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# Kudankulam Unit-5: Reactor Pressure Vessel Installed

22 June 2026 · **SCIENCE & TECH** · **ECONOMY** · **GS3**

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# Kudankulam Unit-5: Reactor Pressure Vessel Installed

22 June 2026 · 3 min read ·

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## WHY IN NEWS

*The Nuclear Power Corporation of India Limited (NPCIL) installed the roughly 320-tonne Reactor Pressure Vessel (RPV) at Kudankulam Unit-5 in Tamil Nadu in June 2026. The installation, a major construction milestone, followed clearance from the Atomic Energy Regulatory Board (AERB (<https://ujjari.com/terms/aerb-atomic-energy-regulatory-board/>)) for the erection of major equipment.*

The Kudankulam Nuclear Power Plant (KKNPP) is the largest nuclear power station in India by capacity potential and the flagship of India-Russia civil nuclear cooperation.

## THE KUDANKULAM PROJECT

KKNPP is located in the Tirunelveli district of Tamil Nadu. It is built in cooperation with Russia under an inter-governmental agreement, with the Russian firm Atomstroyexport (ASE) as the technology partner. The reactors are VVER-1000 units, a Russian design of the pressurised water reactor (PWR) family.

## Site Capacity

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PARAMETER	DETAIL
Location	Tirunelveli district, Tamil Nadu
Reactor type	VVER-1000 (pressurised water reactor)
Russian partner	Atomstroyexport (ASE)
Units planned	Six
Full site potential	6,000 MWe
Operator	NPCIL
Regulator	AERB

Units 1 and 2 are operational. Units 3 to 6 are at various stages of construction, with Unit-5 reaching the RPV-installation milestone.

### WHAT IS A REACTOR PRESSURE VESSEL?

The Reactor Pressure Vessel is the steel container that houses the reactor core, the nuclear fuel assemblies, and the coolant. In a pressurised water reactor, water inside the RPV is kept under high pressure so it does not boil despite very high temperatures, and this hot water transfers heat to a secondary loop that generates steam.

Installing the RPV is a defining moment in reactor construction because subsequent works, internals, control mechanisms and primary piping, are built around it. The vessel must meet exacting metallurgical and quality-assurance standards, which is why AERB clearance precedes its erection.

### WHY VVER AND THE OPERATOR-REGULATOR SPLIT

The VVER-1000 is a Generation III-class reactor with passive and active safety systems including a core catcher to contain a molten core in a severe accident. Importing proven Russian designs lets India add large baseload capacity quickly while it scales up its indigenous Pressurised Heavy Water Reactors (PHWRs) and the three-stage programme.

India maintains a clear separation between the operator and the regulator. NPCIL, a public-sector undertaking under the Department of Atomic Energy, builds and runs commercial nuclear plants. The AERB is the independent regulatory authority that grants consents and enforces safety. This separation is a core principle of nuclear governance.

## SIGNIFICANCE FOR INDIA'S ENERGY MIX

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DRIVER	RELEVANCE
Baseload clean power	Nuclear provides round-the-clock low-carbon electricity
Net-zero 2070	Supports decarbonisation ( <a href="https://ujijari.com/vocab/decarbonisation/">https://ujijari.com/vocab/decarbonisation/</a> ) targets
Strategic partnership	Deepens India-Russia civil nuclear ties
Energy security ( <a href="https://ujijari.com/terms/energy-security/">https://ujijari.com/terms/energy-security/</a> )	Diversifies away from imported fossil fuels

## ANALYSIS AND WAY FORWARD

Nuclear power is central to India's plan for firm, dispatchable clean energy to complement intermittent solar and wind. The government has signalled ambitions to expand nuclear capacity sharply, including through small **modular** (<https://ujijari.com/vocab/modular/>) reactors and greater private participation, which would require amendments to the Atomic Energy Act and the Civil Liability for Nuclear Damage Act. Kudankulam demonstrates the gains from technology partnerships, but the long-term answer lies in scaling India's indigenous reactor fleet and fuel-cycle capability while sustaining the highest safety and regulatory standards.

## UPSC RELEVANCE

- GS3 (Science and Technology / Energy): nuclear energy, indigenous reactor programmes, energy security.
- Prelims: VVER versus PHWR, NPCIL and AERB roles, KKNPP location and capacity.
- Mains: Assess the role of nuclear power in India's net-zero transition and the reforms needed to scale it.

## FACTS CORNER

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### ★ FACTS CORNER — KNOWLEDGEPEDIA

Kudankulam (KKNPP) is in Tirunelveli district, Tamil Nadu; full site potential is 6,000 MWe across six VVER-1000 units.

The Russian technology partner is Atomstroyexport (ASE); VVER is a pressurised water reactor design.

NPCIL operates India's commercial nuclear plants; the AERB is the independent regulator.

The Reactor Pressure Vessel installed at Unit-5 weighs about 320 tonnes.

India's domestic mainstay is the Pressurised Heavy Water Reactor (PHWR) using natural uranium.

*Sources: Nuclear Power Corporation of India (<https://www.npcil.nic.in>), Department of Atomic Energy (<https://dae.gov.in>), Press Information Bureau (<https://pib.gov.in>)*

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