

**Staff Summary
Method 2B Application**

**Clean Energy and CERF Shelby, LLC
North Shelby Landfill Gas (Millington, Tennessee) to Liquefied Natural Gas,
and Liquefied-Compressed Natural Gas Delivered in California
(Pathway Codes: CNG035 and LNG028)**

Deemed Complete Date: May 11, 2015
Posted for Comments Date: May 28, 2015
Certified Date: June 8, 2015

Pathway Summary

Clean Energy has applied for two prospective landfill-gas-to-biomethane fuel pathways for biomethane originating from North Shelby Landfill, Millington, Tennessee operated by CERF Shelby LLC (CERF). One pathway covers the liquefaction of the resulting biomethane at Clean Energy's Boron, California liquefaction facility and the dispensing of the fuel as liquefied natural gas (LNG); the other pathway covers the compression of the LNG into compressed natural gas (L-CNG). Unlike the other Clean Energy LFG-to-biomethane pathways, the applicant didn't apply the biomethane to CNG for the reason of providing flexible allocation between LNG production and CNG stations. All fueling stations covered by these pathways are located in California. The maximum capacity of the plant is 2,800 standard cubic feet per minute LFG. The proposed pathway CIs are subject to verification against operational data covering two years of commercial production. The CERF Shelby plant commenced full operations on September 2014 and is required under the terms of this certification to submit operational data at intervals of no greater than six months until staff is in possession of data covering a full two years of operation.

The CERF Shelby processing facility is powered by grid electricity, fossil natural gas, and landfill gas. The landfill gas is used as feed in the compressor and thermal oxidizer (consumes waste stream). The thermal oxidizer (TOX) is used to destroy the VOCs in the tail gas while the flare is used to destroy the CH₄ in any unprocessed landfill gas. The imported natural gas is used for the pilot of the TOX. A small volume of propane (0.2 percent molar concentration) is added to the product gas for additional heating value requirements.

The CERF Shelby pathways utilize the CA-GREET1.8b default values for landfill gas recovery and processing. Flare and thermal oxidizer emissions were based on the model defaults for a natural gas turbine. These emissions are more representative of operations at the CERF Shelby plant than are the emission factors for a compressor powered by a natural gas engine.

The biomethane Clean Energy purchases from the CERF Shelby LFG processing plant is injected into the interstate pipeline system for conveyance to

Clean Energy’s LNG plant in Boron, California. The pipeline transport distance is 1,925 miles. As such, Clean Energy will be obligated to retain records that unequivocally demonstrate that the credits it earns under the pathways described in this summary correspond directly with the volumes of biomethane it purchases from the North Shelby Landfill in Millington, Tennessee.

Carbon Intensity of the LNG and L-CNG Produced

As shown in the table below, the applicant has calculated the CIs of its LNG and L-CNG pathways to be 43.83 and 45.95 gCO₂e/MJ, respectively.

Proposed Lookup Table Entries

Fuel	Pathway Identifier	Pathway Description	Carbon Intensity Values (gCO ₂ e/MJ)		
			Direct Emissions	Land Use or Other Indirect Effects	Total
LNG from LFG	LNG028	2B Application*: Tennessee landfill gas to pipeline-quality biomethane; delivered via pipeline; liquefied to LNG in CA	43.83	0	43.83
L-CNG from LFG	CNG035	2B Application*: Tennessee landfill gas to pipeline-quality biomethane, delivered via pipeline, liquefied in CA; transported by trucks; re-gasified and compressed to L-CNG in CA	45.95	0	45.95

* Specific Conditions Apply.

Operating Conditions

1. The CIs appearing in the above table were based on default energy consumption values from the CA-GREET 1.8b model rather than on pathway-specific energy consumption data. Thermal and electrical energy consumption records covering a total of two years are required for LCFS Method 2 pathway applications. Staff is able to prospectively certify applications, however, on the condition that the applicant submits a full two-year data record. Clean Energy will, therefore, submit energy consumption records no less frequently than every six months, until staff is in receipt of records covering a full two years of operations at its CERF Shelby plant. If these records indicate that one or more of the certified CIs shown in the above table are lower than the actual CIs, staff may adjust the certified CI to reflect actual operations at the CERF Shelby plant.

2. Actual pathway energy consumption values shall remain at or below the levels specified in Clean Energy's application. The recovery and processing efficiency levels at the North Shelby landfill in Millington, Tennessee shall remain at or above the levels specified in Clean Energy's application¹. In addition, the liquefaction efficiency at the Boron LNG plant and the compression efficiency level at the CNG and L-CNG stations in California shall remain at or above the levels specified in the application. Energy consumption values for these facilities are classified by the applicant as confidential business information.
3. Because the biomethane supplied under this pathway is commingled with fossil natural gas both when it enters the interstate pipeline system and when it enters Clean Energy's Boron liquefaction facility, Clean Energy must maintain an accounting system that will enable it to demonstrate unequivocally at any time that every unit of biomethane-based transportation fuel sold and reported under the LCFS can be associated with an equal unit of biomethane purchased from the North Shelby Landfill.
4. The total LFG supplied by North Shelby landfill to all gas purchasers shall not exceed this landfill's maximum LFG production capacity in the same accounting period. Because CERF maintains accrued storage biogas inventory, it is possible for CERF's biomethane sales to Clean Energy's Boron facility to exceed the maximum yield of the North Shelby facility in any given period. CERF's direct purchases from North Shelby landfill, however, must not, in combination with all other purchases occurring in the same period, exceed the maximum yield of the North Shelby facility.

Staff Analysis and Recommendations

Staff has reviewed Clean Energy's CERF Shelby application for the production of L-CNG, and LNG from LFG originating in Millington, Tennessee. Staff has replicated the proposed CI values calculated by Clean Energy using the CA-GREET1.8b spreadsheet. Clean Energy has provided documentation in support of the key components of its proposed pathways: energy consumption at the California liquefaction plant and California L-CNG fueling stations. It has also provided the proposed volumes of LNG and CNG to be produced. Clean Energy will submit the energy consumption data of the CERF Shelby extraction and processing facility every six months until staff is in possession of data covering a full two years of operation as stated in the operating conditions above.

Staff is satisfied that the energy consumption levels reported in Clean Energy's application accurately represent the levels that will be realized during normal operations, and that Clean Energy is capable of maintaining CIs that are at or below those shown in the table above. Therefore, staff recommends that Clean

¹ Clean Energy assumed recovery and processing efficiencies equivalent to those used in pathway LNG007: http://www.arb.ca.gov/fuels/lcfs/022709lcfs_lfg.pdf

Energy's Method 2B application for LFG-to-LNG, and LFG-to-L-CNG pathways be certified, subject to the operating conditions set forth in this staff summary.