

WIN GLOBAL 2008
Status of Nuclear Activities of Bangladesh Atomic Energy
Commission

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Summary

Bangladesh Atomic Energy Commission (BAEC) is the national authority for acquisition, development and application of Nuclear Science and Technology and thus is playing the pioneering role for the development of the country's nuclear research programmes and thus helping to achieve the cherished goal of self-reliance through national efforts and international co-operation. Being firmly committed to the peaceful uses of Atomic Energy, programmes have been undertaken in Physical Sciences, Biological Sciences, Engineering and Nuclear Power Sector by Bangladesh Atomic Energy Commission and some of the results have been transferred from laboratories to hospitals, agriculture, industries and environment for practical applications. In spite of some major constraints, presently BAEC's activities have increased many folds and keeping in view of the overall power crisis of the country efforts have also been given to establish Nuclear Power Plant in the country.

1. Nuclear 2007 highlights:

Constant power crisis is one of the main problems for Bangladesh to attain the projected goals of its socio-economic development. But due to limited indigenous energy sources it is not possible to increase electricity production. Over the last four decades scientists working in the nuclear field had been striving to fulfill the dream of implementation of nuclear power plant to overcome the crisis of electricity but limited resource and financial constraints are the major obstacles in the way of Nuclear Energy in Bangladesh. However, the overall power crisis situation and the constant efforts of the scientists made the Government of Bangladesh to take the decision of establishing nuclear power plant in the country and so, the Government has taken steps to expedite the implementation of the power plant project. Feasibility study has been made which has clearly identified nuclear option as appropriate and viable for the country. A site has already been selected for the establishment of the 1st nuclear power plant in the country. The feasibility study about the financial and technical aspects of the selected site has been acknowledged. A Cabinet Committee, headed by the Honorable prime Minister has been formed to provide policy guidelines aimed at resolving problems confronted in implementation of the project.

2. Nuclear Overview:

a) Energy Policy: Nuclear Energy has been introduced as an alternative source of energy mix in the National Energy Policy 2007 of the country.

Future of nuclear power: National Energy Policy has identified the necessity of implementing of two units of medium size nuclear power plants within the year of 2015 and 2017 respectively in order to enhance the security of supply of electricity.

Projects: A development project has been approved for the fiscal year 2008-2010 to accomplish essential activities to implement the Nuclear Power Plant.

b) Public acceptance: As people are constantly being suffering from power crisis so if Nuclear Power Plant can give some guarantee of power supply acceptance of nuclear power from major part of the public would go in favour of this.

c) Nuclear equipments (number and type):

- **Research:** Bangladesh has only one research reactor. The 3 MW TRIGA MARK – II Research Reactor had been installed in the country in 1986.

d) Nuclear Waste Management: A Central Radioactive Waste Management Facility has been developed for processing, safe storage and disposal of radioactive wastes. The capacity is sufficient to meet the demand of the radioactive waste storage facility of the country including the proposed power plants wastes.

e) Nuclear Research: Material research is being done in the neutron scattering using triple axis neutron spectrometer at the 3 MW research reactor for structural characterization of condensed matters like metals, alloys, ceramics, polymers, superconductors and various types of magnetic materials. Neutron activation analysis, another nuclear technique is being used for multi-elemental analysis in geological, biological, nutritional and health related environmental samples. Also Tc-99 and I-131 isotopes are being produced to meet the demands of the nuclear medicine centers of the country.

f) Other Nuclear Activities:

Medical Use:

Nuclear Medicine:

One of the major fields of BAEC using radiation is the Nuclear Medicine. BAEC is providing nuclear medicine services to the general people of the country at a lower cost than the private clinics and is thus giving support to the governmental health program. Through 14 Nuclear Medicine Centers in different cities of the country it is playing the pivotal role in the diagnosis and management of thyroid disorders and also providing diagnostic services for the patients of oncology, cardiac, renal and many other disorders. Recently, in some of the centres new

modality of Bone Mineral Densitometry have been introduced which is new in the country. Five Radioimmunoassay laboratories have already been set up. To save our children from mental and physical retardation due to congenital hypothyroidism screening of New born babies using nuclear technique are being carried out. BAEC is now engaged in developing and continuous upgrading of nuclear medicine in the country.

Procedures for Sterilization of Tissue Graft and Sterilized Amniotic Membranes for dressing of burn wounds and bone pieces for use in orthopedic and dental surgery have been established and are being supplied in limited quantities to different hospitals. Establishment of a national tissue banking facility is under consideration.

Non Medical Uses of Radiation Technology: In Bangladesh non-medical uses of radiation includes:

Non-destructive Testing: In the case of NDT, the role of BAEC is to provide services and dissemination of the technology. Services are being provided for the National gas networking system, Power stations, Fertilizer Factories, Airlines and other industries. Training programs are being provided to develop a core of personnel in the levels of I, II and III of ISO standard.

Radiation Processing: Radiation processing technologies are being used for sterilization of medical equipment and some of the food items. Radiation techniques are being used for vulcanization of natural rubber latex. Also, by using radiation techniques on polymers wood-plastic, jute-plastic and other composite materials have been developed locally. All of these will be commercialized in future. Bangladesh has also a project on upgrading of its huge agro and agricultural wastes to useful products such as animal feed by the combination of radiation and fermentation.

Nuclear Analytical Techniques: In the field of nuclear analytical techniques, Proton induced X-ray Emission and Atomic Absorption Spectrometry Techniques are being used successfully in estimation of trace elements in medical, biological and industrial samples. Such services are now being provided to various local organizations.

Isotope Hydrology: This technique is being applied for the investigation of ground water resources, release of arsenic contamination in water, safety and sustainability of dam and proper management of water resources.

Bio-Sciences

A 50,000 Curie cobalt-60 Gamma Irradiator has been installed for the application of nuclear techniques in different fields of biological sciences. Nuclear and biotechnological methods are being used for the protection of stored and field

crops against insect infestation. Molecular biological techniques are being used for the suppression and exploitation of insects. Sterile Insect Technique is being used for controlling fruit flies. Radiation and combination treatments are being employed for processing and preservation of fruits, vegetables, fish and meat. Pharmaceutical products are being sterilized regularly by using radiation. Successful works have been done on shelf-life extension of perishable food, conversion of agro-wastes to food, feed and industrial application of microorganisms using nuclear and microbial biotechnology. Radiation sterilized tissue allografts (amnion, bone, tendon, ligaments, fascia lata, heart valve etc.) are being prepared and supplied to different hospitals and clinics for clinical use in rehabilitative and/or reconstructive surgery.

Nuclear Safety and Radiation Control: According to NSRC Act Bangladesh Atomic Energy Commission (BAEC) has been empowered to implement the Act and rules. On behalf of BAEC Nuclear Safety and Radiation Control Division is responsible to implement the rules. NSRC Rules has incorporated all the important requirements of the IAEA Basic Safety Standards and other international standards. The main activities of NSRCD are notification, regulatory inspection and authorization of the use of different radiation sources/facilities, accident investigation, enforcement of regulatory requirements, providing training and advisory services, radiological emergency action plan and preparedness etc.

To fulfill regulatory requirements BAEC has also established some laboratories. Calibration and standardization of various radiation measuring devices used in health, agriculture, industry and research sectors are being done by Secondary Standard Dosimetry Laboratory. Through Health Physics Laboratory monitoring of environmental radioactivity in air, water, soil, grass, food grains etc are being done, personal services are being provided on regular basis, area monitoring is being done at regular intervals, radioactivity monitoring of imported/exportable food items are being carried out.

3. Nuclear competences: Trainings are being offered mostly through IAEA, Japan and Korea. But still there is shortage of skilled man power. Many more trainings especially for operation and maintenance of Nuclear power Plant are needed. Some local facilities of higher studies are being provided locally and local training programs are also in place.

4. WIN 2007 Main Achievements: Articles have been published in the daily newspapers to dissemination knowledge about various aspects of nuclear energy and to create positive awareness about the energy.

Conclusion: In spite of many of the limitations scientists of BAEC are working hard for the socio-economic development of the country on the basis of the peaceful uses of atomic energy.