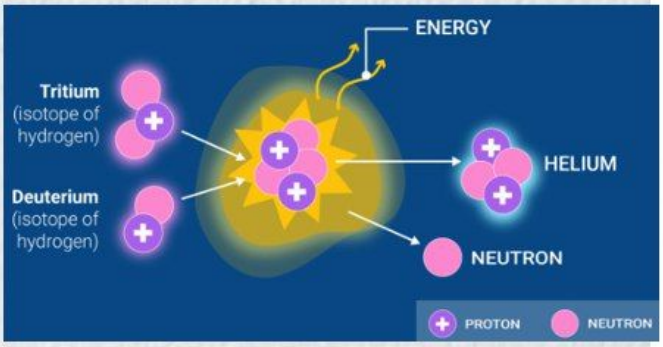
1. **National Critical Minerals Mission (NCMM):** The government recently approved a **Rs 16,300-crore** National Critical Minerals Mission (NCMM) to promote the exploration of critical minerals within the country and at offshore locations.
   - **About the mission:** NCMM will address all stages: mineral exploration, mining, beneficiation, processing, and recovery from end-of-life products.
   - **Objectives**: Reduce **import dependence** and ensure **self-reliance** in mineral supply.
     - Support **clean energy transition** and growing demand for critical minerals.
   - **About:** Critical minerals are elements, substances, or materials that are essential for the manufacturing of modern technologies.
     - The Centre has identified **30 critical minerals**, including lithium, cobalt, nickel, graphite, tin, copper, and more.
   - **Significance of Critical Minerals**:
     - Essential for **clean energy technologies** like **wind turbines, electricity networks, EVs, and battery manufacturing**.
     - Includes **copper, lithium, nickel, cobalt, rare earth elements**, etc.
   - **Legislative & Policy Support**: **Mines and Minerals (Development and Regulation) Act, 1957** was amended in **2023**.
   - **Customs duties on critical minerals eliminated** in **FY25 budget** to boost availability and processing facilities.

CRITICAL MINERALS: INDIA'S NET IMPORT RELIANCE (2020)

Critical Mineral	%age	Major import sources
Lithium	100%	Chile, Russia, China, Ireland, Belgium
Cobalt	100%	China, Belgium, Netherlands, US, Japan
Nickel	100%	Sweden, China, Indonesia, Japan, Philippines
Vanadium	100%	Kuwait, Germany, South Africa, Brazil, Thailand
Niobium	100%	Brazil, Australia, Canada, South Africa, Indonesia
Germanium	100%	China, South Africa, Australia, France, US
Rhenium	100%	Russia, UK, Netherlands, South Africa, China
Beryllium	100%	Russia, UK, Netherlands, South Africa, China
Tantalum	100%	Australia, Indonesia, South Africa, Malaysia, US
Strontium	100%	China, US, Russia, Estonia, Slovenia
Zirconium (zircon)	80%	Australia, Indonesia, South Africa, Malaysia, US
Graphite (natural)	60%	China, Madagascar, Mozambique, Vietnam, Tanzania
Manganese	50%	South Africa, Gabon, Australia, Brazil, China
Chromium	2.5%	South Africa, Mozambique, Oman, Switzerland, Turkey
Silicon	<1%	China, Malaysia, Norway, Bhutan, Netherlands

2. **Nuclear Fusion:** Recently, the experimental China's EAST reactor maintained operational state for **over 1,000 seconds (17 minutes)**, setting a new record.

- **About:** Nuclear fusion is the process by which two light atomic nuclei combine to form a single heavier one while releasing massive amounts of energy.
  - Fusion reactions take place in a state of matter called plasma — a hot, charged gas made of positive ions and free-moving electrons with unique properties distinct from solids, liquids or gases.
- **Extreme Conditions for Fusion**: Requires **hundreds of millions of degrees Celsius – hotter than the Sun's core**.
  - **1 gram of fusion fuel = energy of 8 tonnes of coal**. The uses **abundant hydrogen isotopes (deuterium & tritium)**, emits **zero emissions**, and generates **no nuclear waste**.



- **ITER – The Largest Fusion Reactor: International collaboration** with **India as one of 7 key members**, which is **located in France**, under development since **2005**.
  - Expected to start **deuterium-tritium fusion by 2039**, generating **500 MW**.

3. **Credit Guarantee Scheme for MSMEs (MCGS-MSME):** The government recently approved the introduction of a new credit guarantee scheme for the micro, small and medium enterprises (MSMEs) that was announced in the FY25 Budget.
   - **About the scheme:** Applicable for **four years** from the date of operational guidelines or until a cumulative guarantee of **₹7 lakh crore** is issued.
   - **Loan Coverage**: Provides **credit guarantee for loans up to ₹100 crore** for MSMEs to procure equipment and machinery.
   - **Guarantee Coverage**: **60% guarantee coverage** by **National Credit Guarantee Trustee Company Limited (NCGTC)** to **Member Lending Institutions (MLIs)**.
   - **Collateral-Free Loans**: Facilitates **loans without collateral** from banks and financial institutions for MSMEs' expansion and growth.
   - **Eligibility Criteria**: MSMEs must have a **valid Udyam Registration Number**.
     - **Loan amount under the scheme cannot exceed ₹100 crore**.
     - **Minimum cost of equipment/machinery must be 75% of the project cost**.

4. **Ethanol Blended Petrol (EBP) Program:** The Cabinet Committee on Economic Affairs (CCEA), chaired by PM **Modi**, recently approved **revision of ethanol procurement price** for **Public Sector Oil Marketing Companies (OMCs)** for **Ethanol Supply Year (ESY) 2024-25** (**1st November 2024 – 31st October 2025**).
   - **About EBP program:** Launched by the Ministry of Petroleum and Natural Gas (MoPNG) in January 2003.
     - Allows **OMCs to blend ethanol up to 20%** in petrol.
     - Promotes **alternative and eco-friendly fuels** while reducing **import dependence**.
     - Boosts **agriculture sector** by increasing demand for ethanol.
     - **Foreign exchange savings**: **₹1,13,007 crore** (as of **31.12.2024**).
     - **Crude oil substitution**: **193 lakh metric tonnes**.
   - **Growth in Ethanol Blending**: Increased from **38 crore litres in ESY 2013-14** to **707 crore litres in ESY 2023-24**.
     - **Achieved 14.60% blending** in ESY 2023-24.
     - **Future Targets & Initiatives**: **20% ethanol blending** target **advanced from 2030 to ESY 2025-26**, and **planned 18% blending** in **ESY 2024-25**.
     - **Long Term Off-take Agreements (LTOAs)** for **Dedicated Ethanol Plants (DEPs)** in ethanol-deficient states.
     - **E-100 & E-20 fuels** introduced; **flex-fuel vehicles launched**.
   - **About: Flexible fuel vehicles (FFVs)** have an internal combustion engine and are capable of operating on gasoline and any blend of gasoline and ethanol up to 83%.
5. **GSLV-F15/NVS-02 Mission:** The ISRO has recently achieved its 100th successful launch from Sriharikota.
   - **About the GSLV-F15 Launch: 17th flight** of India's **Geosynchronous Satellite Launch Vehicle (GSLV)**.
     - **11th flight** with **Indigenous Cryogenic Stage**.
     - **8th operational flight** of GSLV with **Indigenous Cryogenic Stage**.
   - **About NVS-02 Satellite: One of five replacement satellites** for the **Indian Regional Navigation Satellite System (NavIC)**.

- **Features of NVS-02: Heavier and longer mission life** than previous satellites.
  - **Indigenous atomic clock** for **better accuracy**.
  - **Enabled with L1 frequency**, commonly used in **US GPS system**, improving compatibility with personal trackers.
  - Enhances **reliability and accessibility** of **India's navigation system** for **civilian and strategic applications**.
  - **NVS-01**, launched in **May 2023**, was the **first second-gen NavIC satellite** with **India's first indigenous atomic clock**.
- **About NavIC: Seven-satellite system** providing **location data** over **India and 1,500 km beyond**.
- **Global Navigation Systems: GPS (USA), GLONASS (Russia), Galileo (Europe), Beidou (China), and Japan's QZSS** augments **GPS** but is **not independent**.
- **About ISRO: Established in 1969**, but the **first launch pad** was set up **only in 1993**.
  - **Second launch pad** was established **in 2004**, after a **decade-long gap**.
  - **Last 10 years** witnessed **unprecedented expansion** in **infrastructure and investment** in the space sector.
  - **India's third launch pad** is being built in Sriharikota, and a **new launch site in Tuticorin, Tamil Nadu** was inaugurated by **PM Modi in February 2023**.

6. **Legal Metrology (Packaged Commodities) Rules:** The Central Government recently announced the structured timeline for compliance with Amendments in labelling provisions under the Legal Metrology (Packaged Commodities) Rules, 2011.
   - **About the key decisions & implementation timeline: January 1st or July 1st** of a given year.
     - **180 days' notice** will be provided for **smooth transition** and **compliance adaptation**.
     - Amendments aim to **enhance transparency, ensure accuracy in product information**, and **empower consumers**.
   - **Role of Legal Metrology (Packaged Commodities) Rules, 2011: Ensures fairness, transparency, and consumer protection** in trade and commerce.
     - Mandates **clear, legible, and standardized labelling** on packaged goods.
     - Provides consumers with **essential product details**: **Net quantity**, **MRP**, **Manufacturing date**, **Country of origin**, and **Manufacturer details.**

7. **Marine Heatwave:** Recently the tens of thousands of fish have died off **Northwestern Australia** due to a large and long-lasting marine heatwave.
   - **About the key highlights:** The heatwave is **heading south** towards **Ningaloo Reef** and **Shark Bay's seagrass gardens**.
     - The heatwave **began in September 2024** with **ocean temperatures 3°C higher than usual** off **Broome**.
     - **More than 90% of heat trapped by greenhouse gases** is absorbed by the **oceans**.
   - **Recent Observation & Impact on Ocean Life:**
     - **Fish kill in Karratha** is the most **visible sign of distress**.
     - **Bleaching observed** in **Kimberley coral reefs**.
     - **Corals at Ningaloo Reef experiencing heat stress**.
     - Heatwave affecting the **Gascoyne region (Carnarvon-Exmouth)**, likely spreading **further south**.
     - Currently, **28% of the world's oceans** are experiencing **heatwave conditions**.
   - **About Heatwave:** It can be defined as a period where local excess heat accumulates over a sequence of unusually hot days and nights.
     - It amplify many risks, such as health-related or economic risks, including increased human mortality, drought and water quality, wildfire and smoke, power shortages and agricultural losses.
   - **Marine Heatwave:** A marine heatwave is a period of unusually **high ocean temperatures** and is defined by its duration and intensity. One of the most common ways that scientists measure the ocean's temperature is through **sea surface temperature.**
     - It occurs when the surface temperature of a particular region of the **sea rises to 3 or 4 degree Celsius** above the average temperature for at least five days.