

July 15, 2011

Richard Corey  
Michelle Buffington  
Co-Chairs, LCFS Program Review Advisory Panel  
California Air Resources Board  
1001 "I" Street  
Sacramento, California 95814

Dear Mr. Corey and Ms. Buffington,

Thank you for the opportunity to provide further comments in regard to the draft outlines and other issues discussed during the June 30-July 1 meetings of the LCFS advisory panel.

### **1. Technology Assessment Chapter Draft**

RFA believes the draft chapter on technology assessment is adequate in providing a high-level description of current, near-term, and longer-term fuel technologies. However, missing from the chapter is any discussion of the commercial and/or economic feasibility of the future technologies discussed and potential volumes, but we assume those issues will be addressed elsewhere in the report (i.e., the chapters dealing with topics 6 and 7). In general, citations or references for several statements in the draft should be provided (e.g., "Some estimates place algae's potential yield as high as 6,500 gallons of biofuel per acre, compared to about 600 gallons per acre for the most productive conventional crops.") Following are comments on specific sections of the draft:

- a. **Ethanol derived from grains and sugars:** It should be noted that recent efficiency gains in grain ethanol production have resulted from a number of incremental process improvements and new technologies offered by a number of technology providers. ICM is only one of several leading engineering firms whose process designs have resulted in reduced energy use. RFA recommends ARB staff review Mueller (2010)<sup>1</sup> and the accompanying detailed report<sup>2</sup> for a more comprehensive view of recent ethanol dry mill efficiency gains. RFA recommends the following revisions to the section on ethanol derived from grains and sugars (underscored text denotes a proposed addition, strikethrough text denotes a proposed deletion):

Since the original staff report was published in 2009, facilities producing ethanol from corn have been increasing the efficiency of their facilities. These plants incorporate modern plant design developed by ICM and other firms, which results in less energy use in the plant. The reduction in energy use is derived from incremental improvements in multiple portions of the facility, including increases in ethanol yield, lower electricity use, installation of combined heat and power (CHP), lower temperatures for fermentation, more efficient enzymes, and more efficient natural gas boilers and other process equipment. In some cases the reduction in carbon intensity (CI) can be attributed to use of low carbon intensity inputs, such as biogas rather than ~~CNG~~-natural

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<sup>1</sup> Mueller, S. 2008 National dry mill corn ethanol survey. *Biotechnology Letters*. Published online May 15, 2010. Available at: [http://www.erc.uic.edu/PDF/mueller/2008\\_corn\\_ethanol\\_survey.pdf](http://www.erc.uic.edu/PDF/mueller/2008_corn_ethanol_survey.pdf)

<sup>2</sup> Available at: <http://www.ethanolrfa.org/page/-/EthanolSurveyReport.pdf?nocdn=1>

gas powered equipment. Many of the fFacilities utilizing these technologies have been applying for custom CI values through the Method 2A/2B process.

- b. **Ethanol from cellulosic biomass:** RFA suggests avoiding the use of the term “lignocellulose” and recommends using the broader term “cellulose.” This is because there is research suggesting hemicellulose may also be a viable feedstock for ethanol production in the future. Using the more inclusive term “cellulose” would ensure that all potential cellulosic feedstocks are accounted for. Because there are no projections of the future availability for other fuel types in this chapter, and because it appears that future supply/availability will be addressed in other chapters, we recommend removing references to EPA and EIA expectations of cellulosic biofuel availability from this section. Thus, RFA recommends the following revisions to the section on ethanol derived from cellulose (underscored text denotes a proposed addition, strikethrough text denotes a proposed deletion):

***Ethanol derived from ~~lignocellulosic~~ biomass***

The ~~traditional~~ most researched pathway to produce ~~lignocellulosic~~ ethanol from biomass is through hydrolysis and fermentation. This process is similar to production of ethanol from grains, except that it is significantly more difficult to hydrolyze ~~lignocellulose~~ than starch. An alternative pathway involves gasification of ~~lignocellulosic~~ biomass to produce syngas. The syngas can be converted to ethanol using a modified Fischer-Tropsch synthesis or by fermentation techniques. More background on types of technologies can be found in Chapter III of the staff report. More information on facilities and volumes can be found in Chapter 5 of this report. ~~U.S. EPA reduced the cellulosic biofuels portion for the RFS2 from 250 million gallons to 6 million gallons for 2011. EIA suggests that a more likely 2011 production total for cellulosic biofuels is approximately 4 million gallons. U.S. DOE is still processing grants to help stimulate cellulosic-biofuels~~ production.

- c. **Ultra Low Carbon Fuels (ULCFs):** RFA is still unclear on how ARB is defining “ultralow carbon fuels.” Has ARB proposed a definition for ULCFs? Additionally, it is RFA’s belief that ARB should not consider additional incentives for ULCFs. The performance-based structure of the LCFS naturally provides the most reward (i.e., credits) to those fuels with the lowest CI. Therefore, providing additional incentive only for a certain class of fuels would be equivalent to choosing winners and losers.

## **2. Supply & Availability Outline**

RFA believes ARB should add “mid-level” ethanol blends (i.e., those blends with greater than 10% ethanol by vol., but less than 70-85%) to the assessment of gasoline alternatives. Currently, the outline references only E85 and E10. While mid-level blends, such as E15, may not be commercially available in California in the short-term, it is likely that such blends may be common in the state in the longer term. ARB should also consider adding a category for “other biofuels,” such as butanol. Further, RFA strongly supports and appreciates the invitation by ARB for panelists to provide our own compliance scenarios. RFA will be submitting some information in response to this invitation.

## **3. Economic Impacts Outline**

RFA supports ARB’s effort to revisit the LCFS economic impacts analysis and we strongly encourage ARB to consult with panel members and other industry experts to develop reasonable assumptions for the analysis. Further, we believe ARB should provide more sensitivity cases examining how changes in certain assumptions (e.g., the biofuels tax policy outlook) will change the outcomes of the analysis.

Additionally, we believe ARB should revisit its assumptions on infrastructure costs for alternative fuels (e.g., electric vehicle re-charging stations, CNG refueling, etc.). We also question the base case approach of “Remov[ing] the infrastructure costs, as they are absorbed by the RFS2 program.” This seems at odds with ARB assumptions and statements elsewhere that suggest the LCFS is the primary driver of certain future capital expenditures for alternative fuel production facilities and infrastructure. RFA also encourages ARB’s re-analysis of biofuels feedstock costs to pay particular attention to the shift in global sugar prices and the resulting impact on sugarcane ethanol production costs. ARB should also update its assumptions on likely cellulosic biomass feedstock costs, based on the most recent literature in this area.

#### **4. HCICO Outline**

RFA is still reviewing the proposed options for handling HCICO that were discussed at the July 1 advisory panel meeting. In general, we believe it is important that individual HCICO sources and any increases to the average CI of gasoline and diesel over baseline levels are properly accounted for under the regulation. If the goal of the LCFS truly is to reduce emissions from transportation fuels, then ARB must take the appropriate steps to ensure that CI reductions achieved through increased use of lower carbon fuels are not offset or overwhelmed by the increasing CI of gasoline and diesel. While we agree with some other stakeholders that the HCICO provisions may result in economic inefficiencies and “shuffling,” the same can be said for other fuel pathways (e.g., the LCFS encourages displacement of corn ethanol from the nearby Midwest and corn ethanol *from California itself* by higher-priced, imported Brazilian sugar cane ethanol). RFA will provide further comment on this topic in response to the upcoming July 22 workshop.

#### **5. August 25-26 Advisory Panel Meetings**

Because Topic 3 (Lifecycle Assessment) is on the agenda for the August 25-26 meeting, RFA would like to recommend that ARB invite a presentation from Michael Wang (Argonne National Lab), Zia Haq (Dept. of Energy), or Wally Tyner (Purdue University) regarding their recent publication in *Biomass & Bioenergy*.<sup>3</sup> The recent publication discusses the results of new lifecycle assessment on corn and cellulosic ethanol that combines updated GREET results with updated GTAP results. This new paper represents the cutting edge in lifecycle analysis and both ARB staff and the advisory panel would benefit from better understanding the new results. RFA would be happy to extend an invitation to the authors if ARB staff approves this request. Further, RFA believes discussion of Topic 3 at the August meeting should include an update on the ARB staff’s efforts to integrate the recommendations of the Expert Work Group into the regulation.

Thank you for the opportunity to share our comments on the June 30-July 1 advisory panel meetings. I look forward to discussing these issues at future panel meetings.

Sincerely,



Geoff Cooper  
Vice President, Research & Analysis

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<sup>3</sup> See Wang et al. Energy and greenhouse gas emission effects of corn and cellulosic ethanol with technology improvements and land use changes. *Biomass & Bioenergy* 35 (2011): 1885-1896.