Topic of the week for discussion: 16th to 22nd May 2013

Topic: Perspective: Nuclear Energy

Topic Introduction

The electricity sector in India had an installed capacity of 223.343 GW as of March 2013, the world's fifth largest. Captive power plants generate an additional 34.444 GW. Non Renewable Power Plants constitute 87.55% of the installed capacity and 12.45% of Renewable Capacity. India's share of nuclear power plant generation capacity is just 1.2% of worldwide nuclear power production capacity, making it the 15th largest nuclear power producer. Nuclear power provided 3% of the country's total electricity generation in 2011. India aims to supply 9% of it electricity needs with nuclear power by 2032. India's largest nuclear power plant project under implementation is at Jaitapur, Maharashtra in partnership with Areva, France.India is one of the most rapidly expanding economy and its further growth and expansion can be ascertained with the availability of adequate amount of power and electricity. The constant fluctuations in the supplies and prices of the fossil fuels have made it necessary that India adopt the route of producing power and electricity using nuclear energy.

In the years following the major accidents at Three Mile Island in 1979 and Chernobyl in 1986, nuclear power fell out of favor, and some countries applied the brakes to their nuclear programs. Concerns about climate change and air pollution, as well as growing demand for electricity, led many governments to reconsider their aversion to nuclear power, which emits little carbon dioxide and had built up an impressive safety and reliability record. Some countries reversed their phase outs of nuclear power, some extended the lifetimes of existing reactors, and many developed plans for new ones.

But the movement lost momentum in March, when a 9.0-magnitude earthquake and the massive tsunami it triggered devastated Japan's Fukushima nuclear power plant. Three reactors were severely damaged, suffering at least partial fuel meltdowns and releasing radiation at a level only a few times less than Chernobyl. The event caused widespread public doubts about the safety of nuclear power to resurface. Germany announced an accelerated shutdown of its nuclear reactors, with broad public support, and Japan made a similar declaration, perhaps with less conviction. Their decisions were made easier thanks to the fact that electricity demand has flagged during the worldwide economic slowdown and the fact that global regulation to limit climate change seems less imminent now than it did a decade ago. In the United States, an already slow approach to new nuclear plants slowed even further in the face of an unanticipated abundance of natural gas.

Electricity generation emits more carbon dioxide in the United States than does transportation or industry, and nuclear power is the largest source of carbon-free electricity in the country. Nuclear power generation is also relatively cheap, costing less than two cents per kilowatt-hour for operations, maintenance, and fuel. Even after the Fukushima disaster, China, which accounts for about 40 percent of current nuclear power plant construction, and India, Russia, and South Korea, which together account for another 40 percent, show no signs of backing away from their pushes for nuclear power. Nuclear power's track record of providing clean and reliable electricity compares favorably with other energy sources. Low natural gas prices, mostly the result of newly accessible shale gas, have brightened the prospects that efficient gas-burning power plants could cut emissions of carbon dioxide and other pollutants relatively quickly by displacing old, inefficient coal plants, but the historical volatility of natural gas prices has made utility companies wary of putting all their eggs in that basket. Besides, in the long run, burning natural gas would still release too much carbon dioxide. Wind and solar power are becoming increasingly widespread, but their intermittent and variable supply makes them poorly suited for large-scale use in the absence of an affordable way to store electricity. Hydropower, meanwhile, has very limited prospects for expansion because of environmental concerns and the small number of potential sites.

Heavy Water — the third key element of nuclear power — has also had hiccups though Heavy Water reactors had been India's hot favorite from the very beginning. All this has led to reactors working on low capacity and facing shut downs and Department of Atomic Energy (DAE) staying happy with turnkey projects and imports. Expensive plutonium separation from used fuel rods continues to be justified for its 'tremendous potential' for treating hazardous radioactive waste and for unlocking the huge energy reserves of low-grade uranium and thorium resources through breeder reactors to unfold India's nuclear renaissance. Nuclear genie continues to be the symbol of progress and power and our scientific and political leadership continues to vouch for its cost-effective and indigenous nature. It reminds one of the 'Atoms for Peace' of 1950s and the famous prognoses of Lewis Strauss, President Eisenhower's Chairman of US Atomic Energy Commission, who once called it source of energy "too cheap to meter."

The Power of Promise highlights how DAE continues to rely on future projections with zero correlation to its past accomplishments. From its original target of 10,000 MW by year 2000, to its revised target of 20,000 MW by 2020. since 1984, the heated debates on Indo-US nuclear deal were to make Cabinet Minister for Power, Sushil Kumar Shinde declare that, against existing 4120 MW for 2008, "the U.S. will help us add 40,000 MW of nuclear power by the year 2020." Atomic Energy Chairman Anil Kakodkar was to pitch in predicting, how by 2050, the share of nuclear power will constitute 20 to 35 per cent of electricity generation though it now stood at less than 3 per cent. But it was for Prime Minister Manmohan Singh to top it all. At the International Conference on the Peaceful Uses of Atomic Energy in New Delhi in September 2009 he prophesied: "India would have 470 GW of nuclear power by mid-century" which was one-hundred times that of India's current total. It is this penchant for making unrealizable projections that triggered Ramana's research into evaluating DAE's history.

Take the case of recently-in-news Koodankulam. The deal for two 1000 MW VVER-1000 Soviet reactors was originally signed in November 1988. This was soon after the notorious 1986 Chernobyl accident as also in the face of this reactor's disastrous track records in Bulgaria and Czech Republic which had destroyed Soviet reputation. DAE did not take into consideration the fact that Koodankulam lies at the edge of the Gulf of Mannar, one of the world's richest marine biodiversity areas. The hot water discharged after cooling nuclear reactors is likely to affect adversely this precious biological reserve. Not just Environmental Impact Assessments are flawed but popular protests were met with either neglect or use of force.

Read further:

http://www.indianuclearenergy.net/

http://www.foreignaffairs.com/articles/136544/ernest-moniz/why-we-still-need-nuclear-power

http://www.thehindu.com/books/books-reviews/indias-nuclear-power-problem/article4595432.ece