



DAILY EDITORIAL ANALYSIS

TOPIC

**OPENING INDIA'S NUCLEAR ENERGY
SECTOR TO PRIVATE PARTICIPATION**

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OPENING INDIA'S NUCLEAR ENERGY SECTOR TO PRIVATE PARTICIPATION

In Context

- In a landmark policy shift, India has opened its civilian nuclear energy sector to private companies—a domain exclusively reserved for the state since the enactment of the Atomic Energy Act, 1962.
- Drawing inspiration from the successful liberalization of the space sector, this reform aims to accelerate clean energy transition, enhance energy security, and foster indigenous high-tech manufacturing capabilities.

Constitutional and Legal Framework

- Entry 53, Union List (7th Schedule): Grants the Union exclusive authority over atomic energy regulation and development
- Atomic Energy Act, 1962: Established state monopoly over nuclear energy; may require amendments for full private participation
- Civil Liability for Nuclear Damage Act, 2010: Addresses liability concerns but may need refinement to attract foreign investment
- Atomic Energy Regulatory Board (AERB): The regulatory watchdog overseeing nuclear safety and security.

Key Features of the Reform

- The reform allows private companies to participate in nuclear power generation under regulated frameworks.
- They may enter into joint ventures with the Nuclear Power Corporation of India Limited (NPCIL), engage in public-private partnerships, or adopt build-own-operate models.
- The government will continue to maintain strict control over nuclear materials, safety standards, and security systems.
- Regulatory oversight will remain with the AERB and the Department of Atomic Energy (DAE).

Rationale Behind the Reform

- Economic and Industrial Impact: India's energy demand is rising rapidly, and coal still accounts for more than half of electricity generation. The expansion of nuclear power will increase demand for heavy engineering products such as reactor vessels, turbines, and precision components.
- Geopolitical and Strategic Impact: The reform enhances India's energy independence by reducing reliance on imported coal and natural gas. It strengthens India's strategic autonomy in global energy markets.
- Energy and Environmental Impact: India has committed to installing 500 GW of non-fossil fuel capacity by 2030 and achieving net-zero emissions by 2070. Nuclear power is essential for meeting these climate goals because it offers stable, long-duration power that supports a renewable-heavy grid.
- Operation Efficiency of Private Sector: India's nuclear capacity has grown slowly due to high capital costs, long construction timelines, and limited government resources. Private companies can bring additional investment, technological expertise, and better project management.
- Startup Boost: The government's decision draws heavily from the success of India's space-sector reforms. After opening the space sector, more than 300 startups entered the field, and India soon became home to the world's third-largest startup ecosystem.

Critical Challenges

- Safety and Regulatory Preparedness:
 - ♦ AERB requires significant capacity enhancement to monitor private entities
 - ♦ Need for stringent safety protocols matching international standards
 - ♦ Emergency response mechanisms must be robust
- Legal and Policy Framework:
 - ♦ Atomic Energy Act, 1962 may require comprehensive amendments
 - ♦ CLND Act, 2010 needs clarity on liability distribution between suppliers, operators, and insurers

- ♦ Clear guidelines needed for technology transfer, procurement, and participation eligibility
- Financial and Economic Challenges:
 - ♦ Nuclear projects have long gestation periods (8-12 years)
 - ♦ High upfront capital creates financial risk
 - ♦ Cost overruns common in nuclear construction globally
 - ♦ Need for innovative financing mechanisms
- Technology Transfer Constraints:
 - ♦ Global suppliers may hesitate due to: Intellectual property concerns, liability framework uncertainties, export control regimes (Nuclear Suppliers Group considerations)
- Environmental Concerns:
 - ♦ Radioactive waste management, water requirements, water thermal pollution & decommissioning costs.

Global Models and Lessons

- Countries like the United States, France, South Korea, and China have shown that a combination of strong regulations, transparent liability frameworks, and standardised reactor designs can help expand nuclear energy safely. India can learn from their models while designing its own approach.

Way Forward

- India should strengthen the AERB by giving it more autonomy, manpower, and resources.
- Clear regulatory guidelines are needed so that private companies understand their responsibilities. India should also promote indigenous R&D in Small Modular Reactors and thorium technologies.
- Financial reforms such as green bonds, sovereign guarantees, and nuclear infrastructure funds can help reduce risk for investors. P
- Public awareness campaigns will be necessary to build trust and address misconceptions about nuclear safety.

Source: TH

Daily Mains Practice Question

[Q] Opening India's nuclear energy sector to private participation marks a major shift in the governance of a strategic domain.

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