

FUEL CELLS 101

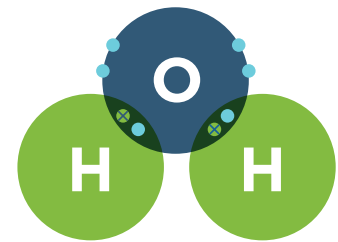
A fuel cell is a device that generates electricity through an electrochemical reaction, not combustion. In a fuel cell, hydrogen and oxygen are combined to generate electricity, heat, and water. Fuel cells are used today in a range of applications, from providing power to homes and businesses, to recharging consumer electronics, to moving a variety of vehicles including warehouse forklift fleets, buses, trucks, cars, and more.

BENEFITS OF FUEL CELLS

Fuel cells generate clean power and can use a range of fuels. When hydrogen is used, the only byproduct is water. Beyond the environmental benefits, fuel cells are also an extremely efficient, reliable, and quiet source of power.

Fuel cell technology brings innovation and ingenuity that can foster a new clean economy and economic growth.

On the next page, learn more about how fuel cells work.



In hydrogen fuel cells, hydrogen molecules bond with oxygen to produce water.



A fuel cell vehicle's only tailpipe emission is water.

PRACTICAL USES OF FUEL CELLS

Hydrogen fuel cells are widely used in both the private and public sectors. For example:

STATIONARY POWER

Fuel cells are providing both primary power and back-up power to thousands of sites across the country in a range of applications, including data centers, utilities, hotels, grocery stores, retail sites, hospitals, telecommunication towers, and more.

VEHICLES

Many of the world's leading automotive companies are selling, leasing, and developing fuel cell vehicles today. These zero-emission vehicles refuel in three to five minutes, with a range of 300 to 400 miles.

MATERIAL HANDLING

Fuel cell-powered forklifts are currently in operation at manufacturing plants, distribution centers, freezer facilities, and grocery warehouses around the country, replacing incumbent battery-powered and combustion vehicles due to their advantages of longer runtime, faster refueling, and higher efficiency.

HOW FUEL CELLS WORK

A fuel cell is an electrochemical energy conversion device – it utilizes hydrogen and oxygen to generate electricity, heat, and water.

- 1** The hydrogen atoms enter at the anode.
- 2** The atoms are stripped of their electrons in the cathode.
- 3** The positively charged protons pass through the membrane to the cathode and the negatively charged electrons are forced through a circuit, generating electricity.
- 4** After passing through the circuit, the electrons combine with the protons and oxygen from the air to generate the fuel cell's byproducts: water and heat.

