

MYTH AND REALITY

Nuclear Power: Neither Cheap nor Safe

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MR LEWIS STRAUSS, THE then Chairman of the US Atomic Energy Commission, while speaking on nuclear power at the height of optimism uttered in 1954 that, "It is not too much to expect that our children will enjoy in their homes electricity too cheap to meter". Some in the scientific and technological community from the beginning were skeptical about the future of this emerging form of energy. Mr C G Suits, Vice-President and Director of Research at the General Electric Company, in a December 1950 speech before the American Association for the Advancement of Science stated bluntly that - "At present atomic power presents an exceptionally costly and inconvenient means of obtaining energy. ...The economics of atomic power is not attractive at present, nor are they likely to be for a long time in the future. This is expensive power, not cheap power as the public has been led to believe." There was, as mentioned in a report authored by Enrico Fermi, Glenn Seaborg and Robert J Oppenheimer in 1948, an "unwarranted optimism" about the speed at which the technological problems related to proper harnessing of nuclear power could be satisfactorily resolved.

There, however, was a hurry. In the post-war years the demonic power which destroyed the two Japanese cities and ended the War brought down the American technological prowess to a demeaning level before the world's eyes. There was an urgency to show the beneficial side of the atom by setting up nuclear power stations and supply electricity cheap to the consumers before the Russians did it. The Americans lost to the Russians who started their first nuclear power plant at Obninsk in 1954. Queen Elizabeth opened the first British plant at Calder Hall in 1956. The American plant of Shippingport, Pa, was inaugurated by General Eisenhower in 1957. The nuclear electricity age appeared with so much of fanfare, so much of eloquent optimism that the scar of the horrid destruction in Japan of 1945 started being pushed back into the mind.

The sixties of the last century witnessed a phenomenal rise in nuclear power generation. The two leading American manufacturers—General Electric and Westinghouse with their own special designs of Boiling Water Reactor and Pressurised Water Reactor respectively—received too many orders to cope with their manufacturing capacities. Problems arose with fresh understanding of the safety issues and the required modification of the design and incorporation of additional safety measures. The Atomic Energy Commission was issuing new guidelines and standards and each compliance added to the cost. The disillusion started dawning. The power utilities found the cost overruns unbearable. Nuclear power stations with construction 97% completed had to be converted to coal-fired stations failing to raise the excess capital required. Few went bankrupt.

The seventies started with complete disillusionment. Orders for nuclear power stations in the USA started being cancelled. Elsewhere in Europe and other rich countries where the power stations were set up by the state the cost had never been a deciding factor—it all came from the public exchequer. The decline in America with private utilities went on unabated. Finally the cancellations blocked fresh orders. The last order for a new nuclear power plant in America had been placed in 1978. The first major accident leading to a core meltdown occurred a year after that—in 1979 at Three Mile Island. The American Nuclear Industry thus failed prematurely suffering colossal losses. It is instructive at this point to recount what the *Forbes magazine* in 1985 commented on this unfortunate and unexpected turn—it was "the greatest managerial disaster in business history". The loss amounted to \$145 billion. The American bill for the Vietnam War or the entire Space Program was less than this. The reactor manufacturers finally confessed that in their initial enthusiasm to capture a rapidly expanding market and also to impress the administration they sold reactors at prices much lesser than the manufacturing cost.

The cost factor is one of the important reasons for the decline in nuclear power. Where the utilities and the reactor manufacturing companies are state-owned cost had never been an issue. In the UK so long as CEGB, the state company owned the nuclear plants there was no problem—the state

provided subsidies. After denationalization in 1989 the non-nuclear part of the utility was immediately sold. There was no buyer for the nuclear plants. The government set up a new company—British Energy—for running the nuclear plants and doled out huge subsidies every year. Finally the government succeeded in handing over the company to Electricite-de-France (EdF), the French state-owned utility.

The latest fiasco in the cost area centres around the French manufacturing company AREVA NP's supplying a 1650MW EPR reactor (the same type proposed to be supplied at Jaitapur) to a Finn consortium TVO and erecting it at Olkiluoto. The turn-key contract was given to Areva at \$ 5.3 billion in 2003—the plant was to come to line in 2009. It is now three years behind schedule and the cost has been raised to \$ 8.6 billion, nearly 50% more than the original. The entire project's economy has gone haywire and it is uncertain when the plant comes to operation. (The cost comes to more than \$ 5000 per MW, nearly five times that of a coal-fired power plant in India—the apprehensions about the high cost of Jaitapur electricity are wellfounded).

All along the economics of nuclear power has remained unfavourable. By maintaining an unholy secrecy it had been touted to be a cheaper inexhaustible source. None of these claims are true. The 'breeder reactors' take an inordinately long time to breed the same amount of fuel with which the reactor had been started. For thorium this 'doubling time' is about one century!

SAFETY

The safety issues are paramount in the case of nuclear power plants. The safety measures essentially ensure that extremely harmful radioactive substances do never come out of the protective shell of the reactor. Human intelligence and innovative-ness are to be rightly appreciated in devising the mechanism for harnessing the atom. But human fallibility is also to be taken into account. Any leak, even a minor one, results in radioactive contamination of all those in immediate vicinity and radioactive particles are easily carried by air and water. There have been innumerable cases of such leaks from reactors, old and new, now operating in the world. In fact Greenpeace has compiled the accident data and made a calendar which shows the nuclear accident information on all the 365 days of the year. The severity of the accidents vary but there is no denial of the fact that in spite of all the precautions taken at every stage from design to final construction, with all possible safety measures in place and rigorous training of all personnel there had been cases of deadly radioactivity coming out of the various nuclear establishments related to power generation. And, very importantly, there is no minimum dose of radiation which is not harmful to living cells according to International Commission of Radiological Protection (ICRP), the highest international body in this field.

Serious accidents had already taken place. Three Mile Island in the USA in 1979, Chernobyl in Ukraine in 1986 and Fukushima in Japan only very recently. It is the general practice of the nuclear plant operators to suppress informations on all unfavourable events in the plants as much as they can. So minor events never come before the public. In India there is an ancient draconian act—Official Secrets Act, 1886 by which the officials try to keep every abnormal situation, specially those related to human health, outside the public knowledge. The loss of life, in case of general accidents, is usually the most within hours or days of an ordinary accident. In case of nuclear accidents, the radiation effects appear after a certain time which may be years. The radiation victims of Hiroshima and Nagasaki bombing are still suffering. In case of the Chernobyl accident the immediate deaths numbered only 31 as reported officially. The total number of lives lost because of the radioactivity spread from the damaged reactor, whose 2000 ton top lid was blown out, had reached 9.85 lakhs by 2004 as reported by two Russian scientists. The deaths were, as apprehended, mostly from cancer and the next generations will likely suffer from genetic disorders.

The control of a nuclear power plant is extraordinarily complex. It is often said that man has succeeded in taming the atom. By his extraordinary intellectual power man has sent the fragile human frames to outer space and made incredible moon-landing a reality. Man has conquered space. Here again the control was very deeply complex. The astronauts were highly trained in flight control and the accidents were few. But, in spite of all the safety precautions taken, accidents had happened and precious lives had been lost. The American Space Administration has finally accepted the otherwise simple fact: compared to the returns the cost, taking into account the possibility of loss of life, is too high. After the break-up the Soviets had also discontinued their space programme as the defence imperatives had disappeared. There is no valid reason to continue the very expensive and highly risky

space programmes. The American space shuttle has finally made its last trip. No more conquering of space, at least not for the near future. Rationality, at long last, has prevailed.

There can be drawn a parallel logic. Nuclear plant operation will ever remain hazardous. The radioactive contamination of a large number of people, not only the near ones but also those living away, by insisting the continued running of nuclear plants when other safe alternatives are definitely available for energy generation, is a risk which is insurmountable. Even admitting the weapon link the current international strategic thinking is gravitating to non-aggression. In a world now more inclined to peaceful development nuclear activities should be stopped. It is an open secret that nuclear weapon development had been continued in poor countries, like India and Pakistan, under the guise of the 'peaceful atom'. Let there be an end to this hypocrisy. A number of rich nations, like Denmark, had wisely rejected nuclear energy from the very beginning. When only 30 countries out of a total of 192 member nations of the UN are continuing the costly and dangerous nuclear path for no fair and tangible reason phasing out of nuclear power is the only path that the human society must take.

If not the human society will experience the TMI-Chernobyl-Fukushima shock again and again.□