

India The Middle East and Africa



From The Economic Times



From The Economic Times


Login

Get App

- News
 - Leaders Speak
 - Events
 - Awards
 - Webinars
 - Brand Solutions
 - More
- Renewables
 - Oil & Gas
 - Coal
 - Economy
 - Companies
 - Power
 - Podcast
 - Energy TV
 - More


WhatsApp Channel

Tune in to know the latest updates on the EnergyMEA industry



Newsletters

Explore and Subscribe to our ETEnergyWorld Daily Newsletters



Follow Us

Get updates latest news from ETEnergyWorld

Power 4 Min Read

Can Indian nuclear energy's future be small, modular, and market-driven

India's nuclear energy expansion, with a focus on small modular reactors (SMRs), aims reach a 100 GW capacity by 2047, leveraging private-sector investment and regulatory reforms to reduce costs, enhance deployment, and support decarbonisation.



K S Kaveri Ashok & Sudhatri Bharadwaj, • ETEnergyWorld
Updated On Mar 6, 2025 at 03:11 PM IST

With the Union Budget 2025–26 announcement of a 100 GW target for nuclear energy capacity by 2047 and Rs 20,000 crore outlay for small modular reactors (SMRs), the government's emphasis on nuclear energy expansion is clear. There is also a clear emphasis on public–private



partnerships in nuclear energy in the last two consecutive union budgets. Historically, the Department of Atomic Energy (DAE) has struggled to meet its capacity targets, largely due to challenges in securing sufficient investments. So far,

nuclear energy has remained under state control, with an average annual budget of INR 24,000–25,000 crore. In contrast, the privatised renewable energy (RE) sector is estimated to have reached a market size of nearly INR 2 lakh crore in 2023.

Advt

Expanding nuclear capacity will require significantly larger investments, and this is the first time India is exploring private financing in the highly regulated nuclear sector. This move is expected to accelerate capacity expansion and help realise the 100 GW target.

Importantly, this shift appears to be part of a deliberate policy strategy. Over the years, India has taken steps to address concerns related to nuclear liability, including joining the Convention on Supplementary

Compensation (CSC) in 2016 and establishing the Indian Nuclear Insurance Pool (INIP) in 2019. A market-driven approach can potentially drive innovation, reduce costs, and accelerate deployment.

EVENT**DEI Roundtable**

Women currently make up
Women currently make up



Fri, 28 Mar 2025

Hyatt Regency, New Delhi

Fri, 28 Mar 2025

Hyatt Regency, New Delhi

[Register Now](#)

EVENT**The Economic Times
India Net Zero Forum
2025**

Wed, 18 Jun 2025

Hyatt Regency, New Delhi

Wed, 18 Jun 2025

Hyatt Regency, New Delhi

[Register Now](#)

Lessons from Finland and the United Kingdom's Sizewell C model show how regulatory frameworks and private investment can enhance nuclear capacity, maintain safety, and reduce public funding reliance. SMRs, with lower costs and faster payback periods, present a key opportunity for India's private sector.

They also offer flexibility, rapid deployment, and grid stability. Further, SMRs can potentially integrate with hybrid renewable systems, supporting critical industry decarbonisation and enhancing decentralised power generation. Beyond electricity, SMRs can diversify and boost their economic viability by extending support to energy-intensive processes such as hydrogen production, desalination, and co-generation for industrial applications.

In the 2024–25 budget, it was announced that the government would partner with the private sector to set up Bharat Small Reactors (BSRs) as part of efforts to open up India's nuclear power sector for private investments and achieve net-zero goals. As per the terms listed by Nuclear Power Corporation of India Limited (NPCIL), BSRs are expected to be developed with private capital for captive use under existing legal frameworks. The private entity will fund construction, provide land and resources, and cover all lifecycle costs, including operations, maintenance, and decommissioning. While the private sector will have revenues from the electricity output based on fixed tariffs by the DAE, plant ownership will have to be transferred to NPCIL for operational control. This model fosters an ecosystem for private-sector participation while ensuring regulatory oversight and non-proliferation of sensitive nuclear material.

Since the inception of the Indian nuclear power programme, there has been a clear emphasis on the efficient use of nuclear resources and, therefore, on a closed-fuel cycle policy. However, the once-through or open uranium fuel cycle is predominant in most other countries with nuclear energy. This means that, by and large, India will have to chart its own path when it comes to framing an effective regulatory framework inclusive of private partnerships and SMR technology. To manage this

and address the concerns on supply chain and nuclear material security, India must have a comprehensive roadmap for the 100 GW nuclear energy vision. The roadmap should clearly delineate the technology choice, fuel cycles, waste management strategy, proliferation safeguards, and safety considerations.

To successfully integrate the private sector, market mechanisms that allow direct sales and exchange participation, similar to how RE generators operate under open access and power exchanges, may be explored. While RE benefits from long-term power purchase agreements (PPAs), competitive tariff structures, and risk-mitigating financial instruments, nuclear power requires adaptation of these mechanisms to account for high capital costs and traditionally baseload nature. Further, introducing capacity markets to reward SMRs for their reliability and ensuring priority dispatch policies will highlight SMRs' value as a stable, low-carbon baseload and flexible source. By tailoring tariff frameworks, enhancing grid infrastructure, and promoting awareness of nuclear energy's benefits, India can create a level playing field that attracts private investment while maintaining market stability.

The siting of nuclear power plants presents a complex challenge, influenced by public perceptions shaped by both real and perceived risks and events such as Fukushima and Chernobyl. However, RE alone cannot fully address the climate change mitigation challenge due to intermittency issues and land constraints. Prevailing land acquisition challenges aside, studies indicate there may not be enough land available to sustainably site all the solar and wind energy plants required to meet net-zero targets. Nuclear energy, particularly from SMRs, offers a land-efficient energy solution that can also help address the intermittency of RE.

Ultimately, the success of privatisation will depend on a balanced

regulatory framework, strategic incentives, and robust public engagement. If implemented effectively, nuclear power—through a well-planned SMR strategy—can redefine India’s energy landscape and position it as a global leader in sustainable power generation.

(Disclaimer: Kaveri Ashok is the head of Sustainability group and Sudhatri Bharadwaj is an analyst in the Climate Change Mitigation group in the Climate, Environment and Sustainability sector at the Center for Study of Science, Technology and Policy. Views are personal.)

Published On Mar 6, 2025 at 03:11 PM IST

MOST READ IN POWER



Battery storage target triples to 13,200 MWh under VGF, up from 4,000 MWh...



Developing 100 GW of nuclear energy by 2047 will require nearly Rs 15 lakh...



North India's first nuclear project coming up in Haryana: Govt



Philippines eyes India as key nickel buyer for EV batteries, trade pact talks...



Be the first one to comment.

[Comment Now](#)

Join the community of 2M+ industry professionals

Subscribe to our newsletter to get latest insights & analysis.

