

# Nuclear Energy—Facts and Fiction, Part II

Satish K. G. \*

## 1. Corruption and the Nuclear Establishment

It would be absurd to think that corruption—so endemic in the system—has spared the nuclear establishment. The ‘cash-for-votes’ scam erupted in July 2008 when the UPA government was trying to get through the vote of confidence in Parliament against the background of the Indo-US nuclear deal. On 17 July 2008, WikiLeaks revealed a cable sent from the US Embassy in New Delhi to the US State Department which said that, out of a total amount of Rs.50-60 crore set aside for pay-offs, four MPs belonging to Rashtriya Lok Dal (RLD) had been paid Rs. 10 crore each to support the government.[1]

Even the process of selecting the foreign vendors for building nuclear plants is beset with anomalies. Prof Brahma Chellaney, a leading strategic thinker and analyst, has criticised the nuclear establishment for ‘pampering’ foreign companies such as General Electric and Westinghouse (USA), Areva (France) and Atomstroyexport (the engineering firm under Russia’s state corporation Rosatom). He has identified the following irregularities which—as he says—is no way to meet energy needs, or to reduce carbon emissions, or to help India’s poor[2]:

- Foreign reactor builders need not worry about producing electricity at marketable rates since the Government will run the reactors through the state oper-

ator, NPCIL, and will have to subsidise the high-priced electricity generated,

- Exclusive reservation of a nuclear park for each foreign vendor even before the deal is negotiated,
- Land acquisition by the government on behalf of foreign firms,
- The deals signed with select foreign companies without open bidding and transparency,
- Skewed accident liability that shields the foreign reactor builders in case of an accident.

Such corrupt practices coupled with the manifest lack of safety culture render any assurances by the nuclear establishment on the safety or viability of nuclear power, completely hollow.

## 2. Non-nuclear sources: Potential vs. Performance

Let us look at the available alternatives to nuclear energy and check how safe, plenty, cheap or clean they are.

### 2.1 Solar energy

A study by two professors at the Indian Institute of Science (IISc) in Bangalore, Hiremath Mitavachan and Jayaraman Srinivasan, published in the journal *Current Science* in July, 2012 shows that India’s energy needs can be met entirely by solar and other renewable sources.

The analysis overturns the argument that nuclear power is essential for India because

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\*Satish is the Karnataka State convener of *Breakthrough Science Society*.

the country does not have enough land to exploit the potential of solar energy.

According to their study, just 4.1% of the total uncultivable and waste land area in India is enough to meet the projected annual demand of 3,400 terawatt-hour (TWh) by 2070 using solar energy alone (1 TWh per year requires 114 MW capacity). The land area required will be further reduced to 3.1% if we bring the other potential renewable energy sources like wind and biomass into the picture. Thus they conclude that land availability is not a limiting constraint for harnessing solar energy.

Their calculations are based on present-day solar photovoltaic (PV) technology and do not include higher efficiencies achieved by new solar cells. Neither have they considered roof-top PV systems that can be established without any need for additional land.

The IISc researchers' conclusion is in conformity with that of a report prepared in 2011 by the Australian government which said: 'There is more than enough suitable land in India, with high direct beam solar, to meet the entire nation's electricity needs in principle.'[3]

The researchers compared the land-use pattern of three energy sources—coal, hydro and nuclear—with solar energy. They found that solar land requirement is comparable with that of coal and nuclear power when it includes the area for setting up the plant, fuel mining, transportation and waste disposal across the lifetime of the power plant.

While nuclear and fossil fuel-based technologies must continuously transform some land to extract the fuels or dispose of the waste, this is not the case with solar plants. In fact, the same land used for PV solar power plants can be utilised for other purposes like grazing.

The roof-top solar power technology,

along with that proposed by the IISc professors, will be able to meet most of the electricity demand, and has the potential to transform the power sector', says Shankar Sarma, a power policy analyst and author of a forthcoming book 'Integrated Power Policy'.

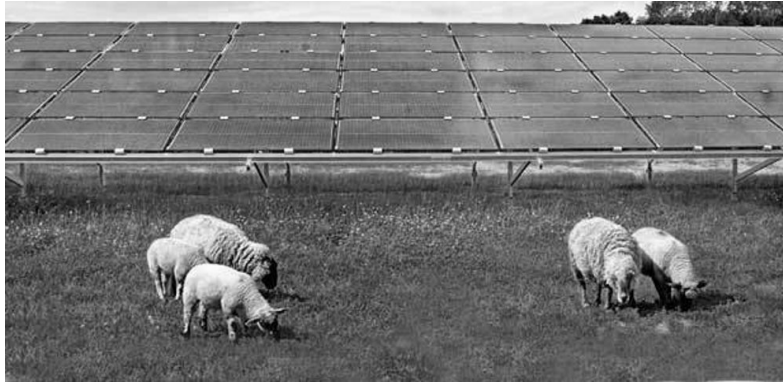
Atul Chokshi of the IISc Department of Materials Engineering agrees. He reported recently that a three kilowatt rooftop solar panel system on the 425 million households can generate a total energy per year of 1900 TWh – half of the projected energy demand by 2070.[3]

Germany installed a record 4,300 MW of solar power capacity in the first half of 2012. Tunisia is working on a 2000 MW solar plant to open in 2016. Dubai is building a 1000 MW solar park to be completed in 2013. California has approved nine solar power projects including a 1000 MW plant with a total potential to generate a massive 4300 MW capacity once completed. Projects with an additional 1500 MW capacity are under review.[4]

Is it unreasonable to expect solar power exploration to set the direction for further research and investment in energy in our country?

## **2.2 Wind energy**

Wind energy is another renewable energy source which—as Indian Wind Energy Association says—is affordable, clean and helps provide energy security. The Ministry of New and Renewable Energy has released its estimate of the potential wind resources at a massive 1,02,300 MW—at 80m hub heights—which is more than six times the currently installed wind capacity. Hub height is the distance between the platform and the rotor of a wind turbine i.e., the distance from the ground to the center of the turbine and it does not include the length of the turbine blades. Normally, the more



Sheep grazing at a 15MW solar plant at Anglesey, Wales

the hub height, the better the power generation.

The wind resources at higher hub heights are possibly even more. A new assessment of wind energy in India in March, 2012 by Lawrence Berkeley National Laboratory has found that the potential for wind energy in India is between a gigantic 20-30 times higher than the government estimates given above! Dr. Amol Phadke, the lead author of the report, says 'wind energy is one of the most cost-effective and mature renewable energy sources available in India'. In fact, the cost of wind power has actually dropped below the coal-based energy in parts of India such as Maharashtra thanks to advanced wind turbines. A major EU funded research study undertaken over the period of 1995 to 2005 found that the environmental and health costs are the least for wind energy among all energy sources.

Incidentally, not far from the Koodankulam nuclear power plant, thousands of windmills around Koodankulam are rotating to produce power. This corridor—with its ideal geography between the sea and the hills with winds from advancing and receding monsoons—is the hub of wind energy forming the country's highest concentration of windmills. As per estimates, the wind capacity in this region is nearly twice the

nuclear capacity of Koodankulam nuclear plant. What's more, eight wind turbines are installed at the Koodankulam nuclear power plant itself with a total capacity of 10MW![5]

Obviously, harnessing wind energy is another area for further research and investment.

### 2.3 Hydro, waste-to-energy and other sources

Coming to yet another important renewable, safe, reliable and clean source of electricity, namely water, a study published in International Journal of Arts and Science in 2010 finds that the hydro power potential in India is about 1,49,000 MW out of which only about 38,000 MW has been so far harnessed. This means about 75% of the total hydro potential is yet to be exploited[6] but in a manner that properly addresses the environmental concerns associated with large hydro-electric projects.

Waste-to-energy is a neglected domain in India. There are new technologies such as plasma gasification where both organic and inorganic waste (plastic, glass, sewage, industrial waste, oil sludge) will be heated to high temperature (4000°C–5000°C) to produce 'syngas' which is used as fuel to produce electricity. Already, Pune Municipal

Corporation has set up a gasification plant which is successfully treating 650 tons of waste every day generating 2.2 lakh units of electricity.[7] If Bangalore had adopted this 'treasure out of trash' model, the recent crisis surrounding garbage disposal could, perhaps, have been avoided.

Overall, renewable energy in India—including other sources such as biomass, biofuel (Jetropha), geothermal—is a sector that is still underdeveloped and underexplored in relation to its enormous potential to fulfil the energy needs of the country in an affordable, clean, safe and sustainable way.

#### 2.4 Clean Coal Technology

It is true that fossil fuel-based power generation produces greenhouse gas emissions that have been linked to climate change. But, there are clean coal technologies available to improve efficiency of the conversion cycle and to reduce emission. Clean coal technologies include:

(a) *Advanced pulverized coal-supercritical steam generation* — Coal is ground into fine particles and blown into the furnace. Combustion of coal is used to produce superheated steam (i.e., steam at a temperature higher than water's boiling point) without boiling. Two experts from Harvard University, Ananth Chikkatur and Ambuj Sagar believe that this is the best option for the short-to-medium term future of coal in India.[8]

(b) *Fluidized-bed combustion (bubbling, circulating, pressurized)* — A fluid (air, pure oxygen or liquid) is passed through suspended solid fuels at high velocity resulting in more effective chemical reactions and heat transfer.

(c) *Flue gas desulphurization* — Technology used to remove sulfur dioxide (SO<sub>2</sub>) from exhaust flue gases of a power plant.

(d) *Integrated gasification combined cycle (IGCC)* — Technology that turns coal

and other carbon based fuels into gas—synthesis gas (syngas). It then removes impurities from the syngas before it is combusted.

(e) *Carbon capture and storage (CCS)* — the process of capturing waste carbon dioxide (CO<sub>2</sub>) from fossil fuel power plants, transporting it to a storage site, and depositing it where it will not enter the atmosphere, normally underground.

Millions of tons of CO<sub>2</sub> are already captured and stored hundreds of meters below ground at the 8 large-scale CCS plants in the US, Norway, Canada and Algeria. Norway opened an R&D centre for CCS technologies in May, 2012. However, India is yet to make any real headway in this regard and CCS should be taken as a research and investment area in the short term given India's heavy dependence on electricity production from fossil fuels.

#### 2.5 Power saved is power produced!

Union power ministry proclaims that 'Power saved is power produced'. However, the ministry statistics reveal that the Aggregate Technical and Commercial losses (AT&C losses) which include transmission and distribution losses, power theft and billing deficiencies account for 27% of the total power generated in 2009-10.[9] An International Energy Agency study shows that the power losses in India are among the highest in the world.[10] In most of the developed countries, the loss levels do not exceed a single-digit figure. In South Korea, the losses are 9%, in Singapore 3% and in the USA 6%.[11]

Even if the power losses are reduced by a mere 1% in 2013, it would make more than 2000MW available for consumption—more than what KKNPP is expected to produce even at its most optimal load factor! While better technology can certainly help reduce



Why solar and wind are not common?

losses, a Joint Secretary with the power ministry says that even measures such as proper energy audit and metering, fixing responsibility and accountability, and displaying political will can help reduce the AT&C losses by 10%.[11] Is the government listening?

### 3. The rural poor and nuclear energy

The Planning Commission estimates that 60 crore Indians do not have access to electricity and about 70 crore Indians use biomass (read dung cakes or firewood) as their primary energy resource for cooking. The UPA government launched Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) in April, 2005 with the slogan of achieving 100% rural electrification by 2012. But here comes the cruel twist: under the scheme, a village is declared electrified if the number of electrified households is just 10% of the total number of households in the village!

Clearly, there is a lot to be done. The renewable energy sources namely solar, wind and biomass are known to be best suited for rural electrification. The Alliance for Rural Electrification (ARE) believes that renewable energy technologies, utilised in off-grid and mini-grid power systems, can sustainably meet the energy needs of rural communities at an affordable price rather than

extending the electricity grid.[12] When viewed from the perspective of the rural poor, the overzealous thrust on nuclear energy is clearly a skewed outlook meant to support big business and corporate houses and not the common masses. No wonder that Dr S.P.Udayakumar feels that nuclear power benefits only industrial India and not the common man.[13]

### 4. Is anti-nuclear stand same as anti-technology?

The nuclear protagonists try to brand anyone who has concerns against nuclear technology — concerns that have been substantiated to considerable depth in the above sections — as being ‘anti-technology’. Of course, this is not true.

It needs to be emphasised that the principal demand from the nuclear skeptics — which includes nuclear energy experts — is that technology must have the goal of bettering the life of the common man and not to serve the interests of profit-greedy domestic and foreign monopolies. In fact, as this article has strived to show, further research in technologies for tapping renewable energy sources more efficiently can better serve the interests of the common people including the rural poor, provided the government seriously and sincerely worries about them. Accordingly, priorities should be set right by channelising the funds doled out to R&D in nuclear sector into these technology areas as well as by augmenting these research grants.

While absolute opposition to nuclear technology under all conditions is not a tenable stand, today’s reality is that firstly, there is a lack of fool-proof mechanism of radioactive waste disposal and of preventing or even, adequately handling radioactive hazards including accidents. Secondly, there are other cleaner, safer, more plentiful and even cheaper alternatives available

that are sustainable in the long run and are yet to be explored fully as this article has attempted to show. Thus, today, nuclear energy has to be necessarily ruled out as an option.

## 5. Why is the government so bent upon going ahead?

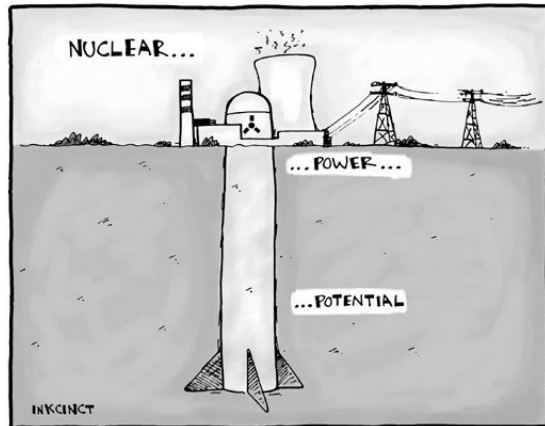
Now, to the billion dollar question: why is the government so adamant to go forward with the Koodankulam and other nuclear energy projects despite facing ceaseless and massive mass protests and objections from experts? Let us investigate further to arrive at a conclusion.

### 5.1 Nuclear energy and India's status as 'regional super power'

Let us quote from a pro-nuclear voice, Prof. Rahul Siddharthan (IMS, Chennai): 'Unfortunately, for most of its history in India, civilian nuclear power has been deeply intertwined with the nuclear weapons project'.[14] Why? Because, while nuclear energy can be used for electricity generation, the same process is also necessary for making nuclear bombs.

Let us see how this works. In 1954, under the US-sponsored 'Atoms for Peace' program, India acquired a Cirus 40 MW research reactor from Canada. In 1964, India commissioned a reprocessing facility at Trombay to separate out the plutonium produced by the Cirus research reactor. This plutonium was used in developing the nuclear bomb that was tested on May 18, 1974 at Pokhran.[15] This is how the civilian and military uses of nuclear energy in India are intertwined and this is how, India joined the select club of nine nuclear weapon states.[16]

Significantly, in the debate on nuclear energy in the Constituent Assembly in 1948, Nehru himself stated: 'I do not know how



Does this not adequately explain the need for secrecy in the India's nuclear energy pursuit?

you are to distinguish between the two [peaceful and military] uses of atomic energy'.[17] Prof. John Hariss from London School of Economics concludes that 'right from the time of Independence, India has entertained the possibility of developing nuclear weapons'.[18] Prof. Amulya KN Reddy was absolutely unequivocal when he said that India's nuclear power programme can be justified only by the fact that it enabled the nuclear weapons programme.[19]

India signed a Safeguards Agreement with the International Atomic Energy Agency (IAEA) — an international agency with a stated purpose to prevent nuclear proliferation — in 2008. As part of the agreement, a total of 14 Indian reactors would be open to Agency inspections by 2014 while 8 reactors — 4 in Kaiga, 2 in Kalpakkam, 2 in Tarapur — and associated facilities would not be subject to any international examination. In other words, they can be used for military purposes. But, make no mistake. These safeguards are mainly concerned with checking nuclear proliferation, not with the safety of the plant itself.[14]

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Ashley J. Tellis, a key US adviser to the Indo-US nuclear agreement, estimates that these eight unsafeguarded reactors in India can produce sufficient Weapon Grade Plutonium for more than 2000 nuclear weapons to add to the existing arsenal of 50 to 100 nuclear weapons.[20]

The imported reactors at Koodankulam and Jaitapur plants are reported to be incapable of producing weapon grade plutonium. But, they can still help the weapons program in an indirect manner. How? Joseph Cirincione, former director at Carnegie Endowment for International Peace asserts that the Indo-US nuclear deal (and other deals with France, Russia etc.) frees up India's limited uranium reserves to make nuclear weapons[20] while the imported uranium would be used in the civilian reactors.

K. Subramanyam, former head of the National Security Advisory Board, provides ample proof for this line of thinking. In December 2005, he advised: 'Given India's uranium ore crunch, it is to India's advantage to categorise as many power reactors as possible as civilian ones to be refueled by imported uranium and conserve our native uranium fuel for weapons grade plutonium production'.[21]

One month after signing the Safeguards Agreement, the Nuclear Suppliers Group (NSG), a 45-nation group led by the US to oversee global nuclear trade, allowed India to be part of global nuclear commerce. Thus India became the only nuclear weapons state to be part of nuclear trade without signing either the Nuclear Non-proliferation Treaty (NPT) or the Comprehensive Test Ban Treaty (CTBT). The US lobbied heavily to get this proposal through, supported by France and Russia among other countries.

In the subsequent months, nuclear firms from these three countries — such as Areva

(France), Westinghouse & GE-Hitachi (US), Rosatom (Russia) — were in talks with NPCIL to sell reactors, to supply raw materials and technical know-how. India signed bilateral deals on civilian nuclear energy technology cooperation with several NSG member countries including the US, France, UK, Canada, Kazakhstan, and South Korea.

Let us listen to a telling remark from Dr A.Gopalakrishnan: 'The ethical standards of DAE, NPCIL and AERB have fallen considerably, especially since 2004, perhaps because of the current prime minister's direct interference with these institutions to meet the political ends of getting the Indo-US nuclear deal passed through parliament'.

In summary, India agrees to separate its military and civilian nuclear facilities and continue its nuclear weapons ambitions to sustain and enhance its 'regional super power' status. In return, foreign companies get a large share of the Indian nuclear market pie! So, you see, this is how the principle of give-and-take operates in the exclusive nuclear club!

Is this not a reason why the government is so aggressive on its nuclear plans?

### 5.2 Nuclear business — a mine of opportunities for the corporates

Currently, Uranium and Thorium exploration, mining and nuclear power generation are in the public sector domain in India. However, in 2010, a DAE communiqué to the Lok Sabha says 'Private sector in India is in a position to participate in setting up nuclear power plants through supply of components, equipment and works contracts'. But, having limited their role to erection, procurement and construction of nuclear plants and supply of infrastructure equipment so long, the corporate bigwigs have started their foray into the nu-

clear sector in India in a bigger way.

Federation of Indian Chambers of Commerce and Industry (FICCI) — the apex industry body in India — has a nuclear sub-group. Significantly, the chairman of this sub-group is an ex-vice chairman of AERB. As part of the Indo-US nuclear agreement in December, 2009, this sub-group recommended that '100% privatisation in nuclear sector should be achieved in a cautious, stepwise and smooth manner to make it sustainable and irreversible. The initial steps could be Public Private Partnership (PPP) or Joint Venture (JV) with NPCIL leading to 100% privatisation'.[22] So, does this not mean the die has already been cast?

US-based investment guide, iStockAnalyst estimates the size of India's nuclear power sector to be a mammoth Rs.7.5 lakh crores! As many as 400 Indian and foreign firms are seen as the beneficiaries of the far-reaching NSG verdict.

'We have (in India) at least a dozen technologically-competent players who can rope in strategic alliances and joint ventures with reactor manufacturers. Eventually, these players can go on to become reactor manufacturers themselves' said V. K. Chaturvedi, former CMD, NPCIL and interestingly, a Director on the Board of Reliance Power.

To name a few, L&T, India's biggest engineering company is tied with NPCIL for the erection, procurement and construction of nuclear plants including Koodankulam. Reliance Infrastructure (formerly Reliance Energy) reportedly plans to invest Rs.12,000 crore to install 2000 MW of nuclear power capacity. Tata Power tied up with some major nuclear equipment suppliers like Areva and Toshiba (which has acquired Westinghouse). Gammon India, India's largest civil engineering company which built the nuclear plants in Rajasthan and Tarapur along with L&T are now in-

involved in building India's first Prototype Fast Breeder Reactor plant at Kalpakkam, Rolta India, in association with Stone and Webster offers reactor-building technology. Hindustan Construction Company has so far constructed four nuclear power projects in India and is well-placed to get turnkey construction contracts in nuclear projects. Crompton Greaves completed a switchyard project for NPCIL.[23] L&T and Tata Power were also involved in the construction of India's first-ever indigenous nuclear submarine — INS Arihant.

Significantly, former DAE head, Dr Anil Kakodkar, admitted in an article published in a Marathi daily earlier this year that India must import reactors worth billions of dollars because 'we also have to keep in mind the commercial interests of foreign countries and of the companies there'.[24] One is tempted to ask the Prime Minister whether the foreign hand operates in the anti-nuclear protests or in the nuclear establishment!

Dr A.Gopalakrishnan, in an article in DNA on 17 March, 2011, steps up his fierce attack and drops the bombshell: 'All along, these nuclear agencies of the government have also colluded with, and were assisted by, large Indian and foreign corporate houses and their federations interested in the sizeable nuclear power market they are helping to create in India. Even in the evaluations and negotiations of cost, the safety and liability of imported reactors, the official nuclear agencies today are operating hand-in-glove with their friends in the corporate houses and federations.'

Indian corporates are not limiting their nuclear ambitions only to India. Last December, Times of India carried a significant piece of news that said Reliance Industries Limited — an Indian monopoly corporate house with global investments — acquired a stake in the US-based nuclear de-



sign & engineering firm, Terra Power. RIL already has a 49% stake in Australia-based UXA resources. This clearly indicates the aspirations of RIL in nuclear power generation. In 2010, Indian mining company, Dharni Sampda, acquired Uranium mining licenses in 3000 sq. km area in Niger.

Now, it is an open secret that the political parties are funded by the corporates only to reap the policy fruits when governments are formed. So, the governments are destined to implement what the corporates demand.

Is this not another reason why the government is so aggressive on its nuclear plans?

## **6. Nuclear policy decisions — democratic or autocratic?**

In a democracy, it is expected that the government involves and consults the people, and addresses their concerns in policy decisions that have direct impact on their lives and livelihoods, that the process should be democratic instead of forcing the decisions down people's throats.

However, it is evident that this basic principle of democracy is bypassed in the decision making process concerning nuclear power projects in India. This article has aimed to establish that a nuclear disaster can by no means be compared with any other disaster or calamity in its terrible magnitude and long-term pernicious effects. So, it can be well understood that those who are protesting against nuclear plants are doing it not only for their own sake but for the sake of the future generations and in the larger interest of the people of the country as well.

If the term 'Nation' includes the people and the environment in the national territory, then the protesters are fighting to protect the national interest. If so, framing false charges or slandering them or branding them traitors and anti-nationals, or let-

ting loose state repression on them — can any of these be regarded as proper or democratic?

Rather, the government and the nuclear establishment should address the genuine concerns of the people, and be as prepared to be convinced as they are out to convince, and be prepared to concede to the people's demands including that of a 'No' to nuclear plants if the demands are found to be just and legitimate—all these with an open mind and total transparency.

To set the ground for such a free and fair discussion, all false cases filed against the protesting people and their leaders must be immediately withdrawn, all arrested people rotting in jails should be released forthwith, prohibitory orders in the affected areas should be lifted without further delay, and those who have suffered from injuries and loss of life and property should be adequately compensated.

Finally, steps must be taken to ensure people's participation in making all policy decisions that affect their lives and livelihoods and to protect their right to protest against what they feel is not just and not in their common interest.

## **7. Experts and intellectuals — on which side?**

As we have seen, the nuclear establishment has leveraged its heavyweights in its campaign for nuclear power. At the same time, the movements at Koodankulam, Jaitapur, Gorakhpur and other places have stirred the conscience of pro-people intellectuals and experts across the globe. Support is still pouring in.

Noam Chomsky, internationally acclaimed intellectual who was voted 'World's top public intellectual' in 2005 has cautioned that Koodankulam could be another Bhopal disaster waiting to happen. In a letter of solidarity, he said: 'Nuclear energy

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is a very dangerous initiative, particularly in countries like India, which has had more than its share of industrial disasters. I would like to express my support for the courageous people's movement protesting the opening of the Koodankulam Nuclear Power Plant'.

Other prominent intellectuals, nuclear energy experts, scientists, jurists, artists, writers, journalists who have either actively taken part in the struggle or lent their support include:

- Eminent Jurists like Justice VR Krishna Iyer (former judge, Supreme Court of India), Justice A P Shah (former Chief Justice of Delhi High Court), Justice B.G. Kolse Patil (former judge of the Bombay High Court)
- Former West Bengal Governor Gopalkrishna Gandhi,
- Former navy chief Admiral L Ramdas, former Army Chief General V.K.Singh
- Former Union Power Secretary, Dr. EAS Sarma (India Today magazine says 'a testimony to his honesty is the fact that he was transferred 26 times in his 35-year tenure'),
- Former Chairman of Haryana State Electricity Board, MG Devasahayam
- Social activists and environmentalists like Medha Patkar, Prof.T.Shivaji Rao, Lalita Ramdas
- Scientists, energy experts and physicists like Prof. Ram Punyani, Dr Surendra Gadekar, Dr Sangamitra Gadekar, Dr PM Bhargava, Dr Suvrat Raju, Shankar Sharma, Dr Partho Sarothi Ray,
- Economists like Dr. Sulabha Brahme
- Noted writers, columnists, film makers and journalists like Praful Bidwai, Vandana Shiva, Anand Patwardhan, Nagesh Hegde,
- Anti-corruption activists like Prashant Bhushan, Aruna Roy,
- Political scientists like Prof. Achin Vanaik,
- Human rights activists like Dr Binayak Sen,
- And hundreds of eminent citizens in various fields

### 8. The last word

Due to the well-orchestrated and relentless campaign by the nuclear establishment, a section of the people has become confused on the issue. This article is meant to distinguish facts from fiction and thus, to establish the correctness of the anti-nuclear line on the intellectual front to clear the confusions and dispel the wrong notions.

Finally, a question that keeps popping up is that since thousands of crores of rupees have been already spent on the KKNPP, would it not be unwise to pull the plug now? PMANE Expert Team headed by M. G. Devasahayam has suggested fuel-switching and to make KKNPP a liquefied gas-based power plant and that this can be supplemented with wind, solar and tidal power for which there is huge potential in Koodankulam and adjoining areas.[25]

There are precedents elsewhere. For instance, Shoreham nuclear power plant in the USA was decommissioned following protests by the local residents even before it started commercial operations. As of July 2012, there is a proposal to build a natural gas-fired power plant at the nuclear site. There is another proposal to build a wind farm. Both taken together have a combined capacity which is about 300 MW more than the capacity of the shuttered nuclear facility. The existing substation and transmission & distribution system is planned to be reused by both power plants.[26]

In January 2013, Japan announced

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plans to build the largest wind farm in the world — with 1000 MW capacity — just 15 km off the coast of Fukushima![27] The Japan government has also instituted a Feed-in-Tariff (FIT) incentive program for solar energy producers under which the producers are assured of a stable income for 20 years. Thanks to the scheme, solar projects with a capacity of more than 1000MW have taken off since the Fukushima accident.[28]

It means that, since the plans on Jaitapur, Gorakhpur and other nuclear plants are not yet in advanced stages, it is completely feasible to correct the course if the government acts NOW without any delay.

Thus, the money already spent can, at last, be put to some good use!

### References

1. 162458: Cash-for-votes ahead of confidence motion, The Hindu, 17 Mar, 2011
2. India pampers foreign vendors, reserves a nuke park for each, Brahma Chellaney, The Sunday Guardian, 8 Aug, 2010
3. India can meet energy needs sans N-power: Study, IANS, The Hindu, 4 Oct, 2012
4. Large Solar Energy Projects, California Energy Commission, 14 Sep, 2012
5. Koodankulam's windmills produce more than N-plant, Hindustan Times, 30 Sep, 2012
6. Hydro Power Vs Thermal Power: A Comparative Cost-Benefit Analysis, Adesh Sharma, International Journal of Arts & Sciences, 2010
7. Pune's waste-to-energy project pays rich dividends, The Hindu, 15 Sep, 2012
8. Cleaner Power in India: Towards a Clean-Coal-Technology Roadmap, Clean Energy Solutions Center, Chikkatur & Sagar, Dec 2007
9. 27% of power goes waste: Moily, Times of India, 11 Aug, 2012
10. Electric power transmission and distribution losses (% of output), The World Bank, 2010
11. A strategy to cut mounting power losses, Devinder Singh, Financial Express, 16 Dec, 2009
12. Best practices of the Alliance for Rural Electrification, ARE, 2011
13. Thirteen Reasons Why We Do Not Want the Koodankulam Nuclear Power Project, Dr S. P. Udayakumar, dianuke.org, 29 May 2012
14. The real questions from Koodankulam, Rahul Siddharthan, The Hindu, 14 Sep, 2012
15. Nuclear Weapons , FAS, Nov, 2002 (<http://www.fas.org/nuke/guide/india/nuke/>)
16. The Myth of Nuclear Necessity, Ward Wilson, New York Times, 13 Jan, 2013
17. The making of the Indian Atom Bomb, Itty Abraham, South Asia Books, Jan 1999
18. India: The bitter fruits of grandiose ambition, Prof. John Harris, July 2003
19. From Fission to Fusion (M.R. Srinivasan), Viking, New Delhi (2002) — review by Prof. Amulya Reddy 2002
20. Atoms for War? U.S.-Indian Civilian Nuclear Cooperation and India's Nuclear Arsenal, Ashley Tellis, 2006
21. India and the Nuclear Deal, K Subramanyam, Times of India, 12 December 2005.
22. Civil nuclear opportunities in India -review of current status, G R Srinivasan, FICCI Nuclear Sub Group on Utilities, 8 Dec, 2009
23. Indian Government to Allow Private-Sector Participation in Nuclear Sector, an Industrial Info News Alert, iStockAnalyst, 30 Sep, 2010
24. Why Koodankulam is untenable, MV Ramana & Suvrat Raju, The Hindu, 11 Nov, 2011
25. Koodankulam, a way out of the nuclear mess, MG Devasahayam, 19 Sep, 2012
26. Companies pitch gas and wind plans involving Shoreham, The Suffolk Times, 6 Jul 2012
27. Japan to replace nuclear plant with world's largest wind farm, phys.org, 18 Jan, 2013
28. Solar Energy System approvals surge following launch of Japan's FIT, CleanTechnica, 12 Oct, 2012

### Photo & Image Courtesy:

1. <http://www.inkcinct.com.au/>
2. <http://images.icnetwork.co.uk>
3. <http://www.techienation.com/>

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