

**State of California  
Air Resources Board**

**UPDATED INFORMATIVE DIGEST**

**AMENDMENTS TO THE CARBON INTENSITY LOOKUP TABLES IN THE LOW  
CARBON FUEL STANDARD REGULATION**

**Sections Affected:** Amendments to California Code of Regulations (CCR), title 17, section 95486. The following documents are incorporated in the regulation by reference:

- (1) Archer Daniels Midland Company Method 2B Application, May 18, 2011;  
(<http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/adm-15day-110911.pdf>),
- (2) POET Method 2A Application, February 20, 2011;  
(<http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/poet-15day-111011.pdf>),
- (3) Trinidad Bulk Traders LTD Method 2B Application, November 23, 2010;  
(<http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/tbtl-rpt-ncbi-121410.pdf>),
- (4) Green Plains, Lakota Plant Method 2A Application, November 3, 2010;  
(<http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/gp-lak-rpt-ncbi-121410.pdf>),
- (5) Green Plains, Central City Plant Method 2A Application, October 20, 2010;  
(<http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/gp-cct-rpt-ncbi-121410.pdf>),
- (6) LouisDreyfus Commodities Method 2A Application, December 1, 2010;  
(<http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/ld-nor-rpt-ncbi-121410.pdf>),
- (7) ARB CA-GREET Model Pathway for Biodiesel Produced in the Midwest from Used Cooking Oil, Version 2.0, June 30, 2011;  
(<http://www.arb.ca.gov/fuels/lcfs/2a2b/internal/15day-uco-bd-110811.pdf>),
- (8) ARB CA-GREET Pathway for the Production of Biodiesel from Corn Oil at Dry Mill Ethanol Plants, Version 2.0, November 3, 2011;  
(<http://www.arb.ca.gov/fuels/lcfs/2a2b/internal/15day-cornoil-bd-110211.pdf>); and

**Background**

At its April 23, 2009, public hearing, the Air Resources Board (ARB or Board) in Resolution 09-31 approved the adoption of the LCFS regulation, which went into effect in January 2010.<sup>1</sup> The LCFS regulation is described in detail in the LCFS Staff Report released to the public on March 5, 2009, along with other rulemaking materials that can be viewed at <http://www.arb.ca.gov/regact/2009/lcfs09/lcfs09.htm>.

The LCFS regulation is expected to reduce greenhouse gas (GHG) emissions of the transportation sector in California by about 16 million metric tons in 2020. These reductions account for almost 10 percent of the total GHG emission reductions needed

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<sup>1</sup> Codified at title 17, California Code of Regulations, sections 95840-95490. Additional provisions went into effect in April 2010.

to achieve the State's mandate of reducing GHG emissions to 1990 levels by 2020.<sup>2</sup> The LCFS incorporates the use of "lifecycle analysis" to estimate each fuel's GHG emissions.<sup>3</sup> The lifecycle analysis accounts for the GHG emissions associated with the production, transportation, and use in California of regulated transportation fuels in motor vehicles (also called the fuel's "carbon intensity" or "CI").

The LCFS regulation specifies three methods by which a regulated party can arrive at a carbon intensity determination for each fuel pathway (see CCR, title 17, § 95486 for more information). All three methods use the same analytical tools (CA-GREET<sup>4</sup> and GTAP<sup>5</sup>) for establishing the direct and indirect effects that contribute to a fuel's lifecycle carbon intensity. Method 1 refers to the ARB-initiated regulatory adoption or amendment of carbon intensity values in the Lookup Tables<sup>6</sup> in section 95486. The remaining two methods, called Method 2A and 2B, refer to the regulatory process by which regulated parties either obtain a lower CI for an existing fuel pathway in the Lookup Tables (Method 2A) or request a completely new pathway for incorporation into the Lookup Tables (Method 2B). For both Method 2A and 2B, there is a threshold requirement that the proposed pathways meet the specified provisions for "scientific defensibility<sup>7</sup>," and Method 2A has an additional "substantiality<sup>7</sup>" requirement. This is because ARB reviews of new or modified requirements are intended to help focus ARB's resources on consideration of fuel pathways that represent real and significant innovations in the production of biofuels and alternative fuels.

As noted, the addition of fuel pathways to the Lookup Tables is subject to public review. In other words, the Executive Officer may not approve a carbon intensity value proposed pursuant to Method 2A or 2B unless the proposed method and associated information submitted in support of that method has been disclosed to the public and available for public review for the prescribed time period, in accordance with rulemaking requirements in the Administrative Procedure Act. Trade secrets submitted to ARB, as defined under State law, are treated in accordance with established ARB regulations and procedures (CCR, title 17, §§ 91000-91022) and the Public Records Act (Government Code § 6250 et seq.).

Once a fuel's or blendstock's CI value is approved, the CI value may be used by the appropriate regulated party in calculating the overall carbon intensity for its fuel pool and the credits/debits generated by the fuels in its fuel pool. Fuels and blendstocks that have a CI that is lower than the standard (specified in CCR, title 17, §§ 95482 and 95483) for a given year generate credits in that year, while those with a CI that is higher

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<sup>2</sup> Pursuant to Assembly Bill 32 (Stats. 2006, ch. 488), which is codified at Health and Safety Code section 38500 et seq.

<sup>3</sup> For petroleum-based fuels, the lifecycle analysis is also referred to as "well-to-wheels"; for fuels produced from crops, the lifecycle analysis is sometimes referred to "seed-to-wheels."

<sup>4</sup> Staff used the California Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (CA-GREET) model to assess the direct GHG emissions.

<sup>5</sup> Staff used the Global Trade Analysis Project (GTAP) model to estimate indirect GHG emissions from land use change.

<sup>6</sup> "Lookup Tables" refers to tables 6 and 7 in section 95486.

<sup>7</sup> Refer to section 95486 for more details on these requirements.

than that year's standard generate debits (see section 95484 (b) for more information on the credit balance calculations). Under the LCFS regulation, all regulated parties are required to show compliance with the carbon intensity reduction and credit balancing requirement on an annual basis. Thus, the addition of modified or new fuel pathways in the Lookup Tables will provide regulated parties with additional options from which to choose an appropriate mix of fuels and blendstocks to comply with the LCFS' annual CI standards.

### **Description of the Regulatory Action:**

At a February 24, 2011, public hearing, staff proposed amendments to the Lookup Tables of carbon intensity values contained in section 95486, title 17, CCR, as well as the list of incorporated supporting pathway documents. As noted, section 95486 sets forth the methodology for determination of carbon intensity values of various fuel pathways.

As noted, there are three types of proposed CI amendments: (1) ARB initiated pathways, (2) Method 2A submittals, and (3) Method 2B submittals. Staff developed carbon intensities for Used Cooking Oil Biodiesel (one using oil rendered using a high-energy process called "cooking" and one using oil rendered using a lower-energy "without cooking" process) and Corn Oil Biodiesel. In addition, staff evaluated a number of Method 2A/2B customized CI pathway applications submitted by regulated parties or entities on behalf of regulated parties. The customized CI pathways under consideration include: corn ethanol and sugarcane ethanol processed pursuant to the Caribbean Basin Initiative. The various corn pathways differ by process energy input, energy efficiency, production process technology, and co-product mix.

Staff also proposed several non-substantive changes to the Lookup Tables, as follows:

- (1) identification of the process fuels used for two corn ethanol pathways, which were inadvertently omitted in the original Lookup Tables but specified in their respective pathway supporting documents in section 95486(b)(1); and
- (2) addition of an alphanumeric, sequential "Pathway Identifier" column to both Lookup Tables to assist regulated parties and ARB staff in cross-referencing a particular fuel pathway with its specific pathway supporting document identified in section 95486(b)(1).

The Executive Officer approved the new pathways as proposed by ARB staff with the addition of modifications set forth in a 15-day notice. The 15-day modifications included:

- 1) Revisions to POET's fuel pathways 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. Staff also revised seven other POET sub-pathways to correct rounding errors

introduced when staff prepared the documentation for the February 24, 2011, Executive Officer Hearing.

- 2) Correction of errors to the 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<sub>2</sub>e/MJ to 4.00 gCO<sub>2</sub>e/MJ.
- 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.
- 4) Revisions to the staff-developed used-cooking-oil-to-biodiesel pathways. Subsequent staff review of the two ARB-developed used cooking oil pathways revealed two errors. Both errors affected both used cooking oil pathways.

## **COMPARABLE FEDERAL REGULATIONS**

There are no current federal regulations that are comparable to the LCFS regulation. The U.S. Environmental Protection Agency (U.S. EPA) has adopted its Renewable Fuel Standard (RFS2) regulation—Code of Federal Regulations (CFR), title 40, part 80, section 1100 et seq.—that mandates the blending of specific volumes of renewable fuels into gasoline and diesel sold in the U.S. to achieve a specified ratio for each year (i.e., the renewable fuel standard). As defined, “renewable fuels” under the RFS2 superficially resembles the list of transportation fuels subject to the LCFS.<sup>8</sup> However, there are a number of reasons why the RFS2 is complementary, but not comparable, to the LCFS.

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<sup>8</sup> 40 CFR §80.1101(d)(1) and (2) provides: (1) Renewable fuel is any motor vehicle fuel that is used to replace or reduce the quantity of fossil fuel present in a fuel mixture used to fuel a motor vehicle, and is produced from any of the following: (i) Grain; (ii) Starch; (iii) Oilseeds; (iv) Vegetable, animal, or fish materials including fats, greases, and oils; (v) Sugarcane; (vi) Sugar beets; (vii) Sugar components; (viii) Tobacco; (ix) Potatoes; (x) Other biomass; (xi) Natural gas produced from a biogas source, including a landfill, sewage waste treatment plant, feedlot, or other place where there is decaying organic material.

The term “Renewable fuel” includes cellulosic biomass ethanol, waste derived ethanol, biodiesel (mono-alkyl ester), non-ester renewable diesel, and blending components derived from renewable fuel.

Congress adopted a renewable fuels standard in 2005 and strengthened it in December 2007 as part of the Energy Independence and Security Act (EISA). The RFS2 requires that 36 billion gallons of biofuels be sold annually by 2022, of which 21 billion gallons must be “advanced” biofuels and the other 15 billion gallons can be corn ethanol. The advanced biofuels are required to achieve at least 50 percent reduction from baseline lifecycle GHG emissions, with a subcategory required to meet a 60 percent reduction target. These reduction targets are based on lifecycle emissions, including emissions from land use changes.

Although the RFS2 is a step in the right direction, the RFS2 volumetric mandate alone will not achieve the objectives of the LCFS. The RFS2 targets only biofuels and not other alternatives; therefore, the potential value of electricity, hydrogen, and natural gas are not considered in an overall program to reduce the carbon intensity of transportation fuels. In addition, the targets of 50 percent and 60 percent GHG reductions only establish the minimum requirements for biofuels. It forces biofuels into a small number of fixed categories. Once a fuel is approved for inclusion in a category, providers of that fuel have no further incentive to innovate. Finally, it exempts existing and planned corn ethanol production plants from the GHG requirements, thus providing no incentive for reducing the carbon intensity from these fuels.

By contrast, the LCFS regulates all transportation fuels, including biofuels and non-biofuels, with a few narrow and specific exceptions. Thus, non-biofuels such as compressed natural gas, electricity, and hydrogen play important roles in the LCFS program. In addition, the LCFS encourages much greater innovation than the federal program by providing important incentives to continuously improve the carbon intensity of biofuels and to deploy other fuels with very low carbon intensities.

If California were to rely solely on the RFS2 (i.e., the “No LCFS” alternative), the State would not achieve the GHG emission reductions called for in Assembly Bill 32 and Executive Order S-01-07. RFS2, by itself, achieves only approximately 30 percent of the GHG reductions projected under the LCFS program. Because of these differences, the federal RFS regulation is complementary but not comparable to the LCFS.