FACT SHEET: Biodiesel: Solution or Problem?

Biodiesel Basics

A versatile fuel based largely on domestic soybeans, biodiesel can be substituted for and combined with petroleum diesel. At a time when only 1/3 of U.S. oil consumption comes from domestic sources, President Bush has called it "one of our nation's most promising alternative fuel sources."[1] He is sadly misguided.

Biodiesel from U.S.-generated used vegetable oil (3 billion gallons/year) can only meet 5% of U.S. diesel demand (which doesn't address the much larger U.S. demand for oil).[2] 90% of biodiesel is produced from soy. Only 10% is from recycled cooking oil.[3]

Biodiesel is often promoted as a solution to help the United States end its addiction to oil, but few people are talking about its capacity to actually replace oil. We must seek an energy economy based entirely on conservation, efficiency, and renewables like wind and solar, and only use transitional technologies that will help us get there.

That said, the production and consumption of biodiesel from crops has serious negative effects, including water and soil depletion, air and water pollution, global warming pollution, genetic pollution from biotech crops, hunger, net energy loss and national insecurity.

Feed Cars or People?

Humans have already developed the majority of prime agricultural land, and are destroying much of that every day. When talking about biofuels, the question arises: will we feed cars or people?

Biodiesel production from soy uses a lot of land and energy. Conventional soy production uses fertilizers made from natural gas, herbicides made from petroleum and various other energy inputs (farm machinery, transportation, refining) and natural resources (water use, soil depletion).

We would have to harness almost 20% of the earth's photosynthetic energy just to replace oil consumption with biofuels.[4] There simply isn't enough land, water or productive soil to grow crops to feed the world *and* the world's energy needs. Global warming will also make this more difficult over time, as we'll be facing diminishing crop yields worldwide.

Biodiesel from Algae

These issues will likely prevent soy biodiesel from putting a significant dent in diesel or oil consumption. However, biodiesel from algae (currently still in the early experimental stage) may hold the promise of mass producing liquid fuels more sustainably than ethanol, soy biodiesel or any of the various biomass, waste or fossil-derived liquid fuel schemes. The Department of Energy has reported that biodiesel can be produced from algae in self-contained ponds using salt water and sunlight as the main ingredients (fresh water works, too, but why waste that?). Production of diesel from algae could be done for far less than the current cost of diesel.[5] All of the U.S. diesel needs can be met using only 1-3 million acres of land (about 2-5% of the currently fallow cropland in the U.S. and less than the size of the state of Connecticut).[2]

The main problem with producing biodiesel from algae is that to make it commercially viable, it needs a concentrated and plentiful CO_2 source, which isn't available in sufficient quantities. While there is plenty of CO_2 in fossil fuel power plant exhaust, this exhaust is quite contaminated and isn't even available in the quantities necessary to meet our liquid fuels demand with algae biodiesel. To obtain a purified CO_2 source from power plant exhaust, massive amounts of investment dollars would need to be spent on "clean coal" gasification systems – perpetuating coal use (and the related destruction from mining, burning and waste disposal). Such money would go much further if invested in genuine clean energy strategies (conservation, efficiency, wind and solar).

Pollution and Global Warming

Since biodiesel burns hotter, nitrogen oxide (NOx) emissions are actually higher than conventional diesel and up to nearly 3 1/2 times that of gasoline.[6] Biofuels in general "result in more atmospheric CO_2 pollutants than burning an energy equivalent amount of oil" when considering the entire production and consumption cycle ("well-to-wheel").[4]

Biotechnology = More Toxic Herbicides

Genetically engineered crops are widely criticized as a grand experiment, as they have not been tested for long-term safety and have a history of spreading – uncontrolled – into neighboring fields. 87% of soy in the United States is currently genetically-engineered, primarily for resistance to Monsanto's Roundup herbicide.[7] Genetic engineering for herbicide tolerance has led to increased use of herbicides (13% increase on average).[8] Roundup has been found to be more dangerous than previously thought, being highly lethal to amphibians.[9]

Net Energy Gain or Loss?

The "net energy" debate on biofuels is heated, but critics have argued that biodiesel production using soybeans requires 27% MORE fossil energy than the biodiesel fuel produced.[5] Even if the critics are wrong on this (which is unlikely, since they're looking at a more holistic picture than those who argue that the net energy is positive), the fact that there's even a debate shows that the net energy is close to one-to-one. This means that roughly the same amount of fossil energy is put in to get the same energy out – yet this conversion comes with the added price of genetic pollution, water and soil depletion and replacement of natural resources with monocrop agriculture.

Cost

Largely because of this net energy problem, the cost of biodiesel is actually significantly *higher* than diesel or gasoline, though this may not be reflected at the pump. Subsidies are an important consideration here – President Bush recently approved a 50-cent-per-gallon subsidy for biodiesel, to make it competitive with diesel,[10] and subsidies have reached as high as $2.50/gallon as recently as 2004.[11] Soy is also highly subsidized – $1.6 billion in 2004 and $2.5 billion in 2005 [12] – and this is disproportionately paid to large-scale farms growing genetically modified soy.[13] There are also other hidden costs in soy production like land reclamation costs and subsidies to the oil and natural gas industries which soy production depends on (in the form of cash handouts, lax standards and enforcement, and military invasions).

Energy Security

Much of the debate on biodiesel is framed in terms of energy security. Given that there may actually be more fossil fuel inputs into this industry than into the fossil-fuel industries they would supposedly displace, this is a flawed argument. Intensive agriculture on the scale needed to significantly reduce oil consumption would threaten our air, water, and food security. Biodiesel would also require immense natural gas-based fertilizer inputs (now mostly from overseas) to account for soil erosion, making "our species... as physically dependent on industrially produced nitrogen fertilizer as it is on soil, sunshine and water."[14]

The only way to attain energy security is by a policy of conservation, efficiency, and clean renewables (wind and solar). A transportation industry based on electricity from these sources, rather than combustible fuels, is the only clear short-term solution. If anything, biodiesel will make us less safe and less independent. Investing significant amounts of money in technologies that do NOT get us closer to a truly clean energy system is not a transition, but a dead-end barrier to clean energy development.

Moreover, transportation fuels are only a part of this picture. The embodied energy the auto industry (the energy needed to run manufacturing plants, refine petroleum, operate automobile dealers and parts stores, and run the construction equipment for building and maintaining highways) is itself very significant, accounting for an extra 50% of consumption in the transportation sector. This means that even if the fuel we put in vehicles was magically free and used no inputs, that would only reduce energy consumption by 2/3rds.

In the long run, we will have to rearrange cities and transportation based on humans, rather than automobiles, with an emphasis on things like bicycling, mass transit, and vertical rather than horizontal construction.

Footnotes:

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3. "Biodiesel Boom Well-Timed," Wired, June 2004. www.wired.com/news/autotech/0,2554,63635,00.html
4. "The Dirty Truth About Biofuels" by Dale Allen Pfeiffer, 2006. www.oilcrash.com/articles/pf_bio.htm
5. Pimental and Patzek, "Ethanol Production Using Corn, Switchgrass, and Wood; Biodiesel Production Using Soybean and Sunflower," Natural Resources Research, March 2005, http://petroleum.berkeley.edu/papers/Biofuels/NRRethanol.2005.pdf
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9. R.A. Relyea. "Dr. Relyea Responds to Monsanto's Concerns About His Research on the Toxicity of Herbicide Roundup." Relyea Lab, University of Pittsburgh. www.pitt.edu/~relyea/Roundup.html
10. "Fact Sheet: Developing Renewable Fuels and Clean Diesel Technologies," May 16, 2005. www.whitehouse.gov/news/releases/2005/05/20050516-3.html
11. "GSPI Looks Forward to Highest USDA Biodiesel Subsidies in US History," March 26, 2004. www.greenstarusa.com/news/04-03-26.html
12. "GM Propaganda Misleading." Jan 12, 2005. www.non-gm-farmers.com/news_print.asp?ID=1937
13. "Mad cash cow: Will the U.S. slaughter agriculture subsidies?" October 11, 2005. http://gristmill.grist.org/story/2005/10/10/201856/33
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