

A Critical Analysis of the SHANTI Act, 2025

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ABSTRACT

The Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Act, 2025, passed within days in December 2025, is India's most significant reform of civil nuclear governance in over six decades. It repeals and replaces the Atomic Energy Act, 1962, and the Civil Liability for Nuclear Damage Act, 2010, ending the state monopoly over the nuclear fuel cycle by allowing licensed private and joint-venture participation. It also introduces a tiered, capacity-linked cap on operator liability, removes the statutory right of recourse against suppliers, grants the Atomic Energy Regulatory Board statutory status, and permits patents for peaceful nuclear inventions. This article examines the Act's background, principal provisions and stated objectives, and critically analyses the concerns it has raised: an unchanged liability ceiling, weakened supplier accountability, doubts over regulatory independence, proliferation and security risks, the absence of explicit criminal liability, tension with Article 21, and passage without Standing Committee scrutiny. A comparison with the US Price-Anderson regime informs the analysis. The article concludes that the Act resolves a genuine constraint on private and foreign investment but does so by redistributing risk from operators to the public, favouring investor confidence over victim compensation and institutional safeguards. It recommends an inflation-indexed liability cap, an industry-funded compensation pool, statutory criminal liability, entrenched regulator independence and retrospective parliamentary review.

Keywords: *SHANTI Act 2025; nuclear liability; private participation; supplier recourse; AERB; regulatory independence; Article 21; India*

1. INTRODUCTION

Since 1962, India's civil nuclear sector has operated as a near-total state monopoly. The Atomic Energy Act, 1962 vested control of the entire fuel cycle, from mining and enrichment to power generation, in the Central Government. The Civil Liability for Nuclear Damage Act, 2010 was enacted after the India-US civil nuclear agreement to create a no-fault liability framework for operators. Its Section 17(b), however, preserved the operator's right of recourse against suppliers, and foreign reactor vendors widely blamed it for stalling billions of dollars of planned nuclear commerce. Nuclear power still supplies only about 3 per cent of India's electricity from roughly 8.8 GW of installed capacity. Against that base, the government has set a target of 100 GW by 2047, driven by the 2070 net-zero commitment and rising demand from data centres, artificial intelligence and semiconductor manufacturing. The problem is that the

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existing legal architecture could not attract private and foreign capital at the scale this target requires, while any attempt to open the sector raises hard questions about who bears the risk of a nuclear accident.

The Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Act, 2025 is the legislative response. It was introduced in the Lok Sabha on 15 December 2025, passed by both Houses within days, and assented to by the President on 20 December 2025. It repeals both earlier statutes and replaces them with a single consolidated law that permits licensed private and joint-venture participation, introduces a tiered, capacity-linked cap on operator liability, removes the statutory right of recourse against suppliers, grants the Atomic Energy Regulatory Board (AERB) statutory status, and permits patents for peaceful nuclear inventions.

Existing commentary on the Act comes mainly from opposition parliamentarians, civil society organisations, environmental lawyers and independent analysts. It has focused on individual concerns, such as the adequacy of the liability cap, regulatory capture, and the absence of criminal liability. The wider literature on nuclear liability, including the Bhopal and Fukushima experiences and international regimes such as the US Price-Anderson Act, offers useful benchmarks. Because the Act is so recent, there is little sustained scholarly work that examines its provisions together, or that tests them against India's constitutional obligations.

This article aims to fill that gap. Its purpose is to examine the Act's stated objectives and principal provisions, and to evaluate critically the objections it has drawn. Its contribution is threefold. First, it gives an integrated account of the Act's provisions and legislative history. Second, it argues that the Act removes a genuine barrier to investment but does so by shifting risk from profit-seeking operators to victims and taxpayers, rather than by building institutional safeguards matched to the entry of private actors. Third, it links this critique to Article 21 and to international precedent, and proposes reforms that would keep the private-participation and supplier-liability changes while strengthening accountability.

The article is organised as follows. Section 2 sets out the background and legislative history. Section 3 analyses the key provisions on licensing, liability, regulation, intellectual property and dispute resolution. Section 4 presents the government's stated rationale. Section 5 offers the critical analysis, covering the liability cap, supplier recourse, regulatory independence, proliferation risk, criminal liability, Article 21 and the legislative process. Section 6 compares the Act with other liability regimes. Section 7 concludes with a way forward.

2. BACKGROUND AND LEGISLATIVE HISTORY

India's nuclear sector had, since 1962, operated as a near-total state monopoly under the Atomic Energy Act, which vested exclusive control over the nuclear fuel cycle from mining and enrichment to power generation in the Central Government, principally through the Department of Atomic Energy and its public-sector undertakings. The Civil Liability for Nuclear Damage Act, 2010² was enacted in the aftermath of the India-US civil nuclear agreement to establish a no-fault liability framework for nuclear operators, but its Section 17(b), which preserved an operator's statutory right of recourse against suppliers, was widely blamed by foreign reactor vendors (including US and French suppliers) for stalling billions of dollars in planned nuclear commerce, since no supplier was willing to accept open-ended liability exposure.

Nuclear power presently accounts for a small fraction around 3 per cent of India's total electricity generation, from an installed base of roughly 8.8 GW.³ Against the backdrop of India's 2070 net-zero commitment, rising electricity

demand from data centres, artificial intelligence infrastructure and semiconductor manufacturing, and a stated national target of 100 GW of nuclear capacity by 2047, the government concluded that the existing legal architecture was structurally incapable of attracting the scale of private and foreign capital as required.⁴ The Union Budget for 2026-27 had already signalled this direction by exempting customs duty on imported inputs for nuclear power plants until 2035, positioning the SHANTI Act as the legislative capstone of a broader liberalisation push.

Notably, the Bill was passed by both Houses within days of introduction and without referral to a Parliamentary Standing Committee – a procedural choice that itself became a significant point of contention, discussed further in Section 5.7 below.

3. KEY PROVISIONS OF THE ACT

3.1 Consolidation and Repeal

The Act repeals the Atomic Energy Act, 1962 and the Civil Liability for Nuclear Damage Act, 2010 in their entirety, replacing them with a single statute intended to govern licensing, safety regulation, liability, compensation, and non-power applications of nuclear technology and ionising radiation under one legislative roof.

3.2 Licensing and Private Participation

Departments of the Central Government, government companies, and privately owned Indian companies – including joint ventures between government and private entities – may now apply to the Central Government for a licence to build, own, operate or decommission a nuclear power plant or reactor, and to manipulate, convert, refine and enrich nuclear fuel up to a threshold value notified by the government.⁵ Licensees may also procure, supply and export nuclear fuel and specified equipment, and import or export related technology and software. Certain sensitive activities within the fuel cycle, including uranium enrichment and spent-fuel reprocessing beyond notified thresholds, remain reserved exclusively for the Central Government.⁶ Companies incorporated outside India are not eligible to hold a licence, and foreign direct investment in atomic energy continues to be prohibited under extant investment rules – a point the Department of Atomic Energy reaffirmed in Parliament on 10 December 2025.

The Central Government retains wide powers to modify, suspend, curtail or cancel a licence, including where a licensee's financial position deteriorates, and licensed activity additionally requires a separate safety authorisation from the AERB.

3.3 Liability and Compensation Regime

The Act's Second Schedule prescribes a tiered, capacity-linked ceiling on operator liability for a nuclear incident: reactors generating more than 3,600 MW face a maximum liability of roughly ₹3,000 crore (about 300 million Special Drawing Rights, unchanged in aggregate terms from the 2010 Act), scaling down to approximately ₹100 crore for smaller reactors, fuel-cycle facilities, reprocessing plants and the transport of nuclear material. Under Section 14, liability for damage exceeding the Second Schedule cap passes to the Central Government, which may also elect, in the public interest, to assume full liability for an installation it does not itself operate. Section 16 provides the operator

a right of recourse, but unlike Section 17(b) of the 2010 Act does not preserve a statutory right of recourse against suppliers; allocation of supplier risk is instead left to be negotiated contractually between operators and suppliers.⁷

3.4 Regulatory Architecture

The Act grants the Atomic Energy Regulatory Board statutory status for the first time it previously operated as an executive body under the Department of Atomic Energy without independent statutory backing and establishes a specialised tribunal for adjudicating nuclear-related disputes, including compensation claims.

3.5 Intellectual Property

Section 20 of the 1962 Act had barred patents altogether for inventions relating to atomic energy, mandated disclosure of such inventions to the government, restricted overseas patent filing, and vested ownership of inventions made in government establishments or under government contracts in the state. Section 38 of the SHANTI Act reverses this default: patents are now permitted for inventions relating to the peaceful uses of nuclear energy and radiation, while continuing to bar patents connected to activities that remain reserved for the Central Government. The query refers to Section 38 of the SHANTI Act and its provisions regarding patents related to the peaceful uses of nuclear energy and radiation. While the provided context does not contain specific citations or detailed excerpts about Section 38 or the SHANTI Act, the statement itself reflects a legislative reversal of patent policy in this area. Specifically, Section 38 changes the default position by allowing patents for inventions connected to the peaceful uses of nuclear energy and radiation. This represents a shift from a prior stance, where such patents may have been disallowed due to concerns about national security or governmental control. Nonetheless, Section 38 maintains restrictions by continuing to bar patents for inventions associated with activities that remain reserved exclusively for the Central Government.

In effect, Section 38 permits innovation and intellectual property protection in the domain of peaceful nuclear and radiation technology, fostering research and development in these fields, while safeguarding certain strategic or sensitive activities under government control. Without additional context or citations, this interpretation aligns directly with the summary description provided in the query and the statement.

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3.6 Dispute Resolution

Compensation and liability disputes are to be routed through the new specialised tribunal rather than ordinary civil courts, a structural change intended to expedite claims but one that concentrates adjudicatory authority in a body whose composition, independence safeguards and appellate oversight will be defined largely through subordinate rule-making rather than the Act itself.

4. STATED RATIONALE AND OBJECTIVES

The government has justified the Act on four principal grounds: first, that a unified statute removes decades of legal ambiguity and fragmentation across two separate laws drafted for a very different technological and geopolitical era; second, that opening licensed private and joint-venture participation is indispensable to reaching 100 GW of nuclear capacity by 2047 given the scale of capital the public sector alone cannot mobilise; third, that resolving the supplier-liability deadlock created by Section 17(b) of the 2010 Act is a precondition for translating bilateral civil nuclear cooperation agreements including with the United States into actual reactor construction; and fourth, that nuclear power, positioned as a reliable, low-carbon baseload source, is essential to meeting the electricity demands of artificial intelligence, quantum computing and semiconductor manufacturing while honouring India's 2070 net-zero pledge.¹⁰

These are not trivial or pretextual objectives. India's nuclear sector has genuinely been constrained for over a decade by supplier reluctance to accept unlimited liability exposure, and the capital intensity of nuclear construction measured in billions of dollars per gigawatt realistically exceeds what public-sector balance sheets alone can finance at the pace the 2047 target requires. To that extent, the Act responds to a real and well-documented policy problem rather than a manufactured one.

5. CRITICAL ANALYSIS

The core analytical tension in the SHANTI Act is that it liberalises participation in the nuclear sector introducing commercial, profit-seeking actors into a domain historically defined by singular sovereign control while

simultaneously reducing, rather than strengthening, the accountability mechanisms that such liberalisation would normally require as a counterweight. Each dimension of this tension is examined below.

5.1 Inadequacy of the Liability Cap

The retained aggregate liability ceiling of approximately 300 million SDR is essentially unchanged from the figure set in 2010, notwithstanding fifteen years of inflation, the licensing of larger-capacity reactors, and the intervening lessons of the 2011 Fukushima Daiichi accident, whose total remediation, compensation and decommissioning costs are estimated in the hundreds of billions of dollars—orders of magnitude beyond even the highest tier of the Second Schedule cap.¹¹ Opposition, argued that the cap is disconnected from the realistic economic cost of a severe accident and that describing nuclear energy as unambiguously "clean" understates the tail-risk the liability regime is meant to price.

The practical effect of a low operator cap combined with an uncapped Section 14 government backstop is to socialise catastrophic tail risk. Proponents frame this as the state playing an insurer of last resort in the public interest; critics frame it as a direct transfer of financial exposure from profit-taking private operators to Indian taxpayers, reversing the polluter-pays logic that civil liability regimes are conventionally designed to encode. Both framings are defensible depending on one's view of the state's proper role—but the Act does not itself resolve which of these interpretations should prevail, leaving it to be tested only in the event of an actual incident—even though that may not be wished to happen among us.

5.2 Removal of the Statutory Right of Recourse Against Suppliers

Eliminating the explicit right of recourse against suppliers under Section 16 achieves the government's stated aim of unblocking foreign reactor technology transfer, since global vendors had cited Section 17(b) of the 2010 Act as commercially tenable. However, leaving supplier liability to private contractual negotiation creates an asymmetry of bargaining power: large multinational equipment and fuel suppliers are likely to negotiate liability caps or exclusions into their contracts as a matter of course, while Indian operators—whether public or private—absorb the residual exposure, which under Section 14 ultimately falls back on the exchequer. Critics argue this converts what was a legislative safeguard into a matter of commercial leverage, with victims and the state bearing the consequences of any imbalance.

5.3 Regulatory Independence and Institutional Capacity

Granting the AERB statutory status is a genuine improvement over its prior standing as an executive creature of the Department of Atomic Energy, and addresses a criticism—including from the Comptroller and Auditor General in earlier reviews—that India's nuclear safety regulator lacked independent statutory footing. However, statutory status alone does not guarantee functional independence¹²; the Act leaves the regulator's budgetary autonomy, appointment process for its members, and freedom from executive direction to be substantially determined by rules and government notifications rather than by entrenched statutory guarantees. Civil society groups have specifically flagged the risk of regulatory capture in a newly liberalised sector where the regulator must oversee both incumbent state entities and new private licensees, without clear firewalls against the same government that promotes nuclear expansion also controlling the body meant to police its safety.

5.4 Fragmentation, Security and Proliferation Risk

Extending licensed private participation into fuel fabrication, enrichment (up to notified thresholds) and reactor operation introduces multiple new corporate actors into a fuel cycle that has strategic and non-proliferation sensitivities extending well beyond ordinary commercial regulation. Critics have argued that fragmenting control across a larger number of private and joint-venture entities even with reserved activities carved out for the Central Government increases the number of points at which diversion, insider risk, sabotage, or inadequate security culture could occur, particularly given that India's institutional capacity for licensing, inspecting and enforcing security standards across a much larger set of private licensees has not yet been tested at scale.¹³ The Act's reservation of the most sensitive fuel-cycle activities for the Central Government is a real safeguard, but the threshold values that demarcate "sensitive" from "licensable" activity are left to executive notification, meaning the actual boundary of liberalisation can shift administratively without further parliamentary scrutiny.

5.5 Absence of Explicit Criminal Liability

Independent commentary most pointedly an analysis published in a Journal, India has observed that the Act is largely silent on criminal liability for negligence, falsification of safety records, suppression of incident reports, or sabotage, addressing accountability almost entirely through the civil, no-fault compensation lens.¹⁴ This repeats a pattern visible after the 1984 Bhopal gas disaster, where civil compensation effectively substituted for meaningful criminal accountability of corporate decision-makers. Reducing catastrophic nuclear risk to an actuarial, insurable cost of doing business rather than pairing civil compensation with clear criminal exposure for negligent or fraudulent conduct arguably weakens the deterrent effect the liability regime is meant to provide, particularly for private operators motivated by commercial return rather than the public-service mandate that characterised the erstwhile state monopoly.¹⁵

5.6 Constitutional Dimension: Article 21 and Environmental Due Process

India's Article 21 jurisprudence from the Bhopal-era judgments through the evolution of the public trust doctrine and the precautionary principle in Indian environmental law has consistently read the right to life to impose a positive obligation on the state to protect citizens from foreseeable environmental and industrial hazards, and has been used to justify strict or absolute liability standards (as in the Supreme Court's M.C. Mehta oleum gas case) precisely in high-hazard industrial contexts.¹⁶ A liability architecture that caps operator exposure well below plausible worst-case costs, removes explicit criminal accountability, and relies on subordinate legislation to define key safety and independence guarantees sits in some tension with this constitutional trajectory. This is not to say the Act is constitutionally infirm Parliament retains wide latitude to calibrate liability regimes as a matter of economic policy but the tension is real enough that constitutional challenge, or at minimum sustained judicial scrutiny if an incident were ever to occur, is a foreseeable consequence of the design choices made.

5.7 Legislative Process: Speed Over Scrutiny

The Bill's passage through both Houses within roughly three days of introduction, without referral to a Parliamentary Standing Committee, is itself a significant point of criticism independent of the Act's substantive content. Standing

Committee referral has historically been the principal mechanism by which technical experts, affected stakeholders, state governments and civil society submit evidence on complex, technocratic legislation before it is finalised.¹⁷ Its absence here for a law restructuring six decades of nuclear governance and touching public safety, federal-state relations (given that nuclear installations are sited within specific states), and constitutional rights has been read by opposition parties and commentators as prioritising the speed of investment signalling over the thoroughness of democratic deliberation that legislation of this consequence would ordinarily warrant.

6. COMPARATIVE PERSPECTIVE

International nuclear liability regimes offer a useful benchmark. The United States' Price-Anderson Act combines a primary layer of mandatory operator insurance with a secondary,¹⁸ industry-funded retrospective pool that has, in practice, provided several billion dollars of coverage per incident an order of magnitude above the SHANTI Act's highest tier before any government backstop is engaged. Japan's post-Fukushima experience demonstrated that even a well-resourced economy can see compensation, decontamination and decommissioning costs run into the hundreds of billions of dollars, overwhelming any operator-based cap and ultimately falling on the state and, indirectly, on taxpayers and ratepayers over decades. Judged against these precedents, the SHANTI Act's approach – a modest operator cap paired with an open-ended sovereign backstop – is not unusual in kind, since most mature nuclear liability regimes ultimately rely on state backstopping for the largest conceivable accidents. What distinguishes the Indian design is the comparatively low operator-tier ceiling relative to the scale of the plants now being licensed, and the absence of an intermediate industry-pooled layer (of the kind Price-Anderson provides) that would spread risk across operators before it reaches the public purse.

7. CONCLUSION AND WAY FORWARD

The SHANTI Act, 2025 addresses a genuine and long-documented structural constraint on India's nuclear ambitions: the near-impossibility, under the 2010 liability regime, of attracting private capital and foreign reactor technology at the scale the 2047 target demands. Its consolidation of two outdated statutes, statutory upgrade of the AERB, and modernised patent framework are, on balance, constructive reforms that were arguably overdue. At the same time, the Act resolves the investment-detering features of the old regime largely by reducing accountability rather than by building new institutional safeguards commensurate with the entry of profit-motivated private actors into a historically state-monopolised, high-hazard sector. The unchanged aggregate liability ceiling, the elimination of the statutory right of recourse against suppliers, the absence of explicit criminal liability, the reliance on executive notification to define the boundaries of both regulatory independence and licensable activity, and the truncated legislative process together constitute a coherent pattern: the Act optimises for investor confidence at the probable expense of victim compensation, public oversight and long-term institutional resilience.

A more balanced framework would likely retain the private-participation and supplier-liability reforms – since these respond to real and legitimate investment barriers – while pairing them with an inflation-indexed and periodically reviewed liability cap, an industry-funded supplementary compensation pool modelled on international precedent, explicit statutory criminal liability for negligence and data falsification, hard statutory guarantees of AERB budgetary and appointment independence rather than reliance on subordinate rules, and retrospective Standing Committee review to surface the technical and federal concerns that a three-day passage window did not allow. Whether the Act delivers the intended surge in nuclear capacity without exposing the public to unmanaged financial and safety risk will depend

less on the text of the statute itself than on how conscientiously the rule-making, licensing and regulatory-appointment processes that flow from it are conducted in the years ahead.

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