

INSIDE: CARMAKERS PREPARE TO ROLL OUT NEW PASSENGER DIESELS

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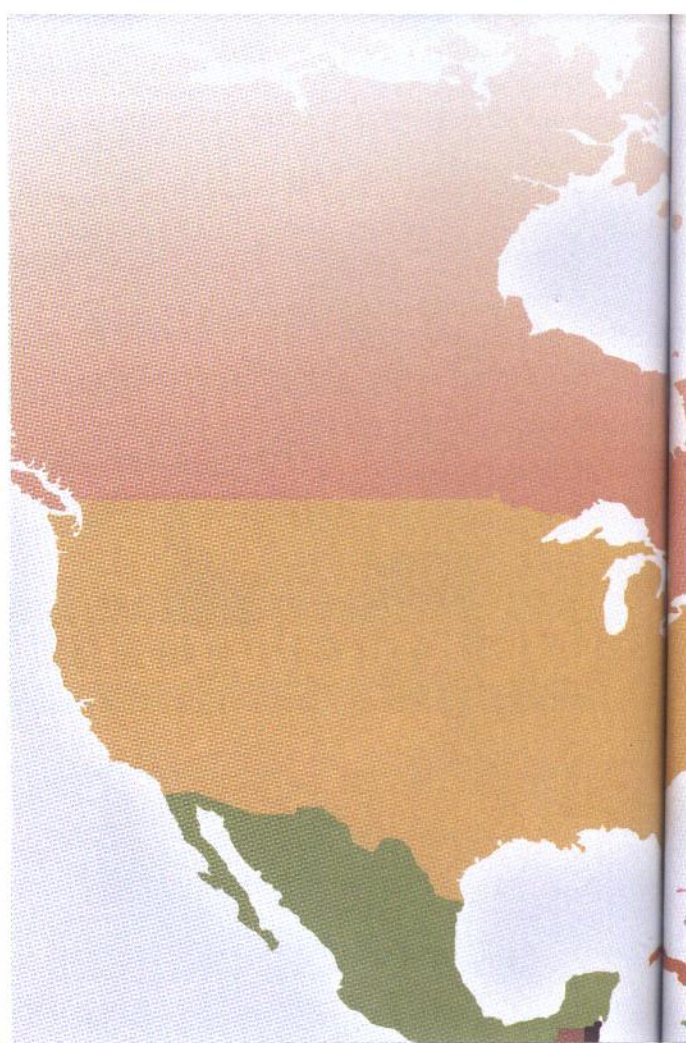


Fish Farm to Fuels

Aquaculture Byproducts Create Fertile Ground for Biodiesel Feedstock

Measuring the Total Carbon Footprint of Biofuels Through Life-Cycle Analysis

By Kenneth J. Markowitz, Bernd G. Janzen and Emily C. Schilling



In recent years, lawmakers in the United States and the European Union have embraced biofuels as a key element of their respective strategies to combat climate change and promote energy independence. However, just as these two major markets are beginning to agree on technical standards for biofuels, as shown in the white paper on “Internationally Compatible Biofuel Standards” that the United States and EU lauded at the recent EU-U.S. Summit of 2008, controversy is emerging in both markets on the tough question of how to show that biofuels represent life-cycle greenhouse-gas emissions savings as compared to traditional fossil fuels. The issue is sensitive because the greenhouse-gas emissions savings of different biofuels vary substantially.

Life-cycle greenhouse-gas emissions analyses for renewable fuels seek to quantify the greenhouse-gas emissions created by the manufacture of the fuel, including its inputs, through transportation to the consumer, use and disposal. In the United States, under the 2007 Energy Independence and Security Act, biofuels only qualify for the new renewable fuels standard (RFS) if all carbon emissions associated with their production and use result in emissions savings of at least 20 percent. In the EU, the Proposed Directive on the Promotion of Energy from Renewable Sources provides that biofuels must represent emissions savings of at least 35 percent in order to be taken into account in the EU’s renewable energy targets. These emissions savings thresholds have become mired in controversy. Technical challenges in measuring life cycle emissions savings, combined with political uncertainty in both jurisdic-



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tions, threaten to stall implementation of these thresholds in both markets. The controversy also may threaten international trade and investment flows in biofuels.

U.S. Implementation Challenges

Under the 2007 Energy Independence and Security Act, renewable fuels must meet life-cycle greenhouse-gas emissions reduction targets for renewable fuels in order to qualify for the RFS. Any renewable fuel produced in a facility under construction as of December 2007 must meet a threshold 20 percent reduction from a 2005 baseline, which is generated by measuring the 2005 life-cycle greenhouse-gas emissions of traditional fuels. Beginning in 2009, the subcategories of renewable fuel created by the act (cellulosic biofuel, advanced biofuel and biodiesel) must meet life-cycle greenhouse-gas emissions reductions of between 50 percent and 60 percent from the 2005 baseline before consideration for the RFS.

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Compliance with these thresholds cannot be determined, however, without a resolution of just how to measure life-cycle greenhouse-gas emissions. The act obligates the U.S. EPA to complete a rulemaking by December 2008, which would establish the appropriate model and inputs for estimation of life-cycle greenhouse-gas emissions and finalize emissions reduction targets. The controversy surrounding how best to measure life-cycle greenhouse-gas emissions, coupled with the shifting political landscape, make it unlikely that consensus will be reached by the December deadline.

The sheer complexity of the analysis, including disagreements as to the appropriate methodology for measuring greenhouse-gas emissions, will make EPA's rulemaking a difficult endeavor. Indeed, the EPA decided against using a life-cycle greenhouse-gas emissions analysis in 2007 because of the complexities and uncertainties inherent in such an analysis. In its rulemaking establishing the 2005 RFS, the EPA determined that "the current state of scientific inquiry surrounding life-cycle analyses is not sufficiently robust to warrant its use." The science has not developed sufficiently over the past year to allow for consensus on this issue, and any rulemaking on the issuance of uniform methodology is likely to be controversial.

In order to undertake a comprehensive rulemaking on a controversial topic, the EPA will need time to consider the science and the policy objectives of the RFS, and the agency has limited time remaining this year to conduct a thorough analysis. The EPA indicated earlier this year that it will not issue a proposal for comment until late summer, which would

give the agency less than four months to consider lengthy and complex comments and publish a final rule—an unlikely feat. The impending change in presidential administrations is an additional complicating factor. The Bush administration's self-imposed deadline for issuing proposed regulations passed on June 1 and final regulations will not be published until after Nov. 1. Although there may be some flexibility in these deadlines, it is unlikely that a significant final rulemaking such as this one will be published in the final days of the Bush administration. Thus, a new administration will have to address the issue, further delaying publication of a final rule and creating additional uncertainty for the biofuels industry as the 2009 requirements for the RFS approach.

EU Implementation Challenges

The biofuels market in the EU reflects similar uncertainties. The comparable legislation in the EU is the Proposed Directive on the Promotion of Energy from Renewable Sources, introduced in January and currently the subject of heated debate. The Proposed Directive provides, at Article 15.2, that biofuels must represent greenhouse-gas emissions savings of at least 35 percent in order to be counted toward the EU's renewable energy targets. Article 17 specifies a variety of tests for determining whether a given biofuel meets this savings threshold. First, for most biofuels "production pathways" used in the EU, the Proposed Directive specifies deemed "default" emissions savings percentages. For example, the deemed emissions savings percentage for rapeseed biodiesel, one of the principal biofuels produced in Europe, is 36 per-

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Setting the Threshold for Future Fuels

The United States and EU continue to implement greenhouse-gas emissions requirements on biofuels. The U.S. 2007 Energy Independence and Security Act set life-cycle greenhouse-gas emissions requirements on biofuels based on 2005 baseline standards. The EU is considering a similar directive that would require biofuels to have a 35 percent greenhouse-gas emissions savings in order to be viable for EU's renewable energy targets. The Proposed Directive on the Promotion of Energy from Renewable Sources is under debate.

The U.S. act is based on the following definitions:

Baseline life-cycle greenhouse-gas emissions: The average life-cycle greenhouse-gas emissions for diesel fuel sold or distributed as transportation fuel in 2005.

Life-cycle greenhouse-gas emissions: The aggregate quantity of greenhouse-gas emissions (including direct emissions and significant indirect emissions such as significant emissions from land use changes) related to the full fuel life cycle. This life cycle takes into consideration all stages of fuel and feedstock production and distribution, from feedstock generation or extraction, through the distribution and delivery and use of the finished fuel, to the ultimate consumer. Mass values for all greenhouse gases will be adjusted to account for their relative global warming potential.

Beginning in 2009, biodiesel must meet life-cycle greenhouse-gas emissions reductions of between 50 percent and 60 percent from the 2005 baseline in order to qualify for the RFS.

The EU directive would deem emissions savings for rapeseed biodiesel of 36 percent. Palm oil-based biodiesel produced outside the EU would be 16 percent, falling well short of the proposed directive's requirements.

More information on the U.S. act and EU's directive is available here: http://ec.europa.eu/energy/climate_actions/doc/2008_res_directive_en.pdf and here: <http://thomas.loc.gov/cgi-bin/bdquery/z?d110:h.r.00006>.

cent, just above the required threshold. In the case of palm oil biodiesel produced outside the EU, the Proposed Directive specifies a deemed emissions savings percentage of 16 percent, well below the required 35 percent threshold.

For biofuels for which no deemed emissions savings percentage is provided, the Proposed Directive provides a complicated formula for calculating emissions savings. In a nutshell, the formula attempts to capture, for each distinct biofuel production pathway, emissions resulting from eight processes along the field-to-tailpipe pathway. These include emissions from cultivation and processing of the raw material, and emissions from the transport, distribution and use of the fuel. The formula then compares the total emissions to a fossil fuel comparator. The comparator must

be based on fossil fuel data as gathered by the EU, or if those data are not available, a specified value of 83.8 grams of carbon dioxide equivalent per megajoule (gCO₂eq/MJ).

However, it remains far from clear that the proposed 35 percent greenhouse-gas emissions savings threshold, or the methodology proposed for calculating emissions savings, will become law. The draft is currently under review as part of the EU's "Co-Decision" procedure, in which both the EU Parliament and Council may propose changes. The Parliament has already proposed a major shift in direction for EU biofuels policy, urging more analysis of the impact of biofuels incentives on food security and environmental sustainability in developing countries where biofuels are produced. Also, industry groups have sharply crit-

icized the 35 percent emissions savings threshold. In a recent position paper on the Proposed Directive, the European Biodiesel Board raised multiple concerns with the 35 percent threshold, arguing, among other things, that the current methodology for calculating greenhouse-gas emissions savings is overly restrictive and could exclude biofuels production pathways that will be critical in reaching the EU's overall greenhouse gas reductions goals.

Another European biofuels industry group, the European Bioethanol Fuel Association, has also raised multiple criticisms of the Proposed Directive. One is that the proposed comparator used to calculate compliance with the 35 percent emissions savings threshold (83.8 gCO₂eq/MJ) is based on light conventional crude oil, rather than more polluting oils also widely used in fossil fuel production. Accordingly, the comparator should be adjusted upward to properly account for the use in fossil fuels of oil other than light conventional crude.

In light of the controversy surrounding the 35 percent greenhouse-gas emissions savings threshold, the Proposed Directive in its current form should be seen as the opening salvo in a debate that will take many months to resolve, and may well result in final legislation in a substantially different form.

Prospects for Transatlantic Friction?

The United States and the EU have made considerable progress in developing and harmonizing biofuels standards. This ongoing work is intended to—and should—facilitate increased biofuels investment and trade. However, divergent approaches to life-cycle emissions analysis in the United States and the EU may drive a new wedge into the economic relationship between these two major biofuels markets. Biofuels market uncertainty is likely to persist until the United States and EU can settle on methodologies for measuring biofuels life-cycle emissions. ■

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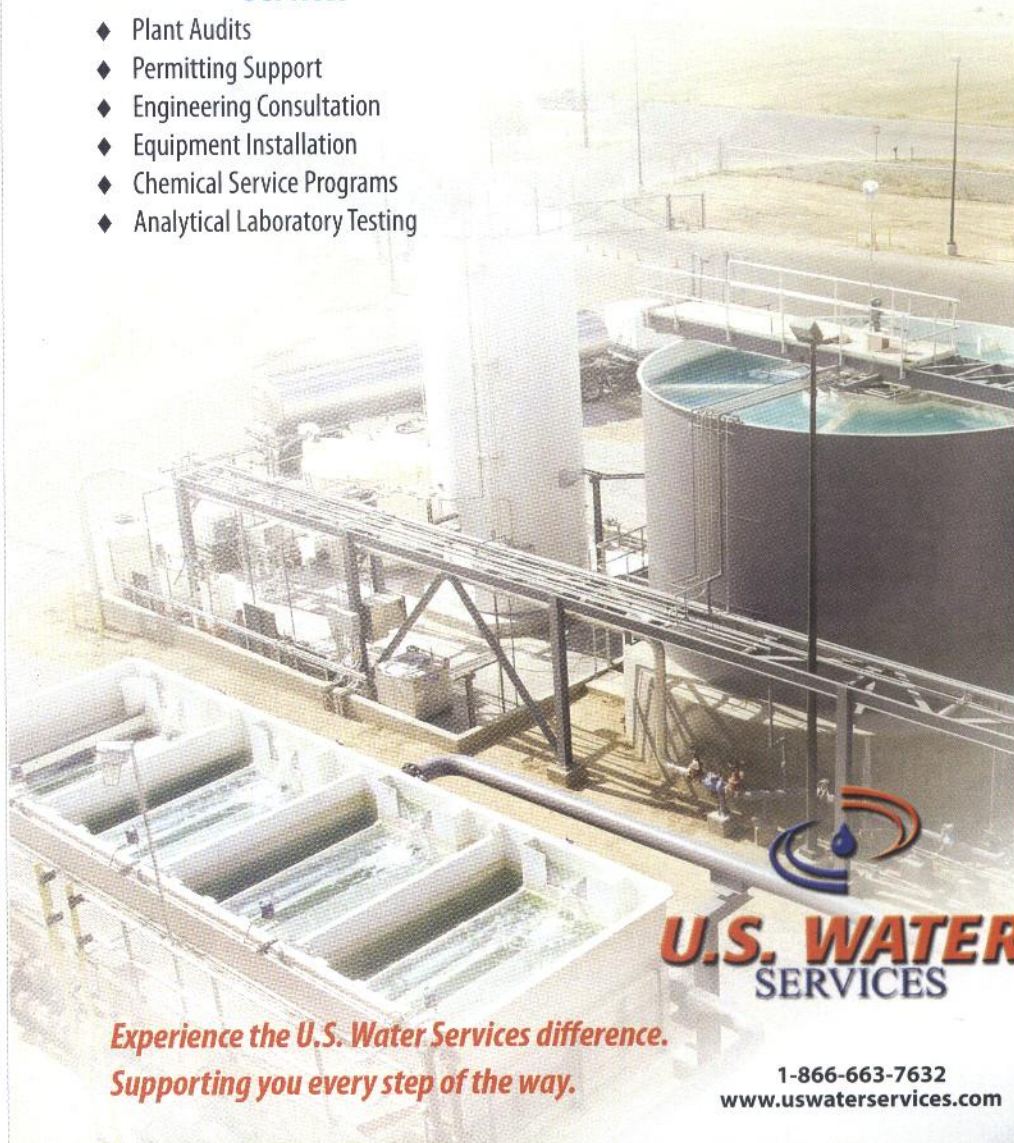
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