



WIND ENERGY: ENVIRONMENT

NEWS: On improving wind energy generation

WHAT'S IN THE NEWS?

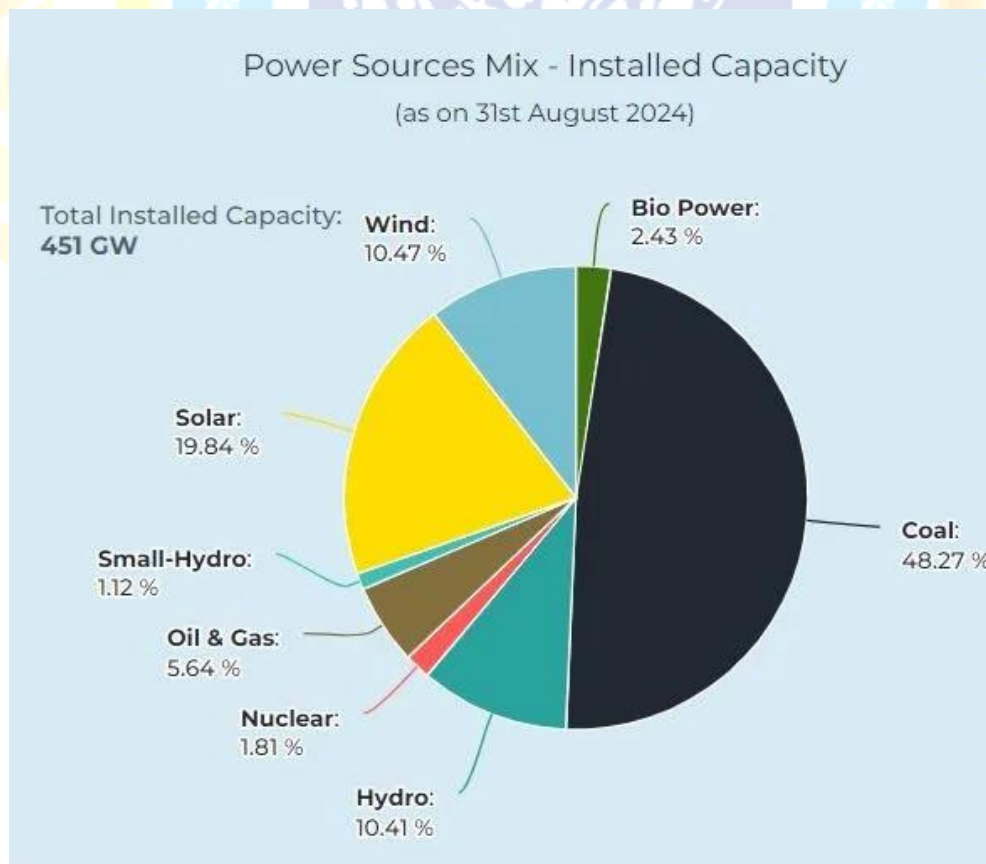
The Tamil Nadu government introduced the 2024 Repowering, Refurbishment, and Life Extension Policy for Wind Power Projects to boost wind energy output by upgrading or repowering small wind turbines. However, stakeholders have expressed concerns about the policy's effectiveness.

Wind Energy in India

Tamil Nadu Policy: The Tamil Nadu Repowering, Refurbishment, and Life Extension Policy for Wind Power Projects (2024) aims to improve wind energy output but has faced concerns from stakeholders on its effectiveness.

India's Wind Energy Potential:

- Potential: 1,163.86 GW at 150m above ground level.
- Installed Capacity Rank: 4th globally.
- Usage: Only 6.5% of potential is utilized.
- Key States: Gujarat, Tamil Nadu, Karnataka, Maharashtra, Rajasthan, and Andhra Pradesh contribute 93.37% of installed wind capacity.





Renewable Energy Mix (2024):

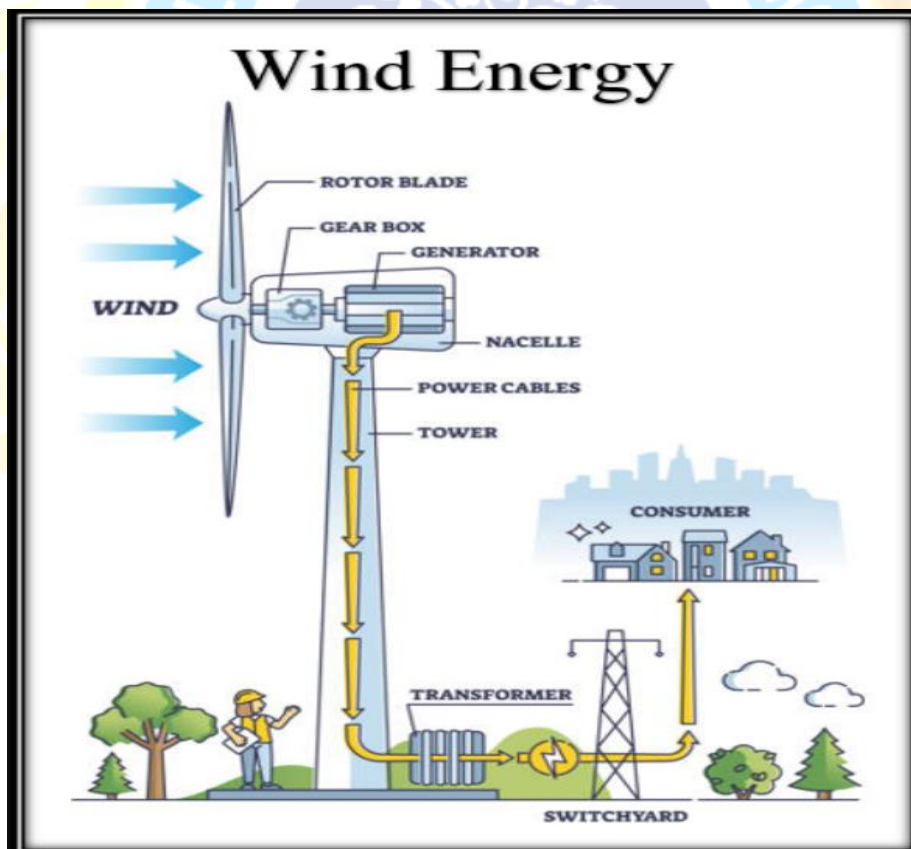
- Total Renewable Capacity: 201.45 GW (46.3% of India's total installed capacity).
- Breakdown: Solar - 90.76 GW, Wind - 47.36 GW, Hydroelectric - 46.92 GW, Small Hydro - 5.07 GW, Biopower - 11.32 GW.

Targets by 2030:

- Total Renewable Capacity: 500 GW (140 GW from wind).
- Renewables to meet 50% of energy requirements.
- Reduce emissions by one billion tonnes and emissions intensity of GDP by 45% from 2005 levels.

Top Wind Power Plants:

- **Muppandal Wind Farm (Tamil Nadu):** Over 1,500 MW capacity.
- **Jaisalmer Wind Park (Rajasthan):** Around 1,064 MW capacity.
- *Global Context:* Gansu Wind Farm in China is the world's largest onshore wind farm, targeting 20,000 MW capacity.



Types of Wind Turbines:

- **Horizontal-Axis Wind Turbines (HAWT):** Most commonly used, known for efficiency.



- **Vertical-Axis Wind Turbines (VAWT):** Less common, suited for urban areas with variable wind directions.
- **Offshore Wind Energy:** Strong, consistent winds; India plans offshore wind projects in Gujarat and Tamil Nadu.
- **Onshore Wind Energy:** Mainly in Tamil Nadu, Maharashtra, and Gujarat, where wind potential is high.

Wind Turbine Modernization:

- **Repowering:** Full replacement of outdated turbines (older than 15 years or under 2 MW) with newer, efficient models.
- **Refurbishment:** Upgrading turbines by increasing height, changing blades, or enhancing components.
- **Life Extension:** Adding safety features to prolong turbine lifespan without full replacement.

Challenges:

- **Natural Dependency:** Variability due to sunlight, wind, and water availability.
- **Regional Limitation:** Wind resources mainly in Tamil Nadu, Gujarat, Maharashtra, and Rajasthan.
- **Wildlife Impact:** Risks to bird and bat populations.
- **Costs:** High initial costs for turbine and grid connections.
- **Lifecycle Issues:** Limited turbine lifespan and challenges in recycling blades.
- **Offshore Complexity:** Higher costs and technological limitations for deep-water, floating turbines.

Government Initiatives:

- **National Offshore Wind Energy Policy (2015):** Supports offshore wind development, mainly in Gujarat and Tamil Nadu.
- **National Wind Energy Mission:** Aims for 140 GW of wind capacity by 2030.
- **National Wind-Solar Hybrid Policy (2018):** Encourages large-scale wind-solar hybrid systems.
- **Wind Resource Assessment:** Conducted by the National Institute of Wind Energy (NIWE).
- **Wind Farm Development:** Financial incentives for new wind projects.
- **Wind Energy Auctions:** Competitive bidding process for wind projects.
- **Renewable Purchase Obligation (RPO):** Mandates a percentage of renewable power procurement by distribution companies and large consumers.

Source: <https://www.thehindu.com/business/Industry/on-improving-wind-energy-generation-explained/article68853371.ece#:~:text=They%20can%20also%20be%20refurbished,mills%20owned%20by%20multiple%20generators.>