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A Decade After the Nuclear Deal

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An increase in nuclear power was promised as an outcome of the Indo-US nuclear deal. That promise has not materialised, but citizens have paid a high price not just in economic terms but also through the loss of democratic rights and environmental well-being.

Nuclear energy in India has had a glorious future for over 60 years. About a decade ago, in September 2009, this future, which never arrives, became even more glorious as the Nuclear Suppliers Group (NSG), the international cartel that controls nuclear trade, allowed India to start importing nuclear technology and materials. This decision followed years of lobbying by the United States (US) as its part of what was called the US India nuclear deal. But as with the earlier promises of glorious futures that have been made for decades, what materialised after the NSG decision is a far cry from what was promised.

As of the end of last year, all the Nuclear Power Corporation's power plants combined could generate up to 6,780 megawatts (MW) of electricity, a mere 1.9 percent of the total electricity generation capacity in the country. Tellingly, this figure is lower than the figure of 8,000 MW of nuclear capacity that Homi Bhabha, the first chairman of the Atomic Energy Commission, had prophesized way back in 1954 for the year 1980, let alone the much larger numbers touted by those advocating the US India nuclear deal. In terms of actual electricity generated, the share of atomic energy in the overall electricity generation in the country was about 2.93% in the year 2017-18, according to a written reply to a question in Lok Sabha in February 2019. This is marginally higher than the 2.6 percent share in 2007.

But misplaced hopes are not the only result of the US India nuclear deal. That process has also involved siding up with U.S. imperialism, vast expenditures of financial and political capital largely in favour of foreign corporations, and domestic repression of citizens who dared to raise their voices against their land and livelihood being taken over for nuclear projects.

Historical Background

To understand the magnitude of the gap between promises and reality, let us start with a little historical background. The nuclear deal saga began publicly with the July 2005 joint statement released by President George Bush and Indian Prime Minister Manmohan Singh in Washington, D.C. In that statement, President Bush promised to "work to achieve full civil nuclear energy cooperation with India", "to adjust U.S. laws and policies", and "to adjust international regimes to enable full civil nuclear energy cooperation and trade with India". For its part, the Indian government promised, inter alia, to identify and separate "civilian and military nuclear facilities and programs" and place "its civilian nuclear facilities under IAEA [International Atomic Energy Agency] safeguards" that would verify these facilities were not used for nuclear weapons purposes.

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These commitments should be viewed in light of the long standing opposition from successive Indian governments and the Department of Atomic Energy to having international safeguards at domestically constructed nuclear facilities. At the same time, the importance of international nuclear support to India's nuclear programme cannot be overstated. But such help had essentially been suspended after India's 1974 nuclear weapon test, when the United States and other countries formed the Nuclear Suppliers Group (NSG). Till 2008, the NSG prohibited selling nuclear technology to countries that had not signed the Nuclear Non Proliferation Treaty (NPT), the aim being to preventing the use of nuclear reactors to make nuclear weapons.

The significance of the nuclear deal can be appreciated only in the context of the Bush Administration's geopolitical strategy, which involved bringing India into US attempts to contain China, to break with the Non Aligned Movement and vote against Iran at the International Atomic Energy Agency, and so on. In order to do this, changing its policies on nuclear exports to India was seen by the Bush Administration's foreign policy advisors as a small price.

Ambitious targets

One of the motivations for the Indian government entering into negotiations with the US was laid out by Prime Minister Manmohan Singh in the Lok Sabha on August 3, 2005. He started with the recognition "that India's nuclear power programme had lagged behind" and went on to explain "When I was a civil servant, I was a member of the Atomic Energy Commission, way back in the seventies. At that time, the Atomic Energy Commission had set for us a target of 10,000 megawatts of generating capacity. Today we are in 2005. Our capacity is less than 3,000 megawatts. We have run into some problems". Therefore, the argument went, India needed international technology, i.e. reactors, to increase its nuclear power capacity.

A second, less often acknowledged, motivation for the deal resulted from another of the nuclear establishment's failures: the inability to supply enough uranium to fuel its nuclear reactors. Uranium production within India was, and continues to be, less than the fuel requirements of the operating nuclear power plants if they are run efficiently. This is why the country has to import uranium.

When it comes to nuclear generation targets, Manmohan Singh's admission of "some problems" is an understatement, but his interpretation was also mistaken. The Atomic Energy Commission's (AEC) targets never had any material substance beneath them. This is why, despite these "problems", the AEC had, in the 1990s, set a target of 20,000 MW by 2020. Setting and broadcasting unrealizable targets is part of the AEC's strategy to maintain its relevance to political leaders and the elite (Ramana 2012).

At the same time, proponents of the nuclear deal with the US also had to battle opposition, including from the current ruling party, the Bharatiya Janata Party (BJP). One way to make the nuclear deal seem vital was to set even more ambitious targets. In 2007, referring to the potential waiver, Prime Minister Manmohan Singh offered the hope that "if international cooperation once again became available"this "modest" target of 20,000 MW could be doubled to 40,000 MW by 2020.Then AEC Chairman, Anil Kakodkar aimed higher: importing 40 gigawatts of light water reactors (LWRs) by 2020 (Kakodkar 2008). Since these LWRs would have been in addition to the heavy water reactors already built or being built in the country, that implicitly amounted to something like 50,000 MW of nuclear power by 2020.

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As mentioned earlier, the current nuclear capacity in the country, a decade after the NSG offered a waiver, is only 6,780 MW, a small fraction of these projections. Hence, it should come as no surprise that not one of the 40 GW of foreign reactors, which were to have followed the fulfilment of the nuclear deal, have been constructed. The increase in capacity, from 2,720 to 6,780 MW, is a result of five new reactors (Kaiga unit 4, Rajasthan 5 & 6 and Koodankulam 1 & 2) that became critical in the intervening years. Construction of these started in 2002-2003 and are therefore not attributable to the waiver

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What can be attributed to the waiver is that uranium can now be imported to use as fuel in those reactors that the government chooses to place under IAEA safeguards. According to responses by the government to questions in Parliament, the Department of Atomic Energy has imported thousands of tonnes of nuclear fuel from countries like Kazakhstan, Canada, and Russia. As a result, there is reportedly no shortage of uranium fuel.

Compromising Economics

The stated power targets might have been unrealised but these were not without costs. The Indian state made promises to foreign nuclear companies, committing in effect to paying huge amounts of Indian money to provide business to these foreign entities. The other cost was the disruption to the livelihoods of people living at these identified sites.

As the prime instigator of the change in the NSG's policies, the US received the biggest promise. In September 2008, then Foreign Secretary Shivshankar Menon wrote a letter to the U.S. Under Secretary for Political Affairs ensuring "the construction of nuclear

power units at least at two sites approved by the Government of India, which would be capable of generating a minimum of 10,000 MW" (Kerr 2010, 2). Those two sites were Mithi Virdi in Gujarat and Kovvada in Andhra Pradesh.Some years later, following widespread local opposition, the government appears to have abandoned the Mithi Virdi site, even though official plans still list the site as having "in principle" approval for setting up nuclear power plants in the future.

The other two countries to be promised sites were France and Russia. For France, the chosen location was Jaitapur in Maharashtra, which has been advertised as "the largest nuclear power plant in the world" when completed. The story with Russia is a bit more complicated.

Russia, more precisely the Soviet Union, had historically been open to exporting reactors to India. The Soviet Union's government entered into an agreement with the Rajiv Gandhi government to set up a nuclear power plant at Koodankulam way back in 1988. With the collapse of the Soviet Union, project plans were shelved and revived officially only in June 1998. Construction of the first two units at Koodankulam started in March 2002, during Atal Bihari Vajpayee's stint as the Prime Minister and well before there was any talk of a nuclear deal.

But the nuclear deal was a chance to offer one more site to Russia. This turned out to be Haripur in West Bengal. Subsequently, when the population around Haripur protested, the Russians were promised a site in the state of Orissa. There are also news reports of a site in Andhra Pradesh being earmarked for a Russian nuclear plant.

There is much that is wrong with these purchase promises. Let us start with the US. Successive heads of state there, and their counterparts in India, have focused on selling India a number of AP1000 reactors designed by Westinghouse. The AP1000 reactor design has been, to put it simply, a disaster. These have been under construction only at four sites around the world. Two projects involving the AP1000 design constructed in China were over budget and over time-which is very rare in China. But it is Westinghouse's home country, the US, that offers the most cautionary lesson. Of the two projects involving the AP1000 design, the one in the state of South Carolina was abandoned after the expenditure of billions of dollars. That project resulted in Westinghouse filing for bankruptcy protection in 2017. The other project, in the state of Georgia, is still under construction but it is delayed and its cost estimates have gone up from the initial estimate of $14 billion to around $27 billion.

Jaitapur is slated for six European Pressurised Reactors (EPRs) from the French company Areva. Once again, the EPR design has been a major failure, having experienced delays and cost increases in China, France, and Finland. The EPR at Flamanville in France, for example, has been under construction for 14 years when it was supposed to be completed in 5 years; its cost estimates have more than tripled, from €3.3 billion to €10.9 billion. In 2010, when the cost estimate of Flamanville was around €4 billion (Du and Parsons 2009, 10), a French official told *The Hindu*that the unit cost of power would be "below four rupees per kilowatt hour" (Naravane 2010). By 2014, officials announced that the two countries had agreed on Rs 6 per unit (Rangnekar 2014). Even this higher estimate is untenable. A calculation of the likely cost of electricity from the project on the basis of international estimates of capital costs for EPRs from the 2010-2012 period, showed that the first-year tariff from the project would be around Rs 15 per kilowatt hour, even after factoring in lower labour costs in India (Raju and Ramana 2013).

The delay in the start of construction of these projects is therefore good news for Indian electricity consumers and the public exchequer. The bad news is that political leaders in all of these countries continue to push these projects.

Compromising Safety

The explanation offered by the nuclear establishment for its failure to meet its targets has been to blame the nuclear liability law. In October 2014, AEC Chairman Anil Kakodkar stated that it was the lack of clarity on India's nuclear damage liability law that has held up faster development of its civil nuclear programme (Choudhury 2014). This excuse is a particular favourite of the nuclear establishment since, in effect, it makes Parliament responsible for its failures. But to understand what is at stake in nuclear liability, one has to dig deeper.

The underlying problem is that all nuclear power plants are capable of undergoing severe accidents that are hugely expensive to deal with. Estimates of the cost of dealing with the Fukushima accident range from around $200 billion to $600 billion. This problem of large financial consequences of nuclear accidents was realized in the 1950s, and nuclear reactor vendors have tried to wash their hands off the consequences of any accident at reactors they have sold and profited from. This is the principle that US and other nuclear reactor vendors wanted the Indian government to agree to in the aftermath of the NSG waiver, namely to indemnify reactor vendors

from any liability for accidents.

The Manmohan Singh Government followed this diktat but for one deviation: it allowed the Nuclear Power Corporation (NPC) the *right of recourse*. Should there be an accident, NPC will have to pay compensation to the victims, up to a maximum of Rs 1500 crores (or Rs 15 billion). Because of the right of recourse, NPC can reclaim this amount, up to a cap value, from the supplier if it can be shown that the accident was caused by a design defect.

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Because the maximum compensation amount of Rs 1500 crores is only a tiny fraction of the multibillion price tags for each reactor, it is hard to imagine that any nuclear vendor would be so concerned about the relatively low liability for an unlikely accident that they would forego the hugely lucrative contracts for nuclear reactors. The only explanation for their reluctance is that from their view point the Indian liability "law sets a bad precedent and, in the future, either in India itself or in another country, it may lead to a more rational law centered on victims rather than the industry" (Ramana and Raju 2012).

But from the viewpoint of citizens and tax payers, any law that limits liability is a problem. The effort of "protecting suppliers" from being forced to pay for the full consequences of accidents "creates a classic example of, what in insurance parlance, is called a "moral hazard": insulating a party from risk has a distorting effect on its behaviour. In particular, indemnifying suppliers is likely to make them pay less attention to safety and encourage them to take greater risks" (Raju and Ramana 2010).

This is a particular problem with the EPR reactor design that is proposed for the Jaitapur site. This design is known to have safety concerns, specifically with regard to the pressure vessel, the key barrier that prevents the spread of radioactive materials from the reactor in the event of an accident.

Compromising Democracy

People at every site identified for these expensive nuclear power plants have responded by opposing these projects. Perhaps the most relevant one is Mithi Virdi, which was struck off the list of sites because of local protests. As Gujarat Chief Minister Vijay Rupani admitted in the state assembly in March 2018, "locals turned against this project after tsunami waves caused (radioactive) leak in Japan (in 2011). After that incident, panicked locals here started a movement against the project, as they felt that the project would prove dangerous for them. As the movement and negative sentiment gained momentum, the project was scrapped" (PTI 2018).Westinghouse was then offered Kovadda in Andhra Pradesh as compensation, where again there have been protests.

Government efforts to acquire land have been an important focus of these protests. Speaking of the decision to stop the project at Mithi Virdi, Gujarat Energy Minister Saurabh Patel explained in March 2018, "NPCIL officials tried their best to convince locals, but they are not ready to give their land for the project" (PTI 2018). In Jaitapur, protestors have agitated repeatedly and accuse the government of pressurising people in the process of land acquisition.

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The government's response has been to use violent means to curb these protests ranging from imposing false charges to open firing at protestors. In April 2011, for example, a protestor was shot dead and several injured in police firing near Jaitapur. Although not a project resulting from the US India nuclear deal, one cannot but note the intense repression of the protestors at Koodankulam. Clearly the government has favoured the interests of foreign corporations over its own citizens, not just in terms of the latter's economic and environmental well-being, but also their democratic rights.

Conclusions: Let's not be emotional about nuclear

The failure of successive governments and the nuclear establishment to deliver on their tall promises made at the time of the US India deal adds to the larger failures since the very inception of the programme. Despite over six decades of sustained funding by governments, nuclear energy has not contributed significantly to electricity generation; the little that there is has been expensive and not cost-effective.

This is in stark contrast to the rapid increase in renewable energy capacity in the country. As of January 2019, the installed capacity of renewable energy sources, including small hydro power, wind power, biomass based power, and solar power, is over 74,000 MW. The corresponding figure as of May 2008 was a little over 12,000 MW. Specific sources grew even more rapidly over the same period: wind by a factor of over 4, and solar energy by a factor of 286.

> The right source to drop emotional attachment to is nuclear power, a failed energy source.

Of course, these operate only when the wind is blowing or the sun is shining. But even when viewed in terms of the actual electricity generated, renewables outstrip nuclear power. Between April 2018 and January 2019, nuclear energy contributed 31,578 gigawatt-hours of electricity to the grid whereas renewables combined contributed 107,216 gigawatt-hours.

The cause for this growth is simple. While nuclear costs have been rising, renewable sources of electricity, especially solar energy, have become cheaper. In 2010-11, tariffs for solar photovoltaic (PV) projects under the National Solar Mission were between Rs 10.95 and Rs 12.76 per kilowatt hour. But several projects approved under Phase II of the mission have been connected to the grid in the last year with tariffs below Rs 5 per unit. In recent auctions for solar PV projects, winning tariff bids in the range of Rs 2 to Rs 2.50 per unit have become routine.

During an interview in 2008, then AEC Chairman Kakodkar had dismissed the importance of renewables saying: "let us not be emotional about it" (Bhatt 2009).The sentiment is right, but aimed at the wrong source. The right source to drop emotional attachment to is nuclear power, a failed energy source.

One of the ways that the nuclear establishment has tried to make nuclear power seem more attractive is by painting visions of a glorious future. As the saga of US India nuclear deal illustrates, these futures never materialise. But in trying to pursue such futures, what get compromised are the economic, environmental and democratic well-being of common citizens.

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