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# Small nuclear reactors get traction: Private players offer captive sites for power projects

Small Modular Reactors seen as key for countries to achieve energy transition.

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The government's push comes at a time when two countries that have already taken a lead in SMRs — Russia and China — are finding it difficult to do business outside of their respective geographies.

India's plans to get into the manufacturing value chain of Small Modular Reactors is yielding some positives with a handful of private players learnt to have shown interest in deploying these at their captive site. Since the talks are sensitive, sources said disclosing names may not be appropriate at this stage.

SMRs — with a capacity of 30MWe to 300 MWe per unit — are increasingly seen as important for nuclear energy to remain a commercially competitive option in the future. India is pushing for a leadership slot in this small reactor space, both as a way of fulfilling its commitment to [clean energy transition](#) , and bundling SMRs as a technology-led foreign policy pitch.

The government's push comes at a time when two countries that have already taken a lead in SMRs — Russia and China — are finding it difficult to do business outside of their respective geographies. With SMRs seen as playing a key role in countries achieving their energy transition goals, Russia is also learnt to be keen to expand its nuclear cooperation with India to include a partnership in SMRs, sources said.

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According to government officials, detailed technical discussions are currently underway in policy circles to plan a roadmap for studying the feasibility and effectiveness of the deployment of such reactors. “The future course of action will be finalised on the basis of the decision of the Government within the overall remit of the Atomic Energy Act, 1962, and the possibility of allowing participation of private sector and start-ups in this sector (SMRs) is also being looked at,” an official told [The Indian Express](#).

An SMR would typically account for about a third of the generating capacity of most traditional nuclear power reactors being deployed by countries such as France, Russia or the United States. These reactors are important in offering base load power that could give grid operators some degree of operational flexibility. This is seen as significant since SMRs, when pooled together, can produce a meaningfully large amount of electricity and help meet the challenge of inducting more base load power to balance out the vagaries of renewable power output. While thermal generation is seen as important in this regard, nuclear energy offers a more carbon-neutral base load generation option.



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## **EXPLAINED**

**What sets SMRs apart**

seen as effective in not just producing base load power (where thermal is seen as important), but also amongst renewables as a more carbon-neutral source.

Though India's civil nuclear programme has progressively upscaled its reactor sizes, from the earlier 220MWe reactors to the latest 700MWe PHWRs (pressurised heavy water reactors), the country does have an edge in producing and commercially operating small reactors. These are seen as a viable alternative for countries with mid-sized grids or for decentralised grid operations.

What changes now is that this push for SMRs which has been on the policy agenda for well over a decade is now likely to turn mainstream and, more importantly, could have the backing of countries such as the United States, especially on the financing aspect and dissemination of the technology. So far, it had not quite translated into a viable commercial option,

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In the civil nuclear sector, New Delhi is pushing SMRs as a technology of promise that can help in industrial decarbonisation, and is hard selling its ability to take some kind of a leadership role in the dissemination of this technology.

As of now, two SMR projects have reached the operational stage globally. One is an SMR named Akademik Lomonosov floating power unit in Russia that has two modules of 35 MWe (megawatt electric) and started commercial operation in May 2020. The other is a demonstration SMR project called HTR-PM in China that was grid-connected in December 2021 and is reported to have started commercial operations in December 2023. India is hoping to pitch itself as a credible alternative to the incumbents in this niche field, riding on its strong track record of having

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The SMR push comes at a time when the global nuclear power sector is faced with a general decline in output, with its share dropping to the lowest point in nearly four decades due to a combination of factors — national policy pivots, economic viability issues, safety concerns and the rapid growth of renewable energy alternatives. According to the World Nuclear Industry Status Report (WNISR), global nuclear power generation experienced a sharp decline till tend-2022 to touch levels not seen since the mid-1990s. Outside of China, the decrease was even more pronounced, leading to the most substantial drop in the aftermath of the Fukushima disaster in 2012.

Several major nuclear-producing nations are seeing a nuclear energy downsizing, with the US seeing its nuclear share of commercial electricity generation drop to under 20 per cent — the lowest level in 25 years, while France experienced a drop in nuclear generation below its 1990 level, turning into a net importer of electricity in 2022-23 for the first time since the 1980s. Germany saw the closure of its last three operating reactors in April 2023, completing the phase-out policy initiated by Berlin in 2011, while neighbouring Belgium witnessed the shutting down of two reactors, in September 2022 and January 2023, with three more slated for closure by 2025.

SMRs are conceptualised in such a way that their systems and components are manufactured in a controlled factory environment and then transported straight to the project site to be installed, which optimises the construction lead time and cuts down the cost of these projects — two big concerns with regard to traditional large reactor projects.



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They have potential deployment advantages like reduced size of the Emergency Planning Zone (ring fenced areas around the project site) and passive safety system, rendering them relatively safer than larger reactor-based projects. SMRs may also be considered for repurposing of de-commissioned fossil-fuel fired power stations and, given the smaller plant area, makes it possible to locate SMR plants at places that are not feasible for constructing large-size reactors, according to a May 2023 NITI report on SMRs. In the case of SMRs, capital investment per reactor is less, to start with, but capital investment per MW may be high compared to large reactor projects. It might improve after N-units have been constructed, the report said.

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