

Clean Technologies for Taxis

Taxi companies may want to consider the following technologies as they research the best alternatives to their conventional gasoline fleet. The TCEQ does not promote one technology over the other.

Hybrid

This term most commonly refers to the hybrid-electric vehicle, which includes internal-combustion engines and electric motors. The hybrid vehicle typically achieves greater fuel economy than conventional internal-combustion engine vehicles, resulting in fewer emissions.

Plug-In Hybrid

A plug-in, hybrid-electric vehicle is a hybrid vehicle with batteries that are recharged by connecting its plug to an electrical power source. It shares the characteristics of both conventional hybrid-electric vehicles and battery-electric vehicles, using an internal-combustion engine and batteries for power.

Low-Emissions Vehicles

The lowest emitting vehicles available on the market today are those certified as meeting one of the following emission standards.

- federal Tier 2-Bin 2 emission standards
- California Partial Zero-Emission Vehicle (PZEV)
- Super Ultra Low Emissions Vehicle II (SULEV II)

Bin 2-, PZEV-, and SULEV II-certified vehicles are available as conventional gasoline-powered vehicles, gasoline-electric hybrid vehicles, and alternatively fueled vehicles.

For a complete listing of vehicles certified to these standards, refer to the U.S. Environmental Protection Agency's (EPA) online [Green Vehicle Guide](#); and search for vehicles with an Air Pollution Score of nine or higher. <www.epa.gov/greenvehicles>.

Hydrogen

A hydrogen vehicle uses hydrogen as its onboard fuel for power. The engine converts the chemical energy of hydrogen to mechanical energy in one of two methods: combustion or electrochemical conversion in a fuel cell.

In combustion, the hydrogen is burned in engines in fundamentally the same method as traditional gasoline cars. In fuel-cell conversion, the hydrogen is reacted with oxygen to produce water and electricity, the latter of which is used to power an electric traction motor.

Hydrogen can also be produced from water by electrolysis. If the electricity used for the electrolysis is produced using renewable energy, the production of the hydrogen would

(in principle) result in zero net carbon-dioxide emissions. However, there are both technical and economic challenges to implementing wide-scale use of hydrogen vehicles, as well as the wide availability of less expensive alternatives.

Biodiesel

Blends of biodiesel and conventional hydrocarbon-based diesel are products most commonly distributed for use in the retail diesel-fuel marketplace. Fuel containing 20 percent biodiesel is labeled B20, while pure biodiesel is referred to as B100.

Blends of 20 percent biodiesel with 80 percent petroleum diesel (B20) can generally be used in unmodified diesel engines. Biodiesel can also be used in its pure form (B100), but may require certain engine modifications to avoid maintenance and performance problems.

Biodiesel blends in certain Texas counties must comply with the [Texas Low Emission Diesel \(TxLED\) standards](http://www.tceq.state.tx.us/implementation/air/sip/cleandiesel.html), which prohibit the use of biodiesel blends without sufficient additives to lower nitrogen oxide emissions when used in vehicles, including taxis and off-road equipment. Read more about the TxLED rule on the TCEQ Web site at [<www.tceq.state.tx.us/implementation/air/sip/cleandiesel.html>](http://www.tceq.state.tx.us/implementation/air/sip/cleandiesel.html).

Propane

Propane is the third-most-popular fuel for vehicles in America behind gasoline and diesel. The advantage of propane is its liquid state at a moderate pressure. This allows fast refill times, affordable fuel-tank construction, and price ranges comparable to (though still less than) gasoline.

Meanwhile, it is noticeably cleaner both in handling and in combustion and results in reduced engine wear (due to carbon deposits) without diluting engine oil (often extending oil-change intervals). However, public filling stations can be difficult to locate.

Compressed Natural Gas

Compressed natural gas, or CNG, is considered an environmentally "clean" alternative to gasoline, diesel, or propane fuels. And it is much safer than other motor fuels in the event of a fuel spill: natural gas is lighter than air, so it disperses quickly when leaked or spilled. However, as the case with propane, public filling stations can be difficult to locate.

Liquefied Natural Gas

Liquefied natural gas, or LNG, is natural gas that has been converted to liquid form for ease of storage or transport. It is odorless, colorless, noncorrosive, and nontoxic. Neither LNG, nor its vapor, can explode in an unconfined environment. As the case with propane and CNG, public filling stations can be difficult to locate.

Ethanol

Ethanol is a renewable fuel made from plants and is produced by fermenting plant sugars. In the United States, most ethanol is currently made from corn. Much of the increased interest in ethanol as a fuel is due to its ability to replace gasoline derived from imported oil. On the other hand, there are concerns that ethanol's use as a fuel may result in higher food prices.

There are several ethanol-gasoline blends in use today. E85 is a blend of 85 percent ethanol and 15 percent gasoline, which can only be used in flex-fuel vehicles. Another common mix is E10, a blend of 10 percent ethanol and 90 percent gasoline. E10 can be used in any gasoline vehicle manufactured after 1980.

In general, E85 reduces fuel economy by about 20 percent to 30 percent, meaning a flex-fuel vehicle will travel fewer miles on a tank of E85 than on a tank of gasoline. The EPA's Tier 2 vehicle standards require that flex-fuel vehicles achieve the same low emissions level regardless of whether E85 or gasoline is used.

Using E85 also reduces carbon dioxide and carbon monoxide levels and provides reductions in emissions of many air toxics, including benzene. However, E85 increases emissions of acetaldehyde, also an air toxic. EPA is conducting additional analysis to expand understanding of the emissions impacts of E85.