

## **Koodankulam: repression reigns**

In the last week of November, fresh criminal charges were slapped against the leading activists in Koodankulam in connection with a bomb blast that happened in the nearby Tsunami Colony that killed 7 people, including children and women. While the media immediately lapped up the police version as the authoritative account, the later developments – protest by local people and concerned groups in Chennai, highlighting that the blasts were clearly a handiwork of competing sand-mining mafia in the region, which forced the administration to step back and even remove the local Superintendent of Police, did not find a mention in the mainstream press.

Such devious tactics to defame and criminalise the movement has become a routine in Koodankulam and people are braving all sorts of machinations to divide and provoke them. The money granted by the centre ostensibly for development of the area is openly being used to buy out individuals and create vested interests.

The struggling people of Koodankulam are witnessing these ploys and bravely keeping the resistance alive while they recede from the public attention. Even the sympathetic civil society in the other parts of the country succeeds in drawing some attention to the issue only when something more dramatic happens at the ground or at the international level in the nuclear sector.

A short re-cap of the repression on this entirely non-violent and massively popular movement, and the issues raised by the people, would be helpful in putting things in the context.

## **25 years of heroic struggle**

Although the recent phase of protests in Koodankulam were boosted by heightened apprehensions regarding nuclear safety after the Fukushima accident in Japan, people's resistance to the

Koodankulam Nuclear Power Project(KKNPP) started as early as the late 1980's when the

agreement for the project was signed between the Indian Prime Minister Rajiv Gandhi and the then President of the USSR Michael Gorbachev in 1988. Confronting the government over loss of their livelihoods and source of drinking water, more than 15,000 fisher-folk assembled in Kankyakumari to protest in May 1989.

## A 25-year campaign

**1986**

Chernobyl disaster, world's worst nuclear accident



**1988**

Rajiv Gandhi and Mikhail Gorbachev sign pact on Kudankulam

Massive mobilisation in Tirunelveli, Tuticorin districts of fishermen, workers, social & political movements. Rev. Y David in forefront

**1989**

Police fire on rally against project led by Father Thomas Kocherry in Kanyakumari

**1987**

Soviet Union announces plan to build N-plant in India

Anton Gomez takes lead in building opinion against N-energy



**1998**

Russia, India sign supplementary agreement on Kudankulam

NAPM organises workshops against N-power

**2001**

Heads of NPCIL and Atomstroyexport sign final agreement

People's movement comes up with comprehensive agenda

**2002**

Concrete poured for project

S P Udayakumar returns from US; takes over leadership along with M Pushparayan



**2003-06**

Fishermen and farmers protest; water for plant is an issue

**2011**

Fukushima disaster stuns coastal villages

Idinthakarai becomes hub; hunger strikes begin. Tamil Nadu says KKNPP cannot start till people's fears are allayed



**2007**

Public hearing for KKNPP units 3&4

Kudankulam village joins protest; huge upsurge in campaign

**2008-10**

KKNPP delayed by hold-up in Russian supplies

Link up with similar protests in Jaitapur

**2012**

Jayalalithaa gives green signal to KKNPP

Idinthakarai under siege; large numbers arrested in Kudankulam

**September 2012**



Insertion of fuel rods in the reactor begins.

People assemble to protest; police resorts to violent repression. 2 persons killed, many injured and hundreds jailed, villages ransacked and vital supplies cut off weeks.

**May 6, 2013**

Supreme Court gives a nod to the project overlooking crucial questions.

Independent experts and activists register protest.

**October 2013**

The NPCIL claims the reactor is connected to the grid and has started generating power. Within hours, the reactor trips and is shut down for 'routine maintenance'.

PMANE claims the reactor is unable to operate due to sub-standard components supplied by Russia.

After the Soviet Union collapsed, the project was shelved and the diplomatic negotiation re-started in 1998 with the new Russian government. Ground work began only in 2001 and met with local people's resistance ever since. In form of processions, campaigns, posters, people in the nearby villages kept expressing their dissent. It

took a few years for the majority to swing against the project as they got disillusioned with the promises of jobs and development in the area. Even people who had taken compensation and sold their land felt cheated. The temporary manual jobs vanished as the construction reached completion.

In March 2011, people in Koodankulam area saw the nuclear accident in Koodankulam and came to realize the horrendous consequences. the NPCIL started mock drill and hot run of the reactor in July 2011 and people were asked to run away from the reactor as soon as possible, leaving behind their belongings and even family members. Loud sound and smell kept coming from the reactor for 2 days. This led people to question the safety claims and realize the nature of a potential nuclear accident.

Massive protest erupted in Koodankulam. More than 125 people sat on hunger-strike in August for 12 days, forcing the Tamil Nadu State Cabinet to pass a resolution, urging the Central Government to hold a dialogue with people and stop construction work until their fears are allayed. The expert panel consisting of DAE scientists by the centre refused to meet the agitating people and even did not share with them the important documents that could enable people to have an informed discussion. The People's Movement Against Nuclear Energy appointed a parallel committee of independent experts. The two committees submitted their reports by the end of the year.

While the charade of dialogue was on, the state government kept on piling false criminal charges on every occasion when people demonstrated in peaceful manner.

In February 2012, the Tamil Nadu government gave a green signal based on its own analysis of the centre's report, conducted by the former Chairman of the Atomic Energy Commission. This was marked by intensified protests on the ground and repression on part of the government. The Idinthakarai village was surrounded by thousands of police and people were intimidated.

The protest on the ground continued peacefully and the Supreme Court was approached by the PMANE. The protesters did not obstruct the construction or resort to violence. In September, when

the NPCIL announced about insertion of radioactive fuel rods, people gathered to protest but were chased into the sea by a violent police. 2 people were killed in the episode and hundreds were arrested. A large number of people were injured; churches and houses were vandalized by the police. Human Rights groups and concerned citizens strongly condemned the repression at national level.

The Supreme Court ruled in May 2013 in favour of the project, on contestable grounds, but also ordered the government to take back the criminal charges imposed on the people in course of the movement. However, the stalemate at the ground has been continuing since then and the government's strategy seems to be chocking the villages, dividing the people and forcing them to surrender. The government knows that it hasn't addressed the questions raised by the people and is wary of eruption of protests again as the second reactor gets ready for commissioning in Koodankulam.

Meanwhile, the NPCIL has been delaying the announcement of commercial operation of the reactor as it seems to have engulfed in serious problems, proving true the PMANE's allegations regarding supply of sub-standard equipments by the Russian firm Zio-Podolsk whose Director has been arrested in Russia in relation with a major scam.

## Koodankulam: Not a Closed Chapter

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With the first unit of the Koodankulam Nuclear Power Project (KKNPP) attaining criticality on 13 July 2013, has the controversy surrounding it ended? The plant has begun functioning a full 25 years after the then prime minister Rajiv Gandhi signed an intergovernmental agreement with the then president Mikhail Gorbachev to import a pair of VVER pressurised water reactors. Due to the collapse of the Soviet Union, the construction of the

reactors started only in September 2001. At that time, it was expected that they would be commissioned in the December of 2007 and 2008. That the first unit has only started functioning now, nearly six years after the initial deadline, is not unusual in itself given the record of time and cost overruns in the Nuclear Power Corporation's operating reactors elsewhere.

It is also not surprising that people living in the vicinity of the plant opposed it from the very inception of the project because that has also been the case with all nuclear projects since the 1980s. What is unusual though is the scale of the opposition, with thousands of people engaging in a wide variety of creative protests even in the face of severe police repression, with a relay hunger strike that has lasted over 700 days, and with moral support from people around the world.

Through its multiple open letters and constant engagement with public debates, the group spearheading these protests, the People's Movement Against Nuclear Energy (PMANE), has thrown up a number of questions ranging from the technical, to the institutional, to the political and to the ethical. An important recent intervention is PMANE's Open Letter of 16 June 2013 that highlighted the various "irregularities and improprieties" concerning KKNPP that have come to light in the last year.

In response to a Right to Information (RTI) petition from PMANE, the Nuclear Power Corporation confirmed that a Russian company, Zio-Podolsk, has supplied the following equipment and parts to KKNPP: "Steam Generators, Cation and Anion Filters, Mechanical Filter, Moisture Separator and Reheater, Boric Solution Storage Tanks, Regenerative Blow Down Heat Exchanger, Pipelines and Fittings of Different Systems, Insulation Materials, PHRS Heat Exchanger." The company has been accused of corruption and fraud and in February 2012, the Russian Federal Security Service arrested the procurement director of Zio-Podolsk on criminal charges, specifically for buying low-quality raw materials on the cheap, passing them off as high-quality materials, and pocketing the difference.

Such practices violate a very basic requirement of nuclear safety – the adoption of the highest standards of construction and

manufacture. This is because all nuclear reactors are susceptible to catastrophic accidents that could result in high levels of radioactive contamination of large areas. Any compromises on the quality of the facility would augment the risks associated with a nuclear power plant. Furthermore, the Koodankulam reactors are of a relatively untested design, although the limited experience with them does suggest problems involving their control rods.

What is even more worrisome about the revelations of PMANE is the response from the Atomic Energy Regulatory Board (AERB) to another RTI petition from PMANE asking for “a list of those equipment and parts that have been supplied by Zio-Podolsk to the KKNPP units”. AERB responded on 12 February 2013 (No AERB/RSD/RTI/Apl. No 329/2013/2421): “Selection of a company for supplying any equipment to NPCIL, is not under the purview of AERB.” Given the charges facing Zio-Podolsk, AERB should have made it a point to find out what pieces of equipment came from Zio-Podolsk and check them extra carefully. Not doing so amounts in essence to dereliction of duty.

A number of other examples cited by PMANE suggest a basic lack of transparency. For instance, the manufacturer of the Koodankulam plant, Atomstroyexport, has no liability in the event of an accident. The government has refused to release the text of the intergovernmental agreement between India and Russia. In addition to the liability indemnification, one does not know what other egregious clauses the agreement may contain.

The government has brushed aside opposition to the plant by arguing that because Rs 17,000 crore have already been spent on the reactor, it has to be commissioned so that the investment already made is not wasted. This is hardly an acceptable argument when the project in question is a nuclear power plant. The government is surely aware, given the experience around the world, that the costs of a catastrophic accident will far exceed the initial investment. Unfortunately, the government’s determination to go ahead with KKNPP despite widespread opposition is paralleled by its actions at other proposed nuclear power plants. In the case of the Jaitapur nuclear power plant in Maharashtra, for example, the local population has clearly shown that they do not want this plant. Doubts have also been raised about the type of plant – again with

no prior experience – being imported from France. Yet, as in Koodankulam, the authorities have decided to ignore protests, dismiss even technical doubts and push ahead. Whatever one thinks about nuclear power and safety, such an attitude is unacceptable and not conducive to a healthy democracy.

### **India's Nuclear Anachronism**

The large scale repression of common people for voicing their dissent against nuclear energy project in Koodankulam is not a localized phenomenon. It stems from the Indian government's reluctance to learn the lessons on Fukushima that has led to major rethinking in several countries across the globe. Such anachronism is a result of the compulsion to fulfill the promises that the government has already made to nuclear suppliers like the US, France and Russia as a diplomatic giveaway in return for the exemption from NSG rules under the Indo-US nuclear deal.

The Manmohan Singh government has bulldozed every possible democratic institution that came in the way of his nuclear obsession: buying votes in the parliament when the government faced a no-confidence motion on the issue of nuclear deal with the US, ridiculously underplaying the lessons of Fukushima nuclear catastrophe, violating the nuclear regulator's own norms in Koodankulam, awarding environmental clearance to Jaitapur, brutally repressing villagers who have been opposing such projects, denying necessary information to the local communities and attempts to keep the nuclear establishment out of the Right to Information, the PM calling grassroots anti-nuclear movements 'foreign funded' and the government even spreading malicious lies about the christian minority creating trouble for the country through these movements.

One must however pause to look at the deepening crisis in Fukushima, parallel to this development. In October, the Japanese government asked for international help for the first time. In October, Japan also had to again close the 2 out of 54 reactors in shut down since Fukushima that it had re-started in 2012. This was mandated by the vulnerabilities highlighted by the new nuclear regulator in Japan.

Learning from the human loss and financial costs of such a nuclear



accident, many countries like Germany, Sweden, Switzerland, Austria etc. have announced a complete roll back of their nuclear programs while even France and China are rethinking about their massive existing and planned nuclear projects.

The bargain legitimizing India's nuclear weapons in return for its purchase of reactors from the US, Russia, France and now Japan has translated into horror for the common people of India. While the India-US nuclear deal was touted as a convergence of the world's oldest and biggest democracies, the Government of India is repressing large, grassroots anti-nuclear movements and ignoring the voices of village-level democratically elected bodies. India has plans to build at least 20 more reactors in the next 20-30 years, and has announced ambitious plans to produce 25% of its total electricity by nuclear power – a 100 fold expansion compared to its present nuclear capacity. This expansion has threatened people with displacement and the loss of livelihood, radiation and threats to health and safety, and the forcible acquisition of agricultural land and irreversible damage to fragile ecosystems in several parts of the country.

Popular protests on the issue of nuclear power in India have stemmed from three concerns: livelihood issues for the Indian poor, the inherent dangers of nuclear reactors and fears of an accident after Chernobyl and Fukushima, and the complete lack of transparency, accountability and efficiency of the Indian nuclear establishment.

People in every part of the country have risen in protest. Koodankulam on the southernmost tip, Mithivirdi on the West Coast, Kovvada on the East, Chutka in the middle of the country, Gorakhpur close to the capital, and Domiasiat in the far Northeast (which is being eyed by the nuclear establishment for uranium mining). Protests in all of these places have been intense yet remarkably peaceful. People at the grassroots, including large numbers of women and children, have deployed non-violent forms of resistance over several years.

The Supreme Court of India has recently given a go ahead to the Koodankulam reactors, overlooking the blatant violations of the regulator's own norms. The Court's verdict rests on three hugely

contested premises: the judges' belief in the necessity of nuclear energy for India's progress, their faith in the country's nuclear establishment to responsibly perform its role, and the judges' notion of the larger public interest amidst the apprehensions of small sections of people who they believe should make way for the country's progress. Not only have the judges given judicial sanctity to these contestable propositions, they have also completely overlooked the Koodankulam-specific violations of safety norms raised by the petitioners. This is perhaps the world's only reactor being commissioned without an independent assessment of its environmental impact, without a natural source of fresh water, with thousands of people living a mere 700 metres from the reactor, and without accommodating the post-Fukushima lessons about the risk of housing the spent fuel pool in the main reactor building.

Proposed reactor projects in other places are being punished for violating such norms. The French EPR-design being implemented in Jaitapur is untested and has run into 100% cost over-runs in Finland, the only place where these new reactors are being built. Its cost in India is expected to triple. The Finnish regulator has taken Areva to court for safety violations and for undermining the terms of agreement. The four reactors being built in Gorakhpur near New Delhi have almost no water source. The small canal intended to provide water to cool these reactors ran completely dry earlier this year.

There are serious problems in the functioning of the Indian nuclear industry. India has a history of missing its nuclear power production targets miserably. Not only has it been inefficient, it has been marked with dangerous accidents, cover-ups and gross violations of best practice standards. This includes the hiring of casual workers for radiation-related work, employing them without adequate safety gear, training or health insurance, and getting away with impunity in cases of accident. Its nuclear regulator, the Atomic Energy Regulatory Board, is a toothless body that is dependent on the same Department of Atomic Energy for funds and expertise that it is designed to regulate.

The repression, including lethal firing, unleashed on peaceful protesters against the Kudankulam nuclear plant on Monday, on top of FIRs over many months charging thousands with sedition,

makes two things clear. Nuclear projects in India can only be thrust on unwilling citizens at gunpoint. As the jalsatyagraha shows, people will resist them tenaciously, because they are aware of their hazards. That's true of every nuclear project, whether Jaitapur (Maharashtra), Gorakhpur (Haryana), Mithi-Virdi (Gujarat), Kovvada (Andhra Pradesh), Haripur (West Bengal), Chutka (Madhya Pradesh) or Banswada (Rajasthan). For instance, at Gorakhpur, there has been a daily dharna against four proposed reactors for two years, unbeknownst to Delhi, which lies in their potential radiation-fallout zone.

Recent disclosures from a special official safety review on all Russian reactor designs reveal their several generic flaws, including inadequate emergency cooling, poor evacuation procedures, and non-factoring of earthquake hazards. The Kudankulam reactors lack an independent freshwater source, critical to cooling them in emergencies. They are probably the world's only nuclear reactors dependent on unreliable seawater desalination, which can fail and has no backup.

The Atomic Energy Regulatory Board (AERB) approved the fuel-loading despite all this and without the mandatory emergency evacuation drill in a 16-km radius. AERB approval is NPCIL's clinching justification for fuel-loading. But the AERB, concludes the latest Comptroller and Auditor General report, is a toothless lapdog of NPCIL-DAE.

It says the AERB's 'legal status' continues to be 'subordinate' to the government – unlike in the US, Canada or France. The AERB "has no rule-making powers." It never fulfilled the mandate to prepare an overall nuclear and radiation safety policy. It has failed to develop as many as 27 of the 168 Standards, Codes and Guides it itself termed essential. It has no role in radiological surveillance and monitoring workers' health. It doesn't directly oversee on-site emergency drills. Even for serious safety infringements, the penalties are absurdly low (eg R500). The AERB cannot enforce them.

The AERB doesn't even possess a full inventory of nuclear materials and radiation sources. Ninety-one per cent of X-ray units aren't registered with it. It has no framework for decommissioning nuclear plants. The AERB fails all criteria of an effective regulator. It's in

such irresponsible hands that the duty to protect millions of Indians is placed. The public can have no confidence in the safety of India's perennially crisis-bound, accident-prone, money-guzzling nuclear programme.

Equally damning is the National Committee's statement against the Jaitapur reactors. It notes the project wasn't subjected to "rigorous scientific" scrutiny or safety audit. Its clearance was based on an "unscientific and deeply flawed" EIA Report. Areva's "untested" EPR design has raised "serious concerns" among different countries' safety agencies; "an internal audit of the French nuclear industry has criticised Areva and Electricity de France (EdF)..." and "EdF itself may be planning to discontinue the EPR design". The EPRs under construction in Finland and France are plagued by four year-plus delays and 130%-plus cost overruns. Areva is perilously close to bankruptcy, has announced major project cancellations, and lost 90% of its share value since 2007. The EPR fails "even an elementary test of techno-economic due diligence".

At Jaitapur, multiple reactors will be erected, aggravating hazards, as in Fukushima. The EPR has a flawed spent-fuel storage design. As Fukushima showed, this hazard "is not less than that from the reactor itself". The NPCIL has no plans for long-term storage of nuclear wastes. It also dismisses seismic hazards at Jaitapur. But eminent geophysicists Vinod Gaur and Roger Bilham writing in a peer-reviewed journal argue that a severe earthquake can occur there. Further comment is unnecessary.

## The Bleak Future of Nuclear Power in India

*M V Ramana*

For nuclear energy to substantially contribute to reducing greenhouse gas emissions, it would have to expand significantly over the next few decades. Much of this expansion would have to occur in industrializing or developing countries that have fast growing electricity requirements and relatively low levels, or a complete

absence, of nuclear generation capacity. For a variety of reasons, some of these countries are still contemplating constructing nuclear reactors despite the accidents at Fukushima.

India offers a case study for understanding the challenges facing expansion of nuclear power in developing countries. It is “ahead of the curve” when compared to most developing countries. Thanks to decades of sustained government support for the nuclear program, the Department of Atomic Energy (DAE) has developed expertise and facilities that cover the entire nuclear fuel chain, starting with uranium mining and milling to reprocessing of spent nuclear fuel, and vitrifying and storing the wastes produced. India has also developed nuclear weapons under the aegis of the same program.

Yet, the currently installed nuclear capacity is 4.78 GW (gigawatts), a mere 2.14% of the total electricity generation capacity. There are twenty operating reactors with plans to build several more. Even if the reactors under construction come online, the nuclear share is unlikely to exceed 5% of the generation capacity over the next decade or more. Can this change in the longer term? There are several reasons why nuclear energy will not be a significant part of the answer to India’s electricity demands even in the long term.

Before examining those reasons, however, it may be useful to briefly describe the current electricity and energy scenario in the country, as well as projections for the future. India has a total installed electricity generation capacity of 224 GW. Together, these generated 876.4 TWh of electrical energy in 2011-12, with an average growth rate of 5.3% over the last decade. Given the roughly 1.2 billion population living in India, at a per capita level, the electricity generated turns out to be only about 730 kWh/y; the corresponding figure for the United States in 2012 was about 13,400 kWh/y. About 70% of the electricity generated in India was from coal or lignite, and another 10% was from natural gas. The OECD’s International Energy Agency projects that if current policies continue to be followed, India would generate about 2600 TWh by 2035. According to the IEA, this projected growth is driven by rising population and per-capita incomes.

### **Explaining Poor Performance**

To start with, the small share of nuclear power in India’s electricity

portfolio is not due to a lack of funding. Practically all governments, regardless of which political party is in power, have favored nuclear energy and the DAE's budgets have always been high. The only period when the DAE did not get all it asked for was the early 1990s, a period marked by cutbacks on government spending as part of economic liberalization. But this trend was reversed with the 1998 nuclear weapons tests: since then the DAE's budget has increased from Rs. 19.96 billion (US\$ 470 million) in 1997-98 to Rs. 98.33 billion (US\$ 1787 million) in 2013-14. In comparison, the Ministry of New and Renewable Energy was allotted Rs. 15.33 billion (US\$ 279 million) in 2013-14. The Ministry is in charge of developing solar, wind, small hydro, and biomass based power, which together constitute around 28 GW of generating capacity as of April 2013.

The other element that is not lacking is aspiration. Like nuclear agencies elsewhere, the DAE has a long history of making ambitious projections, none of which have been fulfilled. In the early 1970s, for example, the DAE predicted that by 2000, there would be 43 GW of nuclear capacity. Actually installed capacity was 2.7 GW in 2000.

One cause of this failure was India's 1974 nuclear weapon test and not signing the Nuclear Non Proliferation Treaty (NPT). Despite Indian diplomatic effort at trying to make the 1974 test to be a peaceful nuclear explosion, few outside the country bought into that charade. Following the 1974 test, the United States and other countries formed the Nuclear Suppliers Group (NSG) with the aim of preventing exports for commercial and peaceful purposes from being used to make nuclear weapons and India was not allowed to import nuclear reactors or materials from other countries till 2008.

In September 2008, the Nuclear Suppliers Group created a special exception for India that allowed it to import nuclear reactors and materials despite not having signed the NPT. The waiver came about in large part due to pressure from the United States, France, and Russia. For France and Russia, the main motivation was the expectation that they could sell nuclear reactors to India and revive their moribund nuclear sectors. In the case of the United States, which led the process of advocacy for the waiver, there were commercial interests, primarily related to nuclear and military

technologies, as well as geopolitical motivations. Following the NSG waiver, estimates for nuclear power in the country have gone up. The current long-term target is for 470 GW by mid-century. Because of India's rapidly growing demand for electricity, even that roughly hundred-fold increase would leave nuclear power at about 35% of the total projected electrical capacity of the country.

There are multiple reasons for why even this target is very likely to be missed. The first is simply that nuclear power is a complex and difficult technology and it is not easy to develop it very rapidly. This is particularly so in the case of post-colonial developing countries like India because there is pressure not just to generate electricity but simultaneously to indigenously develop the requisite technologies, materials, and equipment, partly for solid developmental reasons (creating jobs, stimulating technical education), partly to avoid dependence on whims of Western countries, and partly for the prestige and glamour associated with nuclear power.

If one looks at the history of nuclear power projects in India, practically each reactor took longer to build, cost more than projected, and performed worse than had been envisaged when plans were made. There were problems that had not been envisioned when the site was selected, leading to delays in construction and reduced efficiency in operations. All of this is despite the fact that most operating reactors are of the same type — pressurized heavy water reactors based on the Canadian CANDU design — and thus India has benefited both from standardization and experience elsewhere. The DAE's projections of rapid growth implicitly assume that all previous problems have been solved and no new problems will ever emerge. Such assumptions have been repeatedly shown to be untenable, not just in India but elsewhere.

In the future, however, construction and operation might fare worse because India plans to import a new reactor type: light water reactors.[3] Light water reactors constitute the most common reactor type deployed around the world; of the 434 reactors currently operating, 354 are of this type (IAEA 2013). Current plans in India envision importing at least four new kinds of light water reactors: the VVER from Russia, the EPR from France, the ESBWR and the AP1000 from the United States of America. Apart

from the fact that these are incredibly expensive compared to domestic Indian designs and would make nuclear electricity uncompetitive (Raju and Ramana 2013), a further problem is that Indian safety regulators have no experience with these designs. The primary reasons for the purchase, therefore, seem to have to do with international diplomacy.

With a population that is projected to eclipse China's by mid-century, and a rapidly increasing demand for electricity, India has difficult choices to make regarding its energy future. But, despite much media hype and continued government patronage, nuclear power is unlikely to contribute significantly to electricity generation in India for several decades. This history and prognosis offers important lessons in thinking about the future of nuclear power globally, especially in countries that are preparing to embark on constructing nuclear reactors.

## **Nuclear Energy: Insurmountable Inherent Problems**

The promise" of nuclear energy in the 1950s which led to the development of civilian nuclear programmes for electricity generation in numerous countries around the world has been completely belied. Indeed, in the eyes of one expert Amory Lovins, the performance worldwide of civilian nuclear energy programmes has revealed it to be perhaps the single greatest failure of the industrial age! After over 60 years of experience the case against nuclear energy especially given its safety record is now overwhelming. The main arguments can be summed up under six basic categories – too little, too late, too secretive, too centralised, too expensive, too dangerous.

### **Too Little**

Nuclear energy constitutes an ever declining proportion of world electricity generation whether measured in terms of capacity or output. It now accounts for less than 12% of world output. Of the world's 430 odd existing reactors, even as some old reactors are having their life spans dangerously extended, considerably more



reactors will be shut down over the next two decades than will be built. The proportion of electricity generated by nuclear power will go down even further. In 2009 the installed capacity in energy generation with “new” renewable sources (excluding large hydropower) worldwide surpassed nuclear power capacity for the first time. Since then the gap has got increasingly wider. Nuclear power is not the energy of the future! The claims made of a nuclear renaissance are false.

### **Too Late**

The most recent and popular argument being made to promote the nuclear power industry is that it is a clean energy source and crucial for addressing the problem of global warming. However, nuclear power is not and cannot be clean given the long lasting and highly dangerous radioactive wastes it generates for which there is no long term safe storage process and for which short term storage processes cannot but carry some level of risk of unforeseeable and possible leakages due to circumstances/events/developments beyond control.

While it is true that nuclear reactors do not directly generate carbon emissions, the whole “nuclear fuel cycle”—from uranium mining to fuel fabrication to building, running and maintaining reactors, and managing and storing/reprocessing their wastes — produces a substantial amount of carbon dioxide. Therefore the eventual saving or carbon abatement from nuclear power is much less than from most renewable sources although it is more than from fossil fuel burning. However, even such a saving does not make it worthwhile to go in for nuclear power plants since the opportunity costs are so huge and the period of construction (usually 10 to 13 years) is so long that if the same amount of money was spent for establishing renewable energy sources, the amount of carbon emissions saved would not only be much greater but – and this is very important – the savings would take place much more quickly. Some expert studies conclude that for nuclear energy to make a significant dent in carbon emissions we would need to build close to one plant every fortnight for the next ten years!

### **Too Secretive**

Given both its inherent dual-use character, i.e., its military potential in terms of generating fissile materials for bomb-making and the

risks of leakages at various points in the construction and running of plants and in waste disposal, all civilian nuclear programmes are unavoidably far more secretive than is the case in other industries. All industries are subject to what organisation theorist Charles Perrow calls “normal accidents”. The nuclear industry is no exception. Full transparency about such events would undoubtedly raise great concerns and opposition among the population at large and be highly detrimental to the credibility of all those involved in preserving the nuclear programme – suppliers, operators, governments. The very nature of the industry demands that it must institutionalise deeply undemocratic mechanisms of non-transparency and non-accountability with respect to the wider public.

### **Too Centralised**

Nuclear power only makes some sense if its role is connected to a highly centralised system of electricity generation and distribution and use which also means significant distribution and transmission losses, i.e. accepted inefficiencies. For most developing and developed countries the only sensible approach is to develop a strongly decentralised system of energy production and use alongside existing grid systems since such a decentralised approach is both cheaper and far more compatible with the use of renewable energy sources and local surpluses in electricity generation can be fed into a network of local and regional grids and even into the national grid. Thus, renewable energies are creating many more jobs than nuclear.

### **Too Expensive**

The full costs of nuclear power generation and distribution from the beginning of the fuel cycle to the end of waste disposal and storage are never properly calculated. Indeed, governments from France to Japan to others have always provided open or hidden subsidies of one kind or the other. Among the costs usually excluded in part or full from “levellised costs” or the cost per kilowatt hour produced by nuclear power plants, are the following: a) the cost of decommissioning the plant when its life span is over which is maybe one-third to one-half of the cost of construction itself. b) Not adding the costs, howsoever discounted over a prolonged period, of waste management and storage. c) The ‘real’ financing cost

including interest payments made on borrowed capital and other charges associated with long construction periods. d) Costs are fast rising with new security requirements – and if they were not, it would mean that security is traded off against profits. c) The cost of insurance against accidents (including huge premium costs) if liability is absolute (as it should be) and of creating contingency funds for accidents causing economic, ecological and health damage.

Yet despite the partial or total exclusion of these elements, the costs stated by industry and publicised by the media are everywhere still higher than all other forms of energy production by fossil fuels and with most renewables. Even the most expensive of alternative energy sources today, namely solar energy, is already lower than the levelled costs of nuclear power in many scenarios and steady technical and scientific improvements are making solar energy progressively cheaper over time compared to nuclear power. The opportunity costs of nuclear energy are prohibitively uneconomical. This is the single most important reason why the private sector will not go in for nuclear power without assured subsidies and liability caps guaranteed by governments.

### **Too Dangerous**

There are five kinds of dangers actual or potential.

- 1) The release of ionising radiation and dangerous isotopes bound up with each step of the nuclear fuel cycle, endangering people in various countries from uranium mining to waste storage. These are invisible poisons, which produce cancers and genetic damage and against which there is no defence or cure.
- 2) There is the insoluble problem of waste disposal. Present problems and dangers of waste disposal are partly rationalised by the pro-nuclear lobby as the other side of the coin of present benefits and services. But for future generations there are only the problems and dangers and no presumed benefits and services. Nuclear power is poisoning the earth.
- 3) Accidents are normal in all industries. Consequences small or big always follow. But nuclear power is the sole mode of energy generation in the world, which is vulnerable to catastrophic accidents with enormous and unacceptable consequences. The health and environmental effects of nuclear accidents are of such a nature that they must be deemed unacceptable, although the scale of incidence can vary from small to big. Even if as claimed the probability of a major accident is low it is never zero and no one can give a precise measure of how low.

But the consequences of a major accident are beyond measure and simply incalculable. Even absolute liability only means that the culprits behind the accidents will lose money while the actual victims of such accidents are innocent others who have to pay with their health and lives!

4) Nuclear plants are potential targets for conventional assaults by state or non-state actors, and vulnerable to sabotage with huge consequences.

5) The actual or potential military-related dual-use possibilities of civilian programmes means that if the world is serious about wanting to move towards complete disarmament of nuclear weapons then this must require the complete elimination of all civilian nuclear power programmes as well. As long as civilian nuclear power programmes exist, the threat of nuclear weapons proliferation exists.

India must give up on all or any civilian nuclear power programmes. Where such plants and fuel cycle activities exist, they should be phased out as quickly as possible never to be revived. Nuclear plants can be reconverted wherever possible into other environmentally friendly facilities for productive and employment generating activities.

## Indian People's Charter on Nuclear Energy

**Adopted on July 29 in the National Convention on Nuclear Energy, organized in Ahmedabad by the Coalition for Nuclear Disarmament and Peace(CNDP). The charter has been endorsed by several eminent activists from across India and organizations like the People's Movement Against Nuclear Energy(PMANE), Konkan Vinashkari Prkalp Virodhi Samiti, Lokayat, Samajwadi Jan Parishad, Bharat Jan Vigyan Jatha, Indian Doctors for Peace and Development(IDPD) and Greenpeace India**

The Indian People's Charter on Nuclear Energy is a statement emerging from the shared experiences, struggles and visions of grassroots movements for a safe energy future. Such movements have existed right since the inception of India's nuclear programme and have scored significant victories in places like Kerala.

More recently, people from Koodankulam (Tamil Nadu), Jaitapur (Maharashtra), Mithi Virdi (Gujarat), Kovvada (Andhra Pradesh), Gorakhpur (Haryana), Chutka (Madhya Pradesh) and Haripur (West Bengal) have waged relentless struggles against these anti-people and unsafe nuclear power projects being promoted by the Nuclear Power Corporation of India Ltd (NPCIL). Their massive peaceful protests have been met with callousness and brutal repression on the part of the government. Communities near the existing nuclear facilities in Tarapur, Rawatbhata, Kalpakkam, Kaiga, Kakrapar and Hyderabad have also been raising voices against radiation leaks and their harmful effects, which are often hushed up by the authorities. Existing and proposed new uranium mines in Jharkhand, Andhra Pradesh and Meghalaya have also met with massive protests. In the recent past, these voices of protest have received solidarity and support from the wider democratic sections of Indian society. Intellectuals, policy experts, scientists, social activists, writers, artists and people from all walks of life have come out and backed these movements.

Nuclear energy is today widely seen as posing a threat to the life, livelihoods and the environment, not least because it can have irreversible catastrophic consequences and radiation effects spanning across generations. Chernobyl, followed by the Fukushima nuclear accident in Japan has led to global rethinking on the pursuit of nuclear energy with many countries reversing and phasing out their nuclear energy programmes. Owing to its inherent safety problems, exorbitant costs and secretive nature, it has been invariably thrust on people against their will through pressure tactics and often violent repression of local communities.

Despite the hyperbole surrounding it and its enormous budgets, nuclear power accounts only for 3% of India's electrical capacity. Yet India is planning to expand it massively, one of the main motives being to fulfil the promise of paybacks made to the US for the Indo-US nuclear deal and to other countries for their support in getting an endorsement for that agreement from the International Atomic Energy Agency and the Nuclear Suppliers' Group for India. Such expansion will also strengthen the domestic and foreign industrial lobbies that see great opportunities to profit. It will greatly reinforce the power and

privilege of the nuclear establishment and further promote India's highly centralised and energy-intensive growth path.

The claim that nuclear energy is indispensable for the country's energy security is widely questioned. Nuclear energy expansion will detract from our real requirements of ecologically sustainable, decentralised and equitable model of energy supply and use.

All this means that the issue of whether or not the path of nuclear energy should be pursued (and if so, how and under what preconditions) must be put upfront on the public agenda.

### **We demand that:**

- A moratorium should be imposed with immediate effect on all proposed nuclear reactor projects.
- Land acquisition for nuclear projects should immediately be put on hold.
- An open and democratic national debate on nuclear energy and alternatives to it be organised. The government must acknowledge that there are serious and legitimate concerns about the hazards of nuclear power
- The government must constitute a high-level citizens' commission to examine the appropriateness, desirability, safety, environmental soundness, costs and long-term problems posed by nuclear power generation. This commission must include independent experts, social scientists and civil society representatives.
- The government must set up a body of independent experts to carry out baseline health and environmental surveys in all areas where it is proposed to set up reactors, start mining and otherwise establish activities and structures connected to the whole nuclear fuel cycle. The survey results must be transparently shared with the local public, which must assured full and unimpeded access to their health data.
- The existing process of Environmental Impact Assessment for nuclear projects by non-accredited bodies is unacceptable. So is the non-consideration of specific nuclear hazards, including radiation leaks, radioactive waste storage, transportation risks, accidents, etc. Environmental clearances to all nuclear projects must be tightened with mandatory public hearings and full disclosure of all pertinent facts, including those related to the generic problems of nuclear power generation – radiation, effluents and emissions, requirements and availability of resources such as freshwater, impact on forests, fauna and flora and local eco-systems, potential for accidents and mishaps, waste separation, storage and disposal, hazards from transportation of nuclear materials, and risks to public and planned measures to mitigate

these. The definition of potentially affected population by nuclear mishaps must be severely revised in the light of the catastrophic accidents like Chernobyl and Fukushima.

- Veto power must be entrusted to the local population as to whether they wish or not wish to have a nuclear installation or uranium mining or other related dangerous facilities to come up in their areas. Instead of the farce that currently takes place, there must be proper Jan Sunwais that are well advertised, organised by independent civil society bodies and open to participation and testimonies from all, be they ordinary civilians, concerned groups or experts.
- A transparent safety review of the entire nuclear sector be carried out by independent experts. Periodic safety reviews of existing nuclear facilities and mining sites must be carried out by independent experts.
- The authorities should facilitate long-term and medium-term health studies near these facilities by independent health experts and their findings must be publicised by the government. A citizens-based network for radiation monitoring near nuclear facilities should be created and financed out of a public fund expressly created for that purpose.
- Independent health inspection of nuclear workers should be carried out periodically and the results be made public. No contract worker should be employed in the nuclear sector because their health condition cannot be properly monitored.
- The government must immediately bring forth new legislation to replace the 1962 Atomic Energy Act to maximise the transparency of functioning and public accountability of the nuclear programme, with full public participation in decision-making.
- The Atomic Energy Regulatory Board has failed to perform its mandate and violates its own norms. It must be immediately made completely independent of the DAE and staffed by senior personnel known for their public probity and independence of mind who can be trusted to be completely impartial in their supervision. Furthermore, its budget provisions should come through the Ministry of Environment and Forests.
- The Right to Information Act must be made fully applicable to all aspects pertaining to the existence and development of the civilian nuclear energy sector so that the government cannot claim secrecy in the name of security considerations and thereby hide relevant information.
- Emergency plans for disaster management which include procedures for mass evacuation must be publicly discussed and examined and approved by the representative bodies of those likely to be affected. The government must establish with full local participation the practical mechanisms, structures and practices for rapid and effective evacuation along with initial— and periodic —

trials runs to ensure the reliability of such evacuation procedures in case of accidents.

- The present Nuclear (Civil Liability) Act 2010 is not based on the moral and legal principle of absolute liability in case of accidents and must be suitably amended. Moreover, any attempts to further dilute the Act by formulating Rules calculated to artificially restrict and limit the suppliers' liability must be dropped.
- The government must immediately provide health facilities and adequate compensation to all victims of radiation sickness living around India's nuclear installations. The government presently does not even acknowledge these health effects.
- The government must immediately and unconditionally withdraw all charges of sedition and other false allegations against people protesting against nuclear projects. In the specific case of Koodankulam, the Supreme Court has directed the withdrawal of all charges against protesters which the Tamil Nadu government has refused to do.

Given these infirmities of nuclear energy, it is imperative to prepare a comprehensive alternative energy policy based on principles of equity, environmental sustainability and affordability, and on conventional and non-conventional energy resources, including solar, wind, small hydro, etc. This is the least that the government owes to the Indian public. The nuclear energy fuel cycle is too important a matter to be left only in the hands of scientists, bureaucrats, industrialists and politicians.