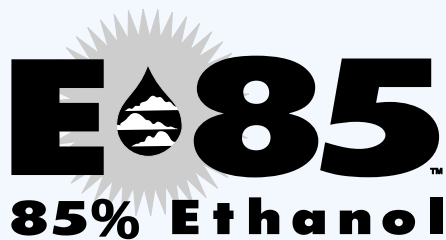


Flexible Fuel Vehicles



FLEET MANAGERS GUIDE

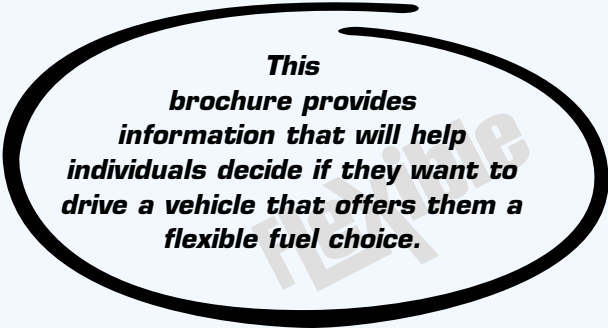
What are E85 FFVs?

E85 Flexible Fuel Vehicles (FFVs) are designed to run on a mixture of 85% ethanol and 15% gasoline. They will also run on unleaded gasoline alone, or any mixture of gasoline and ethanol (up to 85%).

These vehicles (cars, trucks, vans, etc.) look and drive just like “gasoline only” vehicles, but provide the driver with the ability to use E85 fuel. This ability is not apparent, unless the vehicle has an FFV or E85 logo on its exterior, or inside the cover of the fuel filler. The owner’s manual of each FFV gives additional details about the ability to use the two types of fuel.

Vehicle manufacturers who have designed E85 FFVs have provided an engine control computer with the ability to automatically recognize which fuel is being used. The computer also controls the fuel system and ignition system to allow for the best calibration. This involves the flow rate of the fuel injectors and timing the firing of the spark plugs. Some components in the fuel system (fuel tank, filter, pump, injectors) are also sized differently and made of material which is compatible with E85 fuel.

E85 FFVs allow for a choice of fuels. This important choice affects our state’s and nation’s future air quality, economy, and dependence on imported oil.



***This
brochure provides
information that will help
individuals decide if they want to
drive a vehicle that offers them a
flexible fuel choice.***

What E85 FFVs Offer the Fleet Manager

Driving an E85 FFV has many benefits. Fleet Managers will be interested in the advantages that E85 has for the vehicle, the environment, and the economy.

All Fleet Managers

E85 FFVs provide:

- standard equipment and operational characteristics
- fueling similar to gasoline
- no fuel supply or climate issues
- improved corporate responsibility/environmental image
 - Minnesota grown and produced, supporting our domestic economy
 - offers farmers a value-added commodity for their corn crop
 - renewable, sustainable product
- a variety of makes and models to choose from

EPA Act Mandated Fleet Managers

E85 FFVs have:

- satisfied alternative fuel vehicle purchasing requirements
- significant E85 fueling infrastructure in the Twin Cities metro area
- no incremental cost
- bi-fuel capabilities which offer unlimited trip distances



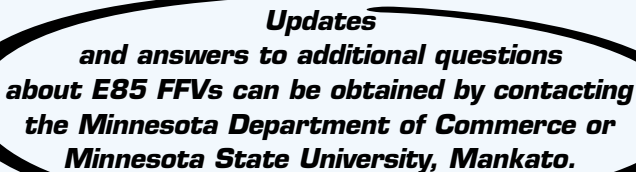
E85 allows individuals to make a choice which will benefit us all.

The E85 FFV Difference

An E85 FFV is similar to a standard gasoline powered vehicle. Power, acceleration, payload and cruising speed are generally comparable to gasoline powered vehicles. As the percentage of ethanol increases in the fuel tank, the power output of the engine actually improves. Ethanol enhances engine power by increasing the fuel's octane level and oxygen ratio.

E85 fuel keeps the fuel system clean and acts as a gas line antifreeze. The main differences in the vehicle are the materials used in the fuel system and special engine computer calibration that allow it to adapt to E85 fuel. The computer takes signals from input sensors in the engine management system and uses them to optimize the ignition timing and fuel flow rate that best suits the fuel being used. This process occurs automatically as the vehicle is being driven.

The only difference is that FFVs aren't limited to burning gasoline; they offer individuals a choice!



***Updates
and answers to additional questions
about E85 FFVs can be obtained by contacting
the Minnesota Department of Commerce or
Minnesota State University, Mankato.***

E85 FFV Frequently Asked Questions

Q. How much do E85 FFVs cost to purchase?

E85 FFVs cost the same as gasoline powered automobiles. Many car owners are unaware that they are actually driving an FFV.

Q. Where can I buy, or lease, an E85 FFV?

FFVs can be purchased or leased from new automobile dealerships. The process is the same as shopping for a gasoline powered vehicle.

Q. How long have FFVs been available?

The first commercially available flexible fuel car was the 1992 Lumina by Chevrolet. Even before that, the automotive industry, government and research universities had experimental models that were driven millions of miles during testing.

Q. What about the warranty?

E85 FFVs are standard equipment on select models and are covered under the same warranty conditions as their gasoline powered counterparts.

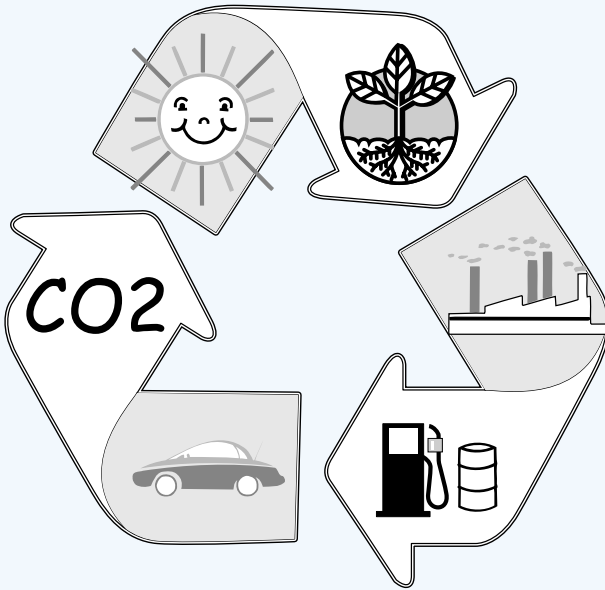
Q. Is the fuel economy for FFVs the same as it is for “gasoline only” vehicles?

Fuel economy varies depending upon the blend of fuel being used. When the FFV uses 100% gasoline, the miles per gallon is the same. When E85 is used, fuel economy is lower. Because pure ethanol has a lower energy content (BTU's per gallon) than gasoline, E85 fuel has less energy than gasoline. Extensive research by the Minnesota State University, Mankato (MnCAR) indicates that consumers should expect a 15 to 25% reduction in fuel economy.*

The typically lower cost of E85 as compared to gasoline coupled with the fact that E85 is not as affected by price fluctuations, makes up for some of the energy difference. Also, manufacturers install a larger fuel tank to provide the same range as a pure gasoline vehicle. The result is that consumers will receive the same range between fill-ups.

* MnCAR can provide specific test result data upon request.

What is E85 Fuel?



Ethanol is an alcohol fuel made from grains (corn, wheat) or agricultural waste products called biomass (potato wastes, cheese whey, corn fiber, rice straw, sawdust, yard clippings).

In Minnesota, most ethanol is made from corn. One

bushel of corn yields 2.5 gallons of ethanol. The starch is the only part of the corn that is used for producing ethanol. Manufacturers convert the starch into sugar; the sugar is then added to yeast which converts it into ethanol. The rest of the corn is used for making corn oil, protein feed, protein gluten meal, and carbon dioxide (used for carbonating beverages). Ethanol plants in Minnesota are located throughout the state and use corn grown by local farmers. They are often farmer co-op owned and operated.

Producing and using ethanol as a transportation fuel is a form of recycling. Carbon Dioxide (CO₂) is released into the atmosphere when corn is converted into ethanol and when ethanol is burned in automobiles. The CO₂ is then reconverted to carbon and oxygen when new plants are grown. Over this complete "lifecycle" an E85 FFV reduces total CO₂, which helps lessen global warming.

**Using
E85 as a transportation fuel
benefits the environment and the
economy.**

E85 Fuel Frequently Asked Questions

Q. How much does E85 fuel cost?

E85 fuel is usually priced equal to or less than regular unleaded gasoline.

Q. Where can I buy E85 fuel?

E85 fuel is available at several service stations. See the insert for the current list of Minnesota E85 refueling stations.

Q. When using E85, do I need a gas line antifreeze?

No, using fuel blended with ethanol eliminates the need for gas line antifreeze products.

Q. Is E85 as safe as gasoline?

Yes, there is no loss of safety if E85 is spilled or an E85 FFV is involved in an accident.

Q. Is the use of ethanol as a fuel a new concept?

No, over 2 trillion miles have been driven on ethanol blended fuels since 1979.

Q. How does the use of E85 reduce carbon monoxide (CO)?

Ethanol contains oxygen, which contributes to cleaner, more efficient combustion and results in lower CO exhaust emissions.

Q. How does the use of E85 help prevent ozone pollution?

Ethanol use reduces exhaust emissions which contribute to ozone pollution.

Q. How does E85 affect global warming?

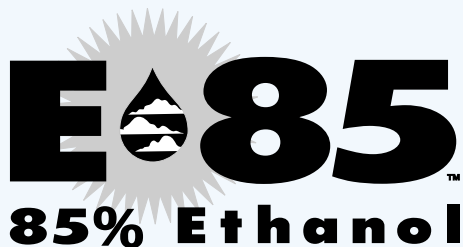
Carbon Dioxide (CO₂) is a major contributor to global warming. Most ethanol is made from corn, which “breathes in” CO₂ and “breathes out” oxygen (O₂). Increased use of E85 will partially offset the global warming effect of burning gasoline.

Q. What if I can't find an E85 fuel station?

E85 FFVs offer a choice. Any combination of gas and ethanol can be used when traveling where E85 is not available.

Updates

and answers to additional questions about E85 Fuel can be obtained from the Minnesota Department of Commerce or Minnesota State University, Mankato.



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The Minnesota Center for Automotive Research (MnCAR) is a component of the Automotive Engineering Technology Program at Minnesota State University, Mankato.

MnCAR provides industry and government with direct assistance in automotive research and product development. MnCAR focuses on alternative and renewable fuel research in which vehicle emissions, fuel economy and performance are studied.
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