India's Wind Energy Potential

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Why in News?

Recently, the Ministry of New and Renewable Energy unveiled noteworthy insights into **India's wind energy potential.** This revelation sheds light on **key states with the highest** wind power **potential and emphasizes the nation's dedication to sustainable energy practices.**

- Additionally, the Ministry outlined innovative strategies aimed at enhancing wind power utilization and ensuring eco-friendly practices in the sector.

What is the Wind Power Potential in India?

- India ranks **4th globally after China, the United States and Germany**, in terms of **installed wind energy capacity, with 42.8 GW (onshore wind) as of April 2023.**
- Wind resource assessment by the **National Institute of Wind Energy** reveals an estimated wind **power potential of approximately 695.5 GW at 120 meters** and **1,164 GW at 150 meters above ground level** across the nation.
- **Best Performing States:**
  - **Wind Power Potential (in GW) at 120 m Above Ground Level:**
    - Gujrat (142.56), Rajasthan (127.75), Karnataka (124.15), Maharashtra (98.21), and Andhra Pradesh (74.90).
  - **Wind Power Potential (in GW) at 150 m Above Ground Level:**
    - Rajasthan (284.25), Gujarat (180.79), Maharashtra (173.86), Karnataka (169.25), and Andhra Pradesh (123.33).

What are the Government Initiatives for Wind Energy Development?

- **Policy for Repowering of the Wind Power Projects, 2016:**
  - This policy incentivizes wind power project repowering by providing an **additional interest rate rebate of 0.25% over existing rebates for new wind projects** financed by the **Indian Renewable Energy Development Agency (IREDA).**
- **Guidelines for Disposal of Fiber Reinforced Plastic (FRP):**
  - The **Central Pollution Control Board (CPCB)** issued specific guidelines for the proper disposal of FRP, including Sheet Moulding Compound (SMC), **used in wind turbine blades.** These guidelines ensure environmentally responsible waste management.
- **National Wind-Solar Hybrid Policy,2018:**
  - The main objective is to provide a **framework for promotion of large grid connected wind-solar PV hybrid systems** for optimal and efficient utilization of wind and solar resources, transmission infrastructure and land.
- **National Offshore Wind Energy Policy:**
  - Objective is to develop offshore wind energy in the Indian **Exclusive Economic Zone (EEZ)** along the Indian coastline of 7600 km.

Different Types of Turbine Used in the Wind Power:

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Aspect	Vertical-Axis Wind Turbines (VAWT)	Horizontal-Axis Wind Turbines (HAWT)
Blade Orientation	Blades are vertical and perpendicular to the ground.	Blades are horizontal and parallel to the ground.
Blade Configuration	Blades are attached to the top and bottom of a vertical rotor.	Blades are like airplane propellers, extending outward.
Common Type	Darrieus wind turbine is a well-known design.	Three-bladed turbines are the most common type.
Performance	Generally less efficient compared to HAWT.	Typically more efficient in converting wind energy.
Electricity Generation	Typically lower electricity generation capacity.	Higher electricity generation capacity.
Application	Limited use due to lower performance.	Widely used in the wind energy industry.
Wind Direction Sensitivity	Less sensitive to wind direction due to omnidirectional rotation.	Needs to adjust to wind direction for optimal efficiency.