Viola West

"Rethinking the Future of 'Green' Auto Technology"

Amidst financial turmoil and high oil prices, ethanol and biodiesel production have enjoyed a surge in popularity within the past decade. Ethanol is made from renewable resources, usually corn or soybeans, and is derived by fermenting and distilling starch crops such as corn, barley, and wheat. Proponents of ethanol say that vehicles running on it will help the environment, generate money for American family farmers, and reduce the United States' dependence on foreign oil.

It is accepted that there must be alternative sources sought for fuel use, but several recent studies suggest that ethanol may not be the answer. Ethanol and biodiesel are often seen as environmentally friendly because they are plant-based instead of petroleum-based. Although ethanol stimulates the local farm job market, there exist doubts about its effectiveness environmentally and globally.

Camron Wilson, Marketing Specialist at the Memphis Region Ford, Lincoln, and Mercury Sales Operations believes that electric vehicles, rather than ethanol, are a more environmentally safe and practical solution for auto manufacturers.

"I think electric vehicles or some combination of electric and bio-fuel vehicles are the wave of the future since the architecture is already in place for electricity and everyone would be able to plug in at home."

Wilson continues, "However, if the additional electricity used to power the vehicles isn't coming from a renewable resource like wind, water, or solar power and we are simply burning more coal and other non-renewable resources, then we haven't done anything to help the environment."

In 2008, 30 percent of the United States corn crop will be used for ethanol production. The average price of corn has increased by 60 percent, soybeans by 76 percent, wheat by 54 percent, and rice by 104 percent, according to the Council on Foreign Relations. These price increases in corn and other staple crops worldwide pose serious threats to developing nations facing food deficits. Robert Zoellick, president of the World Bank, estimates that there are 100 million newly poor and hungry people as a result of rising food prices.

Current Ethanol production represents only 3.5 percent of American gasoline consumption, but uses 20% of the entire United States corn crop. The United States accounts for 40 % of the world corn crop and over half of net corn exports. The World Bank estimates that in 2001, 2.7 billion people in the world were living on the equivalent of less than $2 a day. To them, even marginal increases in the cost of staple grains could be devastating. Filling the 25-gallon tank of an SUV with pure ethanol requires over 450 pounds of corn, which contains enough calories to feed one person for a year.

A 2005 study by Cornell University and the University of California at Berkeley said that ethanol production using corn grain required 29 percent more fossil fuel energy than the energy produced by the product itself.

The Sierra Club activist organization strongly protests the use of ethanol, claiming that it is not as “green” or clean as commonly thought. Ethanol production causes more soil erosion than any other crop and uses more insecticides. High nitrogen levels damage soil in surrounding areas, causing them to be infertile and unable to grow crops. Soybean and corn are row crops that contribute to soil erosion and water pollution. They require large amounts of fertilizer, pesticides, and fuel to harvest. Corn production causes large amounts of nitrogen runoff and has created a “dead zone” absent of oxygen in the Gulf of Mexico.

In the United States, corn and soybeans are typically planted in rotation. Soybeans add nitrogen to the soil, which corn requires for growth. However, as corn increasingly displaces soybeans as a main source of ethanol, it has been cropped continually. This requires major increases in nitrogen fertilizer use to sustain the artificially maintained corn crops.

Nobel prize winning chemist Paul Crutzen, who pioneered the study of ozone depletion, co-authored an article demonstrating that the heave application of nitrogen fertilizer on corn would produce such high levels of atmospheric nitrous oxide that it would have a negative net effect on greenhouse gas emissions. Nitrous oxide in the atmosphere is 296 million times more damaging as a greenhouse gas than carbon dioxide.

As biofuel production displaces crops in pursuit of planting more corn in the Midwest, high applications of nitrogen and phosphorous fertilizers are needed to prepare the land for growth. This creates nitrogen runoff, a toxic occurrence that enters lakes and streams, eventually tracing down to the Gulf of Mexico. This rapid land use changes have nearly doubled greenhouse emissions over 30 years.

“It really does nothing in terms of our greenhouse gas efficiencies because it takes so much natural gas to process these products into ethanol” states Roy Cullen, liberal natural resources critic. Diesel fuel combined with petroleum-derived fertilizers and pesticides are necessary to create ethanol, in effect negating the environmental benefits that come from burning ethanol in automobiles instead of gasoline.

In the United States, the ethanol industry is supported by large government subsidies. With the prices of raw materials for biofuel use rising, there is significant stress placed on other parts of the agricultural sector in the United States. Food processors and farmers who create seemingly unrelated crops such as peas have been forced to pay higher prices to keep their supplies and land, prices that will eventually be inherited by the consumers at the grocery store.

Ethanol requires manual transportation by truck or train instead of running through existing gasoline pipelines. If ethanol mixes with any water or impurities it is rendered ineffective, so not only is it expensive to transport, it is very fuel inefficient and releases dangerous emissions into the atmosphere as it is transferred.

Ethanol also gives drivers less fuel efficiency than gasoline. Since production and transport of the biofuel are high, it will not necessarily equal to cheaper prices at the gas pumps.

“Since 1996 Ford Motor Co. has sold more than 1.6 million vehicles that run on ethanol but with less than 2000 ethanol fueling stations in the U.S It makes it difficult for all of these vehicles on the road to take advantage of using ethanol,” states Ford Marketing Specialist Camron Wilson.

“Also, as more corn is converted to E85 we will continue to see rising food prices so at this point I am not convinced that ethanol is the direction in which automotive companies should turn.”

Large-scale ethanol use for fuel will almost certainly require cellulosic technology. This modified approach requires the application of new chemical techniques to break down and convert the raw material of a biofuel resource. Corn has been the primary raw material for ethanol production, although cellulosic technology would enable ethanol to be manufactured from various other sources such as grass, wood chips, or trees.

“The big advantage then is that you don’t have to grow food to make ethanol,” says Alexander Farrell, lead study author and Professor at the University of California at Berkeley, “You can grow willow trees or you can grow prairie grass to make ethanol.”

Hydrogen and electric technology hold tremendous appeal for automakers because they have the potential to be entirely emissions-free and clean, although a new infrastructure would be expensive to research and create. Honda Motor Co, Toyota Motor Co., GM,

and Daimler G. have developed road-ready hydrogen models but there is hardly any infrastructure to support them.

“We certainly would like to see hydrogen infrastructure development move faster” GM spokesman Pete Barkley said. “We have been very public that we need energy companies and governments to accelerate their efforts”.

Derrick Kuzak, Ford Motor Co.’s chief executive states that electric cars are the automobiles of the future, and there appears to be no will on the part of the government or the private sector to make the immense investments in infrastructure needed to transition to a hydrogen economy.

“It was a perfect storm of opportunity for the ethanol industry, and a perfect combo of every single element that they have counted on turning against them” said David Swenson, a researcher at Iowa State University, “The infrastructure isn’t there, and wholesale patriotic demand for ethanol didn’t materialize”.