

Why support E85 (85% ethanol / 15% gasoline) use in NC?

NC has over 120,000 flex-fuel vehicles (FFVs) while the US has over 6 million FFVs – vehicles that can operate on either gasoline or ethanol blends up to 85%. All major US automakers sell FFVs at no additional cost to the purchaser and have announced plans to significantly expand production to meet federal directives. Consequently it is important to expand access to E85 for these FFVs.

Consumers interested in energy independence and the environment want cleaner burning fuels that will help reduce our dependence on fossil fuels and support agricultural interests. Tests have shown that E85 reduces carbon monoxide as well as harmful hydrocarbon and benzene emissions.

Demand for renewable based fuels such as ethanol is expected to continue increasing. The Renewable Fuel Standard requires 7.5 billion gallons of renewable fuel in U.S. gasoline by 2012 and a phase out of MTBE (which ethanol serves as a replacement for in states that require reformulated gas) assures markets for farmers and producers. Production facilities are expanding rapidly in the U.S., including anticipated production in North Carolina. With no petroleum refineries, NC must import virtually all its fuel, so expanding the use of E85 will help our economy and environment.



Greenhouse Gas Emissions

According to the U.S. Environmental Protection Agency (US EPA)¹, the transportation sector directly accounted for approximately 27% of total U.S. greenhouse gas (GHG) emissions in 2003. Furthermore, transportation is the fastest-growing source of U.S. GHGs and the largest end-use source of CO₂, which is the most prevalent greenhouse gas. Every gallon of gasoline creates 19 lbs of CO₂. Replacing gasoline with ethanol (E85) can reduce greenhouse gas emissions because plants used in the production of renewable fuels absorb CO₂ from the atmosphere during the growing process; therefore there is no net increase of CO₂ in the atmosphere. According to the National Renewable Energy Lab using corn ethanol reduces greenhouse gases on full life cycle analysis (18% for E10 and 29% for E85²).

Food versus Fuel

Rising corn prices are good for farmers. A primary threat to agriculture today is losing farmland to development interests. One of the reasons for this is that crop prices have been too low and development pressures are too high for farmers to stay in agriculture. The argument that raising prices for corn from the ethanol boom is contributing to the world hunger problem is over simplified. It could be argued that the low prices for US agricultural products overseas is making it more difficult for the world's hungry as less developed countries find it hard to compete on the world market with subsidized (and therefore cheap) American grain³. As the largest U.S. agricultural crop, corn is generally in surplus, requiring government price supports. Therefore, to whatever extent ethanol supports corn prices, taxpayer costs are reduced. Furthermore, most grain grown in the US is not used to feed people but to feed animals which in turn we eat. It takes about 7-9 lbs of grain to make one pound of meat. The corn used in ethanol production is "field corn" used to feed livestock and not sweet corn which humans eat. Moreover, it is not a "fuel or food" argument because the production of corn based ethanol uses only the starch, leaving dried or wet distillers grain suitable for animal feed. This is a valuable co-product of ethanol production.

Cost Comparison

The costs of ethanol must be taken into consideration with what ethanol is replacing - petroleum. There are many hidden and not so hidden costs related to our reliance on petroleum. This is hurting our economy and putting us in a very vulnerable position. "America's Achilles Heel, The Hidden Cost of Imported Oil" by the National Defense Council Foundation (www.ndcf.org) does a thorough job of laying out some of these costs and concludes that we are really paying far more for petroleum than the price at the pump.

¹ Greenhouse Gas Emissions from Transportation and Other Mobile Sources. U.S. Environmental Protection Agency. www.epa.gov/otaq/greenhousegases.htm

² Wang, Michael. "Updated Energy and Greenhouse Gas Emission Results of Fuel Ethanol." Center for Transportation Research, Argonne National Laboratory. 2005. www.transportation.anl.gov/pdfs/TA/375.pdf

³ Danko, Katie. "Is the US Killing African Farmers?" *Conscious Choice*. March 2007. www.consciouschoice.com/2007/03/thoughtforfood0703.html

Energy Balance

The production of ethanol has a positive energy balance as compared to gasoline. The US Dept of Agriculture (USDA) estimates that for every BTU dedicated to producing ethanol there is a 34% energy gain. This includes considering all energy inputs related to corn farming, corn transport, ethanol production, and distribution and transport of finished ethanol. Only about 17% of the energy used to produce ethanol comes from liquid fuels, such as gasoline and diesel fuel. For every 1 BTU of liquid fuel used to produce ethanol, there is a 6.34 BTU gain⁴. According to the USDA study, gasoline has an energy ratio of 0.805. In other words, for every unit of energy dedicated to the production of gasoline there is a 19.5 percent energy loss. In summary, the finished liquid fuel energy yield for fossil fuel dedicated to the production of ethanol is 1.34 but only 0.74 for gasoline. In other words the energy yield of ethanol is (1.34/0.74) or 81 percent greater than the comparable yield for gasoline.⁵

Comparison of Energy Yield from One Btu of Fossil Energy Used

Fuel	*Energy Yield	Net Energy (Loss) or Gain
Gasoline	0.81	(19 percent)
Diesel	0.83	(17 percent)
Ethanol (corn)	1.34	34 percent
Biodiesel	3.20	220 percent

*Life cycle yield in liquid fuel Btu's for each Btu of fossil fuel energy consumed.



The Future of Ethanol

The limitations for corn based ethanol are well known and researchers are developing new variations of plants that have readily available sugars as well as studying enzymes and processes that have the ability to release the sugars from cellulosic materials. With our strong agricultural heritage and many woodlands and biotechnology companies, North Carolina is well positioned to benefit from the future of cellulosic ethanol. Producing ethanol from specially engineered crops and/or agricultural waste products such as woody biomass or corn stalks will offer tremendous energy efficiency gains and broaden the opportunities for North Carolina and other southeastern states.

Resources:

- Alternative Fuels Data Center www.eere.energy.gov/afdc
- American Coalition for Ethanol www.ethanol.org
- National Ethanol Vehicle Coalition www.e85fuel.com
- NC Solar Center www.ncsc.ncsu.edu
- Triangle Clean Cities Coalition www.trianglcleancities.org
- Centralina Clean Fuels Coalition www.4cleanfuels.com
- Land-of-Sky Clean Vehicles Coalition www.landofsky.org/planning/p_cvc_home.html
- U.S. DOE Energy Efficiency & Renewable Energy - Biomass www1.eere.energy.gov/biomass
- U.S. EPA Renewable Fuel Standard Program www.epa.gov/otaq/renewablefuels/index.htm

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⁴ Shapouri, Hosein et al. "The Energy Balance of Corn Ethanol: An Update" USDA, 2002, www.usda.gov/oc/reports/energy/aer-814.pdf.

⁵ Minnesota Dept of Agriculture. "Energy Balance Life Cycle Inventory for Ethanol Biodiesel and Petroleum Fuels" <http://www.mda.state.mn.us/renewable/renewablefuels/balance.htm#yield>