



Fuel Cell Electric Vehicle

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Why in News

Recently, the **Supreme Court** of India has directed the government to look into the feasibility of **Fuel Cell Electric Vehicle (FCEV)** to deal with air pollution.

- Research is ongoing at the **International Research Center for Hydrogen Energy at Kyushu University, Japan** on FCEVs based on **hydrogen cell technology**, also known as 'fuel cells'.
- In this context the Indian government is the The research is being studied closely by the as it readies a hydrogen-fuelled blueprint.

Fuel Cell

- Fuel cells and batteries convert chemical energy into electrical energy and are very useful forms of galvanic cell.
A galvanic or voltaic cell is an electrochemical cell that converts chemical energy into electrical energy through the redox reactions that occur within the cell.
- Galvanic cells that are designed to convert the energy of combustion of fuels like hydrogen, methane, methanol, etc. directly into electrical energy are called fuel cells. One of the most successful fuel cells uses the reaction of hydrogen with oxygen to form water.

Key Points

Mechanism: The **Fuel Cell Electric Vehicle (FCEV)** combines hydrogen and oxygen to generate an electric current and **water is the only byproduct.**

Hydrogen + Oxygen = Electricity + Water Vapour



- **Fuel Cell Electric Vehicle (FCEV)** engines are **similar to the conventional internal combustion engines** because they also **rely on a constant supply** of fuel (hydrogen) and oxygen.
However, there are **no moving parts** in the fuel cell, so they are **more efficient and reliable**.
- **Stationary fuel cells** are the **largest and most powerful** fuel cells. These are being designed to provide a cleaner, reliable source of on-site power to hospitals, banks, airports and homes.
- The successful development of the technology would **provide energy for transportation and electric power**.
- **Hydrogen fuel tanks** are made from **highly durable carbon fibre**. Some FCEVs have a triple-layer hydrogen tank made of woven carbon fibre.

Advantages

- FCEVs produce much **smaller quantities of greenhouse gases** and none of the air pollutants that cause health problems.
- Fuel cells **emit only heat and water as a byproduct** and are **far more energy-efficient** than traditional combustion technologies.
- FCEVs **do not need to be plugged in for charging**, like battery-powered EVs.
- There is a **wide availability of resources for producing hydrogen**.

Disadvantages

- The **process of making hydrogen needs energy**, often from **fossil fuel** sources, which raises questions over hydrogen's green credentials.
- Handling of hydrogen is a safety concern because it is **more explosive** than petrol.
- These vehicles are expensive and fuel dispensing pumps are scarce.

Status in India

- In India, so far, the definition of **Electric Vehicles** only covers **Battery Electric Vehicles (BEVs)**.
BEVs have **no internal combustion engine or fuel tank** and run on a **fully electric drivetrain powered by rechargeable batteries**.
- The Government of India has launched **FAME India Scheme** with the objective to support hybrid/electric vehicles market development and manufacturing ecosystem. It also covers Hybrid & Electric technologies like Mild Hybrid, Strong Hybrid, Plug in Hybrid & BEVs.
- The **Ministry of New and Renewable Energy**, under its **Research, Development and Demonstration (RD&D) Programme**, has been supporting various projects on hydrogen and fuel cells.

- The **Ministry of Science and Technology** has supported two networked centres on **hydrogen storage** led by IIT Bombay and Nonferrous Materials Technology Development Centre, Hyderabad.

Source: IE