Regulation of Fuels and Fuel Additives: Renewable Fuel Standard Program

Summary and Analysis of Comments

Chapter 8
Impacts on Fossil Fuel Consumption and Greenhouse Gases

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Office of Transportation and Air Quality
U.S. Environmental Protection Agency

United States
Environmental Protection
Agency

EPA420-R-07-006
April 2007

8 IMPACTS ON FOSSIL FUEL CONSUMPTION AND GREENHOUSE GASES

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What We Proposed:

The comments in this section correspond to Section IX of the preamble to the proposed rule and are targeted at the effects of renewable fuel use on fossil fuel consumption and greenhouse gases and other related implications. A summary of the comments received and our response to those comments are located below.

8.1 Lifecycle Modeling

[***Note**: Comments related to the use of lifecycle analyses in setting Equivalence Values are addressed in Section 3.5*]

What Commenters Said:

Several commenters raised the issue of building consensus on renewable fuels lifecycle modeling assumptions and inputs, and they indicated support for EPA to initiate a public dialogue on lifecycle modeling. The American Petroleum Institute (API) and Marathon Petroleum Company (MPC) believed that such a dialogue should include a discussion of the "boundaries" of lifecycle models, i.e., how the overall problem is defined. The Union of Concerned Scientists (UCS) commented that EPA, in cooperation with other appropriate agencies, should put a flexible process in place within this rule to establish reporting standards and develop a scientific consensus on lifecycle values.

Letters:
American Petroleum Institute (API) OAR-2005-0161-0185
Marathon Petroleum Company (MPC) OAR-2005-0161-0175
Union of Concerned Scientists (UCS) OAR-2005-0161-0226

Our Response:

This rulemaking is an initial step in the public dialog process for reviewing lifecycle modeling inputs and assumptions used to represent benefits of increased renewable fuel use. There currently exists no organized, comprehensive dialogue among stakeholders about the appropriate tools and assumptions behind any renewable fuel lifecycle analyses, but this is one of our goals. Conclusions reached from such a dialogue could lead to the use of lifecycle analyses in future actions to establish incentives for renewable fuels. We will be initiating more comprehensive discussions about lifecycle analyses with stakeholders in the near future.

8.2 Impacts of Increased Renewable Fuel Use

8.2.1 Model Used and Reduction Benefits Calculated

What Commenters Said:

EPA received comments from three organizations concerned with greenhouse gas (GHG) reductions from renewable fuels displacing conventional fuels. The Renewable Fuels Association (RFA) emphasized the inherent benefits of renewable fuels with respect to GHG reductions, and Environmental Defense strongly supported recognizing and rewarding any and all methods, including waste-derived power generation, that reduce the greenhouse gas profile of biofuels.

API commented at length on EPA's use of Argonne National Laboratory's GREET model for conducting renewable fuels lifecycle analysis. The commenter noted that different studies reveal that different models yield different results with respect to estimating greenhouse gas reductions from corn-based ethanol and biodiesel versus conventional fuel, and that these differences may stem from model assumptions related to the energy output/input ratios of ethanol and fossil fuels. API also commented that the extent to which the GREET model accounted for emissions from land use changes associated with biofuels production was unclear.

Letters:
American Petroleum Institute (API) OAR-2005-0161-0185
Environmental Defense OAR-2005-0161-0172, -0223
Renewable Fuels Association (RFA) OAR-2005-0161-0192, -0228 (hearing)

Our Response:

EPA acknowledges that several other models, other than the GREET model, have been developed for conducting renewable fuels lifecycle analysis. For example, researchers at the Energy and Resources Group (ERG) of the University of California Berkeley have developed the ERG Biofuel Analysis Meta-Model (EBAMM) and Mark Delucchi at the Institute of Transportation Studies of the University of California Davis has developed the Lifecycle Emissions Model (LEM). There are also other non-fuel specific lifecycle modeling tools that can be used to perform renewable fuel lifecycle analyses.

Several studies have been released recently making use of these other models and showing slightly different results than we find in the analysis done for this rule. For example, whereas GREET estimates a net GHG reduction of about 22% for corn ethanol compared to gasoline, the previously cited works by Farrell et al. utilizing the EBAMM show around a 13% reduction. While there may be small differences in the models in terms of emissions and energy uses associated with ancillaries (e.g., emissions to produce fertilizer, electricity, etc.) the main difference in results is not due to the model used but assumptions on scope and input data used.

For example, most studies focus on average or current ethanol production, which uses a current mix of wet and dry mill ethanol production, and coal and natural gas as process energy. In contrast, we consider new or marginal ethanol production which implies a higher portion of more efficient dry mill production and mix of process fuels. Other studies also typically base ethanol and farm energy use on historic data while we are assuming a state of the art dry milling plant and more current farming energy use data. Assumptions concerning agriculture-related GHG emissions could also have an impact on overall results. Other studies also differ in the environmental flows considered. For example, Delucchi uses different types of greenhouse gases and global warming potentials compared to those used in this final rulemaking to determine GHG emissions.

The differences found by different studies and models used emphasize the importance of the input data and methodology when using lifecycle analysis. It also shows how dependent this type of analysis is on the assumptions made throughout the model. Based on differences in scope and input data considered between these other studies and what we defined in this analysis, we believe the differences in results that are seen are reasonable and the values we are obtaining from our use of the GREET model are acceptable for this analysis.

The issue of CO_2 emissions from land use change associated with converting forest or CRP land into crop production for use in producing renewable fuels is an important factor to consider when determining the overall sustainability of renewable fuel use. While the analysis done for this final rulemaking is indicating that there will not be a significant change in land use, this is an area we will continue to research for any future analysis.

8.2.2 Use of FUEL-CO2 Model

What Commenters Said:

In the proposed rule, EPA discussed the "FUEL-CO2" model for estimating lifecycle greenhouse gas emissions and fossil energy usage. API and MPC commented that no information was provided on the "FUEL-CO2" model either in the draft RIA or on the EPA website, and that EPA should provide appropriate notice and opportunity for public comment on the model if it is to be used for regulatory purposes.

Letters:
American Petroleum Institute (API) OAR-2005-0161-0185
Marathon Petroleum Company (MPC) OAR-2005-0161-0175

Our Response:

EPA's final rulemaking does not make use of the FUEL-CO2 model. We will continue to evaluate the FUEL-CO2 model as a potential tool for future regulatory actions, and will provide the opportunity for public input and comment if we decide in the future to use the model for regulatory purposes.

8.2.3 Relative Fuel and Energy Savings of Renewable Fuels

What Commenters Said:

A private citizen commented that he has concerns that EPA has not looked at the issue of using alternate fuels to decrease the dependency on crude oil. The commenter noted that he previously studied a number of alternate sources of fuel for a specific company and found that many were not energy savers. He also noted that, at that time, ethanol took more energy to produce than a gallon of ethanol provided as a fuel source. The commenter also stated that, in some cases, it might be electrical energy that makes up the difference. He noted, however, that this could require the construction of more powerhouses as the country is close to overloading the current electrical generating capacity.

Letters:
Private CitizenOAR-2005-0161-0156

Our Response:

Our lifecycle analyses do examine the impacts of renewable fuels on consumption of fossil fuels and dependence on foreign sources of petroleum. See Section IX of the preamble to the final rule. However, these analyses we were meant only to provide an indication of the potential impacts of the rule. They were not used in the development of the RFS program.

The Energy Act provided no authority to include the impacts of changes in the electrical power industry in the development of the RFS program, nor did it provide authority to account for renewable fuels used for the production of electricity in the RFS program. However, to the degree that electricity was a factor in the GREET model used for our lifecycle analyses, our lifecycle estimates did account for it.