India-Australia Civil Nuclear Cooperation

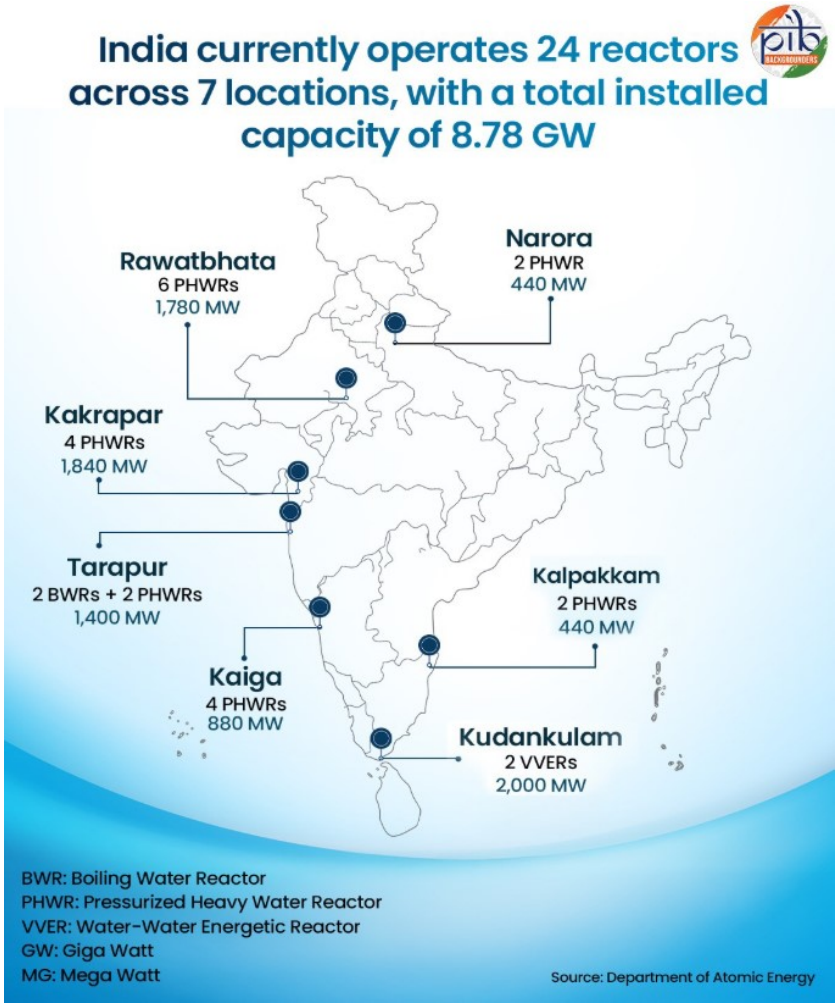
Mains: *GS II – International Relations*

Why in News?

Recently, India–Australia Civil Nuclear Cooperation Agreement was finalised during the Third India–Australia Annual Summit.

What is India's nuclear energy landscape?

- **Total number of reactors & capacity**– India currently operates **24 nuclear power reactors** across **seven sites** with a total installed capacity of **8.78 Gigawatt (GW)**.
- **Current projects – Ten more reactor units** with a combined capacity of **8000 Megawatt (MW)** are under construction.
- Pre-project activities for **10 additional reactors** are also underway.
- **Reactor types** – The reactors are Pressurised Heavy Water Reactors (PHWRs), Boiling Water Reactors (BWRs) and Light Water Reactors (LWRs).
- India mainly uses natural uranium fuel to run the Pressurised Heavy Water Reactors (PHWRs) to produce nuclear energy and Plutonium is produced as a bye product.



- **Thorium reserves** – India's long-term strategy is centred on utilising its abundant thorium reserves for future nuclear fuel, found mainly in the coastal sands of Kerala, Tamil Nadu, Andhra Pradesh, and Odisha**.**
- But naturally occurring Thorium has to be first made fissile by neutron absorption inside a nuclear reactor.
- **FBRs** – India is advancing **Fast Breeder Reactors (FBRs)** to utilise plutonium and support the transition to thorium-based reactors.
- **SMRs** – The Government has allocated **₹20,000 crore** in the **Union Budget 2025-26,** for the research, design, development, and deployment of indigenous **Small Modular Reactors (SMRs).**
- **SMRs** typically generate **up to 300 MWe** of electricity. Their compact, modular design enables factory-based manufacturing, faster construction, improved quality and phased deployment.
- The Government aims to operationalise **at least five indigenous SMRs by 2033**.
- With continued investments in advanced reactor technologies and domestic innovation, nuclear energy is emerging as a reliable pillar of India's future energy mix.

Prototype Fast Breeder Reactor (PFBR)

• India's indigenously built **500 MWe Prototype Fast Breeder Reactor (PFBR)** at Kalpakkam attained **first criticality on 6 April 2026**, marking the start of India's **second stage of its three-stage nuclear power programme**.
• Unlike conventional reactors, the PFBR uses plutonium recovered from spent fuel of Pressurised Heavy Water Reactors (PHWRs) and is designed to **produce more nuclear fuel than it consumes**.
• It will eventually breed **Uranium-233 from thorium**, unlocking India's vast thorium reserves for future-ready clean energy generation.
• Developed indigenously by the Department of Atomic Energy, the reactor is a major milestone, strengthening India's reliable fuel supply, reducing dependence on imported uranium, and advancing the country's net-zero ambition by 2070.

Why this is crucial for India?

- **Energy Security –** The Arrangement assures a long-term supply of fuel for an expanding fleet of reactors.

  Australia *possesses the largest uranium resources globally, accounting for more than one-third of the global total.*

- Nuclear power provides dependable baseload generation, available at all hours, which lends stability to the grid and complements the variable output of solar and wind power.
- **Clean Energy –** Nuclear power is a low-carbon source that adds firm capacity to India's non-fossil energy mix.
- It can progressively meet demand currently served by coal while supporting the growing energy needs of industry, data centres and the digital economy.
- **Nationally Determined Contributions (NDCs) and net-zero –** India has committed to achieving **net-zero emissions by 2070** and has progressively raised its climate targets, including a greater share of non-fossil capacity.
- A secure supply of nuclear fuel supports this transition by enabling the expansion of clean and reliable generation.
- **India as a responsible nuclear power –** Australia's decision to supply uranium reflects confidence in India's strong non-proliferation record and responsible use of nuclear technology.
- The Arrangement further reinforce the India–Australia Comprehensive Strategic Partnership by adding a robust energy pillar to cooperation spanning trade, defence, critical minerals, technology and the Indo-Pacific.

India has signed ***Inter Governmental Agreement (IGA)*** *with 18 countries on Civil Nuclear Co-operation for peaceful purposes.*

- **Supports India's nuclear ambitions** – It complements the Nuclear Energy Mission, which targets 100 GW of nuclear power capacity by 2047.
- It also reinforces the Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Act, enacted in December 2025.

- The Act enables participation by Indian private companies and joint ventures in building, owning and operating nuclear power plants.
- Assured long-term uranium supplies provide greater confidence to developers, investors and industry, supporting timely project implementation.

What lies ahead?

- The Administrative Arrangement is a practical measure with far-reaching benefits.
- For the economy, it helps to secure clean and firm power for growth, manufacturing and digital infrastructure.
- For energy security, it diversifies India's fuel supply and strengthens the foundation of the power system.
- This momentum is already evident, with milestones such as the PFBR at Kalpakkam attaining first criticality.
- For the bilateral partnership, energy now joins a broad and deepening relationship.
- Anchored in shared interests and mutual trust, India and Australia are well placed to widen their cooperation in the years ahead, with a dependable supply of uranium lending India's clean energy endeavor a firmer foundation.

Reference

PIB| India – Australia Nuclear Arrangments