Low Carbon Fuel Standard: Proposed New Fuel Pathways

Executive Officer Hearing

February 24, 2011

California Air Resources Board

Low Carbon Fuel Standard

Background

- Approved LCFS fuel pathways in the Lookup Table
- Mechanism for adding new fuel pathways: Methods 2A & 2B:
  - 2A: improvements to existing pathways
  - 2B: entirely new process or fuel
- ARB staff also develops some high-priority pathways

Proposed New Pathways

- Staff recommends the approval of 28 new fuel pathways
  - 25 Method 2A and 2B pathways, contained in 6 applications
  - 3 staff-developed pathways, contained in 2 ARB pathway documents.
- Will incent additional volumes of lower-carbon fuels into California
- Other new pathways to be heard at subsequent hearings will continue this trend

Presentation Structure

- Summarize key characteristics of each pathway
- Slides organized by ***application***—not ***pathway***
  - Each application can contain multiple pathways
- Information presented for each application:
  - Applicant
  - Application type (2A or 2B)
  - Reference pathway for 2A applications
  - Type and location of plants covered
  - Number of pathways proposed in the application
  - Co-products produced
  - Proposed pathway carbon intensities

Archer Daniels Midland, Inc.

- ***Application Type***: 2B
- ***Plants***: 1 plant in Columbus, NE.
  - Dry mill, corn ethanol.
  - Thermal power: Natural gas, coal, and biomass powered cogeneration facility
  - No grid electricity
  - Pre- and post-optimized operational modes:
    - Additional heat recovery to be installed

Archer Daniels Midland (Cont.)

- ***Pathways***: 8
  - For each operational mode (pre- and post-optimized): 4 thermal power fuel mixes (coal, natural gas, biomass)
- ***Co-Products***: Multiple DGS products with varying moisture contents
- ***CIs*** range from:
  - Pre-optimized mode: 85.25 to 91.00
  - Post-optimized mode: 84.27 to 90.11

Louis Dreyfus, Inc.

- ***Application Type***: 2A
- ***Reference Pathway***:
  - Midwest; Dry Mill; Dry DGS, NG: 98.4 gCO_2e/MJ
- ***Plants***: 1 plant in Norfolk, NE. Dry mill corn ethanol
- ***Pathways***: 1
- ***Co-products***: Dried and partially dried DGS
- ***Characteristics***:
  - Standard ICM-designed Midwestern plant.
- ***CI***: 87.16

Green Plains, Central City

- ***Application Type***: 2A
- ***Reference Pathway***:
  - Midwest; Dry Mill; Dry DGS, NG: 98.4 gCO2e/MJ
- ***Plants***: 1 plant in Central City, NE. Dry mill corn ethanol
- ***Pathways***: 1
- ***Co-products***: Partially dried DGS
- ***Characteristics***:
  - Standard ICM-designed Midwestern plant.
- ***CI***: 84.29

Green Plains, Lakota

- ***Application Type***: 2A
- ***Reference Pathway***:
  - Midwest; Dry Mill; Dry DGS, NG: 98.4 gCO2e/MJ
- ***Plants***: 1 plant in Lakota, IA. Dry mill corn ethanol
- ***Pathways***: 1
- ***Co-products***: Wet and Dry DGS
- ***Characteristics***:
  - Standard ICM-designed Midwestern plant.
- ***CI***: 91.6

POET, LLC

- ***Application Type***: 2A
- ***Reference Pathways*** (all are MW, dry mill):
  - Dry DGS, NG: 98.4 gCO2e/MJ
  - Wet DGS, NG: 90.1 gCO2e/MJ
  - Dry DGS, 80% NG, 20% Biomass: 93.60 gCO2e/MJ
- ***Plants:*** Pathways are not plant specific. POET will register plants under the approved pathways
- ***Pathways***: 11
  - 6 production technology types
  - Wet & dry DGS for each technology type (except one)

POET, LLC (Cont.)

- ***Co-products:*** Wet and dry DGS (One pathway lacks wet DGS)
- ***Characteristics:***
  - Pathways combine these process technologies:
    - Raw starch hydrolysis (enzymes)
    - Combined heat and power
    - Biomass fuel
    - Landfill gas fuel
    - Conventional cook (heat instead of enzymes)
    - Corn fractionation
- ***CIs***:
  - Dry range: 74.7-92.4;
  - Wet Range: 73.2-83.7

Trinidad Bulk Traders Limited

- ***Application Type***: 2B for Brazilian sugarcane ethanol
- ***Plants***: 1 dehydration plant in Trinidad
- ***Pathways***: 3 (1 CI added to each existing Brazilian sugarcane pathway)
- ***Co-products***: None
- ***Characteristics***: Natural gas to dehydrate Brazilian ethanol
- ***CIs***: 78.94, 71.94, and 63.94

Staff-Developed Pathways

- Staff recommends approval of 3 new pathways it developed
- Developed as “generic” pathways to bring multiple producers into the market
  - Pathways use upper-bound CIs to include the maximum number of producers
  - Producers with lower CIs can apply for those CIs at any time
- Proposed for approval today are
  - 2 Midwestern used cooking oil Biodiesel pathways
  - 1 corn oil biodiesel pathway

Biodiesel from Used Cooking Oil

- ***Pathways:*** 2
  - Higher-energy rendering process ("cooking")
  - Lower-energy rendering process
- ***Co-product:*** glycerin
- ***Characteristics:***
  - Similar to existing California UCO pathway except:
    - Transportation distances
    - Fuel mixes for electrical generation
- ***CIs:***
  - Cooking: 18.44
  - Non-cooking: 13.53

Biodiesel from Corn Oil

- ***Pathways:*** 1
- ***Co-product***: glycerin
- ***Characteristics:***
  - Corn oil extracted by centrifuge from DGS
  - Additional energy to heat and centrifuge DGS
  - Less energy to dry DGS = net energy savings
  - Net energy expenditure for wet DGS
  - Pathway CI consists of:
    - Net energy expenditure or savings from ethanol plant
    - Biodiesel production emissions
    - All other pathway emissions stay with the ethanol
- ***CI:*** 5.9

Environmental/Economic Impacts

- Original LCFS staff report addressed both potential impact areas
- Pathways proposed today
  - Fully contained within original analysis
  - No significant adverse impacts anticipated

POET 15-Day Change

- POET has requested changes to 2 pathway CIs
  - Technical adjustments to assure plants could reliably meet CIs
  - All documentation has been submitted
  - Staff has reviewed and recommends approval
  - Affected pathways:

Sub-Pathway number	Sub-Pathway Description	100% Wet DGS CI	
		Original Value	Revised Value
2	Raw Starch Hydrolysis/Combined Heat and Power	79.8	80.00
4	Raw Starch Hydrolysis/Corn Fractionation	80.7	80.30

Staff Recommendation

- Staff recommends approval of 28 fuel pathways
- Approval of 15-day change period to allow public comments on the proposed changes
- Approval of 2A/2B pathways will incent additional volumes of lower-carbon ethanol into the California market
- ARB-developed pathways incent greater use of low-carbon Biodiesel into the State