



Upgrading Wind Energy Generation

For Prelims: [High Court](#), [Wind Energy](#), [Wind Turbine](#), [Renewable Energy](#), [National Institute of Wind Energy \(NIWE\)](#), [Chennai](#), [Production Linked Incentive \(PLI\) Scheme](#), [Green Hydrogen](#), [Electric Mobility](#), [Panchamrit](#), [United Nations Framework Convention on Climate Change \(UNFCCC\)](#), [Carbon Intensity](#).

For Mains: Role of renewable energy in meeting global climate targets.

[Source: TH](#)

Why in News?

In August 2024, the Tamil Nadu government introduced the “**Repowering, Refurbishment, and Life Extension Policy**” to replace [old turbines](#) and [optimise wind energy use](#).

- However, wind energy generators have opposed the policy, approached the **Madras High Court** and got a stay.

What is Tamil Nadu Repowering, Refurbishment & Life Extension Policy for Wind Power Projects, 2024?

- **Context:** Wind energy generators in **Tamil Nadu** with windmills older than **20 years** needed upgradation for energy efficiency.
- **Policy Focus:** The policy includes **three major aspects**:
 - **Life Extension:** Extending the operational life of windmills **over 20 years old**.
 - **Repowering:** Replacing **old windmills** with new machines.
 - **Refurbishment:** Upgrading or **repairing** old windmills.
- **Capacity Overview:** Approximately **300 MW** of the 9,000 MW wind energy capacity in Tamil Nadu is **over 20 years old**.
- **Reason for Opposition:** For life extension, wind energy generators are expected to pay **Rs 30 lakhs per MW every five years**.
 - For repowering, a one-time payment of **Rs 30 lakhs per MW** is required to replace old machines with new ones.

Note:

The **Ministry of New & Renewable Energy (MNRE)** came out with the **National Repowering & Life Extension Policy for Wind Power Projects-2023**.

- The following Wind turbines are **eligible for repowering/refurbishment** under the policy:
 - All Wind turbines which are **not in compliance** with the **quality control order** issued by this Ministry; or
 - have **completed their design life** as certified under the **Type Test Certificate** in

- accordance with the applicable relevant standards; or
- The Wind turbines of rated capacity **below 2 MW**;
- Based on commercial/voluntary consideration **after 15 years of installation**.
- Wind turbines which are to be replaced within the period of its design life due to **malfunctioning, issues in workmanship, safety etc.**, shall also require to be repowered or refurbished.

What are the Key Facts About Wind Energy in India?

- **Wind Energy Potential:** India has a wind power potential of **1,163.86 GW at 150 metres** above ground level while at a **120-metre** turbine height, it is **695.51 GW**.
- **Wind Energy Utilisation:** Only about **6.5%** of India's wind **potential** is **used** at the national level and **nearly 15% in Tamil Nadu**.
- **Wind Power Generation:** India has been **ranked 4th in wind power capacity** and **fourth in renewable energy installed** capacity, as of **2024**.
- **Cost Competitive:** Power generation from wind projects is likely to be **cost-competitive** relative to thermal power generation in India in **2025-30**.
 - **Wind Turbine Maintenance:**
 - **Repowering:** Replacing wind turbines older than **15 years or under 2 MW capacity** with new ones.
 - **Refurbishing:** Upgrading turbines by **increasing height, changing blades, or installing higher-capacity gearboxes** to boost energy output.
 - **Life Extension:** Implementing **safety measures** to extend the lifespan of older turbines.
- **Windy States:** Major wind energy states are **Gujarat, Tamil Nadu, Karnataka, Maharashtra, Rajasthan, and Andhra Pradesh**, which together contribute **93.37%** of the country's installed wind energy capacity.
 - **Tamil Nadu** has the **second largest** installed wind energy capacity with **10,603.5 MW after Gujarat**.

What are the Challenges in Repowering and Refurbishing Wind Turbines?

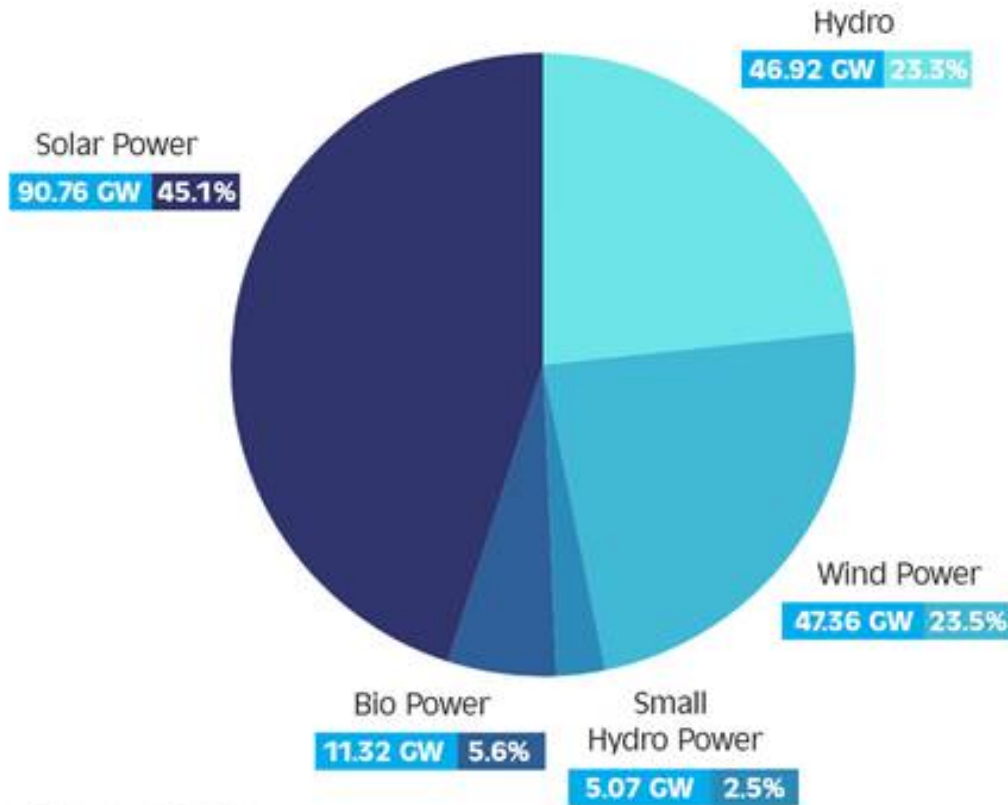
- **Land requirements:** New turbines, especially those with higher capacities (2 MW and 2.5 MW), **require more land (3.5 to 5 acres)** compared to older, smaller turbines.
- **Displacement:** Since the 1980s when turbines were installed, habitats have come up between wind sites which pose **new challenges of displacement and rehabilitation** of population.
- **Technology Evolution:** Upgrading turbines, blades, and gearboxes to keep pace with advances requires significant **investment, time, and expertise**.
- **Banking issue:** Wind turbines installed after **2018** in Tamil Nadu **do not have banking facilities**, meaning that repowered turbines are treated as new installations, and generators cannot bank the energy generated, affecting financial viability.

India's Renewable Energy Target

- India has presented the following **five nectar elements (Panchamrit)** of India's climate action at **COP-26** to the **United Nations Framework Convention on Climate Change (UNFCCC)** held in **Glasgow, United Kingdom**:
 - It aims to reach **500 GW Non-fossil** energy capacity by **2030**.
 - **50%** of its energy requirements from renewable energy by **2030**.
 - Reduction of total projected **carbon emissions** by **one billion tonnes** from now to **2030**.
 - Reduction of the **carbon intensity** of the economy by **45% by 2030**, over **2005 levels**.
 - Achieving the target of **net zero emissions by 2070**.



Renewable Energy Capacity in India



As of October 10, 2024

What are the Major Government Initiatives Related to Renewable Energy Transition?

- [Pradhan Mantri Sahaj Bijli Har Ghar Yojana \(SAUBHAGYA\)](#)
- [Green Energy Corridor \(GEC\)](#)
- [National Smart Grid Mission \(NSGM\) and Smart Meter National Programme](#)
- [Faster Adoption and Manufacturing of \(Hybrid &\) Electric Vehicles \(FAME\)](#)
- [Production Linked Incentive \(PLI\) Scheme](#)
- [Surya Ghar Muft Bijli Yojana](#)

Way Forward

- **Improved Tariff Mechanism:** Offering **competitive renewable tariffs** will ensure stable pricing and reduce financial risks for project developers.
- **Completion Deadlines:** Ensuring strict adherence to **project completion timelines** will prevent delays, improve project efficiencies, and enhance the **credibility of the wind energy sector**.
- **Integration with Solar Energy:** India must focus on improving [solar-wind grid integration](#) to harness energy during periods when solar generation is low, such as at night.

- **Transmission Infrastructure:** Investing in advanced energy storage systems and **upgrading transmission infrastructure** will maximise wind energy efficiency.
- **Long-Term Power Purchase Agreements (PPAs):** Securing **long-term PPAs** with discoms will provide a stable revenue stream for developers and foster greater interest in wind energy projects.
- **Technology Upgradation:** Innovations such as **larger and more efficient turbines**, offshore wind technology, and hybrid systems could further boost India's wind energy capacity.

Drishti Mains Question:

India ranks fourth globally in wind energy capacity but uses only a small fraction of its potential. What solutions are needed to overcome challenges in the sector?

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. "Momentum for Change: Climate Neutral Now" is an initiative launched by (2018)

- (a) The Intergovernmental Panel on Climate Change
- (b) The UNEP Secretariat
- (c) The UNFCCC Secretariat
- (d) The World Meteorological Organisation

Ans: (c)

Q. With reference to the Agreement at the UNFCCC Meeting in Paris in 2015, which of the following statements is/are correct? (2016)

1. The Agreement was signed by all the member countries of the UN and it will go into effect in 2017.
2. The Agreement aims to limit the greenhouse gas emissions so that the rise in average global temperature by the end of this century does not exceed 2°C or even 1.5°C above pre-industrial levels.
3. Developed countries acknowledged their historical responsibility in global warming and committed to donate \$ 1000 billion a year from 2020 to help developing countries to cope with climate change.

Select the correct answer using the code given below:

- (a) 1 and 3 only
- (b) 2 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

Ans: (b)

Q. With reference to the Indian Renewable Energy Development Agency Limited (IREDA), which of the following statements is/are correct? (2015)

1. It is a Public Limited Government Company.
2. It is a Non-Banking Financial Company.

Select the correct answer using the code given below:

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans: (c)

Mains

Q. Describe the major outcomes of the 26th session of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC). What are the commitments made by India in this conference? (2021)

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