

GOVERNMENT OF INDIA
DEPARTMENT OF ATOMIC ENERGY
LOK SABHA
UNSTARRED QUESTION NO. 2415
TO BE ANSWERED ON 01/08/2018

RESEARCH AND DEVELOPMENT ACTIVITIES BY DAE

2415. SHRI K.R.P. PRABAKARAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Department of Atomic Energy (DAE) through its various Research and Development activities is striving hard against all odds to uplift the standard of living in the country;
- (b) if so, details thereof; and
- (c) the fund/allocations made by the Government in this regard during each of the last three years and the current year?

ANSWER

THE MINISTER OF STATE FOR PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND
PRIME MINISTER'S OFFICE (Dr. JITENDRA SINGH) :

- (a) Yes, Madam.
- (b) Details of various R&D activities of Department of Atomic Energy (DAE) aimed at the upliftment of the standard of living in the country are as follows:
 - i) Research and Development for nuclear power production.
 - ii) **Waste Management for Swachh Bharat:**
Efforts are made at Bhabha Atomic Research Centre (BARC) to develop techniques for faster and efficient degradation of biodegradable waste and convert it to natural resources for reuse. NISARGRUNA technology using biphasic bio-methanation process takes care of the biodegradable waste by converting it into two useful byproducts in the form of biogas and manure. Biogas can be used for a community kitchen, hotel kitchen or it can be converted into electricity. NISARGRUNA technology has been commercialized through technology transfers and deployed on fairly large scale.

Radiation Hygienization Technology employs a simple, economic, effective reproducible and scalable process to deal with the sewage sludge. Municipal Dry sludge is Hygienised using gamma radiation and its use as organic manure is found satisfactory. A 100 ton/day dry sludge hygienisation facility is constructed at Ahmedabad by Ahmedabad Municipal Corporation with technical support from BARC under MOU.

iii) **Agriculture for food security:**

BARC has developed 45 high yielding varieties of pulses and oilseeds using nuclear techniques, these varieties include 15 of groundnut, 8 of mung dal, 5 each of pigeon pea and Urid dal, 3 each of mustard & rice, 2 each of soyabean & cowpea and one each of jute & sunflower.

iv) **Food Preservation for food security:**

DAE has set up two irradiation plants for food preservation, one for low dose irradiation at Lasalgaon, Nashik, Maharashtra and another for high dose irradiation at Vashi, Navi Mumbai, Maharashtra. Success of these two plants has led to the establishment of 13 more food irradiation plants by state governments and private entrepreneurs with technical support of DAE.

v) **Water Treatment:**

It is one of the key drivers under non-power applications of DAE programme. BARC is engaged in R&D on various aspects of desalination & Water purification technologies starting from basic research work to development and deployment. Several membrane assisted technologies have been developed at BARC for desalination of brackish and seawater and purification of contaminated water for drinking purposes at domestic and/or community levels.

vi) **Health Care:**

In the field of health care, the Radiation Medicine Centre (RMC), Parel, Mumbai, is in the forefront of practicing Nuclear Medicine for health care. Nuclear Medicine uses radioactive isotopes (radio-isotopes) for the non-invasive diagnosis of several human diseases, including cardiology, oncology (cancer), neurology, psychiatry and infectious diseases and for the treatment of thyrotoxicosis, thyroid cancer, neuroendocrine tumors, neural crest tumors, bone-

pain palliation etc. Several thousand patients are referred to RMC each year. This includes Positron Emission Tomography PET-imaging for cancer diagnosis, staging, therapy planning and management. PET-imaging has revolutionized cancer diagnosis by making possible early detection. The cost to the patient is the lowest, compared to any other nuclear medicine centre in India. RMC has the largest registry in India for radio-isotope therapy for thyroid cancer and neuro-endocrine tumors.

Bhabhatron is an indigenous tele-cobalt machine developed by BARC for cancer treatment with High Source Capacity of 250 RMM (Roentgen/min. at 1 meter). The design of machine is as per the compliance to requirements of International Electro-technical Commission (IEC) and the extensive clinical trials at Tata Memorial Centre have been carried out successfully.

In India, the ratio of doctors to the rest of the population is significantly low. BARC has developed mobile network based low cost, handheld 12-Channel Tele-ECG machine. The mobile network use has the advantage of its reach to about 80% population. The instrument records all 12 ECG channels simultaneously and generates report in form of an image for transmission to the expert's mobile phone through Multimedia Messaging Service (MMS) or any other file sharing apps.

- vii) Development of 'Tuberculoscope', a low cost and portable TB Detection microscope. Technology of the 'Tuberculoscope' has been made available through DAE technology transfer procedure.
- viii) Development of 'Oncodiagnoscope', a low cost and portable instrument for screening of oral cancer. Technology of the 'Oncodiagnoscope' has been made available through DAE technology transfer procedure.
- ix) Agricultural radiation processing facility for irradiation of medical, industrial and agricultural products is nearing completion.
- x) Concept of liquid nitrogen based reefer unit has been demonstrated. On its successful implementation through prototyping and technology transfer, it will

serve as an important component in the 'Cold Chain' for distribution of perishable agricultural products.

- xi) Laser technology based solutions for maintenance of nuclear power reactors has resulted in improvement in plant availability factor of nuclear power reactors. In-house developed laser systems are used for these applications.
- xii) The material for Advanced Ultra Super-Critical (AUSC) thermal power plants are being developed by IGCAR. Also IGCAR is involved in the support to activities relating to space mission, development of magnetoencephalography /magnetocardiography system for measuring the physiological activities of the human brain and heart respectively, a technology for fluoride removal from drinking water, as a spin-off from effluent treatment method, thermography for detection of breast cancer, production of ⁸⁹Sr isotope as a palliative medicine, assessment of fatigue damage in Aircraft Landing Gears for Indian Air Force and comprehensive fingerprinting of South Indian Bronze idols for authentic identification etc. which have direct application to the society.

- (c) The funds allocated during the last three years and current financial year (2018-19) for R&D activities in DAE are mentioned below:

| YEAR | ALLOCATION (Rs.in crore) |
|-----------|-----------------------------|
| 2015-2016 | 3368.95 |
| 2016-2017 | 2621.53 |
| 2017-2018 | 2326.82 |
| 2018-2019 | 2413.31 |
