

fact sheet

How A Fuel Cell Works

What is a fuel cell?

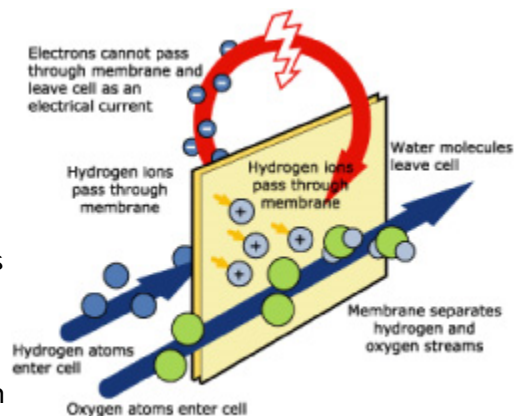
A fuel cell is an electrochemical device that produces electricity efficiently, silently and without combustion. Unlike a battery, a fuel cell does not require recharging. It will produce electricity as long as hydrogen fuel is supplied.

Fuel cells have been a reliable power source for many years. Fuel cells are currently being used to power vehicles, buildings, laptop computers and video cameras.

How does a fuel cell work?

Automakers use a type of fuel cell called a Proton Exchange Membrane, or PEM, fuel cell. The PEM fuel cell uses an electrochemical reaction between hydrogen and oxygen to generate electricity. A PEM fuel cell consists of two electrodes, the anode and the cathode, separated by a polymer electrolyte membrane coated on either side by a catalyst.

Hydrogen flows into the anode, where in the presence of the catalyst, the hydrogen molecules dissociate into electrons and protons. The hydrogen protons are able to pass through the membrane into the cathode. The electrons flow through an external circuit which produces electricity to power the vehicle. The electrons rejoin the protons in the cathode, and combine with oxygen to form water and heat.



Individual fuel cells are combined into a fuel cell stack that resembles a loaf of bread. The number of fuel cells combined into a fuel cell stack determines the amount of power it can supply. Today's fuel cell vehicles use between 65 and 90-kilowatt fuel cell systems.

In a FCV, hydrogen is stored in a tank on-board the vehicle. Most vehicle tanks store the hydrogen as a compressed gas. A few vehicles, however, store the hydrogen as a liquid.

What are the benefits?

A FCV, powered by an electric motor, provides an



3300 Industrial Blvd.
Suite 1000
West Sacramento, CA
95691
(916) 371-2870
www.cafcp.org

environmentally friendly solution for air quality, and has great acceleration and torque. Compared to conventional vehicles, FCVs can offer:

- Zero tailpipe emissions – a hydrogen-powered fuel cell vehicle has no polluting exhaust. The only tailpipe emission is water vapor
- Quiet – FCVs can reduce noise pollution in urban areas
- Hydrogen can be produced from renewable sources of energy, such as biomass and electricity made from solar or wind power. This presents an opportunity for sustainable transportation with reduced environmental impact
- Energy diversity – hydrogen can be obtained from many sources and can be produced by many methods, presenting the opportunity to develop a more diverse and sustainable energy supply portfolio

Updated April 2006