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The nuclear thorn in India-Japan ties

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India waits The ebb and flow of nuclear fortunes

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India offers a large market for nuclear suppliers, but Japan needs to be flexible

The recent visit to Japan by Prime Minister Narendra Modi has brought into focus the ongoing India-Japan negotiations on a civil nuclear agreement. This remains an item of unfinished business, though both sides have declared that it would be pursued with greater vigour. Exactly how important is this agreement in the context of India's nuclear programme? What factors underlie the Japanese position?

India has embarked upon an ambitious programme to step up nuclear power generation. This is to be achieved through (a) indigenous pressurised heavy water reactors (PHWR), (b) fast breeder reactors (FBRs), and (c) imported pressurised light water reactors (PWRs) of advanced design sourced from suppliers such as Russia, France, the US and Japan.

India has developed its PHWRs and scaled them up to 700 megawatt electrical (MWe) capacity. These reactors require natural uranium fuel which is scarce in India and needs to be imported.

In all other aspects such as reactor design, construction, operation, including heavy water production, India is fully self-sufficient. India has been able to adapt these reactors to use various types of fuel, and has accumulated considerable years of technical and operational experience. The PHWR can also be used to produce fissile plutonium-239 for civil or military use after reprocessing the spent fuel. This programme remains the bedrock of India's nuclear programme.

India's fast breeder reactor programme is advancing rapidly. The first commercial FBR will come on stream in Kalpakkam with 500 MWe capacity. It would be capable of transforming fertile thorium-232 (which India has in ample quantity), into fissile uranium-233, enabling India to produce this nuclear fuel for its reactors. Uranium-233, which has to be produced through fuel reprocessing, can also be used for nuclear weapons though there are some technical difficulties.

Short on enriched uranium

In the PWR sector, India has had some experience with imported reactors at Tarapore (supplied by the US) and Koodankulam (supplied by Russia). The post-1974 and post-1998 nuclear embargo on India made it clear that imported low enriched uranium fuel supply could be withheld, effectively shutting down these reactors.

At present, India does not have enough commercial uranium enrichment capacity to produce its own low enriched fuel in sufficient quantities for its PWRs. So it is dependent on imported fuel for its PWRs. India is therefore planning to increase its uranium enrichment capability.

India has planned to set up PWRs imported from Russia (Koodankulam), France (Jaitapur), the US and Japan under its state-run company the Nuclear Power Corporation of India Ltd (NPCIL).

Of these, Koodankulam-1 went on line recently, adding 1000 MW to the energy-starved southern grid. Koodankulam-2 is to become operational in the near future. Areva of France and NPCIL are working on setting up an advanced PWR, the European Pressurised Reactor (EPR), of 1650 MWe capacity at Jaitapur, though the project is facing many hurdles.

Component dependency

The PWR sector is dependent on Japan for supply of some components, notably very large sized special steel forgings as part of the reactor pressure vessel. These are made of special steel, capable of withstanding the high pressures and temperatures and the intense neutron bombardment from the reactor core, without failure for over 40 years.

Typically, the pressure vessel would weigh some 300 tonnes and is made from special steel over 20 cm thick. Without this component it would not be possible to construct a PWR. There are very few companies that can manufacture these components, and the most experienced and largest supplier is from Japan. Their order books are full up to 5-6 years in the future.

A few other companies in South Korea, US, France, Russia and China are also capable of building such components. India is encouraging companies such as L&T, BHEL, and Bharat Forge to develop the capability, which would also be needed for its nuclear propulsion PWRs. Areva and other companies would be severely handicapped if Japanese components were not available for their PWR projects.

The importance of an Indo-Japanese nuclear deal stems from these considerations. The hurdles to this deal emanate from Japan's insistence that no reprocessing of spent fuel would be done in India, and that in the event of a nuclear test by India, the components supplied would be immediately returned to Japan. On the other hand, India considers it should get the same regime applicable to nuclear weapons states (NWS) under the Nuclear Non-Proliferation Treaty, which it has not signed but has unilaterally undertaken to respect. The conditions imposed on India are more stringent than those on countries China, the US and other NWS under the NPT.

Japan was one of the countries that reacted strongly to India's nuclear tests in 1974 and 1998. It was pressured by the Bush administration to agree to the waiver given to India by the nuclear suppliers group (NSG). It has refrained from developing nuclear weapons though it certainly has the technical and financial capacity to do so.

Unfair stipulation

The condition that spent fuel be returned for reprocessing is unacceptable to India as it goes beyond what was agreed with the US and other countries. It would also be difficult and unsafe to transport highly radioactive spent fuel across thousands of kilometres to the fuel supplying country. The other condition that components should be returned in the event of a nuclear test is also impossible to implement for the reason that it involves shutting down a reactor, and dismantling and shipping back massive reactor vessel components which would be highly radioactive.

What would be the consequences of Japan continuing to insist on these conditions? It would result in India facing delays in implementing the PWR programme using imported reactors and fuel. India would then be compelled to step up its PHWR and FBR programmes, and also its enrichment and reprocessing capability to compensate for the shortfall in nuclear power generation. These are programmes where India is fully self-sufficient, and is not obliged to declare them as civilian and subject to IAEA inspections.

The question that Japanese negotiators must face is this: Do they wish India to enlarge its indigenous unsafeguarded PHWR and FBR programmes (and possibly its strategic programmes), or do they wish India to enlarge its IAEA-safeguarded PWR programmes that are dependent on fuel imports? Should they give China more favourable treatment than India in matters of civil nuclear cooperation?

If the answer is no to both questions, then they need to show more flexibility in reaching a reasonable agreement with India, along the lines of civil nuclear agreements India has signed with the US, France, the UK, South Korea, Canada and other countries. India has other options that it will and must follow in case the PWR programme is delayed due to the lack of a civil agreement with Japan.

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