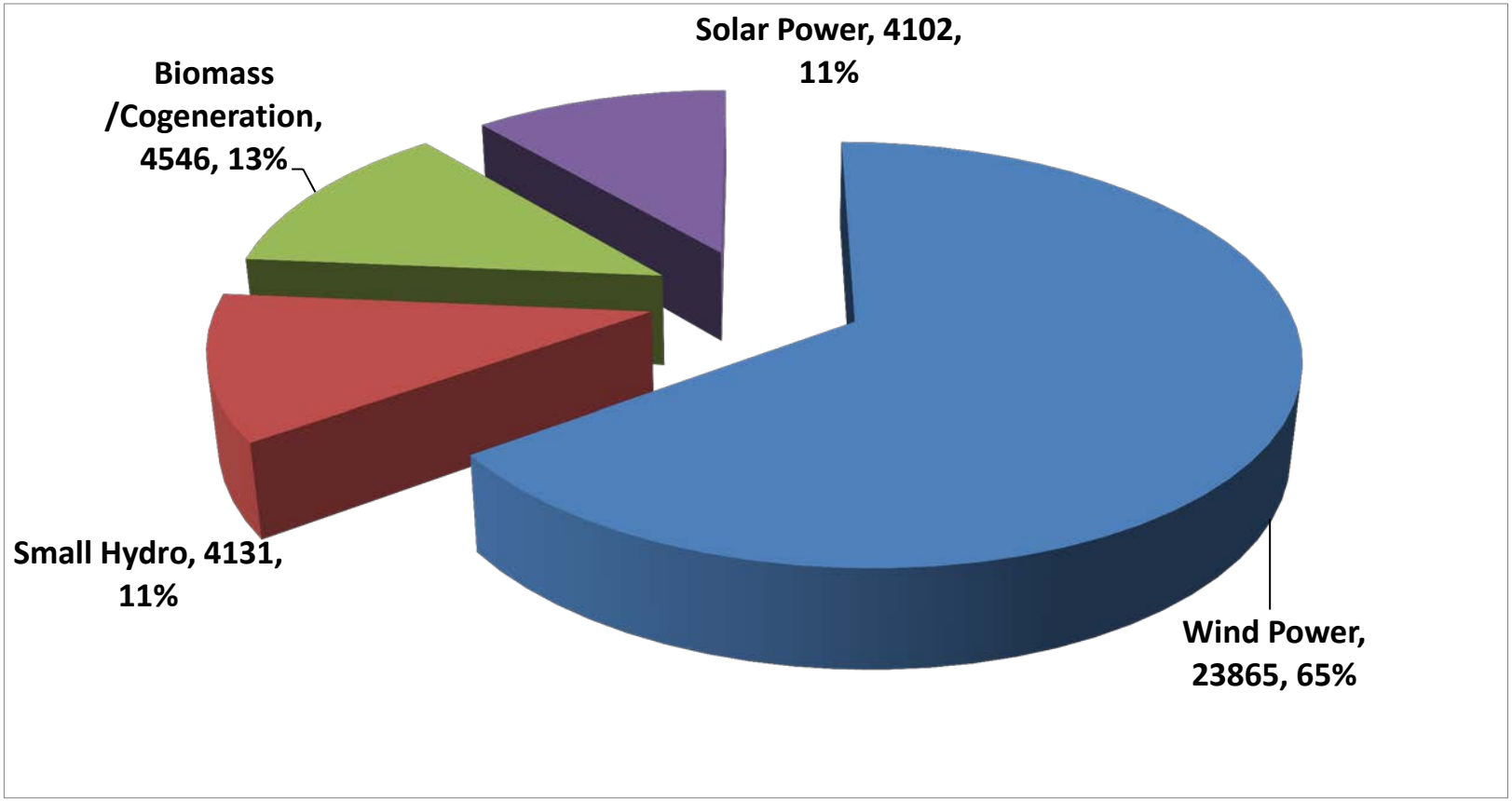


Thermal	Hydro	Renewable	Gas	Nuclear
1,67,707	41,997	36,643	23,955	5,780

Source: Central Electricity Authority (CEA) as on 31.07.2015

Renewables in India

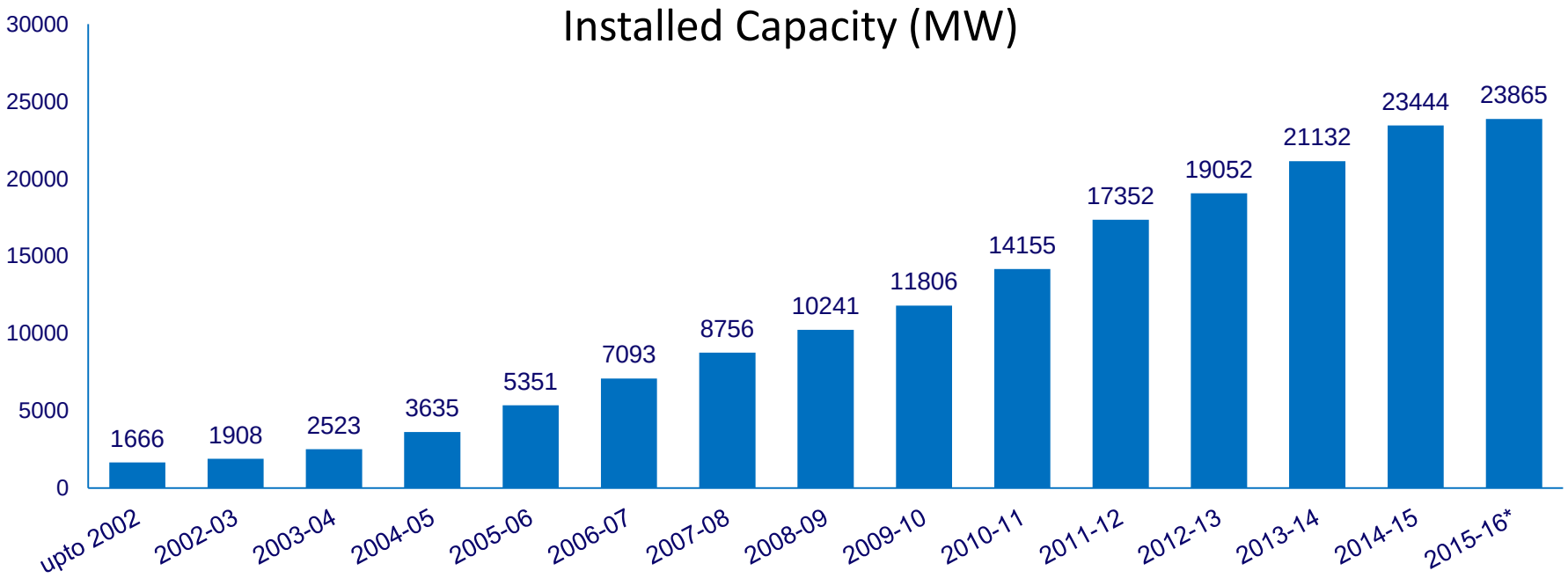
Total Renewable Installed Capacity- 36,643 MW



Installed Capacity as on 31.07.2015

Growth in Wind Power

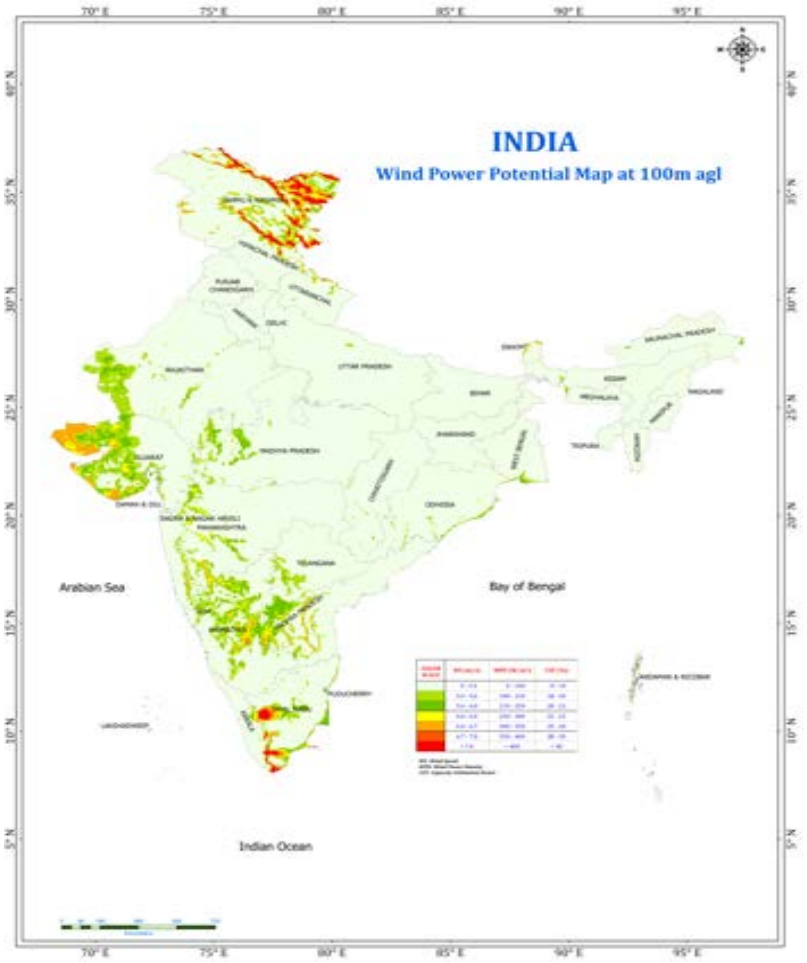
- India presently has the fifth largest wind power installed capacity in the world



* Installed Capacity as on 31.07.2015

Onshore Wind Potential

Potential @100 M: 302 GW



The revised potential assessment at 100m has been carried out at a very high spatial resolution of 500m, using the advanced meso-micro coupled numerical wind flow model, and with the corroboration of 1300 actual measurements spread all over India, which can be stated as first of its kind. The revised wind atlas is available online at NIWE's website.

Major Windy States

S.No.	State	Installed Capacity (MW)
1.	Tamil Nadu	7487
2.	Maharashtra	4450
3.	Gujarat	3789
4.	Rajasthan	3578
5.	Karnataka	2645
6.	Andhra Pradesh	1127
7.	Madhya Pradesh	973

Growth Factors

- Extensive wind resource assessment data
- Technology development and a strong domestic manufacturing base
- Quality assurance
- Conducive policy framework for investment

Wind Resource Assessment & Data Availability

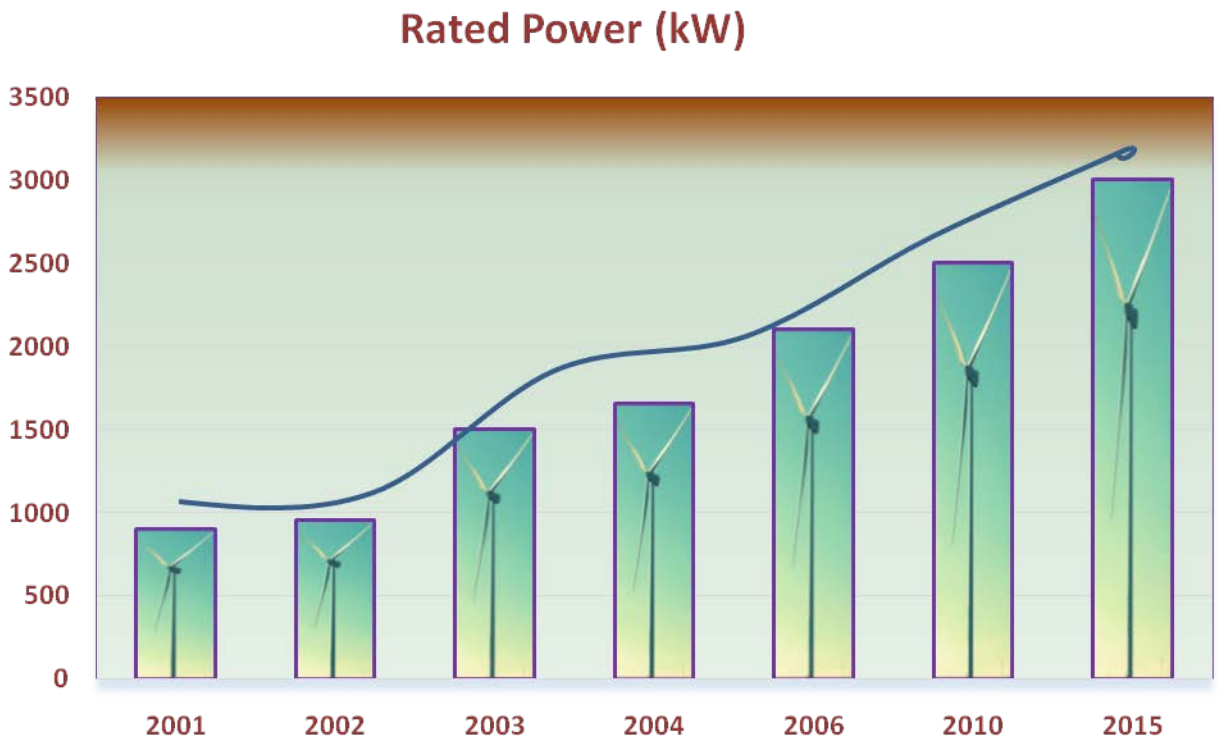
- 805 monitoring stations installed since inception
- Data collected from 693 monitoring stations
- Data being collected from 107 monitoring stations
- 8 handbooks on Wind Energy Resource Data
- Indian Wind Atlas published by National Institute of Wind Energy (formerly C-WET) in 2010
- Detailed datasets available on payment to industry
- Online Wind Resource Atlas at 100 m height launched by Hon'ble Minister on 02.09.2015

State-of-Art Technology & Manufacturing

- Cost of Indian wind turbines among lowest in the world
- Capacity: 250 KW – 3 MW; Gear & Gearless
- Hub heights: Up to 141 m
- Rotor Diameter: Up to 114 m
- 20 manufacturers with 58 models
- Export to USA, Europe, South America, Asia
- Indigenization about 70%
- Rotor blades, gear boxes, yaw components, nacelle cover, raw material for blades being manufactured

Evolution of Wind Turbine Technology

Year	Rated Power
2001	900 kW
2002	950 kW
2003	1500 kW
2004	1650 kW
2006	2100 kW
2010	2500 kW
2015	3000 kW



Source: National Institute of Wind Energy (NIWE)

Quality Assurance-NIWE

- National Institute of Wind Energy, Chennai
  - Wind Resource Assessment
  - International Level Testing Facilities
  - Standardization & Certification
  - Type Approval of Turbines
  - R&D
  - Information, Training, Commercial Service

- RLMM COMMITTEE- Revised List of Manufacturers & Models Committee; approves models for wind projects

Policy Incentives-I

- Income Tax Holiday U/S 80 1A for 10 years
- Full Excise Duty exemption
- Concessional Customs Import Duty on specified parts and components
- Exemption on Special Additional Duty (SAD) on parts & components of wind turbines

Policy Incentives-II

- Feed-In-Tariff (FiT) by State Regulators
- Generation Based Incentive @ Rs. 0.50/unit,
  - over and above the FIT;
  - ceiling Rs. 10 million/ MW,
  - >4 years & <10 years;
  - GBI allowed to captive producers but not to merchant power

OR

- Accelerated Depreciation at 80%

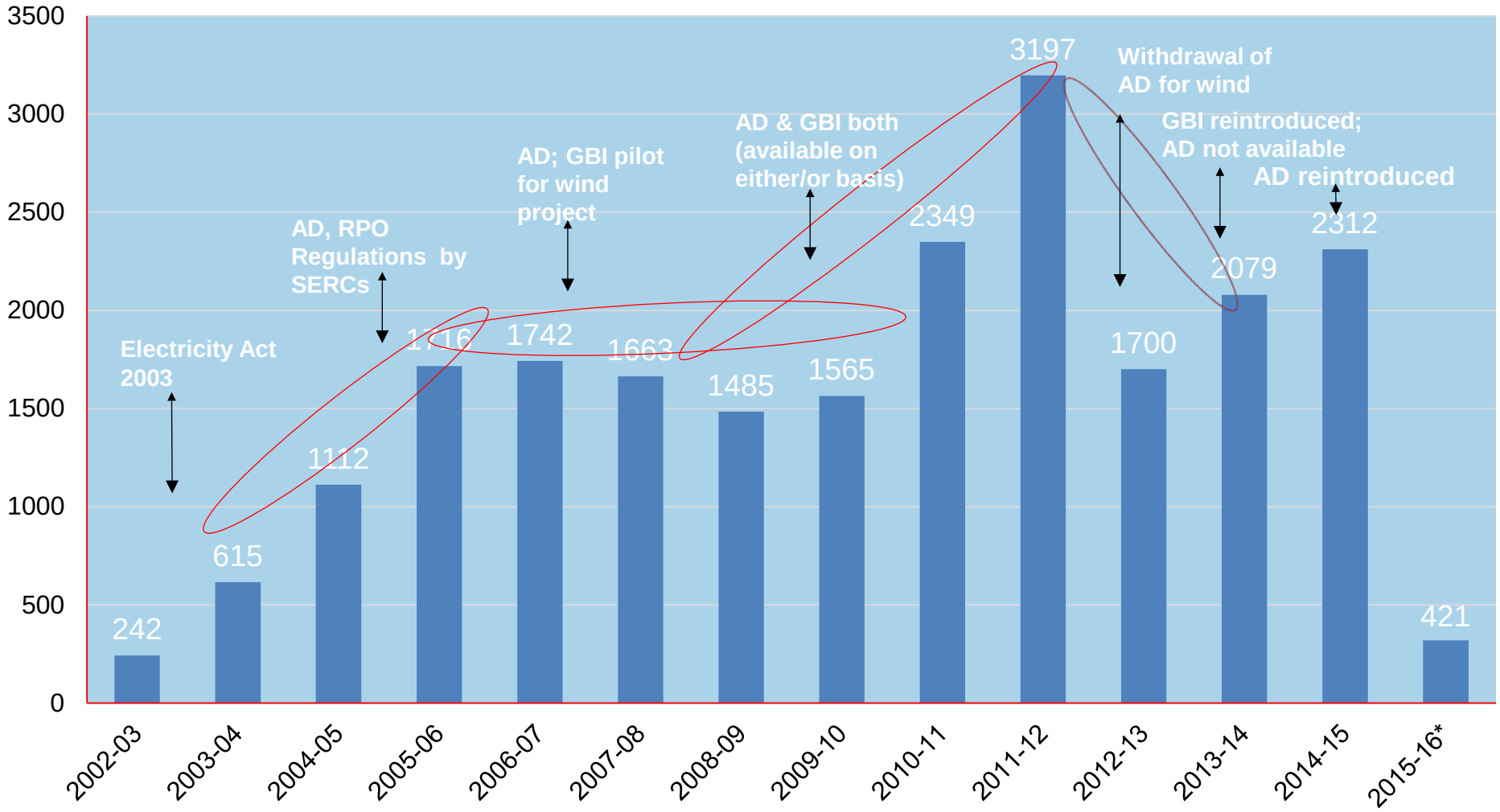
Wind Policy in States

- Wind potential states are providing promotional tariff for wind power projects

State	Tariff
Andhra Pradesh	4.83
Gujarat	4.15
Karnataka	4.5
Madhya Pradesh	5.92
Maharashtra	3.91-5.70
Rajasthan	5.74 & 6.02
Tamil Nadu	3.51

- States are also providing concessional wheeling, banking, Electricity Duty and Cross Subsidy Surcharges

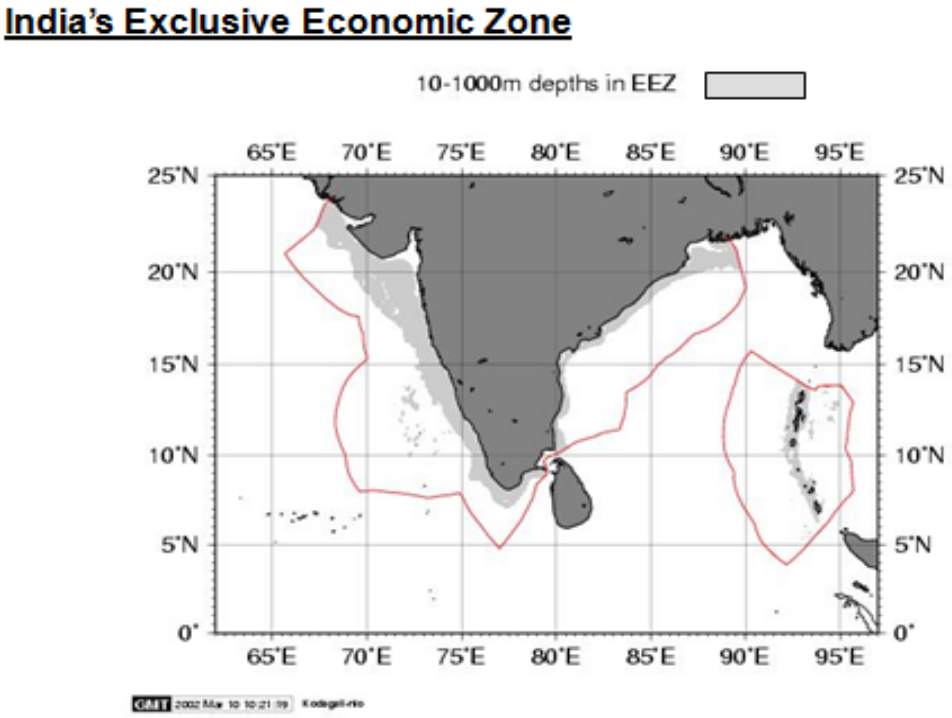
Central Policy Changes - Growth of Wind Sector



* Installed Capacity as on 31.07.2015

Offshore Wind- The Next Frontier

- Entire Exclusive Economic Zone (EEZ) available for offshore wind
- Very good potential in Tamil Nadu & Gujarat coast
- Offshore policy approved by Cabinet



Offshore Wind - Parameters for Consideration

- Within 20 km from sea coast/port
- Average water depth < 25 m
- Average wind speed > 6.5 m/sec at 50 m height
- Outside oil and gas activity zone, marine protected areas, submarine power and communication channels, air traffic, free from security considerations, cyclone zone and in low risk earthquake zone.
- Within 20 km from onshore substation

Proposed National Wind Energy Mission

- Recommended in 12th Plan Document
- Directive from PM's Council on Climate Change to make it a part of National Action Policy on Climate Change (NAPCC)
- Necessitated in view of revised target of 60,000 MW installed capacity by 2022
- Wind Mission to cover - Integrated policies for data availability, technology development & manufacturing, standardisation, repowering, absorption of wind power by other states, and promotion of small wind and offshore sectors

Major Challenges in the Wind Sector

- Variability of wind needs proper forecasting, scheduling and balancing by the Load Despatch Centres; MNRE is working with CERC, POSOCO and States to resolve these issues
- RPO compliance by States; proposed amendments in Electricity Act
- Inter state and intra state transmission needs augmentation, being taken up under Green Energy Corridor

THANK YOU

www.mnre.gov.in