Bharat Small Reactors possible within two years with private sector partnership, says Tata Consulting Engineers' CEO Amit Sharma

He says that the Indian approach to modularisation of nuclear reactors need not necessarily mirror the western approach, which is still in the design phase.

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Updated On Mar 2, 2026 at 07:53 PM IST Read by 910 Professionals

Amit Sharma, MD & CEO, TCE.

NEW DELHI: Since its establishment in 1962, Tata Consulting Engineers has played a key role in providing design and engineering services to India’s civil nuclear programme and till date enjoys a close working relationship with the Department of Atomic Energy. The next major focus area of the Tata Group company is in the development of Small Modular Reactors (SMRs).

In an interview to *ET Infra*, Amit Sharma, Managing Director and Chief Executive Officer, Tata Consulting Engineers, shared that while design and development of SMRs in other nations could take up to 10 years, India has the opportunity to modularise the 220 MW Pressurised Heavy Water Reactors (PHWR) technology-based Bharat Small Reactors (BSR) within a span of two years.

"The American or the western approach is you make this (SMR) completely modular, 100 per cent. Now that is a wish. (For) BSR, what we are saying is we will follow the same concept of modularisation. So BSR is here, it is still modular and it will have multiple manufacturing," said Sharma, highlighting that the Indian approach to modularisation of nuclear reactors need not necessarily mirror the western approach, which is still in the design phase.

"...We should not delay adoption of BSR with private partnership with a modular BSR which is an upgraded version of 220 (PHWR) in a standardised modularised manner. We actually did a proof of concept on that, what all parts of old 220 can be modularised and we have created about four to six entities or systems where we could modularise and we can have in two years time a fully modular BSR," said Sharma.

BSRs are based on 220 MW Pressurised Heavy Water Reactors (PHWRs) which have a proven safety and performance record and are being upgraded to reduce land requirements, making them suitable for deployment near industries such as steel, aluminium, and metals, serving as captive power plants to aid in decarbonisation efforts. Currently, Bhabha Atomic Research Centre (BARC), is the lead entity which has taken-up design, development and establishment of SMRs in India.

“The 220 (PHWR) is a proven and a certified reactor. The IAEA (International Atomic Energy Agency) says as per the international law, first you have to create and certify it. Then you should have it in your country. Only then can you export it. Now if that is the case, by the time the Americans, the French, the British or the Russians make it (SMR) and export it, it is 10 years gone,” said Sharma highlighting that India relying on a proven nuclear reactor design with a degree of modularisation is the optimum approach which can be undertaken for harnessing nuclear energy for country’s needs.

Representative concept of SMR.

The price of SMR energy

Sharma outlined that the modularised BSR based on proven and certified technology is currently the right alternative for India in terms of cost.

“Everywhere in the world SMR is still at a drawing stage. The first true SMR will only come by 2030. Now what price point will it come? Not less than $10 million or $6 million. Definitely above $5 million per megawatt. Even in the best case now, if you do 100 of those, maybe $5 million will reduce to four to three,” said Sharma.

“That is where, though 220 PHWR is an old technology, the best advantage is it meets our price point requirement and it is indigenous,” he added.

“If you look at any (nuclear) reactors outside, they are cost prohibitive. Per megawatt, they are about $8 to $20 million dollars per megawatt capex. If you see NPCIL, DAE and BARC they have done an excellent job of indigenisation and their capital cost is between $0.7 million to $1.4 million per megawatt,” said Sharma.

“For national security and our own interest, we must look at indigenous technology. I think there are two sectors in India that have done extremely well, it is space and nuclear,” he added.

Big, small and micro nuclear reactors

Emphasising that SMRs are needed to address emerging needs for sectors such as data centres and for captive industrial use, Sharma said that large reactors are here to stay and remain relevant.

“SMRs have to coexist with large reactors. It is not either, it is both. So, we need 1,000 MW reactors, we need 700 megawatt PHWR. So, we need large reactors, we need large Russian reactors, we need 700 megawatt Indian reactors, we need Westinghouse, we need EDF, but we also need small modular reactors,” said Sharma.

Beyond powering data centres in the near future and captive industrial use, Sharma outlined that one of the best use cases of SMRs can be retrofitment of thermal power plants as they retire.

“That is a concept even the US is adopting. It is called thermal power retrofitment with

SMR," said Sharma.

Beyond SMRs, there is also the potential of microreactors, highlighted Sharma. Many emerging designs are under development for very small reactors that generate power up to 10 MW in the USA and Canada and in India IIT Madras is working on the same concept.

According to a joint report by Tata Consulting Engineers and NITI Aayog, microreactors can serve niche electricity as well as heat applications of future such as powering micro grids and remote off grid areas, quickly restoring power in areas affected by natural disasters and also for seawater desalination.

Tata Consulting Engineers has about 700 people who specialise in nuclear design and engineering and the company as a whole has close to 60 years of experience in the nuclear energy domain.