Green Alert

CERC Since 1978

Eco-Product

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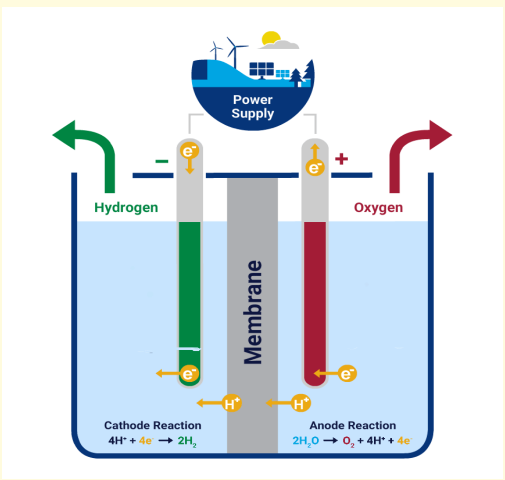
The focus of Environmental Information System (ENVIS) is to disseminate environmental information to decision makers, policy planners, scientists and researchers across the world.

The CERC-ENVIS Resource Partner focuses on 'Environment Literacy - Eco-labelling and Eco-friendly Products' This bi-monthly e-bulletin features latest news, developments and innovations in the field.

Green Issue

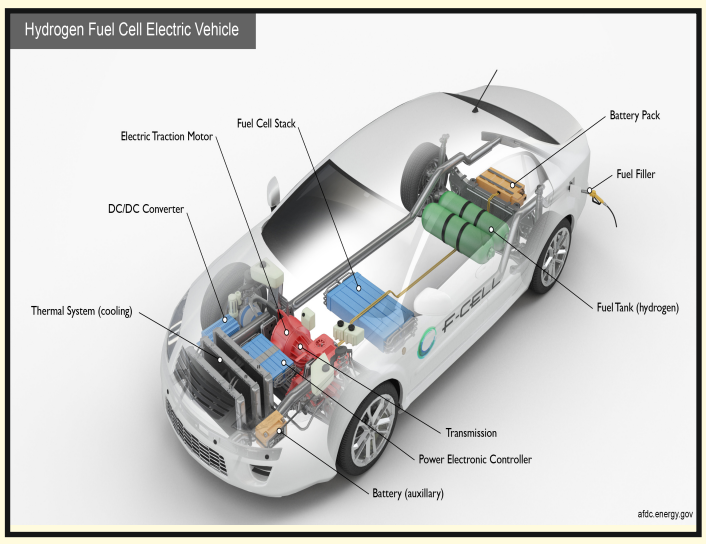


Fuel Cell Electric Vehicles

Fuel cell electric vehicles (FCEVs) are powered by hydrogen. They are more efficient than conventional internal combustion engine vehicles and produce no harmful tailpipe emission. They only emit water vapor and warm air. FCEVs use a propulsion system similar to that of electric vehicles, where energy stored as hydrogen is converted to electricity by the fuel cell.

FCEVs are fueled with pure hydrogen gas stored in a tank on the vehicle. Similar to conventional internal combustion engine vehicles, they can fuel in less than 4 minutes and have adriving range over 300 miles. FCEVs are equipped with otheradvanced technologien to increase efficiency, such as regenerative braking systems that capture the energy lost during braking and store it in a battery.

FCEVs and the hydrogen infrastructure to fuel them are in the early stages of implementation. The U.S. Department of Energy leads research efforts to make hydrogen-powered vehicles an affordable, environmentally friendly and safe transportation option.



Source: https://www.epa.gov/greenvehicles/hydrogen-fuel-cell-vehicles, U.S. Department of Energy

Green Hydrogen

The world is grappling with the great challenge with the climate change. An increasing number of countries are committing to achieve net-zero by 2050 with the goal of limiting temperature rise to 1.5°C. (https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Nov/IRENA_Green_hydrogen_policy_2020.pdf). The energy supply sector (electricity, heat, and other energy) is the largest contributor to global greenhouse gas emissions, responsible for approx. 35% of total emissions. (https://www.un.org/en/actnow/facts-and-figures)

According to the International Energy Agency, global energy demand will increase between 25% & 30% by 2040: which means more CO_2 emissions (https://www.iberdrola.com/sustainability/green-hydrogen). To reach net-zero by 2050 and decarbonize the planet requires a major shift towards clean energies such as green hydrogen.

Hydrogen is an energy carrier and a possible substitute for carbon or GHG emitting fuels. The majority of hydrogen volumes are used for ammonia and methanol synthesis, steel industries and petroleum refining. Other uses are transportation, heating & power generation.

Green Hydrogen is produced from renewable energy. It is generated through a chemical process known as **Electrolysis**. The water used in the electrolysis must contain salts and minerals to conduct the electricity. The two electrodes are immersed in the water and connected to a power source and a direct current is applied. The dissociation of hydrogen and oxygen occurs when the electrodes attract ions with an opposite charge to them. During the electrolysis, an oxidation reduction reaction occurs due to the effect of the electricity.

There are different processes and energy sources to produce hydrogen. Following is the color code nomenclature:

	Grey hydrogen is produced with fossil fuels (i.e. hydrogen produced from methane using steam methane reforming (SMR) or coal gasification).
	Blue hydrogen is same as grey hydrogen with carbon capture and storage (CCS)
	Yellow hydrogen is an another type of hydrogen made by electrolysis, where electrolysis is achieved solely through solar power (unlike green which could use a combination of renewable energy sources such as wind or solar).
	Pink hydrogen is similar to green hydrogen, pink hydrogen is made via electrolysis, but using nuclear energy as its source of power.
	Green hydrogen is hydrogen produced by splitting water by electrolysis. This produces only hydrogen and oxygen. We can use the hydrogen and vent the oxygen to the atmosphere with no negative impact.
	Turquoise hydrogen combines the use of natural gas as feedstock with no CO_2 production. Through the process of pyrolysis, the carbon in the methane becomes solid carbon black. Carbon black can be more easily stored than gaseous CO_2.

Green hydrogen is becoming the fuel for a sustainable future. Low-carbon hydrogen can be a great source of clean energy that can fight climate change and poor air quality around the globe.

The US has invested $150 million in hydrogen fuel infrastructure and development every year since 2017. Government agencies in Europe and Asia are also investing more than $2 billion per year in hydrogen fuel production. China has committed over US$217 billion of investment in hydrogen-powered transportation until 2023.

Prime Minister of India, Shri Narendra Modi, flagged the launch of a National Hydrogen Mission on 15th August 2021. He announced his decision to turn the nation into a global hub for the production and exportation of Green hydrogen. Reliance industries, Gas Authority of India Limited, National Thermal Power Corporation Limited, Indian Oil Corporation, Larsen & Tourbo (L&T) are the Indian companies that spearheaded this revolution.

Source: https://www.livemint.com/industry/energy/five-indian-companies-leading-the-green-hydrogen-revolution-11636369476063.html
https://www.petrofac.com/media/stories-and-opinion/the-difference-between-green-hydrogen-and-blue-hydrogen/
https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Nov/IRENA_Green_hydrogen_policy_2020.pdf
https://www.iberdrola.com/sustainability/green-hydrogen

Eco-Tips

Let us drive green for a sustainable future
Future is better with green vehicles

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