



# CALIFORNIA HYDROGEN BUSINESS COUNCIL



## HYDROGEN AND FUEL CELLS ZERO EMISSION SOLUTION AVAILABLE TODAY

### Commercial Vehicles and Equipment

Fuel Cell Electric Buses



Fuel Cell Forklifts



Fuel Cell Electric Vehicles



Stationary Back-up Power



### Pre-Commercial Vehicles and Equipment

Fuel Cell Trains



Class 8 Trucks



Delivery Vans



Ships



Ground Support



# IMPROVING AIR QUALITY FOR ALL CALIFORNIANS

California's environmental justice community is the driving force behind the state's efforts to **improve local air quality and health outcomes of its citizens**. To achieve these broader goals, development and deployment of zero emissions energy and transportation solutions is critical. Hydrogen and fuel cells offer many benefits that will accelerate California's drive to reduce GHG and particulate matter emissions, which will **improve the health outcomes of the disadvantaged communities** that have taken on the brunt of these harmful emissions. These benefits include:

- Zero emission for the energy and transportation sectors, displacing fossil fuels.
- Air quality improvements for all communities across California.
- No home charging required to keep the tank full.
- Affordable option for high density neighborhoods (low-income, multifamily, inner cities).
- Quiet operation, reducing urban noise.
- No fumes or smells, improving work environment.
- Complete replacement for all conventional gas and diesel vehicles.
- Durable, continuous operation, with fast refueling.
- Reduce energy imports and creation of local, high quality jobs.
- Produced from renewable sources and easily stored for later use.
- Multiple production methods to improve reliability of supply and reduce costs.

According to the Air Resources Board, hydrogen is **already the most renewable fuel in California** at 38 to 44% renewable hydrogen, surpassing the 33% mandate. While most of the hydrogen produced for other sectors (oil refining, fertilizer and chemical production) is from carbon emitting sources, the hydrogen industry has announced its **commitment to decarbonize 100% of hydrogen fuel used in the transportation sector by 2030**, creating a true zero emission solution from wells-to-wheels. As more renewable hydrogen is produced, other sectors that use hydrogen will transition to renewable hydrogen.

## WHAT CAN YOU DO?

- Support Hydrogen Technology Legislation, Rules, Regulations
- Support New Hydrogen Technology Development Programs
- Support Public Education Programs
- Support New Local Hydrogen Technical Job Training Programs
- Testify At Public Hearings That You Want Clean Hydrogen Technology
- Testify At Public Hearings That You Want No More Pollution
- Tell Your Elected Officials That You Want Clean Hydrogen Technologies
- Tell Your Appointed Commissioners That You Want Hydrogen Technologies





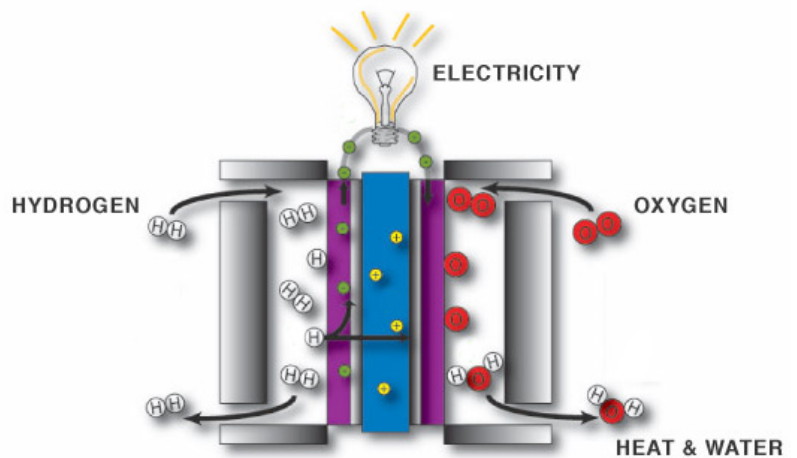
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# HYDROGEN AND FUEL CELLS 101

Hydrogen and oxygen enter the fuel cell, causing a chemical reaction, producing electricity and heat. The electricity can be used to **power vehicles or buildings**. The heat that the fuel cell creates can be captured to provide additional energy for heating or cooling, improving the overall efficiency of the process

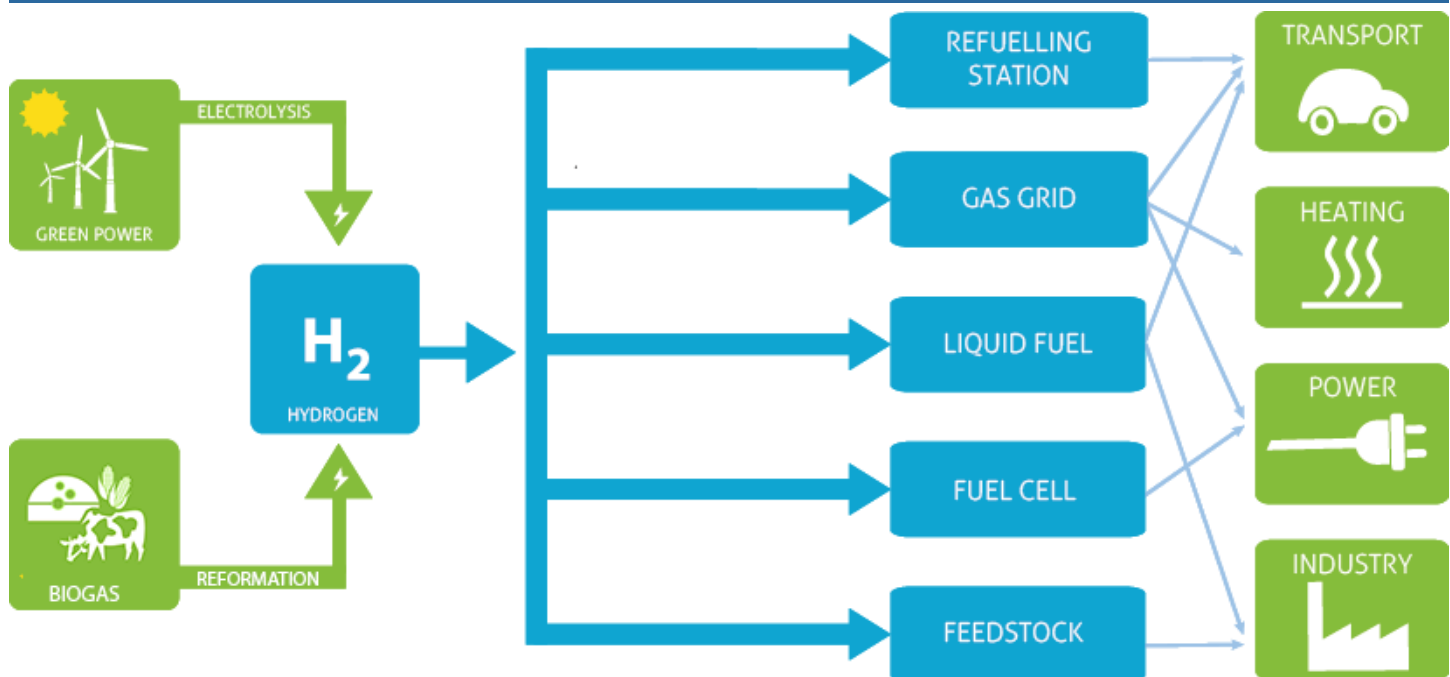
Fuel cells are zero emission, producing **no greenhouse gases or particulate matter** (NO<sub>x</sub> & SO<sub>x</sub>) at the point of use. The only byproduct is water. Hydrogen can be **produced from renewable sources** of electricity (solar or wind power) via electrolysis, biogas or traditional energy sources, making the entire pathway zero emissions.



Hydrogen can be made by splitting a water molecule (H<sub>2</sub>O) through a process known as electrolysis. The electrolysis process is the reverse of a fuel cell. Water enters an electrolyzer and is split into hydrogen and oxygen using electricity. When hydrogen is made by the electrolyzer with renewable or zero carbon electricity, there are **zero carbon and particulate matter emissions for the entire wells-to-wheels** for transportation of people and goods. Excess solar and wind power on California's electric grid can be captured with electrolyzers, producing hydrogen, and stored for later use, **preventing curtailment of renewable electricity** and integrating all renewable energy!



# THE FUTURE ROLE OF HYDROGEN AND FUEL CELLS



The versatility of hydrogen and fuel cells creates an opportunity to **integrate all renewable energy sources and unlock deep decarbonization** for California! Hydrogen can integrate and utilize existing natural gas grids to accelerate the use of renewable fuels across the transportation, energy, and industrial sectors (fertilizer and steel production), eliminating the use of fossil fuels.

Hydrogen produced from renewable sources (using solar, wind, or biogas) can be stored in the existing natural gas system for later use. This process, known as power-to-gas, will **decarbonize the gas industry** by injecting renewable hydrogen fuel into the system. Nations around the world have already begun injecting hydrogen in their natural gas systems, at levels of up to 20%. Theoretically, the existing natural gas infrastructure **could store 100% hydrogen** in the future.



## About the CHBC

The California Hydrogen Business Council (CHBC) is comprised of over 100 companies and agencies involved in the business of hydrogen. Our mission is to advance the commercialization of hydrogen in the energy sector, including transportation, goods movement, and stationary power systems to reduce emissions and dependence on oil.