Global Wind Report 2025

For Prelims: **Global Wind Report**, **Paris Agreement**, **Offshore Wind**, **COP28 Dubai**, **Cybersecurity**, **E-waste**, **Green Bonds**, **Carbon Credit**, **PLI Scheme**, **Green Hydrogen**.

For Mains: Current status of wind energy production in India and globally, associated challenges and way forward.

Source: DTE

Why in News?

The **Global Wind Energy Council's (GWEC) Global Wind Report 2025** warns that projected wind capacity will only meet **77%** of 2030 targets, jeopardizing **net-zero** and **Paris Agreement** goals to limit warming to **below 2°C** (preferably 1.5°C).

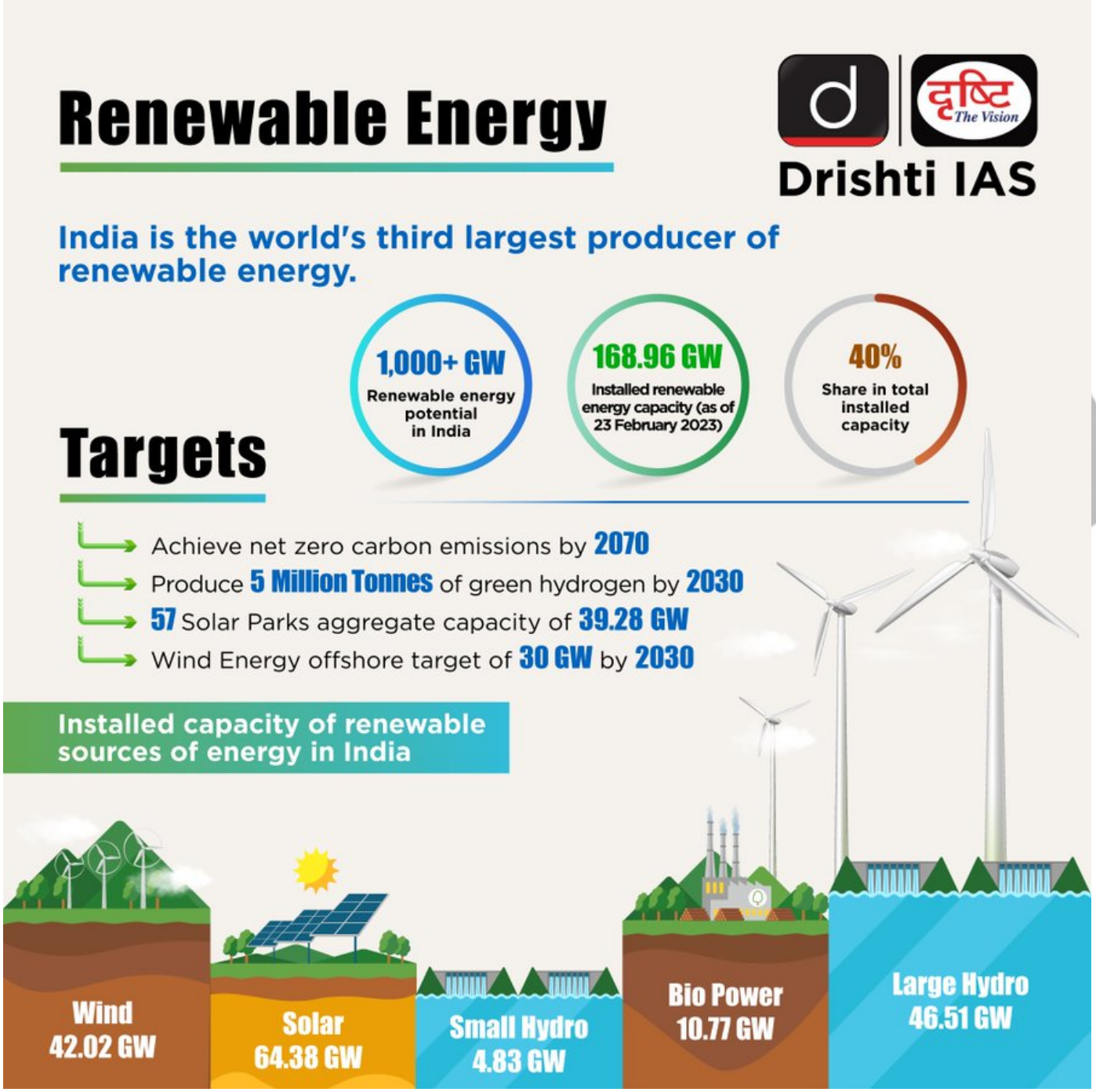
What are Key Findings of the Global Wind Report 2025?

- **Wind Power Installation:** In 2024, **117 GW** of **new wind capacity** was added **globally**, up slightly from **116.6 GW in 2023**, bringing total global capacity to **1,136 GW**.
- **Regional Performance: China** led the global wind market in 2024, contributing **70% of new capacity**, followed by the **United States, Brazil, India, and Germany** as the other top markets.
    - **Uzbekistan, Egypt, and Saudi Arabia** have emerged as success stories, as onshore wind capacity in **Africa and the Middle East** doubled in 2024 compared to previous years.
    - Only **8 GW** of **offshore wind** capacity was installed globally in **2024**, marking a **26% drop from 2023**.
- **Challenges:**
    - **Policy and Regulatory Issues:** Instability in key markets, delays in **project permitting.**
    - **Infrastructure Gaps**: Underinvestment in **grid upgrades.**
    - **Financial and Market Pressures:** Inflation and **high interest rates**, trade protectionism and ineffective renewable energy auction systems
- **Need to Scale-up:** At **COP28 Dubai**, nations committed to **tripling renewable capacity by 2030**, with **wind installations** needing to reach **320 GW annually**.
    - **Without this scale-up**, efforts to limit warming to **1.5°C may fail**, missing a crucial climate window.

What is the Status of Wind Energy in India?

- **Total Wind Power Capacity**: As of 31st March 2025, India has achieved a **cumulative** installed wind power capacity of **50.04 GW**.
    - In **FY 2024–25**, India added **4.15 GW** of wind power capacity, up from **3.25 GW** in **FY 2023–24**.

- **Global Standing**: India ranks **4th globally** in terms of total installed wind power capacity, trailing only **behind China, the United States, and Germany.**
- **State-wise Distribution:** As of 2025, the top wind energy-producing states in India are **Gujarat, Karnataka, and Tamil Nadu.**
- **Domestic Manufacturing Capacity**: India boasts a robust **wind turbine manufacturing** industry with an annual production capacity of about **18,000 MW**.
- **Offshore Wind Energy Potential:** The **National Institute of Wind Energy** estimates that **Gujarat** has **36 GW** and **Tamil Nadu** about **35 GW** of offshore wind energy potential.



What are Challenges in Wind Energy Production in India?

- **Land Acquisition Complexities:** Each wind turbine requires **7–8 acres** for rotors larger than **150 metres in diameter**, and slow land-use conversion from **agricultural land to non-agricultural status** causes major delays in large projects.
- **Non-modernized grid:** High-potential wind sites in Rajasthan, Gujarat, and coastal Tamil

Nadu **lack transmission infrastructure**, raising energy costs due to **distance from demand centers**.

- **Policy Inconsistencies: Withdrawal** of incentives like **Accelerated Depreciation** and **Generation-Based Incentives** has created uncertainty.
    - **Differences** in policies across states regarding **tariffs, power purchase agreements**, and approvals hinder uniform development.
    - The upfront costs for wind projects (**turbines, installation,** and **grid connection)** are substantial and smaller developers often struggle to secure funding.
- **Supply Chain Challenges:** While India has a domestic manufacturing capacity of **5,200 MW for towers and 8,000 MW for gearboxes**, **blade** availability remains a concern, leading to significant **imports**.
    - Reliance on imported components, especially from **China,** raises concerns about **supply chain stability** and **cybersecurity.**
- **E-waste Problem:** Disposal of outdated components like **control systems**, **inverters**, and **batteries** is challenging due to **hazardous materials** like **lead**, **cadmium**, and **mercury**.
    - **Wind turbine blades**, made of **composite materials**, further complicate **recycling** and contribute to **e-waste issues**.

How to Strengthen Wind Energy Production in India?

- **Strengthen Policy Framework:** Fast-track clearances by simplifying **land acquisition**, implement a **uniform national wind policy**, and **repower** old wind farms with **high-capacity turbines**.
- **Provision for Land Bank:** A **land bank** secures **pre-secured, conflict-free land**, reducing delays, ensuring **clear ownership**, and speeding up renewable energy projects while **lowering costs and boosting investor confidence**.
- **Boost Offshore Wind Potential:** Collaborating with countries like **Denmark** and the **United Kingdom**, leaders in **offshore wind technology**, to expedite offshore turbine installation.
    - A project that **combines both wind and tidal energy** can optimize renewable energy generation and enhance reliability.
- **Hybrid Wind-Solar Projects:** Combining wind and solar energy technologies in a **hybrid setup** allows for **better utilization of land** and **more stable power generation**.
- **Financial & Market Innovations:** Promote funding through **green bonds and** leverage **carbon credit mechanisms** to monetize emissions reductions from wind energy.
- **Domestic Manufacturing:** Launch a **PLI scheme** for manufacturing of **wind energy equipment** to promote **local manufacturing** of blades, towers, and gearboxes and invest in **skill development programs** to train the workforce for **offshore wind** and **operations & maintenance (O&M)** roles.
- **Focus on Emerging Technologies:** Explore **floating wind turbines** to harness deep-sea wind potential, and promote **green hydrogen integration** by utilizing surplus wind power for **hydrogen electrolysis.**

Conclusion

India's **wind energy sector** shows strong progress but faces challenges like **land acquisition**, **infrastructure gaps**, **policy inconsistencies**, and **e-waste**. To meet **net-zero goals**, India must scale up **offshore capacity**, strengthen **domestic manufacturing**, promote **hybrid projects**, and invest in **innovation** like **floating turbines** and **green hydrogen integration.**

Drishti Mains Question:

Q. Discuss the key challenges facing India's wind energy sector and suggest measures to overcome them to achieve the country's renewable energy targets.

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
3. temperature by the end of this century does not exceed 2ºC or even 1.5ºC above pre-industrial levels.
4. 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)

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)