CALIFORNIA AIR RESOURCES BOARD

Low Carbon Fuel Standard
Tier 2 Pathway Application

Application No. B0698 Updated: 3/28/2025 (See Underlined Text)

Staff Summary

WOF SW GGP 1 LLC
Green Gas Partners Stanfield, Stanfield, Arizona
Compressed Natural Gas (CNG) from Dairy Manure

Intermediate Facility:
Shamrock Farms Dairy (F00318), Stanfield, Arizona
T&K Red River Dairy (F00316), Maricopa, Arizona
Zinke Dairy, Inc (F00317), Stanfield, Arizona
Dickman & Sons Dairy LLC (F00612), Coolidge, Arizona
D&I Holstein, LLC (F00613), Stanfield, Arizona
Feenstra Friesians (F00614), Stanfield, Arizona
Arizona Dairy Co. LLP (F00615), Gila Bend, Arizona

Joint Applicant: Clean Energy

Deemed Complete Date: 11/13/2024
Posted for Comment Date: 3/10/2025
Carbon Intensity (CI) Certified Date: 3/28/2025
CI Start Date: 10/1/2024

Pathway Summary

WOF SW GGP 1 LLC (WOF) seeks provisional certification of a Tier 2 pathway for biomethane (Bio-CNG) [1] production at Green Gas Partners Stanfield (GGP RNG) in Stanfield, Arizona. Biogas is produced from anaerobic digestion of dairy manure sourced from seven farms: Shamrock Farms Dairy (Shamrock), Zinke Dairy, Inc. (Zinke), D&I Holstein, LLC (D&I), Feenstra Friesians (Feenstra) in Stanfield, Arizona, T&K Red River Dairy (T&K) in Maricopa, Arizona, Dickman & Sons Dairy LLC (Dickman & Sons) in Coolidge, Arizona, and Arizona Dairy Co. LLP (AZDC) in Gila Bend, Arizona. Biogas is purified and upgraded to biomethane to meet common carrier pipeline specifications, injected into Kinder Morgan pipeline co-located with upgrading facility, and ultimately dispensed for transportation use in CNG vehicles in California using book-and-claim accounting. [2]

[1] "Bio-CNG" means biomethane which has been compressed to CNG. Also referred to herein as biomethane or renewable natural gas (RNG).
[2] All citations to the LCFS Regulation are found in Title 17, California Code of Regulations (CCR), section 95480-95503. Book-and-claim accounting for biomethane is primarily addressed in section 95488.8(i) of the LCFS Regulation.

WOF owns the environmental attributes associated with the biomethane and sells these attributes using book-and-claim accounting through its contracted California transportation fuel dispensers. The GGP RNG facility participates in the federal Renewable Fuel Standard and has never participated in the California Cap-and-Trade Offset Program.

The GGP RNG facility commenced digester and upgrading operations in December 2018 and began injecting RNG into the pipeline in May 2019. The table below summarizes the information of participating farms including years farms were founded, years the lagoons were constructed, years farms started sending manure to the digesters, approximate livestock population (i.e., dairy cows, non-milking dairy cows, heifers, and calves), and the distances from the dairy farms to the digesters' location.

Farm Name	Year Founded	Year Anaerobic Lagoons Built	Year Manure Sent to Digester	Approximate Livestock Population	Driving Distance between Farm and Upgrading Facility (miles)
Shamrock	2003	2003	2018	18,500	1.1
T&K	1997	1997	2018	16,200	Co-located
Zinke	2016	2016	2020	5,900	2.5
Dickman & Sons	1950	2005	2022	3,400	33
D & I	2000	2001	2022	3,300	2.7
Feenstra	2001	2002	2022	2,500	3.0
AZDC	1973	2010	2023	4,800	56

Shamrock, T&K and Zinke farms were included in a previously certified LCFS Tier 2 pathway[3] which will be retired and replaced by this application. Under the baseline conditions, Shamrock, T&K, and Zinke farms collected their manure via flush systems. At Shamrock, manure was flushed to a sand vault to remove sand, passed over the stationary slope screen separators, and then sent to an anaerobic storage lagoon. The solids removed were modeled as solid storage. At T&K, manure was flushed from the barns to lagoons, with no mechanical solid separation. At Zinke, manure was flushed into a central reception pit and pumped to weeping cells where solids were retained, and the liquids drained to the lagoon. In all cases, manure deposited in dry lots was left to dry in the sun before being scraped and hauled to fields. Under the

[3] Application No. B0308.

project conditions, manure is directly collected from Shamrock, T&K and Zinke dairy farms and sent to the digester. The stationary screen separator and weeping wall were removed at Shamrock and Zinke, respectively. Manure is either collected via the flush system and sent directly to the digester through a pipeline or vacuumed to a pit and then pumped to the digesters. No other modifications were made at Shamrock, T&K and Zinke dairy farms, with solids removal continuing to be used for long-term storage and manure deposited in open lots left for aerobic breakdown. The enclosed vessel digesters capture methane that would otherwise be emitted to the atmosphere under baseline manure treatment in the anaerobic lagoons.

Manure is transported to the digesters using CNG-powered trucks from the four remote farms: Dickman & Sons, D&I, Feenstra, and AZDC. Under the baseline condition, manure was collected via a flush system to a collection pit at these farms. The manure in the pit was passed over slope screen separators and then sent to the anaerobic lagoons. Solids were stored in piles for bedding use, and any uncollected manure remained in the dry lots. For D&I and Feenstra, some manure was scraped into the dry lots. Under the project condition, the manure collected at the four remote farms is similar to the baseline condition. Manure from all barns, except for the milking parlors, is collected using a vacuum wagon, while manure from the milking parlors continues to be flushed and separated over the slope screen as in the baseline. Collected manure is loaded into CNG trucks and delivered to the digesters. The enclosed vessel digesters capture methane that would otherwise be emitted to the atmosphere under baseline manure treatment in the anaerobic lagoons.

The lagoon systems at all seven dairy farms have never performed complete cleanouts; therefore, no lagoon cleanout is modeled.

This project consists of seven digesters located at a centralized location, five of which process only dairy manure as the feedstock and two of which process non-manure feedstock. The volume of raw biogas production is measured for all digesters, and upgraded biomethane is allocated proportionally to the manure feedstock. The fraction of upgraded biomethane attributed to the non-manure feedstock cannot be reported using this fuel pathway.

Flushed manure received in sand lanes is pumped to the drum screens to separate solids and liquid prior to entering the digester mix pit. Manure from vacuum and tanker trucks received in sand lanes is pumped directly to the digester mix pit. The raw biogas from all digesters is sent to the same co-located upgrading facility. Digestate is sent to the fiber separation area, accumulated in a reception pit, and then pumped to six screw presses arranged in parallel. Solids removed are trucked for use as bedding or soil amendment. Effluent water from the screw presses is sent to an effluent pit and returned lagoons on the dairies.

At the GGP upgrading facility, the raw biogas enters the amine skid to remove carbon dioxide and hydrogen sulfide (H_2S) and then flows to a H_2S polisher. The product gas from the H_2S polisher is then compressed and dehydrated. The upgraded

biomethane is then directly injected into Kinder Morgan common carrier pipeline adjacent to the upgrading facility. The injected RNG is delivered to CNG vehicle fueling stations in California using indirect ("book-and-claim") accounting.

Carbon Intensity of Fuel Type Pathways

The CI is determined from life cycle analysis conducted using a modified version of the Board-approved Tier 1 Simplified CI Calculator for Biomethane from Anaerobic Digestion of Dairy and Swine Manure.[4] The calculator was modified to explain calculation changes, specifically new process units/life cycle stages or inputs. The modified calculator has been determined to be equivalent to CA-GREET3.0 pursuant to section 95488.7(a)(1) of the LCFS regulation. The applicant has provided operational data and supporting documentation for the listed life cycle stages, including unit operations and transport of feedstock and/or fuel (e.g., digester, gas cleanup, and pipeline injection of biomethane), for a period of 3 months, from March 2024 to May 2024. The following table lists the proposed CI for this pathway.

Proposed Pathway CI				
Pathway Number	**Fuel & Feedstock**	**Pathway FPC**	**Pathway Description**	**Carbon Intensity (gCO2e/MJ)**
B069801	CNG from Dairy Manure	CNG026B06980100	Biogas from dairy manure at Shamrock Farms Dairy, Zinke Dairy, Inc., D&I Holstein, LLC, Feenstra Friesians in Stanfield, AZ, T&K Red River Dairy in Maricopa, AZ, Dickman & Sons Dairy LLC in Coolidge, AZ, and Arizona Dairy Co. LLP in Gila Bend, AZ; upgraded to pipeline quality at Green Gas Partners Stanfield; pipelined to CA for transportation use	-367.79

[4] 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).

Operating Conditions

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 Life Cycle Analysis (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. CARB has reviewed the contractual agreements between the pathway holder/biogas upgrader, and marketer(s). All unredacted contract agreements relevant to this biomethane fuel pathway were submitted to CARB as part of the application, pursuant to section 95488.8(i)(2)(B). 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.

   Fuel pathway holders must update the list of Bio-CNG dispensing entities and any biomethane end users at the time of Annual Fuel Pathway Report submission. Contractual agreements from the fuel dispensing entities do not need to be submitted in the original fuel pathway application or the Annual Fuel Pathway Reports; instead, they must be verified as part of the annual verification of the Quarterly Fuel Transactions Reports.

3. 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)(2). The LCFS places no restriction on the use of any emission reduction credits generated by the project for emission reductions that are demonstrated to be additional to reductions claimed under the LCFS.

4. 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.

5. Any quantity of biomethane metered at the 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.

6. Each dairy/swine farm supplying manure to a digester will be subject to third-party verification to support the fraction of volatile solids inputs to the modified Simplified CI Calculator for Biomethane from Anaerobic Digestion of Dairy and Swine Manure for baseline and project modeling (Manure-to-Biogas (LOP Inputs) tab). CARB must be immediately notified through the AFP of any changes to dairy/swine manure suppliers and sources (e.g., additional suppliers or manure from different types of livestock) are made from the certified pathway. Modifications to the dairy/swine manure suppliers and sources may require submission of a new pathway for review, validation, and certification. Failure to notify CARB of such a change may result in the invalidation of the fuel pathway, invalidation of associated LCFS credits, and enforcement action.

7. The fuel pathway applicant/holder must attest to the quantity (or fraction) of the transferred manure, and whether or not any origin points of the transferred manure (all satellite farms) supply manure to any destination other than this project's anaerobic digester site. The fuel pathway holder must implement a recordkeeping system to document the manure transfer activity. Records may be bills of lading or a daily log and must include the following information:

    a. Description of the material transported (e.g., liquid dairy manure after solid removal by stationary screen)
    b. Name, physical address, and contact information of the location(s) where manure is sourced
    c. Name, physical address, and contact information of the location where manure is deposited (e.g., digester site)
    d. Quantity of manure delivered, including units, vehicle capacity, number of trips from each farm, if applicable
    e. Transaction date
    f. Any temporary or uncommon practices (e.g., major spillage, equipment swap due to maintenance)

8. CNG usage for trucking of manure must be reported in field 2.13 of the Tier 1 Simplified CI Calculator for Biomethane from Anaerobic Digestion of Dairy and Swine Manure and is subject to third-party verification. The methodology to assess CNG usage must include disclosure of make, model, and capacity of equipment used to load, transport, and offload the manure. The same methodology must be included in the fuel pathway holder's monitoring plan.

9. The fuel pathway holder must report total upgrading facility energy use and biogas flow, and the calculations used to allocate these parameters to each

digester pathway based on its monthly share of total biogas measured at inlet to upgrading, in its Annual Fuel Pathway Report submitted to CARB and subject to third-party verification of the operational CI.

10. Biogas produced from other non-manure feedstock not included in this pathway and supplying biogas to the upgrading facility, cannot be attributed to this fuel pathway and will require a separate pathway certification to generate credits in the LCFS program. The fuel pathway holder must report total upgrading facility energy use and biogas flow, and the calculations used to allocate these parameters to each digester pathway based on its monthly share of total biogas measured at inlet to upgrading, in its Annual Fuel Pathway Report submitted to CARB and subject to third-party verification of the operational CI.

11. Biogas produced from additional manure supplied from other sources not listed in this application cannot be attributed to this fuel pathway and will require a separate pathway certification to generate credits in the LCFS program. To allocate biogas between manure sourced from pathway manure sources and new manure sources, CARB approves the following allocation methodology for entering site-specific input values in Fields 2.4, 2.6, 2.8-2.21, and 2.23-2.26 in the DSM Calculator 'Biogas-to-RNG':

$$Allocated\ Input = \left(\frac{Livestock\ Population\ of\ Fuel\ Pathway\ Manure\ Sources}{Livestock\ Population\ for\ All\ Manure\ Sources}\right) \times (Unallocated\ Input\ Value)$$

All allocation calculations must be provided in a supplemental worksheet of the calculator that shows the livestock population associated with each additional manure source. Livestock population data in this supplemental calculator will be subject to annual verification and should be added to the site-specific inputs list for this pathway.

Staff Analysis and Recommendation

Staff has reviewed the application and has replicated, using the Tier 1 modified version of the Simplified CI Calculator, the CI values calculated by the applicant. Trinity Consultants, Inc. (H3-20-146) submitted a Positive validation statement. Staff recommends this application be certified on a provisional basis after all the comments received during the 10-day comment period are addressed satisfactorily by the applicant. The certification is subject to the operating conditions set forth in this document.

Comments and Certification

CARB has reviewed the applicant's response to comments received during the 10-day comment period, determined that these adequately address factual and methodological errors, and certified the pathway.