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Shanti Act Advances Reform, Streamlines and Dilutes Liability

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Takshashila Issue Brief 2026-02
Version 1.0, January 2026

This issue brief discusses the highlights of the Shanti Act, situates it in the historical context of the Indian nuclear dream and offers recommendations for reviving nuclear energy.

Recommended Citation:
Lokendra Sharma, ``Shanti Act Advances Reform, Streamlines and Dilutes Liability'', Takshashila Issue Brief 2026-02, Version 1.0, January 2026, The Takshashila Institution

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1 Introduction

On 20 December 2025, the Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India Act (Shanti) received the assent of the President of India after being passed by both houses of Parliament in the same month.[1] The Shanti Act repeals and replaces the Atomic Energy Act of 1962 and the Civil Liability for Nuclear Damage Act (CLNDA) of 2010 with a single piece of legislation. The Shanti Act ends the government's monopoly on nuclear power generation and also tackles the thorny issue of liability in the event of accidents. Through the legislation, the Government of India has addressed long-standing demands for reform in the nuclear energy sector.[2]

A Press Information Bureau backgrounder describes the rationale for the Shanti Act as follows: "To meet the national target of 100 GW nuclear capacity by 2047 and advance long-term decarbonisation by 2070, a modern legal framework is essential, which enables wider participation, leverages indigenous resources, and integrates innovation with safety."[3]

This issue brief unpacks the major highlights of the Shanti Act. It begins by situating the legislation in the larger historical context of the Indian nuclear dream and concludes by making some recommendations for reviving India's nuclear energy sector.

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Acknowledgement: The author would like to thank Pranay Kotasthane, Shambhavi Naik and Aditya Ramanathan for multiple rounds of reviews that has improved the document in terms of content and readability.

2 Echoes of a Faltering Dream and the Necessity of Reform

For eight decades, the Indian nuclear establishment, led by the Department of Atomic Energy — which comes directly under the purview of India's prime minister — continued to enjoy monopoly in operating nuclear power plants in the country. While the private sector was gradually engaged in supplying some crucial components required in a nuclear power plant, operating plants were reserved for Indian public sector undertakings, chiefly, Nuclear Power Corporation of India Limited (NPCIL). Even as prime ministers PV Narasimha Rao, Atal Bihari Vajpayee, Manmohan Singh and Narendra Modi unleashed waves of reform touching different economic sectors since the 1990s, nuclear power generation was largely left untouched

Two factors underscored the government's sustained monopoly over the nuclear sector. The first was India's strategic weapons programme, which for decades had to be kept secret from the prying eyes of geopolitical adversaries and Western non-proliferation interests. The second had to do with the allure of potentially limitless energy that the nuclear establishment shared with the country.

India's investment in nuclear energy started before independence. Homi Jehangir Bhabha, who is referred to as the father of the

Indian nuclear programme, established the Tata Institute of Fundamental Research with support from Sir Dorabji Tata Trust in 1945.[4] A year after independence, when the country's constituent assembly deliberations were still underway, the Atomic Energy Act of 1948 was passed.

But why did a newly decolonised, poor and uranium deficient country still invest in nuclear energy? Because Homi Bhabha believed in the promise of India's abundant thorium, a nuclear material that is fertile but not fissile. In 1954, Bhabha unveiled an elaborate three-stage nuclear power programme to harness energy out of thorium in a phased manner.[5] The first stage involves setting up of Pressurised Heavy Water Reactors (PHWR) that use heavy water both as a coolant and a moderator while running on natural uranium as fuel. Second-stage reactors use depleted uranium-238 from the first stage along with plutonium-239. Fast breeder reactors are designed to generate more fuel than they consume by in-situ generating more plutonium-239 after the transmutation of uranium-238. The third stage that ultimately utilises the abundant thorium through thermal breeder reactors running a virtuous thorium-232/uranium-233 fuel cycle has the potential for generating 358,000 GWe-yrs of electricity,[6] sufficient to power the country for this century at the very least.

Nuclear transmutation happens when an element converts into another because of nuclear reactions.

An alignment between the political class and the scientific establishment on the significance of nuclear energy helped birth a number of nuclear institutions and projects in the country in the 1950s and the 1960s.[7] This included Asia's first research reactor 'Apsara' that became operational in 1956 and the US-supplied boiling water reactor that commenced commercial operations in 1969.[8]

Back to present, India has mastered the first stage by indigenising the Canada-supplied CANDU reactor technology, which is essentially a PHWR. The country currently has 21 PHWRs in operation. These include the Kakrapar Atomic Power Plant-3 and Plant-4 in Tapi, Gujarat. These 700 MW reactors commenced commercial operations in the last few years.[9] As far as the second stage is concerned, India's first 500 MW Prototype Fast Breeder Reactor (PFBR) in Tamil Nadu's Kalpakkam is yet to achieve criticality.[10] However, the third stage remains in the research and development phase.

By the 2000s it was clear that the three stage dream was struggling to take off. It is for this reason that the watershed moment of India-US reset with the signing of the "123 Agreement" in 2008 and the waiver from the Nuclear Suppliers Group in the same year was expected to revitalise India's nuclear energy sector by facilitating the import of Western reactors.[11]

However, this did not happen. Concerns over India's liability regime, stemming from the CLNDA of 2010, have been cited as a reason for stymying the sale of American and French reactors to India.[12]

In addition to liability issues, concerns had been raised over the years about the continuation of the state monopoly over operating nuclear power plants amid the promises of captive nuclear plants (especially small modular reactors or SMRs).

3 Highlights of the Shanti Act

Needing to accelerate nuclear energy growth while balancing a contested liability regime, and the still-distant dream of a three-stage dream, the Government of India enacted comprehensive legislation to overhaul the country's nuclear establishment. Given its scope, the act naturally has multiple important themes. Five major highlights, however, stand out.

First, the Shanti Act does away with the monopoly of the state in operating nuclear power plants in the country. The Atomic Energy Act of 1962 only permitted public sector undertakings like the NPCIL to operate nuclear plants. Section 3 of the Shanti Act essentially permits Indian companies and joint ventures to "build, own, operate or decommission a nuclear power plant or reactor".

Second, the legislation adopts what an explainer published in India's World describes as a dual-permit structure involving licensing by the government and a safety authorisation by the Atomic Energy Regulatory Board (AERB).[13]

Third, the AERB finally gets statutory backing. Before the Shanti Act, the AERB was not a statutory body as it was constituted in 1983 by the President of India by exercising "the powers conferred by Section 27 of the Atomic Energy Act, 1962."[14] Being a statutory body means the regulator is backed by legislation debated and passed by the Parliament after a deliberative process involving both the government and the opposition. A non-statutory regulator, based on executive order, may or may not involve deliberations. The AERB now joins the likes of regulators in telecom (Telecom Regulatory Authority of India) and banking (Reserve Bank of India) which are also backed by legislation. Non-statutory bodies are quick responses to emergent challenges but statutory bodies are preferable over non-statutory ones for policy issues likely to persist over a medium-to-long term.

Fourth, the government continues to maintain an exclusive control over activities like enrichment, spent fuel management, and production of heavy water. Mining of uranium and thorium, "[p]rovided that such mineral shall be of the grade that is equal to or above the threshold value as may be notified by the Central Government" would also fall within government control.

Fifth, the Shanti Act streamlines liability in case of nuclear incidents. The primary change is that there is more tiered liability in the Shanti Act depending on the reactor size, with the maximum liability for the operator being hiked from INR1500 crores (under CLNDA) to INR3000 crores (for "[r]eactors having thermal power

Key players in the uranium market like Canada and Australia allow the private sector to mine. One potential reason for India to continue to maintain state monopoly over mining **uranium** is because it is available in low quantities that too of low grade. Whatever is available in India is required for strategic weapons programs as well (because it comes without safeguards).

As far as **thorium** is concerned, the Indian nuclear establishment did not permit private sector participation because thorium has been central to the three stage plan. But the basis for zealously guarding thorium reserves now, especially as it affects India's rare earth extraction amid China's global dominance in the market, is quite weak.

Subject to state capacity and further investigation, **thorium mining** could be allowed subject to licensing requirements (just like the private sector is allowed to own and operate nuclear power plants now through licensing). **This issue merits a separate investigation**.

above 3600 MW"). Financial penalties have also been added for breaches and violations. The rest of the provisions relating to overall liability, insurance, and Nuclear Liability Fund are similar to the CLNDA of 2010. The operator continues to be primarily liable in case of nuclear incidents. The government also retains the power to modify the liability amount through future notifications.

4 Dilution of Liability

The Shanti Act goes beyond streamlining liability and features two major instances of dilution.

First, in the right of recourse provided to the operator, sub-section (b) of section 17 of the CLNDA has been removed in the Shanti Act. The removed sub-section provided an operator right of recourse against the supplier when "the nuclear incident has resulted as a consequence of an act of supplier or his employee, which includes supply of equipment or material with patent or latent defects or sub-standard services". This brings the Shanti Act in line with the Convention on Supplementary Compensation for Nuclear Damage.[15] However, as a 2015 FAQ by India's MEA had clarified in its attempt to justify the inclusion of 17(b) in the CLNDA,[16] the operator can still negotiate such terms with the supplier in the contract for liability sharing. The Shanti Act therefore does not impede operators of nuclear power plants from seeking right of recourse against suppliers as long as it is provided in the contract that they enter with the suppliers. Hence, while operators are primarily liable for nuclear incident, they may still use their right of recourse to recover costs from a supplier if the contract between the operator and supplier stipulates it.

Second, the CLNDA had the following portion in sub-section 5(2): "Provided that any compensation liable to be paid by an operator for a nuclear damage shall not have the effect of reducing the amount of his liability in respect of any other claim for damage under any other law for the time being in force". This has now been removed in the Shanti Act. When seen in tandem with the removal of section 46, the dilution of the liability regime becomes quite clear. The section 46 of the CLNDA stated: "The provisions of this Act shall be in addition to, and not in derogation of, any other law for the time being in force, and nothing contained herein shall exempt the operator from any proceeding which might, apart from this Act, be instituted against such operator". Under the CLNDA regime, affected parties could potentially take operators to court under other Indian laws in force. That option has been removed in the Shanti Act.

While the Shanti Act does not alter the maximum liability for a nuclear incident, the Fukushima accident clean-up costs[17] — which run into billions of dollars — have demonstrated that the liability caps mentioned in the Shanti Act would in all likelihood turn out to be grossly inadequate in case of a moderate-to-major nuclear accident.

5 Charting the Path Forward

While opening up the nuclear sector for private sector participation is a step in the right direction, additional steps would help in achieving the 100 GW dream.

First, India needs to double down on PHWRs. While imported reactors and technology is welcome, especially in the SMR space, the country has the capability of building PHWRs in SMR style or as large reactors.[18]

Second, instead of waiting for the three stages to materialise, India should urgently seek various reactor designs such as molten salt, accelerator-driven system and high-temperature gas-cooled reactor. India could consider a new fuel mix of thorium and lightly enriched uranium developed by US-based Clean Core Thorium Energy.[19] This fuel can potentially be used in existing PHWRs and can speed up thorium utilisation in the country.

Finally, India would have to solve the vexed problem of processing and storing high-level nuclear waste for any ambitious expansion of nuclear energy[20] — whether helmed by the private or public sector — to work.

In an opinion piece for Moneycontrol in 2025, I had outlined the need for a **new nuclear dream** to scale up nuclear energy from its current abysmal installed capacity of nearly 9 GW.

Three recommendations, out of the five that were made in the aforementioned piece, continue to be relevant post-Shanti Act. These are reiterated in this issue brief with one crucial addition in the point about thorium utilisation.

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