

GOVERNMENT OF INDIA  
DEPARTMENT OF ATOMIC ENERGY  
**LOK SABHA**

**UNSTARRED QUESTION NO -2583**

ANSWERED ON 11/12/2024

**THORIUM-BASED POWER PROJECTS**

2583. SHRI G M HARISH BALAYOGI

Will the PRIME MINISTER be pleased to state:-

- (a) the details of thorium-based power projects currently operational and approved in the country;
- (b) the details of the amount of power generated from the said thorium-based power projects;
- (c) whether the Government has undertaken/plans to undertake any steps to establish molten salt nuclear power station in the country and if so, the details thereof;
- (d) the details of the steps/initiatives undertaken by the Government to utilize the high thorium reserves in the country in power generation; and
- (e) whether India is a part/partner of thorium-based multilateral organizations and if so, the details thereof?

**ANSWER**

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

- (a) & (b) Currently there is no thorium-based power projects approved or operational in the country.
- (c) Yes, studies have been initiated to look into the various aspects of this technology. Molten salt reactors are an attractive option for large scale self-sustainable utilization of thorium using the Uranium-233/Thorium fuel cycle.

- (d) Research & Development on Thorium utilisation continues to be a high priority R&D area of the Department of Atomic Energy (DAE). Thorium ( $^{232}\text{Th}$ ) is a fertile material, which is required to be converted into a fissile material ( $^{233}\text{U}$ ) through irradiation in a nuclear reactor. Spent fuel thus produced, is required to be reprocessed to recover  $^{233}\text{U}$ , thereafter fuel in the desired properties is produced using this  $^{233}\text{U}$ . In this regard, necessary R&D is being carried out. Bhabha Atomic Research Centre (BARC) and other research organisations attached with DAE are engaged in various Thorium related R&D activities. Some important highlights of these achievements and activities are the following:
- (i) Thorium Oxide (Thoria) pellets contained in bundles have been used in the initial cores of operating Pressurised Heavy Water Reactors (PHWRs) and valuable experience has been generated in operation and re-use of this irradiated thorium fuel. Thoria based fuels have also been irradiated in the research reactors of BARC. After such irradiation these fuel elements have been examined in the laboratories at BARC, yielding excellent results.
  - (ii) The irradiated Thoria pins of research reactors have been reprocessed to obtain Uranium 233. The recovered Uranium-233 has been fabricated as fuel for the 30 kW (thermal) KAMINI reactor, which is in operation at a constituent unit of DAE, Indira Gandhi Centre for Atomic Research (IGCAR) at Kalpakkam. This is the only reactor in the world operating with Uranium-233 fuel.
  - (iii) The technologies for fabrication of Thoria based fuel pellets, carrying Uranium-233, have been established.
  - (iv) Studies have been also carried out to use Thorium in different types of reactors with regard to fuel management, reactor control and fuel utilisation.

(v) In addition, BARC has an active programme for utilisation of Thorium in High Temperature Reactors, Molten Salt Breeder Reactor and Accelerator Driven Sub-critical System. Various technologies, fuels, and materials are also being developed for these innovative reactors and advanced energy systems.

(e) India is a member state of International Atomic Energy Agency (IAEA) which is a multilateral organization. India, as a member state, participate in IAEA events on thorium utilisation for knowledge sharing.

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