Atomic juncture

A new comprehensive law opens up the nuclear sector to private players, while diluting disaster liability and safety provisions

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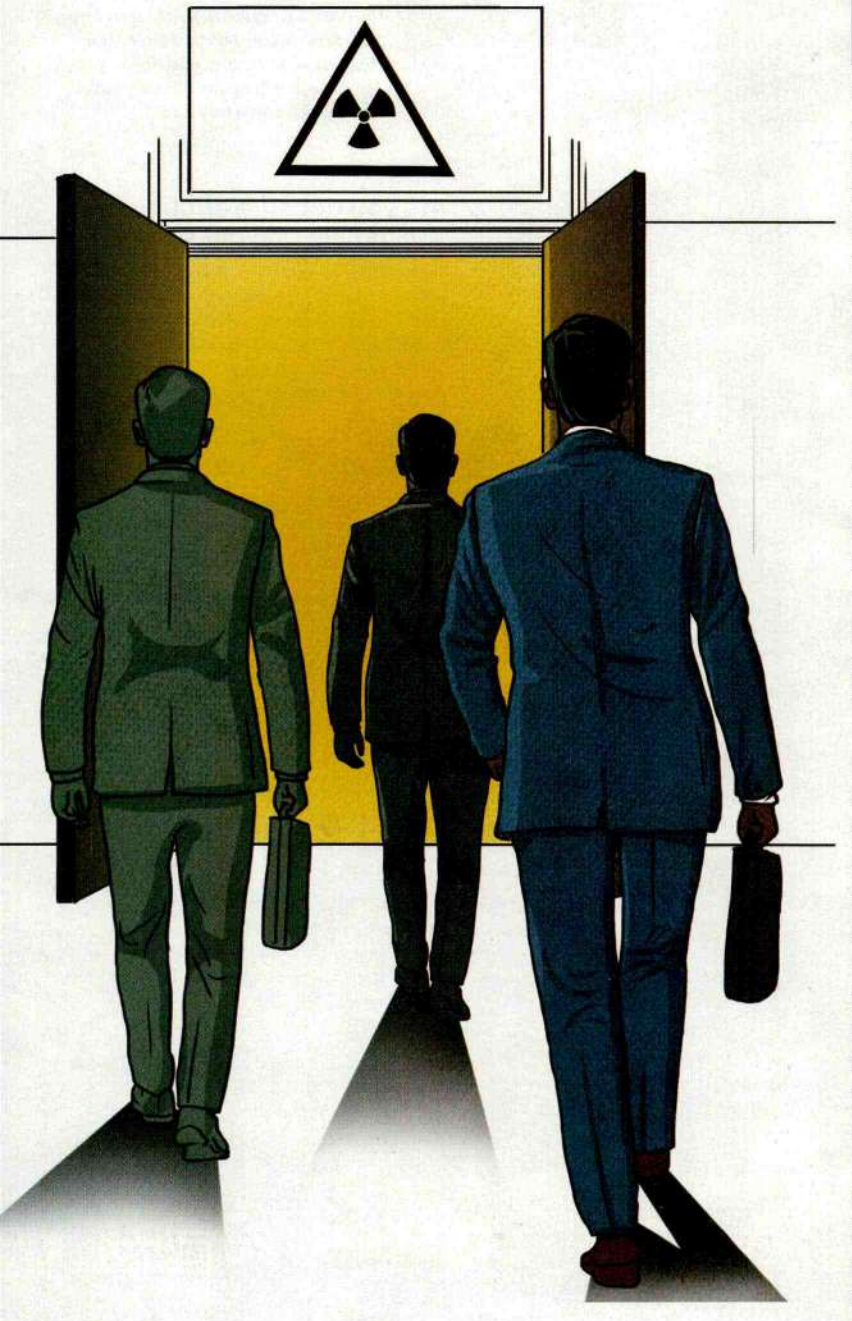


IN THE first week of January came a slew of media reports stating that the National Thermal Power Corporation (NTPC) Limited, a state-owned company, has inked agreements with foreign firms to explore collaborations for nuclear power projects in India. These include Russia's Rosatom, France's Électricité de France SA (EDF) and the US' Clean Core Thorium Energy. Reports of the deals in such quick succession can be attributed to the Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India Act, 2025, or SHANTI Act, passed by the Parliament in December.

The legislation repeals the Atomic Energy Act, 1962 and the Civil Liability for Nuclear Damage Act, 2010, ending the state's monopoly over nuclear power generation and opening the sector to private and foreign participation for uranium mining, reactor construction, operation, equipment manufacturing and other aspects of the nuclear fuel cycle, subject to licensing and regulatory oversight.

Union Minister of State (Independent Charge) for Science and Technology Jitendra Singh termed the Act as a historic reform that will "unlock nuclear potential for peaceful, clean, and sustainable energy while maintaining uncompromising standards of safety, sovereignty, and public interest." The Act furthers the Centre's intent to enhance nuclear power in the energy mix, as a cleaner power source. It is aligned with the Nuclear Energy Mission, announced in the Union budget for 2025-26, which targets 100 gigawatts (GW) of installed nuclear capacity by 2047.

Nuclear power has so far been the preserve of public sector entities like the Nuclear Power Corporation of India Ltd (NPCIL). The Act will allow foreign direct investments up to 49 per cent, with private players able to forge partner-

ILLUSTRATION: YOGENDRA ANAND / CSE

ships, joint ventures and play manufacturing roles. NPCIL will retain operational control over sensitive aspects in the fuel cycle.

This legislative shift comes on the back of accelerating nuclear capacity over the past decade. According to a June 2025 report by the Central Electricity Authority, current installed nuclear capacity in the country is 8.8 GW—around 3 per cent of total installed electricity capacity. This is an increase by about 71 per cent from the 4.78 GW reported in 2014. By early 2025, the country operated 25 reactors across seven sites. Nuclear plants accounted for approximately 57 terawatt-hours of electricity in 2024-25.

Another 10 reactors with a combined capacity of about 8 GW are under construction, while 10 more are in pre-project stages. If completed on schedule, these projects could raise installed capacity to around 22.5 GW by 2031-32. Alongside large reactors, the government is emphasising on indigenous technologies and smaller units, including the 200-MW Bharat Small Modular Reactor (BSMR) under development at the Bhabha Atomic Research Centre, to reach the 2047 target.

Experts question this push. M V Ramana, professor at the University of British Columbia, Canada, and a nuclear policy researcher, tells *Down To Earth* (DTE) that similar high targets have been set repeatedly in India and elsewhere, but never been met. Historically, he notes, nuclear power has remained at 2-4 per cent of India's electricity mix, with little evidence that this trajectory is set to change.

Further, Soumya Dutta, member of the National Alliance of People's Movements, a coalition of social activist groups, highlights that the Act undermines regulatory control. "Granting operational control of fissile and highly radioactive materials to private entities substantially heightens the risk of accidents with catastrophic consequences," says Dutta. The Act permits composite licences, enabling a single entity to hold licences across multiple stages of the fuel cycle. "This further concentrates control, increasing systemic risk rather than containing it," Dutta adds.

Grand plans

India aims for installed nuclear capacity of 100 GW by 2047, with special emphasis on small, indigenously developed reactors

Boiling Water Reactor: Generates electricity by boiling water in reactor vessel

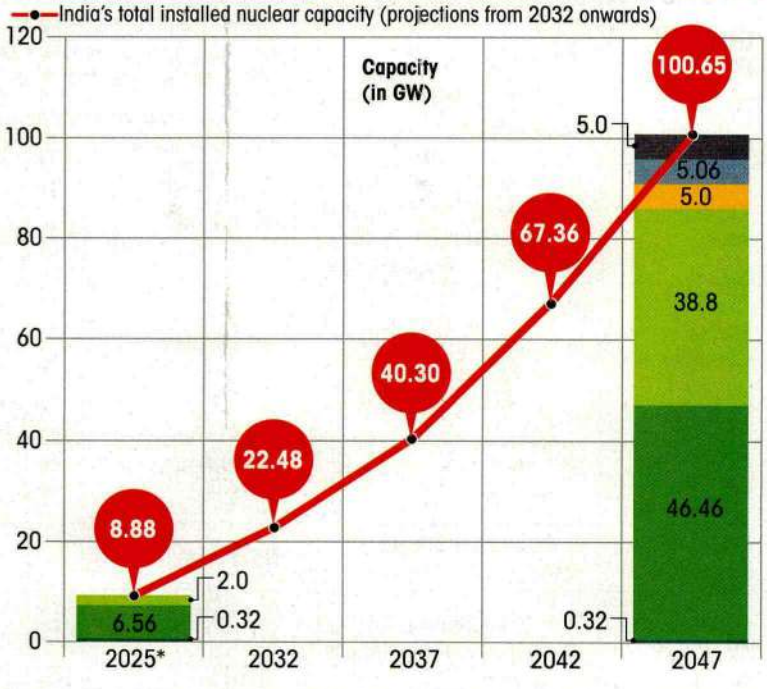
Pressurised Heavy Water Reactor (PHWR): Uses deuterium oxide as both coolant and moderator, allowing use of natural, unenriched uranium as fuel

Light Water Reactor: Uses ordinary water as both coolant and moderator, using low-enriched uranium as fuel. Pressurised Water Reactor (PWR) is a common variant of this technology, using pressure to keep the water from boiling

Fast Breeder Reactor: Uses a liquid sodium coolant and converts fertile uranium-238 or thorium-232 into usable fuel, crucial for India that has large thorium reserves

Bharat Small Reactor: Compact 220 MW PHWRs being developed with private sector participation

Bharat Small Modular Reactor: Compact reactors (around 200 MWe) being developed using PWR technology



Note: as of June 2025, Source: "Road Map for achieving the goal of 100 GW of Nuclear Capacity by 2047", Central Electricity Authority, June 2025

LIABILITIES CAPPED

The SHANTI Act restructures the country's nuclear liability regime. Section 13 of the law caps liability at 300 million Special Drawing Rights

Legislative overhaul

The SHANTI* Act, 2025, opens up India's nuclear power sector for private and foreign participation and relaxes some regulatory and liability provisions

AREA	ATOMIC ENERGY ACT, 1962	CIVIL LIABILITY FOR NUCLEAR DAMAGE ACT, 2010	SHANTI* ACT, 2025
Ownership & participation	100% state monopoly	No change	Private and foreign participation, subject to licensing
Fuel cycle licensing	Fragmented control under government entities	Not addressed	Composite licences: one operator to hold licence for multiple fuel-cycle stages
Operator liability cap	Not specified	₹1,500 crore per incident	Graded caps based on reactor size, ~₹100 crore to ₹3,000 crore
Total liability cap	Not specified	300 million Special Drawing Rights	300 million Special Drawing Rights; Centre assumes additional liability
Supplier liability	Not applicable	Statutory right of recourse for operators against suppliers for defective equipment/services	No statutory right of recourse
Liability periods	Not specified	Up to 10 years (property damage) and 20 years (personal injury)	Retains the 10/20-year extinction periods
Regulatory structure	Atomic Energy Regulatory Board (AERB) set up without statutory status for certain regulations, safety functions	No change	AERB gets statutory status
Executive exemptions	Not specified	Not specified	Allows exemptions from licensing, liability or other provisions for facilities deemed to pose "insignificant risk"
Access to justice	Not specified	Claims through designated authorities; civil remedies preserved	Criminal complaints restricted to authorised persons; claims limited to three years, with extinction after 10/20 years
Environmental safeguards	Environmental impact assessment mandatory	No change	No change
Information disclosure	Right To Information (RTI) Act applicable, with exemptions	RTI Act applicable	Centre empowered to prohibit publication and disclosure under RTI Act once notified

Note: *SHANTI Act is officially termed the Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India Act,
Source: Parliament documents

(SDRs), equal to around ₹3,864 crore or US $430 million, as per the currency exchange rate on January 7, 2026. SDR is an international reserve asset maintained by the International Monetary Fund to help supplement countries' official reserves. Liability beyond 300 million SDRs is assumed by the Centre.

This limit was set under the Civil Liability for Nuclear Damage Act, a law that was introduced in 2010 to strengthen accountability in hazardous industries. However, the limit may prove inadequate when compared with the extent of damage that nuclear disasters may cause—for example, cleanup costs of the 2011 meltdown of the Fukushima Daiichi nuclear plant in Japan exceeded nearly 22 trillion yen (equal to $140 billion, as per the currency exchange rate on January 7, 2026), as per an estimate put out by the country in 2016. "No cap is justifiable for disasters with inter-generational health and environmental

impacts," says Dutta.

"The problem with a low liability cap is that it creates a moral hazard," adds Ramana. "If companies know their maximum exposure is limited, there is less incentive to invest in safety. Any residual risk is transferred to the public."

The Act also removes operator's right of recourse against suppliers, which means faulty equipment or design would not attract supplier liability. Delhi-based legal activist Prashant Bhushan tells DTE these provisions are a departure from established legal principles. "Indian jurisprudence has developed the principle of absolute liability for hazardous industries," he says. "If a company profits from a dangerous activity, it must bear full responsibility for the damage it causes."

However, Amit Kapur, an infrastructure lawyer and partner at JSA Advocates & Solicitors, Delhi, says undoing supplier liability provisions was politically and commercially necessary. "The government needs to communicate clearly how the revised framework will hold operators accountable and ensure prompt compensation through insurance pools and other mechanisms," he adds.

EXEMPTIONS BUILT IN

The SHANTI Act retains the Atomic Energy Regulatory Board (AERB), set up under the Atomic Energy Act, 1962, as the primary regulator for the sector that would oversee approvals and licences for the projects. Appointments, staffing and institutional support to the board will be controlled by the Union government.

Section 44 of the Act empowers the government, with approval from AERB, to exempt any plant, facility, substance or technology from licensing or liability requirements if the assessed risk is deemed "insignificant"; a term not defined in the Act. "AERB is promoting nuclear expansion, licensing projects and underwriting liability," Ramana notes. "That creates an inherent conflict of interest unless regulatory independence is substantially strengthened."

The Act also allows exemptions from regulatory oversight on grounds of national defence and security, further widening executive discretion. Dutta highlights that this could risk bypassing laws governing air and water pollution, forests, coastal zones and biodiversity. Although, the SHANTI Act retains requirements for environmental impact assessment as in previous laws.

THE LIABILITY CAP OF 300 MILLION SPECIAL DRAWING RIGHTS RETAINED BY THE SHANTI ACT MAY PROVE INADEQUATE WHEN COMPARED WITH THE EXTENT OF DAMAGE THAT NUCLEAR DISASTERS MAY CAUSE

Further, Section 39 empowers the Union government to prohibit publication of information related to nuclear activities, overriding disclosure under the Right to Information Act. This could further constrain public scrutiny in a sector with high environmental and safety stakes.

ISSUE OF ADEQUACY

In terms of attracting financial investment, Kapur says the legislative changes under the SHANTI Act are welcome but not sufficient. "Nuclear projects are capital-intensive with long gestation periods. Their viability depends on predictable tariffs, long-term power purchase agreements and the assurance of contract enforcement. Subordinate legislation on pricing mechanisms, offtake guarantees and dispute resolution would help attract private investment. An important concern would be how robust the tariff determination mechanism is," he says.

Ramana also cautions against cost optimism for indigenously developed SMRs. "SMRs will generate lower amounts of power, but the cost of constructing these reactors will not be proportionately smaller," he says. "Nuclear power is not required to meet India's electricity needs," Ramana argues. "India does not suffer from a shortage of generation capacity. What it faces are problems of distribution, grid management and peaking power."

In fact, as per separate analyses by the International Atomic Energy Agency's Power Reactor Information System and the "World Nuclear Industry Status Report 2025", a publication released by an international team of independent scientists, seven Indian reactors are already in "suspended operation" or "long term outage" as of mid-2025. These classifications are given to reactors that do not generate electricity due to ageing, technical and economic constraints and are offline for extended periods, often without firm plans to restart operations. These plants may still be counted as part of the country's installed capacity.

"The question is not just whether India can build more nuclear reactors. It is whether this is the best use of limited public resources," says Ramana. "Flexible options like solar, wind, storage, regulated hydropower and grid upgrades can address distribution and management challenges in a quick and cheaper manner," Ramana adds. DTE

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