Alternative Fuels: Pro's & Con's

by Rick Muscoplat

Monday, January 19, 2009

There's a lot of talk about alternative fuels for our car and trucks. Here's a breakdown of the most likely candidates and the pros and cons of each.

ETHANOL E-85 AND E-10

E-85 is a blend of 85% Ethanol and 15% gasoline. It can only be used in vehicles classified as flexible fuel vehicles (FFV). Those vehicles can run on straight gasoline, straight E-85, or a mixture of both fuels. The computer systems in these vehicles can detect the type of fuel used and make adjustments to burn the fuels properly.

E-10 is a blend of 90% gasoline and 10% ethanol. Most current vehicles can run on this blend without any special modifications.

Pros:
1. Ethanol is presently made from domestically grown corn and provides a degree of energy independence.
2. It results in a 20% reduction in greenhouse gasses.
3. Future ethanol stocks can be made from cellulose (stalks, hulls, forestry residues, switchgrass, sorghum, and municipal waste) which will reduce greenhouse gases by up to 86% compared with gasoline.
4. Experts predict that ethanol from domestically grown feedstocks are capable of replacing 30% of gasoline use with only modest changes in land use.
5. Ethanol readily biodegrades (60-70% within 28 days) and replaces harmful engine cleaning additives like MTBE.
6. Ethanol no longer takes more energy to produce than it provides. Production efficiency has improved to the point where it delivers 1/3 more energy than is used to produce it (including the energy content of the co-products produced by the conversion process).
7. Ethanol E-85 and E-10 can be delivered to the consumer through traditional filling stations.

Cons:
1. E-10 delivers lower gas mileage due to the lower energy content of ethanol. However, ethanol also has a higher octane to prevent pre-ignition.

2. Currently, ethanol production is subsidized with taxpayer dollars. Thus, the true cost is actually higher than the listed pump price.
3. Current ethanol production costs do not accurately reflect the increased cost of corn production due to the worldwide increase in the price of fertilizers and farm fuels, as well as the free market affect in commodities markets.

BIODIESEL

Biodiesel is made from new or used vegetable oils and animal fats. These feedstock materials are biodegradable and renewable. To be used in diesel engines, the oils are converted to fatty acid methyl esters through a treatment process.

Pros:
1. Enough virgin soy oil and recycled restaurant grease are available to provide 1.7 billion gallons of biodiesel per year (5% of on-road diesel use).
2. Biodiesel results in substantial reduction in sulfur, CO, and unburned hydrocarbon emissions.
3. Burning biodiesel results in a 78.5% reduction in carbon dioxide emissions.
4. Biodiesel creates far less particulate matter (soot) in its emissions.
5. Positive energy balance—for every unit of energy required to produce biodiesel, the conversion process results in 3.24 units of energy output.

Cons:
1. Biodiesel produces increased levels of oxides of Nitrogen (NOx), a component of smog and an eye irritant.
2. Biodiesel tends to thicken at lower temperatures, more so than traditional diesel engine fuels. Thus, it is more difficult to store and transport in cold weather.

ELECTRICITY

Although not in widespread use, all-electric vehicles hold the potential to provide substantial environmental benefit over other fossil fuels and bring energy independence. However, since most electricity produced in the U.S. comes from coal or fossil fuels, electricity is not totally clean. Here are some statistics by the U.S. Department of Energy, comparing the emissions produced by a conventional car fueled with E-10, versus the emissions produced by electrical generation to power an electric vehicle.

Emission	Percent Reduction or Increase / Electric Vehicle
Carbon Monoxide:	96% reduction
Volatile Organic Compounds:	83% reduction
Oxides of Nitrogen (NOx):	267% INCREASE
Particulate matter:	64% INCREASE
Sulfur Oxides:	988% INCREASE
Carbon Dioxide:	17% reduction
Greenhouse gasses:	19% reduction

While electric vehicle hold the potential to dramatically reduce greenhouse gasses, CO, and CO2, the emissions from generating plants also produce increased amount of NOx, soot, and sulfur (acid rain). Hopefully, future improvements in emissions abatement at electricity generating plants can reduce those pollutants.

COMPRESSED NATURAL GAS AND PROPANE

Pros:
1. CNG and Propane in converted vehicles emits 20% less greenhouse gas.
2. CNG and Propane emits less NOx and carbon monoxide.

Cons:
1. Vehicles will require costly conversions to safely store and burn CNG in internal combustion engines.
2. Infrastructure. CNG and Propane will require a major revamp of filling station storage and dispensing technologies.
3. Due to storage issues, vehicles running on CNG and Propane will have shorter driving ranges. (More fill-ups)
4. CNG and Propane are still fossil fuels derived from conventional crude oil. While we can increase domestic production, it does not provide an alternative for the future.