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] In the U.S., nearly all biodiesel is produced from (mostly biotech) soybeans, produced through industrial agriculture. Only a tiny fraction comes from used vegetable oil. Elsewhere in the world, biodiesel production is linked to massive destruction of rainforests, peatlands, savannas, and grasslands as thousands of acres worldwide are cleared to plant palm oil and soybean plantations.[3,4,5,6]

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.

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 unchecked into neighboring fields. 92% 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] and to the increased appearance of herbicide-resistant weeds. Farmers in the south and mid-west are finding herbicide-resistant weeds that have been spread between fields by floodwaters.[9] Roundup has also been found to be more dangerous than previously thought, being highly lethal to amphibians.[10]

Biotech crops have also been soundly criticized for numerous other reasons including; potential for allergies and health problems,[11] undermining organic agriculture through contamination of non-biotech varieties, and even farmers being sued by Monsanto for “stealing” their “property” when Monsanto’s biotech crop genes end up contaminating the crops of farmers who haven’t planted them.[12]

Feed Cars or People?

Humans have already developed the majority of prime agricultural land, and are destroying much of that every day through poor farming practices and urban sprawl. When talking about biofuels, the question arises: will we feed cars or people? Since the start of 2006, the average world prices for wheat, corn, and soybeans have risen 136%, 125%, and 107%, respectively, due in large part to both rising global populations and the push for biofuels.[13]

Biodiesel from soy uses a lot of land and energy. Conventional soy production uses fertilizers made with natural gas, herbicides made from petroleum and other energy inputs (machinery, refining, transportation) and natural resources (water, soil). While corn-based ethanol is energy intensive, soy-based biodiesel is land intensive – taking 5 times more land to produce the equivalent of biofuel energy.[14] Consider vegetarianism saving land from avoiding wasteful cycling of food crops through animals to produce food; however, vegetarians using biodiesel made from soybeans are usurping 6 times more land for their cars than their beef-eating counterparts are for cows.[15]

We would have to harness almost 20% of the earth's photosynthetic energy just to replace oil consumption with biofuels.[16] There simply isn’t enough land, water or productive soil to grow crops to feed the world *and* meet the world’s energy needs. Global warming will also make this more difficult over time, as we’ll be facing diminishing crop yields worldwide due to changing weather patterns. If all CRP lands were planted with soy for biodiesel, it could fuel only 1.5% of our cars.[17]

Pollution and Global Warming

Demand for soy biodiesel either takes soybean production away from the food system or causes precious lands to be put into intensive production to produce soy. Lands would do more to fight global warming by acting as a carbon sink than biodiesel will do by displacing petroleum diesel. This is true whether we’re talking about Amazonian rainforests or marginal Conservation Reserve Program lands.[18] Even if the soy used for biodiesel production comes from the U.S., the oil demand that it displaces will go elsewhere, leading to rainforest destruction in Asia or South America.

Since biodiesel burns hotter than diesel, nitrogen oxide (NOx) emissions are actually higher and up to nearly 3 1/2 times that of gasoline.[19] While biodiesel is cleaner than conventional diesel in many other ways, it’s still *dirtier* (more air polluting) than gasoline. 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").[20] If the motivation for biofuels is to combat global warming, the title of a *New Scientist* article in August 2007 summed up the latest studies well: “Forget biofuels - burn oil and plant forests instead.”[21]

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.[22] Even if the critics are wrong on this (unlikely) 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 adds the price of genetic pollution, water and soil depletion and replacement of natural resources with monocrop agriculture.

Subsidized and Expensive

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 due to subsidies. U.S. tax payers will contribute up to $11 billion dollars to subsidize biodiesel between 2006 and 2012 averaging $2/gallon of biodiesel consumed, and $2.20/gallon of conventional diesel equivalent.[23] In addition, biodiesel input crops themselves are also heavily subsidized. Soy is currently the 4th most subsidized crop in the U.S., receiving $5.75 million in 2007 alone.[24] Typically with subsidies, most are disproportionately paid to large-scale farms often growing genetically modified crops.[25] 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 (in)Security

Much of the debate on biodiesel is framed in terms of energy security. The nitrogen-based (ammonia) fertilizers used to start a soybean crop are produced using large amounts of natural gas, of which production is peaking in North America. Natural gas prices have tripled in the U.S. since 1999.[26] Between 1991 and 2006, nitrogen-based fertilizer imports have also tripled, from 14% to 42%[27] and many of the ammonia fertilizer plants in the U.S. have shut down due to high natural gas prices, moving production overseas. Relying on industrial agriculture for "energy independence" masks the reality that our entire food production and agrofuel systems are increasingly reliant on foreign sources in the form of nitrogen fertilizers. Due to extensive soil depletion, "our species has become as physically dependent on industrially produced nitrogen fertilizer as it is on soil, sunshine and water."[28] This need can be reduced by rotating nitrogen-fixing crops or by implementing other sustainable agriculture practices.

Biodiesel from Algae

Because of the above limitations, soy biodiesel will not put a significant dent in diesel or oil consumption. However, biodiesel from algae (still in the early experimental stage) has been touted as being capable of mass-producing liquid fuels more sustainably than ethanol, soy biodiesel or any of the various biomass, waste or fossil-derived liquid fuel schemes. Algae biodiesel can be produced in self-contained ponds using "nutrients," salt (or fresh) water and sunlight. Production of diesel from algae can theoretically be done for far less than the current cost of diesel.[29] All of U.S. diesel needs can be met using only 1-3 million acres of land (smaller than Connecticut).[30]

One problem with commercially producing biodiesel from algae is it needs a concentrated and plentiful CO_2 source, which isn't contaminated as in fossil fuel power plant exhaust. 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.

To make the industry commercially viable, researchers have pursued biotech varieties, which could be particularly dangerous if released into nature.[31] Some algae biodiesel proposals involve aquaculture-style operations in open ocean waters, which could have harmful ecological effects, especially if biotech algae is used.[32]

Clean Transportation Solutions

Conservation and efficiency tactics must be our highest priority. This includes mass transit, buying and working locally, carpooling and car sharing, telecommuting, reducing sprawl, increasing fuel efficiency standards and use of hybrids and electric vehicles, using more rail transport, bicycling and walking. Vehicles using burnable fuels should be converted to plug-in electric vehicles, so they can be powered more cheaply on clean electricity from wind and solar. Investing significant amounts of precious time and money in technologies and fuels that do NOT get us closer to the above ideas is not a "transition," but a dead-end barrier to clean energy development.

But I'm just promoting used veggie oil…

Yes, but when you contribute to the promotion of biodiesel as a "green" fuel, you build the market and public support. Large institutions like universities, corporations and cities are starting to move to biodiesel, in part for its public relations value. These price-sensitive institutions do *not* share the same values and are going to opt for the cheaper biotech soy biodiesel that is available in larger quantities. Even if they wanted to pay more to use veggie oil biodiesel, the supply would quickly run out.

By promoting biodiesel at all, well-meaning activists are creating hype around a fuel that will largely be destructive. The politicians who pass "biofuels" subsidy bills (often with the support of environmentalists) do not restrict the types of biodiesel that will benefit from their subsidies. These subsidies will almost entirely support the dirtier kinds of fuels. By spending time on promoting biodiesel at all, we are drawing attention away from the truly clean solutions we could be promoting. Resources would be far better spent promoting demand reduction (mass transit, bike and pedestrian-friendly cities, buying locally, etc.) and the use of wind- and solar-powered plug-in electric vehicles to move beyond internal combustion engines entirely.

Footnote references available in the web version.

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