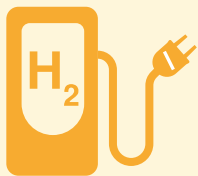


Choosing the Right Low-No Type of Vehicle



Low-emission vehicles (LEV) produce fewer emissions than the average internal combustion engine vehicle, whereas zero-emission vehicles (ZEV) produce no tailpipe emissions. Low-emission vehicles include hybrid vehicles and those powered by compressed natural gas (CNG) and propane. ZEV vehicles are electric vehicles powered by hydrogen fuel cells or batteries. LEV and ZEV projects (vehicles and infrastructure) are both eligible for funding under the FTA 5339(c) Low or No Emission Vehicle (i.e., "Low-No") Program.



Fuel Cell

A fuel cell vehicle uses hydrogen fuel cells as its power source to convert the energy produced by the reaction between hydrogen and oxygen into usable energy that powers the motor (often called an electric drive train).



Propane

Propane vehicle engines operate similar to that of diesel engines but are not widely used to power heavy-duty vehicles.



Battery-Electric

Battery-electric buses (BEB) are powered by an electric motor fueled by energy stored in a battery located on the vehicle.



Conventional Hybrid

Conventional diesel-hybrid vehicles have a diesel engine that recharges onboard batteries through regenerative braking to power an electric motor for at least a portion of the vehicle propulsion. This type of vehicle uses less fuel than that of a conventional engine and is therefore considered low-emission.



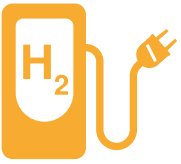




Compressed Natural Gas (CNG)

CNG is methane stored at high pressure and used as fuel in traditional gas-powered engines, with fuel tanks stored on the roof of the vehicle.

QUESTIONS TO ASK BEFORE CHOOSING AN ALTERNATIVE FUEL

- » What goal am I trying to achieve with deploying an alternative fuel?
- » How many miles per day do I need the bus to travel?
- » What size bus am I trying to replace?
- » How often will my bus need to be charged/fueled? At what time of day? How long will it take?
- » What is the availability of power infrastructure?
- » What type of space constraints do I have at my facility?
- » What facility upgrades will I need?
- » Do we run the HVAC system a lot on vehicles?
- » What type of climate and terrain do I operate in?
- » Is there a fuel source nearby?

PROS AND CONS OF ALTERNATIVE FUELS

TECHNOLOGY	PROS	CONS
 Fuel Cell	<ul style="list-style-type: none"> » No greenhouse gas (GHG) emissions » Longest ZEV driving range » Lighter than battery electric » Safer fuel source in event of fire » No fuel spills 	<ul style="list-style-type: none"> » Major infrastructure investments » Vehicle cost is often 2 times greater than conventional diesel » Highest fuel costs per mile » Concern over fuel availability » Fuel cells must be replaced at 7 years » Highest life cycle cost » Highest maintenance cost per mile
 Battery-Electric	<ul style="list-style-type: none"> » No GHG emissions » Less noise produced by motor » Lowest maintenance cost per mile for heavy duty vehicles » No fuel spills » Lowest ZEV vehicle cost » Fuel is not shipped in, or stored in on-site tanks » Facility solar panels can aid in producing own fuel 	<ul style="list-style-type: none"> » Higher vehicle cost than internal combustion engines » Major infrastructure investments » Utility coordination » Range anxiety » Winter heating concerns » Larger parking footprint » Long fueling (charging) times » Reliability concerns » Variable electric rates significantly impact costs » Batteries are replaced after 7 years, 50% of purchase price
 Compressed Natural Gas (CNG)	<ul style="list-style-type: none"> » Slightly higher vehicle cost than diesel » Long driving range 	<ul style="list-style-type: none"> » Major infrastructure investments » Largest GHG and CAP emissions of all alternative fuels with combustible engine » Better suited for warmer climates » Pipeline constraints result in moratoriums on new hook ups » No maintenance cost savings compared to diesel
 Propane	<ul style="list-style-type: none"> » Performance does not decrease in cold climates » Lowest maintenance cost per mile of alternative fuels » Long driving range » Lowest fuelling infrastructure cost of alternative fuels 	<ul style="list-style-type: none"> » No maintenance cost savings compared to diesel » Not available in heavy duty vehicles » GHG are comparable to conventional diesel
 Conventional Hybrid	<ul style="list-style-type: none"> » No infrastructure investments » Long driving range » Proven technology » Lower maintenance cost per mile than conventional diesel 	<ul style="list-style-type: none"> » Vehicle cost is often 1.33 times greater than conventional diesel » Moderately fewer GHG emissions than conventional diesel » Batteries are replaced after 7 years, 15% of purchase price