

## Latha Jishnu: Chasing the nuclear power chimera

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The prohibitive cost of reactors is making nuclear energy unviable across the world.

“If we don’t do it now, history will not forgive us,” says one of the melodramatic advertisements released by the government. Issued by the Ministry of Petroleum and Natural Gas, the ad campaign says that the civil nuclear agreement with the US would ensure India’s energy security and independence by “ending the technological isolation we have suffered since Pokharan”. There is also Anil Kakodkar, chief of the Atomic Energy Commission, saying “the deal is the most promising and viable way of bridging our energy security for the future ...”

These claims have gone largely unchallenged despite growing evidence that globally the nuclear industry is going through a crisis. Soaring costs of raw materials, special components and uranium have put a question mark over the viability of nuclear power, especially since the costs of renewable energy, like solar, are showing a dramatic drop. Across the world, projects are facing huge cost overruns and inordinate delays as the top names in the reactor business grapple with a host of problems, from a sharp spike in the prices for iron, steel and concrete, to limited supplies of reactor parts and a crippling shortage of skilled manpower.

That’s why the nuclear power renaissance, which has been talked about for the past 4-5 years, shows no signs of materialising. Not a single reactor has been ordered in the US since 1978 — and few utilities with nuclear plants are announcing new projects despite the blandishments offered by the US Energy Policy Act of 2005: loan guarantees up to 80 per cent of the project cost, production tax credits of \$18 per MWe for new nuclear capacity through 2021 (this would amount to several hundred million dollars) and insurance protection up to \$500 million against delays during construction.

In spite of this several American utilities have announced that they are rethinking their nuclear projects or putting them in cold storage because the risks have increased. Capital costs have soared from \$1,500/kW to over \$6,000/kW and are still rising. In October, Moody’s Investor Service estimated the “overnight cost” of a new nuclear plant would be between \$5,000 and \$6,000 per kilowatt-hour, but warned (in its report on nuclear generation): “We believe the ultimate costs associated with building new nuclear generation do not exist today and that the current cost estimates represent best estimates, which are subject to change.”

Overnight cost is the price if a reactor were to be completed immediately (five years is the minimum but plants take as much as a decade in some cases), while the total cost includes interest and other costs incurred during construction. John Rowe, chief executive of Chicago-based Exelon Corp, the largest nuclear operator in the US, admits that the economics of nuclear power are daunting. Meanwhile, MidAmerican Energy Holdings, a power utility owned by Warren Buffett’s Berkshire Hathaway, shelved its own nuke plan earlier this year, saying it no longer made economic sense.

The story is no better in Europe, where the showpiece projects are battling huge cost and time overruns apart from quality concerns that halted work for a while. The twin plants at Flamanville in France and Olkiluoto3 in Finland are being set up by the French giant Areva, which claims that its EPR design, a third-generation evolution of the standard pressurised water reactor, will result in the safest and most efficient nuclear plant ever built. But nothing much has gone right for either of these plants. The Olkiluoto 3 reactor is two and a half years behind schedule, and costs have doubled to just short of €5 billion. Both suffer from chronic quality problems in construction.

There are other bottlenecks: shortages of contractors with nuclear certification, of skilled workers and key components. Apart from the Russians, industry sources say only two companies, Japan Steel Works and France’s Creusot Forge, part of Areva, can make critical reactor parts such as massive pressure vessels. Neither has spare capacity.

What does all this mean for India’s “autonomous, independent and sovereign” nuclear power programme? With generation capacity stuck at 4,129 MWe or just 2.8 per cent of the total after 30 years, the DAE, which had promised to set

up 20,000 MWe by 1987, is in a bind. The 17 reactors operated by the Nuclear Power Corporation of India (NPCIL), the sole agency mandated to set up and operate nuclear plants, run at less than 50 per cent capacity for want of uranium although the country has enough reserves to fuel 10,000 MWe. But mismanagement of fuel supply operations is only part of the problems that have landed nuclear power programme in a morass.

Says M V Ramana, physicist and senior fellow at the Centre for Interdisciplinary Studies in Environment and Development, Bangalore: "Not only are the claims made by the government untenable but the economics are clearly unviable." Ramana, who has worked extensively on the economics of nuclear power in India, warns: "Electricity from nuclear power stations, even if it is based on domestic reactors, is more expensive than coal-based power stations because of the high capital cost of reactors. NPCIL's overnight construction costs of recently commissioned reactors like Tarapur III and IV and Kaiga III are around \$1,200/kW. Compare this with the estimated cost of about \$3,750/kW for Olkiluoto-3 or Florida utility Progress Energy's estimate of \$14 billion for two AP-1000 designed by Westinghouse (which translates into over \$6,000/kW) and it is easy to see that imported nuclear reactors will produce electricity at costs that would be simply unaffordable."

NPCIL Executive Director Sudhinder Thakur disagrees. He maintains: "The cost in France and the US and the cost in India are vastly different. The purchasing power parity index is also applicable to nuclear reactors. When you build a reactor here, costs come down dramatically."

This is a pet thesis of the nuclear establishment which says the way out is to indigenise as much of the reactor as is possible. Given the capabilities available here, this would bring down costs of reactors drastically. How feasible is that since Areva is pitching the new EPR reactor design as a flagship for the nuclear industry and is set on earning between €2.5bn and €5bn for each reactor? In the shadowy world of nuclear energy where actual costs are opaque, the illusion is always more beguiling than the reality. But that is no reason why the country should be taken for a ride on energy security.