



Indigenous Fuel Cell System

On the occasion of the **Council of Scientific and Industrial Research (CSIR) Foundation Day**, the President of India recently introduced India's **first indigenously developed** high-temperature based **Fuel Cell System**.

- It is developed under the **Public-Private Partnership (PPP)** model by the Council of Scientific and Industrial Research (CSIR) in partnership with Indian industries.
- It is built under India's flagship programme named '**New Millennium Indian Technology Leadership Initiative (NMITLI)**'.

Specifications

- The developed fuel cells are based on **High-Temperature Proton Exchange Membrane (HTPEM)** technology.
- It is a **5.0 kW** fuel cell system that generates power in a green manner.
- It takes **methanol or bio-methane as the input** and produces **heat and water** as its bi-products, which can be further used.
- This helps to attain an efficiency that is greater than 70%, which is difficult to achieve by other energy sources.

High-Temperature Proton Exchange Membrane (HTPEM) Technology

- High-Temperature Proton-Exchange-Membrane (HTPEM) is the core of the fuel cells that run above 150 °C. It works on two modes of operation with respect to the **source of fuel**.
- One mode is based on the **conversion of natural gas into Hydrogen** by means of **steam reforming**. This mode is used to fulfill **stationary power** demands.
- **Steam reforming** or **steam methane reforming** is a chemical synthesis process for producing **syngas (hydrogen and carbon monoxide)** from hydrocarbons such as natural gas.
- The second mode is based on the **operation of Hydrogen with Oxygen** obtained by the process of **electrolysis**. This is generally used in the space-related applications.



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- **Electrolysis** is a **chemical decomposition process** in which an electric current is passed through a liquid or a solution containing ions.

Applications

- This fuel system is most suitable to fulfil **distributed stationary power applications** demands like in small offices, commercial units, data centres, etc. **where highly reliable power is essential** with simultaneous requirement for air-conditioning.
- This system will meet the **requirement of efficient, clean and reliable backup power generators** that are demanded by telecom towers, remote locations, and strategic applications.
- The Fuel Cells fit well in India's mission of replacing **Diesel** based **Generating (DG) sets** with the green and alternate fuels.
- This development is therefore expected to **reduce India's dependence on crude oil.**