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Fuel Pathway Code:	CNGDD201

Staff Summary
Tier 2 Method 2B Pathway
AMP Americas LLC, Fair Oaks, IN
Livestock Manure Biogas to Bio-CNG

## Pathway Summary

Renewable Dairy Fuels (RDF), an AMP Americas LLC Project (AmpCNG), is producing biomethane from an animal manure anaerobic digester (AD) facility operated by Fair Oaks Dairy Farm, LLC in Fair Oaks, Indiana that is co-located with a dairy farm. The project is a registered, active compliance offset project in ARB's Cap-and-Trade program (Project Name: Fair Oaks Dairy Farm LLC GHD-Designed Digester (CAL5120); Offset Project Operator: Fair Oaks Dairy Farm, LLC; Authorized Project Designee: Camco Offsets I, LLC) and was issued ARB compliance offset credits in 2016 and 2017.

The raw biogas is collected from the digester and is cleaned up in an upgrading facility where it is conditioned to renewable natural gas (RNG) with about 98 percent methane. A portion of RNG is consumed locally as bio-CNG and the remaining amount is injected into an interstate natural gas pipeline for its delivery into California.

AMP Americas LLC is seeking to register a provisional manure biogas to bio-CNG pathway with this application based on 12 months of operational data. The applicant is requesting a carbon intensity (CI) of -254.94 gCO<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 2.0 Tier 2 model as described in the Life Cycle Analysis (LCA) Report. This modified version of CA-GREET 2.0 has been determined to be at least equivalent to the Board-approved CA-GREET 2.0 model by delegated EO approval pursuant to section 95488 (c)(4)(I) of the LCFS regulation.

## Carbon Intensity of Manure to Bio-CNG Pathway

The applicant provided 12 months of operational data, including the third-party verified project monitoring parameters required under ARB's Compliance Offset Protocol Livestock Projects<sup>1</sup> ("Livestock Protocol"), as well as the mass and energy balance data and supporting documentation for the gas upgrading facility over the coincident time period (September 2015 – August 2016).

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

- 1) The applicant used the methodology of the Board-approved Livestock Protocol to quantify and verify the modeled avoided methane (baseline) emissions, and actual methane (project) emissions from operations including the manure and effluent handling, storage and treatment, digester operation, the biogas capture system and associated destruction devices; and

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<sup>1</sup> ARB (2014). The Compliance Offset Protocol Livestock Projects (adopted November 14, 2014). Available at: <https://www.arb.ca.gov/cc/capandtrade/protocols/livestock/livestock.htm>

- 2) The methane emission results from part one were then transferred as inputs to a version of the CA-GREET 2.0 Tier 2 model that has been modified to utilize results from the Livestock Protocol's quantification methodology to determine net methane emissions attributable to the vehicle fuel portion of product gas. Net methane emissions attributable to the vehicle fuel were determined using the allocation method suggested by ARB staff in the discussion paper posted in conjunction with the April 17, 2017 public working meeting on Fossil and Renewable Natural Gas.<sup>2</sup> Emissions from biogas upgrading, pipeline transmission, compression to CNG, and end use of the fuel to provide motive power in a CNG engine were determined from the operational data reported by the applicant using the modified version of the CA-GREET 2.0 model.

The following table lists the proposed CI for this pathway.

### Proposed Pathway CI

Fuel	Pathway FPC	Pathway Description	Carbon Intensity (gCO <sub>2</sub> e/MJ)		
			Direct Emissions	Indirect Land Use	Total
Compressed Natural Gas (CNG) from Livestock Manure	CNGDD201	Tier 2 Method 2B Pathway; Dairy Biogas from manure digester in Fair Oaks, Indiana converted to Bio-CNG in California (accounting for avoided methane per ARB Livestock Offset Protocol)	-254.94	0.00	-254.94

### Operating Conditions

The pathway CI is designated as provisional. The certified CI value in the above table may be used to report and generate credits for fuel quantities that are produced at the facility in the manner described in the applicant's LCA report, and dispensed for transportation use in California, subject to the following requirements and conditions:

1. The applicant shall continue to provide, on a quarterly basis, monthly data associated with biogas upgrading operations, including total methane captured, flared, sent to upgrading, energy use in the upgrading process, product gas, and RNG sales until ARB has received operational data and supporting documentation covering a full two years of commercial operation.
2. The applicant must continue to meet the requirements of the Livestock Protocol, including:

<sup>2</sup> ARB (2017). Staff Discussion Paper for Renewable Natural Gas from Dairy and Livestock Manure, April 13, 2017. [https://www.arb.ca.gov/fuels/lcfs/lcfs\\_meetings/041717discussionpaper\\_ng.pdf](https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/041717discussionpaper_ng.pdf)

- The project must obtain verification services by an ARB-accredited verification body on an annual basis, and submit to the LCFS via the Alternative Fuels Portal: the verified Offset Project Data Report, Offset Verification Report, Offset Verification Statement, and all project monitoring parameters recorded and calculations performed pursuant to the quantification methodology required in Chapter 5 of the Livestock Protocol.
  - The project must be issued Registry Offset Credits following the requirements of the Livestock Protocol.
  - LCFS staff will evaluate the annual submittal and notify the applicant of the portion of Registry Offset Credits (ROC) corresponding to the LCFS credits that must be retired.
3. The project must notify the participating registry of its intent to claim LCFS credits for methane reductions beginning in the first quarter 2017.
  4. The quantity of fuel reported for LCFS credit generation using this pathway in each quarterly LCFS reporting period shall not be used to earn credits under any other state or federal program, with the sole exception of the federal Renewable Fuel Standard program. The LCFS places no restriction on credits that may be generated by methane reductions achieved by the project that are not credited by the LCFS (e.g., reductions from destruction of biogas by flaring or electricity generation).
  5. The quantity of RNG reported using this pathway in any period shall not exceed the quantity of methane that was produced from the dairy cattle manure managed in the digester system during the reporting period.

### **Staff Analysis and Recommendation**

Staff has reviewed the AMP Americas LLC application and has replicated, using the modified version of the CA-GREET 2.0 Tier 2 model, the CI value calculated by the applicant. Since this CI is based on one year of operational data, staff recommends approval of the CI for this application on a provisional basis.

The CI may be subject to revision by the Executive Officer. To confirm compliance with 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, § 95488, subd. (c)(5)(L) (from January 1, 2016).