

**Staff Summary**  
**Method 2B Application: Prospective Pathway**  
**Dairy Biogas to CNG**  
**California Bioenergy LLC (“CalBio”) Bakersfield, CA**

**(Pathway Code: CNG056)**

Deemed Complete: December 15, 2015

Posted for Public Comment: December 22, 2015

Certified Date: January 22, 2016

**Pathway summary**

CalBio is proposing to develop the "Kern County Dairy Biogas Cluster" in Bakersfield, California to capture and upgrade biogas into compressed natural gas (CNG) to be used as a transportation fuel. This system will consist initially of a cluster of six covered lagoons (additional dairies will be included in the future as the cluster is fully developed) connected to a central biogas upgrading facility. Raw biogas is produced from dairy manure in covered anaerobic lagoons.

The raw biogas collected from the covered lagoons will either be cleaned up in an upgrading facility where it will be conditioned to biomethane (98-99 percent CH<sub>4</sub>) and compressed prior to injection into a natural gas pipeline, or, alternatively, used on-site as compressed natural gas (CNG) for delivery as vehicle fuel.

CalBio is seeking to register a Dairy Biogas to CNG pathway with this application. The applicant is requesting a pathway carbon intensity (CI) of -276.24 g CO<sub>2</sub>e/MJ for the proposed pathway. The CI value is based on the lifecycle analysis conducted using a modified version of the CA-GREET 1.8b model as described in the CalBio LifeCycle Analysis (LCA) Report.

**Carbon intensity of biogas produced**

Raw biogas is produced from covered lagoons located at dairy operations near a central processing facility. The covered lagoons are not heated and manure handling and disposal require no external energy inputs due to the use of gravity flow. Hence, there are no energy requirements for operating covered lagoons. The clean-up of biogas in a central upgrading unit and additional compression of the biomethane use grid-based electricity.

The analysis conducted by the applicant to estimate the pathway CI was carried out in two parts:

- 1) net methane emissions avoided by the biogas capture system and verified by ARB's Livestock Offset Protocol; and
- 2) emissions from upgrading, transmission and use of the fuel to provide motive power in a CNG engine using CA-GREET1.8b.

The applicant used the November 14, 2014 Compliance Offset Protocol for Livestock Projects<sup>1</sup> to estimate GHG reductions from an existing dairy lagoon project. The net methane emission reductions estimated from the livestock protocol was first transferred to a modified version of the CA-GREET 1.8b model. Emissions from biogas upgrading, transport and compression are modelled using the same model. The average pipeline transportation distance for delivering the raw biogas to the central upgrading facility is assumed to be 10 miles. The biogas upgrading efficiency is based on the applicant's estimate. The compression efficiency and CNG transportation via pipeline to refueling stations are based on the CA-GREET1.8b model default values.

As shown in the table below, the applicant has calculated the CI of the Dairy Biogas to CNG pathway to be -276.24 gCO<sub>2</sub>e/MJ.

**Proposed Lookup Table**

Fuel	Pathway Identifier	Pathway Description	Carbon Intensity Values (g CO <sub>2</sub> e./MJ)		
			Direct Emissions	Land Use or other Indirect Effects	Total
Compressed Natural Gas	CNG056	2B Application-Dairy Biogas to CNG* (accounting for avoided methane)	-276.24	0.00	-276.24

\*Specific Conditions Apply.

**Operating Conditions**

Due to limited data provided by the applicant for biogas upgrading and compression, staff used the CA-GREET 1.8b default inputs and values where necessary to estimate a pathway CI for this proposed application. The pathway CI is therefore being designated as prospective. The applicant shall not use this prospective CI for purposes of claiming credits under the Low Carbon Fuel Standard (LCFS) program. Upon commencement of commercial production, the applicant will submit one quarter of operational data and request ARB to certify a provisional CI. Upon approval, the applicant may request generation of LCFS credits with this CI only for biomethane dispensed and used as a transportation fuel.

1. The applicant must use ARB's Compliance Offset Protocol for Livestock Projects (adopted November 14, 2014) to quantify the avoided methane for each of the anaerobic lagoon projects proposed to be developed for the Kern County Dairy Biogas Cluster. Under this requirement, the following steps apply:
  - Project must be issued Registry Offset Credits following the requirements of the protocol and ARB's Cap-and-Trade Regulation;

<sup>1</sup> <http://www.arb.ca.gov/regact/2014/capandtrade14/ctlivestockprotocol.pdf>

- Projects must retire Registry Offset Credits (ROCs) and then apply for conversion of these credits into LCFS credits rather than ARB Offset Credits;
- Any quantity of fuel receiving LCFS credits using this pathway shall not be used to claim credits under California's Cap-and-Trade Program or any other carbon market.

In addition to the above, downstream of the avoided methane, CalBio shall commit to complying with all the requirements detailed below:

2. CalBio shall provide quarterly data for two years to demonstrate the quantity of CNG produced from dairy biogas including methane emissions from covered lagoons, effluent ponds and venting, and total methane captured.
3. CalBio shall provide quarterly receipts for two years to demonstrate the electric power/natural gas consumed at the central upgrading unit and total compression energy at the facility.
4. The avoided methane credits estimated for this pathway may be changed in the future due to new regulatory requirements for methane destruction from anaerobic lagoons.
5. Any additional information related to the fuel's lifecycle or production volumes must be made available if requested by ARB.
6. The magnitude of the credit for avoided methane from diversion of manure from anaerobic lagoon management is limited to existing permitted head of cattle at all supplying animal facilities in 2015.

### **Staff Analysis and Recommendation**

ARB staff has reviewed the CalBio application and has replicated, using the modified version of the CA-GREET 1.8b model, the CI value calculated by the applicant. Since this CI is based on limited operational data, staff recommends approval of the CI for this application on a prospective basis.

Fuels with prospective CIs are not eligible to claim credits under the LCFS. To claim credits, the applicant must provide one quarter of operational data once commercial production has commenced. ARB will then complete an updated lifecycle analysis and make necessary adjustments to the originally certified prospective CI if warranted and certify a provisional CI for the pathway. Only the updated provisional CI can be used to generate LCFS credits. The CI may be subject to revision by the Executive Officer until two-year data requirement under the LCFS program is satisfied. To confirm compliance with updated operating conditions, the Executive Officer may reevaluate any aspect of the review at any time and revise the certification to reflect new information. At any time after certification, the Executive Officer may increase the CI values upon determination that the provisional CIs underestimate fuel life carbon intensity. (Cal. Code Regs. tit. 17, § 95486, subd. (e)(3)(K) (original LCFS); Cal. Code Regs. tit. 17, § 95488, subd. (c)(5)(L) (from January 1, 2016).)