

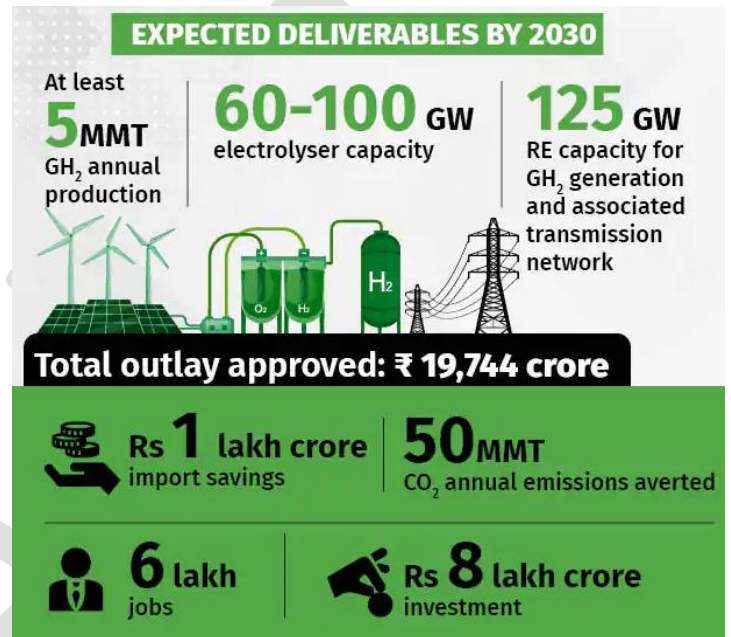
## Weekly Quiz Answers (23<sup>rd</sup> - 29<sup>th</sup> Oct)

Ans1. B

### Explanation:

#### National Green Hydrogen Mission

- **Aim:** To make India a 'global hub' for using, producing and exporting green hydrogen.
- It is a program to **incentivise** the commercial production of green hydrogen and make India a **net exporter** of the fuel.
- The **Mission will facilitate** demand creation, production, utilization and export of Green Hydrogen.
- **Objective:**
  - Developing green hydrogen production capacity of at least 5 MMT (Million Metric Tonne) per annum, alongside adding renewable energy capacity of about 125 GW (gigawatt) in India by 2030.
  - It aims to entail over Rs 8 lakh crore of total investments and is expected to generate six lakh jobs.
  - It will also lead to a cumulative reduction in fossil fuel imports by over Rs 1 lakh crore and an abatement of nearly 50 MT of annual greenhouse gas emissions.



Ans2. D

### Explanation:

The FSSAI under its Food Safety and Standards (Labelling and Display) Regulations, 2020 has **comprehensively outlined the information** to be included on the labels of food products. This includes product name, shelf life, nutrition facts, vegetarian/non-vegetarian logos, ingredient lists, allergen warnings, and other product-specific labelling requirements.

Ans3. A

### Explanation:

- Projected data shows that at least 46 million women in India currently live with post-menopausal osteoporosis, which is only one type of osteoporosis.
- If you include women who had surgeries to remove their uterus, people who used steroid medication for a long time and, men who developed osteoporosis because of old age, the number may be over double.

- ✓ **Osteoporosis**, which literally means porous bone, is a disease in which the density and quality of bone are reduced.
- ✓ **Occurrence:** Bone is living tissue that is constantly being broken down and replaced. Osteoporosis occurs when the creation of new bone doesn't keep up with the loss of old bone.

- A 2019 study also revealed that India was the highest contributor to osteoporosis fracture-related deaths/disabilities worldwide.
- There are enormous gaps in knowledge about osteoporosis, even among doctors.
  - Nobody with long-term pain is going to make an appointment with an endocrinologist (which is where all the knowledge about bone conditions is concentrated, as of date).

Ans4. B

**Explanation:**

**About LUH**

- LCH is the **first indigenous Multi-Role Combat Helicopter**.
- **Designed and developed by:** Hindustan Aeronautics Limited (HAL).
- **Specifications:**
  - Maximum take-off weight: 3,100 kg.
  - Can carry a useful load of 1,500 kg.
  - Maximum speed: 220 km/h, cruise speed: 200 km/h.
  - Service ceiling (maximum altitude it can reach): 6,500 meters.
- **Range:** Approximately 500 km.
- **Features:** It has potent ground attack and aerial combat capability.
  - Equipped with a 3-axis autopilot for stable and controlled flight in various conditions.
  - Features a modern glass cockpit with digital avionics and instrumentation.
  - Includes a weather radar system for real-time weather information.
  - Cockpit lighting works with night-vision goggles for low-visibility conditions.

Ans5. D

**Explanation:**

This year's osteoporosis day's (20th October) the theme was 'Build better bones'.

Ans6. D

**Explanation:**

Centre to introduce DNA, Face Matching Systems at Police Stations across country.

- In April 2022, the Criminal Procedure (Identification) Act (CrPI) was passed by Parliament. The Act enables police and central investigating agencies to collect, store and analyse physical and biological samples including retina and iris scans of arrested persons.
- The rules that would govern the Act were notified in September 2022. However, the Act is yet to

be implemented fully as the National Crime Records Bureau (NCRB), the nodal agency, is still preparing the guidelines and Standard Operating Procedure (SOP) to implement the legislation.

- The NCRB operates under the Union Ministry of Home Affairs (MHA). Though the Act and rules do not distinctly mention collection of DNA samples and face-matching procedures, in subsequent meetings with State police officials, the NCRB has said that these measures will be rolled out in around 1,300 locations across the country.

### Key Highlights

It will be implemented under the **Criminal Procedure Identification Act** which was passed last year; the law enables police and Central investigating agencies to collect, store, and analyse physical and biological samples, including retina and iris scan of arrested persons; NCRB to prepare the SOPs.

- More than a year after the Criminal Procedure Identification Act was passed by Parliament, the Centre is all set to roll out “DNA and face-matching” systems at 1,300 police stations across the country.
- The Act and rules do not explicitly mention the collection of DNA samples and face-matching procedure, the NCRB, in meetings with State police officials, informed them that the said measures would be rolled out in around 1,300 locations spread across police districts, commissionerates, and special investigation units at State headquarters.
- The Union Home Ministry has constituted a Domain Committee for the successful implementation of the Act with representatives from the State Police, Central law enforcement agencies, and other key stakeholders.
- A technical sub-committee for preparing the SOPs for capturing DNA as a measurement has also been constituted.
- The States have been asked to identify the locations and prepare the sites where the measurement collection unit (MCU) may be established as suggested by the NCRB. The Central body under the Home Ministry will be the repository of the database at the national level.
- A Delhi Police official said they were recording measurements such as thumb and finger impressions and photographs of accused persons according to the old format and were also using the National Automated Fingerprint Identification System (NAFIS).
  - Under the NAFIS, another project maintained and managed by NCRB, workstations and scanners have been put up at around 1,300 police stations.
  - It has fingerprint details, a unique 10-digit number of more than one crore people, accused and convicts, across the country.
  - This database is also being integrated with the Criminal Procedure Identification Act.
- An official said the NCRB has cautioned against the misuse of databases by ensuring identification and deployment of appropriate safeguards, adding that only designated officials must have access in real time.
- The NCRB has said the tools and systems used by the police should be technologically, legally, and forensically sound and accredited.

Ans7. C

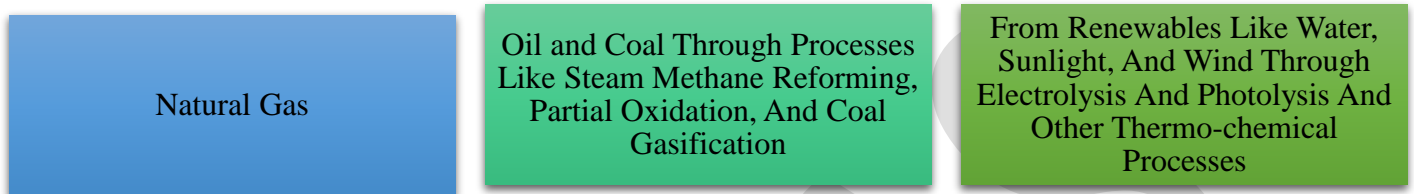
**Explanation:**

**How Is Hydrogen Energy Better?**

- It has zero carbon content.

- Non-polluting source of energy whereas hydrocarbons have a net carbon content in the range of 75–85 percent.
- Expected to reduce carbon emissions which are set to jump by 1.5 billion tons in 2021.
- Highest energy content by weight and the lowest energy content by volume.

It is the most abundantly available element on earth, but commercially viable Hydrogen can be produced from hydrocarbons including

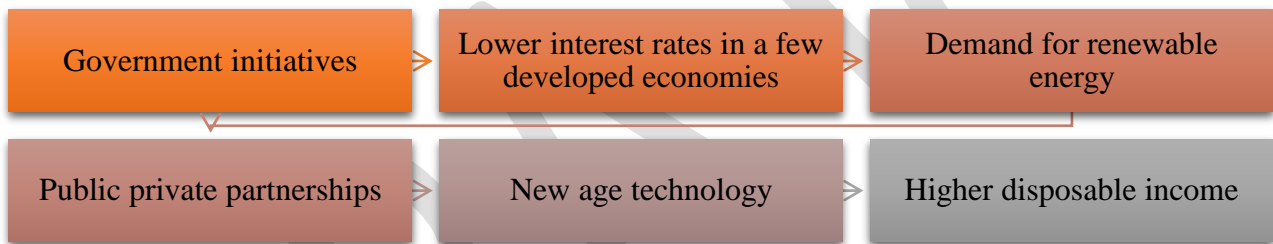


Ans8. C

**Explanation:**

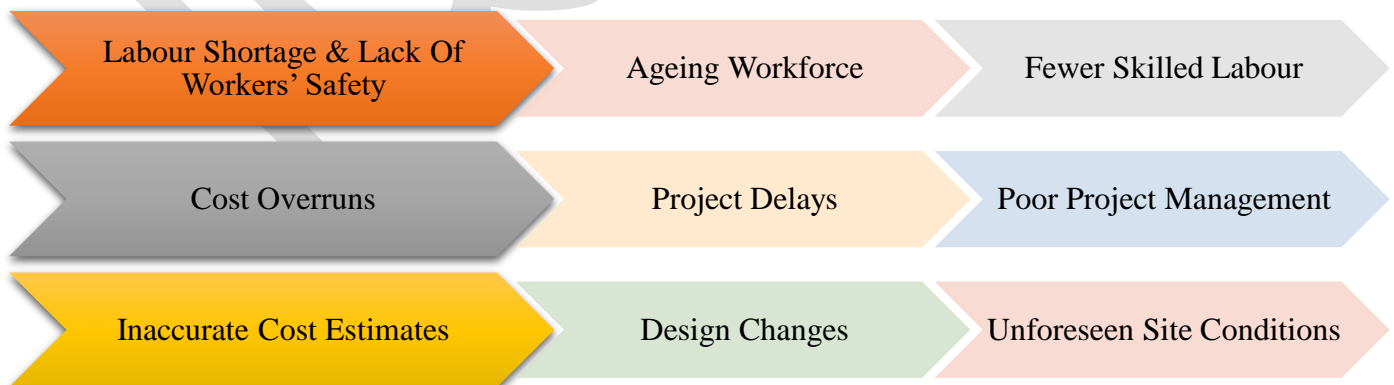
The construction industry which contributes to 13% of global GDP, is expected to grow significantly in the coming years — at an estimated CAGR of 11% — from \$8.2 trillion to \$17 trillion by 2029.

- This growth is driven by certain factors such as



- White paper said, “AI is poised to play a pivotal role in reshaping the sector by addressing a range of challenges and delivering significant advantages.”
  - To meet industry needs, AI has the potential to accelerate growth and add value at all project stages, from design and financing to construction, operations, and business model changes.”
  - AI is estimated to boost industry productivity by increasing it by 1% to 1.5% annually.

**Challenges Faced By Construction Industry**



Ans9. D

**Explanation:**

**Why Is India Watching China-Bhutan Boundary Talks Closely?**

- For India, given the breakdown in its ties with China over the standoff at the Line of Actual Control from 2020, any hint of closer ties between China and one of its closest neighbours is a cause for worry.
- More specifically, New Delhi is watching the demarcation discussions over Doklam, as amongst the proposals China has placed on the table is an agreement to “swap” areas in Doklam under Bhutanese control with areas in Jakarlung and Pasamlung which China claims.
- The Doklam trijunction cuts very close to India’s Siliguri corridor a narrow area that connects the North Eastern States to the rest of India and India would not like to see China gain access to any area closer to it.
- Since the Doklam standoff in 2017, China has doubled down on its control of the Doklam plateau, and according to a recent Pentagon report, has continued to build “underground storage facilities, new roads, and new villages in disputed areas in neighbouring Bhutan,” erasing many of the strategic gains that New Delhi had hoped for after China agreed to step back from the standoff point in 2017.
- Finally, India’s worry is over China’s demand for full diplomatic relations with Bhutan, and opening an Embassy in Thimphu.
- Given India’s challenges with Chinese projects and funding in other neighbouring countries including Bangladesh, Nepal, Sri Lanka and the Maldives, any Chinese presence in a small country like Bhutan would be problematic.
- However, Bhutan’s leadership has thus far said that all decisions would consider India’s interests and that it has always consulted India on issues of concern.

Ans10. A

**Explanation:**

About Mars	
<b>Size and Distance</b>	<ul style="list-style-type: none"> <li>• It is the fourth planet from the Sun and the second-smallest planet in the Solar System.</li> <li>• Mars is about half the size of Earth.</li> </ul>
<b>Similarity to the Earth (Orbit and Rotation)</b>	<ul style="list-style-type: none"> <li>• As Mars orbits the Sun, it completes one rotation every 24.6 hours, which is very similar to one day on Earth (23.9 hours).</li> <li>• Mars' axis of rotation is tilted 25 degrees with respect to the plane of its orbit around the Sun. This is similar to Earth, which has an axial tilt of 23.4 degrees.</li> <li>• Mars has distinct seasons like Earth, but they last longer than seasons on Earth.</li> <li>• Martian days are called sols—short for ‘solar day’.</li> </ul>
<b>Other Features</b>	<ul style="list-style-type: none"> <li>• The reason Mars looks reddish is due to oxidation or rusting of iron in the rocks, and dust of Mars. Hence it is also called the Red Planet.</li> <li>• It has the largest volcano in the solar system i.e., Olympus Mons.</li> <li>• It has two small moons, Phobos and Deimos.</li> </ul>



Ans11. A

**Explanation:**

Mars's liquid iron core is likely to be surrounded by a fully molten silicate layer, according to a pair of studies published in Nature.

- These results offer a new interpretation of the interior of Mars, suggesting its core is smaller and denser than previously proposed.
- Seismological study of Mars to understand the interior of the red planet was carried out in 2019.
- The InSight Mars Lander used an instrument called the Seismic Experiment for Interior Structure (SEIS) to record seismic waves passing through Mars's interior.
- Data from three years of quakes in Mars, including two seismic events caused by meteorite impacts, were used for the study.

**Measurement analysis**

The analysis of measurements from the NASA InSight lander's Seismic Experiment for Interior Structure (SEIS) project in 2021 suggested the presence of a large but low-density core, composed of liquid iron and lighter elements such as sulphur, carbon, oxygen and hydrogen.

**Lighter elements**

- However, the result of the two studies published in Nature results suggest that the core has a higher proportion of lighter elements than is feasible according to estimates of the abundances of these elements early in Mars's formation history.
- The two studies found that the liquid iron-nickel core of Mars is surrounded by an approximately 150 km-thick layer of near-molten silicate rock, the top of which was previously misinterpreted as the surface of the core.
- This decrease in core radius implies a higher density than estimated in the earlier InSight study. These estimates can more easily be reconciled with our existing knowledge of chemical abundance on Mars.
- The molten state of this layer suggests that its temperature must be at least 2,000 Kelvin.
- This could be a sign that Mars had a turbulent interior following its formation, rather than a calmer one that more gently transported and shed heat to interplanetary space.

Ans12. B

**Explanation:**

One of the most rare and mysterious forms of lightning is ball lightning.

- It is a ball of luminosity that usually occurs near the impact point of a flash and moves horizontally at a speed of a few centimetres per second.
- It can penetrate closed windows, is usually accompanied by a hissing sound, and has a lifetime of several seconds.
- The colour is quite variable and the ball often ends with an explosion. However, it is not usually destructive.

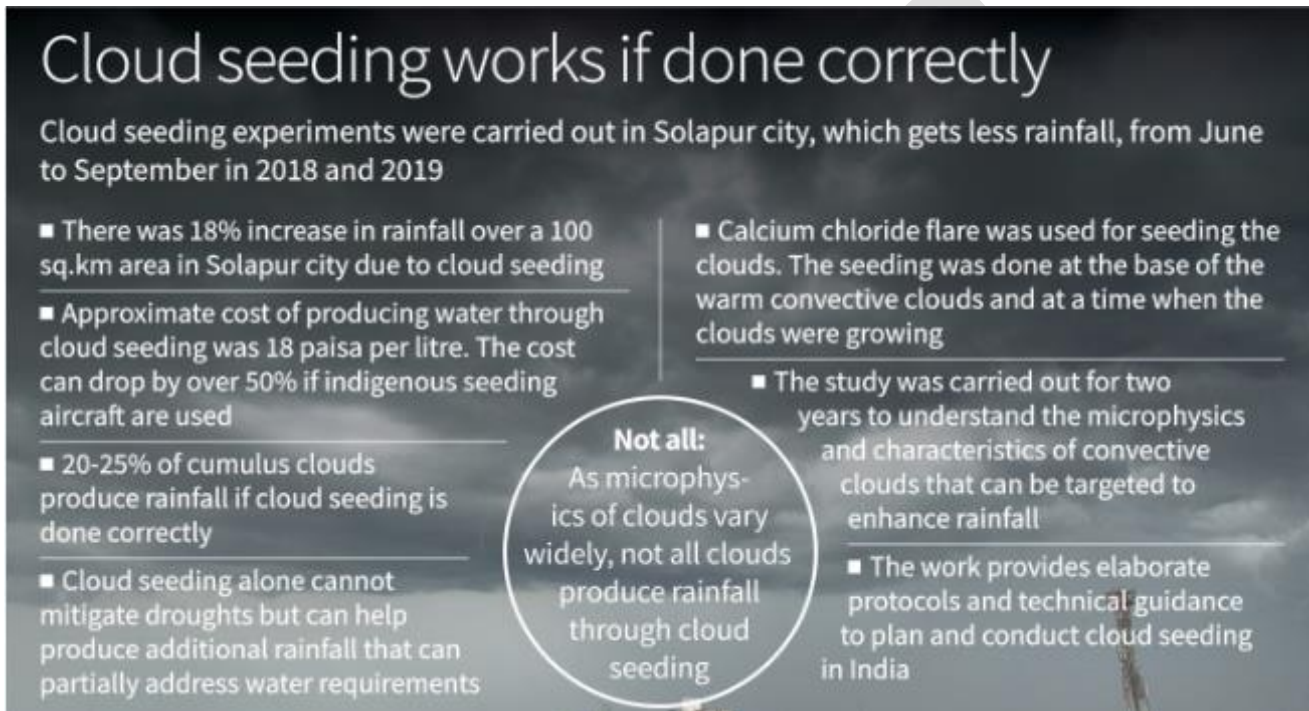
**Important Facts**

- Also called globe lightning, it occurs at times of intense electrical activity in the atmosphere.
- These balls are said to be plasmas.

- Plasma is a completely ionised state of matter, at high temperature, in which positive and negative ions freely move about.
- However, no theory has so far satisfactorily explained the behaviour of a ball as scientists have not been able to reproduce it in the laboratory.

Ans13. D

**Explanation:**



## Cloud seeding works if done correctly

Cloud seeding experiments were carried out in Solapur city, which gets less rainfall, from June to September in 2018 and 2019

- There was 18% increase in rainfall over a 100 sq.km area in Solapur city due to cloud seeding
- Approximate cost of producing water through cloud seeding was 18 paisa per litre. The cost can drop by over 50% if indigenous seeding aircraft are used
- 20-25% of cumulus clouds produce rainfall if cloud seeding is done correctly
- Cloud seeding alone cannot mitigate droughts but can help produce additional rainfall that can partially address water requirements
- Calcium chloride flare was used for seeding the clouds. The seeding was done at the base of the warm convective clouds and at a time when the clouds were growing
- The study was carried out for two years to understand the microphysics and characteristics of convective clouds that can be targeted to enhance rainfall
- The work provides elaborate protocols and technical guidance to plan and conduct cloud seeding in India

**Not all:**  
As microphysics of clouds vary widely, not all clouds produce rainfall through cloud seeding

Ans14. A

**Explanation:**

IITM Pune demonstrates cloud seeding can produce rainfall. The approximate cost of producing water through cloud seeding was 18 paisa per litre; the cost will drop by more than 50% if we use indigenous seeding aircraft.

**Key Highlights**

- A cloud seeding experiment carried out in Solapur city, which falls on the leeward side of the Western Ghats and hence gets low rainfall — 384 mm and 422 mm of total rainfall during the period June to September 2018 and 2019, respectively — was able to achieve 18% relative enhancement in rainfall, which is approximately 8.67mm more rainfall.
- The relative enhancement of accumulated rainfall was seen over two hours after seeding the clouds.
- In all, the total enhancement of water availability through cloud seeding experiments was 867 million litres.
- The experiment — Cloud Aerosol Interaction and Precipitation Enhancement Experiment (CAIPEEX phase-4) — was a scientific investigation conducted in Solapur city during the summer monsoon period of 2018 and 2019.

- The primary objective was to investigate the efficacy of hygroscopic seeding in deep convective clouds and to develop a cloud seeding protocol.
- The experiment used two aircraft for studying various cloud parameters and for seeding the clouds.
- The study found that cloud seeding is an effective strategy for enhancing rainfall in a region under suitable conditions.
- A randomised seeding experiment was undertaken to study the effectiveness of cloud seeding in producing rainfall.
- In total 276 convective clouds were chosen, and 150 were seeded while the remaining 122 clouds were not seeded.

In our previous work we have found certain characteristics in a cloud such as the liquid water content in the cloud, the vertical motion in the cloud, which is an indicator of the growth of the cloud, will help inform us if the cloud will rain or not. Based on several criteria we know if a convective cloud has a potential to rain as all clouds cannot rain.

- Convective clouds with a depth of over one kilometre and likely to evolve into deep cumulus clouds were targeted.
- The seeded clouds produced more rainfall than the unseeded clouds,” Dr. Thara Prabhakaran from the Indian Institute of Tropical Meteorology, Pune and the corresponding author of the paper.
- **Calcium chloride flare** was used for seeding the clouds.
  - A cloud seeding flare releases these particles when triggered.
  - The seeding was done at the base of the warm convective clouds and at a time when the clouds were in their growing stage so that the seed particles could enter the clouds with minimum dispersion.
- The convective cloud bases are found at 500-1,500 metres altitude during the summer monsoon period and around 2,000 metres or more altitude during the monsoon break periods, which depends on the moisture content in the lower atmosphere.
- Since the clouds are found at lower heights, the base of the convective clouds is warm, around 15 degrees C.
- But cloud seeding alone cannot mitigate droughts but can help produce 18% more rainfall and partially address water requirements. Undertaking cloud seeding as catchment-scale projects can possibly help in managing drought conditions.

The study was carried for two years to first study and understand the microphysics and characteristics of convective clouds that can be targeted to enhance rainfall.

- The two-year study has helped develop a high-resolution numerical model that can help stakeholders to identify target locations, clouds that can be seeded, and a suitable seeding strategy to enhance rainfall in an area.
- One of the most important findings of the study was that not all cumulus clouds produce rainfall when cloud seeding is done.
- We found 20-25% of cumulus clouds produce rainfall if cloud seeding is done correctly.

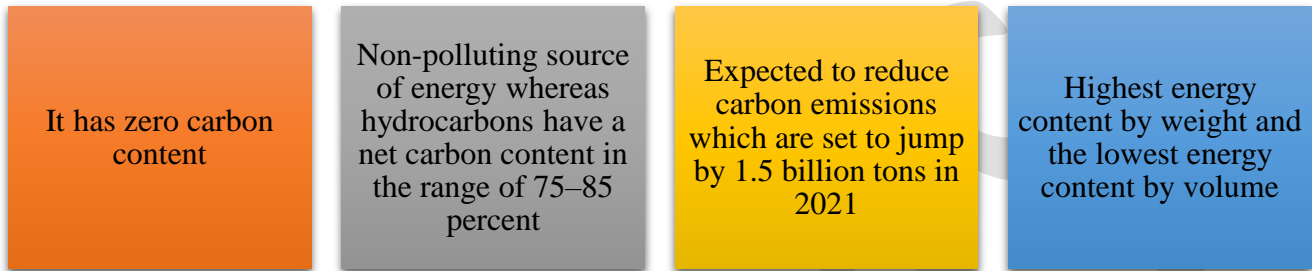


- The micro physics of clouds vary widely and so not all clouds produce rainfall through cloud seeding. Though the relative enhancement of rainfall was 46% as measured by automatic rain gauges, the actual increase in rainfall over a 100 sq.km area was only 18%.

Ans15. D

### Explanation:

#### How Is Hydrogen Energy Better?



It is the most abundantly available element on earth, but commercially viable Hydrogen can be produced from hydrocarbons including

