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Indian Mega Nuclear Plant Protested: Government short-circuits environmental hearings

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Japan Focus presents two articles on the Indian government's plans to build a nuclear power plant in South India and the local struggle to block it.

Praful Bidwai and MV Ramana

KOODANKULAM, Tamil Nadu-—Even as the Indian government gropes in the dark for a coherent policy on energy and the environment, it is pressing hard for a highly unpopular nuclear power project here, close to the peninsula's southern tip.

The project, which involves building six Russian-designed reactors of 1,000 Megawatt (Mw) capacity each, will be India's biggest nuclear power station.

It faces staunch opposition from the local people, many of them fishermen, who fear it will destroy their livelihoods, gravely endanger their safety, and physically uproot thousands of families.

At stake is the fate of India's grandiose plan to produce as much as 275,000 Mw of nuclear electricity (more than twice the existing total power generation capacity) by mid-century, and the issue of granting clearances to potentially hazardous projects which are opposed by the people they are liable to affect adversely.

Also involved is the defence of elementary human rights and principles of environmental protection.

The conflict over the Koodankulam project came to a head on June 2 with a statutory public hearing on an Environmental Impact Assessment (EIA) report on four proposed new light-water reactors.

The other two reactors, for which an agreement was signed way back in 1988 between president Mikhail Gorbachev of the former USSR and then prime minister Rajiv Gandhi, have been under construction since 2002.

India's current nuclear power plants

The hearing, mandated by India's Ministry of Environment and Forests (MoEF), is an essential component of the process of approving all major projects with large

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ecological impacts.

Its rationale is to secure the informed consent of the people after widely disseminating all relevant information about a project and allowing "every person" present to express his/her views about it.

On June 2, more than 2,000 people from three coastal districts of Tamil Nadu turned up at the hearing and demanded to speak -- despite an intimidating police presence .

Many protested violations of the MoEF-specified norms, in particular, the absence of 30 days' notice, and wide publicity for the EIA summary translated into the local language (Tamil).

Anti-nuclear protest at World Social Forum, Mumbai, 2005

The authorities abruptly terminated the hearing within two hours, without recording "all the views and concerns expressed", and reading "them over to the audience", while explaining "the contents in the vernacular language", as they are required to do.

"This termination was not provoked by violence or rowdy behaviour of the opponents,'' says S.P. Udayakumar, a social scientist and peace studies scholar, based in the adjoining Kanyakumari district. "It seemed like a calculated move to deny the people an opportunity to express their views. This has greatly angered the public, which is already unhappy with the construction of the first two of the six reactors, which began five years ago."

The two reactors were granted approval without an EIA or public hearing. Their construction involves mandatory land acquisition, restrictions on fishing, and grave apprehensions about environmental damage.

The local people, highly literate and aware of the dangers of nuclear radiation, are determined to oppose the project.

They believe the project sponsors are hiding the truth about its hazards, including radiation, future accumulation of large quantities of spent fuel, routine releases of toxic isotopes, and the potential for a catastrophic accident leading to a core meltdown.

"The people can hardly be sanguine because they know that the Koodankulam reactors are of Russian design, as was the Chernobyl reactor, albeit a different model", says Udayakumar.

Neither the Nuclear Power Corporation (NPC), a subsidiary of India's Department of Atomic Energy (DAE), nor the EIA, even acknowledges any hazards.

"This opacity has added to public fears about the project", says Anton Gomez, of the Tamil Nadu and Pondicherry Fisherpeople's Federation, based in the port city of Tuticorin.

The fate of the proposed four reactors at Koodankulam crucially hinges on the United States-India nuclear deal, which is under negotiation, and its approval by the 45-nation Nuclear Suppliers' Group (NSG).

If the deal does not go through, or if the NSG does not clear it by amending its rules, the four

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reactors cannot be built. (The earlier two reactors faced no such hurdle because NSG rules were not in force then.)

However, uncertainty about the four new units has not dampened the enthusiasm of NPC and the civil administration in demanding that they be approved at once.

"This has further exacerbated tensions between these authorities and the people", says Manju Menon of the environmental group, Kalpvriksh. "Some of these tensions derive from the project's location-specific problems."

First, the Koodankulam plant is being built at the edge of the Gulf of Mannar, one of the world's richest marine biodiversity areas, with 3,600 species of flora and fauna. Thermal discharges from the plant are liable to adversely affect this precious biological reserve.

Second, three large settlements lie within a five km radius of the plant: Koodankulam (pop. 20,000), Idinthakarai (pop. 12,000), and a new Tsunami (rehabilitation) Colony (pop. 2,000-plus). Its location violates the Department of Atomic Energy's siting norms and a state government order of 1988, which declares a 1.6-km radius around the plant "prohibited".

The next zone, in a five km radius, is a "sterilised area", where "the density of population should be small." Finally, "in the outlying area of 16 km, the population should not exceed 10,000."

Koodankulam and Idinthakarai are just 2 - 4 km from the plant as the crow flies. The last row of houses built for tsunami victims is less than one km away. More than 70,000 people live within a 16 km radius.

So either NPC will flagrantly violate its own norms, or thousands of families will be brutally separated from their livelihood as fisherfolk. "This is altogether too disgusting even to contemplate", adds Menon.

Third, the plant is being built in a seriously water-stressed area. It originally planned to bring fresh water from a dam 65 km away. But the idea was dropped owing to popular resistance. It will now daily
desalinate 48 million litres of seawater -- an exorbitantly expensive, unproved, technology. This will send the electricity costs through the roof.

Koodankulam is also fraught with problems generic to nuclear power, including generation of radioactive waste, routine releases of radioactivity, and the possibility of catastrophic accidents like
Chernobyl.

Thus, the plant will generate large amounts of highly radioactivespent fuel. It will routinely release radio isotopes like iodine-131 and noble gases. It will expose hundreds of occupational workers to high doses of radiation -- a silent, invisible poison that causes cancers and genetic deformities.

The reactors are also vulnerable to catastrophic core meltdowns that will affect India's southern states and even Sri Lanka.

India is making "a Faustian bargain", says Menon. "It is endangering thousands of livelihoods while promoting an ultra-hazardous technology. Ultimately, there will be a contest between the people's will and the government's obsession with nuclear power. If democracy has any meaning, the people should prevail.''

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Tehelka

Jun 23, 2007 issue

Home, Next to N-Reactor

Atomic energy bodies have put 70,000 villagers around the Koodankulam nuclear power plant at risk, write Praful Bidwai and MV Ramana.

Grand Promises, Low Returns

STIMATED GENERATION	ACTUAL GENERATION	YEAR
8,000 MW	600 MW	1980
20,000-25,000 MW	1000 MW	1987
43,500 MW	2,700 MW	2000

The people of southern coastal Tamil Nadu had been looking forward to the thrice-postponed public hearing on the environmental impact of the Koodankulam nuclear reactors being built near India's southern tip, barely 20 kilometres from Kanyakumari. They were concerned about this ever since 1988, when USSR President Mikhail Gorbachev and Prime Minister Rajiv Gandhi signed an agreement on building two large (1,000 mw each) VVER-1000 nuclear power generators.

For five years, they had watched the power station rising slowly but menacingly on cordoned-off land at Koodankulam, the closure of its fishing beach, construction of a special jetty to land heavy equipment, and the growing movement of contractors and equipment.

Over the years, they became more aware of the nature of these plants, being built by the Nuclear Power Corporation of India Limited (NPCIL), and developed apprehensions about radiation releases, about catastrophic accidents, about how hot water from its coolant circuit pumped into the sea might affect the fish catch, about hazards from storage and movement of radioactive material, and about freshwater being diverted from the Pechipparai dam, vital to meeting the region's drinking water and irrigation needs. Another concern grew when plans for adding four more units to the station were announced: their own displacement.

Rules say there should be no habitation around nuclear plants. But 70,000 people live within 16km of Koodankulam On June 2, they finally had their first chance to voice their concerns.

The people of Tirunelveli, Tuticorin and Kanyakumari districts had prepared for the public hearing with petitions and arguments. They came in trucks and buses to Tirunelveli's Government Engineering College hoping that the hearing would be free and fair, and held in a friendly atmosphere — only to find intimidating bandobast with 1,200 policemen, nasty riot gear and armoured personnel carriers. Yet, none of this prevented them from expressing their views.

The hearing, at which we were present, began with District Collector G.Prakash inviting Project Director SK Agrawal to present an overview of the reactors and their safety systems. SP Udayakumar, a peace studies scholar based in Kanyakumari district, objected to this. He said the hearing was to ascertain the people's views on the project's Environmental Impact Assessment (EIA), not to have NPCIL expound on its safety. The collector paid no heed and said NPCIL was there to answer any doubts the people may have. Many protested that the collector had not made the EIA Executive Summary for the proposed Reactors 3 to 6 available in Tamil, thus denying them an opportunity to understand the details. The collector lamely said he had put the EIA summary on the official website and also in certain government offices. But he could not produce a copy. Not one member of the public had seen it.

At any rate, about 10 activists and people spoke, expressing misgivings about the project's risks and hazards. Agrawal also

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spoke. Some speakers were angry. But there was no violence or rowdiness.

Norms Flouted

Under the EIA, the purpose of a public hearing is to ascertain the concerns of local communities, ngos and environmentalists on a project's environmental impact. The EIA notification of 1994, amended last year,mandates that:

- the public be given 30 days' notice in English and vernacular newspapers;
- information regarding the availability of the EIA and its Executive
- Summary in designated offices be publicised;
- the EIA Executive Summary be made available in Tamil, the most widely spoken language in the area;

The June 2 hearing violated each one of these conditions. The collector, say MoEF rules, must conduct the hearing in "ensuring widest possible public participation district-wise... Every person present ... shall be granted the opportunity to seek information or clarifications... The summary... reflecting all the views and concerns... should be read over to the audience... explaining the contents in the vernacular language." These norms were also violated. Finally, MoEF norms mandate an EIA and a public hearing for any project worth Rs 100 crore or more. This has not been done for the desalination plants.

Suddenly, less than two hours later, the collector announced that the hearing had ended. He did not bother to sum up in Tamil the full range of views expressed, nor secure the assembly's approval, required under the rules (See Box: Norms Flouted). Thus ended the only public hearing on India's largest proposed nuclear power station (6,000 mw).

Its farcical nature, the collusion evident between NPCIL and the district administration, and the flagrant breach of stipulated procedures have further polarised opinion here. The people overwhelmingly oppose the project. The authorities seem hell-bent on building it, even if it involves violating norms set by the Department of Atomic Energy (DAE), the Atomic Energy Regulatory Board, and the Tamil Nadu government. Siting norms say that a 1.6-km radius zone around a nuclear power station must have no habitation. The next 5-km radius area must be a "sterilised zone", where "the density of population should be small so that rehabilitation will be easier." Finally, in the outlying 16-km radius, "the population should not exceed 10,000". A TN government order of May 1988 clearing the project lays down the same conditions.

Koodankulam lies at the edge of the Gulf of Mannar, one of the world's richest biodiversity areas.

However, at least three large settlements lie within the 5-km zone: Koodankulam (population 20,000), Idinthakarai (population 12,000), and a new tsunami (rehabilitation) colony (population 2,000-plus). Now, Koodankulam and Idinthakarai are just two to four km from the plant as the crow flies. And parts of the tsunami colony are less than a km from the reactors. The population in the 16-km radius is at least 70,000!

So either NPCIL will flagrantly violate its own norms, or thousands of families will be uprooted — and separated from their livelihood as fisherfolk.

This is only one of the many problems Koodankulam poses. The rest fall into three categories: location-specific, technology- and cost-related, and problems generic to nuclear reactors, irrespective of their design or technology. The reactors' need for freshwater is a major issue in this water-scarce region. The EIA says this would be drawn from the Pechipparai dam, 65 km away. When this led to opposition, NPCIL decided to try desalinating

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seawater. In 2004, it awarded a Rs 116-crore contract to Tata Projects to construct a desalination plant to supply about 7.6 million litres a day. Six reactors would, however, require four times as much. There is no word on how the need will be met.

The second requirement is seawater to cool down the reactors. According to the Ministry of Environment and Forests (moef), the temperature of the discharged water should not be higher than 7°c above that of the sea. But temperature increases at India's coastal nuclear reactors exceed this norm: 7.7°c (Tarapur 1&2), 8.4°c (maps 1&2 at Kalpakkam), and 9.5°c (for Tarapur 3&4).

If all six 1,000 mw reactors are built at Koodankulam, they will release over 13 times the heat discharged by the two maps reactors (220 mw each). Either the increase in the temperature of the water will be higher than at Kalpakkam. Or, the amount of seawater circulated will be minimally 13 times greater. In either case, the impact on marine life will be significantly higher. Further, Koodankulam lies at the edge of the Gulf of Mannar, one of the world's richest marine biodiversity areas, with 3,600 species of flora and fauna, 377 of them endemic. Thermal discharges from the plant are liable to affect this precious biological reserve. No less important is the plant's likely impact on the region's marine fisheries. The three districts account for 70 percent of the state's fish catch, and generate over Rs 2,000 crore in annual exports.

Safety? Dae Doesn't Care

Practically all facilities operated by the Department of Atomic Energy (DAE) have had accidents of varying severity. A 1993 fire at the Narora power plant; valve failure leading to massive radiation doses to workers at Kalpakkam in 2003; and collapse of a containment dome at Kaiga in 1994. All these partly resulted from avoidable reasons: poor cabling design and non-replacement of turbine blades (even after the manufacturer's warning) in Narora, faulty practices in Kaiga, and non-installation of monitors in Kalpakkam. Hundreds of workers have been subjected to radiation above the permissible limit.

Further, the Atomic Energy Regulatory Board (AERB), which is to oversee the safe operation of all civilian nuclear facilities, is not independent of the dae. It reports to the Atomic Energy Commission (AEC), which is chaired by the dae head. The NPCIL chairman is also an AEC member. Thus,both dae and NPCIL exercise administrative power over the AERB. (Its lack of independence directly contravenes the International Convention on Nuclear Safety, which India signed in 1994.) Former AERB chairman A. Gopalakrishnan offers an example of the AEC's interference: "When, as chairman, I appointed an independent expert committee to investigate the collapse at Kaiga, the AEC chairman wanted its withdrawal and matters left to the committee formed by the [NPCIL MD]. dae also complained to the [PMO] who tried to force me to back off".

More vitally, livelihoods of thousands of fisherfolk, who possess remarkable skills in marine fishing, but rarely practice agriculture, are liable to be destroyed. Koodankulam will thus create a displacement crisis as well.

The next set of problems pertain to technology and costs. Nuclear reactors, including the Koodankulam plant, are a high-risk technology. Among all electricity generating technologies, nuclear power alone is vulnerable to catastrophic accidents — witness the Chernobyl meltdown of April 1986 (See Page 12). While the VVER-1000 reactor is different in design from the rbmk reactor at Chernobyl, it only means that the potential sequence of events leading to a major accident would be different. All existing reactor types are capable of undergoing a loss-of-coolant or reactivity-surge accident, which could cause a core meltdown and enormous releases of radioactive

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poisons, affecting the air, water, plant and animal life over thousands of square km.

Besides, VVER-1000 reactors pose specific safety concerns. Their operating experience raises questions about the reliability of their control-rod mechanism, which is crucial to preventing a runaway fission chain reaction. In the last couple of years, at Temelin in the Czech Republic and at Kozloduy in Bulgaria, numerous control rods, which are supposed to arrest power excursion or reactor misbehaviour, did not move as designed.

On March 1, 2006, when Kozloduy's Unit 5 was operating at full power, one of the four main circulation pumps tripped due to electrical failure. As reactor power was reduced to 67 percent of nominal capacity, three control-rod assemblies remained in the wrong position. Of the remaining 61 assemblies, 22 did not move with driving mechanisms. The number of control-rod assemblies unable to scram (to drop due to gravity only) remains unknown. Control-rod insertion failures are considered serious and lead to a severely degraded state of safety if an accident-initiating event occurs.

VVER-1000s pose other safety issues too, including the integrity of the pressure vessel (which tends to become extremely brittle with routine neutron bombardment), reliability of steam generators and auxiliary shutdown system, and the layout of the plant, which involves the crisscrossing of a number of steam-lines. In an accident, this could lead to broken steam-lines whipping around and hitting electrical supply and control systems, intensifying the accident and its consequences.

In 1997, these safety issues led to the cancellation of loans from the European Bank for Reconstruction and Development for VVER reactors in Eastern Europe. The DAE's track record does suggest that these reactors might well undergo accidents (See Box: Safety? DAE doesn't care). As power generation costs go, Koodankulam will be expensive and increase consumer tariffs. The estimate for costs for Koodankulam 1 and 2 is about Rs 3.08 per unit. This will definitely escalate thanks to delays in construction. In contrast, the cost of a unit of power from the nearby Neyveli Thermal Power Station is Rs 1.74 to 1.66 (on capacity factors of 70 and 85 percent respectively). Currently, competitive bids for the Sasan power project in Madhya Pradesh are as low as Rs 1.30 to 1.45 per unit. That thermal power is much cheaper is also shown by detailed research by one of us (MVR) comparing the Kaiga reactor and the Raichur thermal station. Wind power, a totally renewable resource, is being sold at Rs 2 to 2.50 per unit.

Seen from any angle, Koodankulam, then, is a bad, unsound bargain. The DAE's (and NPCIL's) insistence on ramming the project down the peoples'throats is based on a series of fallacies and mistaken assumptions. One widely held assumption is that although serious, the safety problems of nuclear power are manageable; or even that they have been resolved — especially after Chernobyl. However, the basic features of all nuclear reactors remain the same. Nuclear power is a complex technology involving large quantities of radioactive materials, and relatively high temperatures and pressures, where events can spin out of control in a very short time.

In studying the safety of nuclear reactors and other hazardous technologies, sociologists and organisation theorists (e.g. Charles Perrow and Scott Sagan) have concluded that serious accidents are inevitable with complex high-technology systems. Their very character makes accidents "normal" to their operation — regardless of the intent of their designers, operators and managers.

NPCIL doesn't provide for insurance against mishaps. It expects the government to deal with such eventualities. In such technologies, many major accidents have seemingly insignificant origins. Given the complexity, all

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possible accident modes cannot be predicted and operator errors are comprehensible only in hindsight. Adding redundant safety mechanisms only increases system complexity, permitting unexpected interactions between subsystems and creating new accident modes. Therefore, it's impossible to ensure that reactors won't have major accidents; calculations of probabilities of accidents are necessarily unreliable.

That's the problem with nuclear technology's "hardware". Its "software" has been analysed by theorists of the High Reliability Organisation School at the University of California, Berkeley. They identify some human and organisational conditions that are necessary, though not sufficient, for managing risky technologies with a relative degree of safety. These include political elites and organisation leaders placing a high priority on safe design and operations, sophisticated organisational learning that ensures quick responses, and continuous attention to safety culture. The DAE simply does not meet these conditions.

The risks posed by nuclear radiation are grave — and insidious, because radiation damages cell dna and causes cancers and genetic deformities. Radiation is harmful in all doses: there is no safety threshold. All nuclear activities inevitably emit radiation and reactors routinely discharge radioactive isotopes in their effluents and emissions. No wonder nuclear power is intensely unpopular and increasingly shunned the world over. A 2005 International Atomic Energy Agency-sponsored opinion poll of 18 countries found that less than one-third of the people supported building new reactors. When asked about the possible use of nuclear energy to combat climate change, only 38 percent expressed support for expanded reliance on nuclear power. Even in France, nuclear power's poster-child, thousands of people demonstrated in five cities last March against plans to build a so-called "third-generation" nuclear reactor in Normandy. Yet, the nuclear industry propagates the myth that atomic power is now undergoing a global renaissance and that its contribution to energy generation will substantially increase.

In reality, the history of nuclear power is a story of the greatest failure in the world's industrial history — of euphoric projections and repeatedly missed targets. Had the industry's projections made a quarter-century ago materialised, the world would have had at least 10 times more nuclear power than it does. This is true in India's case too. Particularly glaring is the failure of fast-breeders on which the DAE bases the second and third stages of its much touted "three-stage programme". Many countries, including the US, UK, Germany, and France, were initially enthusiastic about breeders. Most have abandoned breeders because of accident-proneness and even poorer economics than non-breeder reactors.

Nuclear power contributes just 16 percent to global power generation — and an even more modest 6 percent to energy production. The International Energy Agency projects that under business-as-usual conditions, nuclear power's contribution will shrink to 10 percent by 2030 as ageing reactors are retired, but fewer replacements ordered. Given this, predictions of a nuclear resurgence are simply wishful thinking. Another fallacy driving the DAE's atomic pursuits is that nuclear power is cheap. But because of its high capital intensity, nuclear power has proven expensive. This has become a particularly negative constraint under ongoing global electricity sector restructuring, leading to a greater emphasis on competition. Financial risks that were previously borne by consumers are increasingly seen as investors' responsibility. As the oecd's Nuclear Energy Agency says, "investors tend to favour less capital intensive and more flexible technologies".

In the country with the most nuclear reactors, the US, a Massachusetts Institute of

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Technology study found that unless there are dramatic improvements in nuclear cost-factors (and none in other technologies), nuclear power simply won't be competitive. The study estimated unit costs of 6.7 cents for nuclear, 4.2 cents for coal, and 3.8-5.6 cents for gas in the US. The story in other countries is similar. NPCIL does not provide for insurance liability against accidents, not even to the minimal extent that the Price-Anderson Act imposes upon nuclear utilities in the US. The assumption seems to be that in the event of an accident, the government would deal with the consequences — a direct subsidy, in effect. Besides costs, irradiated spent fuel imposes another constraint on nuclear plans globally. It can either be reprocessed or directly disposed. Direct disposal involves long-term storage followed by encapsulation and permanent storage in a geological repository. No country has yet built a geological repository. The DAE treats spent fuel by reprocessing it and segregating wastes according to their radioactivity.

But reprocessing is expensive. Based on an examination of DAE budgets, one of us (MVR) estimates that the cost of reprocessing each kg of spent fuel from DAE heavy water reactors is Rs 20,000–30,000. NPC does not include this in tariff estimates; if included, it would increase the unit cost by Re 0.40 to 0.60. The cost of reprocessing from Koodankulam will be even higher because of the reactors' technological specifications. Besides the cost, the wastes stay radioactive for thousands of years, posing health and environmental hazards to future generations. This is iniquitous since these generations would bear the consequences while we use the electricity. No technology that generates long-lived wastes can be environmentally sustainable.

The idea that nuclear power is a safe, environmentally sustainable and cheap source of energy is a mirage. It's time to move away from nuclear power and follow a sound energy policy. As a first step, and in response to the long-standing and just demand of the people of southern Tamil Nadu, the Koodankulam project should be abandoned.

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