Minutes of the Low Carbon Fuel Standard Expert Workgroup Meeting
Sacramento, California
February 26, 2010

The first meeting of the Low Carbon Fuel Standard Expert Workgroup was held at the California Air Resources Board's (ARB) headquarters on February 26, 2010. Robert D. Fletcher, Deputy Executive Officer California Air Resources Board, chaired the meeting. The Meeting Notice and Agenda are available on the webpage: http://www.arb.ca.gov/fuels/lcfs/022610lcfs_ewg_mtg.pdf. The Expert Workgroup Members List is available on the webpage: http://www.arb.ca.gov/fuels/lcfs/members_list.pdf.

Attending the February 26, 2010 meeting were: Fletcher, B. (Chair), Duffy, J. (Co-Chair), Larson, B., Manion, M., McKinney, J., Wuebben, P., Hodson, P. (remote), Noel, J., O'Connor, J., Shapouri, H. (remote), Babcock, B., Gibbs, H., Gurgel, A. (remote), Kaffka, S., Meyer, S., Mueller, S., O'Hare, M., Tyner, W. (remote), Yeh, S., Simmons, B., Nelson, R., Martin, J., Heirigs, P., Kløverpris, J., Haq, Z. (remote), and Stowers, M.

Introduction

Mr. Fletcher made introductory remarks and provided background on the purpose of the Expert Workgroup. He introduced the facilitator, Lindle Hatton, and then the members introduced themselves. The members were advised that the Low Carbon Fuel Standard (LCFS) Expert Workgroup (EWG) is an official advisory body to the Air Resources Board and therefore is covered by the Bagley-Keene Open Meeting Act.

Mr. Fletcher mentioned some objectives of the first expert workgroup meeting:

- Prioritization of topics
- Establish working subgroups
- Identification of members to work in those subgroups
- Identification of any other expertise that needs to be brought into the group

Mr. Fletcher also made some comments about Resolution 09-31 and updated the workgroup on the status of the LCFS. He reported that completing the Final Statement of Reasons was a massive effort. ARB is in the process of developing reporting tools, guidelines on new pathways and the process to register biofuel facilities. There is also a workgroup being formed to develop a screening process for high intensity crude oil.

Updates from EU, US EPA, and NESCAUM

Paul Hodson - European Commission: *"Update from European Union"* (PDF-17k)

Bob Larson – US EPA: RFS2 federal regulations implementing the mandates of the Energy Independence and Security Act (EISA) were signed as final rules on February 3, 2010. These rules will require 36 billion gallons of renewable fuel be used in the US transportation fuel pool by 2022. The rules go into effect beginning July 1, 2010; until then, the existing rules under RFS1 will remain in effect. The rules are a volume mandate. However, as mandated by EISA, the renewable fuel must meet greenhouse gas performance thresholds compared to the fuel being replaced. This includes in the case of advanced biofuel, 21 billion gallons by 2022 with at least a 50% improvement, of which 16 billion gallons must be cellulosic biofuel meeting at least a 60% improvement threshold. While the final rule signed on February 3 included GHG performance determinations for many pathways, it did not cover all pathways. In particular,

EPA indicated in that final rule that it was completing analysis for three additional pathways - biofuel made from wood pulp, palm oil, and grain sorghum; it expects to complete those analyses and adopt final assessments within 6 months. Additionally, EPA expects to continue refining its lifecycle methodology and data and update these analyses in three to five years. As part of that ongoing analysis, EPA plans to have the US National Academy of Sciences provide a technical assessment of the current work and recommend improvements.

Michelle Manion – Update on the Northeast/Mid-Atlantic Low Carbon Fuel Standard

In December of last year, the Governors of 11 northeastern and Mid-Atlantic States from Maryland to Maine signed a Memorandum of Understanding committing their states to 1) analyze the economic impacts of a regional Low Carbon Fuel Standard; and 2) to make recommendations on the key elements of a region-wide Low Carbon Fuel (LCF) program by the end of this year. The Commissioners and Governors will then in turn decide whether to turn those recommendations into a regional model rule for the LCFS in early 2011.

NESCAUM's role is to provide technical support on various aspects of the regional LCFS, including the economic analysis and the development of recommendations on key elements of a LCF program, including sustainability issues such as land use change. NESCAUM anticipates having draft results from the economic analysis by fall, and making recommendations on the elements of a program by the end of 2010.

To give a sense of the scope of a regional LCFS in the Northeast:

- The market for gasoline in the 11-state region is 24B gallons a year, or 18% of the US total; the 11-state market for diesel is 6B gallons annually, equal to 12% of the US total.
- The Northeast also uses significant quantities of fuel for home heating. In fact, the amount of No. 2 oil used for heating each year is roughly equal to the amount of diesel fuel used in the transportation sector.

So, under one possible scenario, a LCFS that requires a 10% reduction in GHG-intensity of transportation fuels in the Northeast would require 2.3B gallons of low-C cellulosic ethanol, 1.3B gallons of biodiesel, and 5M PHEVs and EVs by 2020. The 11-states are also aware that its large heating fuel sector provides opportunities for GHG reductions but also the possibility of an increased role for higher carbon fuels, so in the economic analysis of the regional LCFS, NESCAUM will be looking at different scenarios for including the heating sector in the program.

With respect to indirect impacts, the 11 states have committed to address the potential risks of any *non de minimis* direct and indirect impacts, including (but not limited to) a potential increase in GHG emissions from indirect land use change. However, the states have not decided yet on a method for addressing indirect impacts, nor will the states conduct original modeling. So, the states are very interested in the progress of CARB's expert workgroup and are also reviewing relevant work on indirect impacts done by the EPA, the UK, and the European Union on their respective biofuel programs.

Finally, the Northeast and Mid-Atlantic states will be continuing a public stakeholder process on the regional LCFS that began last year with a series of small meetings with stakeholder groups and included larger public meetings in October 2009. In mid-February, the states hosted a webinar describing their work plan for the economic analysis, and will continue with in-person meetings and webinars this spring that will continue through the year. For more information and background materials on the Northeast/Mid-Atlantic LCFS, go to NESCAUM's website at: www.nescaum.org.

Review of Bagley-Keene Open Meeting Act – Bob Jenne, Assistant Chief Counsel of ARB

Memo from ARB Chief Counsel regarding the California Open Meeting Laws (PDF-23k)

Handy Guide to Bagley-Keene Open Meeting Act (PDF-178k)
Text of Bagley-Keene Open Meeting Act (PDF-137k)

Review of Expert Workgroup Guidelines – Lindle Hatton, Facilitator
LCFS Expert Workgroup Guidelines (PDF-28k)

Introduction to proposed EWG topics - Jim Duffy, co-chair
Rating Form for Potential Expert Workgroup Topics (PDF-10k)
Members were asked to fill out the form and hand it in so it could be scored during lunchtime.

Jim made the following points:

- This workgroup is not policy making body – members are asked to provide objective, technical advice so the process will be data driven
- Members are asked to recommend others with technical expertise to be brought into the process.
- If there is no data available, we want to acknowledge that and offer comment on how to get that information.

Establish and prioritize EWG topics
Each member was given the opportunity to comment about the priorities for implementing the LCFS. They were asked to identify their top 2 or 3 priorities. Some discussion followed.

Public comment
In-person and phone-in verbal comments:

Logan Caldwell: Houston Biofuels Consultants LLC
Dwight Stevenson, Tesoro Corporation

All written comments received via email and in-person are posted on the webpage. Comments will be posted for each meeting. http://www.arb.ca.gov/fuels/lcfs/workgroup/expertworkgroup.htm.

Establish and prioritize EWG topics (cont)
The results of the informal poll were presented. The items were scored thus: High was assigned a score of 5, Medium was assigned a score of 3, and Low was assigned a score of 1. Member responses were tallied and weighted. The score sheet is linked here: Priority Expert Workgroup Topics Identified by Members (PDF-12k)
The chair identified the items of interest as elasticity, co-products, land cover types, emission factors, uncertainty in land use change estimates, secondary effects, and comparative modeling approaches. After discussion, the list was accepted and time accounting was added.

The chair asked for members of the subgroups to collaborate and come back to the next meeting with a work plan. A work plan might include:

- Did we get the major issues right?
- What is the timeline needed to study this issue?
- What other expertise is needed?
- What are the questions we want answered? Does answering these questions involve (for example):
    - Sensitivity analysis
    - Research

    - Literature review
    - Talking to other experts
    - Re-running some of the models
- Identify a schedule for the above
- Identify responsibilities for subgroup members
- Be prepared to present the work plan at the next meeting

Establish working subgroups

The list was put up on the screen and members were asked to submit issues and questions for each group. Members were asked to self-select for the subgroups.

The result of that discussion is **Attachment 1** titled "Subgroup Formation, Questions and Issues for each Subgroup, and Subgroup Members".

Establish schedule for discussion of topics:

Each subgroup will be responsible for coordinating their individual meetings. ARB will provide assistance that could include conference call numbers and note taking. ARB Staff will participate in subgroup meetings.

The next meeting of the entire workgroup is scheduled for Thursday, April 8, 2010 at 8:30 a.m. At this meeting subgroups will report their work plans and the workgroup will schedule subsequent meetings to discuss each of the subgroup topics.

Public Comments

In-person and phone-in verbal comments:

Heather Young, UC Berkeley
Ruth Scotti, BP America
Brooke Coleman, New Fuels Alliance
Kevin Best, Real Energy, Napa Valley

All written comments received via email and in person are posted on the webpage. Comments will be posted for each meeting. http://www.arb.ca.gov/fuels/lcfs/workgroup/expertworkgroup.htm.

Workshop wrap-up:

The chair thanked all who agreed to participate. As each subgroup proceeds with the work plan, note that ARB is looking for recommendations to the board for the report that is due in the December timeframe. Subgroups are encouraged to recommend outside expertise.

Attachment 1

Subgroup Formation, Questions and Issues for each Subgroup, And Subgroup Members

Subgroup leads and co-leads are **bolded and underlined**.

Overarching questions for each subgroup:

1. Where does the data come from?
2. Relevancy to the future?
3. Which values are most important?
4. How do we validate the assumptions?
5. How robust are the values?
6. What boundaries do we put on these values?

Subgroup Topics:

1. Elasticity values – Input values used for land use modeling for different fuels. Subgroup Members: **Bruce Babcock**, Angelo Gurgel, Mark Stowers.
    a. What time period do the elasticities represent?
    b. How to estimate the elasticity to area expansion, land transformation elasticity?
    c. Do elasticity values need to be regional/feedstock/fuel/conversion specific?

2. Co-products – The credit allotted to co-product benefits. Subgroup Members: **Phil Heirigs**, Stephen Kaffka, Mark Stowers, Don O'Connor.
    a. New and expanded uses of existing co-products
    b. New co-products
    c. Diet substitution effects and transformation effects on the value of co-products
    d. How well GTAP is doing on substitution effects
    e. How do you value co-products especially as opportunities of using them change over time
    f. Special issues in co-products related to soy oil
    g. Displacement of petroleum based products with bio-based co-products
    h. Marginal use/impact of co-products coming out of biofuels production
    i. Integrated bio-refineries and co-products
    j. Consistent approach in dealing with co-products as it relates to land use and direct emissions
    k. Issue of double counting between GTAP and GREET

3. Land cover types – Types of land available for conversion to cropland and effects on land use change estimates. Subgroup Members: **Richard Nelson**, **Holly Gibbs** (co), Bob Larson, Bruce Babcock, Angelo Gurgel, Blake Simmons.
    a. What types of land cover can we identify as land sources for new agricultural lands
    b. State and national global data sets – resolution, timeliness, gaps, are they relevant
    c. Definition of marginal land
    d. Remote sensing validation
    e. Land cover as related to technological reclamation
    f. Elasticity transformation
    g. Reconciliation of agricultural land (land transformation elasticity)
    h. Elasticity with respect to area expansion for different land cover types
    i. Lots of input to bring land up to level of productivity and impacts on GHG

j. What would the land be used for? Take the dynamic development of land into account. What is the long-term dynamic land use baseline? Effect of adding biofuels into this system.

4. Emission factors – Review of emission factors used for converting a land use change value to equivalent GHG emissions. Subgroup Members: **Richard Nelson,** **Sonia Yeh** (co), Michael O'Hare, Don O'Connor, Holly Gibbs, Steffen Mueller, Uwe Fritsche.
    a. Lots of input to bring land up to level of productivity and impacts on GHG
    b. Regional data bases for the mode of conversion
    c. Make sense of different sets of emission factors that are out there
    d. Are emission factors appropriately mapped to land cover types in item 3
    e. Aboveground and underground soil carbon loss as a result of conversion and re-sequestration
    f. Nitrogen conversion to N2O
    g. Fate of carbon harvested wood products removed from landscapes
    h. All fuels

5. Uncertainty in LUC estimates Subgroup Members: **Michael O'Hare**, Stephen Kaffka, Michelle Manion, Richard Nelson, and Mark Stowers.
    a. Conducting a more comprehensive sensitivity analysis and validating land use change estimates with empirical data.
    b. What is robust policy in the face of enduring uncertainty
    c. What are the major areas of uncertainty and how do we address them?
    d. What are the metrics and benchmarks to reduce and measure uncertainty?
    e. Is there empirical data or more site specific data – use in modeling is different than looking at it inferentially through economic models
    f. Policy consequences and implications from uncertainty
    g. Is it possible to choose on the safe side? Which side is that?
    h. Policy choice and the actual consequence and how uncertainty affects it. What is the best consequence
    i. Effectiveness of government policy and law on LUC

6. Secondary effects in the energy market – Review indirect effects associated with other fuels. **Blake Simmons, Bob Larson** (co), , Seth Meyer, Sonia Yeh, Jesper Kløverpris, Phil Heirigs, Wally Tyner, Paul Wuebben.
    a. There are multiple models for evaluating the energy sector impact, which ones are most appropriate?
    b. What are the major gaps in the available data sets by energy sector?
    c. What is the marginal fossil fuel being replaced by alternative fuel in short term and long term?
    d. What is the co-product issues related to fossil fuels?
    e. What are the feedback effects of biofuels processing in the natural gas market?
    f. What are the interdependencies between the fuel types as a matter of scale?
    g. What are the effects of supply and price of fossil fuels on the development of alternative fuels
    h. Is it possible to choose on the safe side? Which side is that?
    i. Policy choice and the actual consequence and how secondary energy choices are made. What is the best consequence?
    j. What scenarios are we looking at? How would looking at different scenarios affect the results?
    k. What are the indirect effects of other fuels and how do you quantify them?

7. Comparative and alternative modeling approaches. Subgroup Members: **Bob Larson**, Wally Tyner, Michael O'Hare, Jim McKinney, Jay Noel, Seth Meyer, Steve Kaffka, Blake Simmons, Jeremy Martin, Michelle Manion, Uwe Fritsche.
    a. How would land supply curves in GTAP affect the results?
    b. What are the other options available for us globally analyzing LUC? Do they have to be publicly available rather than proprietary?
    c. What would be the impact on results obtained when switching from GTAP to systems dynamics?
    d. Are there simpler approaches?
    e. If we have other options, how do we validate them and do they reduce uncertainty?
    f. Policy options to constraint or mitigate LUC in high carbon areas such as the tropics – how do we fit them into the baseline that we are modeling? Ex. REDD framework and sustainability certification programs such as RSB, RSPO. Do not limit to just LUC
    g. Should model options that are being considered be transparent?
    h. Should the idea of opportunity cost be included in the LUC estimate?
    i. Verification and validation of the models
    j. Case studies and empirical assessments
    k. Which data assumptions are driving the differences between the different model results? Are we satisfied they are covering the issues?
    l. Meta analysis of assumptions and different models

8. Time Accounting. Subgroup Members: **Jeremy Martin, Jesper Kløverpris** (co), Michael O'Hare.
    a. How do we remove or reduce the arbitrariness of the accounting method
    b. What would the land be used for? Take the dynamic development of land into account. What is the long-term dynamic land use baseline? Effect of adding biofuels into this system.
    c. Reversion of land after program ends
    d. Weigh additional uncertainty against potential improvements with alternative accounting
    e. What is the appropriate production period for different biofuels over which to amortize the land use discharge?
    f. To the extent that warming is not proportional to total carbon discharge, which one should drive policy and how?