



Mains Practice Question

Q. Hydrogen is being dubbed as the alternative fuel. However, there are many problems associated with the leveraging of hydrogen technology. Discuss.

01 Mar, 2021 GS Paper 3 Science & Technology

Approach

- Start the answer by briefly discussing the context of using hydrogen as an alternate fuel.
- Discuss the pros and cons of hydrogen as a source of energy.
- Conclude suitably.

Introduction

Recently, the government has launched the National Hydrogen Energy Mission (NHEM) in Budget 2021. The NHEM proposes a roadmap for using hydrogen as an energy source and augmenting India's growing renewable capacity with the hydrogen economy.

Hydrogen is a clean source of energy and considered an alternative source of renewable energy. However, there are many challenges before leveraging it.

Body

Pros of Hydrogen as a fuel

- **Renewable and Abundant:** It's the most abundant element in the universe, is lighter, energy-dense, and two-three times more efficient than burning petrol.
 - It may take some time to acquire it, but it is renewable, so no one would have to worry about wasting it like other sources of fuel.
- **No Catastrophic Emissions:** Another unique trait that separates hydrogen from other fuel sources is that it is non-toxic and non-polluting.
 - India's electricity is heavily coal-dependent. Hydrogen will replace fossil fuels, address pollution, and oil-price rise.
 - It will benefit transportation (contributes 1/3rd of India's greenhouse-gas emissions), iron and steel, and chemicals sectors.

Cons of Hydrogen as a fuel

In spite of being a relatively cheaper source of energy for many, hydrogen also comes with its share of shortcomings as well.

- **Expensive to Extract:** Hydrogen only exists in chemical compounds like hydrocarbon and water. However, it can be separated using the method of electrolysis, which is quite expensive.
- **Lack of Infrastructure:** There is no infrastructure that is there to replace hydrogen as the prime source of fuel (e.g. petrol or diesel) for land vehicles.

- **Safety Issue:** Hydrogen is highly combustible. It is stored at very high (up to 700 bar) pressure, but the tank is outside the passenger bay. This makes the explosion risk very high.
 - Further, hydrogen is at a lower density than gasoline, it has to be kept at lower temperatures to maintain its liquid form and effectiveness as a fuel source.

Conclusion

India has set the goal to decarbonize by 2050. In this pursuit, it envisages installing 175 GW of renewable energy capacity by 2022. In this context, the National Hydrogen Energy Mission is a step in the right direction.

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