



## 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**

PDF Reference URL: <https://www.drishtiias.com/printpdf/adoption-of-e20-fuel-and-green-hydrogen-production>

