

[Opinion](#) » [Lead](#)

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Nuclear extravagance in Washington

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In rushing to purchase commercially untested reactors from the United States, New Delhi has glossed over concerns about safety and the scope of suppliers' liability, while failing to assess profitability in the long run

Nuclear commerce is likely to feature prominently in the forthcoming discussion between Prime Minister Manmohan Singh and President Barack Obama in Washington. The U.S. government is keen to clinch some sales for its nuclear industry. The Prime Minister would like to advance the nuclear deal that has, so far, failed to yield a single contract for reactors. However, as we describe here, India's plans to buy reactors from the U.S. are deeply problematic: they involve the expenditure of thousands of crores of Indian public money on arbitrarily selected American companies. The reactors on offer are commercially untested, and accompanied by unscientific promises about high levels of safety that are belied by the fierce determination of these companies to absolve themselves of responsibility for any accident.

Cost escalations

Public knowledge of these deals dates back to 2008 when William Burns, a senior U.S. diplomat, told the U.S. Senate that the Indian government had written a "strong Letter of Intent stating India's intention to set aside at least two reactor sites with a minimum of 10,000 MWe generating capacity for U.S. firms." It is customary for the government to go through a competitive bidding process, or at least a feasibility study before awarding a large contract. However, this commitment was made without even settling on broad details like the reactor-designs. In subsequent years, the two sites have been narrowed down to Mithi Virdi in Gujarat for Westinghouse, and Kovvada in Andhra Pradesh for General Electric (GE).

The reactor proposed for Mithi Virdi is the AP1000 — a pressurised light water reactor. The Nuclear Power Corporation of India Limited (NPCIL) has already signed a memorandum of understanding with Westinghouse on an "early works agreement," which is likely to be finalised during the Prime Minister's visit.

No AP1000 has entered commercial operation anywhere in the world, although eight are being constructed — four each in China and the U.S. The AP1000 is based on the AP600 — a design that was described by the president of the U.S.

Nuclear Energy Institute as one that “will compete in world and U.S. markets and maintain America’s global leadership.” In the event, not a single AP600 was ever constructed, because it could not compete economically.

It is evident that electricity from the AP1000 will also be expensive. In the Vogtle project, where two AP1000 reactors are being constructed in the U.S. state of Georgia, each reactor was initially estimated to cost approximately \$7 billion.

Despite strong governmental support, including an offer of a loan guarantee for \$8.3 billion, the plant has already been delayed by a year. Costs have increased, contributing to a downgrade of the associated corporations by financial rating agencies. Westinghouse, and the operator, Georgia Power, recently sued each other for nearly a billion dollars, with each blaming the other for delays and cost escalations.

In May, another U.S. utility, Duke Energy, suspended plans to construct AP1000 reactors in North Carolina. Last month, the same company cancelled two AP1000 reactors in Florida after total cost estimates had risen to “between \$19 and \$24 billion,” before the start of construction.

The reactor design chosen for Kovvada is GE’s Economic Simplified Boiling Water Reactor (ESBWR). This design has not even been certified in the U.S. and not a single ESBWR is under construction anywhere. A few years ago, when talk of a “nuclear renaissance” was rife, a few companies explored the possibility of the ESBWR; one estimated that each reactor would cost \$8.5 billion. All those plans are essentially frozen or cancelled.

The capital costs of both these American designs, per unit of installed capacity, are roughly the same as those of the French EPRs planned for Jaitapur. In a detailed analysis for the *Economic and Political Weekly*, we estimated that at these prices, first-year tariffs would be around Rs.15 per unit of electricity, even after allowing for substantially lower construction costs in India.

Moreover, several indirect subsidies are built into the government’s revenue model for imported reactors. These include cheap loans at taxpayer risk and an investment pattern where the government injects equity early during the construction process, only to receive an effective rate of return on capital well below that mandated by power sector regulations.

Liability law

Despite the government’s willingness to bear these high costs, contracts have been held up by a dispute over a relatively minor clause in India’s nuclear liability law. In his 2008 Senate testimony, Burns pointed out that “India also has committed to adhere to the Convention on Supplementary Compensation (CSC),” which indemnifies the manufacturers of nuclear plants in the event of an accident. As Burns’ deputy, Robert Blake explained, this “would provide a very important legal protection and open the way for billions of dollars in American reactor exports.”

The U.S. engineered the CSC with a discriminatory “grandfather clause” that allows it to maintain its own distinct liability law. Since only four countries have ratified this outlying U.S. creation, the CSC has not even entered into force. Nevertheless, in 2010, the Indian government acquiesced to American demands and drafted a liability bill, almost entirely based on an annex to this convention.

The final law prevents victims from filing lawsuits against the manufacturer, and also caps the liability of the NPCIL at Rs.1,500 crore. In Fukushima — where the accident continues to cause devastation after two years — the costs of a clean-up are estimated to be several hundred times larger. As such, the law is heavily biased in favour of the industry. Nevertheless, the Americans are unhappy since, at the insistence of Parliament, the Indian law does not indemnify their companies outright but allows the NPCIL to recover the money paid out in compensation from the manufacturer.

From another perspective, this indicates a fundamental structural problem with the law: it takes away the rights of victims to directly petition the courts to punish the supplier for negligence. In Bhopal, the government first insisted on representing all the victims, and then let Union Carbide off the hook. A [report](#) in this newspaper (September 19) indicates that the government plans to repeat this strategy, by promising the Americans that the NPCIL will not exercise its “right of recourse.”

This is part of a persuasive case made in a Supreme Court petition — filed by the prominent lawyer Prashant Bhushan — that the current law impinges on the constitutional rights of Indian citizens. Ironically, if the Court takes cognisance of the recent actions of the government, which show how the law can be subverted, then this may result in U.S. companies having to face higher levels of liability.

This reluctance to accept liability is in sharp contrast with the claims of safety surrounding the reactors. Westinghouse asserts that its reactors are likely to suffer severe accidents less than once in four million years. If this were true then,

given the cap on liability, it would cost only Rs.2 lakh to insure the reactor for its entire lifetime — an absurdly low number. The problem is that Westinghouse bases its claims on a method called “probabilistic safety assessment” that cannot be justified scientifically. By using a standard mathematical technique called “Bayesian analysis” to extrapolate from the observed pattern of nuclear accidents, it is easy to show that the Westinghouse figure is almost certainly wrong.

Local misgivings

Apart from these legal and technical issues, there are significant local misgivings about the reactors. A strong protest movement has come up in Mithi Viridi, where a “tractor rally” was held in anticipation of the Prime Minister’s U.S. visit. In March, thousands of people walked out of the public hearing on the environmental impact assessment. Numerous civil society groups, ranging from students to fishermen, have registered their opposition to the reactor in Kovvada.

While reassuring nuclear manufacturers on the liability law, the Prime Minister explained that “the proof of the pudding is in the eating ... I hope their profits will tell the true story. If they make a lot of money, they will forget some of the concerns they have expressed.” One can only hope that in Washington, he will also spare a thought for the concerns of Indian citizens and local residents.

(The authors are physicists associated with the Coalition for Nuclear Disarmament and Peace. Ramana is the author of The Power of Promise: Examining Nuclear Energy in India, Penguin, 2012. The views expressed are personal.)

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