

# Ethanol - Natural Solution to our Oil Dependency

Ethanol is an alternative fuel made by fermenting and distilling a variety of plant-based feedstocks commonly known as “biomass”. Ethanol is available in four different blends, E10, E15, E20, and E85. The most common alcohol blend is known as E85 containing up to 85% ethanol and 15% gasoline.

## Different Ethanol Blends



One Bushel of Corn weighs about 56 pounds and yields about 2.8 gallons of Ethanol

Ethanol is blended with gasoline in different amounts to operate vehicles. The first blend is E10 or lower level blend (10% ethanol and 90% gasoline) which is also classified as substantially similar to gasoline; allowing it to be used in any type of vehicle. The next are E15 and E20; these are intermediate ethanol blends and may be used in flexible fuel vehicles but not as an alternative fuel.

E85 (85% ethanol and 15% gasoline) fuel is typically used in flexible fuel vehicles, and its gasoline percentage allows Flex Fuel Vehicles to operate normally under cold weather conditions. The price of E85 compared to gasoline is less, and even though the energy level of E85 is lower, the cost per mile is comparable.

## What is Ethanol made of?

Ethanol is made by fermenting sugar derived from crops such as sugar cane, maize, sorghum, wheat, cornstalks, fruit and vegetable waste. Ethanol can also be made from cellulosic materials, such as grass, wood, crop residues, or newspapers.

### Local Action

- According to the U.S Department of Energy there are 17 E85 Fueling Stations throughout South Florida
- In 2008, Palm Beach County Fleet management switched to E10. Fueling with Ethanol has saved the County 300,000 gallons of gasoline per year.
- Currently 940 vehicles (13%) of Miami Dade County's light fleet are E85 Flex Fuel Compatible.

## Advantages of using Ethanol

- Renewable fuel is not required to be imported from other countries.
- Ethanol blends reduce nitrogen oxide emissions by up to 20%.
- Ethanol has a high oxygen content which reduces carbon monoxide emissions by 25% to 30%.
- Ethanol reduces sulphur dioxide and particulate matter (PM) emissions significantly.
- High level ethanol blends reduce emissions of volatile organic compounds (VOCs) by 30% or more. VOC is the major source of ground level ozone formation.
- Ethanol is biodegradable with minimal effect on the environment.
- The manufacturing and burning does not increase the greenhouse effect.
- Ethanol emissions do not contaminate groundwater.
- Ethanol can blend with gasoline allowing residents to switch fuels easily.
- Use of ethanol supports local farmers.



Miami Dade Public Transportation Bus

## How is starch ethanol made?

Ethanol is produced through a fermentation/distillation method; only starch in grains is utilized during the production of ethanol. There are two methods to begin the production of starch ethanol: dry milling and wet milling. The dry milling method is most often used due to the smaller size of the facilities in which it occurs. During this method, the starch portion of the grains are ground into powder, mixed with water forming a mash, then heated with added enzymes to separate the fermentable sugars. Fermentation is the following stage where additional yeast is added to convert sugars to ethanol and carbon dioxide. The result of this stage is the blend called "beer" which contains 10% ethanol and 90% water. The "beer" is boiled in a distillation column in order to separate the water, resulting in fuel-grade ethanol which is 85%-95% pure.

## By-products:

Since only the starch in grains is used to make ethanol, the remaining proteins, minerals, vitamins and fiber are used to create by-products. Some of these products are: corn oil, high fructose corn syrup, gluten meal, and dried distillers grains. These products are sold as high value feed for livestock.

## What is cellulosic ethanol?

Cellulosic ethanol is made from woody or structural parts of plants. Its production is more expensive and complex than starch ethanol because the materials need to be broken into component sugars first; which is done by adding enzymes or acids, and then converting to ethanol by using micro-organisms.

## What type of cars run with ethanol fuel?

Flexible Fuel Vehicles (FFVs) are the types of vehicles that run with E85. They are also able to run on gasoline in case ethanol is not available. Currently ethanol can be used in more than six million FFVs around the nation. FFVs are being designed and produced by most automobile corporations. Their prices are similar or a little higher than conventional automobiles.



Ford Ethanol Vehicles

## E85 Fueling Stations

The U.S. Environmental Protection Agency (EPA) indicates there are over 2,000 E85 fueling stations in the United States.

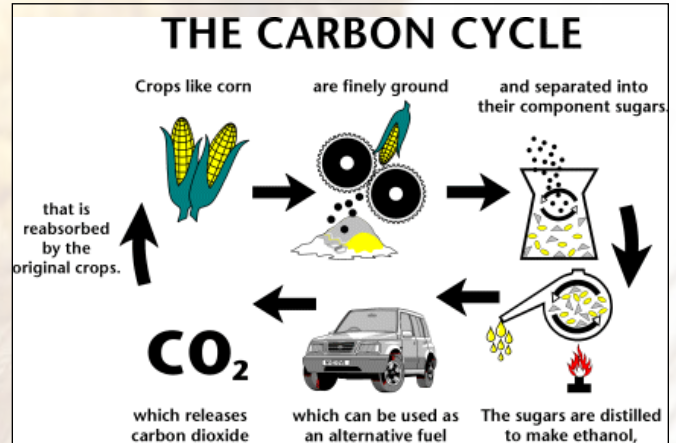


Ethanol Fueling Station

The Gold Coast Clean Cities Coalition is managed by the South Florida Regional Planning Council (SFRPC). The SFRPC is a regional planning and public agency whose mission is to work with South Florida's public, private, non-profit, and civic leadership to create a better future for south Florida. The SFRPC is one of 11 Regional Planning Councils in Florida and serves three counties: Miami-Dade, Broward, and Monroe; 71 municipalities; and almost 4.3 million residents. For additional information about the SFRPC please visit [www.sfrpc.com](http://www.sfrpc.com)

The South Florida Regional Planning Council.  
3440 Hollywood Boulevard, Suite 140  
Hollywood, Florida 33021

For more information about incentives, alternative fuels and alternative fuel vehicles please visit [www.floridagoldcoastcleancities.com](http://www.floridagoldcoastcleancities.com) or email us at: [sfadmin@sfrpc.com](mailto:sfadmin@sfrpc.com)



Ethanol Production Process  
(National Ethanol Vehicle Coalition)