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**Minutes of the Second Low Carbon Fuel Standard Expert Workgroup  
Sacramento, CA  
April 8, 2010**

The second meeting of the Low Carbon Fuel Standard Expert Workgroup was held at the Air Resources Board's (ARB/Board) headquarters on April 8, 2010. Bob Fletcher, Deputy Executive Officer of ARB, chaired the meeting.

The Meeting Notice and Agenda are available on the webpage:

[http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs\\_ewg\\_mtg.pdf](http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs_ewg_mtg.pdf).

The Expert Workgroup (EWG) Members List is available on the webpage:

[http://www.arb.ca.gov/fuels/lcfs/members\\_list.pdf](http://www.arb.ca.gov/fuels/lcfs/members_list.pdf).

Attending the April 8, 2010 meeting were: Bob Fletcher (Chair), Jim Duffy (Co-Chair), Bruce Babcock, Harry Baumes (remote), Vince Camobreco (remote), Angelo Gurgel, Phil Heirigs, Stephen Kaffka, Keith Kline, Jesper Kløverpris (remote), Bob Larson, Michelle Manion, Jeremy Martin, Jim McKinney, Seth Meyer (remote), Steffen Mueller, Richard Nelson, Jay Noel, Don O'Connor, Michael O'Hare, John Sheehan, Blake Simmons, Mark Stowers, Wally Tyner (remote), Paul Wuebben, and Sonia Yeh.

### **Introductions**

Mr. Fletcher made introductory remarks and then the members introduced themselves. The members were reminded that the EWG is an official advisory body to the ARB and is, therefore, covered by the Bagley-Keene Act.

Mr. Fletcher expressed appreciation to participants for all the work on the work plans. He asked that the sub-workgroups try not to deviate from the scope outlined in the charter and specifically requested that the groups focus on technical issues.

### **Agenda**

The items covered on the agenda included: Approval of minutes, presentation of sub-workgroup work plans, introduction of additional subgroup topics, scheduling of future meeting dates and topics, and public comment at various times.

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### **Approval of Minutes**

Mr. Fletcher requested a minor modification to the minutes related to the Statement from Bob Larson – U.S. EPA. Specifically, that the second sentence of Mr. Larson’s statement that reads “These rules will require 36 billion gallons of renewable fuel be used in the US transportation fuel pool by 2022.” be amended to read: “This law will require 36 billion gallons of renewable fuel be used in the US transportation fuel pool by 2022.”

The minutes were then unanimously approved.

One member also commented that the membership of the sub-workgroups listed on the draft work plans was not correct and ARB agreed to work diligently to keep the sub-workgroup membership lists up-to-date. However, it was noted that the membership of the sub-workgroups is fluid and will change through the course of the project.

### **Order of the Draft Work Plan Presentations**

The sub-workgroups presented their draft work plans in the order below. Each group was given approximately 25 minutes for presentation and workgroup discussion. Four opportunities for public comment time were offered during the meeting and they occurred after presentation #3, #5, #8, and the end of the day.

1. Elasticity
2. Co-product credits
3. Land cover types
4. Emission factors
5. Time accounting
6. Uncertainties in LUC estimates
7. Indirect effects of other fuels
8. Comparative modeling and alternative approaches

### **Presentation of the Draft Workplans**

1. Elasticity – The link to the draft work plan is:  
<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040110ewg-elasticity.pdf>

The link to the presentation is:  
<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs-ewg-elasticity-prstn.pdf>

*After the sub-workgroup presentation, EWG members discussed the elasticity topic. The following lists some of the discussion items:*

- Several questions and comments were offered about the proposed tasks presented in the work plan.
  - Concern was expressed that the work plan focuses on supply elasticity values but does not address demand elasticity values. Although the subgroup is aware of no problematic demand elasticities in the model, review in this area is needed.
  - It was also pointed out that estimating the ratio of productivity on new versus existing cropland is also a task within the scope of the land cover types subgroup. The elasticities subgroup will be quantifying historical productivity ratios and applying these historical ratios to like cover types converted in the future. The cover type group will be looking prospectively at lands most likely to be converted in the future.
  - In what is historically the most common agriculture practice of all, slash and burn, new land is always more productive than old. Declining productivity on existing land is what stimulates clearing of new land. The subgroup responded that this type of agriculture is basically practiced by subsistence and other small farmers and is not practiced at all in the major producing areas of the world.
- Questions and comments were also made about issues not in the work plan but within the scope of the subgroup. These questions focused on intensification activities made in response to expanded biofuels production and resulting yield changes.
  - It was noted that the subgroup decided not to make study of the price elasticity of yields one of its explicit tasks, to which the subgroup responded that econometric studies which estimate this value are quite old and that they did not know of data which could be used to provide a better estimate.
  - Concern was also expressed that the GTAP model does not adequately account for double- and triple-cropping. The subgroup responded that preferred approach to simulating this multiple-cropping response is to increase the price elasticity of yields.
- Several comments were made by GTAP modelers at Purdue relevant to the work plan discussion.
  - Expressed approval of the effort to use cross-price elasticities in place of the constant elasticity of transformation, but warned that the time frame used is important. The analysts must decide on the time period over which land transformations occur. The land transformation ratio

will vary according to the time period selected. The analysts must decide what is optimal.

- The GTAP group is currently estimating productivity on newly converted lands by world region and AEZ. The results are showing that, in Brazil and in the Corn Belt, the ratio is about 1. Elsewhere, it is <1, but it varies by region.
- Pasture intensification could be simulated with a technical change which shocks the model on pasture productivity.
- The GTAP can be run with **any** parameters desired. This was offered as a reminder that the analyst must be very careful about input parameters if outputs are to be trusted. The model will not prevent a modeler from manipulating inputs to obtain desired outputs.

2. Co-product credits – The link to the draft work plan is:

<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040110ewg-coprod.pdf>

The link to the presentation is:

<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs-ewg-coproduct-prstn.pdf>

*After the sub-workgroup presentation, EWG members discussed the co-product credits topic. The following lists some of the discussion items:*

- Concern was expressed that the work plan included many co-products issues that affected the calculation of direct emissions and were not related to land use and indirect effect analysis of transportation fuels (scope of the expert workgroup). It was resolved that the primary work of the subgroup should be to address those co-products issues which affect land use and indirect effect analysis of transportation fuels which currently have an LCFS pathway. ARB does, however, encourage the subgroup to identify other co-products issues that require further attention. ARB also welcomes input from the subgroup on co-products issues related to new fuel pathways such as cellulosic, corn oil fractionation, and alternative oilseeds.
- Concern was also expressed that the calculation of displacement ratios without accounting for feed and co-product market prices may overestimate the benefits of co-products. The subgroup work plan identifies feed experts as well as animal nutritionists as part of the technical experts from which to seek guidance – this should provide balance between expert input on the potential benefits and market realized benefits of co-products. One of the overarching principles of the subgroup is to base recommendations on actual field data and avoid extrapolation.
- Other issues raised include:
  - Consideration of debits associated with “co-products” which must be disposed

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- The handling of animal fats in GTAP
- How to properly assign credits to co-products which are exported

3. Land cover types – The link to the draft work plan is:

<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040110ewg-landcover-types.pdf>

The link to the presentation is:

<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs-ewg-land-cover-prstn.pdf>

*After the sub-workgroup presentation, EWG members discussed the land cover types topic. The following lists some of the discussion items:*

- The focus of the subgroup appears to be on land that can be used to cultivate biofuel feedstocks rather than land that would be converted elsewhere as indirect land use change occurred. The subgroup responded that it would focus on lands converted for biofuel feedstock cultivation primarily in the U.S. and leave the indirect land use change portion of the issue to the emission factors group.
- Additional discussion focused on taking the dynamic development of land into account – what would the land be used for in the absence of expanded biofuel production? It was noted that there is some synergy with the Time Accounting sub-workgroup
- The need for a parameter list of the inputs that are within GTAP

### **Public Comments on the Workplans #1 - #3**

- All public comment received via email is posted on the webpage. Comments posted for the meeting are at:  
[http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs\\_ewg2\\_comments.pdf](http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs_ewg2_comments.pdf)
- In-person comments from:
  - Christopher Guay, Community Fuels
  - Rich Plevin – UC Berkeley
  - Martha Schlicher – Monsanto
- Phone-in comments from:
  - Brooke Coleman – New Fuels Alliance

### **Presentation of Draft Workplans - Continued**

4. Emission factors – The link to the draft work plan is:

<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040110ewg-carbon-ef.pdf>

The link to the presentation is:

<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs-ewg-carbon-ef-prstn.pdf>

*After the sub-workgroup presentation, EWG members discussed the emissions topic. The following lists some of the discussion items:*

- How to define when conversion occurs and the reference case prior to that
- Quantify N<sub>2</sub>O emission – is that direct or indirect LUC?
- Special issues of peat soils
- Inclusion of energy inputs as to what would be necessary to grow crops on converted land
- Differences in GHG emissions from crop land that remains crop land as a result of crop shifting

5. Time Accounting – The link to the draft work plan is:

<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040110ewg-time-acct.pdf>

The link to the presentation is:

<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs-ewg-time-acct-prstn.pdf>

*After the sub-workgroup presentation, EWG members discussed the time accounting topic. The following lists some of the discussion items:*

- The primary question of concern is: Do we manage policy on total discharge of greenhouse gases or on the global warming effect resulting from the discharge? If the latter is the goal, then a time accounting methodology that makes the connection between emissions and global warming effect is required. The time accounting subgroup intends to investigate several time accounting methodologies, some of which make this connection. Each methodology will be applied to a variety of LUC scenarios which will result in a more robust comparison of the methodologies.
- The work of the time accounting subgroup overlaps with that of many other subgroups.
  - Accurately capturing the temporal nature of LUC emissions is critical for some time accounting methodologies and is related to the work of the emission factors subgroup.

- The potential for incorporating land reversion and a dynamic land use baseline into time accounting methodologies and their interrelatedness to the work of other subgroups was the topic of several comments.
- The choice of time horizon is not only critical to time accounting but is also critical to the determination of appropriate elasticity values.

### **Public Comment on Draft Work Plans #4 and #5**

- All public comment received via email is posted on the webpage. Comments posted for the meeting are at:  
[http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs\\_ewg2\\_comments.pdf](http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs_ewg2_comments.pdf)
- Phone-in comments from:
  - Brooke Coleman – New Fuels Alliance

### **Presentation of Draft Work Plans – Continued**

6. Uncertainties in LUC estimates – The link to the draft work plan is:  
<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040110ewg-uncertainties.pdf>

The link to the presentation is:

<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs-ewg-uncertainty-prstn.pdf>

*After the sub-workgroup presentation, EWG members discussed the uncertainties in LUC estimates topic. The following lists some of the discussion items:*

- After presenting the group's work plan, the presenter asked the workgroup as a whole to assist the uncertainty group with the scope of work in the current draft of the work plan. That plan contains some peripheral tasks that the larger workgroup may deem to be beyond the scope of the Uncertainty Subgroup
  - Is the EWG, or is it not, looking at policy? At the last meeting, the goal of the EWG was narrowly defined as helping ARB improve its ability to estimate land use change impacts. Evaluating the effectiveness of the LCFS as a policy tool was specifically excluded and placed beyond the EWG's purview. Yet this subgroup work plan contains tasks that are clearly policy oriented. Has the scope shifted between then and now? Response (from ARB): the Workgroup is definitely not venturing into the arena of critiquing policy. The Group is primarily tasked with helping ARB to better determine how much land use change occurs in response to expanded biofuel production.

- The Subgroup asked the group as a whole about applying the safety factor concept to the work of characterizing the uncertainty of ARB's land use change impact estimates. In the case of the LCFS, is it better to err on the side of reducing the likelihood of climate change impacts, even though this may reduce the use of some fuels that might actually have modest climate change benefits (relative to the reference fuels)? Much follow-up discussion occurred on this topic.
  - In trying to reduce uncertainty, the issue of measurements arise - what has been measured, whether new measurements are needed, and how to get them.
  - Policy should reflect learning and evolution. For that reason, we as a group should let ARB benefit from the learning occurring at the subgroup level. Another commenter expressed agreement, urging ARB not to truncate the work of the subgroups. ARB responded that isn't truncating, but that time and resources are limited. Scope must be limited accordingly.
7. Indirect Effects of Other Fuels – The link to the draft work plan is:  
<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040110ewg-ind-eff-other-fuels.pdf>

The link to the presentation is:

<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs-ewg-ind-eff-other-fuels-prstn.pdf>

*After the sub-workgroup presentation, EWG members discussed the indirect effects of other fuels topic. The following lists some of the discussion items:*

- Much of the discussion focused on items listed in the table contained in the work plan and distinguishing between indirect effects and direct effects. Concern was expressed that many of these are not indirect effects but rather direct effects which could be included or not depending on choice of the system boundary. It was resolved that the focus of the subgroup should be on indirect effects, but if the subgroup identifies direct effects that should be included in the modeling they should identify them to ARB.
- Guidance was also requested on the scope of indirect effects to be addressed. Should the group focus on land use change effects or take a broader perspective with regards to indirect effects. ARB responded that a broader perspective is desired.
- Some additional comments were made with regards to weighting indirect effects. For example, does the subgroup intend to weight the indirect effects

for irreversibility? What about weighting for intergenerational effects? The subgroup responded that although there is value in doing this, the group probably won't have time to do it quantitatively.

8. Comparative Modeling and Alternative Approaches – The link to the draft work plan is: <http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040110ewg-models-comp.pdf>

The sub-workgroup used their draft work plan as their presentation.

*After the sub-workgroup presentation, EWG members discussed the comparative modeling and alternative approaches topic. The following lists some of the discussion items:*

- Non-quantitative approaches - Land use change, particularly in developing countries is not only a function of price impacts but also social and cultural variables that are not possible to include in economic models. Would it be worth considering moving from a top down approach to come up with a magnitude and using it as a policy driver to a bottom up approach to changing behaviors? This is a fundamental shift from the current approach in LCFS; the subgroup sought guidance on whether investigation of such approaches belongs to this subgroup. In response, it was brought to the EWG's attention that another workgroup led by ARB is charged with evaluating the sustainability issues related to LCFS. Therefore, the EWG should not spend a lot of time on this option. However, in recognition of the fact that Northeastern states are looking at such approaches, developing a white paper on this option would be important and useful to ARB
- Transparency requirement for models - A new bill requires ARB to make available prior to adoption in plain English a description of what goes in the model and the input files. With a reasonable amount of effort, people should be able to reproduce the generated information. If there are models that you cannot do that for, that is a restriction to put those models into use
- Evaluation of case studies and empirical assessments to help validate model results- Funding might be available from California Energy Commission for case studies. Ideas for such case studies were offered:
  - Data available to do case studies in Brazil
  - Opportunities to generate case studies in California - specific context relative to agriculture
  - A well bounded case study on switch grass is available
- How to do comparative analysis without re-running models- There are model runs available for some of the areas that have predicted impacts. The model results will be matched up with case studies to see that given that kind of

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model analysis on a particular regional basis that these case studies focus on, if the models prove out or not

### **Public Comments on Work Plans #6, #7, and #8.**

- All public comment received via email is posted on the webpage. Comments posted for the meeting are at:  
[http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs\\_ewg2\\_comments.pdf](http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs_ewg2_comments.pdf)
- In-person comments from:
  - Rich Plevin – UC Berkeley

### **Some responses to questions and requests from the Public Comment time**

- A request was made for the Time Accounting sub-workgroup to consider using a time horizon of 100 years and the group agreed that all time horizons will be considered.
- A question about addressing the water issue arose – there was general agreement that it is relevant but complicated, however, the land cover types group agreed to include it in their analysis
- Mr. Fletcher offered clarification concerning a question about indirect effects: We are interested at looking at indirect effects but have not done enough analysis to clarify the issue – that is why the EWG is looking at indirect effects of other fuels as a sub-workgroup topic.

### **Introduction of Additional Sub-Workgroup Topics**

Mike O'Hare made a presentation about "Food Consumption" for the EWG to consider as a possible additional subgroup. The presentation is linked at:  
<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs-ewg-food-consmptn-prstn.pdf>

Blake Simmons, John Sheehan, and Seth Meyer have agreed to tentatively explore the topic along with the initial sponsors Mike O'Hare and Jim Duffy. There was robust discussion about whether this topic was appropriate for the scope of the EWG. A presentation on food consumption will be made at the next EWG meeting and, based on

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the discussion, a decision will be made as to whether a new subgroup should be formed to address food consumption.

### **General Public Comments:**

- All public comment received via email is posted on the webpage. Comments posted for the meeting are at:  
[http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs\\_ewg2\\_comments.pdf](http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/040810lcfs_ewg2_comments.pdf)
- Phone-in and In-person comments: None

### **Scheduling of Future Meeting Dates and Topics**

Possible meeting dates for June, July, and August were presented and the following dates were selected. Sub-workgroups also self-selected dates for their group's presentation. Each group will have the opportunity to conduct an extended robust discussion for their topic. Following are the tentative dates and tentative agenda for each date:

- June 17: Status reports for each sub-workgroup (about 5 minutes each), Food Consumption discussion, Elasticity (needs the database – Bob Fletcher will help in making this available), and Uncertainties in LUC estimates – (would like to see a prioritization of what can be accomplished by December)
- July 15: Indirect effects of other fuels, Comparative Modeling, and Time Accounting.
- August 17: Co-product credits, Land cover types, and Emission factors.

### **Workshop Wrap-Up**

The chair thanked all participants. If sub-workgroups need additional experts, make an informal contact with them, then let ARB know and ARB will close the deal. If there are experts the sub-workgroups would like ARB to contact, let Jim Duffy know. Regarding supplementary support, ARB can make some very small contracts for data or some other source. Please speak with Jim Duffy.

Keep the revision of workplans to a minimum and focus on the work. If people have comments on the workplans, please submit to ARB and we will forward those comments to the leads. ARB will also put any revised plans on the webpage. There was no date

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specified, but all sub-workgroups are encouraged to do so immediately if they have significant changes to their work plans.

ARB is planning on meetings in September, October, and November. The Board meeting is the second week in December. After that meeting, we will assess where to go from there and the interest level among the EWG. ARB will also consider two day meetings in the fall to accommodate additional expert presentations.

A suggestion was offered from the EWG and ARB concurred that time be allotted at future meetings to allow for subgroups to address integration issues. The “uber” sub-workgroup would be charged to synthesize the work of the other sub-workgroups. The idea is under consideration.