

ANEEL: New nuclear fuel

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Why in news?

Clean Core Thorium Energy, a Chicago-based company, developed ANEEL (Advanced Nuclear Energy for Enriched Life), a fuel that combines Thorium and High Assay Low Enriched Uranium (HALEU) (named after India's scientist, Dr Anil Kakodkar).

What is High Assay Low Enriched Uranium (HALEU)?

- HALEU is defined as uranium enriched to greater than 5% and less than 20% of the U-235 isotope.
- Most of the current reactors run on uranium fuel enriched up to 5 percent Uranium-235.
- HALEU is needed for many of the advanced nuclear reactor designs under development. But HALEU is not yet widely available commercially.

How ANEEL can be a game-changer for green energy transition?

- ANEEL can be used in the existing Pressurized Heavy-Water Reactors (PHWRs) which is an indigenous reactor system.
- ANEEL provides an easier and quicker alternative for the deployment of thorium leveraging imported HALEU, especially for nations which lack the infrastructure to install natural gas, wind or solar or hydro.
- By utilising this fuel, the operation cost and nuclear waste can be reduced significantly as compared with the currently used natural uranium.
- ANEEL fuel bundle lasts much longer and burns more efficiently.
- The spent ANEEL fuel cannot be used for weapons.
- With this, India can guarantee green energy security for the subcontinent by fast-tracking the use of Thorium in nuclear reactors.

What is the status of Thorium in India?

- Thorium is contained in, and produced from, the natural mineral monazite, occurring often as a sand deposit.
- Department of Atomic Energy (DAE) has established 11.93 million tonnes of in situ resources Monazite (Thorium bearing mineral) in the country, which contains about 1.07 million tonnes of thorium.
- India has the world's largest reserves of Thorium, which is estimated at 1.07 million tonnes, enough to last over a century.