

2. Private Sector in India's Nuclear Sector- Science & Technology

PM Modi Pushes for Private Sector Entry in India's Nuclear Sector To achieve the target of 100 GW nuclear capacity by 2047, the government proposes amending the Atomic Energy Act, 1962, to end the state monopoly held by NPCIL and BHAVINI and allow private sector participation. This transition faces challenges related to high capital costs, safety regulations, and the stringent liability clauses of the Civil Liability for Nuclear Damage Act, 2010.

Context and Current Legal Framework

The Policy Shift- Prime Minister Narendra Modi has announced the government's intention to open the nuclear sector to private players. This marks a significant departure from the traditional state-controlled model.

The Traditional Monopoly- Historically, the nuclear sector has been the exclusive domain of the state.

Key Operators- The Nuclear Power Corporation of India Ltd (NPCIL) and its subsidiary, Bharatiya Nahariya Vidyut Nigam (BHAVINI), are currently the sole entities authorized to own and operate nuclear power plants.

Legislative Amendments Required-

To facilitate this shift, the government has proposed amendments to two critical pieces of legislation-

Atomic Energy Act, 1962- This acts as the foundational framework for the development, control, and regulation of nuclear energy. Amendments are needed to legally permit private ownership or operation.

Civil Liability for Nuclear Damage Act, 2010- This law governs compensation in the event of nuclear incidents. Private players view the current liability clauses as stringent, requiring amendments to clarify and cap financial risks.

Understanding Nuclear Energy

Definition- Nuclear energy is the vast amount of energy released during nuclear reactions.

Methods of Generation

Nuclear Fission- The process of splitting heavy atomic nuclei (like Uranium or Plutonium) into lighter nuclei. This releases massive energy and is the process currently used in power plants.

Nuclear Fusion- The process of merging atomic nuclei (the energy source of the sun), which is still in developmental stages for power generation.

Application- In a nuclear power plant, the heat generated from fission is used to produce steam, which drives turbines to generate electricity.

Status of Nuclear Power in India

The government has outlined aggressive targets to scale up capacity, moving from a marginal contributor to a major pillar of India's energy security.

Metric	Details
Current Capacity	8,180 MW spread across 24 operational nuclear power reactors.
Future Target	A goal to increase capacity to 100 GW by 2047, aiming for a massive leap in clean energy generation.
Active Expansion	10 new reactors (Totaling 8 GW) are currently under construction.
Key Locations	Projects are underway in Gujarat, Rajasthan, Tamil Nadu, Haryana, Karnataka, and Madhya Pradesh.
Global Collaboration	Approval granted for a 6 × 1208 MW nuclear plant in Andhra Pradesh in collaboration with the USA.

Rationale- Benefits of Private Sector Involvement

Faster Capacity Expansion- The state has limited fiscal space. Private investment can bridge the substantial financial gap required to scale from roughly 8 GW to 100 GW.

Technological Advancement- Collaboration with private entities can facilitate the transfer of technology, drive innovation in reactor design, and bring in global best practices and expertise.

Cost Efficiency- Private participation introduces competition. Competitive bidding processes are expected to optimize project costs and reduce the chronic delays often seen in public sector infrastructure projects.

Energy Security & Clean Energy Goals- Accelerating nuclear power generation is crucial for reducing India's heavy dependence on imported fossil fuels and meeting international climate change commitments (Net Zero).

Key Concerns and Challenges

Regulatory Hurdles- The transition requires a complete overhaul of the existing legal framework. Amending the Atomic Energy Act to allow private control over sensitive technology is legally and politically complex.

High Capital Requirement- Nuclear projects are capital-intensive with long gestation periods (time taken from construction to revenue generation). This delayed Return on Investment (ROI) often deters private investors.

Liability Issues- The Civil Liability for Nuclear Damage Act, 2010, places high liability on operators in case of accidents. Private suppliers and operators are hesitant to enter the market without a cap on this liability.

Safety and Security Protocols- Nuclear energy carries inherent risks. Allowing profit-driven private firms to operate reactors raises concerns about potential compromises on safety standards to cut costs. Robust regulatory oversight is non-negotiable to prevent disasters.

Public Perception- There is existing public resistance regarding radiation risks and nuclear waste management (e.g., the protests at Kudankulam). Private management may face deeper trust deficits from local communities.

Recent Government Initiatives

Small Modular Reactors (SMRs) Mission- The government has announced a Rs 20,000 crore R&D mission specifically for the development of Small Modular Reactors.

Target- Deployment of at least five indigenously developed SMRs by 2033. SMRs are seen as safer, cheaper, and easier to deploy than conventional large reactors.

Joint Venture (ASHVINI)-

Entities- A supplementary Joint Venture agreement was signed between NPCIL and NTPC (National Thermal Power Corporation).

Mandate- The JV, named ASHVINI, will build, own, and operate nuclear power facilities.

Immediate Project- It will handle the upcoming 4 × 700 MWe PHWR Mahi-Banswara Rajasthan Atomic Power Project, paving the way for PSU-PSU collaboration before full privatization.

Way Ahead

Clear Regulatory Framework- The government must establish a transparent and robust regulatory environment that ensures strict safety compliance while addressing private sector concerns regarding accountability and national security.

Public-Private Partnerships (PPPs)- Rather than full privatization, a PPP model may be ideal. The government can retain oversight and control over fuel/waste, while private players handle operations, construction, and investment.

Gradual Implementation- A "Big Bang" approach should be avoided. The sector should open via pilot projects and small-scale initiatives (like SMRs) to test private sector capability and risk management before allowing large-scale independent operations.

Source- <https://www.newsonair.gov.in/pm-modi-pushes-for-private-sector-entry-in-indias-nuclear-sector/>