Wind Energy potential in India

June 27, 2022

Manifest Pedagogy:

India has made great strides in improving access to modern energy in recent years. Since 2000, India has more than halved the number of people without access to electricity and doubled rural electrification rates. India is the world's fourth largest country in terms of total wind installations after China, the USA and Germany. Wind power has become one of the key renewable energy sources for power generation in India and can play an important role in the coming decade to bring a clean and indigenous source of power to the people.

In news: Mumbai international airport has become India's first airport to launch a vertical axis wind turbine (VAWT) and solar PV hybrid (solar mill) to explore the possibility of utilizing wind energy for consumption purposes at the airport.
Placing it in Syllabus: Infrastructure: Energy, Ports, Roads, Airports, Railways etc.

Static Dimensions-

- Types of Wind Farm/Parks
- Advantages of Wind energy

Current Dimensions-

- Wind energy in India
- Policies related to Wind Energy
- Challenges to Wind energy

Content

Background on the news-

- The usage of solar and wind power has reduced around

7,400 tCO2e emissions at the airport.

- The airport continues to bring in new and advanced sustainable practices time and again to further boost the operational efficiency of the facility in a greener way, and endeavors to achieve 'Net Zero' carbon emission by 2029.

Types of Wind Farm/Parks-

- **Onshore** – Onshore wind refers to turbines located on land. Wind turbines harness the energy of moving air to generate electricity.
- **Offshore** – Offshore turbines are located out at sea or in freshwater.
    - A fixed-foundation turbine is built in shallow water, whereas a floating wind turbine is built in deeper waters where its foundation is anchored in the seabed. Floating wind farms are still in their infancy.
    - Offshore wind farms must be at least 200 nautical miles from the shore and 50 feet deep in the ocean.
    - Offshore wind turbines produce electricity which is returned to shore through cables buried in the ocean floor.

According to the International Renewable Energy Agency (IRENA), wind energy contributed to **27%** of the world's renewable electricity generation capacity as of April 11, 2022.

Wind energy in India-

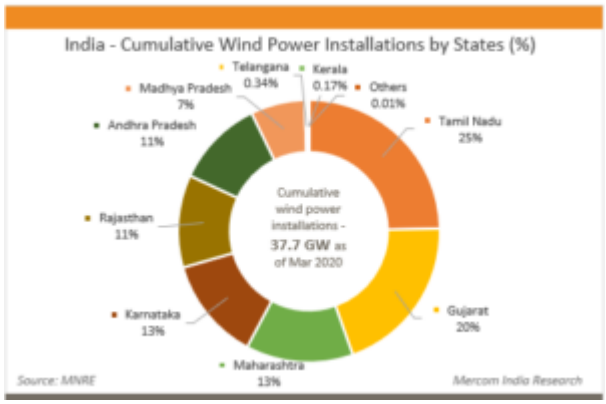
- As of 31 December 2021, the total installed capacity for renewable energy in India is 151.4 GW (MNRE data).
    - Solar Power: 49.34 GW
    - Large Hydro: 46.51 GW
    - **Wind power: 40.08 GW**

- BioPower: 10.61 GW
- Small Hydro Power: 4.83 GW

- India has the **4th largest wind power** capacity in the world, with total installed capacity of 39.25 GW (as on 31st March 2021) (Following **China, USA and Germany**).
- As per Global winds report 2022,
- In India, more than 1.4 GW of wind was installed in 2021, exceeding the 1.1 GW of installations during the previous year.
- India can generate **127 GW** of offshore wind energy with its 7,600 km of coastline.

- Wind power target set by GOI is 60 GW out of 175 GW target of installed renewable energy (RE) capacity by 2022 and 140 GW out of 450 GW RE target by 2030.

- More than 95% of commercially exploitable resources are located in seven states: Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu.
- ***Tamil Nadu, Gujarat, Maharashtra, Karnataka and Rajasthan*** are the top 5 wind-energy potential states in India (As of March, 2021, Source- MNRE).



Initiatives and Policies related to Wind Energy-

- **National Wind-Solar Hybrid Policy:** The main objective of the National Wind-Solar Hybrid Policy, 2018 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.

The Ministry of New and Renewable Energy has proposed a new scheme to develop Wind-Solar Hybrid Parks. The sites to develop the wind-solar hybrid parks are to be selected by the National Institute of Wind Energy (NIWE). The park is expected to be 500 MW and more.

- **National Offshore Wind Energy Policy**: The National Offshore wind energy policy was notified in October 2015 with an objective to develop the offshore wind energy in the Indian Exclusive Economic Zone (EEZ) along the Indian coastline of 7600 km.
- **National Institute of Wind Energy**:Technical support including wind resource assessment and identification of potential sites through the National Institute of Wind Energy.
- Inter-state transmission charges have been waived off for wind projects to be commissioned by June, 2025 in order to facilitate inter-state sale of wind power.
- Accelerated Depreciation benefit; concessional custom duty exemption on certain components of wind electric generators.

Advantages of Wind energy-

- It is a renewable source of energy, hence a sustainable source.
- It’s an environmentally friendly fuel source as it does not pollute the air in the same way that power plants that burn fossil fuels, such as coal or natural gas, do, emit particulate matter, nitrogen oxides, and sulfur dioxide, which cause human health problems and economic losses.
- Carbon dioxide emissions can reduce by 0.3-1.61 gigatonnes every year by 2050 if offshore wind energy

generation is scaled up.

- Wind energy mitigates the price uncertainty that fuel costs add to traditional sources of energy because its electricity is sold at a fixed price over a long period of time and its fuel is free.
- More people are employed in the wind industry, and wind turbine technician is one of the fastest-growing occupations.
- On existing farms or ranches, wind turbines can be installed. This has a significant economic impact in rural areas, where the majority of the best wind sites are located. Farmers and ranchers can continue to use the land because wind turbines only take up a small portion of it.

Challenges of Wind energy-

- Less Lucrative- The lowest bid price for solar energy is Rs 2.23 per unit, whereas it is approximately Rs 4.50 for wind energy. Investors find the solar energy business to be more profitable.
- Intermittent nature- Low power generation when the wind speed is low.
- The wind power industry has been stagnant for the last three years. India added about 5.5 GW in 2016–17; in 2017–18, that number dropped to 2 GW.
- Requires huge initial Capital.
- Land acquisition is another major challenge.
- Poor state of DISCOMS, makes it difficult for them to meet their renewable purchase obligation and due to the lower rate of solar energy it is preferred over Wind energy.
- Local fauna may be impacted by wind farms. Birds have perished after colliding with rotating turbine blades. Additionally, just like other energy sources, wind projects may change the environment where they are installed.

- The development of wind resources may not be the most financially successful use of the property.
- Alternative land uses that might be more valuable than energy production must compete with property that is appropriate for the installation of wind turbines.
- The development of the support infrastructure requires significant investment in order to produce wind energy from offshore.Wind turbines can be damaged by the action of waves and even high winds, especially during storms or hurricanes.
- Offshore wind farms can impact the Marine Flora and Fauna.

Way Forward-

- Policy-The main concern is the slowdown of the wind industry, due to a shift in procurement which has challenged cost recovery, in addition to land allocation and grid capacity issues.
- Wind power should take advantage of the push for RE from India's global partners, such as the US, Norway, Japan, Denmark and the EU.
- Developing underwater power evacuation and sub-sea substations: The Power Grid Corporation of India Ltd can do the work. This would reduce the risk for offshore wind project developers.
- Change in the current Bidding Mechanism: Unlike solar, wind power development cost varies from state to state. There is a need to develop the wind project site, collect data and then carry out biddings.
- Technology-New technologies present new opportunities, such as advanced drivetrain turbines suited to lower wind speeds, larger turbines, hybrid projects and optimized micro siting with environmental and social impact studies.
- Bringing Renewable Energy under GST and lowering GST rates to minimum 5% on inputs like Turbine Blades, motor

etc.

- The Global Wind Energy Council has also called for greater public-private co-operation to confront the new geopolitics of the wind supply chain.
- A stronger international regulatory framework is needed to address the increased competition for commodities and critical minerals.
- Consistent policy environments focused on Long-term gains.

Mould your thought-

1. To meet India’s Paris agreement commitments, Wind Energy will play a very crucial role. Critically discuss the progress made by India in this regard so far. (250 Words)

Approach to the answer-

- Introduce with India’s target especially for Wind energy and potential sites
- Explain in brief why Wind energy is crucial.
- Progress made so far along with government initiatives.
- Challenges being faced in wind energy development.
- Way forward with suggestions and Conclusion.