Application No. B0010

Staff Summary

Element Markets Renewable Energy, LLC
Valley View Farms
Greencastle, Missouri
Swine Manure Biomethane

Deemed Complete: 11/01/2019
Posted for Comment: 12/27/2019
Certified and Posted: 1/31/2020
CI Effective: 10/1/2019
Fuel Pathway Code(s): See below

Pathway Summary

Element Markets Renewable Energy (EMRE) seeks certification of three Tier 2 pathways for biomethane (Bio-CNG, Bio-LNG, and Bio-L-CNG) from anaerobic digestion of swine manure produced by Valley View Farms located in Greencastle, Missouri. Smithfield owns and operates the swine farm. Roeslein Alternative Energy, LLC and Smithfield, through Roeslein Alternative Energy of Missouri, LLC, jointly own and operate the biogas collection and processing equipment at the site and own the resulting biomethane. EMRE purchases and markets the pipeline-injected biomethane and imports it to California for dispensing as CNG or LNG transportation fuel using book-and-claim accounting for biomethane (RNG),[1] through its contracted California dispensers.

Valley View Farms has an average swine population in the range of 40,000 to 50,000. The swine manure is digested in covered lagoons and the biogas control system captures methane that would otherwise be emitted to the atmosphere under baseline manure treatment in anaerobic lagoons. Biogas is supplied to the gas upgrading facility. Prior to building covered lagoons there were 14 uncovered lagoons (baseline) and all were converted to covered lagoons. However, only six of the covered lagoons are connected to the upgrading facility and are included in the analysis.

There is no solid-liquid separation before or after the lagoons. The digested manure from the covered lagoons goes to the anaerobic effluent pond (equalization basin) followed by the aerobic treatment basin and land application.

Any biogas that is not sent to the upgrading facility is either recirculated back to the covered lagoons or flared in the thermal oxidizer (TOX) unit, which also burns the tail

[1] All citations to the LCFS Regulation are found in Title 17, California Code of Regulations (CCR), section 95480-95503. Book-and-claim accounting is primarily addressed in section 95488.8(i) of the LCFS Regulation.

gas from the upgrading facility. Natural gas and grid electricity are used for biogas upgrading and compression. The upgrading facility produces pipeline-quality RNG.

RNG is compressed and transported by tube trailer truck to the pipeline injection site located at Ruckman Farms. EMRE meters the fuel at production, loading, and offloading, and maintains a detailed trucking manifest to demonstrate chain of custody of biomethane quantities transported by truck. RNG is offloaded at Ruckman Farms and injected into the common carrier natural gas pipeline. Beginning July 2019, the project also started to inject a portion of RNG into the Milan City pipeline system via a 13-mile lateral pipeline (without trucking). The calculated CI represents RNG transported by truck and injected at Ruckman Farms; RNG that is injected onsite at Valley View Farms would have a lower CI and qualifies for reporting under the same pathway. Pipeline-injected RNG is delivered to CNG stations in the Los Angeles area, or to Applied Natural Gas Fuels, Inc. LNG facility in Topock, Arizona and transported to CNG/LNG stations in California by truck.

Carbon Intensities of Swine Manure to RNG Pathways

The carbon intensity (CI) values are based on life cycle analysis conducted by modifying the board-approved Tier 1 Simplified CI Calculator for Biomethane from Anaerobic Digestion of Dairy and Swine Manure[2] as described in the applicant's Life Cycle Analysis (LCA) Report. The modified calculator has been determined to be equivalent or superior to CA-GREET3.0 as per section 95488.3(a).

The applicant provided 12 months of operational and production data, including mass and energy balance data and supporting documentation for the covered lagoons, upgrading facility, RNG transport, and pipeline injection. In addition, the applicant provided 24 months of operational data for LNG production. The applicant provided three months of biomethane trucking manifest system control records to demonstrate conformance with chain-of-custody requirements.

The applicant has supplied metered data to enable a mass balance approach to quantify methane flows and emissions, including the amount and methane concentration of biogas (1) captured, measured at the inlet to the upgrading facility, (2) flared, (3) recirculated to lagoons, and (4) the product RNG that is pipeline injected. Any methane that cannot be accounted for between the inlet and product gas is assumed to be vented to the atmosphere and is assigned the emissions of fugitive methane. The calculator is modified to account for fugitive emissions in excess of the default (2%) as determined by energy balance at the upgrading facility.

The project captures less methane than the modeled baseline methane emissions. For this reason, the calculator is modified to set baseline methane emissions equal to the produced methane quantity (in metric tons). There is no methane production during winter months even though manure is continually sent to the covered lagoons; therefore, the production facility is not in operation December to April and any biogas

[2] The Tier 1 Simplified CI Calculator for Biomethane from Anaerobic Digestion of Dairy and Swine Manure (August 13, 2018), incorporated by reference in the LCFS Regulation, section 95488.3(b).

generated is flared. The accumulated manure starts to generate methane once the lagoons start to thaw during the spring season.

GHG emissions for transporting RNG by truck to the injection point at Ruckman Farms were calculated and added to the CI score. The truck transport emissions include the following: vented methane during tube trailer loading and offloading, diesel use for transport, energy use in compression, and fugitive methane from compression. The diesel fuel emissions were determined based on the round-trip miles traveled, the tube trailer capacity per trip, and default fuel economy for heavy duty truck and the diesel emission factor provided in CA-GREET3.0. Methane vented during loading and offloading is a conservative default value of 0.028%. Fugitive methane from compression is based on a conservative value of 0.32% which was estimated using the maximum methane leakage rate reported by Clark et al. (2016).[3] Energy use for compression was included in the facility utility invoices.

Valley View and two other digester projects share the pipeline injection point located at Ruckman Farms and injected quantities from each source are separately metered prior to the utility financial revenue meter.

The following table lists the proposed CI for this pathway.

Proposed Pathway CI

Fuel	Pathway FPC	Pathway Description	Carbon Intensity (gCO2e/MJ)
Compressed Natural Gas (CNG) from Swine Manure	CNG044B 00100100	Renewable Natural Gas (RNG) sourced from Swine Manure of Valley View Farms, Greencastle, Missouri; transported by truck to pipeline injection point; delivered via pipeline to Los Angeles, California	-345.68
Liquefied Natural Gas (LNG) from Swine Manure	LNG044B 00100200	Renewable Natural Gas (RNG) sourced from Swine Manure of Valley View Farms, Greencastle, Missouri; transported by truck to pipeline injection point; delivered via pipeline to liquefaction facility in Topock, Arizona; delivered by truck to California	-334.41
Liquefied Compressed Natural Gas (LCN) from Swine Manure	LCN044B 00100300	Renewable Natural Gas (RNG) sourced from Swine Manure of Valley View Farms, Greencastle, Missouri; transported by truck to pipeline injection point; delivered via pipeline to liquefaction facility in Topock, Arizona; delivered by truck to and re-gasified in California	-330.87

Operating Conditions

The certified CI values 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

[3] Clark, Nigel N., et al. "Pump-to-wheels methane emissions from the heavy-duty transportation sector." *Environmental science & technology* 51.2 (2016): 968-976.

LCA report, and dispensed for transportation use in California, subject to the following requirements and conditions:

1. Fuel pathway holders are subject to the requirements of the California Air Resources Board's (CARB) Low Carbon Fuel Standard (LCFS) regulation, which appears at sections 95480 to 95503 of title 17, California Code of Regulations. Requirements include ongoing monitoring, reporting, recordkeeping, and third-party verification of operational CI and a controlled process for providing product transfer documents or other similar records to counterparties or CARB.

2. The fuel pathway holder must maintain a manifest system for each load transported, recording information and events as they occur. The manifest system includes information on consecutive numerical tracking numbers on the manifest forms for each loading and offloading event and information about tube trailer truck (capacity, compression pressure, and truck model). The upgrading facility operator and fuel pathway holder must retain the completed manifest forms for 10 years. Beginning January 2020, the Bill of Lading (BOL) records must include signatures of the upgrading facility operator, truck operator, and offloading facility operator.

3. Metered quantities of biomethane loaded and offloaded from CNG tube trailers are established through automatic data archival in the SCADA system, and subsequently copied onto the bills of laden (BOLs). The metered quantity that is eligible for reporting transactions under this pathway is referred to as the Conservative Monthly Offloading Quantity and must be equal to the lesser of the two metered quantities, loaded and offloaded, on a monthly basis. The Conservative Monthly Offloading Quantity is subject to two additional constraints described below:

    a. Due to human error in the BOL creation and signing process, discrepancies between the Monthly BOL Quantities and Monthly SCADA Quantities are expected to occur. A margin of error threshold of 5% discrepancy between these quantities is established to determine eligible quantities for reporting:

        Beginning January 2020, if the discrepancy between the monthly loading BOL quantity and monthly loading SCADA quantity is equal to or lower than the 5% margin of error, then the monthly loading quantity must equal the monthly SCADA loading quantity. If the discrepancy between the monthly loading BOL quantity and monthly loading SCADA quantity is higher than the 5% margin of error, then the monthly loading quantity must be the lower of the monthly BOL loading quantity and monthly SCADA loading quantity.

        Likewise, beginning January 2020 if the discrepancy between the monthly offloading BOL quantity and monthly offloading SCADA quantity is equal to or lower than the 5% margin of error, then the monthly offloading quantity must equal the monthly SCADA offloading quantity. If the discrepancy between the monthly offloading BOL quantity and monthly

offloading SCADA quantity is higher than the 5% margin of error, then monthly offloading quantity must be the lower of the monthly BOL offloading quantity and monthly SCADA offloading quantity.

b. If the ANR pipeline injection statement quantity is less than the sum of Ruckman Monthly Metered Production and the conservative monthly offloading quantities from Valley View Farms and Locust Ridge Farms, each of the three facility's biomethane quantities must be adjusted on a pro-rata basis so that the aggregate Final Monthly Quantity equals the ANR pipeline injection statement.

c. If the ANR pipeline injection statement quantity is greater than the sum of Ruckman Monthly Metered Production and the conservative monthly offloading quantities from Valley View Farms and Locust Ridge Farms, the biomethane quantity attributable to Valley View and Locust Ridge is limited to the conservative monthly offloading quantity.

4. The fuel pathway holder must maintain records of venting events that occur during RNG delivery by truck and report estimated venting quantities and the estimation method used in its Annual Fuel Pathway Report submitted to CARB for third-party verification of the operational CI.

5. CARB has reviewed the contractual agreements between the pathway holder, upgrader, marketer, and natural gas fuel dispensing entities. To confirm compliance with Annual Fuel Pathway Report requirements, the pathway holder shall notify CARB of any change in existing contracts that were submitted to CARB with the fuel pathway application, including any new contracts and termination of existing contracts, with any entity engaged in the transfer, purchase, or sale of biomethane and its environmental attributes. Failure to notify CARB of such a change could result in enforcement action and could invalidate this fuel pathway.

6. The biomethane and its environmental attributes claimed under this pathway shall not be claimed by any entity for any other purpose, nor under any other program notwithstanding the exceptions listed in LCFS Regulation section 95488.8(i)(1)(B)(3). The LCFS places no restriction on the use of any voluntary emission reduction credits generated by the project for emissions that are demonstrated to be additional to reductions claimed under the LCFS.

7. The fuel pathway holder must include the assumptions and calculations used to establish the fraction of solids input to each manure management system in its Annual Fuel Pathway Report submitted to CARB for third-party verification of the operational CI.

8. Any quantity of biomethane metered at inlet to the upgrading facility that cannot be demonstrated by meter records to have been pipeline injected or destroyed, must be calculated by energy balance and accounted for in the CI as a fugitive methane emission if the calculated value exceeds the default 2% fugitive emission.

Staff Analysis and Recommendation

Staff has reviewed the EMRE application and has replicated, using the Tier 2 modified version of the Simplified CI Calculator for Biomethane from Anaerobic Digestion of Dairy and Swine Manure, the CI values calculated by the applicant. On the basis of this finding, CARB staff recommends that the EMRE application for LCFS Tier 2 pathways stated in above table be certified on a provisional basis after all the comments received during the 10-day comment period are addressed satisfactorily by the applicant.