Scientific Problems in India

After attaining independence, India lost no time in creating the infrastructure for nuclear development in the country. The Atomic Energy Commission was set up in 1948 within an year of the country becoming free. Dr. Homi Bhabha eventually became the father of India's nuclear development programme placing India in the exclusive nuclear club in less than thirty years. India had started from a scratch. At that time the world was in a state of shock and horror after the Americans had destroyed Hiroshima and Nagasaaki in Japan with atom bombs; the potential of Atom for peace and progress was to be visualised and explored. India interested in making use of the nuclear energy for peaceful purposes – for generating electricity, for speeding up plant growth, for bringing medical relief to its teeming millions and for a number of other developmental purposes. So India thought of all that and set in motion the processes of planning and executing programmes for peaceful nuclear development.

It was in 1954 a full-fledged government department was set up with Dr. Bhabha as its secretary and Mr. Jawahar Lal Nehru, the then Prime Minister, the ministerin-charge. It is said that by giving the technocrats their due much impetus was given to the nuclear development programme. The Atomic Energy Commission continues to be responsible for formulating programmes and policies which the department has been executing. For harnessing atomic energy the research and training establishment at Trombay came up. It became the nursery for those who were to handle research and designing fabrications and innovations to give the country self-dependence in this field. It was at the Bhabha Atomic Research Centre that reactors like Apsara, Cirus, Zerlina, Purnima and advanced computers were set up. The most important addition is Dhruva reactor-a 100 Mwt research reactor completely designed and built by Indian scientists and technologists. Another centre of research and training has come up at Kalpakkam where the thrust is on research on fast breeder reactors. This Indian designed reactor used mixed plutonium-uranium carbide fuel. Its importance lies in the fact that it will help in the development of nuclear technology in India.

Early in the process of nuclear development the country decided that nuclear power must be produced as early as possible since coal and oil resources were limited and must be conserved. Now there are major atomic power stations at Tarapur, Kota in Rajasthan and Narora in Uttar Pradesh. Tarapur, commissioned in 1959, has been generating ever since. Being the first it has to be established with the assistance and cooperation of advanced countries. But subsequently even at Tarapur Indian scientists and technologists have introduced three hundred design changes in the plant to keep it in tune with advanced technology and improve its efficiency of power generation . The Rana Pratap Sagar station at Kota was built by Indian scientists to an old foreign design and then they went on to design and build the third major station at Kalpakkam. The fourth one at Narora is cent per cent Indian design and construction and so is the next one at Kakrapar in Gujarat. Narora's first unit became operational in 1987-88 and that of Kakrapar became operational in 1990-91.

More plants are in the planning and designing stage and in the case of two, Kaiga in Karnataka and one in the northern part of Rajasthan, work on the ground has also begun. The power generated and sold to various state electricity grids is now worth more than Rs. 170 crores but at present it is only a small part of the total power generated. But what has been achieved is just an indication of what the country is capable of achieving as the situation demands and as dependence on this source of energy increases. India is one of the six countries in the world to possess the technology and capability to design and erect a complete atomic power station, the others being the United States, the Soviet Union, France, Japan and Britain.

Much progress has been made in location indigenous source of nuclear fuel and processing it in factories, in producing heavy water required for reactors and servicing the power stations. A Nuclear Fuel Complex has come up at Hyderabad where the fule for the reactors is manufactured. Heavy water is produced at plants in Baroda in Gujarat, Nangal in Punjab, Talcher in Orissa, Kota and Tuticorin in Tamil Nadu. Two more are getting ready at Thal-Vaishet in Maharashtra and Manuguru in Andhra Pradesh.

Nuclear energy is also being developed for the benefit of farming. BARC laboratories are bush producing radiation-induced improvements in seeds. Irradiation of vegetables, fruits and cereals for preservation is area of the use of nuclear energy for agriculture. Seeds of pigeon peas, black gram and groundnuts developed at BARC have been released by the Ministry of Agriculture to the farmers. Industry has been helped with the transfer of technology. Some 200 different processes and instruments have been distributed among manufacturers. Nuclear products are likewise being developed in aid of medicine, apart from radiation.

In 1974, India became the sixth country in the world to explode an atomic device. The explosion was carried out at Pokharan in the Rajasthan desert without any danger to human or animal life or health. The underground explosion, yielding 12 kiloton's of explosive energy was carried out with indigenous know-how, resources and equipment the aim being to gather information on its usefulness for several peaceful applications. Naturally there was jubilation in the country and pride in the achievement of Indian scientists and technologists. There were some apprehensions expressed abroad but India reassured everyone that she has no intention of developing a nuclear weapon programme. Her bonafides have been established by the fact that in the 5 years since then India has not diverted her resources to any more explosions or building a nuclear bomb. This is despite the alarming reports of the various preparations for manufacturing a bomb in Pakistan and reports from American sources that Pakistan is one the verge of acquiring a nuclear weapons capability. India is also in the forefront of a world movement for nuclear disarmament. She is one of the six nations in the world which have been repeatedly urging the two superpowers to stop further nuclear tests, stop the production of nuclear weapons and gradually destroy their stockpiles.