

Introduction to Zero Emission Vehicles

Why zero emission technologies? The transportation sector is one of the largest contributors to U.S. greenhouse gas (GHG) emissions.

What is a zero emission vehicle? Any vehicle that uses a propulsion technology which does not produce internal combustion engine exhaust.

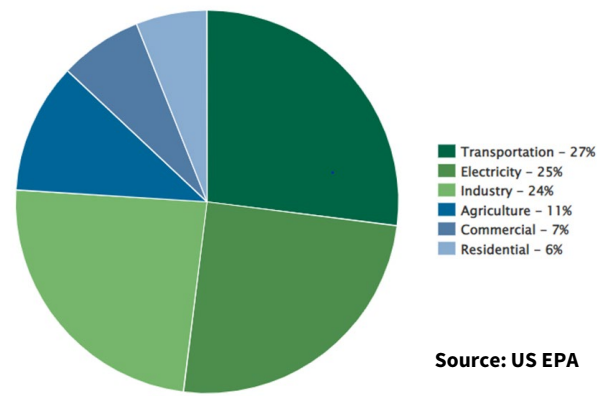
What is a battery electric vehicle? A vehicle which has an onboard battery instead of a fuel tank, and an electric motor to power the wheels instead of an internal combustion engine.

What is a hydrogen fuel cell vehicle? A vehicle which has an electric motor to power the wheels instead of an internal combustion engine. In a fuel cell vehicle, hydrogen gas from the vehicle's fuel tank combines with oxygen from the air to generate electricity onboard. The electricity is used to charge batteries which power the vehicle's propulsion.

Common Industry Acronyms:

ICE – Internal Combustion Engine
ZEV – Zero Emission Vehicle
GHG – Greenhouse Gas
EV – Electric Vehicle
FCEV – Fuel Cell Electric Vehicle
BEB/BEV – Battery Electric Bus/Battery Electric Vehicle

2020 U.S. GHG Emissions by Sector

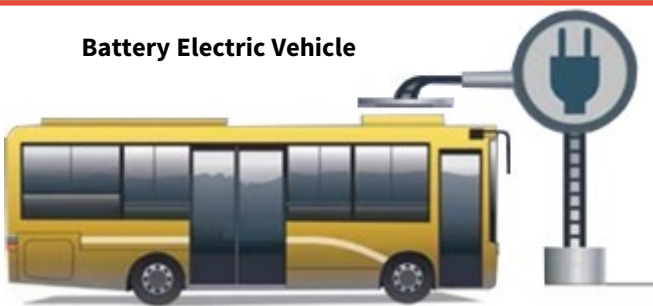


Source: US EPA

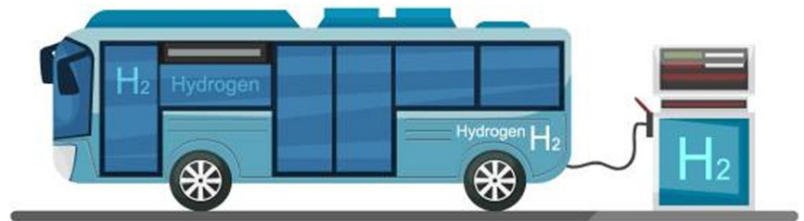
Benefits of zero emission vehicles versus fossil-fuel powered vehicles:

- Noise level reduction
- Emissions reduction/reduced carbon footprint
- Increased energy efficiency (BEB 70-90%, FCEV 25-35%)
- Increased reliability
- Reduced operations and maintenance cost
- Fully ADA accessible

Battery Electric Vehicle



Fuel Cell Electric Vehicle



Challenges of zero emission vehicles versus fossil-fuel powered vehicles:

- Increased vehicle and fueling infrastructure cost
- Decreased driving range
 - Travels approximately 150 miles on a single charge (BEV)
 - Travels approximately 250 miles on one tank of hydrogen fuel (FCEV)
- Decreased fueling/charging accessibility
 - Longer charging time requirements and less access to charging infrastructure (BEV)
 - Limited hydrogen fueling stations (FCEV)
- Increased safety requirements like fire prevention
- New training requirements for vehicle operators and maintenance staff