

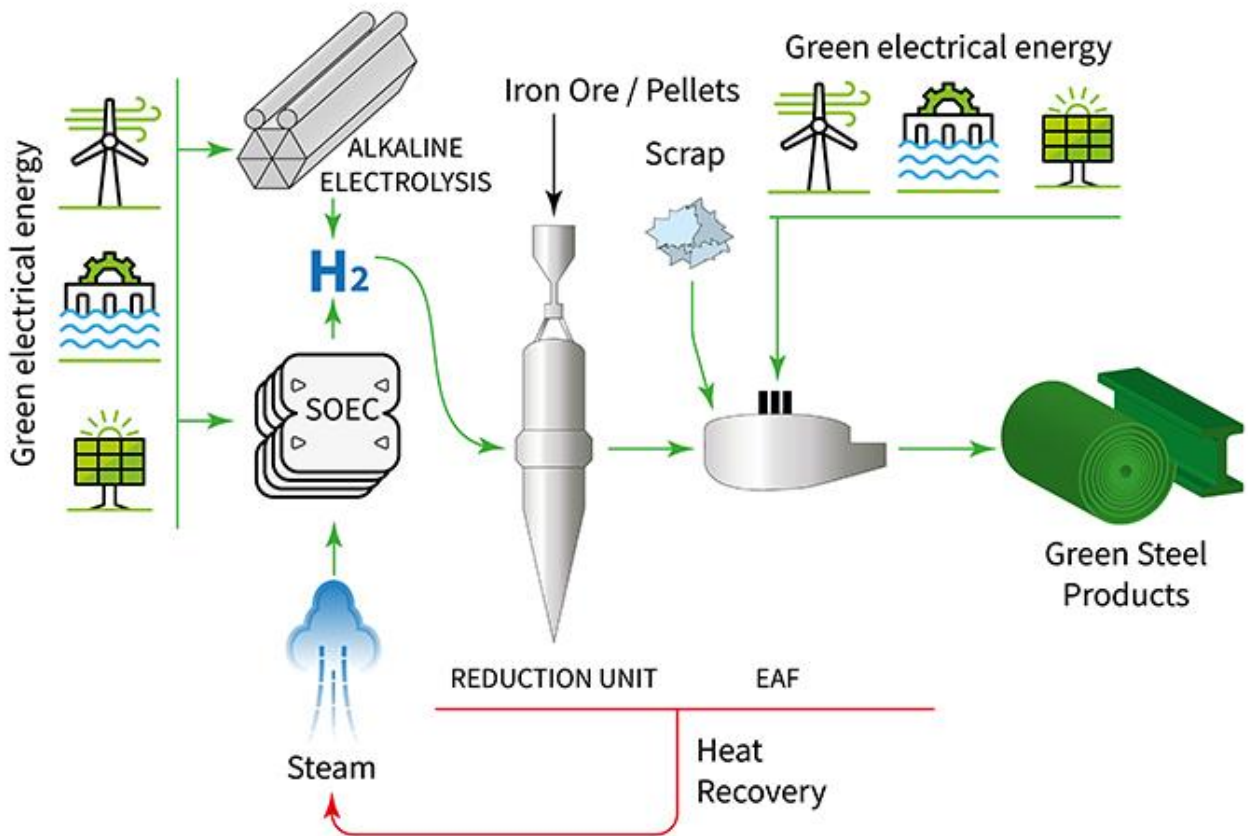
UPSC CURRENT AFFAIRS NOTES 04-04-2024

GREEN STEEL

In March 2023, Union Steel Minister Jyotiraditya Scindia approved the formation of 13 task forces to identify action points for each aspect of green steel production and the adoption of sustainable manufacturing processes

Essentially, green steel is the manufacturing of steel without the use of fossil fuels.

So-called “green hydrogen” is one solution that could help reduce the steel industry’s carbon footprint.



“When burned, hydrogen emits only water. And if that hydrogen is produced via electrolysis using just water and renewable electricity, then it is completely free of CO₂ emissions,” according to Mitsubishi Heavy Industries Group (MHI). Hydrogen can also be low carbon if produced using fossil fuels and carbon



capture, utilization and storage (CCUS) technologies, says MHI. This is known as “blue hydrogen”.

Electric arc furnaces are another option. These furnaces are gradually replacing traditional ones, but they are not always powered by renewable sources, and therefore the steel they produce may not always be green.

Why can't all steel be green?

Some of the world's biggest manufacturers are planning to reduce their carbon footprint by increasing the use of electric furnaces. But a report by the NGO Global Energy Monitor, says the shift from traditional blast furnaces to electric arc furnaces is “stagnant” and significantly behind decarbonization targets.

It says 31% of current steelmaking capacity uses electric furnaces, but only 28% of capacity under construction will use the technology. “We need to stop investing in coal-based blast furnace equipment and speed up the shift towards electric arc furnace steelmaking,” said the report's author, Caitlin Swalec.

The hydrogen solution is also hitting stumbling blocks. “The real roadblock for green steel is simply the availability of low-carbon hydrogen,” says an MHI technology officer.

“Scaling up this technology will require massive amounts of green or blue hydrogen.”

The real roadblock for green steel is simply the availability of low-carbon hydrogen. Blue and green hydrogen can help reduce or eliminate CO₂ emissions. Image: Gasunie

The path to net zero

The world's richest G7 economies can achieve carbon neutrality if governments implement the right policies in the next five years, according to the International Energy Agency (IEA). In a new report, the IEA says G7 economies need to recognize the use of interim technologies that substantially reduce emissions even if they aren't considered zero emissions.

This decade is key to set the tracks to climate neutrality. Especially in sectors where emissions are high but hard-to-abate like steel and cement, we have to fundamentally shift production methods.

One global initiative working to decarbonize industrial sectors like steel is the World Economic Forum's First Movers Coalition. At the Forum's Annual



Meeting in Davos this year, the Coalition announced it had expanded, with 55 companies and nine countries now committed to purchasing a proportion of the industrial materials and transport they need from suppliers using near-zero or zero-carbon solutions.

Promotion of Green Steel

The emissions from iron and steel sector as reported by Ministry of Environment, Forest and Climate Change (MoEFCC) in India's first, second and third Biennial Update Reports (BURs) to the United Nations Framework Convention on Climate Change (UNFCCC) for the years 2010, 2014 and 2016 were 95.998 million tonnes CO₂, 154.678 million tonnes CO₂ and 135.420 million tonnes CO₂, respectively.

The Ministry of Steel is committed to Net-Zero target by 2070. Towards this, in short term (FY 2030), reduction of carbon emissions in steel industry through promotion of energy and resource efficiency as well as renewable energy is being focused. For the medium term (2030-2047), utilisation of Green Hydrogen and Carbon Capture, Utilisation and Storage are the focus areas. For long term (2047-2070), disruptive alternative technological innovations can help achieve the transition to net-zero. For this purpose, Ministry of Steel is continuously engaging with various stakeholders.

Steps taken for promoting decarbonization in steel industry include:-

Steel Scrap Recycling Policy, 2019 enhances the availability of domestically generated scrap to reduce the consumption of coal in steel making.

Ministry of New and Renewable Energy (MNRE) has announced National Green Hydrogen Mission for green hydrogen production and usage. The steel sector has also been made a stakeholder in the Mission.

Motor Vehicles (Registration and Functions of Vehicles Scrapping Facility) Rules September 2021, shall increase availability of scrap in the steel sector.

National Solar Mission launched by MNRE in January 2010 promotes the use of solar energy and also helps reduce the emission of steel industry.

Perform, Achieve and Trade (PAT) scheme, under National Mission for Enhanced Energy Efficiency, incentivizes steel industry to reduce energy consumption.



The steel sector has adopted the Best Available Technologies (BAT) available globally, in the modernization & expansions projects.

Japan's New Energy and Industrial Technology Development Organization (NEDO) Model Projects for Energy Efficiency Improvement have been implemented in steel plants.

LEAP SECONDS

Glaciers are melting so fast that we may need to delay adding that 'negative leap second' to keep clocks aligned with Earth's rotation.

Details

The recent study published in the science journal Nature sheds light on a fascinating aspect of how climate change, particularly the rapid melting of ice sheets in Greenland and Antarctica, is affecting the Earth's rotation and, consequently, our timekeeping systems.

Key takeaways

Impact of Melting Ice Sheets:

The study highlights how the accelerated melting of glaciers and ice sheets due to rising global temperatures is leading to the redistribution of weight across the planet.

This redistribution is causing a slight slowdown in the Earth's rotation on its axis, altering the rotation rate that our clocks and calendars are based on.

Coordinated Universal Time (UTC) and Leap Seconds:

UTC, managed by scientists, is used to synchronize timekeeping worldwide.

Leap seconds are periodically added to UTC to account for variations in the Earth's rotation, ensuring that atomic time and astronomical time remain in sync.

Since the 1970s, leap seconds have been added 27 times to compensate for the Earth's slightly faster rotation.

Delay in Implementing "Negative Leap Second":



Initially, scientists planned to subtract a "negative leap second" from UTC for the first time in 2026 to address the Earth's faster rotation.

However, the recent study suggests that the accelerated melting of ice sheets has acted as a brake, slowing down the Earth's rotation sufficiently.

Consequently, the need for the negative leap second may be postponed until 2029 or later, according to the study's findings.

Potential Challenges and Concerns:

While delaying the implementation of the negative leap second may seem beneficial in the short term, it could pose challenges in the future.

Adjusting timekeeping systems to accommodate a negative leap second may cause significant disruptions and headaches, especially for computer systems not designed to handle subtracting time.

While the study suggests a potential delay in needing the negative leap second, some experts caution that the Earth's rotation is unpredictable.

Demetrios Matsakis, a former chief scientist for time services at the US Naval Observatory, expresses skepticism about definitively predicting when or if the negative leap second will be necessary.

About Leap Seconds

Leap seconds are adjustments made to Coordinated Universal Time (UTC) in order to keep it in sync with the Earth's rotation.

These adjustments are necessary because the Earth's rotation is gradually slowing down due to tidal forces caused by the gravitational interactions with the Moon and other celestial bodies.

Background

Origin: The concept of leap seconds was introduced in 1972 by the International Telecommunication Union (ITU) and the International Astronomical Union (IAU) to account for discrepancies between atomic time and Earth's rotation.

Atomic Time vs. Earth's Rotation:

Atomic Time: Based on the International Atomic Time (TAI), which relies on the vibrations of atoms, particularly cesium atoms.



Earth's Rotation: Determined by astronomical observations, such as the time it takes for the Earth to complete one rotation relative to distant stars (sidereal day).

How Leap Seconds Work

Occurrence: Leap seconds are typically added to or subtracted from UTC at the end of June or December, but not necessarily every year.

Direction: Leap seconds can either be positive (added) or negative (subtracted) depending on the discrepancy between UTC and TAI.

Frequency: Leap seconds are irregularly spaced and are determined by the International Earth Rotation and Reference Systems Service (IERS) based on astronomical observations.

Impact and Importance

Precision: Leap seconds ensure that UTC remains within 0.9 seconds of mean solar time (UT1), preserving the accuracy of civil timekeeping.

Technological Impact: Some computer systems and software require special handling to accommodate leap seconds, as they can potentially disrupt operations if not properly accounted for.

Scientific Research: Accurate timekeeping is crucial for scientific research, particularly in fields such as astronomy, geodesy, and telecommunications.

Debates

Disruptions: The irregular nature of leap seconds can pose challenges for certain systems, leading to debates over whether leap seconds should be abolished or replaced with a different system.

Alternatives: Proposed alternatives to leap seconds include a continuous time scale without adjustments or a fixed schedule for leap seconds, among others. However, reaching consensus on a new system has proven challenging.

Leap seconds play a crucial role in maintaining the accuracy of our timekeeping systems by reconciling the precision of atomic clocks with the Earth's variable rotation. While they present challenges for certain technologies and systems, they are essential for ensuring the reliability and integrity of timekeeping on a global scale. As we continue to advance technologically, ongoing discussions

and debates surrounding leap seconds will shape the future of timekeeping standards and practices.

SCORES 2.0

SEBI (Securities and Exchange Board of India) introduces the latest version of the SEBI Complaint Redress System (SCORES 2.0).

Aims to enhance the efficiency of the investor complaint redress mechanism in the securities market.



Features of SCORES 2.0

Auto-Routing and Auto-Escalation:

Complaints are automatically routed to the concerned regulated entity, eliminating time lapses.

Ensures a smoother flow of complaints for quicker resolution.

Reduced Timelines:

Complaint redressal timeline reduced to 21 calendar days from the date of receipt of the complaint.

Significantly shorter than the previous requirement of 30 days.

Two-Level Review Process:

First review by designated bodies if the investor remains dissatisfied after resolution by the regulated entity.



Second review by SEBI if the investor remains dissatisfied after the first review.

Integration with KYC Registration Agency Database

SCORES 2.0 integrated with KYC Registration Agency database for seamless investor registration onto the platform.

Aims to simplify the registration process and increase investor participation in the complaint redress system.

Significance of SCORES 2.0

Strengthening investor confidence in the securities market.

Promoting transparency and accountability among regulated entities.

Facilitating quicker resolution of investor grievances, enhancing overall market efficiency.

SCORES 2.0 marks a significant step towards improving investor protection and regulatory oversight in the securities market.

By streamlining the complaint redress process and reducing timelines, SEBI aims to foster a more investor-friendly environment conducive to sustainable market growth.

ATAL TUNNEL

Traffic came to a halt at the Atal Tunnel in Rohtang near Manali following heavy snow.

Atal Tunnel (also known as Rohtang Tunnel), named after former Prime Minister of India, Atal Bihari Vajpayee is a highway tunnel built under the Rohtang Pass in the eastern Pir Panjal range of the Himalayas on the National Highway 3 in Himachal Pradesh.

At a length of 9.02 km, it is the highest highway single-tube tunnel above 10,000 feet (3,048 m) in the world.

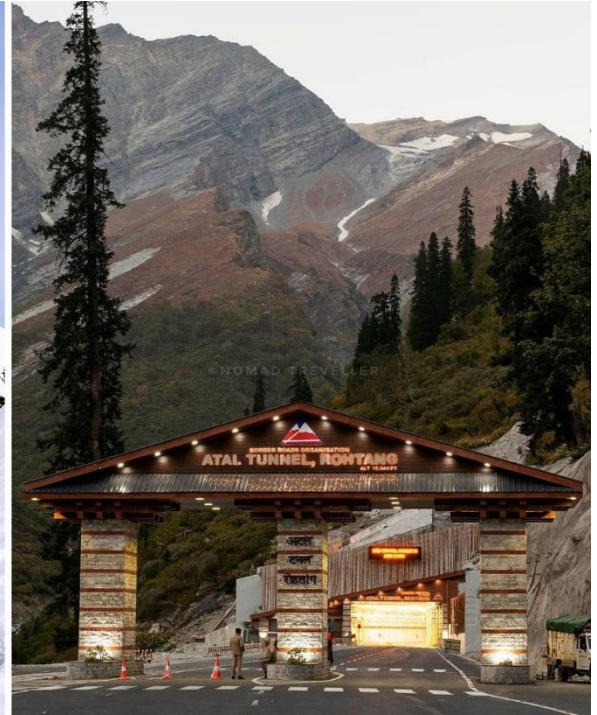
The tunnel is in the form of a single-tube double lane and has a shape similar to the horseshoe.

The project.

It was inaugurated by Prime Minister Narendra Modi on 3 October 2020.

The cost of the entire project is ₹3,200 crore (US\$438 million)

The tunnel was completed by the Border Roads Organisation (BRO) under Ministry of Defence.



Significance:

Reduced Road Distance: The distance between Manali and Leh is reduced by 46 KM by road which in turn reduced the time by 4 to 5 hours. As a result, the distance between Manali to Lahaul and Spiti Valley is estimated to be covered in about 15 minutes.

Electromechanical Systems:

The Tunnel has a system of separate ventilation ducts for fresh air, fire-fighting systems and solutions controlled by SCADA, fire hydrants at every 60 meters, turning cavern at every 2.2 km, and illumination. It also has two monitoring systems at both ends of the tunnel to analyze the movement of the vehicle and keep a view on pollution control.

Connectivity Throughout the Year: The major advantage of the tunnel is in providing fascinating connectivity to Ladakh. Now the connection between



Ladakh to Manali and Chandigarh exists throughout the year which was not possible before due to the winter season as the roads were covered with snow.

Strategic Importance:The Tunnel was also treated as a boon for the armed forces. It gives continuous connectivity to the borders throughout the year. Due to snowbound reasons, earlier it was difficult for the armed forces to travel along the borders, but the foundation of this tunnel proved a boon for the armed forces with their easy access to the border areas.

Availability of Essential Commodities:The necessities of life like petrol, vegetables, diesel, and other supplies would also be available throughout the year which was not possible earlier.

Easy Access to Farmers, Horticulturalists, and Youth:The Tunnel also benefitted farmers and other daily living youth in India to have easy access to the capital of the country to approach job opportunities, sales, and consumer markets. In this way, farmers can protect their precious crops from decaying in the trucks before reaching the market.

Motivate and Enhance Tourism:The Atal Tunnel will gradually enhance the tourism sector. This will improve the livelihoods of the people residing in Lahaul Valley and Ladakh and thus tourism.

Network Connectivity:Three 4G base transceiver stations (BTS) were installed by BSNL in the Tunnel providing strong network connectivity which makes it possible for the residents to contact and reach the outside world. The Tunnel also possesses an automatic incident detection system along with high-resolution CCTV cameras at every 250 meters and a telephonic facility at every 150 meters.

Emergency Terms and Conditions:The Atal Tunnel has a public announcement system in times of emergency. Avalanche control structures have also been constructed to prevent any damage to the roads.

New Austrian Tunnelling Method (NATM):

The New Austrian Tunnelling Method (NATM) is a method of modern tunnel design and construction. This technique is quite popular, employing sophisticated monitoring to optimize various wall reinforcement techniques based on the type of rock encountered in tunnelling progresses. The method analyses the rock's behaviour under load monitors the performance during underground construction and integrates both the principles during construction.



Broad principles of NATM:

Shot Crete Protection: Shotcrete is a mixture of aggregate and Portland cement, conveyed by compressed air to the nozzle of a spray gun. It involves the excessive rock mass deformation to be minimized by applying a layer of 25-50mm of sealing shotcrete immediately after the opening of the face. It is used to reinforce both temporary and permanent excavations.

Mobilization of the Strength of Rock Mass: For the Tunnel to be strong, the mobilization of the strength of rockiness acts as an important factor. The primary support is analysed by checking whether the rock can support itself or not.

Dynamic Design: The design is a dynamic factor during tunnel construction. The selection of the opening rock face and support is based upon the classification of different rocks. Simultaneously, the design is thereafter reinforced based on the deformation as everything is noticed during the monitoring.

Other Features: Primary lining, the closing of invert, measurements, and rock mass classification are the other principles of NATM.

AICTE's Yuvak Scheme

The All-India Council for Technical Education (AICTE) has recently introduced the Youth Undertaking Visit for Acquiring Knowledge (YUVAK) scheme with a vision to impart engineering prospects of the Atal Tunnel among students.

The scheme was initiated to provide financial assistance to technical institutions under AICTE to conduct a study tour to Atal.

The YUVAK program aims to exchange knowledge about the modern techniques and extraordinary efforts used in the construction of the tunnel. The purpose of the visit is also to impart knowledge of the New Austrian Tunnelling method to faculties and students.

The YUVAK program will surely enhance the quality of engineering education in the colleges, inculcate research culture, promote innovation concept, project-based learning, and boost the confidence among the students to think differently.



PLASTIC WASTE MANAGEMENT (AMENDMENT) RULES 2024

New rules introduced by the Union Environment Ministry address plastic pollution by setting standards for labelling disposable plastic ware, particularly products labelled as 'biodegradable', aiming to ensure their environmental impact is accurately communicated.

Microplastics, tiny plastic fragments less than a millimetre in size, have become a major environmental concern. These persistent pollutants contaminate rivers, oceans, and even the food chain, posing a threat to ecosystems and potentially human health.

In response, India is taking a stricter approach to regulating "biodegradable" plastics, a supposedly eco-friendly alternative to traditional plastics.

What is Biodegradable Plastic?

Biodegradable plastics were introduced as a potential solution to plastic waste.

These plastics would decompose naturally after use, minimising plastic accumulation in landfills and the environment.

Challenges with current regulations

Incomplete Breakdown: Previous regulations in India lacked clear definitions for "biodegradable." There were no guarantees that these plastics would fully decompose, potentially leaving behind microplastics.

Testing Ambiguity: The existing rules didn't specify how to measure biodegradability or the acceptable level of microplastics remaining after breakdown. This ambiguity created uncertainty for both manufacturers and consumers.

New Rules announced by the Union Environment Ministry

The Environment Ministry has recently introduced amendments to the Plastic Waste Management Rules, aiming to tighten the definition of "biodegradable" plastics.

No Microplastics Allowed: The new definition requires complete biodegradation, leaving no microplastics behind. This is a significant step towards preventing further plastic waste pollution, even from supposedly eco-friendly alternatives.



Industry concerns

Microplastics from Multiple Sources: Microplastic pollution comes from various sources, including clothing fibres, car tyres, and industrial processes. Manufacturers believe both biodegradable and compostable plastics should be subject to the same standardised microplastics test (once established) to ensure fairness.

Testing Challenges Remain: The new rules lack specific details on testing methods. Manufacturers are unsure of the exact tests or acceptable microplastic levels required for "biodegradable" labelling. This ambiguity creates challenges in proving compliance with the new regulations.

Incomplete Degradation Concerns: Current regulations by the Central Pollution Control Board (CPCB) define "biodegradable" as a plastic sample that degrades by 90%. However, achieving this level can take years.

Way Forward

The Need for Research and Development: Further research is needed to develop improved biodegradable plastics that break down completely and don't generate microplastics. This could involve exploring different biodegradation rates and mechanisms under various environmental conditions.

Consumer Education: Raising public awareness about responsible plastic use and disposal habits is essential. Consumers can help by choosing products with minimal packaging, properly disposing of waste, and supporting companies that prioritise sustainable practices.

Compostable Plastics: Compostable plastics, which require industrial composting facilities to break down, can also be a viable alternative to traditional plastics. However, ensuring proper composting infrastructure is available is crucial for their effectiveness.

India's new regulations on biodegradable plastics represent a positive step towards tackling microplastic pollution. However, establishing clear testing standards and addressing industry concerns are crucial for effective implementation. By working together, policymakers, manufacturers, scientists, and consumers can find innovative solutions to address plastic pollution and protect our environment for future generations.



Ring of Fire

Taiwan is prone to earthquakes as it lies along the Pacific “Ring of Fire” — where 90% of the world’s earthquakes take place.

About Ring of Fire

It is a string of hundreds of volcanoes and earthquake-sites which runs along the Pacific Ocean. It is a semicircle or horse shoe in shape and stretches nearly 40,250 kilometres.

It traces the meeting points of numerous tectonic plates, including the Eurasian, North American, Juan de Fuca, Cocos, Caribbean, Nazca, Antarctic, Indian, Australian, Philippine, and other smaller plates, which all encircle the large Pacific Plate.

It runs through 15 more countries including the USA, Indonesia, Mexico, Japan, Canada, Guatemala, Russia, Chile, Peru, and the Philippines.

Why is it more prone to earthquakes?

It witnesses so many earthquakes due to constant sliding past, colliding into, or moving above or below each other of the tectonic plates. As the edges of these plates are quite rough, they get stuck with one another while the rest of the plate keeps moving.

An earthquake occurs when the plate has moved far enough and the edges unstick on one of the faults.

There are many volcanoes in the Ring of Fire due to the movement of tectonic plates. Many of the volcanoes have been formed through a process known as subduction.

It takes place when two plates collide with each other and the heavier plate is shoved under another, creating a deep trench.

Most of the subduction zones on the planet are located in the Ring of Fire and that’s why it hosts a large number of volcanoes.