

# Hydrogen Fuel Cell

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**In News:** Aimed at a significant push for hydrogen vehicles in the country, the Ministry of Road Transport and Highways has notified standards for the safety evaluation of hydrogen fuel cell-based vehicles.

## About Hydrogen Fuel Cell

- A fuel cell is an electrochemical cell that converts the chemical energy of a fuel (often hydrogen) and an oxidizing agent (often oxygen) into electricity through a pair of redox reactions.
- Fuel cells are different from most batteries in requiring a continuous source of fuel and oxygen (usually from air) to sustain the chemical reaction, whereas in a battery the chemical energy usually comes from metals and their ions or oxides that are commonly already present in the battery, except in flow batteries.
- Fuel cells can produce electricity continuously for as long as fuel and oxygen are supplied.
- Hydrogen + Oxygen = Electricity + Water Vapor
- The products of the reaction in the cell are water, electricity, and heat.
- This is a big improvement over internal combustion engines, coal burning power plants, and nuclear power plants, all of which produce harmful by-products.

## Potential of clean hydrogen industry in reducing greenhouse gas emissions

- Hydrogen as a fuel has long been touted as an almost magical solution to the air pollution crisis. The only by-product or emission that results from the usage of hydrogen fuel is water – making the fuel 100 per cent clean.

- Hydrogen is considered an alternative fuel. It is due to its ability to power fuel cells in zero-emission electric vehicles, its potential for domestic production, and the fuel cell's potential for high efficiency.
- In fact, a fuel cell coupled with an electric motor is two to three times more efficient than an internal combustion engine running on gasoline.
- Hydrogen can also serve as fuel for internal combustion engines.
- The energy in 2.2 pounds (1 kilogram) of hydrogen gas contains about the same as the energy in 1 gallon (6.2 pounds, 2.8 kilograms) of gasoline.

### **Benefits of hydrogen as a fuel**

- It is readily available.
- It doesn't produce harmful emissions.
- It is environmentally friendly and is a non-toxic substance.
- It can be used as fuel in rockets.
- Hydrogen is three times as powerful as gasoline and other fossil fuels, This means that it can accomplish more with less.
- It is fuel efficient, Compared to diesel or gas, it is much more fuel efficient as it can produce more energy per pound of fuel.
- It is renewable.
- It can be produced again and again, unlike other non-renewable sources of energy.