

# INDIA'S QUEST FOR NUCLEAR ENERGY

*M.M.K. Sardana\**

**Abstract:** *Despite European Union, except France, UK and Finland, deciding not to go ahead with new nuclear reactors, Indian Government has finally decided to take up generation of nuclear energy in an accelerated manner. Legal Instruments have been put in place for flow of nuclear fuel and related technologies and materials. Supplies of such technologies and materials perceive a business opportunity of US\$150 billion in the first phase ending 2020. Indian institutions and entrepreneurs are raring to go by joining hands with foreign vendors. Government would do well to make amendments to legislations as required and set up a strong regulatory mechanism before the deals are actualized on ground. Further, the Indian Government, entrepreneurs and institutions should learn lessons from the deal with Enron on Dabhol Power Project so that negotiations take place between two equals and on an equitable basis otherwise everyone would stand to lose as in the aforesaid case. Environment concerns of tackling the nuclear waste should remain paramount, and, satisfactory means devised to contain any fall out.*

Legal instruments are in place to herald an era of accelerated nuclear energy generation in India. This enables India to carry out trade of nuclear fuel and technologies with other countries within the stipulations placed by the Nuclear Suppliers Group, granting waiver to India by these nuclear supplier countries. Besides, there would be country specific agreements. To instil confidence among the suppliers of technology and materials, a Nuclear Liability Act has been put in place to limit their liability. Besides India has also signed the Convention on Supplementary Compensation to provide for additional resource for assistance seeking indemnification for loss and injury from a nuclear installation.

Before the above policy instruments were put in place, there were intense debates in Parliament and media with in-depth and comprehensive coverage on all aspects. Politically, India and US have been calling each other natural allies because of commonality in governance practices and of interests and complementing and supplementing roles both played in relation to each other. However, India remained a *de facto* embargo state from members of Nuclear Suppliers Group Cartel led by United States because she did not subscribe to NPT and had also conducted successful nuclear tests in 1974 and in 1998. This had put India under restraint in its nuclear related plans—for lack of assured supply of uranium and availability of relevant technology. While such a situation enhanced the capability of Indian scientists and technologists to find domestic solutions, the achievements

---

\* The author is a Visiting Fellow at the Institute.

remained below target. In the power sector, the contribution of nuclear energy has been around 2.5% despite rising demands for power. There have been cost overruns and delays despite increased budget allocations and liberal subsidies.<sup>1</sup> In the changed scenario, some of such constraints may ease and the nuclear power needs are sought to be placed in perspective for meeting India's power requirements. Anshu Bharadwaj et. al (2006) have concluded that other fuels are unlikely to close the gap between desired growth and business as usual growth.<sup>2</sup> These authors do not claim that nuclear power is the panacea of India's energy challenges; rather they suggest that nuclear power is a worthwhile option to pursue. India stands to benefit from imported nuclear fuels and reactors to significantly augment its indigenous capabilities. The economic environment may also turn out to be favourable, especially if there is foreign investment. While nuclear plants are capital intensive, operating costs are relatively low, and fuel costs are unlikely to escalate, similar to rise seen in fossil fuels. Thus, these authors see the US-India declaration on civilian nuclear power co-operation as an opportunity for India to increase its power generation using nuclear technology and also as recognition for its outstanding nuclear non-proliferation practices. This, according to these authors, will also free the Indian Atomic Energy establishment to focus on the development of advanced fuel cycle reactors based on thorium and plutonium that may yield a large pay off in an increasingly carbon constrained future.

While there is optimism as described above, there has been scepticism in equal measure and perhaps more resounding. M.V. Ramana has argued that the claims that nuclear power is cost-competitive can only make sense if one ignores the significant subsidies offered to it through the Department of Atomic Energy.<sup>3</sup> Even when those are included, nuclear power is not really economically viable in a competitive environment.

A newsletter of the Levin Institute, The State University of New York, identifies three primary obstacles to the development of the nuclear industry: cost, risk, and waste. A single reactor can cost between \$2.7 billion and \$8 billion (in 2008 dollars) to construct. Many power plant construction companies have learned that it is difficult to achieve economies of scale that might boost profits. But once the initial investment has been made, the operating costs are

---

<sup>1</sup> Ramana, M.V. (2007), "Economics of Nuclear Power: Subsidies and Competitiveness," *Economic and Political Weekly*, Vol. XLII, No. 2, January 13, Pp. 169–171.

<sup>2</sup> Bharadwaj, Anshu, Rahul Tongia and V.S. Arunachalam (2006), "Whither Nuclear Power?" *Economic and Political Weekly*, March 25, Pp. 1203–1211.

<sup>3</sup> Ramana, *op. cit.*

relatively stable because in contrast to coal based power plants, the price of fuel for nuclear plants is only a minor component. Costs rise again when old reactors, containing large amounts of radioactive material, must be decommissioned and dismantled over the course of decades.

In addition, though there have been no major accidents since Chernobyl disaster, a steady stream of minor problems has kept the damages of nuclear power firmly implanted in the public mind. In the Indian context, M.V. Ramana and Ashwin Kumar have dealt with the nuclear safety concerns.<sup>4</sup> The aforesaid newsletter of Levin Institute states that current forecasts predict that one severe accident will occur every 100 years in a network of nuclear plants such as that possessed by the United States, and there is much debate about whether this level of risk is acceptable.

Finally, there is the issue of nuclear waste, probably the greatest hurdle to the expansion of nuclear power generation. Spent fuel units, while no longer capable of sustaining nuclear reactions, nonetheless continue to emit high levels of radiation for many years. They are cooled in underwater pools and then typically stored at sites or near the reactor where they have been used. This method is, however, only a temporary resolution to the storage problem, and policy makers have long sought a more secure and permanent solution. In its saga of 60 years of generation of nuclear power, the United States has yet to finalise the ultimate resting place for the nuclear waste. All of these factors—cost, safety, and waste make the nuclear industry unique; requiring complex and wide ranging partnerships between public institutions and private enterprises. The costs and risks to public safety are so enormous that government must take an active role in supporting, regulating and monitoring nuclear industry. Not surprisingly, despite its initiation in 1950, the nuclear energy mix globally has been of the order of 14% and has been confined to thirty odd countries. As in 2010, there are 438 nuclear plants in operation worldwide with 61 under construction in 15 countries. Some of the countries that rely mostly on nuclear power for electricity generation include France (75 %), Lithuania (76%), Belgium (52%), Sweden (37%), Switzerland (40%), South Korea (45%) and Bulgaria (36%). In the US, the share remains at 20%. It may be pertinent to recall that when President Eisenhower mooted the idea of Atoms for Peace, very few private entrepreneurs were keen to set up nuclear based power plants because of unforeseen risks involved in case of a nuclear fall out. To encourage the

---

<sup>4</sup> Ramana, M.V. and Ashwin Kumar (2010), "Safety First? Kaiga and Other Nuclear Stories," *Economic and Political Weekly*, Vol. XLV, No. 7, February 13, Pp. 47–54.

entrepreneurs, the Congress enacted Price-Anderson Act capping the liability of the entrepreneurs at \$560 million. Under the watchful eyes of the Nuclear Regulatory Commission, about 104 nuclear reactors came up in the US, capable of generating 98,406 megawatt power corresponding to 20% of installed capacity (Reliance Resource of Energy Markets 2002). From 1973 to 2005, there were no nuclear reactors for power generation in the US largely because of perceived fall out of the accidents at Three Mile Island in Pennsylvania and later at Chernobyl (USSR) in 1986. In an article in the South Asian organization in 2003 and its excerpts reproduced on April 16, 2006,<sup>5</sup> M.V. Ramana pointed towards the trend of European countries getting out of nuclear energy.

“Two weeks ago, Belgium became one more European country to decide to phase out nuclear energy. The bill, presented by Prime Minister Guy Verhofstadt’s cabinet and passed by both houses of Parliament, orders the shutting down of Belgium’s seven reactors after 40 years of use and bans the construction of new ones. The first reactors will be dismantled by February 2015, the last by 2025.

“Belgium’s phase out decision is an extremely significant one and points to the dismal future of nuclear energy in Europe. Nuclear Energy currently supplies about 60 per cent of Belgian electricity generation, the second highest in the world. But as elsewhere nuclear power has been uneconomical and electricity in Belgium is among the most expensive in Europe.

“Economics, however, was not the primary reason for the phase out decision. The Belgium government’s bill focused on eliminating the risk of a disastrous accident at nuclear reactors and reducing the dangers of radioactive waste. Environmental sustainability considerations also played a part and, as part of the phase out, the government promised to invest in solar, wind and other renewable energy resources.

“Belgium is just the latest of the five EU states planning to phase out nuclear energy. The others are Germany, Spain, Sweden and the Netherlands. Seven other countries — Austria, Denmark, Greece, Ireland, Italy, Luxemburg and Portugal — have either abandoned nuclear power or never established programmes. The only EU countries that officially maintain faith in nuclear power are France, Britain and Finland. Finland’s nuclear policy seems primarily to end dependency on Russian Technology.

---

<sup>5</sup> Mohanty, Sanat (2006), “Nuclear Energy in India: Feasible?” *The South Asian*, April 16. [http://www.thesouthasian.org/archives/2006/nuclear\\_energy\\_in\\_india\\_feasib.html](http://www.thesouthasian.org/archives/2006/nuclear_energy_in_india_feasib.html)

The British policy is also at a tenuous state with numerous subsidies — overt and embarrassingly covert as reported by The Guardian on 18/7/05 — supporting a competitive price for nuclear energy. France, thus, has become isolated in its pursuit of energy policy.”

In the US, though no new nuclear reactor for power generation was set up during the period 1973–2005, there seems to be renewal of interest in nuclear energy because of the steady rise of energy prices since 2002. In the Energy Policy Act of 2005 adopted by the U.S. Congress, there are provisions for new tax credits and loan guarantees for reactor construction, offer of insurance against regulatory delays, and renewal of the Price-Anderson Act by increasing liability coverage to \$10.9 billion. Thirty-three new plants are scheduled for construction during the 2007–11 period (The Levin Institute). The Indian Pugwash Society terms the Energy Bill of 2005 as an attempt to bail out the civilian nuclear industry.<sup>6</sup>

The debate on the suitability of accelerated nuclear energy following the initiatives taken by the US and India during the period 2005–08, also touched on the impact of the deal between the two countries on the conduct of foreign policy of India and resultant constraints thereon.<sup>7</sup> On the face of it, such constraints, if any, should not have an impact on the commercial operations of the business of power generation based on imported technology and materials. However, going through the fine prints of the deal, Hyde Act and the deliberations of Nuclear Suppliers Group, India and Indian Business face an enormous risk in case of certain perceived non-tangible functions by India in the eyes of the United States in the conduct of its foreign policy notwithstanding the assurances held out by the Prime Minister following the joint statement of the President Bush and Prime Minister Man Mohan Singh in July 2005. The Hyde Act passed in December 2006 made nuclear trade with India conditional upon the US President ensuring, and annually certifying, that India's foreign policy was in line with the US interests. Hyde Act denies India access to technology for enrichment, reprocessing and for heavy water. It is also clear that if the deal were terminated, not only would US fuel supplies stop, the US would also work with other suppliers to ensure full stoppage of supplies to India. Those supporting the deal have argued that these sections in the Act are non binding and are domestic to the US regime and India need not care about them. However, it is being overlooked that the whole arrangement

---

<sup>6</sup> Country Report: USA, 14/3/2008.

<sup>7</sup> Jayaraman, T. (2006), “Price of the Nuclear Deal,” *Economic and Political Weekly*, Vol. 41, No. 15, April 15, Pp. 1418–1421.

between the two countries is subject to adherence to the domestic laws by the contracting parties. As per their domestic legislation, i.e. Hyde Act, if the US President is not able to give necessary certification to the US Congress or the Congress is not satisfied by the US Congress, the US under its own domestic legislation is obliged to terminate its 123 Agreement with India with all the consequences. The deeper India and its business go in a nuclear co-operation agreement with large investments made in imported nuclear reactors and fuel, the more the potential for critical risks. Upon termination, the Agreement calls for return of all materials and equipment supplied earlier. Some compensation payments may be available but India will face huge dislocation in power generation.

Such are the associated risks which the entrepreneurs and lending institutions are required to take into consideration while making investment decisions.

Investors in power sector including the nuclear energy sector should be wary of the unrealistic targets that have been set up by the planning commission based on electricity surveys. Inflated targets create a sense of false panic and short-term measures for generating power at any cost are adopted, resulting in Dabhol type situations. The myth of setting unrealistic targets has to be deprecated. The Eleventh Plan proposes to add 78577 megawatt of power generation, which is 3.5 times than what was achieved in the Tenth Plan. As reported in *Business Standard* of October 28, 2010, the target for Twelfth Plan period is being proposed as 1,00,000 megawatt, over and above the target of 60,000 megawatt in the current plan period ending 2012. It should be kept in mind that growth rate of electricity is not autonomous but depends on the cost of power, purchasing power of the people including the political will to recover the costs and economic growth. If the Planners, for their own reasons, wish to keep targets higher, the entrepreneurs would have to make a critical assessment of the economy's capacity to absorb, otherwise grief would be writ large as happened viz Enron—despite sovereign guarantees—and power generation would come to naught.

Sufficient debate has taken place in the country on this subject. State is finally set to take action towards accelerating nuclear energy production and the concern shown by sceptics would be on the shelves of libraries waiting for judgement on their reservations in future—as it unfolds. Government on its side has been signing nuclear deals with several countries including France, UK, the US, Canada, Namibia, Mangolia, Argentina, and Kazakhstan. In

February 2009, India also signed US\$700 million deal with Russia for supply of 2000 tonnes of nuclear fuel.

Under the existing provision of the Atomic Energy Act, only Government can enter into the business of nuclear power generation. According to various reports appearing in press, a large number of Indian entrepreneurs have made positive moves for entering the nuclear energy race. Naturally among these are NTPC, BHEL, Bharati, L&T, in addition to foreign players—also eyeing the Indian market—like GEH, Hitachi, Westinghouse, Alstom, etc., to name a few. In October 2010, India hosted an *International Conference on Nuclear Energy* in Mumbai in which nuclear technology and material suppliers participated from all over the world. Next such exhibition has already been fixed for September–October 2011. These reflect that despite many a reservation the entrepreneurs are willing to take a plunge. They may not be averse to seeking a host of concessions from Government, including on the nuclear liability.

The interest shown by the foreign nuclear supplier firms and the Indian entrepreneurs wishing to join the new field is not unexpected. After all, according to some estimates commercial deals worth US\$150 billions may well be up for grabs as India aims to expand its nuclear power generation capacity from 4000 megawatt to 20,000 megawatt in 2020.<sup>8</sup> While there would be an increase in FDI, the Indian financial institutions and local entrepreneurs would also be investing in a fair measure. As usual there would be tax breaks, custom duty waiver/reductions and other usual incentives of significant amount. It is expected that for ensuring level playing field, Government should be announcing the packages well in advance of the investment decisions. Amendments as required in the Atomic Energy Act and in the Electricity Act should be made or at least announced. The Nuclear Energy establishments would be unique and with increased inherent risks, strong regulations should be put in place and with an empowered regulator who is independently equipped to exact compliances expected at different stages of commissioning, operation and thereafter waste disposal. Whenever, any cost is sought to be brought on operators and suppliers, their lobbies become active and seek to influence governments on the plea of the discouragement of entrepreneurs, as has been evidenced after the passage of Nuclear Liability Bill. In this task, the foreign as well as domestic players play a role of equal importance and do not hesitate to field their political mentors. In the case of nuclear energy

---

<sup>8</sup> Editorial (2007), "A Nation's Shame," *Economic and Political Weekly*, Vol. 42, No. 32, August 11, p. 3271.

projects there is no scope of loosening of the regulations without bringing the entire polity to peril.

It should be kept in mind that the process of providing India with nuclear energy began in 2005 coinciding with the passage of the Energy Policy Act in the American Congress which was primarily to give boost to the civilian nuclear sector which had been languishing as no new reactor was coming up in the US for last three decades. European Union (except France, UK, and Finland) had also decided to decommission their plants in a phased manner and further decided not setting up new plants.

India, on the other side, has been in quest of energy to maintain its rate of economic growth. In its energy mix, contribution of nuclear energy has remained insignificant because of sanctions faced by it. Thus, India has perceived the US initiative as an opportunity to end its nuclear isolation.

Thus, if India's perceived need is to obtain nuclear fuel, technology and related supplies, the need of US is undoubtedly to boost its industry and in the process retain jobs in an otherwise depressed stage. US cannot trust other markets without endangering its own security in a world as it stands today. India offers itself as a reliable partner with an impeccable record of zero espionage and non proliferation. Also, the US perceives that Indian establishments are on a tunable wavelength in ensuring a long-term strategic commercial relation.

Commercial partners from both the parties, however, should learn a lesson from the Enron episode. If intentions are to maximize profits only which pauperizes the partner, this would be a sure recipe for disaster as happened in Enron. Enron was able to thrust upon a business model which was totally unsustainable and there was a go by to ethics in obtaining most favourable of terms for themselves. The Indian leadership and the bureaucracy of the time refused to see writing on the wall and rather collaborated in suppressing human rights in most brazen manner while acquiring land. To the independent thinkers, the writing on wall was clear. An issue of *EPW* has termed it as Suicidal First Step<sup>9</sup> when it wrote that, the government has taken the first suicidal step in allowing, indeed encouraging, foreign investors to set up expensive power project, passing on the burden of high power costs to the consumers and indulge in profiteering. The subsequent events proved the premonitions more than correct. While the Indians were being naïve; the other side was awash with

---

<sup>9</sup> "Dabhol: Suicidal First Step," *Economic and Political Weekly*, Vol. 29, No. 1/2, January 1, 1994, p. 23.

unethical notions and too sure of their political connections back home and their capacity to spread word about India's capability to sustain reforms. In this connection, it is necessary to quote what Linda Powers, Enron's Vice President, Global Finance had to say in her testimony before the Appropriations Committee of the US Congress:

"Thanks to certain changes in the developing countries which I will describe in a minute, a new way of achieving the same development goals has just become possible. Private parties like our company and others, are now able to develop, construct, own and operate, private infrastructure projects in these countries. In the process of doing so, private parties are able to achieve the two things which the U.S. foreign assistance efforts have long been trying (without much success) to achieve: (1) the projects are serving as action forcing events that are getting the host countries to finally implement the legal and policy changes long urged upon them...

"Under this new approach, the private parties are bearing the costs, both for bringing the policy reform process to fruition, with the host country governments, and for the facilities to alleviate current problems.....

"This private sector driven approach I am describing applies not only in the energy sector, which is my company's area of activity, but also in other infrastructure sectors—toll roads and other transport facilities; water and sewage; telecom and potentially in industrial sectors.....

"When a firm like Enron, Mission or AES goes into a foreign country to undertake a project, just what do we do?... We make money by selling an important commodity – electricity – to the local people at a reasonable price.

"If we are successful, the results are not only the addition of valuable assets to the country, but equally important, the creation of "Commercial Infrastructure." These projects must be put together and financed using standard private sector tools. This process, which for the first round of projects is invariably painful and time consuming, forces government officials of the country in question to deal with the reforms needed in these key areas:

- i) Property rights, including enforceability of contracts....

- ii) Market Pricing... one of the biggest problems in these countries is that they have all had hugely subsidized infrastructure services. Projects like ours aren't financeable as long as you have artificially depressed prices. So they have to bring the prices in alignment with market pricing.
- iii) Regulatory reform. One of the most important regulatory reforms—privatization—is by definition, the necessary starting point for any of these private infrastructure projects.....
- iv) Sound Lending...

“These are the kinds of important changes in laws, policies and practices that private sector led infrastructure projects are causing to finally be implemented. By working closely with private developers, engineers, financial advisers, lawyers and lenders through the several year process of project development and financing, host country authorities come to realize that the project can only go forward to fruition if the changes are made. Importantly, the project also provides these authorities with some “cover” against domestic criticism and resistance to these changes.

“Let me give you a real world example to illustrate these points. Just yesterday Enron reached closing on a \$920 million power plant project in Dabhol..... This is the first privately developed independent power plant in India..... Working through this process has given the Indian authorities a real and concrete understanding of the kinds of legal and policy changes needed in India, and has given the Indian banks a real and concrete understanding of sound project lending practices. Moreover, our company spent an enormous amount of its own money—approximately \$20 million—on this education and project development process alone, not including any project costs.....

“Furthermore, the education provided by our project has had a greater impact than would further general technical assistance, and has finally achieved some key changes that have long been urged by development institutions such as World Bank and AID. Just two of a number of examples:

- The state of Maharashtra, where our project is located in India, is now revamping its electricity rate structure to end electricity price subsidies.

- Five leading Indian banks are playing a major role in the total financing package of our power plant project....

“The success of these private projects in achieving the third key—benefiting US interests—should already be obvious from my description of the projects, and I will touch on it only briefly. One of the main (though not the only) benefits to U.S. interests lies in the economic value of these infrastructure projects. They are very large, usually ranging from about \$200-700 million per project. They include correspondingly large amounts of capital equipment, and engineering and other high value-added services. Since much of these goods and services can be sourced in the U.S., these infrastructure projects are the most important area of growth in export value to the U.S.....”

The Indian media picked up only a miniscule part of the statement admitting that US\$20 million was spent by the company for educating Indians and the relevant institutions on projects. While we would analyse the whole statement a little later, we must admire that Enron has successfully accomplished the task of educating Indians in flat three days as they were able to cut a deal with the Maharashtra State Electricity Board within three days of their arrival in June 1992 despite World Bank cautioning that the credentials of Enron as electricity provider be checked and later the WB refused to assist the project primarily on account of its viability. Later events were to prove that it was a case of project conceived in a hurry to repent at leisure and beyond. The Enron cannot be credited with educationist role in the same vein as they wished to project themselves. This was a demonstration of the practices which later proved to be its ultimate demise.

Entire statement has to be seen and understood in the context that when American Inc. goes abroad for doing business, apart from commercial interest, it would be subserving an important role in fulfilling the strategic interests of the Home Country in creating demand pull and employment push for people at home, but also push much larger interests such as when Enron pitched for imported fuels in disregard of fuels available domestically. Multinational companies would have a strong lobby back home to fend for their interest and generate twisting of the host country through different channels. If such techniques do not serve their purpose, the devices of legal institutions would be triggered in unfamiliar lands.

The statement referred to above boasts of the creation of large assets and also encouraging local financial institutions towards investing in such mega projects. In the ultimate analysis,

very little money, if at all, was brought in by the promoter. Indian Financial Institutions had to lend \$1.3 billion and further these institutions gave guarantee to foreign lenders to the tune of \$600 million. Thus, in effect, the exposure of Indian financial institutions was \$1.9 billion, equivalent to 8900 crore at current prices. The loan by the financial institutions is on non-recourse basis, i.e. there is no asset mortgage other than the assets of the company in the conditions as they stand. The purpose of recalling the Enron episode and associated trappings is to forewarn the Indian parties that they must forearm themselves to become informed negotiators of contracts and other associated issues. It may be well to consider that the negotiators should educate themselves and work out model terms and thereafter work through a collective consultation mechanism. In such collective mechanism there should be representation of the entrepreneurs, financial institutions and other relevant experts who are capable of projecting the proposal in a meaningful way taking into consideration, the ultimate cost of power and the capacity of the system to absorb the same. We need not be hustling through in our anxiety to meet targets as in the initial run the nuclear energy share in the total mix will continue to be marginal. We should view this as our strength. We should be able to bargain on an equitable basis in an atmosphere when partners work for mutual benefits. No one feels exploited at the end of the day. In this game there are not many buyers and sellers and commercial and strategic interests are mutually complementary. While Commercial negotiations are done as above, there would be domestic issues like land acquisition and garnering community support, particularly on the aspect of waste management. Such issues are to be managed by the Political leadership jointly with local leaders so that commercial tie-up and regulatory compliances do not face hurdles in the field. Necessary processes need to be set in motion ahead of commercial negotiations as these processes are dilatory and time consuming besides being challenging.