

**Republic Day Address by:**  
**Shri K. N. Vyas**  
**Chairman, AEC & Secretary, DAE**

My Dear Friends,

A very good morning to all of you

Today we have assembled here to celebrate 71<sup>st</sup> year of our country being declared as “Republic” by adopting a democratic government system on 26<sup>th</sup> January 1950. The meaning of “Republic” is a state in which the power is held by the people and their elected representatives. This brings equality among all of us in India. This has helped in ensuring that each one of us, by putting in hard work, can achieve his or her maximum potential.

Today let me highlight some of our major achievements during the last one year.

For the Department, implementation of nuclear power programme through NPCIL is an important activity. NPCIL has once again shown its ability in design, development, completion and operation of nuclear power stations. I will indicate a few:

- Amongst the operational reactors, we can proudly say that TAPS-1&2 have completed 50 years of Operation. This has been made possible by extensive efforts by NPCIL and other units like BARC for up-gradation and devising methods for special inspections for the plants. Commemorating this achievement of TAPS-1&2, Department of Posts, has released ‘My Stamp’ and ‘Special Cover’ on TAPS-1&2. Department of Posts has also released ‘My Stamp’ and ‘Special Cover’ commemorating the world record of 962 days of continuous operation, set by Kaiga Generating Station (KGS) Unit- 1.
- Unit one of Kakrapar Atomic Power Station completed Renovation and Modernization works encompassing Enmasse Coolant Channel Replacement and Enmasse Feeder Replacement and other safety upgrades, three months ahead of schedule.
- On the whole, NPCIL has demonstrated its capability to safely operate nuclear power plants and the overall capacity factor in 2019-20 till December 2019 was about 85%, which is above the capacity factor of similar plants in the world.

BARC, which is the premier research centre of DAE, has continued to contribute in the field of mega science, agricultural science, material science, health science etc.

- During the last summer window available at Hanle, Ladakh, BARC and ECIL have completed installation of 21m diameter Major Atmospheric Cherenkov Experiment telescope. Optical alignment of the mirror panels and detailed engineering runs of the telescope, including trial observations are currently underway.
- In the food sector, Fenugreek seeds are widely used for their medicinal properties. However, the consumer acceptability is poor due to its bitter taste. A technology for de-bittering and taste masking of fenugreek seed extract was developed at the Food Technology Division BARC and licensed to a firm. The firm has now commercially launched the products in USA. The products were also showcased in a trade exhibition in USA by the firm.
- In the agricultural sector, a linseed variety, Trombay Linseed-99 developed by BARC has been released and notified for commercial cultivation by the Central Sub-Committee on Crop Standards Notification and Release of Varieties - Ministry of Agriculture and Farmers'. This is the first work on the linseed variety by BARC and will allow linseed oil to be used for cooking purpose.
- BARC had carried out development of reduced weight bullet proof jacket, called Bhabha Kavach, using its expertise in the field of material science by use of carbon nanotubes and sintered boron carbide tiles. Fifty five Bhabha Kavach, meeting all qualifying requirements of ballistic tests have been produced as per new BIS standards and supplied to CISF personnel stationed at BARC.

Friends, DAE has many Units under Industries and Mineral Sector. These Units are involved in production of nuclear fuel, electronic equipment, materials and components for use in the Department or within the country for application in the field of aerospace and defence. All the production units of the Department, viz., NFC, HWB, UCIL, IREL, BRIT, ECIL have been meeting their targeted production. I will present some of the highlights of the achievements of these units:-

- AMD has continued the excellent work related to uranium and rare earths exploration and new reserves have been added.
- UCIL plants have been working satisfactorily. Recently, AEC has accorded in-principle approval for 13 projects of UCIL which consists of new mines and plants as well as expansion projects of the existing units.

- NFC has developed an expertise in the field of manufacture of special-material high-quality tubes.
  - Using the same expertise, recently, NFC has developed Inconel-617 Alloy tubes for Advanced Ultra Super Critical Boilers.
  - It has also developed manufacturing process of Pure Nickel Gray tubes for PFBR.
  - For increased fuel production, NFC has also developed Hydraulic Final Compaction Press for Radial Blanket Pellets.
  
- Heavy Water Board is the largest producer of heavy water in the world. I will indicate some of the major achievements of Heavy Water Board :
  - Heavy water plants have recorded lowest ever specific energy consumption of 22.9 Giga joules per kg of D2O produced.
  - A 600 MT per annum, Nuclear Grade Sodium Plant is being planned to be set up at HWP, Baroda, which is based on the developments completed on prototype electrolysis cells.
  - Bench scale sodium purification facility of 400 kg/batch has also been established.
  - At Talcher, trial operation of BF<sub>3</sub> gas generation unit has been successfully established with ~40% yield.
  
- IREL has registered growth in Sales Turnover and Profit Before Tax by 33% & 79% respectively, as compared to corresponding period of the previous year. The capacity of Mineral Separation Plant of OSCOM is being planned to be increased from present level of 630 Kilo-Tonne per annum to 2000 Kilo-Tonne per annum.
  
- Electronic Corporation of India Ltd. has supplied indigenously designed and developed 7.5m Ka Band Antenna in association with SAC Ahmedabad for tracking GEO Satellites. It has also supplied indigenously designed & developed X-Ray Baggage Scanning System.

IGCAR has the mandate for development of fast reactor technologies. Some of the highlights are :-

- At Kalpakkam, the construction activities of Fast Reactor Fuel Cycle Facility continue to make a steady progress. All the five plants have crossed 50% construction.
- CORAL, the Compact Reprocessing facility for Advanced Fuels in Lead cells facility has realized its designated reprocessing mandate of 14 spent fuel sub assemblies over 48 campaigns.
- IGCAR has also played an important role for QA of some of the reactor components required by NPCIL and also in establishing the process of Inconel-617 tubes required for its use in Advanced Ultra Super Critical Boilers

As you all know, RRCAT at Indore has specialized in indigenisation of the advanced technologies in the field of laser and accelerator sciences. Some of the major achievements are:-

- Towards development of an Indian Facility for Spallation Research, a comprehensive infrastructure for fabrication to testing of superconducting RF cavities has been set up under the IIFC collaboration and R&D phase deliverables are under development.
- RRCAT has successfully developed an Agricultural Radiation Processing Facility for societal applications of electron beam processing for increasing the shelf life of the agricultural produce. The system has been installed at Devi Ahilya Bai Holkar Fruit and Vegetable Mandi, Indore and was commissioned in February 2019. Presently, the facility is being used for evolving the protocols. The work to obtain FDA license for utilizing this facility for sterilization of medical devices, is also in progress.
- A new technology is being developed for transportation of fruits and vegetables. This is a spin-off of the cryogenic technology being developed at RRCAT. This technology uses neither diesel nor CFC for refrigeration and hence is eco-friendly. The prototype system was subjected to road trials for 10 days to prove its roadworthiness and to study the performance in actual conditions.

Institute of Plasma Research has been involved in developments in the cutting edge area of fusion technology and use of plasma science for societal applications. Some of the highlights are as follows:

- Experiments have been initiated on the Aditya-Upgrade Tokamak related to disruption mitigation using electromagnetic pellet injection. The injector was developed in collaboration with CAD, BARC. The experiments have yielded encouraging results, with an ability to obtain rapid decrease of plasma temperature and density by using the system.
- In the Steady-State Superconducting Tokamak the SST-1, the experimental campaign has been extended to a record 15 days, with plasma pulse durations upto 650 milliseconds, 30% higher than the best achieved ever before, and better reproducibility of plasma parameters.
- ITER, India has handed over base as well as lower cylinder of the Cryostat to ITER Organization. The fabrication of the upper cylinder is in advanced stage. Supply of these components is ahead of its scheduled supply date.

- At IPR, Gandhinagar, a new high performance computing facility named “Antya” has been commissioned and is operational on a 24x7 basis. This has a theoretical peak performance of ~1 Petaflop and sustained performance ~0.65 Petaflop and will help in simulation of complex processes.

As a part of Departmental mandate for health sciences, DAE has made several contributions.

- In the health sector, BARC has developed Yttrium-90, an important therapeutic radionuclide of clinical grade, sourced from high level liquid waste. The separated isotope was used in preparing patient doses of the therapeutic radiopharmaceutical, Yttrium-90-DOTATATE. This agent is a cost-effective import substitute and has been used so far in treatment of 8 cancer patients in RMC.
- Preliminary studies at IPR have shown very high effectiveness of cold plasma jets for treatment of infections as well as cancer care. Collaborations are underway with several institutions to explore and obtain medical certification for the use of cold plasma-jets for treatments, based on in-vitro as well as in-vivo studies.
- RRCAT has developed two, optical technology based, easy-to-use, portable and low cost health-care instruments viz. TuBerculoScope and OncoDiagnoScope. These have been supplied to Homi Bhabha Cancer Hospital in Varanasi. The fabrication of units by Private company by Technology transfer and at ECIL by technology absorption in larger numbers has been initiated.
- TMC, a premier institute internationally known for cancer treatment and research, had commissioned 2 cancer care facilities in Varanasi last year. Both HBCH and MPMCH, Varanasi are already registering nearly 1500 patients every month.
- At TMC, National Cancer Grid grew to 193 centres in the year 2019, which covers 7,00,000 new cancer patients every year. The Grid is able to reach ~60% of all of India's needy persons having cancer. NCG "Vishwam", the global arm of the National Cancer Grid was launched at the General Conference of the IAEA in September 2019.
- BRIT manufactures Cobalt Teletherapy Sealed Sources upto 200 RMM. During the last one year it has exported the Teletherapy sources to Sri Lanka, Nigeria & Uganda. BRIT has also started marketing of Ruthenium-106 plaques for the treatment of eye cancer as a brachytherapy source developed at BARC. These have been supplied to four hospitals within the country. BRIT has also started production and supply of <sup>177</sup>Lu-PSMA ready-to-use sterile injections to the nuclear medicine hospitals for the treatment of prostate cancer.

Homi Bhabha National Institute is a unique example of effective collaboration between research laboratories and educational institutes.

- HBNI is continuously improving its academic performance in the field of academics. HBNI was placed at 16<sup>th</sup> position among Young Universities, that is (less than 50 years old) on a global level in Nature Index database based on high-quality publications.
- HBNI has introduced four new courses with a focus on skill development viz., M.Sc in Hospital Radio-pharmacy, M.Sc. in Nuclear Medicine and Molecular Imaging Technology at RMC, BARC; and two courses, M.SC in Public Health in Epidemiology and M.Sc. in Occupational Therapy in Oncology at TMC, thus expanding its reach in different subjects.

Dear colleagues,

As I end, I must re-emphasize the need for each one of us to put in our best efforts. In my opinion, efforts of each and every person are equally important, provided, the efforts have been put in with complete honesty and full heart. Our Department has to its credit many achievements. These have been made possible by sustained efforts of all our predecessors and I urge all of you to strive hard and make both the Department and the country proud.

I would like to thank all the members of our Scientific, Technical and Administrative Staff, including Security who have worked hand in hand in making the programmes of the Department a great success.

I once again wish you all a very Happy Republic Day.

Jai Hind.

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