

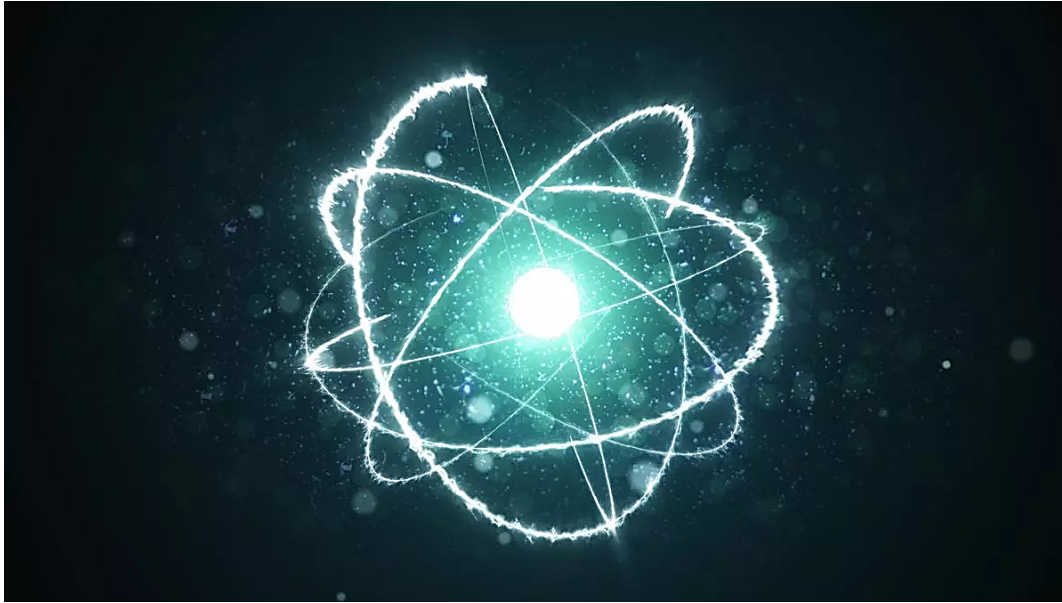
## **ANEEL (Advanced Nuclear Energy for Enriched Life)**

By IAS Toppers | 2024-01-10 15:20:00



### **ANEEL (Advanced Nuclear Energy for Enriched Life)**

An innovative fuel named **ANEEL** (Advanced Nuclear Energy for Enriched Life) was recently developed by researchers of U.S.



[ref-the Hindu business line]

### **About the ANEEL (Advanced Nuclear Energy for Enriched Life):**

- The ANEEL fuel is a blend of **Thorium** and High Assay Low Enriched Uranium (**HALEU**) that can enhance the performance of **reactors** and other **pressurised heavy-water reactor** designs.
  - HALEU is a **uranium** enriched **greater than 5%** and **less than 20%** of the **U-235 isotope** and a proposed fuel in many advanced non-light water reactor designs.
  - HALEU is also crucial for **advanced nuclear reactor designs**.

### **Advantages of ANEEL:**

- It can be used in **traditional boiling water** and pressurized water reactors, but it works best when used in heavy water reactors.
- It can be **developed** and **deployed** more **quickly**.
- It reduces **nuclear waste volume** and operating **costs**.
- It has produced **more energy** as compared to **conventional fuels**.
- The spent ANEEL fuel **cannot** be reused for weapons, providing assurance to **uranium suppliers** and **reactor operators**.
- It can be used in India's existing **Pressurized Heavy-Water Reactors (PHWRs)**, offering a viable solution.
- It has the potential to transform India's **energy landscape** by harnessing its abundant **Thorium reserves**.
  - Unlike **uranium**, **thorium** alone **cannot** be directly used as nuclear fuel in a reactor.

### **Thorium Reserves in India:**

- India possesses the **world's largest Thorium** reserves, estimated at 1.07 million tonnes.
- The country's thorium reserves make up **25%** of the global reserves.
- This reserve can sustain **green energy production** for over a century, aligning with India's **net-zero target** by **2070**.

- Thorium, a **fertile material**, requires pairing with **fissile materials** like **Uranium-235** or **Plutonium-239** for use in reactor.
  - India faces a challenge due to **limited stocks** of **Uranium-235**.
- In India, Thorium is found in **Monazite** mineral which is **abundant** in states like- Odisha, Andhra Pradesh, Tamil Nadu, Kerala, West Bengal and Jharkhand.