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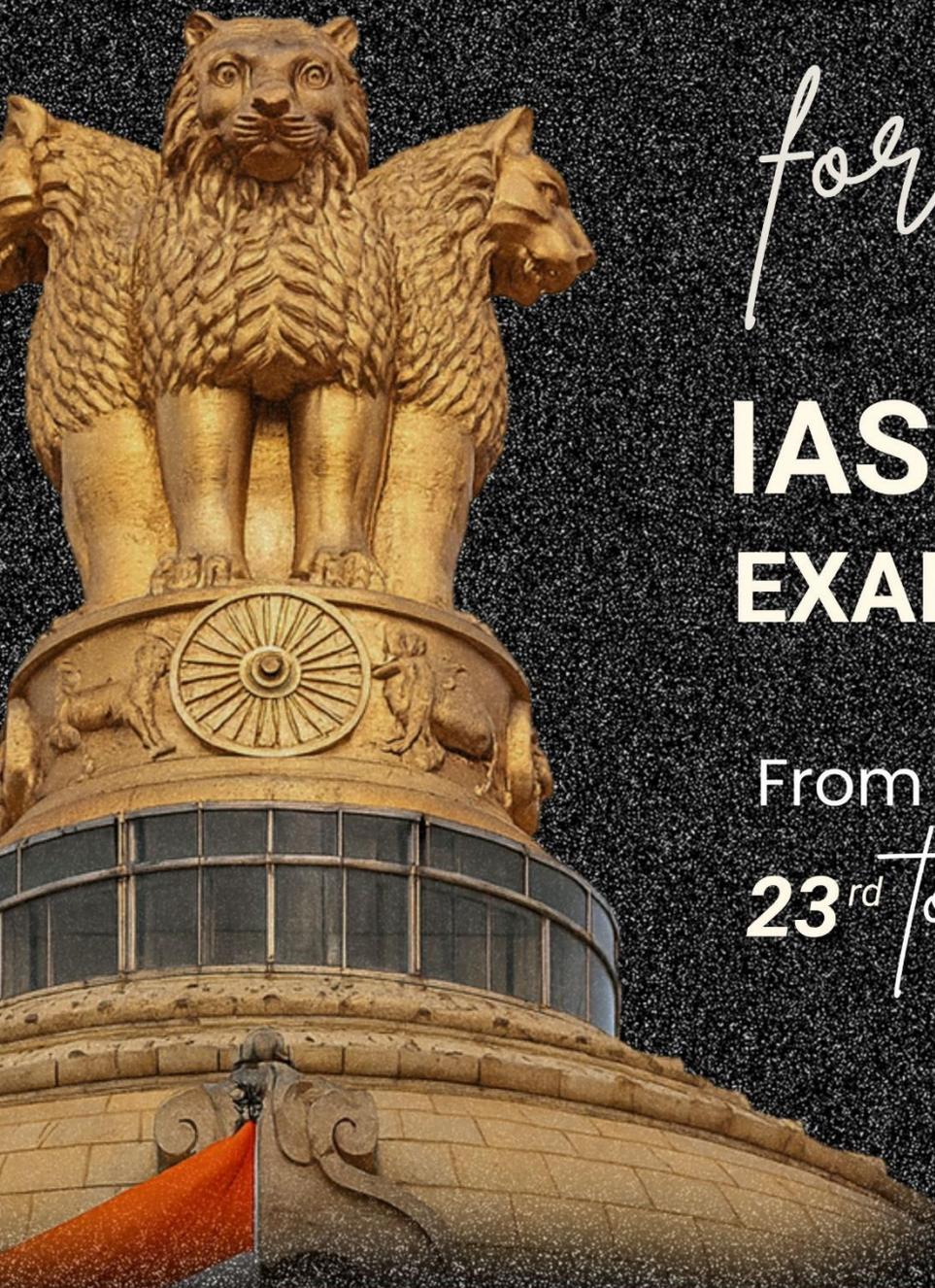
1.1. INTERNATIONAL RELATIONS

1.1.1. THE EVOLVING NATURE OF GLOBAL TRADE AGREEMENTS

Context: Global trade is shifting from **WTO-led multilateralism** to **bilateral FTAs** and imperial **Agreements on Reciprocal Trade (ARTs)**, prioritizing unilateral interests and digital control over non-discriminatory, rules-based international cooperation.

The Three Typologies of International Trade Deals

1. **Multilateralism (The WTO Era)**

   - This is the "gold standard" of the post-WWII global order, governed by the **World Trade Organization (WTO)** and the **General Agreement on Tariffs and Trade (GATT)**.
   - **Core Principle:** The **Most-Favoured-Nation (MFN)** rule. If a country grants a trade favor (like a 5% tariff) to one member, it must immediately extend that same favor to all other 160+ WTO members.
   - **The Goal:** To create a non-discriminatory, rules-based system where large and small nations follow the same playbook.
   - **Scope:** Broadly covers goods, services (**GATS**), and intellectual property (**TRIPS**).
   - **Democratic Agency:** Features a "one-country-one-vote" system, allowing developing nations like India to form coalitions and bargain against superpowers.

2. **Preferentialism (FTAs and Customs Unions)**

   - While the WTO emphasizes non-discrimination, **Article XXIV of GATT** provides a legal "escape hatch." It allows countries to sign deals that give special treatment to specific partners.
   - **Free Trade Agreements (FTAs):** Signatories eliminate tariffs among themselves but maintain their own individual tariffs for the rest of the world (e.g., India-UAE CEPA, RCEP).
   - **Customs Unions (CUs):** Members not only eliminate internal tariffs but also adopt a **Common External Tariff (CET)** for non-members (e.g., the European Union).
   - **"WTO-Plus" Features:** Modern FTAs often include chapters that the WTO hasn't fully mastered, such as **environmental standards, labor laws, and digital trade rules**.

3. **Reciprocal Trade (The "ART" Model)**

   - The most recent and controversial typology, championed by the **Trump administration** (and now adopted as a strategy in various forms), is the **Agreement on Reciprocal Trade (ART)**.

- **Philosophy:** Moves away from "trade liberalization" toward **"strict reciprocity."** It is a tit-for-tat model: "If your tariff on our cars is 20%, ours on yours will also be 20%."
- **Legal Status:** These are often signed **outside** of the WTO's Article XXIV framework. Because they aren't notified to the WTO, they lack transparency and cannot be scrutinized by other nations.
- **"Imperial" Nature:** These deals often include "One-Sided" clauses. For example, a partner country might be forced to adopt U.S. national security trade restrictions or surrender **data sovereignty** (the right to tax digital services like Netflix or Google).
- **The "Shadow" Factor:** ARTs are often negotiated under the threat of unilateral, high-penalty tariffs, making them power-based rather than rules-based.

Key Shifts in Trade Dynamics

1. **Geopolitical Reconfiguration**

   Traditional trade models were built on **comparative advantage** (producing where it's cheapest). Today, "efficiency" is being replaced by **"resilience"** and **"security."**

   - **Friend-shoring:** Nations are redirecting supply chains toward "politically aligned" partners to mitigate risks from adversaries.
   - **Decoupling & De-risking:** The U.S. and EU are actively reducing dependence on China, especially in critical sectors like semiconductors, rare earth minerals, and green energy.
   - **Trade Rerouting:** While U.S. imports from China fell by ~20% in 2025, imports from **ASEAN (especially Vietnam)** surged, suggesting that Chinese goods are being "rerouted" or processed through intermediary countries to bypass tariffs.

2. **The Weaponization of Tariffs**

   Tariffs are no longer just economic tools to protect domestic industry; they have become **strategic weapons**.

   - **Unilateralism:** The 2024–2026 period has seen a massive spike in manufacturing tariffs, notably a global trend sparked by the U.S. "Liberation Day" reciprocal tariffs.
   - **Reciprocity over Liberalization:** The shift toward **Agreements on Reciprocal Trade (ARTs)** marks a departure from the "win-win" philosophy of FTAs. These agreements often force partners to lower their tariffs while the dominant power maintains its protectionist barriers.

3. **Digital Sovereignty vs. Data Flows**

   In the 20th century, trade was about containers; in the 21st, it is about **data bytes**.

   - **The E-commerce Moratorium:** Developing nations (led by India and South Africa) have challenged the WTO moratorium on customs duties for electronic transmissions, arguing it results in massive revenue loss.
   - **Restrictive Digital Clauses:** New ARTs often include clauses that **prohibit data localization** and **ban digital taxes** (like India's Equalisation Levy), stripping nations of their "Digital Sovereignty"—the ability to regulate and tax their own digital markets.

4. **"Green" Protectionism**

   Climate change is the new frontier for trade barriers.

- **CBAM (Carbon Border Adjustment Mechanism):** The EU's carbon tax on imports ensures that "green" domestic products aren't undercut by "dirty" imports from countries with lax environmental laws.
- **Sustainability Standards:** Trade deals now mandate adherence to high labor and environmental standards, which developing nations often view as **"non-tariff barriers"** designed to keep their goods out of Western markets.

Strategic Implications for India

1. The "Dual Axis" Strategy: EU vs. USA

India balances two distinct models:

- **EU Axis (Formal Multi-alignment):** The India-EU **FTA** emphasizes rules-based trade, eliminating tariffs on **96% of goods** to reduce Chinese dependency.
- **U.S. Axis (Transactional Reciprocity):** A narrower **Bilateral Trade Agreement (BTA)** focuses on specific tariff disputes (steel/aluminum) and energy security (LNG/Crude) rather than deep structural integration.

2. Digital Sovereignty: The "Red Line"

India maintains a strict stance on protecting its digital borders:

- **Refusal of "Data Free Flow":** India rejects trade clauses (U.S./UK) that ban **data localization**, ensuring domestic control.
- **The Delhi Declaration (2026):** At the AI Impact Summit, India opposed **"AI extractivism,"** advocating for sovereignty over data to prevent foreign firms from harvesting local data for profit.

3. Friend-Shoring and "De-risking" from China

India positions itself as the primary global alternative to China:

- **Trusted Source Strategy:** Participation in the **Critical Minerals Ministerial** secures raw materials for EVs and semiconductors, slashing reliance on Chinese imports.
- **Selective Integration:** By avoiding the China-led **RCEP** and prioritizing "democratic partners" (UK, EU, UAE), India pursues a strategy of values-based globalization.

4. Impact on Domestic Policy: Atmanirbharta 2.0

Trade negotiations are now a direct extension of internal economic policy:

- **PLI Scheme Alignment:** Negotiators protect **Production Linked Incentive (PLI)** sectors (solar, white goods) by ensuring tariff cuts do not hurt domestic capacity.
- **Rare Earth Corridors: Budget 2026** introduced mineral corridors to link international raw material procurement directly to domestic manufacturing hubs.

Conclusion

India's shift toward **Strategic Pragmatism** secures its digital and energy sovereignty, positioning the nation as a resilient, trusted hub within a fragmented global order through high-standard, value-based trade partnerships.

Q. *The global trade architecture is witnessing a shift from rule-based multilateralism to power-driven bilateralism. Examine this transformation in the context of WTO, Free Trade Agreements (FTAs), and Agreements on Reciprocal Trade (ARTs). Discuss the implications for developing countries. (250 words)*

1.1.2. INDIA-BRAZIL RELATIONS

Context: During Brazilian President Lula's February 2026 state visit, India and Brazil agreed to deepen strategic ties with critical minerals/rare-earth cooperation and aim to raise bilateral trade above $20 billion, boosting Global South cooperation.

Historical Background: India-Brazil Relations

- **1948:** Diplomatic relations established; India was one of the first to recognize Brazil's independence (from Portugal) and vice-versa.
- **Decolonization Era:** Both nations shared a strong commitment to the **Non-Aligned Movement (NAM)** and anti-colonialism.
- **Post-Cold War Shift:** Relations deepened in the 1990s as both liberalized their economies and sought a greater voice in global governance.
- **2003 (IBSA):** Formation of the **India-Brazil-South Africa** (IBSA) Dialogue Forum, institutionalizing South-South cooperation.
- **2006 (Strategic Partnership):** Formalization of a "Strategic Partnership," expanding ties into space, defense, and nuclear energy.
- **Multilateral Alignment:** Co-founding members of **BRICS** (2009) and the **G4** (advocating for UNSC reform), cementing their roles as regional leaders.

Key Pillars of Cooperation in the India-Brazil Relations

1. **Digital Transformation and Emerging Tech**

   This is the newest and most dynamic pillar, described as a "Digital Superpower (India) meeting a Renewable Superpower (Brazil)."

   - **Digital Partnership for the Future:** A landmark agreement signed during President Lula's 2026 visit to share India's **Digital Public Infrastructure (DPI)** (UPI, Aadhaar) to help Brazil bridge its digital divide.
   - **AI Alliance:** Collaboration on **Artificial Intelligence (AI)** governance and ethics, focusing on "inclusive technology" for the Global South.
   - **Open Planetary Intelligence Network (OPIN):** Launched to leverage digital tools for sustainable development and climate action.

2. **Energy Transition and Climate Change**

   Both nations are co-leading the global green agenda through the **Global Biofuel Alliance (GBA)**.

   - **Biofuels & SAF:** Focus on harmonizing global standards for ethanol blending and creating a **Sustainable Aviation Fuel (SAF)** corridor.

- **Belém 4x Pledge:** A commitment to expand sustainable fuel use fourfold by 2035.
- **Green Hydrogen:** Joint research into green hydrogen production and storage technologies.

3. **Defense and Security**

   Defense has shifted from buyer-seller relations to joint **co-design and co-production**.

   - **Aerospace:** MoU between **Adani Group and Embraer** (2026) to set up a Final Assembly Line for regional jets in India.
   - **Naval Cooperation:** Maintenance and lifecycle support for **Scorpene-class submarines** (Mazagon Dock Ltd partnership).
   - **Cyber Security:** Inauguration of the **India-Brazil Cyber Dialogue (2025)** to combat transnational cybercrime and protect data.

4. **Food and Nutritional Security**

   - **Genetic Synergy:** Cooperation in animal husbandry, specifically improving milk yields of **Gir and Kankrej cattle** (Indian breeds highly successful in Brazil).
   - **Agro-chemicals:** India is a major supplier of agro-chemicals ($1B+ annually) to Brazil's massive agricultural sector.
   - **Sustainable Farming:** Joint R&D in precision farming and climate-resilient crop varieties.

5. **Industrial Partnerships & Critical Minerals**

   - **Critical Minerals Accord (2026):** A strategic pact to secure India's access to Brazil's vast reserves of **Lithium, Niobium, and Rare Earths**, vital for India's EV and semiconductor missions.

Significance of the India-Brazil Relations

- **Global South Leadership:** Together with South Africa (**IBSA**), they champion the interests of developing nations in climate justice, debt distress, and food security.
- **Multilateral Reform:** Partners in the **G4** (seeking permanent UNSC seats) and **BRICS**, working to create a multipolar world order.
- **Energy Security:** Brazil is a vital source of crude oil and a global leader in **Biofuels**; its expertise is crucial for India's ethanol blending targets.
- **Economic Complementarity:** A "World's Pharmacy (India) meets World's Barn (Brazil)" partnership; bilateral trade reached **$15.21 billion** in 2025.
- **Strategic Resource Security:** The **2026 Critical Minerals Accord** ensures India's access to Lithium and Niobium, essential for the "Atmanirbhar Bharat" EV and semiconductor missions.
- **Food Security:** Brazil's massive agricultural output provides a safety net for India's pulses and oilseed requirements.
- **Football Cooperation:** India and Brazil are strengthening football ties through the 2025 Football+ Summit in Chennai, promoting grassroots collaboration, ISL cooperation, Brazilian mentorship, technical expertise, and youth development, deepening India's World Cup admiration.

Challenges in India-Brazil Relations

- **Geographical Distance & Logistics:** Lack of direct air/maritime links leads to high shipping costs and long transit times, reducing competitiveness compared to China or the US.

- **Trade Asymmetry & Concentration:** Trade is restricted to **primary commodities** (Crude oil, soy, pharma). Low "intra-industry depth" makes the economic tie vulnerable to global price volatility.
- **The "China Factor":** China is Brazil's top trading partner; this deep interdependency crowds out Indian firms from Brazilian infrastructure and market share.
- **WTO Sugar Dispute:** Friction over **India's sugarcane subsidies**, which Brazil (and Australia) claims distorts global prices. A permanent resolution remains pending in 2026.
- **Divergent Strategic Priorities:** Differing "rhythms" in global governance; Brazil is often more receptive to Chinese-led BRICS initiatives, while India maintains a more cautious, autonomous stance.

Way Forward

- **Expand Trade Basket:** Broaden the **India-MERCOSUR PTA** (Brazil, Argentina, Paraguay, Uruguay) beyond the current 450 items to include high-value sectors like IT, Pharma, and Auto to diversify trade.
- **Enhance Connectivity:** Operationalize a **direct maritime corridor** and air-links between Mumbai/Delhi and São Paulo to slash high logistics costs.
- **Strategic Resource Integration:** Rapidly implement the **2026 Critical Minerals Accord** to move from mere extraction to joint refining of Lithium and Niobium for the EV supply chain.
- **Digital Synergy:** Export India's **Digital Public Infrastructure (DPI)** (UPI/Aadhaar) to Brazil to foster financial inclusion and deepen technological interdependency.
- **Institutional Diplomacy:** Resolve the **WTO Sugar Dispute** through a "compensation mechanism" (e.g., ethanol tech for market access) rather than litigation.

Conclusion

The India-Brazil partnership is a **Strategic Synergy** for the **Multipolar World**, merging India's digital leadership with Brazil's resource wealth to co-lead the **Global South** in green energy and critical minerals.

> **Q.** *India–Brazil relations have gained renewed momentum in the context of critical minerals, Global South cooperation and multipolarity. Examine the key pillars of India–Brazil strategic partnership. Discuss the challenges and suggest measures to strengthen bilateral engagement. (250 words)*

1.1.3. INTERNATIONAL LAW

What is International Law?

International Law (Public International Law) is a system of rules, norms, and standards generally accepted in relations between nations.

- **Nature:** Unlike domestic law, it is **consensual**. There is no "World Government"; instead, it operates on the principle of **Sovereign Equality** (UN Charter Art 2.1).

Sources of International Law

As per **Article 38(1) of the ICJ Statute**, the sources are:

- **Primary Sources:**
  o **Treaties/Conventions:** Expressly recognized written agreements.
    Example: **UNCLOS** (Law of the Sea) or the **Paris Agreement** (Climate).
  o **International Custom:** Evidence of a general practice accepted as law (Opinio Juris).
    Example: Diplomatic immunity was a custom long before it was written into a treaty.
  o **General Principles:** Principles recognized by "civilized nations" (e.g., Good Faith).
    Example: **Res Judicata** (a matter already judged cannot be relitigated) or the **Right to be Heard**.
- **Subsidiary Sources:** Judicial decisions (ICJ/Domestic courts) and teachings of highly qualified publicists.
    Example: The **Kulbhushan Jadhav Case (2019)**, which clarified the interpretation of consular access rights.

Need for International Law

1. **Maintaining International Peace and Security**

   Without a legal framework, the global system reverts to "might is right."

   - **Conflict Limitation:** It provides the rules for when force can be used (Jus ad Bellum) and how it must be conducted (Jus in Bello).
   - **Dispute Resolution:** It offers platforms like the **International Court of Justice (ICJ)** and **Permanent Court of Arbitration (PCA)** to settle border and maritime disputes (e.g., the Chagos Archipelago or South China Sea) through logic rather than lasers.

2. **Management of "Global Commons"**

   - **High Seas:** Governed by **UNCLOS**, ensuring freedom of navigation and fair distribution of deep-sea mineral resources.
   - **Outer Space:** The **Outer Space Treaty** prevents the weaponization of space and ensures celestial bodies aren't "claimed" by private corporations or states.
   - **Atmosphere:** Frameworks like the **Paris Agreement** regulate carbon emissions, which recognize that "pollution knows no borders."

3. **Facilitating Global Economic Cooperation**

   - **Standardization:** The **WTO** provides a rules-based trading system that prevents arbitrary tariffs and trade wars.
   - **Investment Protection:** Bilateral Investment Treaties (BITs) encourage foreign direct investment (FDI) by providing legal recourse to companies if a state illegally seizes their assets.
   - **Functional Needs:** Simple things like international mail (UPU), flight paths (ICAO), and cross-border banking (SWIFT/Basel III) rely entirely on international legal protocols.

4. **Protection of Fundamental Human Values**

   - **Human Rights:** The **UDHR** and subsequent covenants set a "floor" for how a state must treat its own citizens.

- **Criminal Accountability:** It ensures that perpetrators of genocide or war crimes cannot hide behind "sovereignty" (e.g., the role of the **International Criminal Court**).
- **Refugee Protection:** It defines the obligations of states toward those fleeing persecution, preventing humanitarian catastrophes from becoming regional instabilities.

Scope of International Law

1. **Expansion of Subjects (Who is governed?)**

   The scope has moved beyond the "Westphalian" model of only sovereign states.

   - **Sovereign States:** Remains the primary subject (e.g., India's maritime boundaries).
   - **International Organizations:** Entities like the **UN, WTO, and WHO** now have legal personality and can sue or be sued.
   - **Individuals:** Under International Criminal Law (ICC) and Human Rights law, individuals have both rights and liabilities (e.g., prosecution for war crimes).
   - **Non-State Actors:** Multinational Corporations (MNCs) and NGOs are increasingly falling under international regulatory scopes regarding environmental and labor standards.

2. **Expansion of Material Scope (What is governed?)**

   The "Material Scope" has shifted from mere diplomacy to complex technical and social regulations.

   ### A. The Law of Co-existence (Traditional)

   - **Diplomatic Relations:** Immunity of diplomats and embassies.
   - **Territorial Integrity:** Rules regarding land borders and airspace.
   - **War and Neutrality:** The "Laws of War" (Geneva Conventions) which dictate how conflicts are fought.

   ### B. The Law of Cooperation (Modern)

   - **Economic & Trade Law:** Regulating global markets via the **WTO** and **IMF**.
   - **Environmental Law:** The most rapidly expanding scope, including the **Paris Agreement** and the new **Global Plastics Treaty (2025)**.
   - **Human Rights:** International oversight of domestic treatment of citizens.

   ### C. The Frontiers (Emerging)

   - **Outer Space Law:** Regulating satellite traffic and lunar resources (e.g., Artemis Accords).
   - **Cyberspace & AI:** The 2026 scope now includes "Algorithmic Sovereignty" and the prevention of transboundary cyber-attacks.
   - **Bio-Ethics:** International regulation of CRISPR and human cloning.

3. **Geographical Scope (Where does it apply?)**

   - **Land & Air:** Sovereign territory and international flight paths (ICAO).
   - **The Seas:** From internal waters to the High Seas (UNCLOS).
   - **The Polar Regions:** The **Antarctic Treaty System** which keeps the continent demilitarized.
   - **Extra-Terrestrial:** The moon and other celestial bodies.

Regulation of Interstate Relations

- **Sovereign Equality & Non-Interference:** Based on **Article 2 of the UN Charter**, all states have equal voting rights and must not interfere in the domestic affairs of others, maintaining the "Westphalian" global order.

- **Use of Force (Jus ad Bellum):** Prohibited under **Article 2(4)** of the UN Charter, with only two exceptions: **Self-defense (Art 51)** and **UN Security Council Authorization**.

- **Diplomatic Inviolability (1961/1963):** Regulated by the **Vienna Conventions**, ensuring embassies are off-limits to local police, diplomats have immunity from prosecution, and citizens have the right to **consular access** (e.g., Kulbhushan Jadhav case).

- **Law of Treaties:** Governed by the **Vienna Convention on the Law of Treaties (1969)**. Key principle: **Pacta Sunt Servanda** (Agreements must be kept).

- **Jurisdictional Regulation of "Frontiers":** International law defines boundaries in the **High Seas** (UNCLOS), **Airspace** (Chicago Convention), and **Cyberspace** (2026 UN Cybercrime Treaty) to prevent overlaps and conflict in global commons.

- **Peaceful Dispute Settlement:** Under **Article 33 of the UN Charter**, states are obligated to settle quarrels through a hierarchy of tools: from soft diplomacy (negotiation/mediation) to binding legal rulings (**ICJ** or **Arbitration**).

Major Branches of International Law

Branch	Focus Area	Key Instrument/Institution
Law of the Sea	Maritime zones, EEZ, High Seas	**UNCLOS (1982)**
Humanitarian Law (IHL)	Rules of war; protection of civilians	**Geneva Conventions (1949)**
Environmental Law	Climate change, biodiversity	**Paris Agreement**, **ICJ Climate Advisory**
Space Law	Space as **"Province of All Mankind"**; non-appropriation of celestial bodies; liability for space debris.	**Outer Space Treaty (1967)**, **Artemis Accords**
Criminal Law	Genocide, War Crimes, Crimes against Humanity	**International Criminal Court (ICC)**
Trade & Economic	Non-discrimination in trade (**MFN Status**); Investor-State Dispute Settlement (ISDS); Intellectual Property (**TRIPS**).	**WTO**

Issues in International Law

- **The Enforcement Gap ("Toothless Tiger"):** Unlike domestic law, there is no global police. Enforcement is hindered by **Selective Compliance** (powerful states ignoring rulings), **UNSC Paralysis** (P5 Veto power preventing action), and the requirement of **State Consent** for ICJ jurisdiction.

- **Sovereignty vs. Human Rights:** The "Westphalian Trap" allows states to use **Non-Interference** as a shield for domestic abuses. While the **Responsibility to Protect (R2P)** doctrine exists, its application remains inconsistent and politically motivated.
- **Legal Fragmentation:** The proliferation of specialized regimes (Cyber, Space, Trade) creates **Conflicting Jurisdictions**. A single issue may be judged differently by the WTO (economic) vs. an Environmental Tribunal (sustainability), causing legal uncertainty.
- **Democratic Deficit & Eurocentrism:** Many rules were authored by Western powers during the colonial era. The **Global South** often views frameworks like **TRIPS** or sovereign debt rules as biased, leading to urgent calls for the democratization of the UN and Bretton Woods institutions.
- **Technological "Grey Zones":** Law lags behind innovation. Key dilemmas include whether **Cyber-attacks** constitute "armed attacks" under Article 51, legal liability for **Lethal Autonomous Weapons (AI)**, and establishing "causality" for **Climate Liability** and reparations.

Way Forward

- **UNSC Reform:** Expanding the Security Council to include permanent representation from the Global South (India, Brazil, African nations) to improve legitimacy.
- **Compulsory Jurisdiction:** Moving towards a system where states accept the **ICJ's** jurisdiction automatically for certain categories of disputes (e.g., environmental or trade issues).
- **AI Governance:** Finalizing the **Global Digital Compact** to establish ethical boundaries for AI in warfare and state surveillance.
- **Shared Responsibility:** Recognizing India's stance on "shared responsibility" in refugee crises and environmental protection—shifting the burden from just the host/victim country to the global community.
- **Non-state actors & accountability:** Corporations, insurgent groups and private cyber actors complicate applicability and remedies.

Conclusion

International law must evolve from a "law of nations" to a **"law of humanity,"** integrating AI ethics, climate liability, and space governance to ensure a resilient, rule-based global order.

Q. *Discuss the sources and major branches of International Law. Examine the key challenges in its enforcement in the contemporary world order. Also analyse its significance for India. (250 words)*

***

GENERAL STUDIES 3

2.1. SCIENCE & TECHNOLOGY

2.1.1. NEW DELHI DECLARATION ON AI IMPACT

Context: The **India-AI Impact Summit 2026** (held February 18–19, 2026, at Bharat Mandapam, New Delhi) was a landmark event where India positioned itself as a leader of the **Global South** in AI governance.

Background of AI Impact Summit

The Delhi Summit followed a sequence of global meetings that evolved in focus:

The Seven Chakras of the India-AI Impact Summit 2026

Source: impact.indiaai.gov.in/

- **Bletchley Park, UK (2023):** Focused on **AI Safety** and existential risks (The Bletchley Declaration).
- **Seoul, South Korea (2024):** Focused on **AI Safety & Innovation** balance.
- **Paris, France (2025):** The **AI Action Summit**, emphasizing geopolitical competition and standards.
- **New Delhi, India (2026):** The **AI Impact Summit**, shifting the focus to **implementation, inclusion, and the Global South.**

Key Highlights of AI Impact Summit: The "Seven Chakras" (Pillars)

The Declaration is structured around seven thematic pillars that define the global roadmap for AI:

1. **Democratizing AI Resources:** Ensuring affordable access to compute, data, and models for all nations.
2. **Economic Growth & Social Good:** Leveraging AI to boost productivity and social welfare.
3. **Secure & Trusted AI:** Establishing ethical guardrails and voluntary safety benchmarks.
4. **AI for Science:** Using AI to accelerate research in healthcare, agriculture, and climate.
5. **Access for Social Empowerment:** Inclusion-by-design for underserved communities and local languages.
6. **Human Capital Development:** Focus on mass skilling, reskilling, and AI literacy.
7. **Resilient, Efficient & Innovative AI:** Promoting sustainable resource use and energy-efficient systems.

Key Outcomes of the New Delhi Declaration of AI Impact Summit

1. **Global Participatory Frameworks**

   The headline outcome was a non-binding but significant declaration based on the **"Seven Chakras"** (Pillars).

   - **Charter for the Democratic Diffusion of AI:** A voluntary framework to expand access to foundational AI resources (compute, datasets, and algorithms) to prevent technology concentration in a few nations.

- **Global AI Impact Commons:** A digital platform to share and replicate successful AI use cases in sectors like healthcare and agriculture across borders.
- **Trusted AI Commons:** A collaborative repository for benchmarks, safety tools, and ethical best practices to ensure responsible development.

2. **Geopolitical and Strategic Shifts**

- **Pax Silica Initiative:** India formally joined this US-led framework to secure supply chains for semiconductors, advanced computing hardware, and critical minerals.
- **Vishwa Bandhu Role:** India positioned itself as a "Global Friend," bridging the technological standards of the Global North with the socio-economic aspirations of the Global South.
- **GPAI Expansion:** The summit hosted the Global Partnership on AI (GPAI) Ministerial Meeting, welcoming new members like **Saudi Arabia** and **Malta**.

3. **Economic and Infrastructure Commitments**

- **Massive Investment Pledges:** The summit secured over **$250 billion** in infrastructure investment commitments (data centers, fab plants) and roughly **$20 billion** for deep-tech venture funding.
- **Compute Power (GPU) Expansion:** India announced a ramp-up to **100,000 GPUs** by the end of 2026 under the IndiaAI Mission 2.0 to provide affordable compute to startups and researchers.
- **MSME AI Stack:** Plans to launch an "AI Playbook" for small businesses, modeled after the success of UPI, to democratize productivity tools.

4. **Indigenous Technological Breakthroughs**

- **Sovereign LLMs:** Launch of Indian-trained frontier models by **Sarvam AI** (Sarvam-30B and Sarvam-105B) and **BharatGen** (17B parameter Indic-language model).
- **Hardware Innovation:** Unveiling of **Sarvam Kaze**, a made-in-India AI smart glass initiative.
- **MANAV Vision:** Prime Minister Modi unveiled the **MANAV** framework (**M**oral, **A**ccountable, **N**ational Sovereignty, **A**ccessible, **V**alid) as India's ethical compass for AI.

5. **Human Capital & Social Impact**

- **AI Workforce Development Playbook:** Guidelines for nations to prepare for an AI-driven economy through skilling and reskilling.
- **Flagship Challenges:** Recognition of innovators through **AI for ALL** (inclusion), **AI by HER** (women-led), and **YUVAi** (youth-led) awards.
- **Judicial Integrity:** Launch of "AI Essentials for Judges" to prevent "Black-Box Justice" and ensure algorithmic tools remain subordinate to human reasoning.

Concerns Regarding the AI Impact Summit

1. **Lack of Binding Enforcement**

- **Aspirations vs. Actions:** There is no international body or verification mechanism to ensure countries actually follow the principles of "Democratic Diffusion."
- **Voluntary Framework:** Unlike the **European Union (EU) AI Act**, this declaration lacks strict penalties, risking becoming a "spectacle" without real accountability.

2. **The "Silent" Labor Crisis**

- **Job Displacement:** Significant threat to India's **5.8 million Information Technology (IT)** workforce despite the summit's focus on reskilling.
- **Vulnerable Roles:** High risk of mass unemployment in entry-level coding, data entry, and administration due to **Generative Artificial Intelligence (GenAI)**.

3. **Human Rights and "Redlines"**

- **Absence of Prohibitions:** No explicit bans on high-risk practices like **Predictive Policing** or **Biometric Surveillance**, which often harm marginalized groups.
- **Safeguard Gaps:** Organizations like **Amnesty International** criticized the lack of concrete commitments to stop "destructive practices" by tech giants.

4. **Geopolitics and "Data Colonialism"**

- **Data Colony Risk:** Fear that the Global South will supply raw data and talent while **United States (US)** and **China** firms retain ownership of high-value models.
- **Geopolitical Exclusion:** The absence of **Taiwan**—the global semiconductor hub—due to diplomatic sensitivities was seen as a major strategic gap.

5. **Environmental and Sustainability Issues**

- **Resource Intensity:** Training massive models leads to exponential growth in energy consumption.
- **Water Stress:** Data centers require roughly **11 lakh liters of water per day** for cooling, threatening water-scarce regions.

6. **Implementation and Logistics**

- **The "Spectacle" Critique:** Some observers felt the event functioned more like an **AI trade expo** (focusing on investment deals) rather than a governance forum.
- **Domestic Credibility:** Incidents of "rebranding" foreign technology as indigenous (e.g., Chinese robot dogs) raised concerns about the vetting of domestic AI claims.

Measures for Inclusive AI Growth in India

1. **Democratizing Access through DPI (Digital Public Infrastructure)**

- **AI-DPI Convergence:** Utilizing the **"India Stack"** (UPI/Aadhaar) model to treat AI as a public good. Building "common digital rails" allows MSMEs to access high-quality data and models independently of Big Tech.
- **Bhashini & Language Inclusion:** Leveraging the **BHASHINI** platform to provide voice-based services in local dialects, ensuring the non-literate population can access banking and governance.

2. **Strengthening Sovereign AI & Infrastructure**

- **IndiaAI Mission 2.0:** Expanding national compute to **100,000 GPUs** and subsidizing costs (approx. **₹65/hour**) to democratize innovation beyond wealthy corporations.
- **Indigenous LLMs (BharatGen):** Developing **Foundational Models** trained on domestic data to ensure cultural, social, and linguistic relevance.

3. **Sector-Specific Measures for Last-Mile Impact**
   - **Agriculture (Kisan e-Mitra):** Deploying AI for personalized crop advisories, pest detection via mobile images, and climate-resilient farming.
   - **Healthcare (Suman Sakhi):** Supporting **ASHA** workers with AI chatbots and diagnostic tools for maternal and child health tracking in rural centers.
   - **Education (DIKSHA AI):** Utilizing AI for personalized regional language content and identifying potential student dropouts.

4. **Protecting the Workforce (The "Human Capital" Pillar)**
   - **Digital ShramSetu:** An AI platform for **490 million informal workers** that matches skills to jobs and provides micro-credentials for on-the-job learning.
   - **AI Workforce Playbook:** Setting global standards for "mass reskilling" to transition workers from data entry to **AI-augmented** roles.

5. **Ethical and Safe Governance**
   - **MANAV Framework:** Ensuring AI is **M**oral, **A**ccountable, **N**ational (Sovereign), **A**ccessible, and **V**alid.
   - **"Glass Box" Accountability:** Requiring transparency in AI used for public welfare. If a citizen is denied a benefit by an AI algorithm, they must have a "Right to Explanation" to understand why.

Conclusion

The New Delhi Declaration marks a shift toward **Sovereign AI** and **Democratic Diffusion**. By integrating AI with **Digital Public Infrastructure (DPI)**, India is pioneering a human-centric model that ensures frontier technology bridges global divides, fostering an inclusive, sustainable, and equitable digital future.

> **Q.** *Artificial Intelligence is increasingly becoming central to economic competitiveness and strategic autonomy. In this context, analyse the objectives of the New Delhi Declaration on AI Impact. How can India balance innovation with ethical and regulatory safeguards? (250 Words)*

2.2. ECONOMY

2.2.1. INDIA'S GLOBAL CAPABILITY CENTERS (GCCS)

Context: The **Union Budget 2026-27** and the **India AI Impact Summit** (held at Bharat Mandapam) have signaled a shift toward **"Tech Sovereignty."** GCCs are no longer just supporting global HQs; they are where the world's most complex Engineering Research & Development (ER&D) and Generative AI (GenAI) models are being built.

GLOBAL CAPABILITY CENTRES

- Over **1700 GCCs** in India currently
- Combined Revenue in FY 24 reached **$64.6 USD**
- Employs **19 lakh** people

Source: Ministry of Electronics and Information Technology

About India's Global Capability Centers (GCCs)

Definition: A Global Capability Center is a captive, fully owned offshore unit of a multinational corporation (MNC) that handles specialized functions like IT, Finance, R&D, and Analytics.

Current Landscape

- **Scale:** India hosts **1,800+ GCCs**, accounting for nearly **50% of the world's total**.
- **Employment:** Employs over **1.9 million professionals** directly; supporting a total ecosystem of **10.4 million jobs**.
- **Specialization:** Over **500 GCCs** are now exclusively focused on **Artificial Intelligence (AI)** and Advanced Analytics.

Significance of Global Capability Centers (GCCs) for India

1. **Economic Engine**

   - **GDP Contribution:** Adds **$68 billion** to the economy; projected to reach **$105 billion by 2030**.
   - **Service Exports:** Accounts for **~20% of India's total service exports**, providing a critical cushion against the Current Account Deficit (CAD).
   - **Direct Investment:** Moving from "Foreign Direct Investment" (FDI) to **"Human Capital Investment,"** where MNCs invest in Indian high-end talent.

2. **The 'Brain-Gain' Shift**

   - **End-to-End Ownership:** Indian GCCs now own global products from ideation to delivery, shedding the "back-office" tag.
   - **Innovation Hubs:** Over **1,800 GCCs** nearly **50% of the world's total**. Make India the world's largest laboratory for **Generative AI, Semiconductors, and Cybersecurity**.
   - **IP Creation:** Increasing share of global patents being filed from Indian soil by MNC units.

3. **Employment & Urbanization**

   - **High-Value Jobs:** Employs **1.9 million** highly skilled professionals with salaries significantly higher than the IT services average.
   - **Tier-II/III Expansion:** The **"Hub-and-Spoke"** model is decentralizing growth, creating "Mini-Silicon Valleys" in cities like Ahmedabad, Indore, and Kochi.
   - **Ecosystem Multiplier:** Every 1 job in a GCC creates roughly **3-4 indirect jobs** in hospitality, real estate, and transport.

4. **Strategic & Diplomatic Leverage**

   - **Tech-Sovereignty:** Hosting the core tech of Fortune 500 companies integrates India deeply into the global supply chain, making the world "dependent" on India's stability.
   - **Standard Setting:** As GCCs build AI models (like BharatGen) on Indian data, India helps set global benchmarks for **Responsible AI**.

Key Challenges for India's Global Capability Centers (GCCs)

1. **The Talent & Skill Paradox**

   - **Skill Gaps:** High volume of engineers but a shortage of "Super-Specialists" in **Quantum Computing, Cybersecurity-by-Design, and VLSI Design**.
   - **Wage Inflation:** Fierce "Poaching Wars" between GCCs and well-funded Deep-Tech startups are driving up operational costs, threatening the traditional cost-advantage.

- **Employability:** Only **~45-50%** of Indian engineering graduates are considered "industry-ready" for high-end R&D roles without significant retraining.

2. **Regulatory & Legal Hurdles**

- **Data Sovereignty:** Navigating the **Digital Personal Data Protection (DPDP) Act** while maintaining seamless global data flows remains a compliance challenge.
- **Tax Litigation:** Complexity in **Transfer Pricing** (how MNCs charge their Indian units) often leads to long-drawn legal battles with tax authorities.
- **IP Ownership:** Ambiguity in Intellectual Property (IP) laws regarding "Inventions made in India for Global Parents" can deter high-stakes R&D investments.

3. **Infrastructure & Concentration Risks**

- **Tier-I Saturation:** Over-reliance on **Bengaluru, Hyderabad, and Pune** has led to crumbling urban infrastructure, high rentals, and extreme traffic congestion.
- **Tier-II Readiness:** While "Hub-and-Spoke" is the goal, smaller cities often lack **consistent high-speed power, Grade-A office spaces, and international air connectivity**.

4. **Geopolitical & Macro Risks**

- **Protectionism:** Increasing "Onshoring" sentiments in the US and Europe (e.g., US AI Executive Orders) could pressure MNCs to move critical R&D back to their home countries.
- **Cyber Vulnerability:** As GCCs become "Nerve Centers," they become prime targets for **State-sponsored cyber-espionage**, necessitating massive investments in sovereign cloud security.

Government Initiatives for Global Capability Centers (GCCs)

1. **Fiscal & Tax Reforms (The "Ease of Business" Pillar)**

- **Tax Holiday 2047:** Zero tax for foreign firms using Indian Data Centers for AI/Cloud workloads (promotes "Data Residency").
- **Advance Pricing Agreements (APA):** Up to **9 years** of tax certainty through fast-tracked Advance Pricing Agreements.

2. **Infrastructure & Digital Sovereignty**

- **IndiaAI Mission (GPU-on-Tap):** The government is deploying **38,000+ GPUs** of compute capacity. This allows GCCs to build Large Language Models (LLMs) like **BharatGen** using local infrastructure rather than relying on US-based cloud clusters.
- **City Economic Regions (CERs):** A ₹5,000 crore allocation to develop cities like Patna, Kochi, and Chandigarh into specialized GCC hubs under a "challenge mode," providing plug-and-play office spaces.
- **India Semiconductor Mission (ISM 2.0):** An allocation of ₹1,000 crore for FY 2026-27 to support **ER&D GCCs** in chip design and semiconductor equipment manufacturing.

3. **Skill & Talent Development**

- **FutureSkills Prime (MeitY & NASSCOM):** A digital platform that has certified over **1.9 million** professionals in "GCC-critical" skills like Cybersecurity, AI Engineering, and Cloud Architecture.

- **GENESIS (Gen-Next Support for Innovative Startups):** A ₹490 crore scheme to build a "feeder ecosystem," where local startups act as vendors or innovation partners for larger GCCs.
- **YUVAi & AI Tinkerpreneur:** Programs launched at the **AI Impact Summit 2026** to build a talent pipeline starting from schools, ensuring long-term human capital for the sector.

4. **Policy Frameworks**

- **National GCC Framework:** MeitY is formulating a guidance framework for States to create their own **GCC Policies** (similar to Bihar's 2026 IT/GCC policy) to attract investments into non-metro regions.
- **DPDP Rules 2025:** Providing clear "Explanatory Notes" for data processing, giving MNCs the confidence to move global datasets to India for AI training.

Way Forward

1. **Human Capital Transformation**

- **Curriculum Reboot:** Shift academic focus from "Service-based coding" to **"Product Engineering"** and **"Systems Thinking"** through Industry-Academia partnerships.
- **Finishing Schools:** Scale **FutureSkills Prime** to create "Ready-to-Deploy" specialists in niche areas like **GenAI, Quantum, and Space-tech**.

2. **Regional Diversification (Beyond Metros)**

- **The 100-City Plan:** Leverage **City Economic Regions (CERs)** to move GCCs into Tier-II/III cities. This reduces urban congestion and lowers operational costs by **25-30%**.
- **Infrastructure Parity:** Ensure high-speed 6G/Satellite-link connectivity and 24/7 green power in emerging hubs like Kochi, Indore, and Jaipur.

3. **Intellectual Property (IP) & Sovereignty**

- **"In-India for Global" IP:** Incentivize MNCs to file patents in India by streamlining the **Indian Patent Office** and offering "IP-linked" tax credits.
- **Data-Compute Independence:** Utilize the **IndiaAI Mission's GPU clusters** to ensure GCCs train AI on Indian soil, preventing "Data Colonization."

4. **Regulatory Agility**

- **Stable Tax Regime:** Avoid "Tax Terrorism" by sticking to the **15.5% Safe Harbour** margin and fast-tracking **Advance Pricing Agreements (APAs)**.
- **Green GCCs:** Link future incentives to **ESG goals**, encouraging GCCs to run on renewable energy and contribute to India's **Net-Zero 2070** target.

Conclusion

The evolution of GCCs from "Cost Centers" to **"Global Innovation Engines"** is central to India's **$5 Trillion economy** goal. By bridging the skill gap and ensuring regulatory stability, India can transition from the world's "Back Office" to its **"Front Office of Innovation,"** fulfilling the vision of Viksit Bharat @ 2047.

> **Q.** *India's Global Capability Centres (GCCs) have transitioned from cost-arbitrage units to strategic innovation hubs. Discuss the factors responsible for this transformation and examine their implications for India's economic growth. (250 words)*

2.3. ENVIRONMENT

2.3.1. CARBON CAPTURE AND UTILISATION (CCU) TECHNOLOGIES

Context: In the 2026 Union Budget, India prioritized **"Hard-to-Abate"** sectors (Steel and Cement), providing **Viability Gap Funding (VGF)** for CCU pilot plants to counter the EU's **Carbon Border Adjustment Mechanism (CBAM)**.

The Three-Step Process of Carbon Capture, Utilization & Storage

About the Carbon Capture and Utilisation (CCU) Technologies

Carbon Capture and Utilisation (CCU) refers to technologies that **capture CO₂ emissions** from industrial sources (thermal power plants, cement, steel, refineries) and either **utilise** them in value-added products (chemicals, fuels, building materials) or store them (CCS – Carbon Capture and Storage).
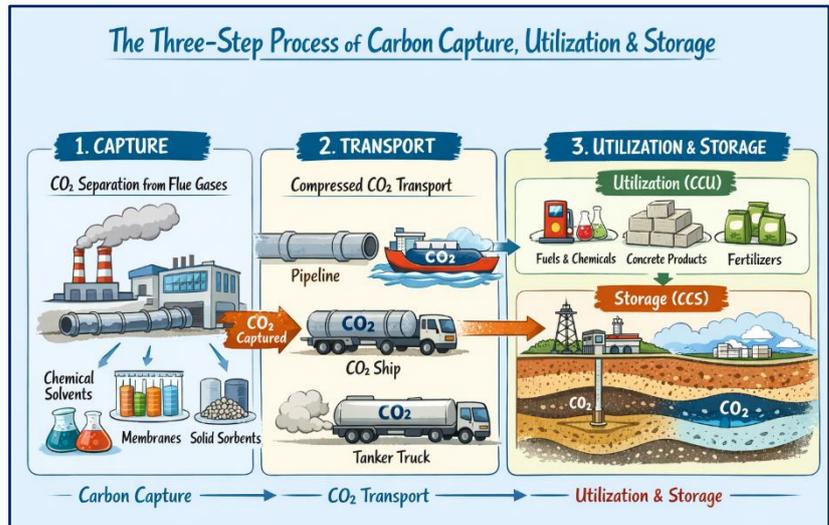
The Three-Step Process

o These diagrams visually explain the **three-step CCUS process**:
o **Capture** – CO_2 separated from industrial flue gases.
o **Transport** – Compressed CO_2 moved via pipelines/ships/tankers.
o **Utilisation or Storage** –
o **Carbon Capture and Utilisation (CCU):** Converted into fuels, chemicals, concrete and fertilizers.
o **Carbon Capture and Storage (CCS):** Injected into deep geological formations for permanent storage.

Why India Needs Carbon Capture and Utilisation (CCU)

1. **Decarbonizing "Hard-to-Abate" Sectors**

   - **Chemical Necessity:** Sectors like **Cement and Steel** produce CO_2 as a direct chemical byproduct (calcination) that renewables cannot eliminate.
   - **Economic Backbone:** These industries are essential for **"Viksit Bharat @ 2047"**; CCU allows growth without high carbon penalties.

2. **Protecting "Young" Industrial Assets**

   - **Avoiding Stranded Assets:** India's industrial plants are relatively new. CCU allows for **retrofitting** existing coal and gas plants instead of costly, premature shutdowns.
   - **Resource Security:** Extends the utility of domestic coal reserves while aligning with Net Zero 2070 targets.

3. **Circular Carbon Economy (Waste-to-Wealth)**

- **Import Substitution:** Converts captured CO_2 into **Urea (fertilizer)** and **Methanol**, reducing India's dependence on expensive chemical imports.
- **Sustainable Infrastructure:** Supports "green" construction by mineralizing CO_2 into **bricks and concrete**.

4. **Economic & Global Competitiveness**

- **Trade Resilience:** Helps Indian exports bypass international carbon taxes like the EU's **CBAM (Carbon Border Adjustment Mechanism)**.
- **Green Growth:** Leverages the **₹20,000 crore CCUS allocation** (Budget 2026) to foster start-ups and create specialized "Green Value Chain" jobs.

India's Carbon Capture and Utilisation (CCU) Status

- **Financial Commitment:** A landmark **₹20,000 crore outlay** in the Union Budget 2026-27 to de-risk private investment and scale up CCUS from pilots to commercial industrial plants.
- **Operational Milestones:** Launch of **five integrated CCU Testbeds** in the cement sector via Public-Private Partnerships (PPP) between top institutes like IITs/IISc and major firms (JSW, Dalmia).
- **Market Mechanisms:** Activation of the **Indian Carbon Credit Trading Scheme (CCTS)**, with the first Carbon Credit Certificates (CCC) expected by **October 2026** for 490 obligated entities.
- **Strategic Roadmap:** NITI Aayog's 2026 reports identify CCUS as the **only viable path** for deep decarbonization in sectors like Cement and Aluminium, where demand is projected to grow 7x by 2070.
- **Targeted Sectors:** Strategic focus on **five "hard-to-abate" sectors**—Power, Steel, Cement, Refineries, and Chemicals to ensure "Viksit Bharat @ 2047" goals align with Net Zero 2070.

Global Carbon Capture and Utilisation (CCU) Initiatives

- **COP30 "Belém to Baku" Roadmap:** The official launch of the **Paris Agreement Crediting Mechanism (PACM)** under Article 6.4, allowing international trade of carbon credits from engineered removals like DAC and CCU.
- **EU Industrial Carbon Strategy:** Implementation of the **Net-Zero Industry Act (NZIA)**, which mandates 50 million tonnes of annual CO_2 storage by 2030 and establishes cross-border "open-access" hubs like **Northern Lights**.
- **Mission Innovation (MI):** A 23-country coalition (including India) pushing the **CDR Mission** to remove 100 Mt of CO_2 annually by 2030, supported by global competitions at the 2026 World Energy Congress.
- **Global Capacity Expansion:** Reports from IEA and GCCSI show a **30% annual growth** in the project pipeline, with global capture capacity on track to double by 2030 through shared industrial "hubs."
- **US 45Q Tax Credits:** The Inflation Reduction Act provides up to **$180/tonne** for CO_2 captured via Direct Air Capture, transforming carbon removal into a profitable business model and scaling DAC hubs in Texas and Louisiana.

Key Challenges of Carbon Capture and Utilisation (CCU)

- **The Energy Penalty:** Capturing CO_2 is highly energy-intensive, requiring industrial plants to divert **15–25%** of their power to run capture units, which can lead to higher overall fuel consumption.
- **Techno-Economic Gap:** High operational costs (up to **₹5,000/tonne**) make CCU-derived products like green urea or concrete struggle to compete with cheaper fossil-based alternatives.
- **Green Hydrogen Scarcity:** Production of high-value CCU products, such as **synthetic aviation fuel**, depends on an affordable and steady supply of Green Hydrogen, which remains limited.
- **Non-Permanence Issues:** Unlike deep storage, many CCU pathways (like fuels or plastics) only **delay emissions**, as the CO_2 is eventually released when the product is consumed or incinerated.
- **Infrastructure Bottlenecks:** India lacks a dedicated **national** CO_2 **pipeline network**, making the transport of compressed carbon by road or sea expensive and carbon-heavy.
- **Regulatory & Liability Gaps:** Uncertainties regarding legal responsibility for CO_2 leakage and the lack of global standards for **"Carbon-Neutral" labeling** hinder large-scale investor confidence.

Way Forward

- **Hub and Cluster Model:** Developing regional industrial clusters (e.g., Gujarat, Odisha) to share CO_2 pipeline and storage infrastructure, drastically reducing the per-tonne cost for individual factories.
- **Carbon Market Activation:** Implementing the **Indian Carbon Credit Trading Scheme (CCTS)** by October 2026 to allow companies to monetize captured carbon through tradeable certificates.
- **Viability Gap Funding (VGF):** Utilizing the **₹20,000 crore** budget to provide direct financial support for the first 10–15 commercial-scale projects to bridge the techno-economic gap.
- **High-Value Pathways:** Prioritizing utilization in **"Green Concrete"** (mineralization) and **Sustainable Aviation Fuel (SAF)** by integrating with the National Green Hydrogen Mission.
- **Policy Standardization:** Establishing a clear national framework for CO_2 transport safety, environmental standards, and long-term legal liability to encourage private investment.
- **Indigenous R&D:** Focusing on the development of low-cost, **locally-made chemical solvents** and a specialized workforce trained in carbon auditing and conversion technologies.

Conclusion

Integrating **CCUS** is vital for India's **Net-Zero 2070** goal. By 2026, shifting from pilots to **industrial clusters** will turn CO_2 into a strategic asset, ensuring sustainable, competitive, and circular economic growth.

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CURRENT AFFAIRS STRATEGY
For 2026 IAS Prelims Exam

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5:50

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