Future of Nuclear Power in India

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The future of any national programme rests on two important pillars: formulation of clear and *precisely articulated goals*, including an elaborate roadmap reflecting time-bound phases of implementation; and, the *ability to achieve the goals* in terms of the prevalence of a conducive environment providing the financial wherewithal, political support, and material and resource availability for the realisation of the goals.

The future of the nuclear power programme in India can be evaluated on the basis of these two parameters. As far as the articulation of goals is concerned, these have been well formulated. The country has set for itself the clear goal of being able to generate 20,000 MW electricity from nuclear power plants by 2020, which would be further enhanced to 63,000 MW by 2032.[1] This target capacity is further broken up into implementable phases on the basis of five-year plans. So, the XII Five Year Plan (2012-2017) is looking at building 10 imported light water reactors in several new nuclear parks, construction of 10 indigenous pressurised heavy water reactors of 700 MW capacity each, and two new fast breeder reactors at Kalpakkam. Therefore, as far as the articulation of goals, the first pre-requisite to determining the future of a programme is concerned, things seem to be in place.

However, challenges begin to emerge as one tries to evaluate India's ability to achieve these goals. Not so long ago, until 2008, the Indian nuclear power programme was handicapped by its inability to participate in international nuclear commerce. Owing to the fact that India was not a member of the nuclear Non-Proliferation Treaty (NPT) and had not accepted full scope safeguards on its nuclear programme, it was debarred from receiving any material or technological assistance from other countries. This situation was overturned in 2008 after a

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long and protracted period of negotiations, largely between the US and India, as part of a bilateral nuclear cooperation agreement. But, the process also involved other players and many steps, including the grant of waiver from the Nuclear Suppliers Group to permit nuclear commerce with a country that was not an NPT member, the conclusion of an India specific safeguards agreement with the International Atomic Energy Agency (IAEA), and, finally, the ratification by the US Congress of the bilateral peaceful nuclear cooperation agreement between India and the USA.

After the conclusion of all the steps by the end of 2008, India was quick to sign nuclear cooperation agreements with ten countries. These are at different stages of implementation. The most immediate benefit of the entire exercise, however, has been to bring about a spurt in availability of uranium to fuel the nuclear reactors. Consequently, the capacity factors of plants that had fallen below 60 percent during the first half of the decade beginning 2000 have been rapidly restored and are close to 80 percent today.

In the light of these developments, the ability of the nuclear establishment to realise the ambitious goals that it had set for itself looked bright, at least until recently. It was towards the end of 2011 that one could sense a shadow looming over the nuclear power programme. Ironically, this time it appeared to be forming as a result of domestic factors so that while India's nuclear power programme had unshackled itself from international regimes, it now appeared to be shackled within!

This perception began to gain ground soon after a natural disaster of unprecedented proportions struck the Fukushima nuclear power station in Japan in March 2011. The events at the three nuclear reactors at that one site, not unsurprisingly, dealt a big blow to public confidence on nuclear safety. In India, there was a general tendency to transpose the events at Fukushima onto Indian nuclear plants without understanding the seismological, technological and operational specificities of the case in Japan. Though the Indian prime minister was quick to call for a safety review at all nuclear sites, the country saw a coalescence of groups that were agitating for different factors but that came together to exploit the public fears generated in the wake of Fukushima. So it was, for instance, at Kudankulam and Jaitapur that people protesting over land acquisition and rehabilitation concerns were joined by those fervently opposed to nuclear power, by those voicing fears on the safety of nuclear power production, and by those 'foreign elements' that had a different agenda and were only to eager to 'fish in troubled waters'. The unfortunate result of this amalgamation,

however, was the stoppage of work at Kudankulam 1 and 2, the first of which, in fact, was very close to completion at the end of 2011, as well as the preparatory work that was going on at Jaitapur in Maharashtra.

Some of the shadow appears to have passed for now, at least in Kudankulam, where according to the latest media reports, over 2,000 engineers are working round the clock to bring the first plant on line by the end of May 2012. However, there is no doubt that India did lose precious time and investor confidence in the six months that it took to convince/break public protests at the nuclear site. If such incidences and losses have to be obviated in the future, it is important that some relevant aspects of the national nuclear power programme be adequately discussed in public fora to arrive at a national consensus on the subject. This article seeks to highlight four specific issues that must be kept in mind if the future of India's nuclear programme is to live up to the goals it has set for itself on paper.

First of all, the future of India's nuclear power programme will be dependent on the adequacy of understanding India's energy vulnerabilities. This, in turn, has to be comprehended at two levels—the linkage between the availability of adequate electricity and socio-economic growth; and the kind of fuel resources available to India.

On the first issue concerning the link of electricity with economic growth, it is now a well known and empirically proven fact that lack of stable, reliable electricity is not only a loss to economic growth but also a drain on the environment, and on the human resource potential of the country. Nations that are unable to meet the national electricity demand, shortchange their citizens from growth and development prospects. While it is true that the benefits of this development may not be equally available to all, it is a problem traversing many other domains, including quality of governance, and it should not be confused with the basic demand for electricity in order to power economic growth.

Within India, it is a proven fact that states that have the least per capita availability of electricity (Bihar, Assam, Manipur) are also the ones that suffer the most due to social strife and economic deprivation. At the same time, it is equally empirically true that greater economic investments flow into areas that provide, among other parameters, the promise of reliable and stable electricity supply. The cases of Gujarat, Haryana and Punjab prove that cheap, reliable electricity makes a state a preferred destination for manufacturing even if it suffers from other handicaps such as higher wages, etc.

India's present per capita power availability is at 778 kWh which compares miserably with the global statistics of 17,053 kWh in Canada, 13,647 kWh in the USA or 5,656 kWh in Italy. Even China, with a population size similar to India's, can assure 2,471 kWh to its citizens. It would be a legitimate aspiration of India to at least be able to provide per capita electricity availability that is commensurate with that of middle income nations at about 5,000 kWh. In order to do so, India would need to expand its electricity generation capacity from the current 180 GWe to at least four times this figure by 2032.[2]

The inability to meet this target or to do so with energy sources that heighten national vulnerabilities by increasing dependence on unreliable and unstable supplier nations or that cause environmental pollution and thereby negate development benefits by increasing costs on health and environment mitigation efforts, would have a direct and indirect impact on the overall economic growth potential and national development index.

For India that hopes to reap the demographic dividend from a young population, this matter should be of urgent concern and redressal. The former Director General of the IAEA, Mohamed El Baradei had once said, "Disparity in energy supply, and corresponding disparity in standards of living, in turn, creates a disparity of opportunity, and gives rise to insecurity and tensions…" India, with the kind of social and religious diversity that it has, can ill afford such fissures.

The second issue that demands adequate appreciation of the policy-makers, intelligentsia and the public, is the grim situation that India faces on the availability of affordable, reliable and sustainable sources of power generation. While most people know that India is the third largest producer of coal in the world, few recognise that the quality of this coal is low grade, with a low calorific (heat generating) value and a high ash content. This not only compromises the efficiency of the power plant but also causes more pollution. Also, the coal deposits are concentrated in select pockets of the country that necessitates haulage of coal over long distances, raises costs and ties down the transportation network. Even so, the domestic coal production is grossly inadequate for the currently operational thermal plants owing to hurdles of environmental clearances, land acquisition problems and low investments. The country already imports large quantities of coal and if nuclear energy is to be ruled out from the future national electricity mix, coal imports for the future thermal power plants would, according to one calculation, be no less than 1.6 billion tons by 2050.[3] The enormity of these figures and their impact on India's energy security hardly needs to be elaborated.

Meanwhile, India's oil-based thermal plants produce only 1,200 MW or 0.67 percent of the total installed capacity. Much of the oil is used up by the transportation sector and yet in 2006, India was the seventh largest net importer of oil in the world, hauling in nearly 68 percent of its oil consumption from other countries. Natural gas-based thermal plants currently provide for 10 percent of the total installed electricity production capacity. While gas provides a cheap source of electricity, India has limited indigenous reserves as also limited options of imports owing to the transportation problems of land-based pipelines that would have to cut across conflict prone or hostile states.

Nearly 22 percent of the current total electricity generation is from water. However, this appears to have plateaued after having experienced its share of displacement and rehabilitation disputes that have delayed projects and raised costs. Most of the potential of this sector is now seen in small projects meant to cater for local needs, rather than generation of electricity for larger grids. On wind energy, India is already the fourth largest producer of this electricity and it contributes 6 percent to the total installed capacity. However, it has its limitations in terms of energy intensity and all-time and all-weather availability. Meanwhile, research and development in solar electricity continues to improve its commercial viability as a large scale and reliable electricity source, but storage technologies are still less than perfect and yet to mature.

As is evident from the above, India currently imports traditional fossil fuels in large quantities to meet its energy demand, thereby increasing its vulnerabilities to global mood swings. For a large and rapidly developing country like India, bulk imports of fuel are neither affordable not strategically prudent.

A third issue that will affect the future of India's nuclear power programme will be the ability, or lack of it, to arrive at a consensus on a national energy strategy. While an integrated energy policy exists on paper, a critical lacuna is the lack of understanding within the political leadership, or the government ministries, on the role that different sources of energy must play in the integrated framework. There is no one entity – person or ministry – that takes ownership of the integrated energy policy and gives it direction from a holistic perspective. Rather, we seem to be in a situation where each ministry bats for its own interests and each effort or programme – thermal, nuclear, or renewable – appears as being pursued at the cost of another. This perception is required to be urgently replaced with the understanding that there is an overall vision seeking energy security for the nation from all available sources since the electricity demand of the country simply does not allow the luxury of removing any electricity source from the basket.

Lastly, it is the nuclear establishment that holds its future in its own hands. This is particularly true in the post-Fukushima environment which has thrown up the requirement for a greater interface between the nuclear organisation and the common man. Therefore, it is necessary that a well staffed, equipped and energised public awareness division of the Department of Atomic Energy energetically and proactively engages with the local populace. This will be especially necessary in areas chosen to host nuclear sites to explain to the local communities as to why their land has been chosen for setting up the nuclear reactor, how the construction of the plant would help transform their lives and their region for the better (which itself calls for innovative employment opportunities in the plant as well as in other secondary options). The overall attempt should be to make the citizen a stakeholder in the nuclear plant rather than an oustee. Most of all, nuclear power plants should become approachable to the common man by encouraging groups of citizens to visit the plant site and appreciate the technology for themselves.

It is only through affirmative action at all levels that the future of India's nuclear power programme can be secured. It would be a shame if the hard won international acceptance of the Indian nuclear power programme is lost due to domestic political shenanigans and public perception mismanagement.

Notes

1. The only other country in the world that has a target larger than the one set by India is China which is aiming to get to 80,000 MW by 2032.
2. Letter written by Nalinish Nagaich, executive director, NPCIL, in response to "Communication in Respect of KKAPP" by Rev David Thirumery, October 5, 2011, available at http://www.npcil.in/pdf/news
3. As estimated by Anil Kakodkar, "Uranium Import can Stave off Looming Energy Crisis: Kakodkar," *Hindu Business Line*, July 5, 2008.