



## Nuclear Energy Conclave

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The 11<sup>th</sup> Nuclear Energy Conclave, **organized by the India Energy Forum**, was held in New Delhi on 18<sup>th</sup> October 2019.

The theme of the Conclave was: **“Economics of Nuclear Power- Innovation towards Safer & Cost Effective Technologies”**.

### Key Highlights

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- The Minister of State for Atomic Energy highlighted some steps taken by the Government with respect to nuclear energy:
  - Earlier the Atomic power plants were restricted in Southern India, now the Government is setting up the nuclear plants in other parts of the country.
  - **A nuclear plant is coming up in the Gorakhpur of Haryana.**
- A **“Hall of Nuclear Energy”** was opened in Delhi to educate the students and the general public about the applications of nuclear energy.
- Use of nuclear energy in diverse fields such as medicine, especially cancer care.
- Other steps highlighted include early movement on **Fast Breeder Reactors (FBR)** deployment and early deployment of indigenous **Light Water Reactors (LWRs)**.
  - **Light-water reactors (LWRs) are power reactors that are cooled and moderated with ordinary water.** There are two basic types: the Pressurized-Water Reactor (PWR) and the Boiling-Water Reactor (BWR).
  - **PWR** is a power reactor in which the heat is dissipated from the core using highly pressurized water (about 160 bar) to achieve a high temperature and avoid boiling within the core. **BWR** is a nuclear reactor with water as a coolant and as a moderator, boiling in the core. The resulting steam is generally used directly to drive a turbine.
- It was underlined that owing to the **waiver of the Nuclear Suppliers Group (NSG) to India in 2008**, the nuclear programme now has much less constraints.
- **Access to the imported uranium** can accelerate the nuclear program size as well as large scale thorium deployment.

## India Energy Forum

- Established in **October 2001**, the Forum has acquired a unique status as a **spokesman of total energy sector**.
- Major public and private sector organizations in Power, Oil and Gas, Coal and Renewable Energy are its members. These include NTPC, NHPC, Power Grid Corporation, Power Finance Corporation, ONGC, etc.
- It's Corporate Office is located in **New Delhi**.

## India's Nuclear Energy Programme

- The nuclear energy programme in India was **launched around the time of independence under the leadership of Homi J. Bhabha**.
- The main objectives of the Indian Nuclear Energy programme are to provide **safe and reliable electric power** for the country's social and economic progress and to be self reliant in all aspects of nuclear technology.
- Exploration of atomic minerals in India, undertaken since the early fifties, has indicated that India has **limited reserves of uranium** (natural uranium consists of mostly  $^{238}\text{U}$ , with 0.7 %  $^{235}\text{U}$ ), but fairly **abundant reserves of thorium** ( $^{232}\text{Th}$ ).
- Accordingly, India has adopted a **three stage strategy** of nuclear power generation:
  - **Stage 1 Pressurised Heavy Water Reactor (PHWR):** The PHWR is a pressure tube type reactor using heavy water ( $\text{D}_2\text{O}$ ) moderator, heavy water coolant and natural uranium dioxide fuel. Considering the growing energy demands and the necessity to increase the energy potential, a second line of light water reactors have been added to the current indigenous programme of Pressurised Heavy Water Reactors.
  - **Stage 2 Fast Breeder Reactor (FBR):** India's second stage of nuclear power generation uses the  $\text{Pu-239}$  obtained from the first stage reactor operation, as the main fissile element of fuel core in fast breeder reactors (FBR). A blanket of  $\text{U-238}$  surrounding the fuel core undergoes nuclear transmutation to produce fresh  $\text{Pu-239}$  as more and more  $\text{Pu-239}$  is consumed during the operation. The Fast Breeder Programme is in the technology demonstration stage. Sodium, because of its good heat transfer and nuclear properties, is used as the coolant to remove the heat generated in the reactor.
  - **Stage 3 Thorium based Reactor:** Thorium utilization is the long term objective of the Indian Nuclear Power Programme. The third phase of India's Nuclear Power Generation programme is breeder reactors based on Thorium- Uranium-233 cycle.

**Source: PIB**