Are Biofuels The Answer?

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***Forerunner*, "WorldWatch," September-October 2007**

As the price of oil rises toward the $100 per barrel mark—and American motorists see more of their income burned at the pump—finding alternative sources of energy has become a major issue. An increasing number of consumers, many of them of the "green" variety, have opted for hybrid cars like the popular Toyota Prius and the Honda Civic and Accord hybrids. American manufacturers have jumped into the market as well, producing such hybrid vehicles as the Saturn Aura and the Ford Escape.

Hybrids are just that, a synthesis of two separate technologies: the internal combustion engine and the electric motor. The modern hybrid uses an efficient gasoline engine as its primary power plant, with the electric motor providing extra power when needed, as well as being able to run the car exclusively—say, in slower city traffic—for even greater efficiency. The 2007 Prius, mid-range in price among hybrids, costs about $23,000.

However, because the modern, industrial economy runs on oil, many movers and shakers want to solve the problem at the source—not by making vehicles more efficient, but by making fuel that is more affordable and renewable. At the same time, they hope that this fuel will also be more environmentally friendly and decrease our dependence on foreign supply. To many, the answer is biofuel.

Biofuel, known as "agrofuel" to some, is any kind of fuel made from biomass—organic substances. The most common biomass crops are corn (maize), soybeans, and sugar cane, although such things as sorghum, hemp, cotton, various grasses, sunflowers, cassava, potatoes, rice husks, wheat, as well as animal fats, food waste, manure, and waste wood have or are being used to produce biofuels. To make ethanol, also called ethyl or grain alcohol, enzymes are used to release sugars from stored starches in the biomass. The extracted sugars are fermented and distilled to produce an alcohol, which is then "dried" or de-moistured, leaving a highly combustible liquid that can be used alone or mixed with gasoline in any ratio.

Most gasoline engines on the market today can use up to about 10 percent ethanol when blended with gasoline (called E10). Because ethanol corrodes components containing iron, any higher ethanol mixture requires modifications to the engine, which are found in the "flex-fuel" vehicles now being sold by several manufacturers. The Renewable Fuels Association reports that the United States produced 4.855 billion gallons of ethanol in 2006, while U.S. demand topped 5.37 billion gallons. (Current ethanol statistics can be found at http://www.ethanolrfa.org/industry/statistics/#A).

While ethanol would seem to be a sure bet, it is inherently less efficient than gasoline. Since pure ethanol (E100) contains about 34% less energy per unit than gasoline, its use will result in a 34% fewer miles per gallon (MPG). Even in E10, MPG is reduced by 3%. Lower fuel mileage means more frequent refueling and thus higher cost. According to *National Geographic* (July 2007), a motorist who drives a gasoline-powered car may pay $3.03/gallon, but the owner of a flex-fuel vehicle that uses E85 (85% ethanol), priced at $2.62/gallon at the pump, will actually end up paying $3.71/gallon for an equivalent MPG.

Ethanol is also touted as a more energy-efficient fuel on the production side than petroleum. For instance, proponents say that for every unit of energy used to produce ethanol, there is a gain of 1.34 units of usable energy. By contrast, they claim, petroleum's "energy balance" is a dismal 0.805 units, a net *loss* of energy. However, if that were so, it would be unprofitable for oil companies to bring petroleum fuels to market.

It turns out that these two figures are apples and oranges, as they are calculated on different bases. Using input versus output BTUs (a unit of heat energy), the energy return on energy invested for gasoline is about four times better than for ethanol (5:1 vs. 1.27:1). Crude oil as a whole (which includes many other fuels besides gasoline) has a total energy return of roughly 10:1.

While ethanol promoters use "reduced dependence on foreign oil" as a major selling point, the underlying motivation is environmental. Ethanol is indeed produced and burns cleaner than gasoline, and it is made from renewable substances. Despite these commendable factors, ethanol comes with two major downsides: 1) It is terribly expensive to convert a fossil-fuel-based economy to ethanol; and 2) it requires that vast swathes of fertile land be switched from growing food to producing biomass.

Put differently, its advocates are more concerned about being environmentally friendly and sustainable than about either the nation's economy or, more importantly, feeding its citizens inexpensively. Too high fuel and pollution standards could stall America's economic engine, and diverting food supplies to make biofuels will certainly inflate food costs. One-fifth of the U.S. corn crop is already being diverted to fuel production, leading to a doubling of the price of corn. As a staple crop, corn prices affect a wide variety of food industries, such as beef, pork, and poultry producers; cereal and snack food makers; and vegetable oil manufacturers, among others. At the end of the line, the consumer takes the biggest hit.

Are biofuels the answer? Not yet—and they may never be. Like solar and wind power, they are certainly not silver bullets for our energy woes. Oil is still the king of fuels, and world events will continue to churn around those nations that have it and those that do not. Today's—and tomorrow's—superpowers will run on Black Gold, and oil fields and oil production centers will remain major prizes in the run-up to the return of Jesus Christ.