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EDITORIAL ANALYSIS

India's 100 GW Nuclear Push: Strategic Necessity, Liability Gridlock, and the Private-Sector Question

BUSINESS STANDARD

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India's 100 GW Nuclear Push: Strategic Necessity, Liability Gridlock, and the Private-Sector Question

Business Standard 18 April 2026 GS3

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INTERVIEW ANGLE

"India's announcement of a 100 GW nuclear power target by 2047 — a tenfold expansion from the current 8.8 GW — comes alongside the PFBR Kalpakkam first criticality (April 6, 2026) marking entry into Stage II of the Bhabha three-stage programme. Business Standard argues that achieving this target requires not just nuclear engineering but a fundamental statutory rewrite — amending the Atomic Energy Act 1962 to permit private operators and the Civil Liability for Nuclear Damage Act 2010 to align with international supplier-liability norms. Is India ready for the legislative transformation?"

Source: Original editorial ↗ Business Standard

EDITORIAL SUMMARY

Business Standard examines India's 100 GW nuclear power target by 2047 (from 8.8 GW current), the PFBR Kalpakkam first criticality (April 6, 2026) entering Stage II of the Bhabha programme, and the dual statutory barrier of the Atomic Energy Act 1962 (restricting private operators) and CLNDA 2010 Section 17(b) (deterring international suppliers via supplier-recourse provision). Calls for both Acts amendment, AERB statutory empowerment, SMR partnerships, sustained NSG diplomacy, and National Nuclear Skills Mission.

INDIA'S NUCLEAR POSITION VS TARGET

METRIC	2026 CURRENT	2047 TARGET
Installed capacity	8.8 GW	100 GW
Operational reactors	24	Multiple new fleet
Share in installed power	~1.6%	10%+
Share in electricity generated	~2.5%	12%+
NPCIL share of new addition	NA	54 GW

THE BHABHA THREE-STAGE PROGRAMME

STAGE	REACTOR TYPE	FUEL	STATUS
Stage I	PHWR (Pressurised Heavy Water Reactor)	Natural uranium	Operational (8.8 GW fleet)
Stage II	FBR (Fast Breeder Reactor)	Plutonium-Uranium MOX	**PFBR Kalpakkam criticality April 6, 2026**
Stage III	Thorium-U-233 cycle (incl. AHWR)	Thorium	R&D phase

STATUTORY BARRIERS TO PRIVATE ENTRY

STATUTE	PROVISION BLOCKING PRIVATE ENTRY	REFORM NEEDED
Atomic Energy Act 1962	Restricts power generation to govt entities	Amendment to permit private operators under AERB licensing
CLNDA 2010	Section 17(b) operator right-of-recourse against suppliers	Align with Vienna Convention; limit to gross negligence
AERB regulatory framework	Executive-only, not statutory	Pass Nuclear Safety Regulatory Authority Bill

INTERNATIONAL COMPARATORS (OPERATIONAL CAPACITY, GW)

COUNTRY	2025 CAPACITY	LONG-TERM
USA	~95	Stable; some new construction
France	~62	EPR2 fleet expansion
China	~57	Doubling by 2035
Russia	~28	Export-led growth
South Korea	~25	APR1400 fleet
India	**8.8**	**100 GW by 2047**

UPSC RELEVANCE

PAPER	ANGLE
GS3 — Science & Technology	Three-stage nuclear programme, PFBR, MOX, SMR, AERB, NPCIL, BHAVINI, AHWR
GS3 — Economy	Energy security, Net Zero 2070, base-load power, infrastructure financing
GS3 — Environment	Climate commitments, COP26, Net Zero 2070, decarbonisation pathways
GS2 — Polity	Atomic Energy Act 1962, CLNDA 2010, AERB statutory status, Nuclear Safety Regulatory Authority Bill
GS2 — IR	India-USA Civil Nuclear Agreement 2008 (123 Agreement), NSG membership, Vienna Convention, CSC, SMR partnerships
GS3 — Internal Security	Nuclear safety, supplier security clearance, regulatory oversight
Mains Keywords	NPCIL, BHAVINI, PFBR Kalpakkam, three-stage nuclear programme, Homi Bhabha, PHWR, MOX fuel, thorium reserves, AERB, CLNDA 2010, Atomic Energy Act 1962, India-USA Civil Nuclear Agreement 2008, NSG, Net Zero 2070, COP26 Glasgow, AHWR, Vienna Convention, SMR

KEY ARGUMENTS AT A GLANCE

India's announced 100 GW nuclear power target by 2047 — a tenfold expansion from the current 8.8 GW, with NPCIL providing 54 GW and the rest requiring international cooperation, Small Modular Reactors, and private-sector entry — is strategically essential for India's Net Zero 2070 commitment but practically blocked by two major statutory barriers: the Atomic Energy Act 1962 restricting nuclear power generation to government-controlled entities, and the Civil Liability for Nuclear Damage Act 2010's "right of recourse" provision (Section 17(b)) that has deterred international suppliers by deviating from the Vienna Convention norm of channelling liability exclusively to operators; without simultaneous amendment of both statutes, the 100 GW target remains aspirational.

✓ SUPPORTING

- India currently operates approximately **24 nuclear reactors with 8.8 GW installed capacity** — about 1.6% of total installed power and 2.5% of generated electricity. The 100 GW target by 2047 requires adding approximately 91 GW in 21 years — averaging ~4.3 GW/year, when India has historically added ~0.3-0.5 GW/year.
  The scaling challenge is unprecedented in India's nuclear history.
- The **Civil Liability for Nuclear Damage Act, 2010 (CLNDA)** has Section 17(b) — the operator''s "right of recourse" against the supplier — which deviates from the international **Vienna Convention** and **Convention on Supplementary Compensation for Nuclear Damage (CSC)** that channel liability exclusively to operators. This has deterred Westinghouse (USA), GE-Hitachi (USA), EDF Areva (France for Jaitapur), Hitachi-GE (Japan), and other major international suppliers — limiting the international cooperation pillar of the 100 GW plan.
- The **PFBR Kalpakkam first criticality (April 6, 2026)** marks India''s entry into Stage II of the Bhabha three-stage programme — Fast Breeder Reactors using plutonium- uranium MOX fuel and sodium coolant. This is technically significant because Stage II "breeds" more fissile material than it consumes, ultimately enabling Stage III thorium reactors. India holds approximately 30% of global thorium reserves but only 1.5% of uranium — making the Stage II → III transition strategically vital.
- The Atomic Energy Regulatory Board (AERB) — India''s nuclear safety regulator — operates under executive authority rather than statutory backing. The Nuclear Safety Regulatory Authority Bill (introduced 2011, lapsed) was intended to provide statutory

independence to AERB. Without statutory regulatory independence, private-sector operator confidence is structurally limited.

⚠ COUNTER

Some argue that opening nuclear power to private operators creates safety risks inconsistent with India''s Bhopal-tragedy historical context — the strict liability framework of CLNDA 2010 was a deliberate response to ensuring operator accountability after Bhopal. Diluting supplier liability could weaken the deterrent against substandard equipment. Additionally, India''s NSG non-membership (China-blocked) limits some international nuclear cooperation regardless of CLNDA reform — making domestic legislative reform a necessary but not sufficient condition for the 100 GW target.

→ WAY FORWARD

Six-pillar implementation framework: (1) **Atomic Energy Act 1962 amendment** — permit private nuclear power generation under AERB licensing, with foreign equity caps and security-clearance requirements; (2) **CLNDA 2010 reform** — align Section 17 with Vienna Convention/CSC norms by limiting supplier recourse to gross negligence and intentional misconduct, while preserving operator liability cap of ₹1,500 crore; (3) **AERB statutory empowerment** — pass the long-pending Nuclear Safety Regulatory Authority Bill to make AERB independent of executive authority; (4) **Small Modular Reactor (SMR) commercialisation** — partner with USA (NuScale), Canada (CANDU SMR), France (Nuward) for SMR technology transfer and indigenous adaptation; (5) **NSG Plenary Engagement** — sustained diplomatic effort to secure NSG membership through Plenary mechanism; (6) **National Nuclear Skills Mission** — workforce development for a 2-3x expansion in nuclear sector employment.

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✍ MAINS ANSWER FRAMEWORK

QUESTION

India's 100 GW nuclear power target by 2047 requires significant statutory and regulatory reform. Critically examine the legal and institutional architecture required for the expansion, and assess the role of the private sector in achieving this ambition. (250 words)

INTRODUCTION

On April 17, 2026, **CEA Chairperson Ghanshyam Prasad** announced that India targets a more than ten-fold expansion of nuclear capacity — from the current 8.8 GW to **100 GW by 2047**. This announcement comes days after the **500 MWe Prototype Fast Breeder Reactor (PFBR) at Kalpakkam achieved first criticality on April 6, 2026** — entering Stage II of the Bhabha three-stage programme.

Business Standard argues that achieving this target requires fundamental statutory and regulatory reform that India has repeatedly postponed.

BODY

The current Indian nuclear position: India operates approximately 24 nuclear reactors with 8.8 GW installed capacity — about 1.6% of total installed power capacity and 2.5% of generated electricity. The fleet is dominated by **Pressurised Heavy Water Reactors (PHWRs)** — Stage I of the Bhabha three-stage programme — using natural uranium fuel.

NPCIL operates the existing fleet; BHAVINI operates the PFBR and will lead Stage II expansion. **The Bhabha three-stage architecture:** Conceptualised by **Dr. Homi Bhabha** in the 1950s, India''s nuclear strategy reflects the country''s unique resource constraint — only ~1.5% of global uranium reserves but ~30% of global thorium reserves. **Stage I** PHWRs use natural uranium, produce plutonium as by-product (current fleet). **Stage II** Fast Breeder Reactors use plutonium-uranium MOX fuel, sodium-cooled, breed more fissile material than they consume. PFBR Kalpakkam (500 MWe) achieving criticality April 6, 2026 is the entry milestone. **Stage III** uses the thorium-U-233 fuel cycle, including the Advanced Heavy Water Reactor (AHWR) under development. **The 100 GW expansion architecture:** NPCIL is expected to provide approximately 54 GW through PHWRs, LWRs (international cooperation), and Small Modular Reactors.

BHAVINI will add Stage II FBR capacity. Private-sector entry is contemplated for the remaining capacity. The expansion requires roughly 4.3 GW/year addition, against the historical 0.3-0.5 GW/year — an unprecedented scale-up. **The CLNDA 2010 barrier:** The Civil Liability for Nuclear Damage Act 2010 caps operator liability at ₹1,500 crore but Section 17(b) provides operator''s "right of recourse" against suppliers for latent defects. This deviates from the Vienna Convention and Convention on Supplementary Compensation (CSC) norms that channel liability exclusively to operators — making suppliers vulnerable to operator litigation.

International suppliers (Westinghouse for Mithivirdi, GE-Hitachi for Kovvada, EDF Areva for Jaitapur, Hitachi-GE for Bangalore SMR proposals) have all hesitated due to this provision. **The Atomic Energy Act 1962 barrier:** The Act restricts nuclear power generation to government-controlled entities — making private operation impossible without statutory amendment. Reform requires either complete

repeal-replace or substantial amendment permitting licensed private operators under AERB oversight. The political-economic implications of opening nuclear to Indian private capital (Tata, Reliance, Adani) and international participation are substantial. **The AERB statutory gap:** India''s Atomic Energy Regulatory Board (AERB) operates under executive authority rather than statutory backing. The **Nuclear Safety Regulatory Authority Bill (2011, lapsed)** was intended to provide statutory independence. Without this, AERB credibility for private-operator regulation is constrained — international standards (IAEA Safety Standards, OECD Nuclear Energy Agency) emphasise statutory regulatory independence as foundational. **The NSG dimension:** India is not a member of the Nuclear Suppliers Group (NSG) — a multilateral export control regime that governs nuclear material and technology transfers. China has consistently blocked India''s NSG membership at successive plenaries.

Without NSG membership, India accesses civil nuclear cooperation through bilateral agreements (notably the India-USA 123 Agreement of 2008 and subsequent NSG waiver) — but this arrangement is more constrained than full NSG membership would provide.

CONCLUSION

India''s 100 GW nuclear target by 2047 is strategically essential for Net Zero 2070, base-load power complementing intermittent renewables, and energy security beyond crude-oil dependence. But it requires simultaneous progress on six fronts: Atomic Energy Act 1962 amendment for private entry, CLNDA 2010 supplier-liability reform aligned with Vienna Convention norms, AERB statutory empowerment for regulatory independence, Small Modular Reactor partnerships with USA-Canada-France, sustained NSG diplomacy, and a National Nuclear Skills Mission for workforce expansion.

The PFBR Kalpakkam criticality achievement proves Indian nuclear engineering capability; the policy and statutory reform now required is a question of political will. Without this, 100 GW remains a target without pathway.

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