

**California Environmental Protection Agency
Air Resources Board**

**Low Carbon Fuel Standard
Release of the Expert Workgroup Final Reports**

Background: The Air Resources Board (ARB/Board) approved the low carbon fuel standard (LCFS) in April 2009, which went into effect in April 2010. In Resolution 09-31, the Board directed the Executive Officer to convene an Expert Workgroup to assist the Board in refining and improving the land use and indirect effect analysis of transportation fuels. This workgroup was tasked with evaluating key factors that might impact the land use values for biofuels including agricultural yield improvements, co-product credits, land emission factors, food price elasticity, and other relevant factors. The Executive Officer has coordinated this effort with similar efforts by the U.S. Environmental Protection Agency, European Union, and other agencies pursuing an LCFS.

Formation of the Expert Workgroup: Staff initiated efforts to convene the LCFS Expert Workgroup in August 2009. A preliminary proposal for the workgroup was shared with stakeholders and discussed during a workshop in August 2009. This proposal contained staff's recommendations for the structure of the workgroup, the proposed member criteria and selection process, and potential topics for discussion. Subsequent member recruitment efforts took into consideration stakeholder feedback on the preliminary proposal.

The official solicitation for members was released on September 17, 2009. We also received member nominations from several stakeholders including BP America, Illinois Corn Growers Association, California Grain and Feed Association, Brazilian Sugarcane Industry Association, California Department of Food and Agriculture (CDFA), and ConocoPhillips. For these nominations, we considered only those persons who actually submitted an application.

The Expert Workgroup was established in February 2010. The workgroup was comprised of 30 members, including eight representatives of other agencies involved in LCFS-type activities. Technical expertise to tackle major issues of concern was a key consideration in our selection of members. The individuals invited to participate in the Expert Workgroup are world-class specialists and represent a breadth of experience in their respective disciplines. The selected individuals come from diverse stakeholder groups such as government agencies, academic institutes and national laboratories, the biofuel and oil industries, and environmental groups. The membership list can be accessed at <http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/ewg-members-list.pdf>.

Expert Workgroup Meetings: The first meeting of the Expert Workgroup was held on February 26, 2010, and seven additional meetings were held at approximately monthly intervals through November 2010. The meetings were open to the public and broadcast

electronically via either webcast or webinar. Meeting minutes and documents presented or discussed at these meetings were posted for public availability at the Expert Workgroup website

(<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/expertworkgroup.htm>). A facilitator from California State University, Sacramento, assisted in running the meetings. During the first meeting, the workgroup members identified the most critical topics to address for the coming meetings. Eight working subgroups were formed with each subgroup focusing on one of the following topical areas:

- Elasticity Values
- Co-Product Credits
- Land Cover Types
- Uncertainty in Land Use Change Estimates
- Indirect Effects of Fuels Other than Biofuels
- Carbon Emission Factors
- Time Accounting
- Comparative and Alternative Modeling Approaches

Each subgroup developed a work plan that was discussed at the April 8 meeting. At the June 17 meeting, a ninth subgroup was formed to address issues related to the modeling of food consumption effects. During the June, July, August, and September meetings, the subgroups presented informative interim reports. Several additional technical experts, who were either invited by the subgroups or by ARB staff, also presented during these meetings. On October 14 and 15, each subgroup presented draft recommendations and on November 5, final recommendations were discussed.

Revised Purdue Analysis: In April, Purdue University researchers led by Professor Wally Tyner released an updated analysis of land use changes associated with corn ethanol, which was requested and partially funded by Argonne National Laboratories. The analysis¹ was subsequently revised in July, at which time the model was made available. At the June Expert Workgroup meeting, Professor Tyner presented the updated analysis, which consists of three distinct simulation methodologies that result in land use change carbon intensity estimates ranging from one third to one half lower than that currently used in the LCFS regulation. ARB staff identified key provisions of the updated analysis, distributed these to appropriate subgroups of the Expert Workgroup, and asked these subgroups to evaluate these updates as part of their overall effort.

ARB staff also contracted with two independent experts to review the updated Purdue analysis. These experts are Professor John Reilly, Co-Director of the Joint Program on the Science and Policy of Global Change at MIT Sloan, and Professor Steve Berry, James Burrows Moffatt Professor of Economics at Yale University. Professor Reilly performed a “top down” assessment of land use change modeling approaches and the

¹ July 2010: *Land Use Changes and Consequent CO2 Emissions due to US Corn Ethanol Production: A Comprehensive Analysis*, Revised Final Report, by Wallace Tyner, Farzad Taheripour, Qianlai Zhuang, Dileep Birur, Uris Baldos, Department of Agricultural Economics, Purdue University

GTAP modeling structure. Professor Berry performed a “bottom up” assessment of the model inputs to GTAP and the empirical basis for these inputs. In September, both independent reviewers presented initial findings to the Expert Workgroup and in November delivered written reports to ARB staff.

Subgroup Final Reports: In reports submitted to ARB, the subgroups were asked to summarize their recommendations in three categories: 1) near-term analysis, 2) short-term work/research, and 3) long-term work/research. ARB staff is presenting these documents for public comment as submitted by the subgroups and without edit. Although many of the topics presented in these documents have been discussed at Expert Workgroup meetings, these documents are products of the subgroups and not of the Expert Workgroup as a whole. Moreover, please note that some of these documents were wholly or substantially written by only a few active members of the subgroups as indicated on the title pages of the documents. The reports can be accessed at <http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/expertworkgroup.htm>.

ARB Staff Review: ARB staff conducted a preliminary review of near-term recommendations from the subgroups and independent reviewers and presented this review to the Board at the November 18, 2010 meeting. This presentation can be accessed at <http://www.arb.ca.gov/board/books/2010/111810/10-10-8pres.pdf>. Pending further analysis of the recommendations and review of public comments, ARB staff intends to incorporate the following model updates and recommendations for corn ethanol and other biofuels as part of near-term work. Staff continues to evaluate other near-term, short-term, and long-term recommendations and may incorporate other model changes not described below.

GTAP Model Updates (as presented in the July 2010 report from Purdue)

- Group 2 simulation methodology. The Group 2 simulation methodology updates the model baseline from 2001 to 2006 and then calculates the land use implications of additional production off this updated baseline.
- Addition of cropland pasture in the U.S. and Brazil.
- Re-estimated energy sector demand and supply elasticity values.
- Improved treatment of corn ethanol co-product (DDGS).
- Modified structure of the livestock sector.
- Improved method of estimating the productivity of new cropland.

Additional Subgroup Recommendations

- Adopt a consistent model version and set of model inputs for all biofuel pathways.
- Re-evaluate the distillers grain co-product credit.
- Develop a more comprehensive and spatially explicit set of carbon stocks and emission factors.
- Gain a better understanding of how and to what extent the updated model predicts changes in food consumption.
- Justify or adjust the choice of time accounting methodology.

- Continue to update and improve the land pools considered as accessible in GTAP.
- Continue to address the indirect effects of other transportation fuels.

ARB staff is currently finalizing contracts to complete some of the above tasks and to revise the land use change modeling for corn ethanol, sugarcane ethanol, and soy biodiesel.

Next Steps: ARB staff is reviewing the final reports from the Expert Workgroup, with a focus on the near-term analysis. However, ARB staff is also evaluating the next steps necessary to fully evaluate the mid-term and long-term analyses. As part of this effort, we encourage comments on the final reports, both from the near-term and long-term perspectives. These comments may be sent to the ARB via email or postal mail at the addresses shown below:

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We intend to complete the near-term revisions to the Low Carbon Fuel Standard Regulation and propose amendments for Board consideration in late spring of 2011, or as expeditiously as practical afterward. For additional information or questions, please contact: Mr. James Duffy, Ph.D., Air Resources Engineer, Alternative Fuels Section, at (916) 323-0015 or jduffy@arb.ca.gov