GREENPEACE Briefing

Jaitapur, India: EPR -- a nuclear problem not an energy solution

The French nuclear industry, supported by a group of European commercial banks[1], plans to build two European Pressurised Reactors (EPRs) in India. Jaitapur in Maharastra state, one of the only parts of the Indian coast classed as a 'high risk' earthquake zone[2], has been chosen as the site.

Despite the EPR being celebrated by the nuclear industry as its answer to the nuclear industry's resurrection, the only EPRs under construction reveal serious concerns about its design, safety and cost. In India, these concerns would be multiplied due to weak regulation and the proposed location.

Nuclear energy is not only the most controversial and dangerous form of energy generation, it is also one of the most expensive. To raise the many billions of euros needed to build even a single nuclear reactor, utility companies rely heavily on banks and other financial market players.

If the deal goes ahead, India will be left with spiralling costs and an energy option that won't meet its energy needs. It will seriously increase nuclear hazards, including contaminating the environment and the danger of deadly nuclear waste that has no safe solution.

The nuclear industry has spent the past decade trying to convince the public and decision makers that, despite its downsides, it will help tackle the climate crisis. But what it offers in reality is an industry that delivers too little, too late, is too expensive and too dangerous.

The EPR – Dangerously flawed

The Jaitapur project comprises two 1,650 MWe nuclear reactors (with the possibility of increasing it with an additional four reactors, which would make it the world's largest nuclear power plant[3]). The Generation III+ class EPR has been designed and developed by the French company AREVA, which is notorious for its poor track record on quality control as seen from the EPRs being built in France (Flamanville 3) and Finland (Olkiluoto 3), which are suffering safety problems, construction delays and skyrocketing costs[4].

[1] In October 2009 NPCIL announced it was in talks with a group of French banks on a loan of US$ 3.2 billion. The group consists of: BNP Paribas France, Calyon, part of Crédit Agricole France, HSBC Bank United Kingdom, Natixis France and Société Générale France; Hindu Business Line, "Jaitapur nuclear plant will cost Rs 1-lakh cr", Hindu Business Line, 15 October 2009.
[2] Geologic Survey of India, letter, January 5, 2009.
[3] http://netindian.in/news/2010/11/28/0008841/jaitapur-nuclear-power-project-maharashtra-gets-environmental-clearance
[4] http://www.greenpeace.org/international/en/publications/reports/epr-the-french-reactor/

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These projects are riddled with a range of problems, including such fundamental design fault hazards as having the operating system joined with the safety system, meaning that in an emergency if the operating system malfunctions, it can take the safety system with it. It is also questionable whether they could withstand having an aircraft crash into them.

The Finnish safety agency STUK recorded over 3,000 safety and quality problems with the construction [5] of Olkiluoto 3, stating these problems occurred for a number of reasons, including attempts to reduce costs leading the company to select cheap, incompetent subcontractors and overlook safety-related problems[6]. In France, there are similar problems[7].

In addition, EPR reactors are inherently harder to build and control because of their larger size and the fact that they are designed to use high fuel burn-up, which places higher requirements and stricter standards on the quality of their construction. In contrast most Indian reactors built to date have been units up to eight times smaller (220 MWe), with just two coming close to even one-third (540 MWe) of the size of an EPR (1,650 MWe).

India has 19 operating reactors in total: seventeen of 220 MWe or smaller, and only two 540 MW reactors. It has long record of safety and technical problems, one of the most extreme examples is the collapse of a reactor containment, which is designed to protect the reactor, in Kaiga[8].

Hardly any nuclear power station has been built on time, and despite AREVA's promises in Europe and now India, to date they have failed to deliver on schedule, leaving their projects years behind schedule and billions of euros over budget.

Earthquake hazards

The proposed site for the reactors and the realities of nuclear waste pose serious dangers for the local community.

Jaitapur is in one of the only high earthquake risk zones on India's coast. The area is classed as being in Zone IV, meaning it is prone to strong earthquakes with the possibility of one reaching seven on the Richter scale, which can cause buildings to collapse. No nuclear plant has ever been hit by an earthquake of this magnitude.

Over the past 20 years alone, there have been three earthquakes in Jaitapur exceeding 5 points on the Richter scale. In 1993, the region experienced one

[5] http://www.spiegel.de/international/europe/0,1518,655409,00.html
[6] Management of safety requirements in subcontracting during the Olkiluoto 3 nuclear power plant construction phase, Investigation report 1/06, STUK (Finland's Radiation and Nuclear Safety Authority), 10 July 2006"]
[7] Management of safety requirements in subcontracting during the Olkiluoto 3 nuclear power plant construction phase, Investigation report 1/06, STUK (Finland's Radiation and Nuclear Safety Authority), 10 July 2006; ASN letter from Flamanville-3 inspection dated 25 January, 2008
[8] http://princeton.academia.edu/MVRamana/Papers/264401/Safety_First_Kaiga_and_Other_Nuclear_Stories

reaching 6.3 leaving 9,000 people dead.[9] And last year, an earthquake caused the bridge to Jaitapur to collapse. None of this was taken into account when the site was chosen.

In 2007, Japan's Kashiwazaki-Kariwa nuclear power plant was near the epicentre of the strongest earthquake ever to hit a nuclear plant. The 6.4 earthquake damaged the plant and shut it down for almost two years.

Nuclear waste – no solution

AREVA claims that one of the EPR's advantages is that it will produce less waste than other reactors. But while the promise is that the volume of waste will be reduced by 15 percent, the waste it produces will be disproportionately more dangerous because it will contain more readily released radioactive substances.

With regard to radioactivity, the EPR will not be a step forward: improved fuel combustion rates simply lead to more dangerous waste. In addition, by being able to function with 100 percent MOX fuel (a mixture of uranium and plutonium oxides) the EPR will be a major link in the nuclear reprocessing scheme that is highly contaminating.

Furthermore, there is still no permanent or safe solution for storing hazardous nuclear waste, which remains lethal for millennia. For Jaitapur, there is no plan or fund for long-term waste management. Hazardous, nuclear waste will be an additional burden – both financially and with regard to safety -- for the Indian people.

Weak regulation

India lacks an independent nuclear safety regulator. An independent, well-resourced nuclear safety authority is the main pillar of minimising the risks inherent in the use of nuclear power.

The six board members that comprise India's nuclear safety agency, the Atomic Energy Regulatory Board (AERB), include several former employees of the state nuclear power company NPCIL, the operator-to-be of Jaitapur EPR power plant. AERB reports to the Department of Atomic Energy (DAE), which is responsible for promotion of nuclear power, and owns NPCIL as well as directly owns and operates nuclear facilities. AERB largely relies on DAE staff for its inspection activities.

The profound implications are clear, as stated by former AERB head, Dr. A. Gopalakrishnan:

[9] 11 Jain, S.K. et al 1994: The M6.4 Killari, Maharashtra Earthquake in Central India. EERI Newsletter, Vol. 28, No. 1. http://www.nicee.org/eqe-iitk/uploads/EQR_Killari.pdf

> *"This dependency is deliberately exploited by the [Department of Atomic Energy] management to influence, directly and indirectly, the AERB's safety evaluations and decisions. The interference has manifested itself in the AERB toning down the seriousness of safety concerns, agreeing to the postponement of essential repairs to suit the DAE's time schedules, and allowing continued operation of installations when public safety considerations would warrant their immediate shutdown and repair."*
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> *"The safety status of nuclear energy installations in India is far below international standards, and in the absence of an independent regulatory body this has serious implications for public safety."*[10]

The low standard of nuclear safety in India can be seen from frequent cases of safety system malfunctions, leaks of radioactive materials and environmental contamination[11].

The situation in India is in clear violation of the International Atomic Energy Agency Convention on Nuclear Safety (1994) to which India is a party[12]:

"Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy."

Costs

The two Jaitapur EPR units are officially estimated to cost 32,000 crore (€ 5.4 billion). This is less than half of the cost estimates of building the reactors in Europe or Canada.

Combined with weaker regulation, the pressure to keep costs low in India could cause even larger problems with cutting safety corners and poor quality of construction than we have seen in France and Finland, which are two and four years behind schedule respectively, with cost over-runs close to 3 billion euros each. India's nuclear power programme has a history of similarly massive cost overruns, with reactors costing on average three times as much to build than originally estimated.

The argument about cheap labour in India cannot explain such a massive price discrepancy, as most of the price comes from engineering equipment and heavy components, and AREVA has already done its best to outsource work to low-cost countries and suppliers.

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10 Ramana, M V & Kumar, A 2010: Safety First? Kaiga and Other Nuclear Stories. Economic & Political Weekly, Vol XLV no 7, February 13, 2010; Gopalakrishnan, A. 1999. "Issues of Nuclear Safety." *Frontline,* 26 March.

11 Ramana M V 2009: The Indian Nuclear Industry: Status and Prospects. CIGI, Canada.

12 Article 8, para 2: http://www.iaea.org/Publications/Documents/Infcircs/Others/inf449.shtml

India has huge potential for energy including from wind power, solar collectors, biomass/biogas and geothermal energy. With pressure to reduce global greenhouse gas emissions significantly by 2020 and help tackle climate change, these options are more affordable and safer [13]. They are also faster to build, providing energy in just one to two years from the planning stage, rather than waiting decades, as is the case with nuclear, as costs spiral.

Human cost

The site is on productive, agricultural land, which will deprive some 1,000 families of their farming land and 6,000 people who depend on fisheries will also be affected. Between December 2009 and January 2010, Nuclear Power Corporation of India officials seized 938 hectares of land from local villagers offering as little as 3 INR (5 euro cents) per square metre, which villagers unanimously rejected. The project has sparked widespread protests that have been violently suppressed by the police with hundreds beaten and arrested. On 29 October 2010, 700 local people got voluntarily arrested in protest of the project.

Other issues include lack of transparency and civil society participation in the planning process. Police has been given emergency powers to arrest any four or more people assembling in the area, based on a draconian section in the Indian penal code dating back to British colonial rule. Three out of four of the affected villages were denied access to the EIA report before the hearing.[14] Also, no hearing was organised before forced land acquisition got underway, which was only possible because "emergency" powers were invoked. Environmental NGOs were denied access to the hearing, which is a violation of the Indian law.

Why India should not embark on nuclear expansion

Most decision makers and investors talk about sustainability and corporate social responsibility, yet the entire nuclear cycle blatantly contradicts this. Radioactive contamination routinely occurs throughout the fuel chain, from uranium mining to processing, reactor operation to the management of nuclear waste.

A severe accident of a typical pressurised water nuclear reactor, due to technical or human failure, could affect many millions of people, causing tens of thousands of victims and forcing the evacuation of areas as large as Belgium.

The nuclear industry has spent the past decade trying to convince the public and decision-makers that, despite its downsides, nuclear power is needed to tackle the climate crisis. The industry promised to have learned from past

[13] http://www.greenpeace.org/international/en/publications/reports/Energy-Revolution-A-Sustainable-World-Energy-Outlook/
[14] The Economic Times, May 18, 2010: Jaitapur villagers nuke power project.

disasters, and that it would offer a clean, safe, cheap and reliable source of energy. None of these claims is true.

The 2010 International Energy Agency (IEA) energy scenario clearly shows that, even if the world were to build 1,300 new reactors and quadruple nuclear power generation by 2050, greenhouse gas emissions would be reduced by less than 4%. Given the long planning and construction schedules required, this would come far too late to meet the imperative to significantly decline greenhouse gas emissions by 2020 and thus prevent climate chaos.

Plus, implementing the IEA scenario would require US$10 trillion for reactor construction, massively increase the amount of nuclear waste we and future generations will have to deal with, and create enormous proliferation hazards. A single reactor typically produces several hundred kilograms of plutonium every year – an amount sufficient for dozens of nuclear of nuclear weapons.

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