Executive Summary

Doing Biofuels Right: Making Sense of the Great Biofuels Debate

Sam Spofforth, Executive Director,
Clean Fuels Ohio
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Introduction:

Rising energy costs, security, climate change and job creation are four interrelated challenges of our era. Some say biofuels are part of the solution; others claim biofuels are a distraction or worse.

Clean Fuels Ohio believes that both sides make legitimate points, but also sometimes distort and exaggerate. This paper is our effort to help policy-makers and others understand the issues and arrive at a strategy that captures the benefits biofuels have to offer while identifying limitations and avoiding or mitigating negative factors.

Biofuels and Climate Change:

On February 3, 2010, the EPA announced its final RFS2 rule.[1] RFS2 established production benchmarks for all renewable fuels, increasing national output from 12.95 billion gallons in 2010 to 36 billion gallons by 2022. The new rule also established a basis for determining which fuels would qualify for various categories based in part on their projected lifecycle net CO2 emission profile.

Certain forms of advanced ethanol will meet the EPA's cellulosic definition of 60% net reduction. Biodiesel meets a 50% reduction level, qualifying it as "advanced." New corn-based ethanol plants meet the standard "renewable" definition of 20% net GHG reduction. Many older corn ethanol plants were judged by EPA to increase net GHG emissions compared with gasoline, but these pre-2007 plants were grandfathered under the Energy Independence and Security Act (EISA) of 2007.

The EPA's analysis cited new data and modeling that led to a somewhat more favorable view of biofuels and climate change than the EPA and others suggested several months ago[2]. Interestingly, the biofuels industry generally praised the new EPA rule[3] as did many environmentalists[4]. Major oil companies were generally critical[5].

The Food-Fuel Debate:

Analyses of factors related to food prices indicate that biofuels have some contribution to higher prices, but that other factors are more significant. According to the Agriculture and Food Policy Center, another key factor is that "the farm share of retail food prices tends to decline as agricultural commodities are further processed into food products." Farmers in 2002 got an average of 20% of the price paid for fresh vegetables but only 5% of bakery and cereal items. However, farm shares of consumer-purchased meats and milk are high, so the claim that

biofuels have significantly impacted the costs of these foods is valid. A report released on April 9, 2009 by the Congressional Budget Office concluded that "from April 2007 to April 2008, the rise in the price of corn resulting from expanded production of ethanol contributed between 0.5 and 0.8 percentage points of the 5.1 percent increase in food prices measured by the consumer price index (CPI). Over the same period, certain other factors—for example, higher energy costs—had a greater effect on food prices than did the use of ethanol as a motor fuel[6]."

Water and Soil Impacts of Biofuels Crop Production:

While the efficiency of nitrogen fertilizers[7] and pesticide application is improving, a variety of agricultural runoff sources – commodity crops as well as livestock – contribute to water pollution. Researchers have noted particularly significant damage to the Gulf of Mexico due to fertilizer runoff.[8] Clearly, one of agriculture's biggest challenges is to make more progress on implementing conservation practices to reduce farm-related runoff pollution into waterways.

Some soil scientists have wondered about the long-term indirect impact of biofuels on soil fertility. The U.S. Department of Agriculture's "Billion Ton Study" projects the potential of generating one billion tons of biomass energy crops from U.S. lands[9]. However, there is significant disagreement about how much crop "residue," trees and other materials can be sustainably removed without harming soils in the long term.[10] More research is needed before we understand how much and what materials can be sustainably removed from the land.

Net Energy Balance of Biofuels:

Critics have argued that studies show ethanol has a "negative energy balance." In other words, the overall process of making ethanol consumes more energy than ethanol itself provides as a fuel. However, all but one energy balance study[11] of ethanol over the past ten years concluded that there is a positive balance, while disagreeing over how positive. The methodologies of the researcher demonstrating a negative energy balance have been discredited by peers.

Water Usage Impacts of Biofuels Manufacturing:

According to a 2006 study by the Institute for Agriculture and Trade Policy (IATP) the average ethanol plant required 4.6 gallons of water to make one gallon of ethanol[12]. Newer ethanol plants have achieved an efficiency of 3 gallons of water for every one gallon of ethanol produced[13]. This does not include water consumption when irrigation of corn is included[14]. The IATP authors recommend strong local and state regulations to compel ethanol plants to be as water efficient as possible, and even to restrict ethanol production in dry places.[15]

Vehicle Emissions and Fuel Economy:

USEPA data indicate reductions in tailpipe emissions generally across the board for high ethanol blends, especially E85.[16] However, some data sources[17] suggest lower ethanol blends, such as E10, may increase nitrogen oxides and volatile organic compounds emissions. There is

consensus that any biodiesel blend level will reduce particulates, hydrocarbons and toxics. Regarding NOx, biodiesel data is contradictory. Some data suggest slightly elevated emissions and other data show NOx emissions are slightly reduced. Overall, data sources agree that biodiesel provides significant reductions of most emissions.[18]

According to Consumer Reports, mileage of a vehicle running on E85 is worse by 27%[19]. A report from the Renewable Fuels Association stated "E85 contains about 73% to 76% the BTU content of gasoline. Biodiesel (B100) has 11% lower energy content than its petroleum equivalent.[20] However, many fleets using biodiesel have documented the same or even slightly higher fuel economy, which may be due to higher cetane rating and/or increasing cleansing effect of blended biodiesel.[21] Either way, the impact is not significant.

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[4] Nathanael Greene blog, February 3, 2010: http://switchboard.nrdc.org/blogs/ngreene/epa_publishes_final_rfsii_rule.html
[5] API Statement, February 3, 2010: http://www.api.org/Newsroom/api-statemnt-rfs2.cfm
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[7] University of Nebraska at Lincoln LCA Report, 200
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[15] Keeney, Dennis and Muller, Mark, Water Use by Ethanol Plants: Potential Challenges, *Institute for Agriculture and Trade Policy*, 2006, pp 5-6.
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[17] Southeastern Michigan Council of Governments, 2005
[18] McCormick, R.L.; Williams, A.; Ireland, J.; Brimhall, M.; Hayes, R.R., Effects of Biodiesel Blends on Vehicle Emissions: Milestone Report: NREL/MP-540-40554, *National Renewable Energy Laboratory*, October 2006.
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[20] Biodiesel—Clean, Green Diesel Fuel. *National Renewable Energy Laboratory*, *U.S. DOE*, September 2001.
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