GOVERNMENT OF INDIA
DEPARTMENT OF ATOMIC ENERGY
RAJYA SABHA
UNSTARRED QUESTION NO. 483
TO BE ANSWERED ON 28.04.2016

IMPLEMENTATION OF THIRD STAGE OF NUCLEAR POWER PROGRAMME

483. DR. V. MAITREYAN:

Will the PRIME MINISTER be pleased to state:

(a) the current status of implementation of the third stage of Indian Nuclear Power Programme and the list of Nuclear Power Projects initiated during the last five years;

(b) the amount spent so far and their installed capacity and actual generation;

(c) whether Government has provided adequate infrastructural, technological and logistic facilities at Madras Atomic Power Plant (MAPP), BHAVINI at Kalpakkam and at Kudankulam Nuclear Power Plants Unit I and II, Kudankulam in Tamil Nadu; and

(d) if so, the details of the financial, technological and logistics support extended by the Government in the last three years?

ANSWER

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

(a) The Government is committed to implement the third stage of Indian Nuclear Power Programme, after an adequate nuclear installed capacity has been reached based on Fast Breeder Reactors to be set up in the second stage. On account of non-existence of any fissile isotope in naturally occurring Thorium (unlike that existing in Uranium), commercial utilisation of Thorium, on a significant scale, can begin only when abundant supply of either Uranium or Plutonium resources are available. Upon the launch, followed by a significant growth of a thorium based nuclear programme in this manner, it could be possible to maintain the achieved level of nuclear power programme with thorium alone, without additional demands on uranium or plutonium resources. Therefore, considering the meager domestic uranium resources in the country, it is feasible to start a significant commercial level Thorium based reactor programme in our

country only after an adequate inventory of Plutonium becomes available from our Fast Breeder Reactors, comprising the second stage of Indian nuclear programme. Accordingly, the utilisation of Thorium as a practically inexhaustible energy source has been contemplated during the third stage of the Indian nuclear programme, which can be reached after a few decades.

Substantial work has been carried out in the areas of research on technologies for utilisation of thorium in nuclear fuel cycle, and on the development of an Advanced Heavy Water Reactor (AHWR), for use of thorium based fuel on a large scale. Some important highlights of these activities are the following:

i) Fuel bundles containing Thorium Oxide (Thoria) pellets have been used in the initial core of our operating Pressurised Heavy Water Reactors (PHWRs) and valuable experience has been generated in operation. 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 encouraging results.

ii) An Engineering Scale Reprocessing Facility, Power Reactor Thoria Reprocessing Facility (PRTRF), has been setup at BARC to reprocess the fuel bundles irradiated in PHWRs. Some of the fuel bundles, irradiated in PHWRs, have been reprocessed to produce Uranium-233. This has provided valuable experience in reprocessing of thoria based fuels.

iii) 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 Indira Gandhi Centre for Atomic Research (IGCAR) at Kalpakkam. This is the only reactor in the world operating with Uranium-233 fuel.

iv) The very challenging technologies for fabrication of Thoria based fuel pellets have been established.

v) Studies have been also carried out to use Thorium in different types of reactors with regard to fuel management, reactor control and fuel utilisation.

vi) The 300 MWe AHWR designed by BARC is intended to serve as a technology demonstrator for Thorium utilisation as well as for validating several advanced safety features that have been incorporated in the design of this reactor. The design of all nuclear systems of the reactor has been completed and associated confirmatory R&D is in a very advanced stage. Several innovative features of the design are currently being validated through large scale engineering experiments. In order to facilitate an early scrutiny of the design of the innovative features of the design from the safety considerations, a Pre-Licensing Design Safety appraisal of the reactor has been completed by the Atomic Energy Regulatory Board. Detailed engineering of AHWR is currently in progress and construction of this reactor can begin after the necessary site selection is approved and associated statutory and regulatory clearances are obtained.

vii) A Critical Facility for Advanced Heavy Water Reactor was commissioned in 2008 at BARC and is being used since then for carrying out experiments to further validate the physics design features of Advanced Heavy Water Reactor.

viii) Conceptual design of a prototype demonstration Indian Molten Salt Breeder Reactor (IMSBR), along with development of technologies related to salts, components, fuels, and materials for this reactor; is being carried out in BARC. This reactor is being considered as an attractive option for the third stage of our nuclear power programme.

The details of Projects initiated in the last five years along with amount earmarked and estimated power production are given below:

Project	Location	Capacity (MW)	Completion Cost (Rs. crore)
Kakrapar Atomic Power Project Units 3&4 (KAPP 3&4)	Kakrapar, Gujarat	2 X 700	11459
Rajasthan Atomic Power Project Units 7&8 (RAPP 7&8)	Rawatbhata, Rajasthan	2 X 700	12320

The details of projects accorded financial sanction and being readied for launch are :

Project	Location	Capacity (MW)	Completion Cost (Rs. crore)
Gorakhpur Haryana Anu Vidyut Pariyojana (GHAVP 1&2)	Gorakhpur, Haryana	2 x 700	20594
Kudankulam Nuclear Power Project (KKNPP 3&4)	Kudankulam, Tamil Nadu	2 x 1000	39849

(b) The amount spent up to February 2016 in respect of KAPP 3&4 (2x 700 MW) is Rs.8066.41 crore and RAPP 7&8 (2 x 700 MW) is Rs.5791.72 crore. Both these projects are presently under construction.

(c)&(d) Yes, Sir. The Madras Atomic Power Station was completed in the year 1986 by the Government with all required infrastructure set up. The units were transferred to Nuclear Power Corporation of India Limited (NPCIL) on its incorporation in 1987. Kudankulam Nuclear Power Project Units 1&2 (including required infrastructure) have been set up by NPCIL in technical cooperation with the Russian Federation. The project is nearing completion. The Government had entered into an Intergovernmental Agreement (IGA) with the Russian Federation for implementation of the project, provision of Russian Credit of Rs 6416 crore and life time fuel supply. The government also provided equity support of Rs.3648.61 crore towards the project. During the last three years (2013-14 to 2015-16), Russian credit of Rs.19 crore has been drawn for Kudankulam Nuclear Power Project Units 1&2.

The financial support extended to Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI) in the last three years is Rs.1262 crore. All the technological/logistical support has been extended to BHAVINI by DAE to meet the requirement.

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