FIRST PRIVATE HEAVY WATER TEST FACILITY: SCIENCE & TECHNOLOGY

NEWS: India's 1st private test facility for heavy water upgrade opens

WHAT'S IN THE NEWS?

India's first private heavy water test facility was inaugurated by **TEMA India Ltd.** in **Palghar, Maharashtra**.It was set up under **technology transfer from BARC (Bhabha Atomic Research Centre)**, marking a significant step in public-private collaboration in the nuclear sector.

Key Highlights

TEMA India's Facility:

- **First private facility** in India to test and build heavy water processing equipment.
- Earlier, **BARC used to conduct all such testing** — the private sector had no such role.
- TEMA can now **design, fabricate, and test equipment (like distillation columns)** at a single integrated location.
- **Time-saving**: Reduces the testing and commissioning time by **1–2 years**, compared to the earlier 7–8 years.
- The facility operates under **BARC's technology transfer agreement** and a **purchase order from NPCIL** (Nuclear Power Corporation of India Ltd.).

Technology Transfer – What It Means:

- It involves **transferring scientific knowledge, innovation, or technology** from a public research institution (like BARC) to a private entity (like TEMA).
- Purpose: **Commercialisation, faster implementation, and wider application** of advanced research in real-world industrial settings.
- In this case, **BARC provides the technical know-how**, while **TEMA executes it in manufacturing and testing**.

About Heavy Water (D_2O):

- Heavy Water = **Deuterium Oxide (D_2O)** → Hydrogen atoms replaced with **deuterium**, a stable isotope.
- **Primary role in nuclear reactors**:
    - Acts as a **moderator** (slows down neutrons for sustained fission).
    - Serves as a **coolant** in **Pressurised Heavy Water Reactors (PHWRs)** – key to India's nuclear energy programme.
- **Purity requirement**:
    - Operational reactors require heavy water to be **99.9% pure**.

    - Over time, heavy water gets diluted with light water and **must be reprocessed (upgraded)** via **distillation**.

- **Strategic importance**:
    - Allows use of **natural uranium**, avoiding dependence on **enriched uranium**.
    - Enhances **India's energy security** and contributes to **non-proliferation** by staying within **IAEA safeguards**.

India's Heavy Water Ecosystem:

Institution	Role
BARC	R&D, technology development, testing protocols
Heavy Water Board (HWB) under DAE	Oversees **production, supply, and quality control** of heavy water in India
NPCIL	Purchases heavy water-related equipment for nuclear power plants
TEMA India	Now acts as a **private partner for testing and fabrication**, reducing public sector burden

Significance:

- Promotes **Make in India** and **Atmanirbhar Bharat** in the strategic nuclear sector.
- Enhances **private sector participation in nuclear technology**, traditionally a state-dominated domain.
- A step toward **faster deployment** of nuclear projects due to reduced testing time and industrial bottlenecks.
- Strengthens **India's clean energy future** via a more robust and indigenous heavy water infrastructure.

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