

Flexible Fuel Vehicles: Powered by a Renewable American Fuel

Today, more than 5 million vehicles on U.S. highways are flexible fuel vehicles (FFVs). These vehicles can operate on E85—a blend of 85% ethanol and 15% gasoline. The ethanol component of this renewable fuel offers significant advantages. It is manufactured in the United States, made from home-grown feedstocks, and is cleaner burning than gasoline.

What is an FFV?

An FFV, as its name implies, has the flexibility of running on more than one type of fuel. FFVs can be fueled with unleaded gasoline, E85, or any combination of the two. Like conventional gasoline vehicles, FFVs have a single fuel tank, fuel system, and engine. And they are available in a wide range of models such as sedans, pickups, and minivans. These light-duty FFVs are designed to run on at least 15% gasoline in the fuel, mainly to ensure they start in cold weather.

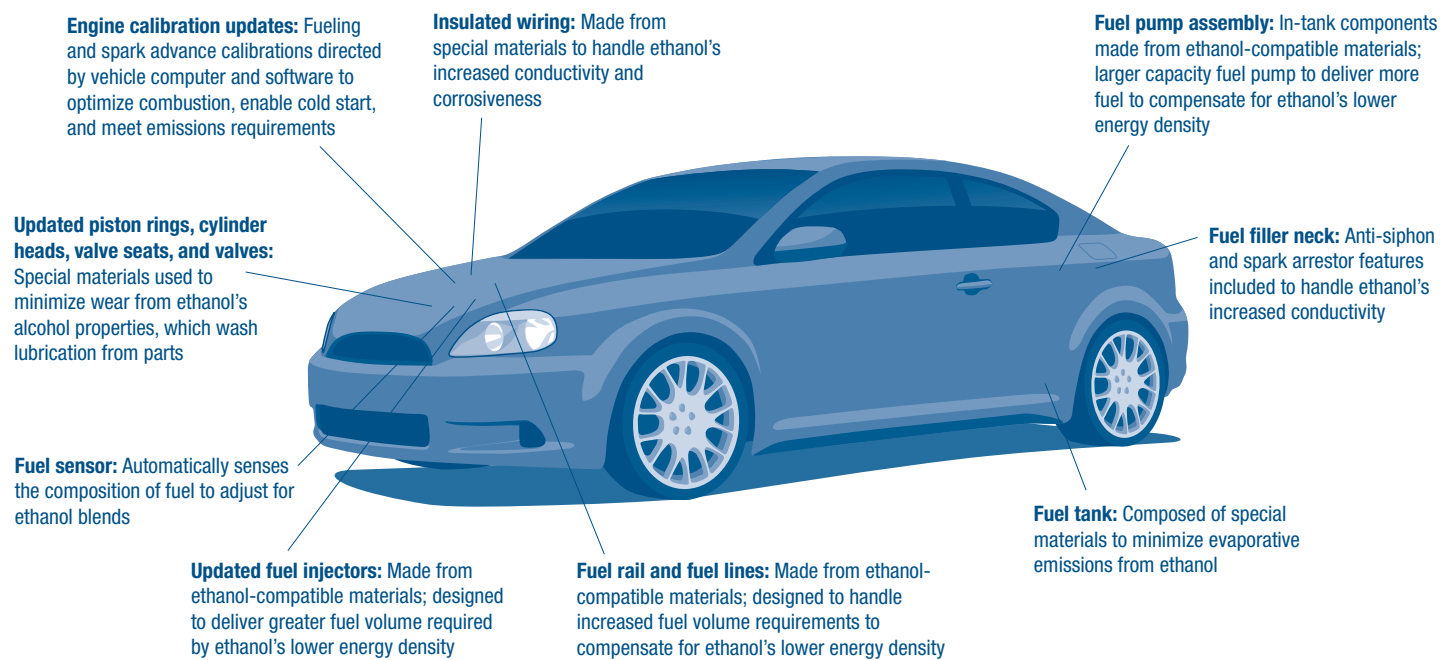
FFVs differ from conventional vehicles in some ways. They are equipped with modified components designed specifically to be compatible with ethanol's chemical properties. In the car illustration below, major modification requirements for FFVs are described. These modifications ensure seamless operation and a long useful life across a wide range of ethanol blends.

Clean Cities posts a list of alternative fuel vehicles, including FFVs, on its Alternative Fuels Data Center (AFDC) Web site. To find out about available models, visit www.eere.energy.gov/afdc/afv/afdc_vehicle_search.php and choose the current model year.

Can existing vehicles be converted to FFVs?

Converting a conventional gasoline vehicle to one that runs on E85 is certainly technically possible by modifying as shown in the figure below.

Flexible Fuel Vehicle Features



However, FFV conversions need to be done by authorized companies and require certification by the Environmental Protection Agency (EPA) or the California Air Resources Board (CARB). As of the publication date of this fact sheet, no certifications have been issued. In addition, converting a vehicle to E85 may affect its warranty.

For more information on the vehicle conversion process, refer to the EPA's Updated Certification Guidance for Alternative Fuel Converters on its Web site at www.epa.gov/otaq/cert/dearmfr/cisd0602.pdf.

Does E85 affect vehicle performance?

FFVs operating on E85 generally perform just as well as when fueled with gasoline. Sensors in the FFV system automatically prompt adjustments for fuel composition, so emissions and standard performance areas such as power and acceleration are not significantly affected by E85. One difference between E85 and gasoline, however, is fuel economy. Ethanol contains less energy per gallon, which roughly translates into a 20% to 25% reduction in fuel economy compared to gasoline. No matter what type of fuel is used, however, fuel mileage is affected by driving habits, weather, ethanol blend in the tank, and other factors.

Standard testing results for fuel economy of FFVs and their gasoline counterparts are posted on the combined EPA and U.S. Department of Energy Web site at www.fueleconomy.gov.

What are the costs and benefits of using E85?

The cost of using E85 is comparable to that of conventional fuel. The flexible fuel feature often comes standard or is offered as a no-cost option. And maintenance costs are level as well. Years of FFV use by private and government fleets have proven the dependability of the technology. Because of this performance history, manufacturers stand behind FFVs with standard warranties equal to those of gasoline vehicles.

The one difference between E85 and gasoline, fuel economy, can be offset in whole or in part by E85's typically lower price per gallon. However, like gasoline, ethanol prices fluctuate and are set based on market supply and demand. To compare the price of fueling with E85 versus gasoline, use the AFDC's Flexible Fuel Vehicle Cost Calculator at www.eere.energy.gov/fleetguide/cost_anal.php?0/E85*Flex*Fuel.

Even though E85's fuel economy is somewhat less, a bonus for its use is lower emissions. According to the EPA, E85 produces fewer total toxins and lower levels of ozone-forming volatile organic compounds compared to gasoline. It also emits fewer emissions of oxides of nitrogen, or NOx, and particulate matter. And, because E85 is predominantly non-petroleum, it results in fewer greenhouse gas emissions.

How are FFVs identified?

A look inside the fuel door quickly identifies FFVs. Since September 2006, the Energy Policy Act of 2005 requires auto manufacturers to place a label inside the FFV fuel compartment that states the vehicle can run on either E85 or gasoline. Flexible-fuel capability also is outlined in the owner's manual and encoded in the vehicle identification number, or VIN. To help determine if an older vehicle is E85 compatible, visit the National Ethanol Vehicle Coalition Web page on flexible fuel vehicles at www.e85fuel.com/e85101/flexfuelvehicles.php.

Where are E85 stations located?

Stations offering E85 continue to increase across the nation. At the end of 2006, more than 1,000 stations in at least 45 states sold E85. To find E85 stations throughout the country, check out the Alternative Fuel Station Locator at www.eere.energy.gov/afdc/infrastructure/locator.html, a database maintained by the AFDC. This easy-to-use database allows users to plot routes either across town or across the nation, showing E85 stations along the way.

Resources

Alternative Fuels Data Center: www.eere.energy.gov/afdc/altfuel/ethanol.html

American Coalition for Ethanol: www.ethanol.org

Clean Cities: www.eere.energy.gov/cleancities

Clean Fleet Guide: www.eere.energy.gov/fleetguide

E85 Fleet Toolkit: www.eere.energy.gov/afdc/e85toolkit

Environmental Protection Agency: www.epa.gov/otaq/consumer/fuels/altfuels/altfuels.htm

Fuel Economy: www.fueleconomy.gov

National Ethanol Vehicle Coalition: www.e85fuel.com

Renewable Fuels Association: www.ethanolrfa.org

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