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Construction of the Kundankulam nuclear power plant in the Tirunelveli district of the southern Indian state of Tamil Nadu. Photo: International Atomic Energy Agency [South Asiaenergy](#)

India speeding toward nuclear energy self-sufficiency

The Modi government's “make in India” nuclear push can help to achieve long-term energy security. Besides allowing India to lead on innovation, it also makes economic sense

By [Seema Sengupta](#) Calcutta, July 10, 2017 4:45 PM (UTC+8)

Even as India struggles to join the elite Nuclear Suppliers Group of nations – over its failure to sign the Nuclear Non-Proliferation Treaty – and as uncertainty continues to surround the global nuclear industry post-Fukushima, Narendra Modi's government has committed itself to nuclear energy in a big way. In May, India's cabinet approved plans to build 10 new atomic reactors that will take the country's nuclear capacity to 63,000 megawatts by 2032.

This push to fast-track a domestic nuclear industry will not only help India to achieve long-term energy security and self-sufficiency – it will also contribute significantly towards its sustainable development goals with regard to clean energy.

Misgivings over proliferation

Despite an impeccable non-proliferation record, apprehensions about India diverting supplied materials and technologies – in order to expand her atomic weapons arsenal – persist in sections of the international community. Hirotaka Matsushima, Director of the International Peace

Promotion Department in Hiroshima – a city whose mayor opposed last year’s Indo-Japan civil nuclear agreement on the grounds that it hindered the cause of nuclear disarmament – told Asia Times that concerns remain about nuclear materials, technologies and associated equipment being potentially used by India for the development of deadly nuclear arms.

Anil Kakodkar, an eminent nuclear scientist and the former Chairman of India’s Atomic Energy Commission, disputes these claims. Welcoming New Delhi’s commitment to new projects, he says the world recognizes India as a responsible player in the domain of atomic energy.

Indigenous thrust justified

The Modi government’s “make in India” nuclear push has the benefit of being economically beneficial to domestic suppliers, while the scale of the program means there will be economies of scale. Nuclear experts have argued that previous delays in home-made projects were not due to deficiencies in knowledge or in India’s technological base, but because of a serious lack of government incentives and planning.

Since 1983, India has built 16 nuclear power units – with a maximum capacity of 540MW – using purely indigenous technology, materials and equipment. And between 2000 and 2010, New Delhi focused its attention on design and construction of larger – 700MW and higher – nuclear power plants.

“Over the decades, India has established a successful track record of designing, constructing and operating Pressurized Heavy Water Reactor-based nuclear power plants economically, safely and with high capacity factors,” says Satinder Singh Bajaj, the former Chairman of India’s Atomic Energy Regulatory Board, the country’s civil nuclear safety regulator.

Indeed, India’s fleet of indigenously designed and constructed reactors have shown remarkable results. One Indian plant clocked over 700 days of nonstop operation – the second-longest run registered globally.

Technological innovation

India is on the verge of passing a nuclear milestone by commissioning an ultra-modern, indigenously-designed fast-breeder reactor (FBR) capable of converting atomic waste into usable fuel. The reactor thus generates more atomic fuel than it consumes, ensuring a renewable and unlimited supply of clean electricity.

“This FBR version uses a mixture of uranium and plutonium oxides as fuel and produces just enough plutonium to sustain operation without the need for external plutonium input,” explained LV Krishnan, former Director of the Safety Research Group at the Chennai-based Indira Gandhi Center for Atomic Research. Later designs will be adjusted to exploit India’s strategic **Thorium** reserve, he adds.

Indian nuclear scientists have already achieved industrial-scale capability for large-scale deployment of **Thorium-fueled reactors** and have even designed a prototype reactor that can produce electricity for two years continuously without refueling and control maneuvering.

Kakodkar, the pioneer of this project believes “accelerated growth of both first stage (Thermal reactors) and second stage (Fast reactors) will lead to advancement in introduction of **Thorium reactors**.” Krishnan, however, cautions that its success hinges on the availability of sufficient plutonium.

Safety assured

India’s dalliance with novel nuclear innovation can help position her as a leading supplier of cutting edge technology that is safe, efficient and convenient, as well as unique reactors capable of revolutionizing the industry. Bajaj contends that India has always put special emphasis on safety mechanisms to address “beyond design basis” events and “station blackouts.”

Krishnan believes a number of safety features make India-made reactors unique. These include double containment to minimize radioactive release; extra space for holding radioactive waste; adequate natural cooling features; capability to withstand absence of off-site power; and special features to guard against natural calamities.