India’s Non-Fossil Fuel Power Capacity

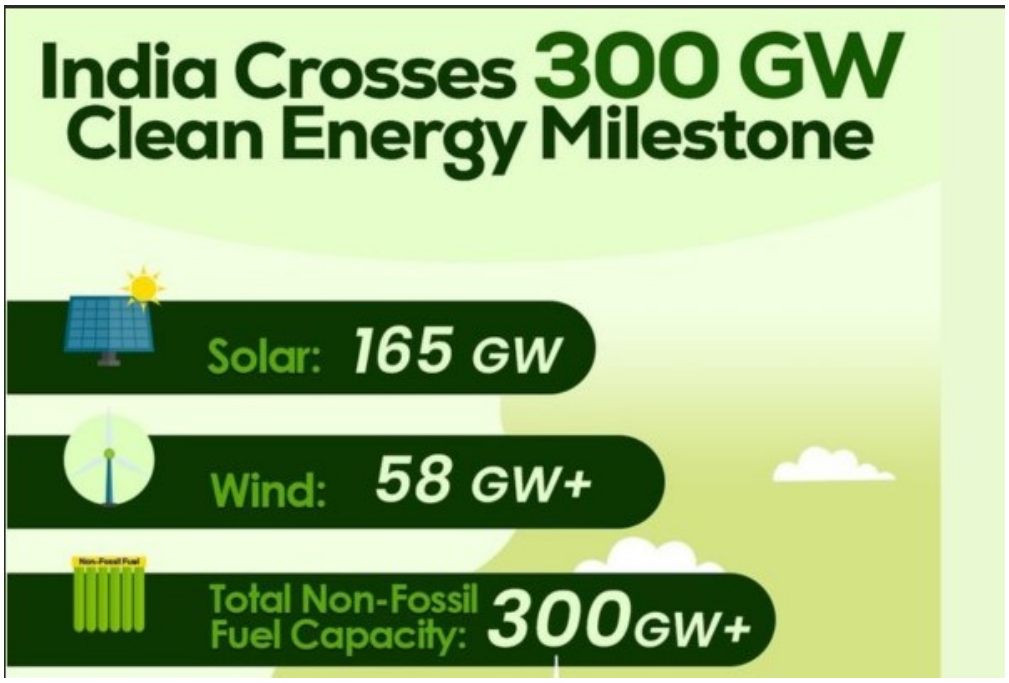
Mains: *GS III – Energy*

Why in News?

Recently India’s Non Fossil Fuel Power Capacity has crossed 300 GW.

What is the Non-Fossil fuel capacity of India?

- **Present status** – India’s Non-Fossil Fuel Power Capacity Crosses 300 GW.
- It is 60 percent of its non-fossil fuel power generation capacity target of 500 GW.
- Non-fossil fuel capacity includes solar power, wind power, hydro power, bio-power and Nuclear Power.
- The share of non-fossil fuel-based electricity capacity in the country’s total installed electricity generation capacity has reached over **54 %.**



- In the total Non-Fossil Fuel Capacity of the country, solar energy has remained a key growth engine.
- It is with around 165 gigawatts of installed capacity at present.
- According to the Ministry of New and Renewable Energy, a record 55.29 gigawatts of non-fossil fuel-based electricity generation capacity was added in the country during 2025-26.
- **Sector-wise Contribution**

- Installed solar capacity has risen to **164.59 GW**.
- Installed wind capacity has reached **58.14 GW**
- Presently, hydropower accounts for **57.24 GW** of capacity, while bio-power contributes **11.75 GW.**
- Nuclear power accounts for another **8.78 GW.**

What is Nationally Determined Contribution (NDCs)?

- **NDC** – Under the 2015 Paris Agreement, every country is obligated to decide upon, and implement, a set of climate actions that help the global fight against climate change.
- These are referred to as **nationally-determined contributions, or NDCs.**
- On March 25 this year, India revealed its revised NDCs for 2035.
- India said it would ensure that at least **60%** of its electricity installed capacity in 2035 was based on non-fossil fuel sources, up from the **50%** target it had set for 2030.
- It has promised to attain at least a **47%** reduction in emissions intensity, or emissions per unit of GDP, on 2005 levels, which is two percentage points more than its current target of **45%** for 2030.
- It has also promised to create a carbon sink that is at least 3.5 to 4 billion tonnes of CO2-equivalent larger than what existed in 2005.

Greenhouse gas Emission Intensity (GEI)
• GHGs are gases that trap heat in the atmosphere and contribute to the "greenhouse effect" that raises surface temperature on Earth. • The five most abundant GHGs in the atmosphere are water vapors, carbon dioxide, methane, nitrous oxide, and ozone. • Other GHGs include synthetic fluorinated gases such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). • GEI is the amount of greenhouse gases (GHG) emitted per unit of product output, such as the quantum of gases released while producing cement.

- **Energy storage** – It refers to systems that can store excess renewable electricity during periods of high generation and discharge it when demand rises but power generation remains low.
- At its core, energy storage systems convert electricity from renewable sources such as solar and wind, when it is available, into forms that can be stored.
- Later, it converts these back into electricity when need arises.
- In India, a key challenge is emerging for its power system — electricity supply that is abundant in some hours but insufficient in others.

What are the range of energy storage technologies?

- **Pumped hydro storage (PHS)** – It uses surplus electricity to pump water from a lower reservoir to a higher one.
- When electricity demand peaks, it releases the stored water downhill through turbines to generate power.
- **Battery energy storage systems (BESS)** – This technology stores electricity chemically and discharges it when needed.
- Lithium-ion batteries, particularly lithium iron phosphate (LFP) batteries, are currently

the dominant technology for grid-scale storage because of their falling costs, high efficiency and long operational life.

- **Concentrating solar-thermal storage systems** – This technology uses mirrors that capture and focus sunlight onto a receiver.
- As the receiver gets heated, materials such as molten salt are circulated inside the receiver to store the heat.
- The stored heat can later be used to produce steam.
- This steam is converted into mechanical energy in a turbine, which powers a generator to produce electricity.
- **Compressed-air energy storage systems** - It uses excess electricity to compress air and store it in underground caverns or tanks.
- When power demand rises, the compressed air is released to drive turbines and generate electricity.
- **Flywheel energy storage systems** – It stores electricity as rotational energy by spinning a rotor at extremely high speeds.
- Because they can inject power into the grid almost instantly, they are particularly useful for maintaining grid stability and managing short-term fluctuations.
- **Gravity energy storage systems** – It uses electricity to lift heavy weights to higher elevations.
- When electricity is needed, the weights are lowered, converting gravitational energy back into electricity through generators.

Reference

The Indian Express| India’s solar PV manufacturing capacity