



# India

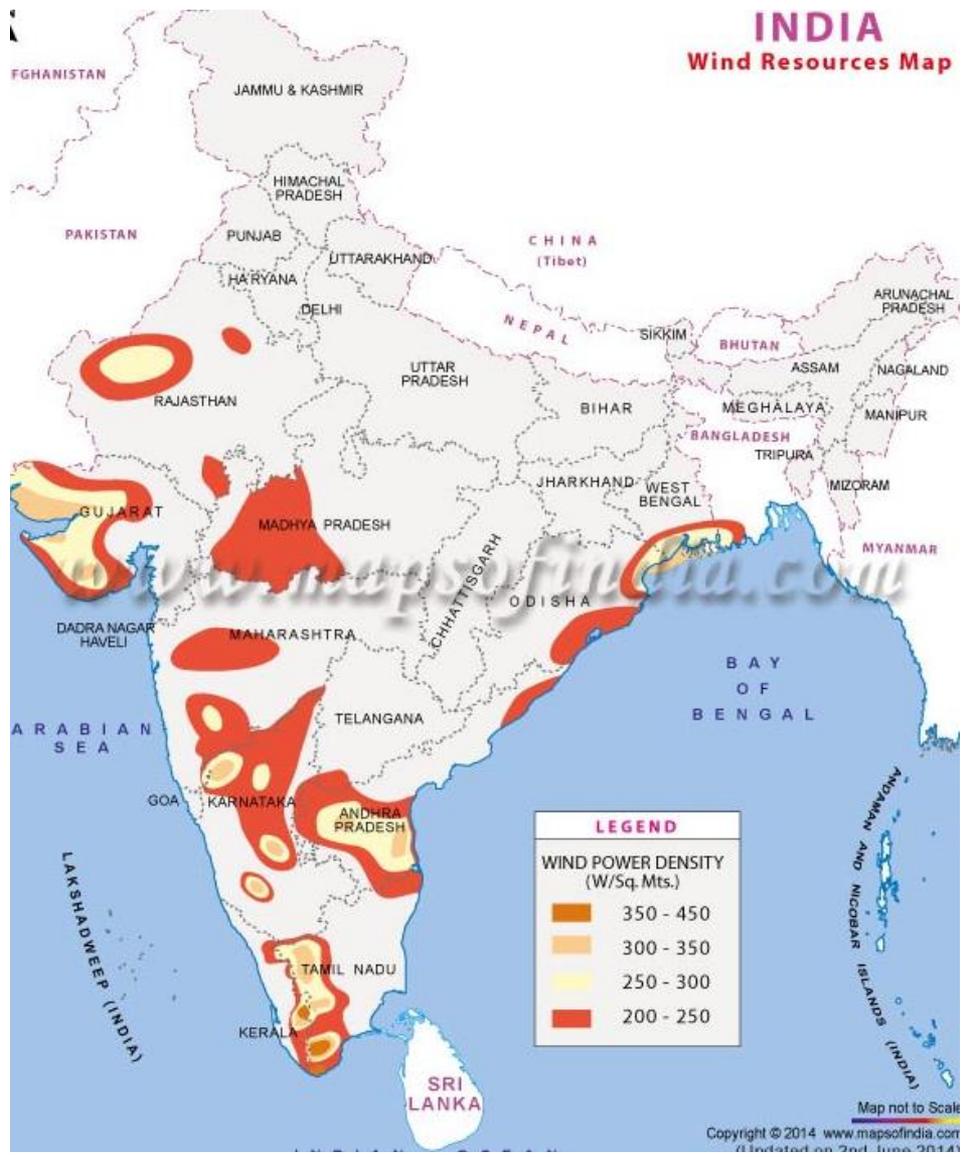
## Wind Development Status



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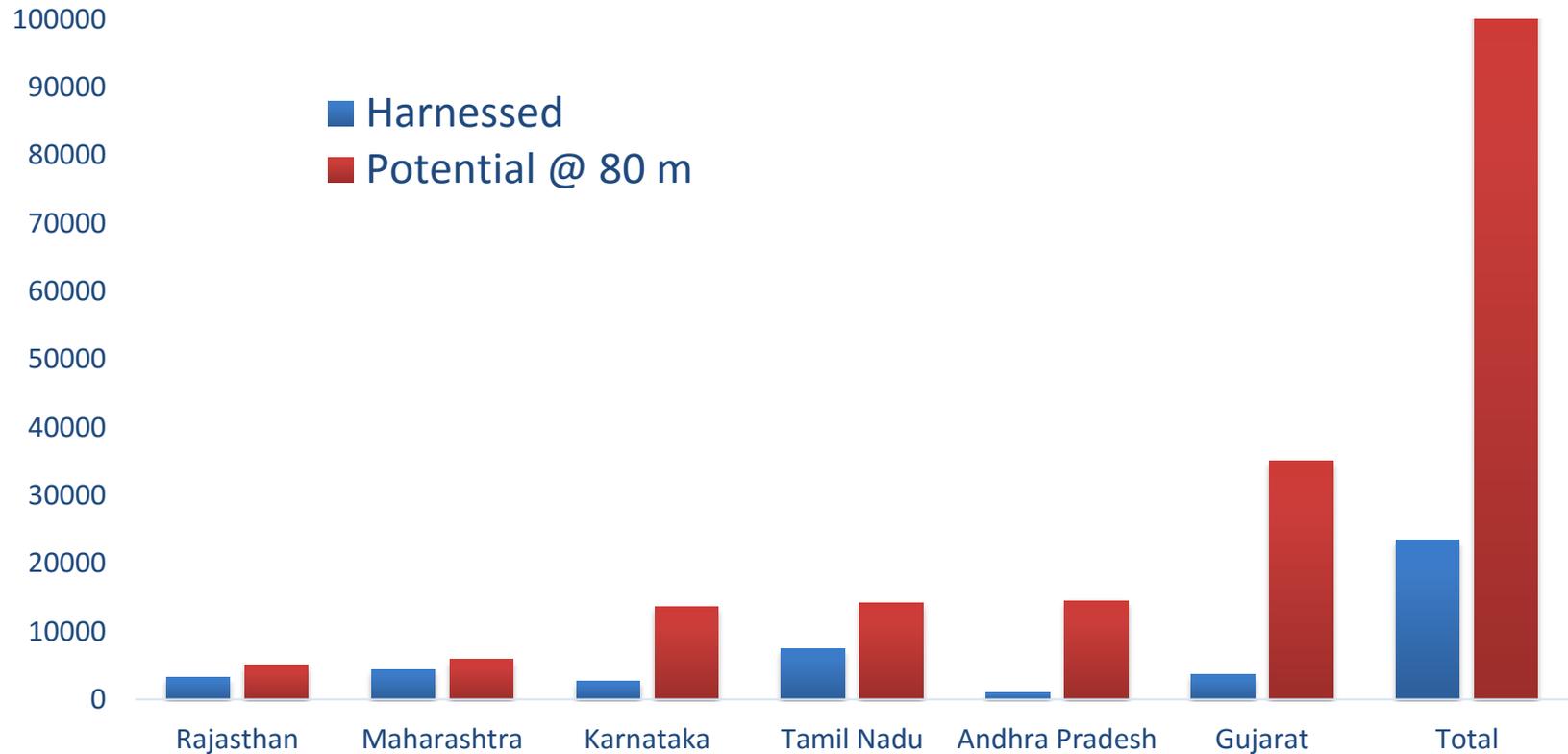
# Wind Energy Roadmap of India

| Item  | Quantity           |
|---|--------------------|
| Total installed generation capacity         | 288,665 MW         |
| Peak Load                                   | 148,166 MW         |
| Electrification ratio                       | 98.10%             |
| Total wind potential (realizable)           | 102,788 MW         |
| Total installed wind power capacity         | 25,088.19 MW       |
| Total wind projects in pipeline (Till 2017) | 7,100 MW           |
| Renewable Energy Target                     | 175,000 MW by 2022 |
| Wind Energy Target                          | 60,000 MW by 2022  |

| Item   | Quantity                        |
|--|---------------------------------|
| Wind energy tariff                                 | 5-8 USc/kWh                     |
| Retail power tariff                                | 8 USc/kWh                       |
| Wholesale power tariff                             | 5 USc/kWh                       |
| Other incentives:                                  |                                 |
| - Accelerated Depreciation                         | 80%                             |
| - Tax Holiday                                      | 10 years                        |
| - Generation Based Incentive                       | 1 USc/kWh                       |
| - Renewable Energy Certificates                    | To meet RPOs                    |
| - Relief from Unscheduled Interchange grid charges | Waiver or shared by all states. |

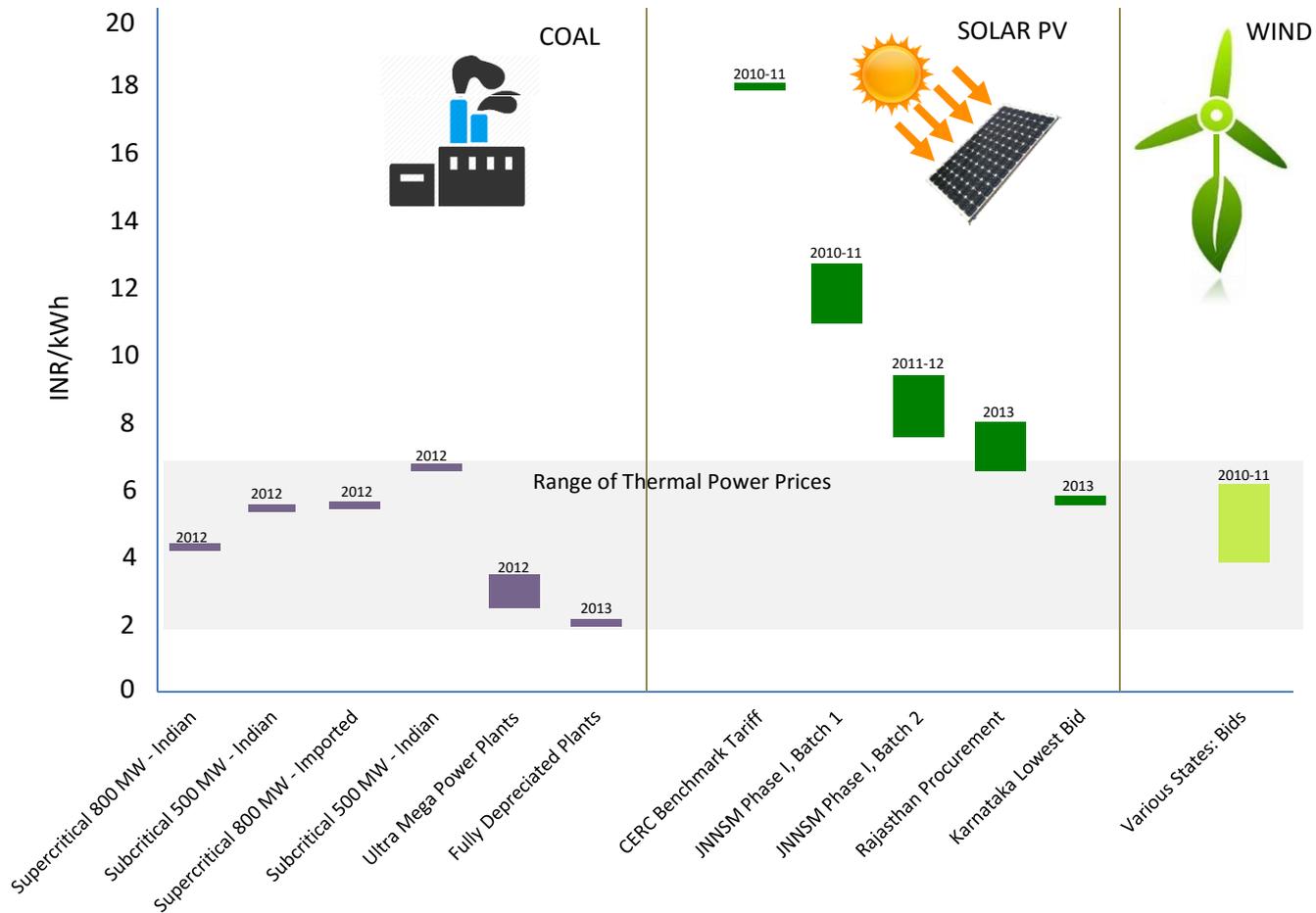
Data as available on March 2016

# Wind Potential vs Harnessed Capacity (MW)



Just three southern states account for 50% generation  
About 35% generation is in four monsoon months

# Convergence of Generation Cost between RE and Conventional Power



# Top Wind Equipment Manufacturers in India

| Manufacturer                        | Collaboration/Joint Venture               | Max Turbine Capacity           | Annual Capacity |
|-------------------------------------|---|--------------------------------|-----------------|
| Suzlon Energy Limited               | None                                      | 1500 kW and 2100 kW            | 3600 MW         |
| Gamesa Renewable Pvt. Ltd.          | Gamesa Innovation and Technology SL Spain | 850 kW and 2000 kW             | 1700 MW         |
| Inox Wind Limited                   | AMSC Austria GmbH, Austria                | 2000 kW                        | 1600 MW         |
| Regen Powertech Pvt. Ltd.           | Vensys Energy AG, Germany                 | 1500 kW                        | 1050 MW         |
| Kenersys India Pvt. Ltd.            | None                                      | 2000 – 2500 – 2400 – 2625 – kW | 950 MW          |
| Leitwind Shriram Manufacturing Ltd. | WindFin B.V., Netherland                  | 1500- 1800-3000 kW             | 450 MW          |

# Onshore Wind Initiative in India

## What can be done to Accelerate Wind Development?

- Planning flexibility into grid
- Broadening the areas over which load and generation are balanced
- Improving forecasting and scheduling techniques.
- Market for flexible energy services including DR
- Monitoring RE generation on near real time basis



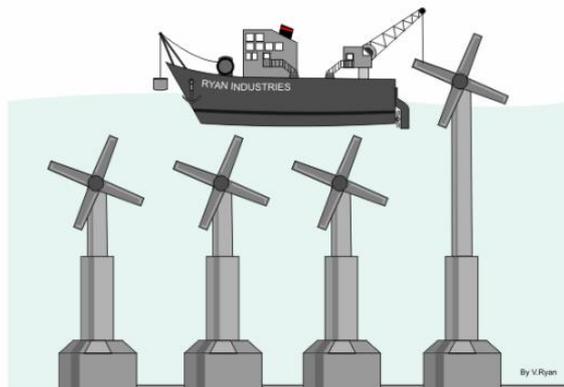
## New Developments in terms of Policy, Tariff and other Enablers

- Development of Green energy corridors.
- New regulations for market development such as ancillary services.
- Revision in Grid Code for forecasting scheduling and managing system imbalances.
- GOIs smart grid road map and pilot projects in distribution sector.

# Offshore Wind Initiative in India

## Offshore Wind Power Status

- Coast line – 7600 kms
- Potential of Tamil Nadu State – 127 GW @ 80 m (To be confirmed)
- Geographical Coverage
  - 12 Nautical Miles from baseline
  - 200 Nautical Miles for R&D
- Nodal Agency – Ministry of New and Renewable Energy (MNRE)
- Regulatory Body – National Offshore Wind Energy Authority (NOWA)



## Developmental Support:

- Preliminary Resource Assessment, Environment Impact Assessment and Oceanography Survey will be carried out by NOWA
- Single Window Clearance through NOWA
- Offer of Blocks by International Competitive Bidding
- Developer to Construct Evacuation Infrastructure up to first onshore substation
- Certificate of Commencement of operation to be given by NOWA
- Developer to submit decommissioning program before to NOWA before any offshore construction work begins

# Thank you

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