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Back **Policy challenges for nuclear power**

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While nuclear power has good growth potential, a clear and supportive policy framework needs to be put in place to assure the healthy and robust growth of this sector, and to optimise the scope for foreign investment and technology transfer, says BHASKAR BALAKRISHNAN.

Fuel for Koodankulam being transported…India's uranium reserves are insufficient to meet the demand from existing nuclear power plants.

India has just won a hard battle at the Nuclear Suppliers' Group (NSG) to gain freedom to engage in civilian nuclear commerce, despite its non-adherence to the Non Proliferation Treaty (NPT) and the Comprehensive Test Ban Treaty (CTBT) for well-known reasons. Strong lobbying by the US, and India's External Affairs Minister, Mr Pranab Mukherjee's statement giving assurances, were critical for winning the NSG waiver. Here's a look at some of the ma jor issues affecting the development of the Indian nuclear power sector.

The major players in the NSG, such as the US, France and Russia can now look forward to commercial participation in India's nuclear power sector and, indeed, major international companies active in this field can contribute significantly to the development of this sector. In fact, this was an important motivation for the support of these advanced countries for releasing India from the shackles of restrictions on civil nuclear commerce.

Power requirements

India's power sector needs are indeed significant. Power generation capacity has to be raised from the present meagre level of 144 GW to a minimum of 210 GW to achieve the target of "power for all" by 2012, set by the Power Ministry.

At this level, the per capita availability of power for India may not even be enough to meet the growth in demand, which is around 6.3 per cent, or a doubling every 10 years. Nuclear power from the existing 17 power reactors represents only 3.8 GW or 2.5 per cent of total capacity, compared to other sources — 92 GW (thermal), 36 GW (hydro), 12 (renewable). The six additional nuclear power reactors under construction will add another 3 GW to nuclear capacity; eight more are being planned.

The Department of Atomic Energy has projected a target of 25 GW from nuclear energy by 2020, going up to meet 25 per cent of India's power from nuclear sources by 2050. The Prime Minister, Dr Manmohan Singh, stated that these targets were too modest and called for 40 GW from nuclear power by 2020. Achieving these targets would call for a tremendous effort.

Policy for nuclear power

Internationally, there are some 439 nuclear plants in operation in 31 countries. After the 1986 Chernobyl disaster, nuclear power has had a good safety record. The share of nuclear power in the total power capacity is large in some countries such as France (78 per cent), US (19 per cent) and the EU as a whole (30 per cent). The industry seems set on a growth path, even in countries which have for long avoided nuclear power. While the nuclear power sector has good growth potential, a clear and supportive policy framework needs to be put in place to assure the healthy and robust growth of this sector, and to optimise the scope for foreign investment and technology transfer, while safeguarding public interest. Experience in other sectors indicates that piecemeal and ill-conceived reforms can damage the prospects of growth and development of the sector.

So far, the nuclear power sector has remained the exclusive responsibility of the Government. The Government alone would not be able to build up nuclear power on the scale envisaged in the future.

Therefore, it is obvious that this sector will have to be opened up to private participation, by domestic and foreign partners. Unless this is done in a meaningful manner, nuclear power growth in India will remain crippled, this time by self-imposed obstacles.

Focus on reforms

There is no sign yet of any serious review of the policy framework for the civil nuclear power sector. What are the main reforms required for this?

First, there are issues which are common to the entire power sector, such as tariff fixing, tax and other incentives, power purchase agreements, state guarantees, etc. These need to be addressed in any case.

Second, India's uranium reserves are insufficient to meet the demand from existing nuclear power plants, let alone new ones.

Therefore, import of uranium is needed. Countries such as Australia, Canada, Kazakhstan, Gabon, etc. which have large reserves of uranium will assume importance. The development of the Thorium-based fuel cycle will take more time, as there are some technical problems to be overcome, both for civilian and strategic use, although Thorium is available in plenty in India.

Need for private participation

Third, the nuclear power sector will have to be opened up to domestic and foreign private participation. Whether the government should hold a minimum stake of 26 per cent or 51 per cent is an open question.

Nuclear Power Corporation of India (NPCIL), the established government entity in this field, will be an important potential partner for foreign firms, and could benefit from foreign collaboration and gain valuable experience. It is, of course, by no means certain that this sector will be seen as attractive for private investment, as nuclear power plants have long gestation periods.

But the long-term returns should prove attractive. Allowing foreign investment in this sector would also help in obtaining assured fuel supplies and technology, and introducing a competitive element into this sector.

Fourth, the projected build up of nuclear power plants will need independent, strong and effective regulatory systems. The role, functions, and resource base of the Atomic Energy Regulatory Board (AERB) will need to be reviewed to meet the new requirements.

The regulatory body will have to deal with issues related to nuclear safety, site clearances, plant operation regulations, inspections, public information, sanctions for violations of norms, and emergency response mechanisms. It will also have to deal with waste management, transport of dangerous materials, and International Atomic Energy Agency (IAEA)-related issues.

Whether one or more regulatory bodies are needed will have to be examined. This is critical in securing public confidence and support, both domestic and foreign, for the nuclear power programme. India must ensure best possible safety in all aspects of nuclear power, from design to operation of plants, and waste management.

Addressing security concerns

Sites chosen for location of future nuclear plants will have to take into account stringent safety norms, and in case they are located near international borders, concerns of neighbouring countries will have to be addressed. Public information and campaigns aimed at meeting safety concerns will be needed to avoid growth of local opposition to nuclear power plants.

Of course, a prime concern will be the security of nuclear power plants against terrorist attacks, as well as security clearances for all companies and personnel involved in the plants. The security systems and procedures will need to meet best international standards. While we will place many of our nuclear facilities to international safeguards, the safeguards regime will involve visits by inspectors and experts. It will be a challenge to safeguard sensitive information about our strategic programme from these personnel.

Fixing carbon credits

The increased production of radioactive waste will have to be managed, taking into account safety requirements, and the fact that India has a relatively high population density. It will be a challenge to find locations for storage of the waste, as many advanced countries have found.

The additional nuclear power plants may well qualify for carbon credits under the global climate change mitigation framework. In the case of hydro power, credit of about 2,000 tonnes CO{-2} is available per MW of capacity.

But for nuclear power, there is no agreed figure for the credit, as many considerations need to be taken into account, apart from the power generation process *per se*. But if an agreed carbon credit level is fixed, the income from this (present values for carbon credits

are Euro21 per tonne CO{-2}) could be important. The precise climate change impact of a nuclear power plant under Indian conditions requires further studies.

It is hoped that the policy-making establishment in the Government and the Department of Atomic Energy (DAE) are actively seized of these issues, and are prepared to meet the challenge of rapid growth in India's nuclear power sector by all available means.

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