Notes and News

Setting up of nuclear plants

During the last three years and the current year, the Union Government has accorded administrative approval and financial sanction for construction of twelve nuclear power reactors - ten indigenous 700 MW pressurized heavy water reactors (PHWRs) are to be set up in fleet mode and two units of light water reactors (LWRs) are to be set up in cooperation with Russian Federation to enhance nuclear power capacity in the country. The details of these projects are given in the table below:

Presently, two public sector companies of the Department of Atomic Energy, - Nuclear Power Corporation of India Limited (NPCIL) and Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI) are involved in nuclear power generation.

There is no proposal under consideration at present to allow private partnership in the nuclear power generation sector. The Atomic Energy Act, 1962 permits public sector undertakings (PSUs) in setting up of nuclear power plants as a junior equity partner of a government company. At present companies in private sector in India are participating in a major way in setting up nuclear power plants through supply of components, equipment and works contracts.

The total installed capacity from conventional energy sources (excluding renewable energy sources) in the country as on 28.02.2018 is 2,71,300 MW. Out of which private sector contributes about 89,540 MW. It is estimated that capacity of energy production from conventional sources likely to be added through private sector during March 2018 – March 2022 will be 3802 MW. The likely requirement of private sector plants during March 2018 – March 2022 is about 1,070 MW. Hence, the total capacity for energy production from private sector at the end of March 2022 is likely to be 92,272 MW from conventional energy sources.

Augmenting coal supplies to power plants

A number of important steps have been taken in the government, in the Coal India Limited (CIL) and Singareni Collieries Company Limited (SCCL) to monitor and augment coal dispatches to the powerhouses. Some of the steps taken are:

i. Coal stocks at the power plants are monitored constantly on the basis of daily CEA reports, which form the basis for CIL to advice its subsidiary companies to plan the movement of rakes, with specific reference to critical/supercritical plants, in coordination with the zonal railways.

ii. In addition to the monitoring mechanism available at coal companies and CIL, coal supplies to power utility sector is monitored regularly by an inter-ministerial sub-group comprising representatives of Ministry of Power, Ministry of Coal, Ministry of Railways, Central Electricity Authority, Ministry of Shipping, NITI Aayog, CIL etc. This sub-group has been meeting periodically, at times twice every week, in order to take various operational decisions for meeting any contingent situations relating to power sector including critical coal stock position for power plants.

iii. A committee of Secretary (Coal), Secretary (Power)

State	Location	Project	Capacity(MW)
PHWRs to be set up in fleet mode			
Madhya Pradesh	Chutka	Chutka -1&2	2 × 700
Karnataka	Kaiga	Kaiga - 5&6	2 × 700
Rajasthan	Mahi Banswara	Mahi Banswara - 1&2	2 × 700
Haryana	Gorakhpur	GHAVP - 3&4	2 × 700
Rajasthan	Mahi Banswara	Mahi Banswara - 3&4	2 × 700
Light Water Reactor (LWR) to be set up in cooperation with Russian Federation			
Tamil Nadu	Kudankulam	KKNPP - 5&6	2 × 1000

and Member (Traffic), Railway Board has been jointly reviewing the coal transportation and supply on a regular basis.

iv. Comprehensive monitoring has been done for coal movement through rakes from CIL sidings, washery sidings and goods sheds.

v. There has been close monitoring of turnaround time of rakes at the loading and unloading ends.

vi. An Innovative Monitoring Control Cell has been established in order to monitor supply related issues of the powerhouses and provide regular feedback to the MoC/CIL authorities.

vii. In order to meet the coal requirement of thermal power plants, CIL has offered coal through road mode from the available pithead stock to those plants which are located within 50 km to 60 km from the nearest mines. As a result, power plants located within 50 km to 60 km have taken coal to fulfill their immediate coal requirement.

viii. Coal supplies to power sector from CIL have grown by 20%, 19%, 17%, 9% and 3% during the months of August-2017, September-2017, October-2017, November-2017 and December-2017 respectively over coal supplies during corresponding months of the last year.

To improve coal supplies to power plants, Indian Railways have augmented rakes availability for loading of coal to power plants. Turnaround time of rakes at loading end has improved. These efforts and close monitoring have resulted in increase in coal supplies to power plants from the level of 219 rakes per day from CIL sidings in September, 2017 to 270.6 rakes per day in March, 2018. Besides the rail projects which have been undertaken by the Railways, CIL has collaborated with the Indian Railways to undertake construction of railway lines on deposit basis and in the States of Jharkhand, Odisha and Chhattisgarh by formation of joint ventures. There are 14 rail projects which will augment coal evacuation and these are regularly monitored in the Ministry.

Status of nuclear cooperation agreement between India and USA

During discussions between Nuclear Power Corporation of India Limited (NPCIL) and Westinghouse Electric Company (WEC) for setting up of six units of AP-1000 (6 x 1208 MWe) reactors at Kovvada, Andhra Pradesh, WEC has expressed willingness to continue with the proposed project in India. Further progress in these discussions will depend upon finalization of techno-commercial aspects of the project acceptable to the Indian side and upon establishing the viability of the project. In this regard, a techno-commercial offer has been submitted by WEC to NPCIL, on which negotiations have been initiated. Further progress in the negotiation will also depend on the operation of reference plant of the above design in U.S.

ISA and India sign the host country agreement

The International Solar Alliance (ISA) and the Ministry of External Affairs (MEA), signed recently the 'host country agreement'. The agreement will give ISA a Jurisdical personality and gives it power to contract, to acquire and dispose off movable and immovable properties, to institute and defend legal proceedings. Under this agreement, ISA shall enjoy such privileges, applicable tax concessions and immunities as are necessary for ISA's headquarter to independently discharge its function and programmes. ISA shall be deriving its status, privileges and immunities as per Article 10 of Framework Agreement.

The agreement was signed by General (Dr.) V.K. Singh, Minister of State, Ministry of External Affairs and Mr. Upendra Tripathy, Interim Director General, ISA in the gracious presence of Mr. R K Singh, Union Minister of State (IC) Power and New & Renewable Energy.

Congratulating the signatories, Mr. R.K. Singh said that ISA has potential to change developmental paradigm in the world. He said that energy will now be available to less developed tropical countries at affordable rates and in an easily deployable manner. The Minister also mentioned that many countries have shown interest to learn from India's experience in renewable energy. He emphasized the need for our industry to go and set up infrastructure in these countries and talked about doing necessary de-risking in this regard.

General (Dr.) V.K. Singh also congratulated ISA and stated that ISA has an onerous task at hand to mobilise over US$ 1000 billion of investment into the solar sector and deploying over 1000 GW of solar capacity. He also stated that ISA needs to firm up financial partnership deals with more multilateral and bilateral donor agencies in order to meet its stated objectives. Mr. Upendra Tripathy called the signing of 'host country agreement' an important milestone and thanked the Government of India for its wholehearted support.

The International Solar Alliance is an initiative jointly launched by the Prime Minister of India and President of France on 30th November 2015 at Paris, in the presence of the Secretary General of the UN, on the side lines of COP21 UN Climate Change Conference. The main objective of ISA is to undertake joint efforts required to reduce the cost of finance and the cost of technology, mobilize more than US $ 1000 billion of investments needed by 2030 for massive deployment of solar energy, and pave the way for future technologies adapted to the needs of 121 countries lying fully or partially between the tropics.

ISA has presently four ongoing programmes: Scaling solar applications for agricultural use, affordable finance at scale, scaling solar mini grids and scaling solar rooftop catering to the needs of solar energy in specific areas.

The 'framework agreement' coming into force on 6th December 2017, the ISA became the first international inter-governmental treaty based organization to be headquartered in India. ISA celebrated its founding day on 11th March, 2018.

MNRE to set up 65,180 biogas plants in current year

The National Biogas and Manure Management Programme (NBMMP) aims at setting up of family type biogas plants for providing biogas as clean cooking fuel and a source of lighting. The slurry produced from biogas plants as a by-product is an organic bio-manure for enhancing crop yield and maintaining soil health. The biogas technology dissemination helps in reducing the environment degradation and prevents the emissions of greenhouse gases (GHGs) such as carbon dioxide (CO_2) and methane into the atmosphere. The Ministry of New and Renewable Energy (MNRE) has fixed an annual physical target of setting up of 65,180 biogas plants for the current year 2017-18 under the NBMMP.

Under the NBMMP, about 49.6 lakh household size biogas plants have been installed since the inception of the National Biogas Programme in the country.

The Ministry of New and Renewable Energy (MNRE), through the State Nodal Agencies/Departments, spreads awareness about the programme (NBMMP) through advertisements in local newspapers, display of posters in Panchayat offices, schools, kisan seva kendra's, distribution of booklets on biogas during gatherings at exhibitions, kisan melas/fairs etc.

The MNRE has taken various steps to increase the production of biogas in the country including Tamil Nadu which include introduction of new biogas plant designs under the NBMMP such as floating design Shakti Surabhi Model, Solid-State Deenbandhu design model of biogas plants.

High performance computing systems Pratyush and Mihir

The Ministry of Earth Sciences has augmented the high-performance computing (HPC) system at a total cost of Rs.438.9 crores. The systems are installed at two sites, Indian Institute of Tropical Meteorology (IITM), Pune and National Center for Medium Range Weather Forecast (NCMRWF), Noida with computing capacities of 4 peta flops and 2.8 peta flops, respectively.

The two high performance computing systems Pratyush and Mihir installed at IITM, Pune and NCMRWF, Noida respectively have a total computing capacity of 6.8 peta flops. After the current augmentation, the total HPC capacity of the ministry has gone up to 8.0 peta flops.

The HPC system with a combined capacity of 8.0 peta flops is now placed at the 4th position after Japan, UK and USA for dedicated HPC resources for weather/climate community.

Indian monsoon is one of the most complex coupled climate systems of the world. The geographic location of India surrounded with tall mountains and oceans make the system more difficult to simulate and predict. The HPC system is being used for the advanced dynamical prediction systems which are now being used for seasonal prediction (mainly for SW monsoon season of June to September); extended range prediction (for next 20 days) and short range prediction (up to 8 days). The HPC system is also being used for generating probabilistic forecasts for extreme weather.

The global weather prediction model has a horizontal resolution of 10 to 12 km and the regional models have much finer horizontal resolution of 3 km and less over the Indian domain. These high resolution models will be used for prediction of cyclones and other severe weather events with more accuracy and lead time.

Use of nuclear energy

Applications of nuclear energy and radiation have played a significant role in the field of electricity production, agriculture, medicine and health. Contributions of Department of Atomic Energy (DAE) have made a positive impact on improvement in the treatment of disease and the quality of life of citizens in the country.

Electricity generation

The total electricity generation from the nuclear power plants during the last three years was 115292 million units.

Agriculture

Using radiation induced mutagenesis technology, DAE has developed 42 varieties in oilseeds (groundnut, mustard, soybean and sunflower), pulses (urdbean, mungbean, pigeonpea, cowpea), rice and jute, which have been released and notified for commercial cultivation across the country.

Government of India (Department of Atomic Energy) has set up two radiation technology demonstration units, one commissioned in the year 2000 for high dose irradiation at Vashi, Navi Mumbai, and another in 2002, for low dose irradiation, i.e. Krushi Utpadan Sanrakshan Kendra (KRUSHAK) facility at Lasalgaon near Nashik. The facilities are being operated by the Board of Radiation & Isotope Technology (BRIT). Two plants are also set up one each by Maharashtra government and Gujarat government. Currently, 15 irradiation plants including those in private sector are functional in the country carrying out radiation processing of agricultural/food products. Presently fruits like mango and pomegranate and vegetable like onions and garlic are being irradiated for shelf life extension.

Medicine and health

BRIT under DAE India is responsible for production and supply of medical products linked to human health. The radioisotopes produced in nuclear reactors/cyclotron is employed for medical applications. The nature of radiation

emitted from the radioisotope determines its utility for diagnostic or therapeutic application. Under this category diagnostic and therapeutic radiopharmaceuticals are manufactured.

Some of the radio-pharmaceuticals manufactured and supplied are:

1. Tc-Technetium based radiopharmaceuticals: For diagnosing diseases related to all the important organs of the body comprising cerebral, myocardial, renal, liver, lung, etc. and for cancer detection.
2. F-Fluorine based diagnostic radiopharmaceuticals: PET based products for diagnosis of cancer, cardiac and neuro diseases.
3. I-Iodine based products for diagnosis and therapy of thyroid and related cancers.
4. P-Phosphorus, 153Sm-Samarium and 177Lu-Lutetium based Therapeutic radiopharmaceuticals for relieving the cancer borne pain and cancer therapy.

Other than the above radiopharmaceuticals BRIT supplies Co (cobalt) source for Bhabhatron Teletherapy unit used as radiation source for treatment of cancer. Also ^{125}I based in vitro radioimmunoassay kits for diagnosing the low concentrations of hormones, proteins, etc. present in blood are supplied.

b. The nuclear share of electricity generation in the year 2016 in the country was about 3.4% and is comparable to China (3.6%) and Japan (2.2%).

In so far as medicine and health sectors are concerned, around 220 nuclear medicine centres are currently operational in India which employ above radioactive products for medical applications. However no such data is available for countries like China and Japan for direct comparison.

c In so far as electricity generation through nuclear technology is concerned, the government has taken several enabling steps to increase the nuclear power capacity and to provide adequate quantity of fuel. These include:

Resolution of issues related to Civil Liability for Nuclear Damage (CLND) Act and Creation of Indian Nuclear Insurance Pool (INIP).

i. Accord of administrative approval and financial sanction of - ten (10) indigenous 700 MW pressurized heavy water reactors (PHWRs) to be set up in fleet mode and two (02) units of light water reactors (LWRs) to be set up in cooperation with Russian Federation.

ii. Amendment of the Atomic Energy Act to enable joint ventures of public sector companies to set up nuclear power projects.

iii. Entering into enabling agreements with foreign countries for nuclear power cooperation including supply of fuel.

In so far as agriculture sector is concerned, Ministry of Food Processing Industries (MOFPI) grants subsidy to gamma radiation processing plants under SAMPADA (Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters) which are installed for gamma radiation processing of food products.

In so far as health and medicine sectors are concerned, the Government provide all impetus to the use of nuclear energy in health care by promoting nuclear medicine practices in the country. This is with respect to indigenous development of import substitutes and also providing cost-effective treatment. The medical cyclotron of radiation medicine centre provides the PET imaging facility to patients at no cost. Use of a Lutetium-177-labeled product (DOTA-TATE) for treatment of cancer patients having neuroendocrine cancer is 10-15 times less than the imported radio-pharmaceutical ($ 10,000 vs. $1,50,000).

FLOOD GEOENVIRONMENTAL DISASTER PREVENTIVE MEASURES IN WATER SHEDS AREA OF AMBASAMUTHIRAM TOWN BY USING GIS AND MULTICRITERIA TECHNIQUE

(Continued from page 88)

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