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**Topic :** India gets U.S. support in fight against terror

**Relevance :** GS Paper 2 Polity and International Relations

**Source :** The Hindu

**Context :**

Terrorism, as a transnational threat, invokes not just national security responses but also **international support systems**. The **Pahalgam terror attack** has become a catalyst for renewed India-U.S. counter-terrorism alignment. The incident underscores key theoretical frameworks in **realism, liberal institutionalism, and constructivism**, particularly in the realms of **strategic alliances, norm-building, and mutual security interests**.

### A. Realist Perspective

- **States as rational actors:** India and the U.S. prioritize national security and survival in an anarchic world system.
- **Strategic alignment:** The U.S. backing India's "right to defend itself" reflects **realist balancing behavior**, especially against non-state actors supported by rival states (here, Pakistan).
- **Power projection:** Naval exercises and NOTAMs represent classical **military signaling** to deter escalation and demonstrate readiness.

### B. Liberal Institutionalism

- Emphasizes **international cooperation** to tackle shared threats.
- India and the U.S. collaborate through platforms like:

**DEL-HYD-B'LORE-PUNE-TPT**

## India gets U.S. support in fight against terror

America stands 'in solidarity' with India and supports its 'right to defend itself', says Hegseth; Rajnath points out that Pakistan has a 'history' of supporting and training terrorist organisations

Dinakar Peri  
Suhasini Haidar  
NEW DELHI

The U.S. stands "in solidarity" with India and supports its "right to defend itself", Secretary of Defence Pete Hegseth said in a conversation with Defence Minister Rajnath Singh, while the latter said Pakistan had a "history" of supporting, training and funding terrorist organisations, the first direct reference to Pakistan by a senior minister in the aftermath of the Pahalgam terror attack.

The call between the Defence Ministers came after U.S. Secretary of State Marco Rubio spoke to External Affairs Minister S. Jaishankar and Pakistan Prime Minister Shehbaz Sharif, calling on India and

### Push for peace

Two top U.S. officials have spoken to Indian Ministers



Defence Secretary Pete Hegseth said the U.S. stands in solidarity with India and supports its right to defend itself. He reiterated the strong support of the U.S. government in India's fight against terrorism

- Rajnath Singh's office



Secretary of State Marco Rubio reaffirmed the U.S.'s commitment to cooperation with India against terrorism and urged India to work with Pakistan to de-escalate tensions

- U.S. State Department

Pakistan to "work together" to de-escalate tensions.

### Naval exercises

Meanwhile, the Indian Navy and the Pakistan Navy began simultaneous exercises in the Arabian Sea with both issuing 'Nav Area' warnings amid speculation of punitive strikes by the Indian military and

a tense situation between the two countries. On the Line of Control (LoC), there was no let-up in ceasefire violations, which have been going on for a week now.

"Secretary Hegseth said the U.S. stands in solidarity with India and supports India's right to defend itself. He reiterated the strong

support of the U.S. government in India's fight against terrorism," Mr. Singh's office said in a post on X.

"During the conversation, Mr. Singh said that Pakistan has a history of supporting, training and funding terrorist organisations. He further said that it is important for the global community to explicitly and unequivocally condemn and call out such heinous acts of terrorism," the post added.

Mr. Jaishankar wrote on his X account: "[I] Discussed the Pahalgam terrorist attack with U.S. Secretary of State Rubio." He added, "Its perpetrators, backers and planners must be brought to justice."

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- Counter-Terrorism Joint Working Group
- QUAD
- Indo-Pacific strategies
- Institutions and dialogues facilitate **information-sharing, military cooperation, and joint action.**

### C. Constructivist Approach

- Focuses on the **role of identity, norms, and discourse.**
- India frames itself as a **victim of cross-border terrorism**, invoking global norms against terrorism.
- The U.S. support reinforces India's **normative legitimacy** and marginalizes Pakistan's narrative.

## India gets U.S. support in fight against terror

The U.S. State Department readout on the call said Mr. Rubio "expressed his sorrow for the lives lost in the horrific terrorist attack in Pahalgam, and reaffirmed the United States's commitment to cooperation with India against terrorism," adding that he "encouraged India to work with Pakistan to de-escalate tensions and maintain peace and security in South Asia".

### Rubio calls for Pak. cooperation

In his call to Mr. Sharif, Mr. Rubio spoke of the "need to condemn" the Pahalgam attack, and urged Pakistani officials' "cooperation in investigating this unconscionable attack".

Mr. Rubio's note urging talks joined a number of other countries including the U.K., Saudi Arabia, Kuwait and others who have spoken at high levels in both Delhi and Islamabad, even as India prepares its next response to Pakistan over the Pahalgam attack. Meanwhile, in Islamabad, a statement from Mr. Sharif's office said the Pakistani Prime Minister had asked the U.S. to ask India to "dial down the rhetoric and act responsibly".

A day after the terror attack, U.S. President Donald Trump spoke to Prime Minister Narendra Modi during which he strongly condemned the terror attack and expressed "full support" to India to "bring to justice" the perpetrators of this heinous attack.

Since the terror attack, Pakistan issued 'Nav area' warning or NOTAMs (Notice to Airmen) for almost every day, while the Indian Navy too had carried out several missile firings. India had notified naval firing at four locations off Gujarat from April 30 to May 3, while Pakistan had notified naval drills from April 30 to May 2.

sponsored terrorism.

- Highlighted Pakistan's **historic complicity** in nurturing terrorism.

### B. U.S. Response

- Defence Secretary Pete Hegseth's remarks align with past American support during events like:
  - 2016 **Uri attack** (followed by surgical strikes)
  - 2019 **Pulwama-Balakot episode**

## India-U.S. Counter-Terrorism Cooperation

### A. Historical Background

- Post-9/11 and especially after the 2008 **Mumbai attacks**, India-U.S. cooperation in counter-terrorism deepened.
- Frameworks like the **Homeland Security Dialogue and Defense Technology and Trade Initiative (DTTI)** enhanced collaboration.

### B. Recent Developments

- The U.S. supports India's actions against Pakistan-based terror groups like **Jaish-e-Mohammed (JeM)** and **Lashkar-e-Taiba (LeT)**.
- There is growing intelligence cooperation and joint efforts in **terrorist financing surveillance**, cyber-terrorism, and border security.

## Diplomatic Dynamics Post-Pahalgam Attack

### A. India's Position

- Asserted its **right to self-defence** under Article 51 of the UN Charter.
- Demanded **international condemnation** of state-

- Secretary of State Marco Rubio's outreach reflects **diplomatic balancing**: condemning the attack while urging both India and Pakistan to avoid escalation.

## C. Pakistan's Position

- Denied involvement.
- Accused India of "rhetoric escalation" and sought U.S. intervention to temper Indian responses.

A DFI after the Pahalgam terror attack, India on Wednesday announced a slew of diplomatic measures against Pakistan, including the suspension of the Indus Waters Treaty, expulsion of Pakistani personnel from India, and closure of the Attari border post.

Officially, Islamabad has denied any involvement. But initial investigations, and more importantly, the larger geopolitical context in which the attack has taken place, leave little doubt about Pakistan's role.

### Pakistan in dire straits

Pakistan today is a country in dire straits. Consider the following facts.

■ For years, Pakistan was a key partner to the United States with regards to its objectives in Afghanistan — there could neither be war nor peace in Afghanistan without Islamabad's support. With Washington pulling out of Kabul in 2021, the leverage that Pakistan enjoyed with the Americans is mostly gone.

■ And as it faces a crippling economic crisis, the US has not stepped in to bail Pakistan out, as it had repeatedly done in the past.

■ The Gulf states too have refused to open up their coffers. There is fatigue among the Gulf states about having to repeatedly bail Pakistan out, and a sense that Islamabad has not given them much in return for doing so over the years.

■ Even China has seemingly grown impatient with Pakistan. Beijing has poured in billions of dollars to develop infrastructure in Pakistan as a part of its Belt and Road Initiative. But many of China's projects in Pakistan remain stalled today.

■ Corruption and inefficiency aside, Pakistan's inability to deliver on security promises has been responsible: in recent years, a number of Chinese engineers and project supervisors have been killed by Baloch terrorists. Although China remains Pakistan's biggest patron, the two countries' bilateral relationship is not what it used to be even in the very recent past.

■ The Taliban regime in Kabul has not been the client state Pakistan had hoped it would be. Instead, it has turned rather hostile. Regions bordering Afghanistan have witnessed a spate of attacks on both civilians and military personnel.

■ Far from providing "strategic depth" to Pakistan against India, Taliban-ruled Afghanistan has become a serious security vulnerability.

■ Pakistan's border with Iran has not been much better. Just last week, eight Pakistani migrant workers were shot dead in Iran's Sistan-Baluchistan province by a Baloch militant outfit. Last year, both countries targeted alleged "terrorist sanctuaries" on the other side of the border with missile strikes.

■ Such is the situation with its western neighbours today that some analysts would say Pakistan's border with India is its most peaceful one at the moment.



All in all, Pakistan's economy is in doldrums, its security situation is deteriorating, even as it feels more and more marginalised and isolated on the international stage.

### 'India taking advantage'

In the eyes of Islamabad, India is taking advantage of Pakistan's dire situation by isolating and marginalising it. New Delhi, in recent years, has acted as if Pakistan simply does not matter, that it is but a minor distraction for a country with ambitions of becoming a superpower.

This is perhaps most obvious with regard to India's Kashmir policy, which treats Pakistan as a non-factor that is in no position to interfere with the largely successful attempts to bring stability and prosperity to the region. Contentious as it may be, the abrogation of Article 370 on August 5, 2019, which revoked Kashmir's special status, was the strongest signal that India is looking to fully integrate the region with the rest of the country, regardless of Pakistan's oft-stated position on the matter.

■ And in recent years, there has undoubtedly been a steady improvement in the economy and daily lives of Kashmiris, who ultimately benefit from stability in the region, regardless of their personal opinion of the ruling dispensation in Delhi. That a record number of tourists from all over India have been flocking to Kashmir is the ultimate bellwether of "normalcy".

■ New Delhi has also successfully pushed the US to "de-hyphenate" its relations with India and Pakistan. That US Vice President JD Vance is currently on an official trip to India, with Pakistan being nowhere on his itinerary is proof of this fact.

■ Moreover, as India improves its ties with other Islamic countries in the Gulf, Pakistan has been little more than a silent spectator. It is noteworthy that the attack in Pahalgam took place while Prime Minister Narendra Modi was on an official visit to Saudi Arabia, a country which had been a steadfast ally to Pakistan during its wars with India, especially in 1971.

### Pakistan's desperate gambit

It is in this context that one can see a cer-

tain logic behind why Pakistan would take this rather desperate step. The terror attack in Pahalgam is essentially an attempt by Pakistan to assert that it is still a regional power which cannot simply be ignored or cast away as a non-factor, and the sense in India that "Pakistan does not matter" is misplaced.

This appears to make sense in the light of Pakistan Army Chief General Asim Munir's statements last week, in which he repeatedly invoked the logic of the "two-nation theory".

"Our religions are different, our customs are different, our traditions are different, our thoughts are different, our ambitions are different. That was the foundation of the two-nation theory that was laid there. We are two nations, we are not one nation," General Munir said at the Overseas Pakistani Convention in Islamabad on April 15.

Beyond trying to shore up support for the beleaguered Pakistani establishment, this was essentially Munir saying that Pakistan is a country with its own identity, and thus has its own place in the world, which cannot be ignored and belittled.

In his statements, Munir also invoked Kashmir, which he referred to as the "jugal vein" of Pakistan. "Our stance is absolutely clear, it was our jugal vein, it will be our jugal vein, we will not forget it. We will not leave our Kashmiri brothers in their heroic struggle," he said.

The attack in Pahalgam, can thus also be seen as an extension of Munir's statements from last week: it is not only an attempt to undermine the progress made towards "normalcy", but also a message to India that Kashmir cannot be stabilised without Pakistan as a stakeholder, and that India's policy of integration is unacceptable to Islamabad.

Note that the precise timing of the attack, with PM Modi in Saudi Arabia and US Vice President Vance in India, suggests that it is as much a message to the rest of the world, as it is to India. Pakistan wants the world to know that it is still a critical player in the region, and has the capacity and capability to cause a serious security situation with potentially global ramifications, to prevent which there is no choice but to engage with Islamabad.

And even if the world reacts negatively to Pakistan — indeed countries from around the

world have issued unequivocal condemnations of the terror attack — (Pakistan hopes) this will prompt greater engagement with it, if only as a bad actor. Amid its current international isolation, engagement of any kind would probably be received by Islamabad as a win.

### India's path forward

The first order of business for India is to analyse what went wrong. Were their lapses in the security arrangements? Were we too complacent? How can such attacks be prevented in the future so that tourists continue to travel to Kashmir without fear or trepidation?

An honest assessment is necessary to ensure that the progress Kashmir has been witnessing is not undone. And the Centre must leave aside its political differences with the National Conference, avoid a "blame-game", and make the elected government an active stakeholder in this process.

Internationally, in the immediate term, India will certainly try to ensure that Pakistan remains isolated. If Pakistan believes that terror is a way to force other countries to engage with it, India will make sure that it is not.

With regards to retaliating against Pakistan, what is most important is that no action be taken based on emotions and public sentiment.

In the medium-to-long-term, the attack should prompt India to rethink its assumption that Pakistan has been completely neutralised, and does not matter anymore. I have always believed that India has to engage with Pakistan. To completely isolate a neighbour with which it shares a 3,000 km border makes no sense. We have to continue talking to Pakistan, if only to know what it is thinking.

Moreover, New Delhi must appreciate that there is no one Pakistan. There is the Pakistani establishment, the elected government, as well as the people of Pakistan. Each constituency needs to be dealt with differently, and even if India has frayed relations with one of them, say the Army, it should continue to engage with the others.

At the end of the day, India's long-term policy vis-à-vis Pakistan and Kashmir has to be centred around the people of Kashmir, and the region's development and stabilisation. The attack must not interrupt the progress that is being made.

Shyam Saran served as India's foreign secretary from 2004-06. Based on a conversation with Arjun Sengupta

## Strategic Significance of India-U.S. Relations

### A. Defence and Security Ties

- Major Defence Partner status (2016)
- Foundational agreements: LEMOA, COMCASA, BECA
- Enhanced naval cooperation in the Indian Ocean Region (IOR) and Arabian Sea.

### B. Counter-Terrorism Synergy

- Shared intelligence, FATF-related coordination.
- Common concern over Afghanistan-Pakistan terror networks post-Taliban takeover.

## C. Regional and Global Outlook

- India and the U.S. both support a **Free, Open, and Inclusive Indo-Pacific**.
- Countering China's assertiveness and **state-sponsored terrorism** from Pakistan is part of a **broader strategic alignment**.

## International Implications

- U.S. support isolates Pakistan diplomatically.
- Global norms against terrorism gain reinforcement.
- Naval posturing in the Arabian Sea could evolve into **limited coercive diplomacy** if tensions escalate.
- Encourages India to act within the bounds of **international legitimacy** while pursuing national interests.



The U.S. support to India post-Pahalgam attack exemplifies the **convergence of strategic interests, shared democratic values, and counter-terrorism goals**. It illustrates how bilateral relations extend beyond economic or military cooperation to become **normative partnerships** in times of crisis.

This episode reaffirms the **robust nature of India-U.S. relations**, particularly in the context of terrorism and regional security, and highlights the **evolving role of global powers in responding to asymmetric threats** like terrorism.

## Bring Pahalgam attack sponsors to justice: UNSC

China, Pakistan join rest of the Security Council members in condemning the terror strike in the 'strongest terms'; Pakistan PM Shehbaz Sharif says his govt. is ready for a neutral investigation

Kallol Bhattacharjee  
NEW DELHI

The United Nations Security Council (UNSC) on Saturday condemned in the "strongest terms" the April 22 terror strike at Pahalgam in Jammu and Kashmir.

The remarks from the top grouping of the UN came even as various heads of governments and states continued to call Prime Minister Narendra Modi conveying condolences on the attack that killed 26, including a Nepali citizen. "The members of the Security Council expressed their deepest sympathy and condolences to the families of the victims and to the Government of India and Government of Nepal," said a statement from the 15-member council. It also stressed the need



Shattered Valley: A CRPF jawan patrolling the banks of Dal Lake in Srinagar on Saturday. (IRAN NEISSAR)

to bring the perpetrators and sponsors to justice.

China and Pakistan too joined the rest of the UNSC in condemning the attack. China is a permanent member of the UNSC, while Pakistan is a non-permanent member.

India has alleged that the terror suspects had "cross-border support". Foreign Secretary Vikram

Misri had briefed G-20 envoys about "cross-border linkages", hinting at the involvement of Pakistan-based elements.

Separately, Pakistan Prime Minister Shehbaz Sharif said his government is open to a neutral investigation into the attack.

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More houses razed, several detained amid tension at LoC

Peerzada Ashiq  
SRINAGAR

The crackdown in J&K in the wake of the Pahalgam terror attack continued on Saturday as at least five more houses of alleged active militants were razed. Seven houses have been demolished so far. Over 100 residences of supporters were raided and hundreds were detained. Skirmishes by Pakistan Army posts along the Line of Control continued for the second day.

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### Bring Pahalgam attack sponsors to justice: UNSC

The Security Council further "underlined the need to hold perpetrators, organisers, financiers and sponsors of this reprehensible act of terrorism accountable and bring them to justice."

The UNSC called upon "all states" to "cooperate actively" with the Indian authorities to bring the perpetrators of the crime to justice.

"The members of the Security Council reaffirmed that terrorism in all its forms and manifestations constitutes one of the most serious threats to international peace and security," the UNSC said.

### Prelims Practice Question

**Q. With reference to India–United States relations in the context of counter-terrorism, consider the following statements:**

1. The United States has officially supported India's right to self-defence under international law in the aftermath of major terror attacks.
2. India and the U.S. conduct joint naval exercises only under the framework of the QUAD grouping.
3. The U.S. designation of India as a "Major Defence Partner" enhances cooperation in areas including intelligence sharing and counter-terrorism operations.

**Which of the statements given above is/are correct?**

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2 and 3

**Answer: C. 1 and 3 only**

**Explanation:**

- **Statement 1: Correct**

The U.S. has supported India's right to defend itself, as seen post-Pulwama (2019) and Pahalgam (2025) attacks, aligning with Article 51 of the UN Charter (right to self-defence).

- **Statement 2: Incorrect**

While India and the U.S. conduct joint naval exercises like **Malabar**, they are **not limited to the QUAD framework**. Bilateral and trilateral formats exist as well.

- **Statement 3: Correct**

India was designated a **Major Defence Partner** in 2016, which paved the way for enhanced strategic and intelligence cooperation, especially in areas like counter-terrorism.

### Mains Model Question

**Q. Discuss how the United States' support to India in the aftermath of the Pahalgam terror attack reflects the evolving nature of India-U.S. strategic partnership in the fight against terrorism.**

The United States' unequivocal support to India following the Pahalgam terror attack marks a significant moment in the deepening of the India-U.S. strategic partnership, especially in the realm of counter-terrorism. The endorsement of India's right to self-defence by U.S. Defence Secretary Pete Hegseth and the condemnation of the attack by Secretary of State Marco Rubio demonstrate not only diplomatic solidarity but also a shared recognition of terrorism as a global threat requiring coordinated response. Historically, India and the U.S. have witnessed a gradual transformation in bilateral ties from a transactional relationship to a more value-based strategic alliance. This evolution has been particularly visible in the wake of terror incidents like the 2008 Mumbai attacks and the 2019 Pulwama bombing, where U.S. support helped India gain international legitimacy for its counter-terror operations.

The recent exchange further signifies that the U.S. now acknowledges India's security concerns with greater sensitivity, particularly regarding Pakistan's alleged role in supporting cross-border terrorism. While the U.S. continues to urge restraint and dialogue between India and Pakistan, its increasing emphasis on holding perpetrators and their backers accountable marks a shift from neutrality to principled support. This shift is bolstered by foundational defence agreements, increased intelligence-sharing mechanisms, and joint military exercises like Malabar.

Furthermore, such developments strengthen India's case in global forums against terrorism and bolster bilateral mechanisms for surveillance, cyber security, and counter-radicalisation. The strategic message is clear: India and the U.S. are willing partners in a rules-based international order where terrorism is not just condemned rhetorically but addressed through active cooperation. Thus, the Pahalgam episode reinforces the geopolitical maturity of the India-U.S. partnership and its centrality in ensuring regional and global security.

**Topic :** GST Mop-up at Record High of ₹2.37 Lakh Crore in April

**Relevance :** GS Paper 3 Economy

**Source :** Indian Express

**Context :**

India's **Goods and Services Tax (GST)** revenue reached a historic high of **₹2.37 lakh crore in April 2025**, registering a **12.6% year-on-year growth**, signalling robust economic momentum and increased tax compliance. This marks the highest-ever monthly GST collection since the tax's implementation on **July 1, 2017**. The previous highest was ₹2.10 lakh crore in April 2024, and ₹1.96 lakh crore in March 2025, reflecting both sustained economic activity and the year-end financial closing process by businesses.

**Out of the total ₹2.37 lakh crore:**

- **Domestic transactions (including services and manufacturing)** contributed about **₹1.9 lakh crore**, a **10.7% increase** from last year.
- **Imports added ₹46,913 crore**, reflecting a **20.8% jump**, indicating robust trade inflow and customs collections.
- **Refunds issued rose significantly by 48.3% to ₹27,341 crore**, which when adjusted brought **net GST revenue to ₹2.09 lakh crore** — a **9.1% increase** from last year.

GST collections were **consistently strong across all major States**, with growth ranging from **11% to 16%**, showcasing the tax system's expanding base and improved enforcement.

**Break-up of April 2025 GST Revenue:**

- **Central GST (CGST): ₹48,634 crore**
- **State GST (SGST): ₹59,372 crore**
- **Integrated GST (IGST): ₹69,504 crore**
- **Cess: ₹12,293 crore**

## GST mop-up at record high of ₹2.37 lakh crore in April

**Press Trust of India**  
NEW DELHI

Goods and Services Tax collection rose 12.6% year-on-year to an all-time high of about ₹2.37 lakh crore in April, reflecting strong economic activity and March-end reconciliation of books by businesses.

The GST mop-up was ₹2.10 lakh crore in April 2024 – the second highest ever since GST was rolled out on July 1, 2017. In March 2025, the collection was ₹1.96 lakh crore.

As per the government data released on Thursday, GST revenue from domestic transactions rose 10.7% to about ₹1.9 lakh crore, while revenue from imported goods was up 20.8% to ₹46,913 crore.

Refunds issuance rose 48.3% to ₹27,341 crore during April. After adjusting refunds, net GST collection rose 9.1% to over ₹2.09 lakh crore in April.

Deloitte India Partner M.S. Mani said the net GST



collections crossing ₹2 lakh crore in the first month of the current fiscal year indicates a strong economic performance in the last month of the previous fiscal year.

### Uniformly high

The GST collections during the month have been uniformly high in all the major producing/consuming States and have been in the range of 11% to 16%.

Central GST collection

from domestic transactions stood at ₹48,634 crore in April, while state GST mop-up was ₹59,372 crore. Integrated GST and cess collection were ₹69,504 crore and ₹12,293 crore, respectively, from domestic transactions.

EY Tax Partner Saurabh Agarwal said the record GST collections underscore the Indian economy's underlying strength in the face of global economic uncertainties.

## Understanding GST and Its Significance

**GST** is a **comprehensive indirect tax** levied on the supply of goods and services across India, replacing a complex web of central and state taxes like excise, VAT, service tax, and more. It is structured as a **dual GST model** — levied concurrently by the **Centre (CGST)** and **States (SGST)** on intra-state transactions, and **IGST** on inter-state trade.

Introduced in **2017**, GST aimed to:

- **Simplify the indirect tax system**
- **Broaden the tax base**
- **Enhance compliance**
- **Create a unified national market**

## GST's Role in Indian Economic Growth:

### • Formalization of the Economy:

GST has incentivized businesses to formalize, especially MSMEs, by integrating them into a digital tax system. E-invoicing and digital returns improve traceability and reduce tax evasion.

### • Increased Tax Buoyancy:

The record revenue reflects both improved compliance and expanding economic activity. More businesses are registered, and automated tracking (e.g., e-way bills, invoice matching) enhances enforcement.

### • Boost to Cooperative Federalism:

GST is administered by both Centre and States through the **GST Council**, a unique constitutional body ensuring consensus-based decision-making.

### • Efficient Logistics and Trade:

By removing state-border taxes and check-posts, GST has cut logistics costs, improved supply chains, and boosted ease of doing business.

### • Economic Resilience:

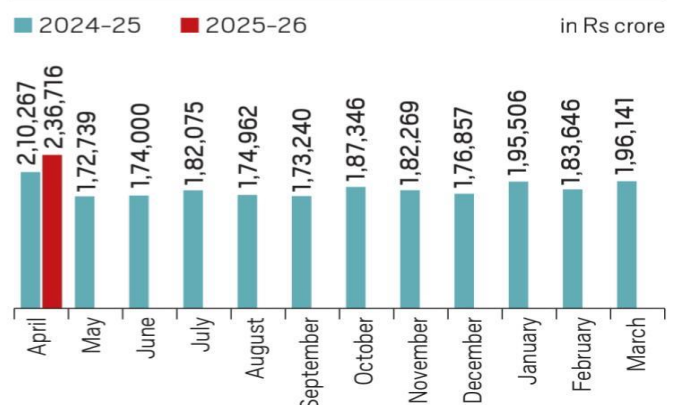
The steady increase in GST collections, despite global uncertainties, underscores India's strong domestic demand and resilience, supported by infrastructure growth, consumption, and manufacturing.

### • Better Fiscal Health:

Higher GST revenue improves the Centre and State governments' fiscal capacity, enabling better delivery of public goods and welfare programs.



## GROSS GST COLLECTIONS



Source: GSTN



The record GST collection in April 2025 reflects more than just an administrative milestone — it signals a maturing tax regime, deepening formalization, and robust economic performance. As GST stabilizes further with improved technology and compliance, it continues to be a cornerstone in India's journey towards a transparent, efficient, and growth-oriented economic system.

**Prelims Practice Question:**

**Q.** With reference to the Goods and Services Tax (GST) in India, consider the following statements:

1. GST is a destination-based tax levied only by the Central Government.
2. Integrated GST (IGST) is applicable on inter-state supply of goods and services and imports.
3. GST revenues are shared between the Centre and the States in a pre-decided ratio for all components.
4. A record GST collection of over ₹2.3 lakh crore in April 2025 indicates increased compliance and strong economic activity.

Which of the above statements is/are correct?

- A. 2 and 4 only  
B. 1, 2 and 3 only  
C. 3 and 4 only  
D. 1 and 4 only

**Correct Answer: A. 2 and 4 only**

**Explanation:**

- **Statement 1 is incorrect:** GST is a **dual levy**, imposed by both the **Central and State Governments** (CGST and SGST), not just by the Centre.
- **Statement 2 is correct:** IGST is indeed levied on **inter-state supplies and imports**.
- **Statement 3 is incorrect:** GST revenues from **CGST and SGST are retained separately** by the Centre and States. **IGST is apportioned** between them based on consumption.
- **Statement 4 is correct:** The record mop-up in April 2025 reflects **strong economic performance and improved tax compliance**.

**Mains Model Question:**

**Q.** The record Goods and Services Tax (GST) collections in April 2025 reflect not just economic momentum but also a maturing indirect tax regime in India. Discuss the significance of GST in India's economic growth.



The record GST collection of ₹2.37 lakh crore in April 2025 marks a significant milestone in India's indirect tax evolution. It reflects the resilience and robustness of the Indian economy amid global uncertainties and the successful institutionalization of a comprehensive tax reform. GST, implemented in 2017, subsumed a multitude of central and state taxes into a single unified tax system, aiming to simplify compliance, eliminate cascading effects, and formalize economic activity across the country.

**“... The figures showcase the resilience of the Indian economy and the effectiveness of cooperative federalism. Deepest gratitude to the taxpayers whose contributions and faith in the GST architecture drive the nation's progress ...”**  
— NIRMALA SITHARAMAN  
FINANCE MINISTER

This historic revenue achievement indicates a combination of factors at play—strong consumption, year-end financial reconciliation by businesses, and increased tax compliance. It also points towards effective use of digital tools such as e-invoicing, e-way bills, and real-time data integration which have curtailed evasion and improved enforcement. The performance is also uniformly high across major states, suggesting that both production and consumption bases have broadened, aligning with the core principle of GST as a destination-based tax.

Moreover, the buoyancy in GST revenue strengthens fiscal federalism by providing a steady stream of revenue to both the Centre and States. It has helped improve logistics efficiency by removing inter-state barriers and check-posts, thereby fostering ease of doing business. For investors and enterprises, GST offers a transparent and predictable tax framework which is essential for long-term planning.

This record collection demonstrates that GST is no longer in its infancy. Instead, it is evolving into a stable and effective mechanism for resource mobilization. It has not only enhanced India's revenue capacity but also contributed to formalizing the informal economy, encouraging digital compliance, and reinforcing fiscal consolidation. Therefore, GST continues to be a cornerstone in India's journey toward a more integrated, efficient, and growth-oriented economic model.

**Topic :** U.S. Gains Access to Ukraine's Minerals

**Relevance :** GS Paper 3 Environment and Ecology

**Source :** The Hindu

**Context :**

The recently signed agreement between the United States and Ukraine, establishing the *United States–Ukraine Reinvestment Fund*, marks a significant geopolitical and economic development. At its core, this deal offers the U.S. privileged access to Ukraine's rich deposits of rare earth and critical minerals. In return, it provides Ukraine with continued military and economic support amid its ongoing war with Russia and post-war reconstruction plans.

**Why is this deal necessary?**

- **Strategic Security Context:**

Ukraine is fighting a prolonged war against Russia. While NATO and EU support has continued, U.S. backing remains indispensable. However, with concerns that the Trump administration may limit or reshape future aid, Ukraine sees this deal as a strategic guarantee of continued engagement. It provides Washington with material incentives to stay involved, beyond just military concerns.

- **Economic Reconstruction of Ukraine:**

Ukraine's infrastructure and industrial sectors have been devastated. This agreement channels American investment through a reinvestment fund aimed at rebuilding critical industries, attracting global investors, and rejuvenating Ukraine's war-hit economy. It is both an economic and diplomatic lifeline.

- **U.S. Supply Chain Security:**

The U.S. is actively seeking to diversify its supply chains for critical minerals, especially to reduce dependency on China. The Russia-Ukraine war, COVID-era supply disruptions, and energy security challenges have accelerated this shift. Ukraine presents a non-hostile, resource-rich partner aligned with Western interests.

## U.S. gains access to Ukraine's minerals

**Associated Press**  
WASHINGTON

The U.S. and Ukraine on Wednesday signed an agreement granting American access to Ukraine's vast mineral resources, finalising a deal months in the making that could enable continued military aid to Kyiv. The development comes amid concerns that President Donald Trump might scale back support in ongoing peace negotiations with Russia.

The two sides offered only the bare bones about the structure of the deal, which they called the United States-Ukraine Reinvestment Fund.

But it is expected to give the U.S. access to Ukraine's valuable rare earth minerals while providing Kyiv a measure of assurance about continued American



U.S. Treasury Secretary Scott Bessent (left) with Ukraine's Deputy Prime Minister Yulia Svyrydenko. AFP

support in its grinding war with Russia.

### 'Commitment to peace'

"This agreement signals clearly to Russia that the Trump administration is committed to a peace process centered on a free, so-

vereign, and prosperous Ukraine over the long term," Treasury Secretary Scott Bessent said in a statement.

"President Trump envisioned this partnership between the American people and the Ukrainian pe-

ople to show both sides' commitment to lasting peace and prosperity in Ukraine."

### Oval office meeting

The signing comes two months after a different but similar agreement was nearly signed before being derailed in a tense Oval Office meeting involving President Donald Trump, Vice-President J.D. Vance and Ukrainian President Volodymyr Zelenskyy.

Mr. Trump said on Wednesday night that the deal, "in theory," means that the U.S. will get more from Ukraine than it contributed.

"I wanted to be protected," he said, adding that he didn't want to look "foolish" by not getting money back for the investment.

**CONTINUED ON**  
» PAGE 12

**What are these minerals and why are they important?**

Ukraine possesses over 20 raw materials classified by the U.S. as “strategically critical.” These include:

- **Titanium:** Essential for aerospace components, such as aircraft wings and jet engines. The U.S. defense and aviation industries rely heavily on titanium.
- **Lithium:** Crucial for EV batteries and energy storage systems.
- **Cobalt and Nickel:** Vital in battery technology and high-performance alloys.
- **Rare Earth Elements (REEs):** Used in electronics, green technologies (like wind turbines), and military hardware.
- **Graphite and Manganese:** Important for battery anodes and high-strength steel.
- **Uranium:** Ukraine has significant uranium resources, essential for nuclear energy.
- **Natural Gas and Oil:** Ukraine also holds potential in conventional energy resources, which adds to the strategic calculus.

**U.S. gains access to Ukraine's minerals**

For Ukraine, the agreement is seen as key to ensuring its access to future U.S. military aid.

“Truly, this is a strategic deal for the creation of an investment partner fund,” said Prime Minister Denys Shmyhal. “This is truly an equal and good international deal on joint investment in the development and restoration of Ukraine between the governments of the United States and Ukraine.”

Ukraine's Economy Minister, Yulia Svyrydenko, flew to Washington on Wednesday to help finalise the deal. “Together with the United States, we are creating the Fund that will attract global investment to our country,” she wrote in a social media post after the signing.

The U.S. has been seeking access to more than 20 raw materials deemed strategically critical to its interests, including some non-minerals such as oil and natural gas. Among them are Ukraine's deposits of titanium, which is used for making aircraft wings and other aerospace manufacturing.

**Prospects and Implications**

- **Geopolitical Alignment:**  
This deal is a clear message to Moscow that U.S.-Ukraine ties remain strong. It anchors American interests in Ukraine's recovery and deters future aggression through economic interdependence.
- **Resource Security for the U.S.:**  
By gaining direct access to Ukrainian minerals, the U.S. can secure alternative sources for critical materials, insulating itself from the strategic monopoly of China over global rare earth supply chains.
- **Post-War Investment Model:**  
The reinvestment fund serves as a template for post-war reconstruction, involving joint development, mining partnerships, and infrastructure rebuilding. It could attract not just American, but broader Western private capital.
- **Economic Sovereignty for Ukraine:**  
By partnering with the U.S., Ukraine ensures it does not fall into exploitative relationships. The emphasis on “equal and good” international cooperation underlines Kyiv's aim for a fair and transparent post-war economy.
- **Technological and Industrial Synergy:**  
Ukraine's mineral wealth can complement U.S. technological know-how and industrial needs, potentially establishing a long-term innovation and manufacturing partnership.

The U.S.-Ukraine mineral access deal is not just a transactional agreement—it is a strategic compact that ties together economic reconstruction, resource security, geopolitical alignment, and industrial policy. It represents a model where national interest, diplomatic assurance, and global market needs converge, setting a precedent for future post-conflict partnerships.

**Prelims Practice Question:**

*Q. With reference to the recent U.S.-Ukraine mineral agreement, consider the following statements:*

1. The agreement grants the U.S. exclusive rights to extract and export rare earth minerals from Ukraine.
2. Titanium, a key mineral in the deal, is used extensively in the aerospace industry.
3. The agreement is part of a broader U.S. effort to diversify critical mineral supply chains away from China.

*Which of the statements given above is/are correct?*

- A. 1 and 2 only  
B. 2 and 3 only  
C. 1 and 3 only  
D. 1, 2 and 3

**Answer: B. 2 and 3 only**

**Explanation:**

- Statement 1 is incorrect: The agreement enables U.S. access and investment but does not mention exclusive extraction rights.
- Statement 2 is correct: Titanium is used in aircraft and aerospace components.
- Statement 3 is correct: The U.S. seeks to reduce reliance on China for critical minerals, and Ukraine's resources fit into this strategy.

**Mains Model Question:**

**Q. Discuss the strategic significance of the recent U.S.-Ukraine agreement on mineral access. How does it reflect evolving geopolitical interests and resource security considerations in global politics?**

The U.S.-Ukraine mineral access agreement marks a significant strategic development in contemporary geopolitics, intertwining economic interest with security imperatives. As the war in Ukraine persists, the United States has been exploring sustainable mechanisms to support Kyiv while also securing long-term strategic gains. The newly signed agreement establishes the United States-Ukraine Reinvestment Fund, which is expected to provide the U.S. access to Ukraine's rich reserves of critical minerals, notably titanium and rare earth elements. These resources are indispensable to key industries such as defense, aerospace, electronics, and renewable energy, and the deal aims to diversify America's supply chain away from China's dominance.



Ukraine's mineral wealth, including over 20 types of raw materials classified as strategically important, has long been underutilized due to geopolitical instability. For Kyiv, this partnership not only brings investment but also solidifies continued U.S. support, especially in the form of military aid. For Washington, the deal enhances energy and resource security at a time when securing access to critical inputs has become vital for national resilience. This agreement also sends a strong diplomatic message to Moscow that U.S. backing for Ukrainian sovereignty is not just military but also economic and strategic.

COMPLIES WITH KYIV'S EU BID, SAYS MINISTER; KREMLIN SILENT ON DEAL

## Ukraine, US ink minerals deal sought by Trump, set up fund for reconstruction

TOM BALFORTH,  
TULIA DYSA  
& TREVOR HUNNICUTT  
KYIV, WASHINGTON, MAY 1

UKRAINE AND the U.S. on Wednesday signed a deal heavily promoted by U.S. President Donald Trump that will give the United States preferential access to new Ukrainian minerals deals and fund investment in Ukraine's reconstruction.

The two countries signed the accord in Washington after months of sometimes fraught negotiations, with uncertainty persisting until the last moment with word of an eleven-hour saga.

The Kremlin was silent on Wednesday's agreement, but former President Dmitry Medvedev said in a tweet that "Russia's policy is to ensure a peaceful settlement in Ukraine. The agreement is central to Kyiv's efforts to meet ties with Trump. Ukrainian officials have hoped that the deal would ensure continued U.S. support.

U.S. Treasury Secretary Scott Bessent and Ukrainian First Deputy Prime Minister Yulia Svyrydenko were shown signing the agreement in a photo posted on X by the Treasury, which said the deal had "solidly signed the Trump



The photo shared by Ukraine's Emergency Service shows the site of the Russian drone strike in Odesa, Ukraine. (Reuters)

Administration's commitment to a free, sovereign, prosperous Ukraine," Svyrydenko wrote on X that the accord provides for Washington to contribute to the fund. "In addition to direct financial contributions, it may also provide NEW assistance - for example air defense systems for Ukraine," she said. Washington did not directly address that suggestion. The US has been Ukraine's single largest military donor since Russia's 2022 invasion with aid more than \$72 billion.

In announcing the deal, the US Treasury said the partnership recognized "the significant financial and material support that the people of the United States have provided to the defense of Ukraine since Russia's

full-scale invasion." Svyrydenko said the accord allowed Ukraine to "determine what and where to extract" and that its subsoil remains owned by Ukraine. Ukraine is rich in natural resources including rare earth metals which are used in electronics, electric vehicles and military applications.

Ukraine also has large reserves of iron, uranium and natural gas. Svyrydenko said Ukraine has no debt obligations to the United States under the agreement, a key point in the lengthy negotiations. The deal also, she said, complied with Ukraine's constitution and Ukraine's campaign to join the European Union, key elements in Ukraine's negotiating position. (Reuters)

## US reaches out to start tariff talks, say Chinese state media

Secy: Intellectual property theft to be discussed

JOE CASH  
& DAVID LAWDER  
BEIJING, WASHINGTON, MAY 1

THE UNITED STATES has approached China seeking talks over President Donald Trump's 145% tariffs, a social media account affiliated with Chinese state media said on Thursday, potentially signalling Beijing's openness to negotiations.

The U.S. has proactively reached out to China through multiple channels, hoping to hold discussions on the tariff issue," Xinhua said in a post published on its official Weibo social media account, citing anonymous sources.

US officials, including Treasury Secretary Scott Bessent and White House economic adviser Kevin Hassett, also expressed hope for progress in easing trade tensions. Hassett told CNBC that there have

been "broad discussions" all over both governments' about the tariff and China's voicing of duties on some US goods last week was a sign of progress.

Beijing has made little effort to contain its anger at the tariffs, which it says are tantamount to bullying and cannot stop its rise. Instead, it has directed its fury at rallying public and global condemnation of the import curbs - showing no interest in a reprieve. That said, alongside the ongoing propaganda machine to be back at the duties, China has quietly created a list of US-made products it will exempt from its regulatory 125% tariffs, Reuters has reported.

Bessent mentioned no specific talks during the business network interview, but said that high tariffs of 145% on the US side and 125% on the Chinese side needed to be de-escalated for negotiations to begin. Bessent also said that "visionary" non-tariff trade barriers and intellectual property theft also would be part of negotiations over tariffs with China. (Reuters)

By fostering investment-led partnerships rather than merely providing aid, the U.S. is also signaling a shift toward transactional but mutually beneficial diplomacy. This reflects a broader global trend where strategic resource security and alliances are increasingly framed through economic cooperation and access agreements. In the context of the broader U.S.-Russia and U.S.-China rivalries, such moves bolster American influence in Eastern Europe and set the foundation for Ukraine's post-war reconstruction through foreign capital and technological collaboration. Hence, this agreement is not merely about mineral access but symbolizes the intertwining of security, diplomacy, and economic statecraft in 21st-century geopolitics.

EXPLAINED | POLICY

## The next Census

The much-delayed Census could be held soon. The Census findings will be crucial in shaping the future delimitation exercise as well as reservation of Parliamentary seats for women

AMITADHI SINHA  
NEW DELHI, MAY 1, 2025

THE CENSUS, it seems, is finally preparing to conduct the Census which could not carry out in 2021 because of the Covid-19 pandemic. Though an official announcement is yet to be made, sources have indicated that the Census is likely to be held in 2025.

This Census is linked to two other important outcomes - the delimitation of Parliamentary constituencies, which has been on hold for the last five decades, and the implementation of women's reservation in Panchayats.

The Census is also linked to the state's economic growth. The Census is expected to be held in 2025, and that could have a significant impact on the state's economic growth. The Census is expected to be held in 2025, and that could have a significant impact on the state's economic growth.



Census department officials taking a count of the homeless people in Chandigarh as part of the 2011 exercise. (IANS)

Once in a decade

The Census has happened in the first year of every decade since 1951. The Census is expected to be held in 2025, and that could have a significant impact on the state's economic growth.

Schedule for delimitation

The Census is expected to be held in 2025, and that could have a significant impact on the state's economic growth.

The recommendations of the 10th Finance Commission might be a trade-off between the Finance Commission, already constituted every five years, recommends the delimitation of financial resources between the Centre and states. The 10th Finance Commission is expected to submit its report by the end of May.

Further, the Parliament approved the 10th Finance Commission in 2022, and it is expected to be implemented in 2025. The 10th Finance Commission is expected to submit its report by the end of May.

Caste Census demand

The Census is expected to be held in 2025, and that could have a significant impact on the state's economic growth.

There is also an expectation that the population of India as of midnight on March 1st of the Census year. The Census is expected to be held in 2025, and that could have a significant impact on the state's economic growth.

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**Topic :** Census, Delimitation, and Their Constitutional Significance

**Relevance :** GS Paper 2 Polity and Governance

**Source :** Hindustan Times

**Context :**

The **Census of India** is a comprehensive exercise conducted every 10 years, providing crucial data for policy-making, resource allocation, and governance. The upcoming **Census in 2026** will be significant for several reasons, including the alignment with the

**Delimitation of Constituencies** process, a constitutional requirement. This article explains the role of the Census, the significance of the upcoming caste enumeration, and the impact on electoral representation.

## The Census Process in India:

### What is the Census?

The Census is the most extensive demographic exercise in India, typically held every decade. The **Census of 2011** was the last one, and the **2021 Census** was delayed. The exercise spans two phases:

- House Listing and Housing Schedule
- Population Enumeration (11-month process)

### Significance:

The data gathered helps the government plan socio-economic policies, allocate resources, and identify developmental priorities.

## The Importance of Caste Enumeration:

### A Long-Standing Demand:

While caste data has been gathered in special surveys like the **Socio-Economic and Caste Census (2011)**, it was never a part of the regular Census. The Union Minister's recent announcement to include **caste enumeration** is a significant step forward.

### Why is Caste Enumeration Necessary?

- Helps design targeted policies for social justice and welfare.
- Assists in ensuring effective **reservation policies** for SCs, STs, and OBCs.
- Offers insights into **socio-economic disparities** that need urgent attention.

## Delimitation and Its Constitutional Importance:

### What is Delimitation?

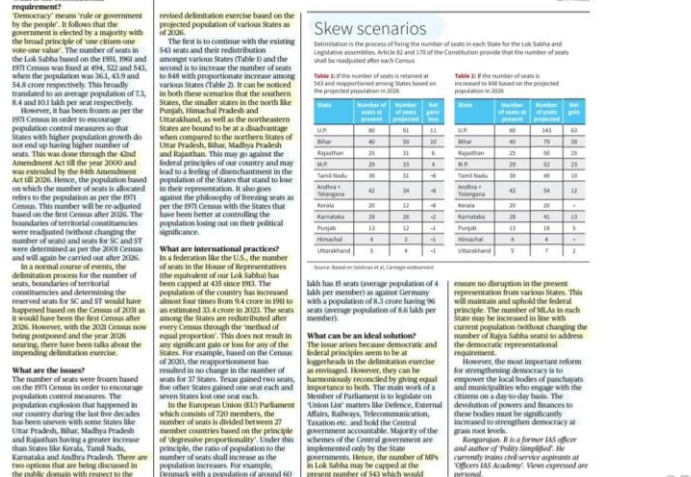
Delimitation refers to the redrawing of the boundaries of electoral constituencies based on population data to ensure **equitable political representation**.

### Link to Census:

According to the **84th Constitutional Amendment Act (2001)**, constituency boundaries are redrawn after every Census, and the most recent boundaries

## Understanding the delimitation exercise

What does delimitation mean and what are the constitutional provisions which deal with it? Why were the seats from a per the 87th Census? Will the fresh exercise go against the federal principle, giving an advantage to certain States over others?





were drawn based on the **1971 Census**. The **2026 Census** will be the basis for the next **Delimitation** exercise.

### • Why Is Delimitation Needed?

To ensure that constituencies reflect the current population dynamics, maintaining the principle of "**one person, one vote**."

### Constitutional Framework:

#### • Census Act (1948):

Governs the process of the Census, though it does not currently include provisions for caste enumeration, which is being addressed through an amendment.

#### • Representation of the People Act (1950):

Guides the **Delimitation** process. The **Delimitation Commission** draws the boundaries for Lok Sabha and Assembly constituencies.

### Why the 2026 Census is Crucial:

#### • Constitutional Requirement:

The **84th Constitutional Amendment** mandates that the delimitation exercise must be based on the **2026 Census**, which will provide the most accurate and current demographic data for redrawing electoral boundaries.

#### • Ensuring Fair Representation:

The alignment of **Census and Delimitation** ensures that constituencies are redrawn to reflect the population accurately, ensuring fair and proportional political representation.

### Political Implications of Caste Enumeration:

#### • The inclusion of **caste data** is a politically sensitive move. It aims to:

- Address historical **inequalities** by providing data that can guide affirmative action policies.
- Enable better **targeting of welfare schemes** to those who need it the most.

The government has emphasized that **Muslim community** caste data will also be included, marking a departure from previous policies.

The alignment of the **Census (2026)** with the **Delimitation** process is a key step in ensuring **fair representation** in India's democracy. The decision to include **caste enumeration** in the Census could

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## Census next year, then delimitation: Plan for 2029 polls in new seats

LIZ MATHEW  
NEW DELHI, OCTOBER 28

THE GOVERNMENT is set to conduct the much-delayed Census next year, and to complete the process by 2026, with suggestions being taken on whether caste enumeration can be part of the exercise, as per sources.

Following the completion of the Census, the government will go ahead with delimitation, for redrafting of parliamentary

CONTINUED ON PAGE 2

**EXPLAINED**  
**Dilemma over seats**

TO TAKE care of the South's delimitation concerns, the government is considering tweaking the population-areas formula. For caste count, progress is still to be made on a workable solution.

EXPLAINED, PAGE 18

**EXPLAINED POLITICS**

## Political issue of delimitation

Delimitation of constituencies, on which the fate of the women's quota depends, is an old, highly sensitive issue. Why is there a fear that the South may suffer? What political gains does the Govt hope to make?

AMITABH SINHA &  
DEEPTIMAN TIWARY  
NEW DELHI, SEPTEMBER 26

THE WOMEN'S Reservation Bill, providing 33 per cent quota to women in Lok Sabha and state Assemblies, was swiftly passed by both Houses of Parliament last week, but it is far from being a simple exercise. It is a complex one, because of its dependence on the delimitation exercise.

Opposition parties have repeatedly slammed the government for linking the implementation of women's reservation with delimitation, claiming there was no reason or requirement to connect the two. Indeed, the last time the women's reservation Bill was discussed in Parliament, there was no such linkage.

By making the women's reservation contingent on delimitation, the government seems to be aiming for several objectives. The delimitation exercise will increase the number of both Lok Sabha and Assembly constituencies. In that scenario, reservation of one third of seats for women is likely to leave the current number of male legislators largely undisturbed. This could mean greater acceptability of women's reservation within the political class.

But a much bigger objective seems to be an attempt to force the hands of the Opposition parties, mainly those from south India, on the delimitation exercise.

Delimitation is a Constitutional mandate, to be carried out after every Census, to readjust the number of seats and their boundaries on the basis of latest population data. But the number of seats for the Lok Sabha and state Assemblies has remained frozen for the last 50 years, because of opposition from political parties from the South. And there is no inclination among them to allow delimitation even now, mainly because any such exercise would result in Lok Sabha seats in north Indian states increasing much more sharply, as the population rise here has been greater. And if this happens, the BJP stands to gain the most.

#### Reservation in a larger pie

One of the reasons women's reservation did not become a reality in the last 35 years was the fear among male politicians of having to let go of their seats. A 33 per cent reservation in the current 545-member Lok Sabha would mean 182 seats being kept for women. Only 363 seats would be available for men. The current Lok Sabha has 467 men. But delimitation could preserve the political fortunes of the current group of male politicians.

If, as a result of the delimitation exercise, the strength of the Lok Sabha increases to 770, as some calculations suggest, 257 seats would be reserved for women, and the remaining 513 could be available for men to contest. This would mean that political parties would have to deal with much lesser

#### POPULATION-SEAT RATIO BROADLY EQUITABLE ACROSS INDIA

State	1961 population	1971 population	1981 population	1991 population	2001 population	2011 population
UP	7,01,43,635	85	8,25,219	8,38,48,797	85	9,86,456
Bihar	3,48,40,968	53	6,57,377	4,21,26,236	54	7,80,115
Rajasthan	2,01,55,002	23	8,76,331	2,57,65,806	25	10,30,632
Tamil Nadu	3,36,86,952	39	8,63,768	4,11,99,168	39	10,36,389
Kerala	1,69,03,715	19	8,89,669	2,13,47,375	20	10,67,369
India	43,92,34,771	520	8,44,682	54,81,59,652	542	10,11,365

#### PROJECTED 2025 POPULATION, SEATS AT MULTIPLE RATIOS

States	Current seats	2025 projected population (in thousands)	Seats at the same ratio as last time (10:1 lakh)	Seats at 15 lakh ratio	Seats at 20 lakh ratio
UP	85	2,52,342	250	168	126
Bihar	54	1,70,990	169	114	85
Rajasthan	25	82,770	82	55	41
Tamil Nadu	39	77,317	76	52	39
Kerala	20	36,063	36	24	18
India	545	14,13,324	1,397	942	707

#### ELECTORAL PERFORMANCE OF TOP TWO PARTIES IN A STATE

States	2014	2019	2024	2029	2034	2039
UP (85)	INC: 54 BJP: 31	INC: 51 BJP: 34	INC: 52 BJP: 33	INC: 53 BJP: 32	INC: 54 BJP: 31	INC: 55 BJP: 30
Bihar (54)	INC: 32 BJP: 22	INC: 31 BJP: 23	INC: 32 BJP: 22	INC: 33 BJP: 21	INC: 34 BJP: 20	INC: 35 BJP: 19
Rajasthan (25)	INC: 13 BJP: 12	INC: 13 BJP: 12	INC: 13 BJP: 12	INC: 14 BJP: 11	INC: 15 BJP: 10	INC: 16 BJP: 9
Kerala (20)	INC: 14 CPI(M): 6	INC: 13 CPI(M): 7	INC: 13 CPI(M): 7	INC: 14 CPI(M): 6	INC: 15 CPI(M): 5	INC: 16 CPI(M): 4
Tamil Nadu (39)	INC: 27 DMK: 12	INC: 28 DMK: 11	INC: 29 DMK: 10	INC: 30 DMK: 9	INC: 31 DMK: 8	INC: 32 DMK: 7

UP & Bihar include Uttarakhand & Jharkhand respectively. Seats, elections, projected ratios shown randomly. Number of seats in Columns 4, 5, 6 of Table 2 are projections only. Data: EC and Census

complications in accommodating the political interests of their male leaders.

#### Checkmate Opposition

But the bigger design of the government is not lost on the Opposition parties. As one Opposition leader told The Indian Express, the attempt clearly is to make the delimitation exercise a foregone conclusion.

"Delimitation is a contentious issue. But now, a resistance to the delimitation exercise ahead of 2029 polls would give a handle to the BJP to accuse the Opposition of creating hurdles for the women's reservation Bill," he said.

DMK leader Karimozhi echoed this concern in last week's Parliament session and said delimitation was now "a sword hanging over our head". But she indicated that the Opposition was not ready to surrender.

"If delimitation is going to happen on population census, it will deprive and reduce the representation of the south Indian states. Why should the implementation of women's Bill be connected to delimitation?" she said while reading a statement from Tamil Nadu Chief Minister MK Stalin. "There is fear in the minds of the people of Tamil Nadu that our voices will be undermined," she said.

Former law minister and now independent MP Kapil Sibal said the linkage with delimitation could delay the implementation of women's reservation even beyond 2029. "I want the Prime Minister and the Home Minister to come to the House and say that if they do not complete the process of delimitation by 2029, they will resign," Sibal said.

**Gains for north Indian states**  
The main rationale of delimitation is to

ensure that every state has equitable representation in the Lok Sabha on the basis of its population, with the same logic running down within the states for Assemblies. The idea is to ensure that every MP, as far as possible, represents the same number of people. In the 1977 Lok Sabha, for example, every MP in India represented about 10.11 lakh people, on an average (see box). While there are large variations, especially in small states, the attempt is to keep this number in as tight a range as possible.

But there is no restriction on what this number should be. In fact, if we attempt to retain the same number as in 1977, the strength of the Lok Sabha would have to be expanded to nearly 1,400, due to the increase in population. But the new Lok Sabha has been built with the maximum capacity of 888 seats. That means the average population size of every constituency would have to go up.

But whatever the calculation, the number of Lok Sabha seats in states like Uttar Pradesh or Bihar are likely to jump much more than south Indian states. The jump would be much more pronounced mainly because the number of seats has been forcefully kept unchanged for 50 years now. If the delimitation exercise had happened after every Census, as mandated in the Constitution, seats for the north Indian states would have gone up progressively and not all of a sudden. North Indian states can argue that they are terribly underrepresented right now.

#### BJP stands to gain most

The BJP's leverage on delimitation is undeniable, and so are the apprehensions of the Congress and other Opposition parties. Following the rise of the BJP through the late 1980s and early 1990s on the back of the Ram Temple movement, and the arrival of social justice parties following the Mandal movement, Congress has been doing poorly in the Hindi heartland. From the high of 51 seats in UP (including Uttarakhand) and 30 seats in Bihar (including Jharkhand) in 1980, its tally has fallen to just 1 in the erstwhile united UP and 2 in Bihar and Jharkhand (see box).

Of the 52 seats won by the Congress in 2019, 15 came from Kerala and eight from Tamil Nadu. Even in 2004, when it had won 145 seats and regained power, a majority of its victories had come from south Indian states, with 29 from Andhra Pradesh. In 2009, when it won again, Andhra Pradesh returned 33 seats.

In contrast, BJP's consolidation in north India has been going on for decades. Delimitation is only going to strengthen its hold over national politics.

Delimitation continues to be a politically hot potato. By linking it with women's reservation, BJP has tried to press its advantage, but the Opposition has not yet opened its cards. In this political tussle, the women's reservation Bill could become the casualty yet again.

transform the socio-economic landscape by offering valuable data for policy design and resource allocation. Ultimately, these steps reflect the government's commitment to addressing demographic changes and ensuring equitable political representation for all sections of society

**Prelims Practice Question:**

**Q. Which of the following statements regarding the Census and Delimitation process in India is/are correct?**

1. The Census of India is conducted every 10 years, and the next Census is scheduled for 2026.
2. The delimitation of constituencies is carried out based on the population data of the Census held every 20 years.
3. The inclusion of caste enumeration in the Census requires an amendment to the Census Act, 1948.
4. The delimitation process is based on the 1971 Census data until the 2026 Census is completed.

**Select the correct answer using the code below:**

- a) 1, 3, and 4
- b) 1, 2, and 4
- c) 1 and 3
- d) 2 and 4

**Answer:**

**Correct answer: a) 1, 3, and 4**

**Explanation:**

1. **The Census of India is conducted every 10 years, and the next Census is scheduled for 2026:** This statement is correct. The Census is a decennial exercise, and the next one is expected to be conducted in 2026, after a delay from the 2021 Census.
2. **The delimitation of constituencies is carried out based on the population data of the Census held every 20 years:** This statement is incorrect. Delimitation is based on the population data from the most recent Census, which is conducted every 10 years. The most recent delimitation exercise was based on the 2001 Census, but the next one will be based on the 2026 Census.
3. **The inclusion of caste enumeration in the Census requires an amendment to the Census Act, 1948:** This statement is correct. The Census Act does not currently allow for the enumeration of caste. Therefore, an amendment is required to include caste data in the upcoming Census.
4. **The delimitation process is based on the 1971 Census data until the 2026 Census is completed:** This statement is correct. The current boundaries of Lok Sabha and Assembly constituencies were drawn based on the 1971 Census, and they will be redrawn after the 2026 Census.



### Mains Model Question:

**Q. Discuss the significance of the Census process and the Delimitation Commission in India. How do constitutional provisions impact the conduct of these processes and their role in ensuring equitable representation?**

The Census and the Delimitation process are critical to India's democratic functioning, as they ensure accurate representation and effective resource allocation across states and constituencies. The Census is a decennial exercise that gathers comprehensive data on India's population, housing, education, employment, and other socio-economic indicators. The next Census is scheduled for 2026, with preparations already underway. This data is crucial for formulating government policies, planning development programs, and ensuring targeted welfare measures.

The Delimitation Commission, mandated by the Constitution, is responsible for redrawing the boundaries of constituencies to reflect population changes. As per the 84th Constitutional Amendment of 2001, the redrawing of boundaries is based on the population data of the first Census after 2026. This provision ensures that constituencies are reflective of population growth, maintaining fair representation for every region. However, the present constituencies are based on the 1971 Census, creating discrepancies in representation.

**EXPLAINED POLICY**

## Delimitation, women's quota

Indications that the delayed Census of 2021 could be held next year have reopened the discussion on two very significant related exercises: the delimitation of constituencies, and reservation of seats for women. What is the legal and political roadmap on these?

**DAMINI NATH & APURVA VISHWANATH**  
NEW DELHI, OCTOBER 29

THE CENTRE has indicated that the much-delayed Census could now start as early as next year — and be completed by 2026. There are two very important upshots of the exercise — the delimitation of constituencies, and the implementation of the reservation for women in elected bodies.

How will the rollout of the Census impact these two exercises, and what is the legal roadmap for the process here onward?

**Delimitation exercise**

**THE PROCESS:** Since senior government sources have said that the Census process is expected to be completed by 2026, it would imply that the government is hoping to wrap up the process in time for the 2029 Lok Sabha election.

The timeline is significant since it also involves the delimitation exercise. Delimitation is the process of fixing or redrawing the boundaries of territorial constituencies. A Delimitation Commission is appointed for carrying out the exercise.

Though the decadal Census has been conducted seven times since Independence (1951 to 2011), the delimitation exercise has been carried out only four times (in 1952, 1953, 1973, and 2002).

The last delimitation, however, only readjusted the boundaries of constituencies based on population, and did not lead to an increase in the number of seats, which have remained constant since 1976. This was because the Constitution was amended in 1976 and 2001 to readjust the allocation of seats till the findings of the first Census taken after 2001 and 2026 respectively are published.

The number of seats in Lok Sabha is currently 543, and in all state Assemblies taken together, 4,123. These numbers were decided on the basis of the 1971 Census for Lok Sabha and 2001 Census for state constituencies, when the country's population was 54.81 crore and 102.87 crore respectively. The numbers of seats are likely to increase substantially, going by the expected population of around 1.5 billion when the 2021 Census is eventually conducted.

**CONSTITUTIONAL CHANGES:** Article 82 of the Constitution calls for such re-adjustment of boundaries after each Census.

"Upon the completion of each census, the allocation of seats in the House of the People to the States and the division of each State into territorial constituencies shall be readjusted by such authority and in such manner as Parliament may by law determine," the provision states.

The 42nd Constitution Amendment brought in 1976 amended Article 170, and froze the delimitation exercise until the results of the first Census after 2000 were published. In 2001, this was further extended for 25 years. And now, delimitation will happen only after the results of the first Census after 2026 are published.

Article 170 deals with the composition of legislative Assemblies, and contains an explanation to the provision defining the word "population" which is the basis for dividing territorial constituencies.

The provision states: "In this clause, the expression 'population' means the population as ascertained at the last preceding census of which the relevant figures have been published: Provided the reference in this Explanation to the last preceding census of which the relevant figures have been published shall, until the relevant figures for the first census taken after the year 2026 have been published, be construed as a reference to the 2001 census."

Questions have been raised on whether the 2021 Census, taken in 2025 and published in 2026, can be the basis for the readjustment mandated under Article 82.

This provision will have to be amended to facilitate delimitation before the next Lok Sabha election. Apart from this, other provisions dealing with the composition of the Lok Sabha (Article 81); state Assemblies (Article 170); and President's election (Article 55) will also have to be altered.

**POLITICAL CHALLENGES:** There are other challenges too, such as building consensus on the procedure to be followed for delimitation.

So far, delimitation Acts passed by Parliament have said that readjustment is done on the basis of the Census, physical features, existing boundaries or administrative units, facilities of communication and public convenience.

The same challenges that led to the readjustment being postponed in 1976 and 2001 remain today. Southern states that have fared better in controlling their population would lose out if the number of seats are to be increased on the basis of only population, which has increased more in the North.

The BJP's numbers in the House will also be crucial to carry out these amendments.

While it had majorities of its own in 2014 and 2019, this time the party has 240 seats in Lok Sabha, and needs its allies, the Telugu Desam Party and the Janata Dal (United) to push through legislation. Andhra Pradesh Chief Minister and TDP chief N Chandrababu Naidu recently flagged the issue of declining young population, saying he was thinking of giving an incentive to families that have more than two children.

**Women's reservation**

In September 2023, Parliament amended The Constitution (One Hundred and Twenty-eighth Amendment) to provide 33 per cent reservation to women in Lok Sabha and state legislative Assemblies. A crucial provision in the law makes the implementation of women's reservation contingent upon the delimitation process.

It states that the quota "shall come into effect after an exercise of delimitation is undertaken for this purpose after the relevant figures for the first census taken after the commencement of The Constitution (One Hundred and Twenty-eighth Amendment) Bill 2023 have been published, and shall cease to have effect on the expiration of a period of 15 years from the date of such commencement."

This in effect will be the 2021 Census that, according to the latest indications, is likely to be published in 2026.

One of the reasons women's reservation did not become a reality in the last 35 years was the fear among male politicians of having to let go of their seats.

A 33 per cent reservation in the current 543-member Lok Sabha would mean 182 seats being kept for women. Only 363 seats would be available for men. The current Lok Sabha has 467 men. But delimitation could preserve the political fortunes of the current group of male politicians.

If, as a result of the delimitation exercise, the strength of Lok Sabha increases to 770, as some calculations suggest, 257 seats would be reserved for women, and the remaining 513 could be available for men to contest. This would mean that political parties would have to deal with fewer complications in accommodating the political interests of their male leaders.




Chief Election Commissioner Rajiv Kumar during the delimitation of parliamentary and Assembly constituencies in Assam in March 2023. Archive

In addition, the inclusion of caste enumeration in the Census is a key issue, as it has been historically excluded except for Scheduled Castes and Scheduled Tribes. The government has announced plans to amend the Census Act, 1948, to include caste data, which will provide insights into social stratification and help implement affirmative actions effectively. The decision to conduct caste enumeration is expected to have a significant impact on resource distribution and social welfare schemes.

Both processes are guided by constitutional provisions. Article 82 of the Constitution mandates the completion of a fresh Census before each delimitation exercise. The accurate enumeration of population, including caste data, is vital for ensuring that the political structure remains responsive to demographic shifts, thereby upholding democratic principles of equity and representation. The effective execution of these exercises plays a key role in fostering a fair, inclusive, and balanced democracy in India.

### Parliament to workplace

Increased political representation of women can help loosen supply-side constraints to women's labour force participation



**FARZANA AFRIDI**

**BURSAPORE TWO FACTS:** First, India is among the countries in the world where women's representation in politics is the lowest. According to the Election Commission of India, women constituted only 10.3 per cent of all members of Parliament in 2019, lower than in sub-Saharan Africa (14 per cent), Latin American countries such as Nepal (14 per cent) and Pakistan (20 per cent). Second, Indian women's engagement in the labour market (the labour force participation rate) is alarmingly low at about 21 per cent, relative to the global average of almost 50 per cent (as per World Bank estimates). Only 11 countries such as Yemen, Iran and Iraq show lower female labour force participation rates than India. The recent legislative initiatives mandating the reservation of at least 33 per cent of seats in the Lok Sabha and state legislatures and assembly seats for women are primarily a game changer for increasing gender equity in political spheres in the country. But, does increased political representation of women also have implications for women's labour force participation? What are the channels through which women's participation in the political arena translates into their economic empowerment?

As a first step, let's lay out the factors that have kept women's economic engagement low in India. The gendered division of labour within the household, which places a disproportionately high burden of domestic work on women, the social norms that emphasise marriage rather than careers for women, the lack of safety and perceived high risk of sexual violence compounded by an absence of reliable and safe public transport infrastructure that restrict women's physical mobility, have been highlighted as some of the most salient factors constraining women from supplying their labour. On the other hand, recent research points out that the existing structural constraints may be changing due to changes in agricultural technology have reduced the demand for manual labour, which has historically accounted for the largest share of women's labour. The absence of remunerative opportunities in the non-farm sector implies that these women drop out of the labour market entirely.

Increased political representation of women has some immediate implications for loosening the supply-side constraints to women's labour force participation in India. At the political level, the increased representation of women in the legislature and administrative offices has increased women's visibility in the larger formal labour market. Evidence from the reservation for women in Gram Panchayats indicates that women political leaders are more likely to emphasise and promote issues that are directly related to women's economic empowerment, such as education, health, and skill development. The reservation of seats for women in the Gram Panchayats also influences the demand for women's labour in the economy, increasing the opportunities for "decent" work for women in the formal, non-farm sector.

Women's reservation in Parliament and state legislatures is also likely to have indirect impacts on increasing women's labour supply in the longer term. Evidence from gender quota in panchayats suggests that exposure to women political leaders weakens traditional gender stereotypes of their role in society and within the home. Greater public visibility of women creates a role model effect for younger women, raising their aspirations. They can enter and feel successful in male-dominated fields, and for economic matters, it is not just acceptable but also possible for women to supply in the longer term.

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There is much empirical evidence available to provide a convincing answer to this question. However, extrapolating from what we know from quota in Panchayats, women political leaders may be more amenable to introducing legislation that enforces gender parity in pay and work conditions in the formal sector, besides strengthening public and private sector opportunities for women in the manufacturing sector.

An anecdote from a senior woman legislator in the state assembly with whom I spoke, called that as a District Collector posted in a rural district in 1982, he would have weekly meetings at the district headquarters with the panchayat leaders (usually men) to discuss local issues facing them. On one of his occasional visits to a panchayat, she noted that the village headman had been working for several months. This is a rather unique situation since this was the only source of drinking water for one thousand people in the village. The women who had to collect water, the men who did not have to, were more likely to interact with the collector. Therefore, in a way, if women's political representation engenders heightened sensitivity and brings a gender perspective to everyday decision-making by policy-makers, it has the potential to weaken just the status quo but also the economic lives of India's women.

The writer is Professor of Economics at the Indian Institute of Social and Policy Studies, Delhi. Digital Labour and Women's Economic Empowerment Programme

## Topic : How can India tap its natural hydrogen potential?

Relevance : GS Paper 3 Environment and Ecology

Source : The Hindu

Context :

India, a rapidly growing economy with aspirations for energy independence and a pledge to achieve net-zero emissions by 2070, is turning its focus to natural hydrogen as a potential game-changer in its energy

## How can India tap its natural hydrogen potential?

What are some of the challenges to exploring and exploiting natural hydrogen resources? Is it a more expensive process than manufacturing hydrogen? How is the U.S. going beyond just trying to locate and excavate natural hydrogen deposits? Does India have a growing hydrogen demand?

### EXPLAINER

**Kalyan Manjappalli**

**The story so far**

India, an economy in growth mode with aspirations for energy independence and a pledge to reach net-zero emissions by 2070, the exploration and use of natural hydrogen offers a potentially game-changing opportunity in an increasingly volatile world where natural gas, coal, oil, and energy security become inseparable, leading into a naturally occurring commodity could go a long way toward enhancing India's strategic autonomy.

**How much potential does India have?**

India's hydrogen demand was projected to grow from six million tonnes per year in 2020 to 20 million to 30 million by 2070 to support its net-zero target. A preliminary study, by some members of academia referencing model predictions of global geologic hydrogen resources, arrived at a value of 3.47 million tonnes of natural hydrogen potential in India. If these estimates were to be true, we may not need to engage in the process of manufacturing hydrogen anymore but rather harness the power of finding and producing naturally occurring hydrogen that would be carbon-free and cost-effective economy faster at a lower cost.

**What are the challenges?**

Natural hydrogen exploration and exploitation is no easy feat. It has technical, logistical, economic, and safety-related challenges. Accurately locating and quantifying underground hydrogen reserves is the primary challenge. Unlike oil and gas, for which well-established exploration techniques exist, natural hydrogen exploration is still evolving. Additionally, efficient and cost-effective extraction technology for natural hydrogen is key. While analysing current gas industry practices associated with well drilling and extraction in oil, one must consider hydrogen's specific properties, including its small molecular size and high diffusivity. Studies into extraction solutions for lesser-known hydrogen resources are underway.

**How can India kickstart the process?**

A key component of the Indian Solar PV mission growth was the Green Energy Research Institute of India (GRII) project under the National Solar Mission that commissioned 125 SREAs stations along with four Advanced Shunting



**Station (AMS).** Natural hydrogen agencies can formulate a similar public-private partnership to assist in the identification of potential geological deposits.

The U.S. ARPA-E's newly funded project is exploring the potential of geologic hydrogen beyond locating and extracting trapped geologic hydrogen towards the possibility that hydrogen can be produced intentionally, by drilling and flowing water into rock and then transporting the hydrogen to the surface for collection. Another approach is to inject water with dissolved carbon dioxide into rock, creating rock that could potentially lead to carbon sequestration in formation while simultaneously producing hydrogen.

The oil and gas exploration industry in India, with the help of the Directorate General of Hydrocarbons, could review the rock samples available with them and explore more wells across the country with adequate anti-drill capital. A few of the current natural gas pipelines could be repurposed for transporting hydrogen with adequate modifications and safety studies. Creating low-cost and safe solutions for hydrogen storage, especially massive underground storage, is imperative.

Formal estimates indicate natural hydrogen production would be much lower in cost than produced hydrogen, the actual cost of exploration, extraction, and delivery must not be too high. Commercial feasibility studies are underway. Commercial feasibility studies are underway. Commercial feasibility studies are underway.

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### THE GIST

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strategy. The utilization of natural hydrogen, a naturally occurring resource, could significantly enhance the country's energy security and contribute to its decarbonization efforts, offering a pathway to reduce reliance on traditional hydrogen production methods.

## India's Hydrogen Demand and Natural Hydrogen Potential

India's demand for hydrogen is projected to increase drastically, from 6 million tonnes (Mt) per year in 2020 to over 50 Mt per year by 2070, to support its goal of achieving net-zero emissions. Natural hydrogen is being considered a promising solution due to its cost-effectiveness compared to manufactured hydrogen. A preliminary study suggests that India may have a potential of 3,475 million tonnes of natural hydrogen reserves, which could meet its hydrogen demand, potentially eliminating the need to manufacture hydrogen altogether. This would not only make the process more affordable but also expedite India's decarbonization process.

The discovery of natural hydrogen reserves in regions like the Andamans is fueling interest in this resource. To harness this potential, the country needs to conduct a comprehensive geological study to assess the quality, size, and accessibility of these reserves. The study will also need to consider key factors such as hydrocarbon generation potential, the effectiveness of seals and traps, and migration loss.

## Challenges to Exploring Natural Hydrogen

Despite its potential, the exploration and exploitation of natural hydrogen face several technical and logistical challenges. Locating and quantifying hydrogen reserves underground is complex, as current exploration techniques for hydrogen are still in their nascent stages. Unlike oil and gas, which have well-established extraction methods, natural hydrogen requires innovative technologies and strategies.

The small molecular size and high diffusivity of hydrogen pose specific challenges in extraction, as current methods used for natural gas may not be directly applicable. Hydrogen's reactivity also raises safety concerns, demanding the use of hydrogen-resistant materials and advanced alloys to mitigate risks.

## Is natural hydrogen the fuel of the future?

How does hydrogen occur naturally in the environment? Why was it considered unviable to mine or harvest natural hydrogen? Can natural hydrogen as a fuel meet growing global energy demands? Why is it still an untapped industry? Does India have natural hydrogen reserves?

### EXPLAINER

Kalyan Mangalagalli

#### The story so far:

Hydrogen is seen as the fuel of the future – one that would decarbonise world economy and stop global warming. If harvested in a sustainable manner, natural hydrogen may provide a clean and potentially low-cost fuel to satisfy the world's increasing energy needs with a considerable reduction in carbon emissions as well. And it's most likely abundant in India, too.

#### How is natural hydrogen extracted?

Right now, hydrogen is manufactured mostly from natural gas through an energy-intensive and polluting process. Green hydrogen made with renewable electricity, on the other hand, is still prohibitively expensive and would require vast amounts of wind and solar power to work out at scale.

Natural hydrogen occurs as a free gas in geology, produced by processes such as serpentinisation (the interaction of water and iron-containing rocks), radiolysis of water by radioactive rocks, and from organic matter at depth.

#### What is the history of its extraction?

In the summer of 1987, drillers arrived at Mamadevi village of Bouralebougou, Mali, to bore for water. After drilling 10km at one site, with no water to be found, one of the crew lit a cigarette – and a jet of flame shot into his face. The flame turned into a huge fire that shone crystal blue during the daytime with no sign of smoke around it. At night, it shone a glowing gold that lit its surroundings. It took weeks for the crew to extinguish the blaze and cap the well.

This unexpected event led the villagers to avoid the site until 2007 when Alou Diallo, a successful Malian businessman, politician, and

chairperson of Petronas, an oil and gas firm, purchased the rights to prospect in the area around Bouralebougou. In 2012, he hired Chapman Petroleum to figure out what was emanating from the borehole. Protected from the UV rays in a mobile laboratory, a team of engineers found that the gas was 98% hydrogen. Hydrogen is rarely recovered in oil operations and was not thought to exist in large reserves within the earth's crust, until then.

While the presence of naturally occurring hydrogen has been known for decades, with the discovery of its presence in gas seeps, volcanic outgassing, and even mine workings being well-documented decades ago, for many years, it was viewed as a geological curiosity. Majority of the scientific opinion at the time proposed that hydrogen's small size and extreme reactivity would hinder the formation of substantial underground deposits.

Now, geological environments favourable to natural hydrogen generation and accumulation are being recognised worldwide. Active mountain ranges with tectonic activity, such as the Pyrenees, Alps, and Himalayas, are also being considered as areas for geological hydrogen production. The fact that helium co-exists with hydrogen in a few reserves points towards some geological processes, such as radiolysis, playing a role in its generation.

The presence of hydrogen in coal mines points towards generation from underlying organic matter. What was previously a specialist field of geological



Storing for more: A 2,500 cubic-metre tank containing liquid hydrogen at Kobe Port Island plant in Kobe, Hyogo Prefecture, Japan. AP

study has therefore become a growing field with enormous implications for the future of energy.

#### What about current reserves?

Although the total size of worldwide natural hydrogen reserves is still poorly known because of a lack of concentrated exploration, recent discoveries and current research indicate considerable potential. In contrast to conventional hydrocarbon exploration, dedicated frameworks for natural hydrogen exploration are still evolving.

In the Indian context, natural hydrogen potential is mostly untapped but found to be promising because of the existence of favourable geological structures like hard rock formations of diverse ultramafic and basaltic assemblages, Andaman and Himalayan ophiolite complexes, greenstone volcanic-sedimentary sequences in cratons (Bharatpur, Singhbhum), sedimentary basins (for example, in Vindhya, Cuddapah, Gondwana and Chhattisgarh), basement rocks with fractures, and areas where active hydrothermal systems as represented by hot springs exist.

Recent finds elsewhere in the world indicate the scale of these resources. Hundreds of hydrogen seeps have been catalogued globally in various countries, including Australia (Byre Peninsula and Kangaroo Island), the United States (Kansas, Nebraska), Spain, France, Albania, Colombia, South Korea, and

Canada. There could be sufficient natural hydrogen to supply the growing world demand for thousands of years, based on a model run by the U.S. Geological Survey (USGS) that was unveiled in October 2022 at a Geological Society of America meeting.

Close on the heels of the USGS model, scientists, venturing into abandoned mines in France's Lorraine region, chanced upon naturally occurring hydrogen in May 2023. Further excavation in March 2025 in the adjacent Moselle region yielded more reserves. Together, the deposits are estimated to be about 12 million tonnes – worth about \$82 billion and about half of the current global hydrogen production.

While it's difficult to project with certainty just how much hydrogen is available in geologic stores, the best estimate is on the order of tens of trillions of metric tonnes. If even just 2% of these reserves are commercially exploitable, they would provide about twice as much energy as all the earth's provable natural gas reserves – enough to meet projected hydrogen demand (500 million tonnes per year) for around two hundred years. However, experts note that it is still unclear how much of that potential can be tapped economically, especially if deposits are too scattered.

How has industry reacted? The promise of so much renewable fuel sitting undiscovered beneath the surface has sparked a veritable gold rush. By the

### THE GIST

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The American Association of Petroleum Geologists have formed its first natural hydrogen committee.

end of 2024, 40 companies, including start-ups, were searching for deposits of natural hydrogen around the world, up from just 10 in 2020, according to research firm Hystat Energy.

They're hunting for natural hydrogen in countries such as Australia, the U.S., Spain, France, Albania, Colombia, South Korea and Canada. Producers claim they can extract the fuel for about \$1/kg, or even less – much lower than the production cost for green or even natural gas-based hydrogen.

The American Association of Petroleum Geologists have formed its first natural hydrogen committee, and USGS began its first effort to identify promising hydrogen production zones in the United States.

In the U.S., a start-up called Kokoma raised \$245 million of venture funding last year to search for and extract geologic hydrogen, attracting investors including Amazon's climate fund and Bill Gates' Breakthrough Energy Ventures, which is also investing in other natural hydrogen companies, such as Munda 8 in Europe. Even conventional energy and mining companies are in on the rush – both BP and Rio Tinto recently invested in U.K.-based start-up Snowfox Discovery.

Kalyan Mangalagalli is an expert in Energy and Emerging Technologies and serves as a member of the International Advisory Board of the Indian Institute of Petroleum Energy, Visakhapatnam. This is the first of a two-part series on naturally occurring hydrogen reserves.

## U.S. Approach and Innovations

The U.S. has made significant strides in expanding beyond traditional natural hydrogen extraction. The ARPA-E (Advanced Research Projects Agency-Energy) has funded projects aimed at not just locating and extracting geologic hydrogen, but also intentionally producing hydrogen by injecting water into rocks. This process could help in transporting the extracted hydrogen to the surface, adding a layer of intentional production alongside natural extraction. These projects also include the idea of injecting carbon dioxide dissolved in water into iron-containing rocks to produce hydrogen while simultaneously aiding in carbon sequestration. Such innovative techniques could offer solutions to India's own challenges in natural hydrogen extraction.

## India's Path to Tapping Natural Hydrogen Potential

To successfully tap into its natural hydrogen reserves, India must take several critical steps. Firstly, similar to its approach with the National Solar Mission, a public-private partnership can be established to identify potential hydrogen reserves across the country. Agencies specializing in natural hydrogen exploration could collaborate with the Indian Oil and Gas Exploration sector, leveraging existing resources such as rock samples and well data to identify promising sites for exploration. The Directorate General of Hydrocarbons could play a crucial role in reviewing existing data and expanding exploration efforts.

Additionally, India can focus on infrastructure development, specifically modifying existing natural gas pipelines to transport hydrogen. This would reduce the cost of transportation and ensure the scalability of hydrogen as a resource. Creating low-cost, safe storage solutions for hydrogen, particularly for underground storage, is another critical area that requires investment.

## Policy and Initiatives for Growth

To kickstart natural hydrogen exploitation, India can look at policies and initiatives similar to those used in the renewable energy sector. The government can set up funding mechanisms, including grants and debt capital, to encourage exploration in high-potential areas. Public-private partnerships could be instrumental in developing extraction technologies, as well as in creating safe storage and transportation solutions for hydrogen.

## Certification scheme, carbon offset rules likely to boost green hydrogen ecosystem

AGGAM WALLA  
NEW DELHI, MAY 1

TO BOOST India's green hydrogen exports and encourage energy-intensive sectors to adopt the emerging fuel, the Centre has introduced a certification scheme under the National Green Hydrogen Mission and notified rules for claiming emission offsets under the Carbon Credit Trading Scheme (CCTS).

Union Minister of New and Renewable Energy Pralhad Joshi on April 29 launched a scheme to measure, monitor, report, verify on-site, and certify green hydrogen based on a standard introduced by the Ministry in 2023.

Union Minister of New and Renewable Energy Pralhad Joshi on April 29 launched a scheme to measure, monitor, report, verify on-site, and certify green hydrogen based on a standard introduced by the Ministry in 2023.

"This will help to ensure that the hydrogen produced in India truly qualifies as green. A lot of greenwashing tends to happen these days, which is why certification is most important. With the certification in place, our green hydrogen will carry a mark of quality and credibility, making it globally desirable and export-ready," Joshi said about the scheme.

On April 27, the Bureau of Energy Efficiency (BEE), nodal agency for the Green Hydrogen Certification Scheme, also announced an offset mechanism for hard-to-abate sectors using green hydrogen under CCTS, to allow them to earn and trade credits.

While CCTS does not yet include sectors like steel, refineries, and shipping, where there is a use case for switching to green hydrogen, the latest guidelines will provide industry greater clarity on compliance before the ambit of CCTS eventually widens.

**Certification boost**  
In 2023, the Ministry of New and Renewable Energy (MNRE) introduced a green hydrogen standard, capping emissions at 2 kg of CO<sub>2</sub> per kg of hydrogen produced. The certification scheme, based on the standard, applies only to green hydrogen production from electrolysis or conversion of biomass.

On April 27, the BEE, under the export appeal of Indian green hydrogen is likely to increase. At the

### CERTIFICATION BASED ON 2023 STANDARD

■ Union Minister of New and Renewable Energy Pralhad Joshi on April 29 launched a scheme to measure, monitor, report, verify on-site, and certify green hydrogen based on a standard introduced by the Ministry in 2023

launch, Joshi said India has signed an agreement with Japan to supply over 4 lakh tonnes of green hydrogen derivatives like green ammonia. The heads of terms (HoT) for the cross-border supply of green ammonia to Japan were signed in August last year.

Still, high production costs remain a hurdle. In March, the Parliament's Standing Committee on Energy noted that "the current cost of production of green hydrogen is quite high," and called for green hydrogen hubs to be located in regions rich in renewable energy, water, and proximity to demand centres to be economically viable.

For exports, the government has identified Kandla, Paradip, and Tuticorin—all with international ports—as key hubs for green hydrogen production.

"In 2012-13, the cost of solar energy was Rs 12 per unit; today it's around Rs 2," Joshi said. "What made this possible? Scale, skill, and speed. Green hydrogen will follow the same path," he added.

### Offset rules for carbon credits

At the launch of the green hydrogen certification scheme, Saurabh Diddi, director of BEE, emphasised the importance of ensuring transparency, authenticity, and accountability in green hydrogen production. Diddi also said the certification scheme "will enhance investor confidence and enable producers to access carbon credits".

On April 27, the BEE, under the Ministry of Power, released a methodology for estimating carbon

offsets from green hydrogen produced via electrolysis. In effect, it defines how switching from fossil fuels like coal to green hydrogen can reduce emissions and earn tradable credits under CCTS.

So far, emissions targets under CCTS apply only to sectors like aluminium, chlor-alkali, pulp and paper, and cement, where the potential of green hydrogen is limited. However, the new methodology offers a compliance roadmap for hard-to-abate sectors like steel and shipping, once CCTS expands to cover them.

To be clear, the green hydrogen certification scheme itself is not a mitigation tool and does not generate emission reduction credits. However, it can be used to support claims for credits under CCTS.

### Desalination push

Compared to the rules for green hydrogen certification, the carbon offset mechanism under CCTS sets significantly stricter standards—especially on water use for electrolysis. CCTS guidelines, for instance, cap a project's water consumption at no more than 5 per cent of the locally available drinking water, to ensure it does not displace other uses.

Producing 1 kg of green hydrogen via electrolysis requires around 10 litres of treated water, according to official estimates.

"The treated water required for hydrogen production can also be sourced by desalinating seawater or treating wastewater, with only a marginal impact on the cost of hydrogen production," the MNRE told the Standing Committee on Energy.

"Under the Mission, sustainable use of water will be encouraged. R&D will also be supported for technologies that can utilise seawater or waste water directly, thereby reducing the need for treatment and further decreasing the water requirement," it said.

Backed by an outlay of nearly Rs 20,000 crore, the National Green Hydrogen Mission also supports domestic electrolyser manufacturing, green hydrogen production, and sector-specific pilot projects.



Commerce Minister Piyush Goyal with European Commissioner for Trade and Economic Security Maroš Šefčovič amid ongoing talks on India-EU FTA in Brussels, Belgium. ©MarošŠefčovič



Regulatory frameworks are crucial for spurring investment and ensuring transparency in the exploration and extraction processes. Additionally, India could take inspiration from the U.S. ARPA-E's funding model to support innovative hydrogen production methods.

India's potential to tap into natural hydrogen is immense, with the ability to transform its energy sector and contribute significantly to its decarbonization goals. By addressing the technical, logistical, and safety challenges associated with exploration, and by building strong policy frameworks and partnerships, India can position itself as a leader in natural hydrogen production. With rising hydrogen demand and growing global interest in sustainable energy, India's exploration of natural hydrogen could be pivotal in securing a sustainable, energy-independent future.

**Prelims Practice Question:**

**Q. Which of the following statements about natural hydrogen in India are correct?**

1. Natural hydrogen reserves in India are projected to be around 3,475 million tonnes.
2. India's hydrogen demand is expected to grow from 6 million tonnes per year in 2020 to over 50 million tonnes per year by 2070.
3. The primary challenge in exploring natural hydrogen in India is the lack of technological methods to locate hydrogen reserves.
4. The U.S. ARPA-E focuses on locating and extracting natural hydrogen without exploring new methods of hydrogen production.

**Select the correct answer using the code below:**

- (a) 1 and 2
- (b) 2 and 3
- (c) 1, 2, and 3
- (d) 1, 3, and 4

**Answer: (a) 1 and 2**

**Explanation:**

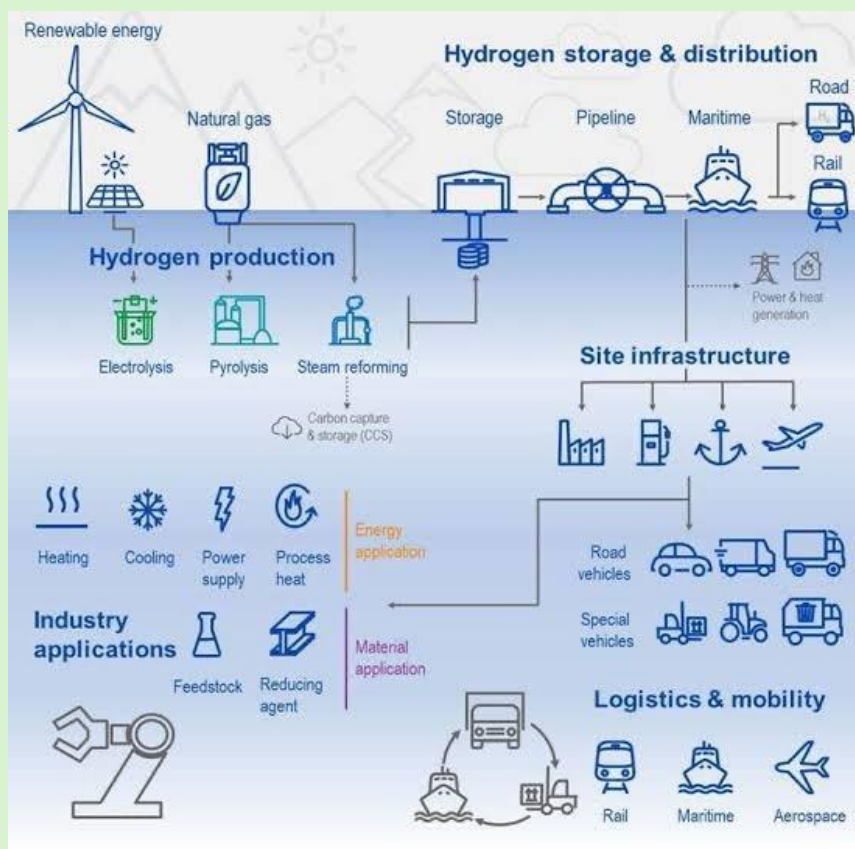
1. **Correct:** India's potential natural hydrogen reserves are estimated to be around 3,475 million tonnes, based on preliminary studies.
2. **Correct:** India's hydrogen demand is projected to grow from 6 million tonnes per year in 2020 to over 50 million tonnes per year by 2070, aligning with its net-zero emission target.
3. **Incorrect:** The primary challenge in exploring natural hydrogen is not just the lack of technological methods but also its extraction, the small molecular size of hydrogen, and safety concerns during the process.
4. **Incorrect:** U.S. ARPA-E is focused not only on locating and extracting natural hydrogen but also on developing innovative methods of hydrogen production, such as intentionally producing hydrogen by injecting water into rocks.

### Mains Model Question:

**Q. How can India tap its natural hydrogen potential, and what are the challenges in its exploration and exploitation? Discuss the potential policies and initiatives that can support this process.**

India's growing hydrogen demand, projected to increase from 6 million tonnes in 2020 to 50 million tonnes by 2070, presents a significant opportunity for tapping into natural hydrogen. Natural hydrogen, unlike manufactured hydrogen, occurs naturally in the Earth's crust, and India's potential to harness it is considerable, with estimates suggesting around 3,475 million tonnes of reserves. If successfully explored and exploited, natural hydrogen could contribute to decarbonizing the economy more quickly and cost-effectively, making it a game-changer in India's pursuit of net-zero emissions by 2070.

However, there are substantial challenges in exploring and exploiting natural hydrogen. First, the techniques for locating underground hydrogen reserves are not as established as those for oil and gas. The exploration technologies are still evolving, and assessing reserves for their quality, accessibility, and economic viability is a complex process. Additionally, hydrogen's small molecular size and high diffusivity pose technical challenges in extraction, as existing gas industry practices need to be modified. Safety concerns also need to be addressed due to hydrogen's reactivity and potential risks during extraction.



To capitalize on this potential, India must adopt strategic policies and initiatives. One of the critical steps would be a public-private partnership akin to the Solar Radiation Resource Assessment Project under the National Solar Mission, which could help identify geographical deposits of natural hydrogen. India can also collaborate with international agencies, such as the U.S. ARPA-E, which is exploring innovative methods to produce hydrogen intentionally by injecting water into rock formations. Furthermore, India's Oil and Gas Exploration industry, with the Directorate General of Hydrocarbons, could assist by reviewing existing rock samples and conducting exploratory drilling with adequate funding.

For natural hydrogen to become a viable resource, India must also focus on developing cost-effective and safe extraction methods, improving infrastructure for hydrogen storage, and creating a transparent regulatory framework to encourage investment and innovation.

