California Environmental Protection Agency

Air Resources Board

Final Statement of Reasons for Rulemaking

Addition of New Fuel Pathways to the California Low Carbon Fuel Standard Lookup Table

Public Hearing Date: February 24, 2011
Agenda Item: EO 11-1-1

January 2012

Prepared by
Stationary Source Division

Reviewed by
Office of Legal Affairs
Stationary Source Division
Executive Office

This Page Intentionally Left Blank

I. General

A. Action Taken in this Rulemaking

The *Initial Statement of Reasons for Rulemaking, Amendments to the Low Carbon Fuel Standard Regulation Carbon Intensity Lookup Tables*, released to the public on January 6, 2011, provides a description of the rationale and necessity for the proposed action, and is incorporated by reference herein.

On February 24, 2011, the Executive Officer of the California Air Resources Board held a public hearing to consider the adoption of 28 new fuel pathways into the Low Carbon Fuel Standard Regulation Carbon Intensity Lookup Tables set forth in title 17, California Code of Regulations (CCR), section 95486. Section 95486(b)(1) of the Low Carbon Fuel Standard (LCFS) Regulation contained two carbon intensity lookup tables (Table 6 for gasoline and fuels that substitute for gasoline, and Table 7 for diesel and fuels that substitute for diesel). Together, these tables contain the original 64 Board-approved LCFS fuel pathways. The purpose of the February 24, 2011, hearing was to amend the LCFS carbon intensity Lookup Tables through the adoption of 28 additional fuel pathways.

New fuel pathways can be developed by fuel providers or by ARB staff. The amendments heard by the Executive Officer on February 24, 2011, consisted of pathways developed by both fuel providers and ARB staff. The LCFS Regulation established two mechanisms by which fuel providers can determine the carbon intensities (CIs) of the transportation fuels they provide to the California market. The first, Method 1, allows fuel providers to select appropriate CI values from the Lookup Tables. The second, Method 2, allows any entity to apply for Board or Executive Officer approval of additional fuel pathways.

Method 2 is subdivided into two similar but distinct sub-processes (Method 2A and 2B). Method 2A is reserved for applicants whose proposed pathway(s) consists of a modified version of an existing pathway. A Method 2A pathway improves upon one or more aspects of the fuel production, transport, storage, and/or dispensing processes in an existing fuel pathway so as to reduce the lifecycle carbon intensity of that existing pathway. Method 2B, on the other hand, is used for entirely new fuels or fuel production pathways.

The public hearing was conducted in accordance with a delegation of authority from the Air Resources Board (ARB or Board), pursuant to Board Resolution 09-31, which was approved on April 23, 2009. After the public hearing on February 24, 2011, Staff made modifications to the original proposal in response to comments received. The text of the proposed modifications to the regulation, with the modified text clearly indicated, was made available for a 15-day comment period starting on December 8, 2011, and ending on December 23, 2011, by issuance of a Notice of Public Availability of Modified Text and Availability of Additional Documents and a 15-Day Modified Regulation Order containing the modified regulatory text. The Executive Officer subsequently issued

Executive Order No. R-12-001 adopting the amendments to the Carbon Intensity Lookup Tables contained in section 95486, title 17, CCR, as proposed by ARB staff with the addition of modifications set forth in Section II of this FSOR.

B. Incorporation of Materials by Reference

The following documents are incorporated by reference in the regulation.

Archer Daniels Midland Company Method 2B Application Package (May 18, 2011), http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/adm-15day-110911.pdf

POET Method 2A Application Package (February 20, 2011). http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/poet-15day-111011.pdf

Trinidad Bulk Traders LTD Method 2B Application Package (November 23, 2010), http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/tbtl-rpt-ncbi-121410.pdf.

Green Plains Holdings II LLC—Lakota Plant Division Method 2A Application Package, (November 3, 2010), http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/gp-lak-rpt-ncbi-121410.pdf

Green Plains Central City LLC, Method 2A Application Package (October 20, 2010), http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/gp-cct-rpt-ncbi-121410.pdf

Louis Dreyfus Commodities, Elkhorn Valley Ethanol LLC Method 2A Application Package (December 1, 2010), http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/ld-nor-rpt-ncbi-121410.pdf

Stationary Source Division, Air Resources Board (June 30, 2011, v.2.0), http://www.arb.ca.gov/fuels/lcfs/2a2b/internal/15day-uco-bd-110811.pdf "Detailed California-Modified GREET Pathway for Biodiesel Produced in the Midwest from Used Cooking Oil and Used in California

Stationary Source Division, Air Resources Board (November 3, 2011, Version 2.0) "California-Modified GREET Pathway for the Production of Biodiesel from Corn Oil at Dry Mill Ethanol Plants". http://www.arb.ca.gov/fuels/lcfs/2a2b/internal/15day-cornoil-bd-110211.pdf

These documents were incorporated by reference because it would be cumbersome, unduly expensive, and otherwise impractical to publish them in the California Code of Regulations (CCR). The documents are lengthy and highly technical and would add unnecessary additional volume to the regulation. It is also not technically possible to publish computer models such as CA-GREET in the CCR. The incorporated documents were made available by ARB during the rulemaking action and any modifications to the incorporated documents were made available during the 15-day

change comment period in accordance with the Administrative Procedure Act (Government Code section 11340, et seq.).

C. Fiscal Impacts

The Executive Officer has determined, pursuant to Government Code sections 11346.5(a)(5) and 11346.5(a)(6), that this regulatory action will not create costs or savings to any State agency or in federal funding to the State, costs or mandate to any local agency or school district whether or not reimbursable by the State pursuant to part 7 (commencing with section 17500), division 4, title 2 of the Government Code, or other nondiscretionary savings to State or local agencies.

As discussed in chapter V of the Staff Report, in developing this regulatory proposal, staff evaluated the potential economic impacts on private persons and businesses. In accordance with Government Code sections 11346.3 and 11346.5(a)(10), the Executive Officer has determined that the proposed amendments should have no impacts on the creation or elimination of jobs within the State of California, no impacts on the creation of new businesses and the elimination of existing businesses within the State of California, and no impacts on the expansion of businesses currently doing business within the State of California. Finally, the Executive Officer has determined that adoption of the regulatory action will not have a significant, statewide adverse economic impact directly affecting business, including the ability of California's businesses to compete with businesses in other states, or on representative private persons.

D. Consideration of Alternatives

No member of the public suggested any alternatives to the proposed amendments before or during the public hearing, or during the 15-day comment period. ARB has determined that no reasonable alternative considered by the agency or that has otherwise been identified and brought to the attention of the agency would be more effective in carrying out the purpose for which this regulatory action was proposed, or would be as effective and less burdensome to affected private persons or businesses, than the action taken by ARB.

II. Modifications to the Original Proposal

The following discussion addresses all substantive modifications made to the originally proposed regulatory text. It does not include modifications to correct typographical and citation errors, numbering errors, grammar errors, or the rearranging of sections and paragraphs for structural improvements. These modifications were explained in the Notice of Public Availability of Modified Text for a 15-day public comment period beginning on December 8, 2011, and ending on December 23, 2011.

A. Summary of Proposed Modifications in the 15-Day Notice

(1) Revisions to nine of the corn ethanol pathways proposed by POET LLC. (See Table 1 for a summary of POET's proposed pathways.) Staff undertook two of those revisions at POET's request. POET requested these changes so that it could better ensure that the plants operating under those pathways could reliably meet the proposed pathway carbon intensities. Seven other POET sub-pathways are being revised to correct rounding errors introduced when staff prepared the documentation for the February 24, 2011 Executive Officer Hearing. These rounding error corrections are considered to be non-substantive. Staff is not revising two pathway carbon intensities. Table 1 reports all original and revised values.

The values reported in Table 1 reflect the values appearing in POET's completed Method 2A Application Form (POET LLC, February 20, 2011, *POET Method 2A Application*), which is available at the POET Application Package web page referenced in Section I B, above. The table under item d. on page 5 of 8 of that document contains the carbon intensity values appearing in Table 1.

Table 1: Revised Carbon Intensities: POET LLC

		Carbon Intensity (gCO_2e/MJ)			
		100% Dry DGS		100% Wet DGS	
Sub-Pathway	Sub-Pathway Description	Original Value	Revised Value	Original Value	Revised Value
1	Raw Starch Hydrolysis	92.40	92.44	83.70	83.69
2	Raw Starch Hydrolysis/Combined Heat and Power	88.50	88.49	79.80	80.01[1]
3	Raw Starch Hydrolysis/Biomass & Landfill Gas Fuels	88.50	Unchanged	none	None
4	Raw Starch Hydrolysis/Corn Fractionation	91.70	91.66	80.70	80.26[1]
5	Conventional Cook/Combined Heat and Power	90.50	90.52	80.50	80.47
6	Raw Starch Hydrolysis/Biogas Process Fuel	74.70	Unchanged	73.20	73.21

[1]These values were changed at POET's request. All other revisions are ARB-initiated rounding error corrections.

(2) Revisions to the proposed staff-developed corn oil pathway. Comments received during the 45-day comment period revealed calculation errors in the corn oil biodiesel pathway CI. Correcting those errors reduced the original value of 5.9 gCO_2e/MJ to 4.00 gCO_2e/MJ. Please see pages 3, 8 (Table 1), and 20 (Table 10) of the *California-Modified GREET Pathway for the Production of Biodiesel from Corn Oil at Dry Mill Ethanol Plants, Version 2.0* (which is available

at the ARB corn oil pathway document web page referenced in Section I B, above). Staff corrected the following two errors in the ARB's corn oil biodiesel pathway. Please refer to the same corn oil biodiesel pathway document to see how staff implemented those corrections. The pages on which the relevant discussion can be found are noted in parentheses below:

(a) The energy savings resulting from corn oil extraction in ethanol plants did not produce "upstream" emissions reductions. Upstream emissions are generated by supplying the ethanol plant with natural gas and electricity for process power (see Table 4, page 13 and Table 5, page 15).

(b) The corn oil biodiesel carbon intensity includes a credit for the production of glycerin—a co-product associated with biodiesel production generally. The glycerin credit was not applied consistently in the calculation of the original pathway carbon intensity (see Table 2, page 11; Table 3, page 12; Table 6, page 17; Table 7, page 17; Table 8, page 18; and pages 23-24).

(3) Revisions to the pathways developed by Archer Daniels Midland (ADM) Corporation for its corn ethanol plant in Columbus, Nebraska. When ADM first submitted its Method 2A application, its Columbus plant had been operating for only a few months. As ADM's engineers worked to optimize the plant, they discovered that condensate return flows had to be augmented with more fresh water than initially anticipated. This created the need for additional thermal energy for steam generation. That need was met by increasing the plant's consumption of coal. Offsetting the carbon intensity increases associated with additional coal use, however, was the achievement of greater plant operational efficiency than originally anticipated. The net effect of these mutually offsetting changes was that ADM's carbon intensities changed very little. Table 2 shows how energy consumption and carbon intensities have changed at the Columbus plant.

Table 2: Original and Revised Pathway Energy Consumption and Carbon Intensity: ADM's Columbus, Nebraska plant[a]

	Original Pathways				Revised Pathways			
Pathway	**Natural Gas (%)**	**Coal (%)**	**Bio-mass (%)**	**CI gCO_2e /MJ**	**Natural Gas (%)**	**Coal (%)**	**Bio-mass (%)**	**CI gCO_2e/ MJ**
Baseline Plant Energy								
0% Biomass	36.81	63.19	0.00	91.00	29.00	71.00	0.00	90.99
5% Biomass	36.81	57.51	5.68	89.09	29.00	65.15	5.85	89.08
10% Biomass	36.81	51.83	11.36	87.17	29.00	59.29	11.71	87.16
15% Biomass	36.81	46.15	17.04	85.25	29.00	53.44	17.56	85.24
Optimized Plant Energy								
0% Biomass	31.65	68.35	0.00	90.11	29.48	70.52	0.00	89.80
5% Biomass	31.65	62.30	6.05	88.16	29.48	64.35	6.17	87.86
10% Biomass	31.65	56.24	12.11	86.22	29.48	58.19	12.33	85.91
15% Biomass	31.65	50.18	18.17	84.27	29.48	52.02	18.50	83.96

[a]The carbon intensities shown in this table can be found in Archer Daniels Midland Company, May 18, 2011, *Method 2A and 2B Application Form–Draft* (which can be found at the Archer Daniels Midland web page referenced in Section I B, above). These carbon intensities can be found at the bottom of page 5. They are also discussed in Archer Daniels Midland Company, May 18, 2011, *Method 2B Pathway California Low Carbon Fuel Standard* (also at the Archer Daniels Midland web page referenced in Section I B, above). See pages 23 through 32.

(4) Revisions to the staff-developed used-cooking-oil-to-biodiesel pathways. Subsequent staff review of the two ARB-developed used cooking oil pathway revealed two errors. Both errors affect both used cooking oil pathways:

(a) Emissions associated with the transport of the finished biodiesel from the plant to a bulk terminal (a 50-mile trip) were omitted.

(b) The glycerin co-product allocation factor of 0.951 was inappropriately applied to the transport of finished biodiesel.

Correcting these errors increased the final carbon intensity of both Midwest used cooking oil pathways, as shown on Table 3 below. The values in Table 3 can be found in Air Resources Board, June 30, 2011, *Detailed California-Modified GREET Pathway for Biodiesel Produced in the Midwest from Used Cooking Oil and Used in California*, Version 2. This document can be found at the ARB Used Cooking oil web page referenced in Section I B, above.

Table 3: Existing and Revised Carbon Intensities: Staff-developed Used Cooking Oil Biodiesel Pathways

Pathway	Previous CI	New CI
No Cooking[a]	13.53	13.83
Cooking Required[a]	18.44	18.72

[a] "Cooking" is rendering process in which the used cooking oil feedstock is heated.

III. Summary of Comments and Testimony Received in Response to the 45-Day Notice and the Subsequent 15-Day Notice

A. List of Commenters

ARB received written and oral comments during the formal 45-day rulemaking comment period, which began with the notice publication on January 6, 2011, and ended with the Board hearing on February 24, 2011.

The persons identified in Table 1 below provided written and/or oral comments. Following the list is a summary of each objection or recommendation made regarding the proposed action, together with an explanation of how the proposed action has been changed to accommodate the objection or recommendation or the reasons for making no change.

Table 1: Comments Received

Abbreviation	Commenter
COSTA	Byron Costa Written Testimony: 1-21-2011
KLINE	Keith Kline Written Testimony: 2-23-2011
KLOV	Jesper H. Kloverpris, MSc, PhD, LCA specialist at Novozymes Written Testimony: 2-23-2011
LCA1	Stefan Unnasch, Life Cycle Associates, LLC Written Testimony: 2-23-2011
LCA2	Stefan Unnasch, Life Cycle Associates, LLC Oral Testimony: 2-24-2011
LCA3	Stefan Unnasch, Life Cycle Associates, LLC Slides submitted in support of oral testimony
NBB	Louie Brown, National Biodiesel Board* Oral and Written Testimony: 2-24-2011
POET	Jim Lyons, POET Oral Testimony: 2-24-2011
WSPA	Catherine H. Reheis-Boyd, Western States Petroleum Association Written Testimony: 2-22-2011

*Mr. Brown submitted substantially identical written and oral testimony to the record.

A. Corn Oil Biodiesel (COB) Pathway

1. **Comment**: We believe that ARB's approach for treating corn oil biodiesel as an incremental technology is inconsistent with other fuel pathways and inconsistent with the precedent set for life cycle analysis and international standards for life cycle assessment. (LCA2)

   Treating corn oil extraction technology as an incremental technology is inconsistent with standards for life cycle assessment and other fuel pathways analyzed by ARB. (LCA3)

   Biofuel LCA Recommendations: Use consistent methodology and follow ISO standards. (LCA3)

   We do not see the case of corn oil extraction with biodiesel production to be sufficiently unique to warrant a treatment that is different from other technologies. (LCA1)

   So we believe that . . . [ARB should follow the approach it] . . . has defined to treat both ethanol and biodiesel as products of the corn ethanol mill and thereby allocating the energy inputs and emission to the ethanol and the corn oil biodiesel. (LCA2)

   ARB treats corn oil extraction as an incremental technology. This approach assigns the electrical energy for corn oil extraction to the corn oil and provides a credit to the biodiesel for energy savings realized by integrating oil extraction into the fuel plant. The advantage in this approach is that it partially assigns the energy inputs based on the processing energy. However, the ARB's approach selectively defines COB as an incremental technology. ARB's treatment of the incremental biodiesel production is inappropriate because corn ethanol is also a fuel under the LCFS. (LCA1)

   In the proposed Low Carbon Fuel Standard LCFS pathway for COB, ARB treats corn oil extraction differently than other similar products. The proposed approach does not allocate emissions associated with production and processing of feedstock to obtain COB and despite adding this new co-product, ARB does not appear to propose corresponding adjustments to the ethanol production pathway that generates the corn oil as a co-product. The pathway for COB should be consistent with the approach used for other fuels under the LCFS. Recommendation: a clear and consistent approach for allocation of emissions and benefits in alternative fuel pathways should be applied in a manner that is consistent with ISO standards for life- cycle assessment. More detailed analysis and examples of how to achieve this have been provided by others (see for example, the submission from Stefan Unnasch). (KLINE)

In the proposed Low Carbon Fuel Standard pathway for COB, ARB treats corn oil separation differently than similar product pathways. The proposed approach does not give adequate consideration to the consequences of using the corn oil for biodiesel instead of another purpose and, despite adding this new co-product, the approach does not consider corresponding adjustments to the ethanol production pathways that generate the corn oil. The pathway for COB should be consistent with the approach used for other fuels under the LCFS. I therefore recommend another conceptual approach, which is consistent with the system expansion methodology. (KLOV)

Biofuel LCAs should be performed using consistent methodology. We believe that fuel LCA calculations should be performed in a consistent manner. A consistent approach promotes equity among fuel pathways and inspires confidence in the LCFS process. ARB's treatment of back end corn oil extraction as an incremental technology with the energy saving from the ethanol plant applied to the corn oil is too subjective. (LCA1)

COB is a co-product with first order consequential LCA already addressed in GREET methodology. (LCA3)

Biofuel LCAs should not arbitrarily assign low carbon intensities to selective gallons coming from the same refinery. The golden gallon approach sets a bad precedent because it is inconsistent with the treatment of other fuel LCA pathways. (LCA1)

ARB's approach for COB is inconsistent with both International Organization for Standardization (ISO) standards as well as the approach used for other fuels under the LCFS for life cycle assessment and creates potentially undesirable incentives. Allocation schemes consistent with ISO standards are possible for this pathway. (LCA1)

Biofuel LCAs should be consistent with ISO Standards. ARB's golden gallon treatment is inconsistent with standard methods of life cycle assessment identified under ISO 14040. These standards require the identification of a system boundary for the biofuel and the definition of a reference system. Energy inputs and emissions are then to be assigned to products and co-products through a consistent method such as substitution or allocation. Under the LCFS, the reference system is petroleum gasoline and diesel production and the biofuel fuel system is assigned a CI. ARB defines the analysis only around COB, which leads to an incomplete definition of the system boundary. The fate of the ethanol is not addressed. Unfortunately, the incremental biodiesel approach is inconsistent with the ISO standards and should not be applied under the LCFS. (LCA1)

During his presentation, commenter LCA2 presented slides illustrating the corn ethanol system boundary, the system boundary for a consequential analysis of

the corn oil biodiesel system, the system boundary for allocation greenhouse gas emissions between corn ethanol and corn oil biodiesel based on an energy allocation method, and his understanding of system boundary used by ARB staff in its corn oil biodiesel pathway analysis. (LCA3)

Due to the issues identified with ARB's approach to COB, we recommend the more straightforward and conventional allocation method based upon energy content of products for determining the CI for corn ethanol plants with co-produced biodiesel. Energy inputs for farming and land use conversion should be assigned to the ethanol and biodiesel. Corn mill energy inputs should be assigned in proportion to the energy content of the fuel that is produced. The steps would be the following:

- Draw system boundary diagram showing corn dry mill with ethanol and corn oil products and downstream processing to biodiesel
- Allocate energy inputs and emissions for farming and LUC to both energy products
- Allocate energy inputs for the corn mill to both ethanol and COB
- Calculate energy inputs for biodiesel transesterification and allocate emissions to biodiesel and glycerin
- Add transport and non-biogenic vehicle emissions. (LCA1)

We believe the ARB method is inconsistent with prior methodology. It doesn't follow the intent of ISO standards. (LCA2)

The emphasis is on Method i, which provides the most appropriate treatment of COB, and on Method iv as chosen by ARB. Our analysis shows that the total GHG emissions from the corn mill are about the same with Methods i and iv….The CI for COB varies by a factor of 10 across methods…..Method i results in lower emissions for corn ethanol and higher emissions for COB when compared with Method iv; although the total emissions assigned to the fuels is relatively close. The CI for COB using Method i is 65 g CO2e/MJ without LUC compared to 5.7 g CO2e/MJ for Method iv. (LCA1)

As I indicate, allocating all of the benefits to corn oil biodiesel is inconsistent with the LCA methods. (LCA2)

Lifecycle analysis protocols developed by the International Standards Organization (or ISO), if not always adopted by modelers, should always be given strong consideration. ISO recommends avoiding allocation of GHG emissions between co-products and using a consistent approach between products. Mixing allocation approaches within the same analysis typically causes more problems than it addresses. Therefore, in our view, CARB staff- and U.S. EPA, for that matter- have used the most reasonable displacement method in the analysis that is being presented to the board today. (NBB)

We believe that ARB's approach for treating corn oil biodiesel as an incremental technology is inconsistent with other fuel pathways and inconsistent with the precedent set for life cycle analysis and international standard for life cycle assessment. (LCA2)

Response: The guidelines appearing in ISO 14040 apply directly to the usual case in which a single production process unavoidably yields two or more products. Examples include the biodiesel production process that co-produces glycerin, the dry mill corn ethanol process that co-produces distillers' grains with solubles (DGS), and the wet mill corn process that produces a range of primary products including corn oil, ethanol, gluten, and DGS. The corn oil biodiesel pathway that staff developed departs from this general pattern in that it describes the retrofitting of an extraction process onto an already operational plant. Unlike the more typical production system, corn ethanol plants do not unavoidably yield corn oil as a separate commodity. Importantly, neither the retrofitting itself, nor the operation of the retrofitted equipment in any way affects the properties, quality, or quantity of the plant's primary product. Given the uniqueness of this situation, it is appropriate that the allocation method leave the carbon intensity of the primary product unchanged (since the production of that product is in no way altered by the retrofitted extraction process) and allocate only the incremental changes in GHG emissions to the new product. Staff continues to believe that the allocation method it has chosen faithfully reflects the actual dynamics of the corn oil extraction and biodiesel production system: the extraction of a new product from an existing process in such a way as to leave the production of the original primary product unchanged. Because the incremental extraction of corn oil from the back end of the ethanol production process has no effect on the production of the primary product, ethanol, there is no compelling reason to include ethanol within the corn oil biodiesel system boundary. For this reason, staff maintains that its incremental approach is defensible and methodologically sound.

2. **Comment**: Biofuel LCAs should not create lopsided incentives. ARB's proposed treatment of COB results in a very low CI for the fuel. The incentive to build back end corn oil extraction facilities will therefore be much higher than the incentive for technologies such as front end extraction for food grade corn oil, improving corn ethanol plant efficiency, or operating wet mill corn ethanol plants producing food grade corn oil. Plants currently selling corn oil into the animal feed markets, produced via the same process, will be motivated to instead convert their oil to biodiesel. ARB's approach creates a "golden gallon" that will be very valuable under the LCFS because a very small volume blended with conventional diesel achieves LCFS targets. The golden gallon approach allows a blender to easily meet both their diesel and gasoline CI reductions for multiple years by utilizing very small volumes of back end COB. This carbon derivative provides an opportunity for unintended consequences. (LCA1)

Biofuel LCAs should not unfairly penalize competing technologies. Several other corn oil extraction technologies could also be implemented in corn ethanol plants. These include front end extraction to produce food grade corn oil production, as well as back end extraction where the corn oil is used for animal feed or as boiler fuel. In these circumstances, no additional vehicle fuel is produced and the LCA would need to reflect both the changes in food or feed production as well as impacts on the ethanol plant with an adjustment to the CI for the ethanol fuel. Since these technologies do not produce additional fuel, the improvements in energy efficiency would be reflected in the CI of the ethanol. We do not see the case of corn oil extraction with biodiesel production to be sufficiently unique to warrant a treatment that is different from other technologies. (LCA1)

Biofuel LCAs should take into account distribution logistics. Treating COB as an incremental product provides an incentive that is realized only through the sale of COB in California. Ethanol plants would need to store sufficient corn oil to warrant a shipment to California. Since corn oil would represent a smaller fraction or output compared to ethanol, the storage of corn oil provides cost and fuel quality challenges. Consider a 50 million gallon/year corn ethanol plant. This facility would consume 1 billion lb/year of corn and potentially could produce 20 million lb/year of corn oil. This fuel volume corresponds to about 8,200 gal/day of biodiesel which would require 4 days of production to fill one rail car. The corn oil would then need to be processed to biodiesel. Instead of this biodiesel being used in local proximity to the ethanol plant, where transport emissions and fuel use would be minimized, the low CI value assigned by ARB motivates the transport of this biodiesel from the Midwest to California. (LCA1)

Biofuel LCAs should be technology neutral. The lopsided incentive for COB could make this technology the preferred method for corn oil extraction with no obvious improvement in GHG emission compared to other corn oil extraction methods or uses. It also promotes the production of biodiesel over food grade corn oil and detracts resources from other technologies such as biorefinery efficiency improvements or separation of corn oil from the DDGS for use as a separate animal feed. (LCA1)

The ARB's carbon intensity creates a golden gallon where all of the benefits are added to a single gallon of fuel, which creates a lopsided or distorted incentive. For example, fractionation technologies receive the benefit only in terms of the corn ethanol plant's carbon intensity. And here the benefit is concentrated into the golden gallon. (LCA2)

Incremental approach creates a "golden gallon" where the life cycle impacts are concentrated into a very small amount of fuel. (LCA3)

ARB's incremental COB approach proves a preferential incentive for one technology. Therefore, LCA should distribute energy inputs and emissions to both ethanol and COB. (LCA3)

Biofuel LCA Recommendations: maintain technology neutrality and do not create lopsided incentives. (LCA3)

We think that the pathways should maintain technology neutrality rather than over-incentivizing one particular technology which would create a lopsided incentive to do back-end extraction for corn oil biodiesel. (LCA2)

The golden gallon will be the most valuable product from a fuel production facility thereby creating a distorted incentive. (LCA1)

> **Response:** Staff agrees that lopsided incentives and market distortions in the low-carbon fuel market would be created by the promulgation of a fuel carbon intensity that does not faithfully reflect a fuel's actual carbon intensity. However, promulgation of a carbon intensity that *does* reflect a fuel's actual carbon intensity would create beneficial incentives. Market realignments in response to reasonable and accurate carbon intensity values increase market efficiency by moving products to their highest and best use. As shown in the response to Comment 1 above, staff is confident that the corn oil biodiesel carbon intensity it has published reflects that fuel's actual carbon intensity. The new incentives that carbon intensity creates, therefore, are beneficial rather than lopsided: they will act to divert some corn oil to its highest and best use.
>
> Staff believes that lopsided incentives would be created, not by a low corn oil biodiesel carbon intensity, but by a high one. Commenter LCA1, for example, advocates an emissions allocation scheme that assigns corn oil biodiesel a carbon intensity of around 70 gCO_2e/MJ while simultaneously reducing the carbon intensity of the associated corn ethanol by about two gCO_2e/MJ. The result would be that (a) corn oil biodiesel would not be competitive against most other forms of biodiesel, and (b) the associated corn ethanol would receive a credit. Corn ethanol would be credited not for the production of biodiesel, but for the extraction of corn oil. Given the relatively low incentive to use the extracted oil to produce biodiesel, it could be diverted to other uses. It could be added back into the DGS, sold as a livestock feed additive, or simply disposed. A biodiesel pathway that credits corn ethanol for the production of a feedstock that may or may not be used to produce biodiesel is problematic. Commenter LCA1 acknowledges this problem by suggesting that the proposed pathway require that both the biodiesel and the associated ethanol be sold in California. Please see Comment 6 below.

Regardless of the alternative uses for corn oil, however, incenting uses other than the expansion and diversification of California's supply of low-carbon fuels is incompatible with the objectives of the LCFS. The incentives created by staff's allocation method are consistent with this objective—while also reflecting the actual dynamics of the corn ethanol-corn oil biodiesel fuel system. In the end, staff sought to create a pathway for the production of corn oil biodiesel—not for the extraction of corn oil from the corn ethanol process stream. The latter would be separate and different fuel pathway. Staff would consider corn ethanol pathway applications that include back-end corn oil extraction for uses other than biodiesel, as well as front-end extraction pathways. The publication of this corn oil biodiesel pathway in no way precludes the development of such pathways.

3. **Comment**: Under the biodiesel pathway, ARB has assumed the same feed value for de-oiled distiller's grains and solubles (DGS) as for non-de-oiled DGS. This assumption is not consistent with the view of the animal feed experts who participated in the LCFS Expert Work Group/Co-Products Subgroup meetings and should be re-evaluated. For example, Appendix A of the Co-Products Subgroup final report notes that the "heating values of DGS will change as the fat content changes," and Appendix C notes that the "Nutritional Value of DGS varies as a function of extent of fermentation, amount of solubles added to DGS, oil removal, sulfur use." The report also says: "There are cases in which the real-world in which DGS displacement ratios can be less than 1:1. For example, DGS with corn oil removed will have a lower caloric value than rolled or flaked corn, and if DGS displaces SBM in poultry rations without adding additional fat or amino acids to the diet, animal performance could suffer (but may be acceptable because of economics)." (Emphasis in original) (WSPA)

   Biofuel LCAs need to recognize both food and fuel impacts. The extraction of corn oil reduces the oil content of DDGS and the overall food output from corn ethanol. High oil content DDGS is considered a high quality feed, especially for swine and poultry. In order to provide the same feed energy, another source of oil will need to be added to the animal diet. Providing an incentive to turn this corn oil into fuel ignores the other vegetable oil that will likely be added to the food system. Providing a very low CI for the biodiesel with zero adjustment to the ethanol provides an incentive that detracts from the integrated production of food and fuel that is achieved with corn ethanol. (LCA1)

   Ideally, in a consequential LCA which is used by EPA and you would look at taking the corn oil out of the DGS and you would examine the effect of alternative oil supplies. This is not the approach that ARB has taken. They have taken the more attributional LCA approach and made a first order estimate of changes of DGS, for example, on the feed market. (LCA2)

There are a number of issues with ARB's approach converting the feed into fuel. (LCA2)

It is my understanding that the generation of corn oil is driven by corn ethanol production (not by biodiesel demand). Thus, a given amount of corn oil is available. If not used for biodiesel, the corn oil will go into the feed market one way or another (either from separation or via DDGS), i.e. the consequence of using the corn oil for biodiesel is that less oil will go into the feed market. Accordingly, the corn oil biodiesel should be assigned a carbon intensity (CI) equal to the feed component it would otherwise displace plus the CI related to the processing steps required to turn corn oil into biodiesel (where by-products such as glycerol should also be treated by use of system expansion). This approach would most appropriately illustrate the GHG implications of using corn oil for biodiesel production. For further guidance, please see Ekvall and Weidema (2004): System Boundaries and Input Data in Consequential Life Cycle Inventory Analysis, International Journal of Life Cycle Assessment 9 (3) 161-171. (KLOV)

Inedible com oil has characteristics very similar to used cooking oil and other waste feedstocks. The only way that corn oil extraction could have a positive impact on the corn ethanol pathway is if one argued that inedible corn oil displaces soybean oil or beef tallow in the marketplace. Considering inedible corn oil's high free fatty acid content, however, this would be a very difficult case to make. (NBB)

Corn oil biodiesel converts the oil fraction into fuel and the effects of converting the small amount of food into fuel have not been addressed and is not consistent with ARB's approach on land use conversion. (LCA2)

The corn oil component is a valuable fraction of DDGS converting feed to fuel. Corn oil biodiesel (COB) promotes the conversion of feed to fuel and should be reflected in the life cycle analysis. (LCA3)

Biofuel LCA Recommendations: Recognize food and fuel impacts. (LCA3)

We believe that the food and fuel impacts, albeit a small fraction of the DGS, have not been taken into account. High fat DGS is very good feed. It's exported to Asia. And removing the oil form the DGS would ultimately result in shuffling soy oil, or other corn oil may need to be sprayed back onto the DGS to maintain a consistent system boundary and retain the value of the DGS. (LCA2)

> **Response:** Staff agrees that using the system expansion methodology to assess the feed market impacts of de-oiled DGS would be appropriate. It has found, however, that livestock feeding practices are dynamic and complex. Many feeds, supplements, and amendments are available, and the relative prices of these commodities tend to fluctuate from period to

period. Rations change frequently as operators seek to minimize costs. These changes then exert new pressures on feed prices. Even more confounding is the fact that the nutritional needs of the various livestock species are quite different. While corn oil is important in the rations of some species, it is undesirable in the diets of others. Thus, removing corn oil from DGS and diverting it to biodiesel production both increases and decreases demand for DGS. Staff has identified no empirical findings or feed market modeling that could be used to support the development of a system expansion analysis. Should such data or modeling become available, staff will assess its suitability for use in such an analysis. If staff determines that sound, defensible market effect estimates are possible, it will re-run the corn oil biodiesel life cycle analysis to account for those effects. In lieu of a rigorous assessment of the feed market effects of diverting corn oil to the fuel market, therefore, staff has assumed that the diversion of corn oil from the feed market creates offsetting effects: decreased consumption in some species offsets increased consumption in others.

4. **Comment**: ARB's treatment of back end corn oil extraction as an incremental technology with the energy saving from the ethanol plant applied to the corn oil is too subjective. What other technologies could be defined as incremental? (LCA1)

   Biofuel LCAs should not arbitrarily assign low carbon intensities to selective gallons coming from the same refinery. The golden gallon approach sets a bad precedent because it is inconsistent with the treatment of other fuel LCA pathways and opens the door for similar treatment with other fuel pathways. Would ARB also apply the incremental technology approach to a corn ethanol plant that reduced its energy input by 3000 Btu/gallon while improving its yield from 2.7 to 2.8 gallon/bushel? (LCA1)

   Response: Staff believes that the approval of this corn oil pathway will not open the door to the inappropriate application of the incremental approach to other fuel pathways. The appropriate use of the incremental approach is carefully and comprehensively described in the corn oil biodiesel pathway document: the installation of equipment in an existing fuel plant that produces a new fuel feedstock without in any way affecting the production of the primary fuel product. Reviewing this discussion in the pathway document will confirm that the efficiency and yield improvements such as those identified by commenter LCA1, clearly would not qualify as incremental production, as it is defined in that document.

5. **Comment**: So we analyzed both ARB's analysis and found other than a few minor nuances that they perform the analysis as intended. (LCA2)

In support of the previous comment, commenter LCA2 presented two slides comparing ARB's incremental approach to an alternative approach using an energy-based allocation method. One slide contains a bar graph and the other a table. (LCA3)

[We] note several small errors in ARB's pathway document…. The difference in overall emissions is due to some of the agricultural inputs being assigned to glycerin in Method I. (LCA1)

Response: Staff determined, based on this comment letter (LCA1), that it had made two small errors in calculating its corn oil biodiesel CI. As described in the 15-day Change Notice released for this rulemaking, staff corrected those errors in the final corn oil biodiesel pathway document.

6. **Comment**: If we follow the more conventional approach, we arrived at a carbon intensity of 70 grams per mega joule for the corn oil biodiesel and a reduction of about two grams per mega joule ethanol. We believe the ethanol and corn oil biodiesel should be sold in California to receive the full benefits of the LCFS. (LCA2)

   Response: This comment appears to acknowledge the problematic incentives that would be created by assigning corn oil biodiesel a relatively high carbon intensity while crediting the associated ethanol for corn oil extraction. These problems are discussed in detail in the response to Comment 2 above. The fuel sales requirement recommended in this comment—if feasible—might help alleviate those problems. The LCFS program, however, cannot require that fuel be sold in California. Importantly, no such requirement would be necessary under staff's proposed pathway. Extracted corn oil would be converted to biodiesel and sold in California whenever producers determine that biodiesel production is the best use for extracted corn oil. Those sales would generate credits as would sales of any other low-carbon fuel. Whether or not the associated ethanol is sold in-state is of no consequence, since its CI is unchanged.

7. **Comment**: Our analysis shows that the total GHG emissions from the corn mill are about the same with Methods i and iv….The CI for COB varies by a factor of 10 across methods….Method i results in lower emissions for corn ethanol and higher emissions for COB when compared with Method iv; although the total emissions assigned to the fuels is relatively close. The CI for COB using Method i is 65 g CO_2e/MJ without LUC compared to 5.7 g CO_2e/MJ for Method iv. . . Total emissions for Methods i and iv are 21,113 and 21,655 g CO_2e/bushel, respectively. The difference in overall emissions is due to some of the agricultural inputs being assigned to glycerin in Method i. In this method, the corn farming, feedstock transport and fuel plant energy emissions are calculated per MJ of ethanol produced and then converted to denominator units of MJ

ethanol plus biodiesel by multiplying by 91.1%. This yields the corn ethanol results for those pathway steps. The biodiesel results for farming, feedstock transport and the fuel plant are further allocated to account for glycerin by multiplying by 95.1%. This allocation factor is the same used by ARB in the soybean biodiesel pathway to allocate results between biodiesel and glycerin. The corn ethanol transport and distribution and fuel combustion results are then added to the ethanol fuel cycle results without applying any allocation factors; the biodiesel results for fuel transport and combustion are treated similarly. The glycerin production rate is assumed to be the same as assumed by ARB for soy oil biodiesel production (0.105 lbs glycerin/lb biodiesel produced. (LCA1)

Response: This is largely a methodological comment: it describes the commenter's approach to calculating illustrative alternative CIs for corn oil biodiesel and corn ethanol from plants in which corn oil is extracted. The assertion that the method i approach, which reduces the ethanol CI while significantly increasing the biodiesel CI, is more appropriate than staff's approach was addressed in the responses to Comments 1 and 2 above.

8. **Comment**: Biofuel LCAs should be based upon actual instead of predicted performance. The ARB staff based the CI of COB on process data from GreenShift technologies. ARB's analysis could serve as a default fuel pathway as long as fuel producers save a total of 3,070 Btu of energy (natural gas plus electricity) per gallon of ethanol produced. This intermediate calculation does not provide an appropriate constraint on the CI because it combines natural gas and electric energy without a linkage to the corn oil volume. A more straightforward approach would be to specify the net Btu of natural gas and the kWh of electric power and the corn oil volumes separately. (LCA1)

   Response: As mentioned in the response to Comment 1 in Section C below, staff generally agrees that basing fuel pathways upon actual operational data is desirable. For reasons discussed in that response, however, staff will recommend some pathways for approval based on estimated or modeled data. Staff also agrees with the recommendation in Comment 8 that it would be preferable to impose separate operating conditions for thermal energy savings, electrical energy savings, and corn oil yield on users of the LCFS corn oil biodiesel pathway. To that end, staff will require the submission of electrical and thermal energy savings data, as well as corn oil yield data, as a condition of using the corn oil biodiesel pathway. When and if this data yield a clear indication of the levels at which these three operational conditions should be set, staff will revise the pathway so as to impose those conditions.

9. **Comment**: The National Biodiesel Board would like to indicate its support to the methodology CARB staff have used to assess the greenhouse gas emissions for biodiesel made from inedible corn oil. First, it is our view that GHG modelers who are contributing to government policy should strive for consensus whenever

possible- especially when policies overlap, which could be the case with the federal Renewable Fuel Standard and the California low carbon fuel standard. On this point, we commend the staffs at CARB and U.S. EPA for using the same approach for GHG assessment for biodiesel made from inedible corn oil. This type of outreach and consensus building is something we continue to appreciate about CARB processes. (NBB)

Response: Staff appreciates this expression of support.

B. Substantiality Requirements

1. **Comment**: Staff appears to have circumvented the substantiality requirement by allowing "sub-pathways" to qualify for separate carbon intensity values as long as the initial 5 gCO_2e/MJ hurdle was achieved. These "sub-pathways" are additional modifications built off of the same primary modification. This results in, for example, CI values that differ by much less than 5 gCO_2e/MJ, as illustrated below. (The chart submitted by WSPA is not included in FSOR comment summary.) WSPA's position is that the regulations require a pathway modification to meet the substantiality requirement. This requirement should apply equally to modifications of an existing Lookup Table pathway and modifications of modified pathways that ARB intends to approve (i.e., sub-pathways). For example, pathways in a submittal were approved for sub-pathways containing various percentages of biomass (0%, 5%, 10%, or 15%) that do not achieve the minimum 5 gCO_2e/MJ CI reduction threshold between each of the sub-pathways. This reduction threshold should be consistently applied across the sub-pathways. For example, the 15% biomass sub-pathway achieves a greater than 5 gCO_2e/MJ savings relative to 0% biomass, but the 5% and 10% biomass sub-pathways do not. (WSPA)

   Response: The substantiality requirement referenced in this comment does not come into effect until a pathway receives final Executive Officer approval. Therefore, no substantiality requirement applies to the simultaneous submission of multiple sub-pathways. It is only after one or more pathways receive final approval that new sub-pathways would be subject to the 5 gCO_2e/MJ substantiality requirement. The reason the regulation is structured this way is to accommodate normal operational variability. A variety of production scenarios are possible: a single sub-pathway could be used all year; unexpected fuel price and availability problems could force an unplanned transition to another sub-pathway; or production could alternate among all sub-pathways with some regularity as the producer seeks to optimize profit and carbon intensity. ARB allows applicants to apply for two or more sub-pathways to provide exactly this kind of operational flexibility. If this flexibility were not available, producers not able to apply for sub-pathways separated by five or more gCO_2e/MJ would usually have to apply for the pathway with the highest carbon

intensity. Producers approved for one of their lower-CI sub-pathways could not sell fuel in California when production shifts (intentionally or unintentionally) to a higher-CI sub-pathway. Because this outcome strongly disincentivizes innovation on the part of applicants, it is inconsistent with the goals of the LCFS program. For this reason, the substantiality requirement can only be enforced after pathways receive final Executive Officer approval.

C. Prospective Pathway Approvals (when little or no operational data is available)

1. **Comment**: Staff has proposed separate CI values (~ 1 gCO_2e/MJ delta) for an "optimized plant energy mode" that would result in "additional heat recovery and energy savings… in the future." (Emphasis added.) How has staff verified modifications that do not yet exist? Approval for CI values for the optimized mode should be withheld until it has been implemented and data are available with which to confirm the energy savings. (WSPA)

   Biofuel LCAs should be based upon actual instead of predicted performance. The ARB staff based the CI of COB on process data from GreenShift technologies. ARB's analysis could serve as a default fuel pathway as long as fuel producers save a total of 3,070 Btu of energy (natural gas plus electricity) per gallon of ethanol produced. This intermediate calculation does not provide an appropriate constraint on the CI because it combines natural gas and electric energy without a linkage to the corn oil volume. A more straightforward approach would be to specify the net Btu of natural gas and the kWh of electric power and the corn oil volumes separately. (LCA1)

   Response: In general, staff agrees that actual operational data is the preferred basis for an LCFS fuel pathway carbon intensity. Experience has shown, however, that the low-carbon fuel supply goals of the program are best met if applicants are allowed to develop prospective pathways. Requiring prospective applicants to accumulate operational data before even applying for a pathway creates an unacceptably long delay before new low-carbon fuels enter the California market. In the interest of expediting the diversification of fuels available in the State, therefore, ARB is allowing applicants to apply prospectively for fuel pathways. In order to overcome the uncertainties inherent in prospective pathways, however, staff routinely advises applicants for such pathways to (a) err on the high side when estimating carbon intensities, and (b) be prepared to be required to submit operational data as it becomes available. On the basis of that operational data, applicants may have to amend their original applications to reflect actual operational carbon intensities.

D. Coal and Biomass Accounting in Pathway Carbon Intensity Calculations

1. **Comment:** Another comment relates to other changes to the CA-GREET inputs that result in lower CI values for pathways - including the use of biomass to displace coal, and the use of coal with a lower carbon content than the default CA-GREET pathway. Both of these changes imply a difference in transportation emissions because of the lower energy content of biomass and lower carbon coal relative to the baseline. Was this accounted for in the CA-GREET analysis? Is there any special pre-preprocessing of biomass for this application (e.g., drying or chipping/grinding), and if so, were those emissions accounted for? (WSPA)

   Response: CA-GREET contains two coal heating values: The lower heating value (LHV) of 19,546,300 Btu/ton is used for average U.S. power plants, while 16,497,700 Btu/ton is used for facilities that burn coal from the Powder River Basin (PRB). The default for coal-burning Midwestern corn ethanol plants is non-PRB coal and the higher heating value (HHV). If an applicant for a Method 2 pathway can provide staff with official documentation from the coal supplier showing that only PRB coal is delivered to the plant, that plant can calculate its CI using the LHV for coal. Staff allowed the use the lower coal heating value in one of the pathways included in this regulatory action. This was only allowed after staff carefully considered the data provided by the applicant, and compared that data to public information from the coal industry. Regarding the calculation of emissions associated with biomass combustion, biomass is treated like any other fuel in CA-GREET: The energy use and emissions associated with collection, grinding, and other pre-processing steps—as well as the energy content of the biomass fuel itself--are accounted for in the CI.

E. Use of Applicant-Specific Rather Than Default Inputs

1. **Comment:** WSPA also believes some pathways reflect selective inputs. Under some pathways, credit is given for a lower transportation distance from the corn field to the corn stacks and from the corn stacks to the ethanol plant relative to the baseline CA-GREET estimates. Although valid, it appears to us that this borders on “cherry-picking” inputs. Has ARB confirmed that other inputs to CA-GREET properly reflect the local conditions of this plant, e.g., electricity mix? For cases in which local inputs that result in a relatively small decrease in the CI estimates are proposed, ARB should also require a thorough investigation of local inputs that could potentially increase the CI estimates. (WSPA)

   Response: Staff’s approach to the use of non-default CA-GREET inputs is very rigorous and systematic: Applicants are required to use the conservative default inputs unless they are able to properly document actual input values that are lower than the defaults. In addition, applicants

wishing to use non-default values in two areas—agricultural practices and electrical generation energy mix—face even more stringent requirements. In the case of agricultural practices, extensive and specific data on the current practices on the specific farms supplying feedstocks to the applicant's production plant are required. That data must also be robust enough to demonstrate that the current practices will remain in place (or improve) over the lifetime of the proposed pathway. Staff has also placed enhanced requirements on the use of non-default electrical generation energy mix values. Because most applicants will use the defaults, and because those defaults represent regional averages, it is important to protect the integrity of those regional averages. If some applicants are allowed to carve out small pieces of the regional average (almost always, the lowest-carbon-intensity pieces), the larger regional average becomes increasingly invalid. In order to maintain the integrity of the regional average, it would have to be recalculated after each small piece (individual utility-district-area) is removed. The next step, of course, would be to recalculate the carbon intensities of all pathways based on the recalculated average—an obviously non-trivial undertaking. For this reason staff requires applicants to use the regional electrical energy mix defaults unless they can demonstrate the use of localized, off-grid sources of electricity, such as on-site photovoltaic cells or wind turbines. For these reasons, a thorough audit of all inputs is not necessary in each instance in which an applicant proposes the use of non-default CA-GREET values.

F. Support for POET's Proposed Pathways

1. **Comment:** As we heard during the staff presentation, POET has submitted a Method 2A application for eleven different sub-pathways from Midwest corn. These pathways reflect POET's incorporation of raw starch hydrolysis and corn fractionation into the ethanol production process at facilities using renewable biomass and landfill gases fuels or combined heat and power processes. The carbon intensity values for these sub-pathways based on dry distillers' grains range from 74.7 to 92.4 grams of CO_2 equivalent per mega joule in contrast to the 99.4 grams CO_2 equivalent per mega joule for default value produced from the corn. With wet distillers' grain, the co-product CI values drops to 73.2 from 83.7 grams of per mega joule. POET urges you to approve the addition of these sub-pathways to the carbon intensity Lookup Tables. (POET)

   Response: Staff continues to recommend approval for the pathways in POET's Method 2 application. The LCFS Lookup Table pathway with a carbon intensity of 99.4 gCO_2e/MJ, however, is not a reference pathway for any of the Method 2A pathways proposed by POET. The reference pathways for most of POET's dry DGS pathways are the two Midwest dry mill, natural gas pathways. The carbon intensities for these pathways are 98.4 gCO_2e/MJ when dry DGS is produced and 90.1 gCO_2e/MJ when wet

DGS is produced. For the two pathways which include biomass as a process fuel, the two reference pathways are the two Midwest, dry mill, dry DGS, 80 percent natural gas, 20 percent biomass pathways. The carbon intensities for these pathways are 93.6 gCO_2e/MJ when dry DGS is produced and 86.8 gCO_2e/MJ when wet DGS is produced. POET's pathway carbon intensities are all at least 5 gCO_2e/MJ below these reference carbon intensities. As such, all meet the LCFS substantiality requirement for Method 2A pathway applications.

G. Offer of Assistance

Comment: POET also hopes to work with CARB staff on broader and more general enhancements in the CI values assigned to ethanol produced from Midwest corn that will lower them such that they more accurately reflect life cycle emissions. These enhancements include revisions to the CI assigned for indirect land use impacts as well as others that update current assumptions regarding the source mix for Midwest electricity generation as well as those for energy, fertilizer, and pesticide use in corn farming. (POET)

Response: Staff appreciates POET's offer of assistance and will continue to work closely with POET and all other interested parties in refining existing pathways and in developing new pathways.

H. Process

Comment: And we believe that this process–another element of the ISOR procedure—is stakeholder review. And this is a rather small group of stakeholders right here. So perhaps I don't know how the process works, but it would be appropriate to review this fully with all of the affected parties. (LCA2)

Response: This rulemaking followed the procedures established in the California Administrative Procedures Act: the publication of an Initial Statement of Reasons, a 45-day comment period followed by a public hearing before the Executive Officer, a 15-day change period, and the preparation of this Final Statement of Reasons containing responses to all comments received during the 45- and 15-day comment periods. This process was designed to provide the public with ample opportunity to participate in the rulemaking process.

I. Miscellaneous

Comment: The commenter expresses appreciation to ARB for working to control air pollution—particularly, emissions from transportation vehicles. He described the

decline in air quality in his home town of Long Beach and expressed concern over the health effects of air pollutants such as diesel exhaust. He provided a list of references on the health effects of such pollutants. He did not mention the current rulemaking or greenhouse gas emissions except to note that he had read that CO_2 inhalation can cause flu-like symptoms. (COSTA)

Response: These comments are beyond the scope of this rulemaking.