

Staff Summary
Method 2A Application
Aemetis Advanced Fuels Keyes, Inc., Keyes, California
Corn and Sorghum Ethanol
(Pathway Codes: ETHC120, ETHC121, ETHC122, ETHG020, and ETHG021)

Deemed Complete Date: December 10, 2015
Posted for Comment Date: December 17, 2015
Certified Date: December 30, 2015

Pathway Summary

Aemetis Advanced Fuels Keyes, Inc. (Aemetis) Ethanol operates an ethanol plant in Keyes, California. Aemetis has applied for five Method 2A pathways where three of them are prospective for landfill gas for this plant under the California Low Carbon Fuel Standard (LCFS) utilizing the CA-GREET1.8b model. The plant is a dry mill, natural-gas-fired facility capable of producing 73.5 million gallons anhydrous ethanol from corn and grain sorghum per year. Corn sourced from California counties for the production of ethanol do not use lime in corn farming. This is due to high soil pH levels in these counties and is attested to by analysis from the University of California at Davis and other supporting documentation. In addition, the sorghum sourced from the Midwest Great Plains region by Aemetis also do not use lime in the production of grain sorghum. This is attested to by separate documentation provided by the applicant. The plant also sources corn from the Midwest Great Plains regions where lime is required as a supplement to maintain soil pH levels for maximum productivity. The plant uses local grid electricity and natural gas (NG) for its process energy. It can also use North American Landfill Gas (LFG)¹ as an alternative to natural gas as process fuel. The facility produces wet distillers grains with solubles (WGDS) and corn oil as co-products from the ethanol production process.

Carbon Intensity of Ethanol Produced

The applicant has requested three corn ethanol pathways and two grain sorghum pathways. Details of these pathways are provided in Table 1.

¹ California Air Resources Board, 2013. LCFS Life Cycle Fuel Pathway Report: North-American Landfill Gas to Compressed Natural Gas, January 28, 2013: <http://www.arb.ca.gov/fuels/lcfs/2a2b/internal/nalfg-cng-rpt-031513.pdf>

Table 1. Details of Pathways Requested by Aemetis Keyes

Pathway No.	Aemetis Ethanol Pathways
1	California corn, no lime use, 100% NG
2	California corn, no lime use, 100% North American LFG (prospective)
3	Midwest grain sorghum, no lime use, 100% NG
4	Midwest grain sorghum, no lime use, 100% North American LFG (prospective)
5	Midwest corn, with lime use, 100% North American LFG (prospective)

The California corn and Midwest grain sorghum no-lime use pathways specify that no more than two percent of ethanol would be sourced from fields which require use of lime for corn and sorghum farming. The applicant provided two years of natural gas and electricity invoices covering the months of August 2013 through July 2015. Using average energy consumption values calculated from these invoices and other facility-specific CA-GREET inputs, the applicant calculated the CI of these pathways as shown in Table 2 below.

Proposed Method 2A pathways must be evaluated against reference pathways from the LCFS Lookup table. A Method 2A pathway must be similar to its reference pathway and must achieve at least a five gram CO₂e/MJ CI improvement over the reference pathway.² The reference pathways for the proposed Aemetis Method 2A pathways are ethanol from corn (California; Dry Mill; Wet DGS, NG) pathway (ETHC003) with a CI of 80.70 gCO₂e/MJ and the ethanol from grain sorghum (Midwest; Dry Mill; Wet DGS, NG) pathway (ETHG002) with a CI of 85.81 gCO₂e/MJ. Aemetis pathways improve upon its reference pathways CI by more than the requisite five grams of gCO₂e/MJ.

² In the LCFS regulation, this 5 gCO₂e/MJ threshold is referred to as the “substantiality requirement.”

Table 2. Proposed Lookup Table Entries

Fuel	Pathway Identifier	Pathway Description	Carbon Intensity Values (gCO ₂ e/MJ)		
			Direct Emissions	Land Use and Other Indirect Effects	Total
Ethanol from Corn	ETHC120	2A Application*: California Ethanol; California Corn; Dry Mill; Wet DGS; North American LFG; No Lime	32.76	30	62.76
	ETHC121	2A Application*: California Ethanol; California Corn; Dry Mill; Wet DGS; NG; No Lime	42.42	30	72.42
	ETHC122	2A Application*: California Ethanol; Midwest Corn; Dry Mill; Wet DGS; North American LFG	39.78	30	69.78
Ethanol from Sorghum	ETHG020	2A Application*: California Ethanol; Midwest Grain Sorghum; Dry Mill; Wet DGS; North American LFG; No Lime	38.24	30	68.24
	ETHG021	2A Application*: California Ethanol; Midwest Grain Sorghum; Dry Mill; Wet DGS; NG; No Lime	49.60	30	79.60

*Specific Conditions Apply

Operating Conditions

Operations at the plant will be subject to the following operating conditions designed to ensure that the CI of the corn and grain sorghum ethanol produced at the Aemetis plant will remain at or below the values appearing in table above. These conditions must be met for every gallon ethanol sold in California:

1. No conditions are placed on the amounts of electricity and natural gas consumed and the ethanol yield at the Aemetis plant, so long as the CIs reported in the above table are not exceeded. For purposes of determining compliance with this operating condition, the plant's CI will be calculated based on data from the most recent 12 months of operation, excluding periods of abnormal operations, such as planned maintenance or unpredictable, unavoidable, and uncontrollable force majeure events. The plant's thermal and electrical energy use, and ethanol yield values are classified by the applicant as confidential business information.
2. No more than two percent of the California corn or Midwest grain sorghum used as a feedstock at the Aemetis plant shall be grown on fields on which lime (or other pH-management soil conditioner) has been applied. This condition applies to all gallons produced at the Aemetis plant regardless of where those gallons are sold. California corn grown in the counties in the immediate vicinity of the Aemetis plant can be used to produce ethanol under the ETHC120 and

ETHC121 fuel pathway codes (FPCs), so long as it is grown on soils with pH values equal to or greater than 5.0.

3. As long as above five pathways shown in the Lookup Table CI are not exceeded, FPCs of ETHC120, ETHC121, ETHC122, ETHG020, and ETHG021 may be used to report transactions involving volumes from the Aemetis plant based on 100 percent wet DGS the plant produces.
4. Since the Aemetis plant is currently not utilizing landfill gas as process fuel, the ETHC120, ETHC122, and ETHG020 FPCs are considered as “prospective” pathways. Aemetis must provide an agreement or contract for sourcing adequate quantities of renewable biomethane from landfills ensuring that 100 percent of fossil natural gas is displaced by renewable landfill gas.
5. The commingled feedstock accounting method will be used to determine the CIs of mixed feedstock from California and/or Midwest corn and grain sorghum. Producers and regulated parties should use this approach to calculate the volumes based on weighted average of ethanol associated with each feedstock present in the finished fuel storage tank at any given time. Producers should be able to provide records that unequivocally associate specific quantities of feedstock with specific volumes of fuel produced. As volumes are added to and withdrawn from the tank, the volume of each feedstock-related CI will be adjusted to account for those additions and withdrawals. Commingled feedstock CI accounts for mixed-feedstock corn and grain sorghum must be directly determined over an accounting period of no more than a calendar quarter. That is, all volumes of fuel produced must be associated with a specific feedstock within a calendar quarter. Gallons will be associated with feedstocks based on the accepted yields for each fuel.

Staff Analysis and Recommendations

Staff has reviewed the Aemetis Method 2A application and finds the following:

- Staff has replicated, using the CA-GREET spreadsheet, the carbon intensity value calculated by the applicant;
- Staff has concluded that the plant’s actual thermal and electrical energy consumption are not likely to exceed the thermal and electrical energy consumption levels specified in the Aemetis Method 2A application; and
- Staff has concluded that Aemetis is capable of operating its plant in a manner such that the ethanol yield is equal to or greater than the corresponding value specified in the Aemetis Method 2A application, and that compliance with the operating conditions above can be maintained.

On the basis of these findings, ARB staff recommends that the Aemetis application for the above Method 2A LCFS pathways be certified.