

GOVERNMENT OF INDIA  
DEPARTMENT OF ATOMIC ENERGY  
**RAJYA SABHA**  
**UNSTARRED QUESTION NO.1127**  
TO BE ANSWERED ON 30.07.2015

**UTILISATION OF NUCLEAR SUBSTANCE FOR POWER GENERATION**

1127. DR. SATYANARAYAN JATIYA:

Will the PRIME MINISTER be pleased to state:

- (a) the quantum of utilization of the nuclear substances in power production and other sectors as well as the action plan and target for supply and use of atomic energy source in the next three years; and
- (b) the names and quantum of sources of indigenous atomic energy including thorium along with the status of technology being developed to harness them?

**ANSWER**

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

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- (a) The annual requirement of fuel for Pressurised Heavy Water Reactors (PHWRs) in the country for the year 2015-16, 2016-17 and 2017-18 is about 875, 985 and 1330 tons, respectively, of Natural Uranium as Uranium Oxide (UO<sub>2</sub>). In addition about 40 tons of Low Enriched Uranium (LEU) as UO<sub>2</sub> for Tarapur Atomic Power Station Units 1&2 (TAPS 1&2) (Boiling Water Reactors) and about 150 tons of LEU as UO<sub>2</sub> for Kudankulam Nuclear Power Project Units 1&2 (KKNPP 1&2) (Light Water Reactors) will be required in the next three years.

- (b) Uranium and Thorium are the two major resources for nuclear energy.

The Department of Atomic Energy (DAE) through its Constituent Unit i.e., Atomic Minerals Directorate for Exploration & Research (AMD) has carried out exploration activities which has resulted in establishing resources of Uranium and Thorium in the country. As of June, 2015, AMD has established 2,25,936t *in-situ* U<sub>3</sub>O<sub>8</sub> (1,91,594t Uranium) reserves and 11.93 million tonnes of Monazite (Thorium bearing mineral) in the country which contains about 1.07 million tonnes of Thorium.

The indigenously produced natural Uranium Oxide is used in 220 MWe and 540 MWe capacities Pressurised Heavy Water Reactors (PHWRs). In addition, PHWRs of 700 MWe capacities are also being constructed to utilise the available natural UO<sub>2</sub> resources.

On account of physics characteristics of Thorium, it is however not possible to build a nuclear reactor using Thorium alone. It has to be converted to Uranium-233 in a reactor before it can be used as fuel. With this in view, a Three-Stage Nuclear Power Programme, based on a closed nuclear fuel cycle has been chalked out right at the inception of India's nuclear power programme to use Thorium as a viable and sustainable option. The three stage nuclear power programme aims to multiply the domestically available fissile resource through the use of natural uranium in PHWRs, followed by use of Plutonium obtained from the spent fuel of PHWRs in Fast Breeder Reactors (FBRs). Large scale use of Thorium will subsequently follow making use of Uranium-233 that will be bred in FBRs, when adequate nuclear installed capacity in the country has been built. The third stage of Indian nuclear power programme contemplates making use of Uranium-233.

Thorium based reactors have not yet been set up in the country for generation of power. A 30 kW (thermal) research reactor viz. Kalpakkam Mini Reactor (KAMINI), the only operating reactor in the world using Uranium-233 fuel has been set-up at Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam (Tamil Nadu). The Uranium-233 was obtained by irradiation of thorium fuel in CIRUS research reactor at Trombay and then reprocessing it. A 300 MWe Advanced Heavy Water Reactor (AHWR) using thorium based fuel has been designed and developed. This reactor will serve as a technology demonstrator for the thorium fuel cycle technologies.

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