

**GOVERNMENT OF INDIA
ATOMIC ENERGY
LOK SABHA**

UNSTARRED QUESTION NO:4138
ANSWERED ON:17.12.2014
CONVERSION OF THORIUM INTO URANIUM
Chandumajra Shri Prem Singh

Will the Minister of ATOMIC ENERGY be pleased to state:

- (a) whether the Government proposes to convert thorium into uranium to meet the demand of uranium in the country; and
- (b) 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) To produce power in a reactor, the nuclear fuel must contain a fissile material. In order to provide the nuclear fuel for first stage of the Indian Nuclear Power Programme, we require a supply of natural uranium that contains Uranium-235 as fissile material. The naturally occurring Thorium consists of 100% fertile isotope Thorium-232 with no fissile isotope and energy can only be produced from thorium after converting it into a man-made fissile material Uranium-233 in a nuclear reactor operating with Uranium 235 or plutonium as the fuel. Keeping in view the basic nuclear physics principle of the fuel materials, a three-stage nuclear power programme has been chalked out to effectively utilise the available domestic resources. The three stage nuclear power programme aims to multiply the domestically available fissile resource through the use of natural uranium in Pressurised Heavy Water Reactors, followed by use of plutonium obtained from the spent fuel of Pressurised Heavy Water Reactors in Fast Breeder Reactors. Large scale use of Thorium will subsequently follow making use of Uranium-233 that will be bred in Fast Breeder Reactors, when adequate nuclear installed capacity has been built in the country. The large scale deployment of Uranium-233 based reactors as part of the third stage of Indian nuclear power programme will therefore take place three - four decades after the commercial operation of Fast Breeder Reactors with short doubling time.

All efforts towards technology development and demonstration are made so that a mature technology is available in time. As part of this R&D effort, thorium fuel has been irradiated in Research Reactors and Power Reactors on a small scale to convert it into Uranium-233. The Uranium-233 thus obtained have been used for carrying out experimental fuel irradiations and for constructing the KAMINI (Kalpakkam Mini) research reactor, which is at present the world's only operating reactor based on Uranium-233 fuel.