



Adoption of E20 Fuel and Green Hydrogen Production

For Prelims: [E20](#), [Ethanol Blending](#), [National Green Hydrogen Mission](#), [G20 presidency](#), [Nitrous oxides](#), [Green hydrogen](#), [International Energy Agency](#), [Renewable energy](#), [Carbon emissions](#).

For Mains: Applications of Green Hydrogen, Advantages of Ethanol Blending.

Why in News?

In a recent announcement, the Union Minister of Petroleum and Natural Gas, highlighted that **petrol blended with 20% ethanol, known as E20**, will soon be available at **1,000 outlets of oil marketing companies (OMCs) nationwide**.

- The [National Green Hydrogen Mission](#) aim to achieve a production capacity of **5 Million Metric Tonnes (MMT) per annum by 2030**, was also highlighted.

What is Ethanol Blending and E20 Fuel?

▪ About:

- **Ethanol is an agricultural by-product which is mainly obtained from the processing of sugar from sugarcane**, but also from other sources such as rice husk or maize.
 - **Blending ethanol with petrol to burn less fossil fuel while running vehicles is called [Ethanol Blending](#).**
 - **E20 fuel is a blend of 20% ethanol and 80% petrol.** The E20 was launched by the **Prime Minister of India in February 2023 in Bengaluru**. This pilot covers at least 15 cities and will be rolled out across the country in a phased manner.
- India has been increasing **its ethanol blending in petrol from 1.53% in 2013-14 to 10.17% in 2022**.
 - The government has advanced its target to achieve 20% ethanol blending in petrol **from 2030 to 2025**.
 - During our [G20 presidency](#), the government has also proposed to launch a **global biofuel alliance with countries like Brazil** to promote biofuels internationally.

▪ Advantages:

- E20 fuel has several advantages over conventional petrol, such as:
 - It **reduces vehicular tailpipe emissions** by lowering the carbon monoxide, hydrocarbons and nitrogen oxides levels.
 - It **improves engine performance and reduces maintenance costs** by preventing corrosion and deposits.
 - It **reduces the import bill for crude oil** by substituting domestic ethanol production.
 - It is estimated that a **5% blending (105 crore litres)** can result in replacement of **around 1.8 million barrels of crude oil**.
 - India imported 185 million tonnes of petroleum at a cost of USD 551 billion in 2020-21. A successful E20 programme **can save the country USD 4 billion or Rs 30,000 crore per annum**.

- It **supports the farmers and rural economy** by creating demand for surplus crops.

▪ **Challenges:**

- **Shift Towards Sugarcane Production:** In order to achieve a 20% blend rate, almost **one-tenth of the existing [net sown area](#) will have to be diverted for sugarcane production.**
 - Any such land requirement is likely to put a **stress on other crops and has the potential to increase food prices.**
- **Storage Constraint:** Annual capacity of required bio-refineries is stipulated to be **300-400 million litres**, which is still not enough to meet the 5% petrol-ethanol blending requirement.
 - Storage is going to be the main concern, **for if E10 supply has to continue in tandem with E20 supply**, storage would have to be separate which then raises costs.

What is Green Hydrogen?

▪ **About:**

- **Green hydrogen** is hydrogen produced by **electrolysis of water using renewable or green energy.**
- It is considered the **cleanest form of energy, as it does not emit any greenhouse gases when used.**
 - India has the potential to become a leader and a superpower in green hydrogen production, **according to the [International Energy Agency \(IEA\)](#).**
 - India has abundant renewable capacity, especially solar power, which can be used to produce green hydrogen at low cost.
 - India has also set a target of producing **5 million metric tonnes of green hydrogen per annum by 2025-26 under its National Hydrogen Mission.**
 - The **private sector is also actively engaged in pursuing green hydrogen production** and has attracted significant investment from international sources.

▪ **Applications:**

- **Decarbonizing Energy Systems:** Green hydrogen can be used as a clean energy carrier and stored for later use.
 - It can be utilised in sectors such as **power generation, heating, and transportation to replace [fossil fuels](#)**, thereby reducing **[carbon emissions](#).**
- **Production of Green Ammonia:** Green hydrogen has the potential to replace **traditional fertilisers in agriculture through the production of ammonia using renewable energy sources.**
 - Green ammonia produced with help of green hydrogen is carbon-free, it has other benefits **over traditional fertilisers, including improved efficiency and reduced soil acidity.**
- **Off-Grid and Remote Power Generation:** Green hydrogen can provide reliable and clean power in **off-grid or remote locations where access to electricity is limited.**
 - It can be used in **fuel cells or combustion engines** to generate electricity for communities, industries, and infrastructure.

▪ **Challenges:**

- **Cost:** Currently, the **production of green hydrogen is more expensive compared to hydrogen produced from fossil fuels through steam methane reforming.**
 - The high cost is primarily due to the capital investment required for renewable energy infrastructure.
- **Scale and Infrastructure:** Establishing a comprehensive green hydrogen infrastructure, including **production, storage, and transportation, is a significant challenge.**
 - Scaling up production capacity and building a distribution network for hydrogen require substantial investments.
 - Additionally, **retrofitting existing infrastructure or creating new pipelines, storage facilities, and refuelling stations adds to the complexity and cost.**
 - **Impact on Resources:** About **9 kilograms (kg) of water** is required per kg of hydrogen.
 - The **production of green hydrogen requires vast amounts of**

- resources: land, water, and renewable energy.** This can fuel land-use and water conflicts, human rights violations, energy poverty, and the delay of the de-carbonisation of the electricity grid in producer countries
- **Energy Efficiency:** The process of electrolysis requires large amounts of electricity to split water into hydrogen and oxygen.
 - While **renewable energy sources can provide a clean electricity input**, the overall energy efficiency of the process is relatively low.

Way Forward

- **Policy and Regulatory Framework:** India needs to **formulate and implement supportive policies that provide incentives for ethanol production**, blending, and use, as well as promote the development of green hydrogen.
 - This includes **setting blending mandates, ensuring a favourable pricing framework, and establishing quality standards for both E20 and Green Hydrogen.**
- **Technological Advancements:** In the case of E20, advanced blending technologies, such as **flex-fuel engines and compatible fuel systems**, need to be developed and made widely available.
 - For Green Hydrogen, the **advancement of electrolyzer technologies**, storage systems, and efficient conversion processes is crucial to drive down costs and improve efficiency.
- **Public Awareness and Acceptance:** Public awareness and acceptance play a significant role in the successful adoption of E20 and Green Hydrogen.
 - Raising awareness about the benefits of these alternatives, addressing concerns related to **fuel efficiency, performance, and compatibility**, and promoting the environmental advantages are essential.
 - **Educating consumers, industry stakeholders, and policymakers** about the potential of these solutions and their contribution to decarbonization can drive acceptance and demand.

UPSC Civil Services Examination, Previous Year Questions (PYQ)

Q. Given below are the names of four energy crops. Which one of them can be cultivated for ethanol? (2010)

- (a) Jatropha
- (b) Maize
- (c) Pongamia
- (d) Sunflower

Ans: (b)

Q. According to India's National Policy on Biofuels, which of the following can be used as raw materials for the production of biofuels? (2020)

1. Cassava
2. Damaged wheat grains
3. Groundnut seeds
4. Horse gram
5. Rotten potatoes
6. Sugar beet

Select the correct answer using the code given below:

- (a) 1, 2, 5 and 6 only
- (b) 1, 3, 4 and 6 only
- (c) 2, 3, 4 and 5 only
- (d) 1, 2, 3, 4, 5 and 6

Ans: (a)

Q. Consider the following heavy industries: (2023)

1. Fertiliser plants
2. Oil refineries
3. Steel plants

Green hydrogen is expected to play a significant role in decarbonizing how many of the above industries?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Ans: (c)

[Source: DTE](#)

Transgenic Crops

For Prelims: Transgenic Crops, [GEAC](#), [Genetically Modified Crops](#), Environment (Protection) Act, 1986, Bt Cotton.

For Mains: Transgenic Crops.

Why in News?

Recently, Gujarat, Maharashtra and Telangana, have deferred a proposal, approved by the **Centre's Genetic Engineering Appraisal Committee (GEAC)**, to test a new kind of Transgenic Cotton Seed that contains a gene, Cry2Ai.

- Gene Cry2Ai purportedly makes cotton **resistant to pink bollworm**, a major pest. The conflict shows that a **broad acceptance of genetically modified crops** continues to be elusive.

Note: Agriculture being a State subject means that, in most cases, companies interested in testing their seeds need **approvals from the States for conducting such tests**. Only Haryana gave permission for such tests.

- Telangana requested an extension to **consider the proposal and later responded that trials would not be allowed in the current cropping** season. Gujarat, on the other hand, simply stated that the proposal was unacceptable without furnishing reasons.

What are Transgenic Crops?

- **About:**

- Transgenic crops are plants that have been modified through genetic engineering techniques. These crops have had **specific genes inserted into their DNA** to give them new characteristics or traits that are not naturally found in the species through traditional breeding methods.
- **GMO vs Transgenic Organisms:**
 - Genetically Modified Organism (GMO) and transgenic organism are two terms that are used interchangeably.
 - However, there is a **slight difference** between GMO and transgenic organism. Although both have altered genomes, a transgenic organism is a GMO **containing a DNA sequence or a gene from a different species**. While a GMO is an animal, plant, or microbe **whose DNA has been altered** using genetic engineering techniques.
 - Thus, all transgenic organisms are GMOs, but not all GMOs are transgenic.
- **Status in India:**
 - In India, only **Cotton is currently commercially cultivated as a GM crop**. Trials are underway for other crops like brinjal, tomato, maize, and chickpea using transgenic technology.
 - The GEAC approved the **environmental release of GM mustard hybrid DMH-11, bringing it closer to full commercial cultivation**.
 - However, there is an ongoing legal case in the **Supreme Court** questioning the permission for transgenic food crops. They seek a **stay on GM mustard, citing concerns about farmers using banned herbicides**.
 - Previous instances include the GEAC's approval of GM mustard in 2017 with additional tests and the government's indefinite moratorium on GM brinjal in 2010.

How Are Genetic Modified Crops Regulated in India?

- **Regulation:** In India, the regulation of all activities related to GMOs and products are **regulated by the Union Ministry of Environment, Forest and Climate Change (MoEFCC)** under the provisions of the **Environment (Protection) Act, 1986**.
 - **Genetic Engineering Appraisal Committee (GEAC)** under MoEFCC is authorised to review, monitor and approve all activities including import, export, transport, manufacture, use or sale of GMO.
 - GEAC recently approved commercial cultivation of **genetically modified mustard**.
 - GM foods are also subjected to regulations by the **Food Safety and Standards Authority of India (FSSAI)** under the Food Safety and Standards Act, 2006.
- **Acts and Rules that Regulate GM Crops in India:**
 - Environment Protection Act, 1986 (EPA),
 - Biological Diversity Act, 2002,
 - Plant Quarantine Order, 2003,
 - GM policy under Foreign Trade Policy, Food Safety and Standards Act, 2006,
 - Drugs and Cosmetics Rule (8th Amendment), 1988.

What is the Process of Regulating Transgenic Crops in India?

- Developing transgenic crops involves **inserting transgenic genes into plants to achieve a sustained, protective response**
- The process involves a mix of science and chance.
- **Safety assessments by committees are conducted** before open field tests.
- Open field tests are done at agricultural universities or **Indian Council for Agricultural Research (ICAR)**-controlled plots.
- Transgenic plants **must be better than non-GM variants and environmentally safe** for commercial clearance.
- **Open field trials assess suitability** across multiple seasons and geographical conditions.

What is the Significance of Genetic Modification (GM) Technique?

- **Safer and Affordable Vaccines:** The GM has revolutionized the **pharmaceutical sector by**

enabling the production of safer and more affordable vaccines and therapeutics. It has facilitated the **mass production of drugs like human insulin**, vaccines, and growth hormones, making life-saving pharmaceuticals more accessible.

- **Control Weeds:** GM technology has also played a crucial role in **developing herbicide-tolerant crops**. **Crops like soybean, maize, cotton**, and canola have been genetically modified to withstand specific broad-spectrum herbicides, allowing farmers to effectively control weeds while preserving the cultivated crop.
- **Ensuring Food Security:** GM crops are being developed to adapt to **changing environmental conditions**. Researchers are working on strains of rice, maize, and wheat that can tolerate longer droughts and wetter monsoon seasons, ensuring food security in challenging climates.
- **Solution for Growing Crops in Salty Oils.** GM has also been **used to create salt-tolerant plants, offering** a potential solution for growing crops in salty soils. By inserting genes that remove **sodium ions from water and maintain cell balance**, plants can thrive in high-salt environments.

What are the Concerns related to Transgenic Crops?

- **Lack Nutritional Value:** GM foods can sometimes **lack nutritional value despite their increased production** and pest resistance focus. This is because the emphasis is often placed on enhancing certain traits rather than nutritional content.
- **Risks to Ecosystems:** GM production can also **pose risks to ecosystems and biodiversity**. It may disrupt gene flow and harm indigenous varieties, leading to a loss of diversity in the long run.
- **Trigger Allergic Reactions:** Genetically modified foods have the potential to **trigger allergic reactions** since they are biologically altered. This can be **problematic for individuals accustomed** to conventional varieties.
- **Endangered Animals:** Wildlife is also at risk due to GM crops. For instance, genetically modified plants used for producing plastic or pharmaceuticals can **endanger animals like mice or deer** that consume crop debris left in fields after harvest.

Way Forward

- In the face of new advances, the **regulatory regime needs to be strengthened**, for the sake of domestic as well as export consumers.
- **Technology approvals must be streamlined** and science-based decisions implemented.
- Rigorous monitoring is needed to ensure that **safety protocols are followed strictly**, and enforcement must be taken seriously to prevent the spread of illegal GM crops.

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q1. Other than resistance to pests, what are the prospects for which genetically engineered plants have been created? (2012)

1. To enable them to withstand drought
2. To increase the nutritive value of the produce
3. To enable them to grow and do photosynthesis in spaceships and space stations
4. To increase their shelf life

Select the correct answer using the codes given below:

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

Ans: (c)

Q2. Bollgard I and Bollgard II technologies are mentioned in the context of (2021)

- (a) clonal propagation of crop plants
- (b) developing genetically modified crop plants
- (c) production of plant growth substances
- (d) production of biofertilizers

Ans: (b)

Mains

Q. How can biotechnology help to improve the living standards of farmers? **(2019)**

[Source: TH](#)

Lingering Health Effects of Bhopal Gas Tragedy

For Prelims: [1984 Bhopal Gas Tragedy](#), [Neonatal mortality](#), [Methyl isocyanate](#), [Environment \(Protection\) Act, 1986](#), [Public Liability Insurance Act of 1991](#), [UN's International Labour Organization](#).

For Mains: Ways to Prevent Future Industrial Disasters.

Why in News?

The [1984 Bhopal Gas Tragedy](#), one of the world's worst industrial disasters, continues to cast a long shadow on the health of future generations, **even those who were not directly exposed to the toxic gas.**

- A recent study has shed light on the persistent health issues faced by **individuals, including disabilities and cancer, decades after the tragic event.**

What are the Major Findings of the Research?

- **About:** The study reveals that the repercussions of the Bhopal Gas Tragedy extend beyond immediate mortality and morbidity. It has been observed that the **impacts of the disaster are visible in a 100 km radius around Bhopal**, affecting a wider area than previously reported.
 - The findings highlight the social costs associated with the tragedy, which continue to afflict subsequent generations.
- **Health Issues Faced by Survivors:** The survivors of the Bhopal Gas Tragedy have experienced a range of health problems over the years. These include **respiratory, neurological, musculoskeletal, ophthalmic** (related to eyes), **and endocrine issues.**
 - Additionally, there has been a significant increase in **miscarriages, stillbirths, neonatal mortality, menstrual abnormalities**, and premature menopause among women exposed to the toxic gas.
- **Investigating Long-Term Health Effects:** Researchers from the **University of California (UC)** conducted a comprehensive analysis to assess the long-term health consequences and potential intergenerational effects of the Bhopal Gas Tragedy.

- They gathered data from the [National Family Health Survey \(NFHS-4\)](#) conducted **between 2015 and 2016** and the **Integrated Public Use Microdata Series from India for the year 1999**, including individuals ranging from ages six to 64 years and those in utero at the time of the disaster.
- **Disability among Women:** Women who were pregnant with male fetuses and resided within 100 km of Bhopal had a **one percentage point higher disability rate that affected their employment 15 years later.**
- **Decline in Male Births:** There was a decline in the **proportion of male births from 64% (1981-1984) to 60% (1985)** among mothers living within 100 km of Bhopal suggesting a higher vulnerability of male fetuses to external stress.
 - No significant change was observed beyond the 100 km radius.
- **Increased Cancer Risk:** Men born in 1985 within 100 km of Bhopal had an **eightfold higher risk of cancer** compared to those born in the periods **1976-1984 and 1986-1990.**
 - Furthermore, men born in 1985 who continued to reside within 100 km of Bhopal experienced a **27-fold higher risk of cancer in 2015** compared to their counterparts born in the reference periods and individuals living more than 100 km away.
- **Employment Disabilities:** Those who were in utero during the tragedy and lived within 100 km of Bhopal were **one percentage point more likely to report employment disability** compared to older individuals and those residing further from Bhopal.
 - The likelihood increased to two percentage points among those living within 50 km of the city.

What was the Bhopal Gas Tragedy?

- **About:**
 - The **Bhopal gas tragedy** was one of the **worst industrial accidents in history that occurred on the night of 2-3 December 1984** at the **Union Carbide India Limited (UCIL) pesticide plant in Bhopal, MP.**
 - It exposed people and animals to the highly toxic gas [methyl isocyanate \(MIC\)](#), causing immediate and long-term health effects and deaths.
- **Causes of Gas Leak:**
 - The exact cause of the gas leak is still disputed between corporate negligence or employee sabotage. However, some of the factors that contributed to the disaster are:
 - The **UCIL plant was storing large quantities of MIC, a highly reactive and volatile chemical**, in poorly maintained tanks.
 - The plant was operating with **reduced staff and safety standards** due to financial losses and market competition.
 - The **plant was located in a densely populated area with no proper emergency plans** or warning systems for the nearby residents.
 - On the night of the disaster, **a large amount of water entered one of the MIC storage tanks (E610)**, either due to a faulty valve or a deliberate act of sabotage by a disgruntled worker.
 - This triggered an [exothermic reaction](#) that **increased the temperature and pressure inside the tank**, causing it to rupture and release a large cloud of MIC gas into the atmosphere.
- **Reactions:**
 - A 2019 report by the [UN's International Labour Organization \(ILO\)](#) said at least 30 tonnes of the poisonous gas affected more than 600,000 workers and nearby inhabitants.
 - It added the disaster was among the world's **"major industrial accidents after 1919"**.
 - **Laws Passed:**
 - **Bhopal Gas Leak Disaster (Processing of Claims) Act, 1985** - Gave the **Central Govt the "exclusive right" to represent, and act in place of every person connected with the claims.**
 - [Environment \(Protection\) Act, 1986](#), - Authorised the **central govt to take relevant measures and regulate industrial activity** for environmental and public safety.
 - [Public Liability Insurance Act of 1991](#) - Provides public liability insurance for providing immediate relief to the persons affected by an accident occurring while

handling any hazardous substance.

- **Civil Liability for Nuclear Damage Act 2010**- India enacted the **CLNDA in 2010 to put in place a speedy compensation** mechanism for victims of a nuclear accident. It **provides for strict and no-fault liability** on the operator of the nuclear plant, where it will be held liable for damage regardless of any fault on its part.

How can Future Industrial Disasters be Prevented?

- **Risk Assessment Technologies:** There is a need to utilize advanced technologies such as **artificial intelligence, machine learning, and predictive analytics** to identify and assess potential risks in industrial processes.
 - These technologies can analyse vast amounts of data and provide early warnings for potential hazards, enabling proactive safety measures.
- **Social and Environmental Impact Assessments:** There is a need to prioritise **social and environmental impact assessments for industries**, especially those dealing with hazardous materials.
 - Such assessments should **consider the potential risks to nearby communities, ecosystems, and natural resources**, and incorporate preventive measures into the planning and design of industrial processes.
- **Strict Enforcement:** It is crucial to ensure strict enforcement of safety regulations by government authorities.
 - **Regular inspections should be conducted to monitor compliance** with safety standards, and severe penalties should be imposed for violations.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims:

Q2. In India, why are some nuclear reactors kept under “IAEA safeguards” while others are not? (2020)

- (a) Some use uranium and others use thorium
- (b) Some use imported uranium and others use domestic supplies
- (c) Some are operated by foreign enterprises and others are operated by domestic enterprises
- (d) Some are State-owned and others are privately owned

Ans: (b)

Mains:

Q1. With growing energy needs should India keep on expanding its nuclear energy programme? Discuss the facts and fears associated with nuclear energy. (2018)

Source: IE

Sovereign Gold Bond Scheme 2023-24

Why in News?

Recently, the Government of India, in consultation with the [Reserve Bank of India](#), has decided to issue [Sovereign Gold Bonds](#) (SGBs) in tranches for 2023-24.

- The first SGB scheme was launched by the Government in November 2015, under [Gold Monetisation Scheme](#) with an objective **to reduce the demand for physical gold** and shift a part of the domestic savings - used for the purchase of gold - into financial savings.

What are the Key Details of the Scheme?

Item	Details
Issuance	Issued by the Reserve Bank of India on behalf of the Government of India.
Eligibility	SGBs will be restricted for sale to resident individuals, HUFs (Hindu Undivided Family), Trusts, Universities and Charitable Institutions.
Tenor	The tenor of the SGB will be for a period of eight years with an option of premature redemption after 5th year.
Minimum size	Minimum permissible investment will be One gram of gold.
Maximum limit	The maximum limit of subscription shall be 4 Kg for individuals, 4 Kg for HUF and 20 Kg for trusts and similar entities per fiscal year (April-March) notified by the Government from time to time.
Joint holder	In case of joint holding, the investment limit of 4 Kg will be applied to the first applicant only.
Issue price	Price of SGB will be fixed in Indian Rupees on the basis of simple average of closing price of gold of 999 purity, published by the India Bullion and Jewellers Association Limited.
Sales channel	SGBs will be sold through Scheduled Commercial banks (except Small Finance Banks, Payment Banks and Regional Rural Banks), Stock Holding Corporation of India Limited, Clearing Corporation of India Limited , designated post offices and National Stock Exchange of India Limited and Bombay Stock Exchange Limited, either directly or through agents.
Interest rate	The investors will be compensated at a fixed rate of 2.50% per annum payable semi-annually on the nominal value (face value or stated value).
Collateral	The SGBs can be used as collateral for loans.
Tax treatment	The interest on SGBs shall be taxable as per the provision of the Income Tax Act, 1961. The capital gains tax arising on redemption of SGB to an individual is exempted.
Tradability	SGBs shall be eligible for trading.
SLR eligibility	SGBs obtained by banks through the pledge process will be considered as part of their Statutory Liquidity Ratio requirements.

What is India Bullion and Jewellers Association Ltd. (IBJA)?

- IBJA was **established in 1919** as an association for bullion traders in India.
- IBJA is considered the **apex association for all bullion and jewellery associations in India.**
- It **publishes daily Gold AM and PM Rates**, which are benchmark rates for issuing Sovereign and Bonds.
- IBJA is involved in promoting trade through exhibitions and is setting up its own **Domestic Gold Spot exchange, Bullion refinery, and gems & jewellery park.**
- It assists its members in promoting and **regulating bullion trade, resolving disputes,**

providing a neutral platform for weighing precious metals, and interacting with government departments.

- IBJA owns a building in **Zaveri Bazaar, Mumbai**, where it carries out various business activities for the bullion and jewellery industry.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Q. What is/are the purpose/purposes of Government's 'Sovereign Gold Bond Scheme' and 'Gold Monetization Scheme'? (2016)

1. To bring the idle gold lying with Indian households into the economy.
2. To promote FDI in the gold and jewellery sector.
3. To reduce India's dependence on gold imports.

Select the correct answer using the code given below:

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

Ans: (c)

Exp:

- Sovereign Gold Bond Scheme and Gold Monetization Scheme were launched by the Government in 2015.
- The main objectives of these schemes are:
 - To mobilize the gold held by households and institutions in the country. Hence, 1 is correct. To provide a fillip to the gems and jewellery sector in the country by making gold available as raw material on loan from the banks
 - To be able to reduce reliance on import of gold over time to meet the domestic demand. Hence, 3 is correct.
 - To promote FDI in gold and jewellery sector is not the objective of these schemes. Hence, 2 is not correct. Therefore, option (c) is the correct answer.

[Source: PIB](#)

Harmonized Guidelines and Space Standards for Universal Accessibility in India

Why in News?

[Harmonised Guidelines and Space Standards for Universal Accessibility in India-2021](#) prepared by the Ministry of Housing and Urban Affairs has been amended in **RPwD (Amendment) Rules, 2023**.

What are Harmonised Guidelines and Space Standards for Universal Accessibility in India-2021?

- It is a set of rules and standards for making the **physical environment, transportation, information and communication, and other facilities and services accessible for [persons with disabilities \(PwDs\)](#) in India.**
 - The guidelines are a revision of the Harmonised Guidelines and Space Standards for **Barrier-Free Built Environment for Persons with Disabilities and Elderly Persons released in 2016.**
 - Earlier, the guidelines were for creating a **barrier-free environment, but now, the focus is on universal accessibility.**
- The guidelines are not just for **Persons with Disabilities (PwDs), but also for those involved in planning projects**, from the construction of government buildings to master-planning cities.
- The nodal ministry for the implementation of the guidelines is the **Ministry of Housing and Urban Affairs (MoHUA).**

What is the Legislative Framework Related to PwDs in India?

- India ratified the **[UN Convention on the Rights of Persons with Disabilities \(CRPD\)](#)** in 2007 and passed the **Rights of Persons with Disabilities Act in December 2016** which came into effect in 2017.
 - As per the RPwD Act 2016 - **21 types of disabilities have been recognized.**
- As per **Section 40 of RPwD Act 2016**, the Central Govt in consultation with the **Chief Commissioner (for PwDs) formulate rules for persons with disabilities laying down the standards of accessibility for the physical environment, transportation, information and communication**, including appropriate technologies and systems and other facilities and services provided to the public in urban and rural areas.
 - Under this, many initiatives, such as **“Sugamya Bharat Abhiyan”** ([Accessible India Campaign](#)), are being taken up.
- **Other Initiatives:**
 - [Unique Disability Identification Portal](#)
 - [Accessible India Campaign](#)
 - [DeenDayal Disabled Rehabilitation Scheme](#)
 - [Assistance to Disabled Persons for Purchase/fitting of Aids and Appliances](#)
 - [National Fellowship for Students with Disabilities](#)



Holistic Framework for Universal Accessibility Implementation

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims:

Q. India is home to lakhs of persons with disabilities. What are the benefits available to them under the law? (2011)

1. Free schooling till the age of 18 years in government run schools.
2. Preferential allotment of land for setting up business.
3. Ramps in public buildings.

Which of the statements given above is/are correct?

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

Ans: (d)

Mains

Q. Does the Rights of Persons with Disabilities Act, 2016 ensure effective mechanism for empowerment and inclusion of the intended beneficiaries in the society? Discuss. (2017)

Global Wind Day

For Prelims: Wind Energy, Renewable Sources of Energy, Government Initiatives

For Mains: Significance of Wind Energy, Challenges in Wind Energy Projects, Related Government Initiatives

Why in News?

Global Wind Day celebrated on 15th Jun June 2023 by the Ministry of New and Renewable Energy (MNRE) with the theme of **“Pawan - Urja: Powering the Future of India”**.

- MNRE has **set the target of 500 GW renewable energy capacity by 2030** and **Wind Atlas at 150 meter above ground level** was also launched by **National Institute of Wind Energy (NIWE)**, estimating the **onshore wind potential at 1,164 GW**.

What is Global Wind Day?

- Global Wind Day is an annual event since 2007 to promote wind energy as a clean and renewable source of power.
- It was started by the European Wind Energy Association (EWEA) and later joined by the **Global Wind Energy Council (GWEC)**.
 - GWEC is a member-based organisation that represents the entire wind energy sector.

What is Wind Energy?

- **About:**
 - Wind energy is **a form of renewable energy that uses the kinetic energy of the air to generate electricity**.
- **Mechanism:**
 - Wind energy is **created using wind turbines, which are devices that have blades that rotate** when the wind blows.
 - The rotation of the blades drives a generator that produces electricity.
 - **Wind energy can be generated on land or offshore**, where there are stronger and more consistent winds.
- **Emission of Gases:**
 - Wind energy is a **clean and renewable source of power that does not emit greenhouse gases** or other pollutants.
- **Uses:**
 - Wind energy **can be used for homes, businesses, farms**, and other applications. Wind energy is one of the **fastest-growing renewable energy** sources in the world.
- **Some Facts About Wind Energy:**
 - **Global:**
 - The **largest wind power market in the world is China**, with a **capacity of over 237 GW** of wind power installed followed by U.S and Germany.
 - China also has the world's largest onshore wind farm in Gansu Province, built out of the Gobi Desert.
 - **India Specific:**
 - India ranks **fourth in wind power capacity** (with 42.8 GW as of April 2023) in the world and has a huge potential for both onshore and offshore wind energy

production.

- Wind energy is vital for India's transition to a low-carbon economy and achieving its goals of 50% non-fossil fuel-based energy by 2030 and **Net Zero by 2070**.
- **Tamil Nadu installs highest wind power capacity** till June 2022 followed by Gujrat and Karnataka.

▪ **Indian Initiatives:**

- **National Wind-Solar Hybrid Policy:** The main objective of the National Wind-Solar Hybrid Policy, 2018 is to provide a framework for promotion of large grid connected wind-solar PV hybrid systems for optimal and efficient utilization of wind and solar resources, transmission infrastructure and land.
- **National Offshore Wind Energy Policy:** The National Offshore wind energy policy was notified in October 2015 with an objective to develop the offshore wind energy in the Indian **Exclusive Economic Zone (EEZ)** along the Indian coastline of 7600 km.

▪ **Global Initiative:**

- **Global Offshore Wind Alliance (GOWA)** founded by **Denmark, the International Renewable Energy Agency (IRENA), and the Global Wind Energy Council (GWEC)**, was officially launched at COP27 in November 2022, where a large group of countries agreed to a rapid ramp-up of offshore wind.
 - For the coming three years, the founders and **Colombia will co-chair the Alliance.**

UPSC Civil Services Examination, Previous Year Question (PYQ)

Q. Give an account of the current status and the targets to be achieved pertaining to renewable energy sources in the country. Discuss in brief the importance of National Programme on Light Emitting Diodes (LEDs). (2016)

Source: [PIB](#)

Daitari Greenstone Belt

Why In News?

A recent research has unveiled remarkably well-preserved volcanic and sedimentary rocks in [Singhbhum craton, eastern India](#), dating back 3.5 billion years.

- Singhbhum craton is **stretched across Jharkhand and Odisha between Chhota Nagpur plateau and the Eastern Ghats.**
- These findings shed light on India's geologic history and its **similarities to regions in South Africa and Australia.**

What are the Findings?

▪ **Study Area:**

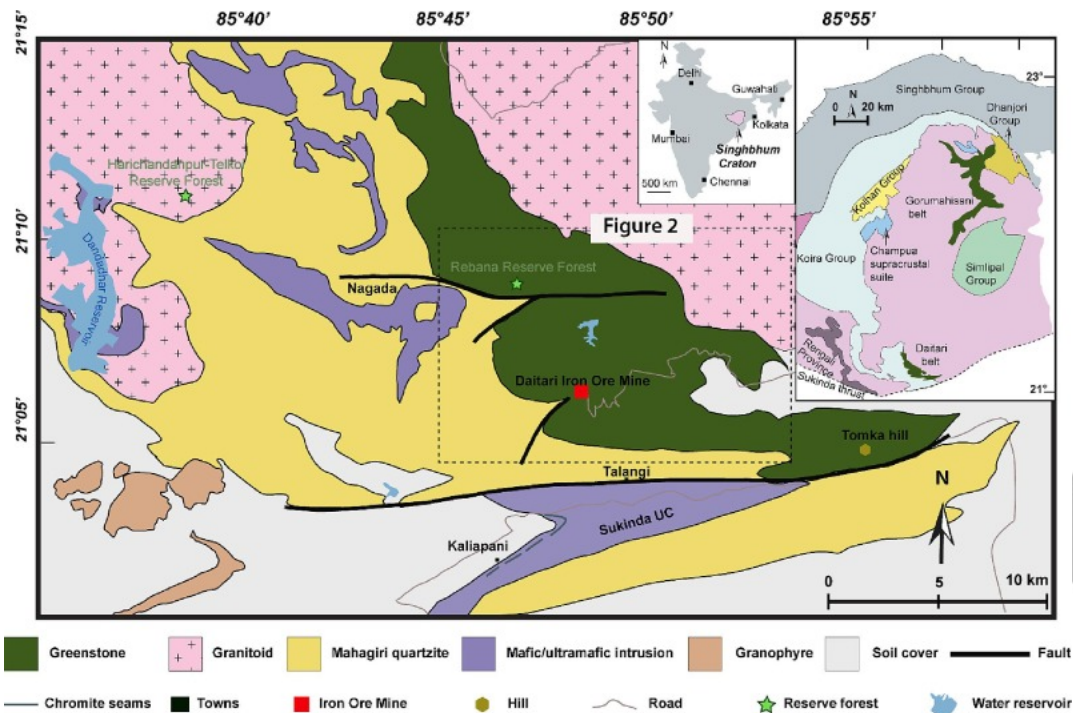
- The study focused on volcanic and sedimentary rocks that **formed approximately 3.5 billion years ago** in the **Daitari greenstone belt** in the Singhbhum Craton in east India.
- These rocks are exceptionally well-preserved and offer a glimpse into Earth's past.

▪ **Geologic Makeup of Greenstones:**

- The researchers discovered that the Daitari greenstone belt shares **similar geological characteristics** with the greenstones found in **South Africa's Barberton and**

Nondweni areas, as well as those in **Australia's Pilbara Craton**.

- This similarity suggests a common geologic history for these regions.



▪ Sub-Marine Volcanic Activity:

- The study revealed that **sub-marine volcanic eruptions** were prevalent between **3.5 and 3.3 billion years ago**.
- These eruptions left behind **pillow lava formations** within the greenstone rocks of the Singhbhum, Kaapvaal, and Pilbara cratons.
- **Pillow lava** is formed when **hot molten basaltic magma slowly erupted underwater and solidified rapidly** to form roughly spherical or rounded pillow shapes.

▪ Sub-Marine Sedimentary Rocks:

- Following silicic volcanism, sub-marine turbidity current deposits formed as the volcanic vents drowned.
- These sedimentary rocks provide valuable insights into sub-marine environments and were dated to approximately 3.5 billion years ago using precise **detrital U-Pb zircon data**.
 - Detrital zircon U-Pb geochronology is a **tool for sedimentological studies** such as provenance, correlation of successions, and definition of maximum depositional ages as well as **for studies concerning paleogeographic reconstructions and evolution of the continental crust**.

What is the Significance of Findings?

▪ Understanding Ancient Environments:

- The study of ancient greenstones, including both volcanic and sedimentary rocks, allows scientists to **gain insights into habitable environments on Earth during its early stages**. These rocks **serve as time capsules**, providing clues about the planet's evolution.

▪ Geological Processes:

- These findings **contribute to our understanding of diverse volcanic processes** and the **geologic history of ancient continents**.

▪ Geological Connections:

- The similarities between the geology of India, South Africa, and Australia **suggest that these regions may have experienced similar geological processes** 3.5 billion years ago.

▪ Paleogeographic Positioning:

- Further studies may shed light on the paleo-geographic positioning of these ancient continents during that time and contribute to theories related to **plate tectonics**.

Rapid Fire Current Affairs

Julley Ladakh (Hello Ladakh)



The [Indian Navy](#) initiated the “**Julley Ladakh**” (**Hello Ladakh**), outreach program to foster awareness about the Navy and engage with the youth and civil society in Ladakh. This initiative, following the Navy's successful efforts in the Northeast and coastal states, aims to achieve several objectives. Firstly, it seeks to celebrate the **75th anniversary of Indian Independence through the "Azadi ka Amrit Mahotsav."** Secondly, it aims to **create awareness** about the career opportunities in the **Indian Navy, including the [Agnipath Scheme](#)**, among students and colleges in Ladakh. Moreover, the program endeavors to **motivate the youth to join the Indian Navy** and showcase [Nari Shakti](#) by involving women officers and spouses.

Read more: [Agnipath Scheme](#)

U.S. and Papua New Guinea Security Pact



In a significant move aimed at countering [China's influence in the Pacific region](#), the **United States** has entered into a landmark security pact with **Papua New Guinea**. The agreement, which allows the **U.S. military to develop and operate bases in Papua New Guinea**, grants access to strategic ports

and airports, including the **Lombrum Naval Base on Manus Island and facilities in Port Moresby**. **Lombrum Naval Base** has historical significance as a former garrison for various countries during [World War II](#) and provides **deep-water port capabilities**. By securing this foothold, the U.S. aims to outflank China's growing presence in the region and reinforce its defense capabilities in the Pacific.

The security pact has faced both support and criticism within Papua New Guinea. Concerns have been raised about potential compromises to Papua New Guinea's autonomy and the target it might paint on the nation. As the country finds itself at the center of a **diplomatic tug-of-war between Washington and Beijing, its rich natural resources and strategic location** make it a valuable asset for both powers. This agreement is part of Washington's broader strategy to counter China's military foothold in the South Pacific, particularly concerning the defense of [Taiwan](#).

Read more: [China's Expansion in the Pacific Island Countries](#)

Bio-Stimulants

The Ministry of Agriculture and Farmers Welfare, Government of India issues draft guidelines **for the registration of bio-stimulants**. It is mandatory for a person who wants to manufacture or import any bio-stimulant to list such bio-stimulant under Schedule VI of the Fertiliser (inorganic, organic or mixed) Control Amendment Order 2021, also called the FCO Amendment order.

Bio-stimulants are substances, microorganisms, or combinations thereof that **enhance the physiological processes in plants, leading to improved nutrient uptake, growth, yield**, nutrition efficiency, crop quality, and stress tolerance. They serve to stimulate plant processes without directly providing nutrients. Bio-stimulants are different from pesticides or plant growth regulators which fall under the Insecticides Act, 1968.

Some examples of bio-stimulants include **plant hormones, vitamins, enzymes, humic acid, sugars, sea kelp, fish emulsion, protein hydrolysates**, seaweed and plant extracts, chitosan and other biopolymers, inorganic compounds and beneficial microbes.

The key difference between bio-stimulants and fertilizers is the use and the mechanism of action, and the fact that living **microbes are involved in the bio-stimulants**. While bio-stimulants help to improve plant growth and health, fertilizers are primarily used to replenish the soil with essential nutrients that plants need to grow.

Phosphorus on Saturn's Moon Enceladus

Scientists have discovered phosphorus, a key element for life, on [Saturn's moon Enceladus](#). Previous studies had found minerals and organic compounds in Enceladus' ice grains but had not detected phosphorus until now. The discovery was based on a review of data collected by [NASA's Cassini spacecraft](#) during its 13-year exploration of the giant planet, its rings and its moons from 2004 to 2017.

Phosphorus is a fundamental unit of the structure of [DNA and RNA](#) and is a vital part of cell membranes and energy-carrying molecules existing in all forms of life on Earth. This new discovery makes Enceladus a potential option as a habitable place in the solar system beyond Earth, if only to microbes.

Over the past 25 years, scientists have discovered **habitable places with oceans beneath a surface layer of ice in the solar system, including Jupiter's moon Europa, Saturn's largest moon Titan, and Pluto**.

