



With 4,400 propane-powered vehicles in its on-road fleet, the Texas Department of Transportation (TxDOT) is a leader in the use of alternative fuel vehicles.

Driven in part by a Texas law mandating that all state agencies purchase alternative fuel vehicles, the department has been using propane-powered vehicles since 1992. Today, these vehicles, along with 1,000 vehicles powered by natural gas, comprise more than half of the department's total on-road fleet. Propane vehicles are also popular in Texas because propane is less expensive than gasoline and is manufactured in the state.

For more information, contact Don Lewis of Texas TxDOT at (512) 416-2085.

Clean Alternative Fuels: Propane

One in a series of fact sheets



More than 60 million Americans use propane gas for everything from heating and cooling their homes and businesses to powering their barbecue grills. Propane is also used to fuel more than 350,000 vehicles on our roads today, from taxicabs and school buses to police cars. In fact, with more than 5,000 fueling stations nationwide, propane is the most widely used alternative fuel to date.

Propane (otherwise known as Liquefied Petroleum Gas or LPG) is a byproduct of natural gas processing and petroleum refining. In its natural state, propane is a colorless, nontoxic gas—at least 90 percent propane, 2.5 percent butane and higher hydrocarbons, and the balance ethane and propylene. An odorant is added to the gas so it can be detected for safety reasons. Under moderate pressure, propane gas turns into a liquid mixture, making it easier to transport and store in vehicle fuel tanks. Compared with gasoline, propane can lower carbon dioxide, carbon monoxide, and other toxic emissions.

AVAILABILITY

Propane has been used as a transportation fuel since the 1940s. Today, auto manufacturers offer a variety of light- and medium-duty propane-powered vehicles, primarily used by vehicle fleets. Many of these vehicles have two separate fuel systems, allowing the vehicles to run on either propane or gasoline. Other automobiles can be converted from gasoline to

dual fuel (i.e., propane and gasoline) for between \$1,000 and \$2,000. Conversion typically includes adding a special fuel tank to the vehicle's trunk, which can take

EMISSIONS CHARACTERISTICS*

Actual emissions will vary with engine design; these numbers reflect the potential reductions offered by propane, relative to conventional gasoline.

- Potentially lower toxic, carbon dioxide (CO₂), carbon monoxide (CO), and nonmethane hydrocarbon (NMHC) emissions.
- Rich calibration shows high NMHC and CO emissions, but lower nitrogen oxide (NO_x) emissions.
- Lean calibration shows slightly higher NO_x emissions, but lower CO and NMHC emissions.

* Estimates based on propane's inherently "cleaner" chemical properties with an engine that takes full advantage of these fuel properties.

up a space about the size of a spare tire or larger. Also, in converted vehicles, the propane fuel system increases the weight of the vehicle by approximately 100 pounds.

Propane refueling stations are located in all 50 states, typically at service stations, propane dealerships, and equipment and truck rental facilities. Many fleet owners have also installed refueling facilities on site. Propane storage tanks can often be bought or leased through existing propane providers. An online database maintained by the U.S. Department of Energy contains the locations of refueling sites throughout the country. For the vehicle owner, refueling time for an LPG vehicle container is similar to filling a gasoline or diesel tank.

AFFORDABILITY

Propane and gasoline are comparable in price per gallon. Propane costs tend to fluctuate with oil prices and can spike during periods of increased demand, such as harsh winters. Vehicle owners can avoid these price swings through long-term service contracts and bulk-fuel deliveries.

The energy content of propane is less than gasoline, meaning it achieves fewer miles per gallon than gasoline. As a result, more propane (and a slightly larger fuel tank) is needed if the vehicle is to travel the same distance as a similar gasoline or diesel vehicle. In addition, propane vehicles are more expensive than their gasoline-powered counterparts, roughly \$3,000 to \$4,000 more for light-duty vehicles and \$4,000 to \$5,000 more for medium-duty deliv-

ery trucks. These costs are expected to decrease as more propane vehicles are manufactured and sold.

PERFORMANCE

Those who drive propane-powered vehicles assert that there are no significant driving differences between dedicated propane vehicles and gasoline-powered vehicles. In fact, propane vehicles have a higher octane rating than gasoline, allowing for a higher compression ratio in the engine and greater engine efficiency. This also reduces engine “knock” and allows the engine to run more smoothly. Because the fuel is already in a gaseous state, it mixes readily with air in the combustion chamber to allow for nearly complete combustion. This reduces certain exhaust emissions, such as carbon monoxide, and minimizes problems with starting the vehicles in cold weather.

SAFETY

Propane in its liquid state has the lowest flammability range of any alternative fuel, which reduces the chances of a vehicle fire. Because it becomes a gas when leaked, however, it is more likely to ignite than gasoline and other liquid fuels; propane gas when leaked can fill a room and form a flammable layer against the ground or floor. Nevertheless, in case of a spill outdoors, propane is non-toxic, slightly soluble and biodegrades rapidly in soil, water or air. If stored in an enclosed space, proper ventilation and leak detection sensors are needed to increase safety, since the gas can displace the air necessary

for breathing.

MAINTENANCE

There are no special maintenance requirements for propane vehicles, other than having the vehicle serviced by a professional familiar with the fuel storage and delivery system.

For More Information

EPA's Alternative Fuels Web Site

www.epa.gov/otaq/consumer/fuels/altfuels/altfuels.htm

National Propane Gas Association

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Phone: 630 515-0600
Fax: 630 515-8774
Web site: www.npga.org

Propane Vehicle Council

1155 Connecticut Avenue, NW.
Washington, DC 20036
Phone: 202 371-6262
Fax: 202 721-4204
Web site:
www.propanegas.com/vehicle

Alternative Fuel Refueling Station Locator

Web site: afdcmapp.nrel.gov/nrel

Alternative Fuels Data Center

Web site: www.afdc.nrel.gov

National Alternative Fuels Hotline

Phone: 800 423-1DOE

