

Fuel Cell Electric Vehicles (FCEVs)

What are Fuel Cell Electric Vehicles?

Fuel cell electric vehicles (FCEVs) are electric vehicles that operate using compressed hydrogen gas as fuel and whose only tailpipe emission is water vapor. In these vehicles, fuel cells utilize a chemical process of hydrogen to produce electricity without combustion. The fuel cell-generated electricity then powers an electric motor, just as a battery does in a battery electric vehicle.

Many of the world's leading automotive companies are developing and commercializing FCEVs today. Hyundai's Tucson FCEV is available today in Southern California, Toyota's fuel cell-powered Mirai will be available later this year, and Honda's new fuel cell vehicle will follow in 2016.

What are the Benefits of Fuel Cell Electric Vehicles?

Replicating Today's Driving Experience

Able to travel 300 miles on a tank of hydrogen, and refuel in three-five minutes, FCEVs combine the emissions-free driving of an electric vehicle with the range and convenience of a traditional internal combustion engine. Filling up a FCEV with hydrogen is as simple as pulling up to a hydrogen dispenser located at a local gas station, and connecting the gas dispenser to your vehicle, just as you would for a gasoline vehicle.

Zero Emission Driving

FCEV are zero-emission vehicles – they do not generate tailpipe pollutants, only water vapor.

Most hydrogen in the United States is generated from natural gas reformation, which does produce some emissions. However, when comparing well-to-wheels emissions (WTW, or the full lifecycle carbon emissions) of hydrogen production from reformation of natural gas to the WTW emissions of gasoline internal combustion engine vehicles, FCEVs provide a great reduction in greenhouse gas emissions.

Hydrogen can also be generated from renewable sources such as solar or wind electrolysis, nearly eliminating total lifecycle carbon emissions.

What are Industry and Government Doing to Bring Fuel Cell Electric Vehicles to Market?

Automotive Collaborations, Brining Affordable FCEVs for Consumers

Hyundai is leasing its FCEV to the public now, and announcements have been made by Toyota and Honda about commercializing their fuel cell vehicles in 2015 and 2016. Nearly every major automaker recognizes the need to develop its own FCEV platform, and many are forming collaborations with other automakers to reduce development time and cost to bring these vehicles to market as quickly as possible.

Ford, Nissan-Renault, and Daimler are jointly developing a fuel cell system to produce an affordable, mass-market FCEV as early as 2017. General Motors and Honda are collaborating on a next-generation fuel cell system and hydrogen storage technologies for the 2020 timeframe. BMW and Toyota are jointly developing fuel cell stacks, systems, hydrogen tanks, motors, and batteries with the goal of completion by 2020. In addition, at the 2015 Detroit Auto Show, Volkswagen has also demonstrated both a fuel cell concept Passat and a fuel cell powered concept Audi A7.

H₂USA, a Public-Private Collaboration for U.S. Hydrogen Infrastructure

Co-launched by the U.S. Department of Energy (DOE) and industry, H₂USA is the public-private collaboration helping to bring FCEVs to the market by developing America's hydrogen infrastructure. In addition to DOE, participants include the state of California, the Northeast States for coordinated Air Use Management, automotive companies, fuel cell and hydrogen technology suppliers, energy companies, trade associations, national laboratories, nonprofit organizations, and others.

Need for Renewed Federal Tax Credits

Unfortunately, just as these first vehicles are coming to market, the federal tax credits for FCEV purchases expired on December 31st, 2014. The lack of a federal tax credit to reduce the cost of vehicle purchases puts the FCEV market at a great disadvantage compared to other alternative vehicles, such as battery electric vehicles (BEV), which have a federal tax credit that can be claimed of up to \$7,500 per vehicle purchase. This is an issue that the fuel cell and hydrogen industry is striving to overcome through advocacy efforts with the administration and congress.