

Alternative Fuels: E85 and Flex Fuel Vehicles

Ethanol is a renewable fuel made from plants. Essentially non-drinkable grain alcohol, ethanol is produced by fermenting plant sugars. It can be made from corn, sugar cane, and other starchy agricultural product. The cellulose in agricultural wastes such as waste woods and corn stalks (also know as “cellulosic ethanol”) can also be used as a base. In the United States, most ethanol is currently made from corn, although because of rapidly developing research, cellulosic ethanol may soon become a larger part of the market.

E85 FUEL

While pure ethanol is rarely used for transportation fuel, there are several ethanol-gasoline blends in use today. E85 is a blend of 85 percent denatured ethanol and 15 percent gasoline. In certain areas, higher percentages of gasoline will be added to E-85 during the winter to ensure that vehicles are able to start at very cold temperatures.

E85 cannot be used in a conventional, gasoline-only engine. Vehicles must be specially designed to run on it. The only vehicles currently available to U.S. drivers are known as flex fuel vehicles (FFVs), because they can run on E85, gasoline, or any blend of the two. Much like diesel fuel, E85 is available at specially-marked fueling pumps. Today, nearly 700 fueling stations offer it.

Another common mix is E10, a blend of 10 percent ethanol and 90 percent gasoline. E10 is available in many areas across the United States and can be used in any gasoline vehicle manufactured after 1980.

FLEX FUEL VEHICLES

Ethanol-fueled vehicles date back to the 1880s when Henry Ford designed a car that ran solely on ethanol. He later built the first flex fuel vehicle: a 1908 Model T designed to operate on either ethanol or gasoline.

Today’s FFVs feature specially-designed fuel systems and other components that allow a vehicle to operate on a mixture of gasoline and ethanol that can vary from 0 percent to 85 percent ethanol. These cars and trucks have the same power, acceleration, payload, and cruise speed as conventionally fueled vehicles. Maintenance for ethanol-fueled vehicles is very similar to that of regular cars and trucks. However, owners should identify the car as an FFV when ordering replacement parts.

Today, the United States has more than 6 million FFVs on the road. These vehicles are available in a range of models, including sedans, pick-up trucks, and minivans. Additionally, several auto

For More Information

EPA Grow & Go Web Site

www.epa.gov/smartway/growandgo

EPA Alternative Fuels Web Site

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

FuelEconomy.gov: Flex-Fuel Vehicles Web Site

www.fueleconomy.gov/feg/flextech.shtml

DOE Alternative Fuels Data Center: Ethanol Web Site

www.eere.energy.gov/afdc/altfuel/ethanol.html

DOE Alternative Fuel Station Locator Web Site

www.eere.energy.gov/afdc/infrastructure/locator.html

manufacturers have announced plans to greatly expand the number of FFV models they will offer. In fact, you may even be driving one now. To find out, check the inside of your gas tank door for an identification sticker.

AFFORDABILITY

FFVs are priced the same as gasoline-only vehicles, offering drivers the opportunity to buy an E85 capable vehicle at no additional cost.

In general, E85 reduces fuel economy and range by about 20-30 percent, meaning an FFV will travel fewer miles on a tank of E85 than on a tank of gasoline. This is because ethanol contains less energy than gasoline. Vehicles can be designed to be optimized for E85—which would reduce or eliminate this tendency. However, no such vehicles are currently on the market. The pump price for E85 is often lower than regular gasoline; however, prices vary depending on supply and market conditions.

E85 & CONVENTIONAL VEHICLES

Consumers should never use E85 in a conventional, gasoline-only vehicle. This can lead to a range of problems, including not being able to start the engine, damage to engine components, illumination of the check engine light, and emissions increases.

It is technically possible to convert a conventional gasoline vehicle to run on E85; however, such conversions would likely be illegal unless they are certified by the U.S. Environmental Protection Agency (EPA). To date, EPA has not certified any E85 conversions. In addition,

converting a conventional vehicle to E85 may violate the terms of the vehicle warranty. For more information on the vehicle conversion process, please visit EPA's Web site at: www.epa.gov/otaq/cert/dearmfr/cisd0602.pdf.

BENEFITS

Much of the increased interest in ethanol as a vehicle fuel is due to its ability to replace gasoline from imported oil. The United States is currently the world's largest ethanol producer, and most of the ethanol we use is produced domestically from corn grown by American farmers.

E85 also provides important reductions in greenhouse gas (GHG) emissions. When made from corn, E85 reduces lifecycle GHG emissions (which include the energy required to grow and process corn into ethanol) by 15-20 percent as compared to gasoline. E85 made from cellulose can reduce emissions by around 70 percent as compared to gasoline.

EPA's stringent Tier II vehicle emission standards require that FFVs achieve the same low emissions level regardless of whether E85 or gasoline is used. However, E85 can further reduce emissions of certain pollutants as compared to conventional gasoline or lower volume ethanol blends. For example, E85 is less volatile than gasoline or low volume ethanol blends, which results in fewer evaporative emissions. Using E85 also reduces carbon monoxide emissions and provides significant reductions in emissions of many harmful toxics, including benzene, a known human carcinogen. However, E85 also increases emissions of acetaldehyde—a toxic pollutant. EPA is conducting additional analysis to expand our understanding of the emissions impacts of E85.