

ETHANOL AS A FUEL SOURCE - II

Environmental Benefits:

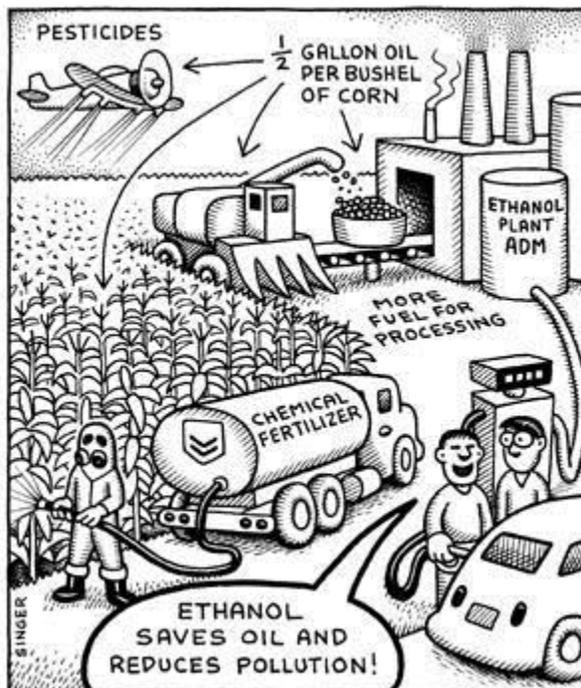
Ethanol as a renewable fuel source is very beneficial to the environment and the process in which it is produced is no exception. Converting corn or other materials to usable fuel is a fairly simple process that doesn't require a large amount of time. There are also very few wastes, and an overwhelming majority of the byproducts produced can be either recycled or sold to be used elsewhere. Using ethanol not only reduces our dependency on foreign nations for oil, it reduces our negative impact on the world in which we live, but of which are extremely positive results. When using ethanol as a low percentage fuel additive to gasoline in cars, it reduces the greenhouse emissions like carbon monoxide and nitrogen oxides. Typically, ethanol is added to gasoline by only using one part ethanol to nine parts gasoline. Another great benefit of ethanol is that it burns relatively clean because its chemical structure contains oxygen. When mixing ethanol with gasoline for a car, it reduces the amount of fossil-fuel-based gasoline that the car consumes. Plus, any car can run on a mixture of E-10 ethanol (1:9 ratio). The option of flex fuel vehicles is becoming more popular too. These cars have the ability to use stronger more potent forms of ethanol in their fuel or have the option of using ordinary gasoline as well. This fuel is called E-85 (85:15 ratio of ethanol to gasoline). With this higher ethanol ratio, the fuel burns even cleaner and further reduced the greenhouse emissions apposed to using regular gasoline [6].



Another benefit to using ethanol based fuels is that it is an easily renewable energy source which then helps to reduce the dependence on other energy sources. Our oil resource is slowly running out, and biofuels like ethanol are becoming more and more accepted across the globe. In fact, Brazil holds ethanol as their second most used energy source. It is 16% of their entire energy needs. In contrast to Brazil, where the major source for ethanol is from sugar cane, the United States use 23.7% of their annual corn crop to create biofuels [7]. Because ethanol is made from waste products, it helps reduce the amount of landfill wastes that countries have. Examples of waste products are wood chips from a logging mill and left over fruit skins at a juicing plant [8].

Problems:

One of the biggest problems with ethanol as an energy source is when it is used in large scale situations. In reality, there is not much of a significant amount of energy that can be extracted from food crops. There is simply not enough land available to grow these crops for energy usage and at the same time provide for the world's daily food needs. It almost seems wrong to fuel a car with ethanol that is basically crop food when people from other countries are starving.



Another problem is with the ethanol blends. These blends, that have only a 1:9 ratio of ethanol, have problems achieving enough vapor pressure for the fuel to evaporate and spark for ignition during colder weather at temperatures below 59°F. If the vapor pressure is below 45 kPa, it becomes very hard to start a car engine [9]. The solution to this problem is to have a higher ethanol ratio. E-85 ethanol fuel can achieve the correct vapor pressure in cold climates and an E-70 blend for even colder climates. But with E85 and E-70, one needs to have a flex fuel vehicle. Plus, these higher ethanol ratio type fuels cannot be used on regular gasoline driven vehicles. To add to the colder weather climate problem, an engine heater system is recommended for temperatures that are below 10°F for the initial start up of the car [10]. This puts a major limitation on the ability of using these types of fuels especially in areas that have snow in the winter months.

The Future of Ethanol:

As with any new idea or technology, advances in the study and production of ethanol are being made at a rapid pace. Thanks to all of the information gathered from the ever growing number of flex fuel cars on the road and ethanol fill stations around the country, the industry is learning invaluable information about the pros and cons of ethanol and its impact on the world. The trend of the rapid increase in the use of ethanol is expected to continue for years to come. From the year 1980 to 2001, the use of ethanol grew at an average rate of 75 million gallons per year. From 2001 to 2006 this value increased to 770 million gallons per year and after 2006, the average grown exploded to 2,950 million gallons per year and is showing no signs of stopping [11].

Many advancements are being made in the production of ethanol as well, in order to make the process as efficient and environmentally friendly as possible. “Companies are also utilizing biomass gasification and methane digesters to reduce natural gas consumption. Additional work is being done to reduce energy consumption and production costs, increase efficiency and reduce emission using the best available control technologies” [4]. There is also a push towards producing ethanol from other products in addition to corn. Cold starch fermentation, corn fractionation and corn oil extraction are just a few new ideas being innovated. Some experts have gone as far to say that the United States has enough excess cellulose in the form of wheat, wood waste, and municipal solid wastes to replace all imported petroleum products [11].

Improving the way in which ethanol is produced reduces the overall cost of manufacture, which in turn reduces the cost to the consumer. In an attempt to make the process more efficient, more robust yeasts that are capable of tolerating higher temperatures and therefore higher ethanol levels are being tested and used in production. Improved fermentation processes that will increase ethanol concentrations and better front-end separation of the co-products will help to increase the quality and value of the ethanol and the solid wastes and gases that are produced [12].



The production and use of ethanol across the United States and around the world will most likely increase at an extremely rapid pace long into the foreseeable future. Technology advances will aid in the production of the fuel from many different sources in addition to corn. As a result, the U.S. dependency on foreign oil will be dramatically reduced and our impact on the environment will be improved. The improved gas emissions from ethanol fueled cars is considerably cleaner than that from petroleum based engines which will improve the quality of air and perhaps reduce the impact of global warming. While ethanol and the various other forms of biofuels being produced today have some unaddressed concerns, the continued research and production will make the world a better place to live in the years to come.

Source : <http://me1065.wikidot.com/ethanol-as-a-fuel-source>