

**Staff Summary
Method 2B Application**

**Clean Energy: Kansas City Landfill Gas, LLC
Kansas City Landfill Gas (Shawnee, Kansas) to Compressed Natural Gas,
Liquefied Natural Gas, and Liquefied-Compressed Natural Gas Delivered in
California
(Pathway Codes: CNG029, CNG030, and LNG024)**

Deemed Complete Date: February 18, 2015

Posted for Comments Date: May 28, 2015

Certified Date: June 8, 2015

Pathway Summary

Clean Energy has applied for three landfill-gas-to-biomethane fuel pathways for biomethane originating from Kansas City Landfill Gas (KCLFG). The landfill gas (LFG) for all three pathways would be extracted by Deffenbaugh Industries at Johnson County landfill in Shawnee, Kansas. 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); one pathway covers the liquefaction of the resulting biomethane at Clean Energy's Boron, California liquefaction facility and the subsequent vaporization and compression of the liquefied natural gas into compressed natural gas (L-CNG); and the final pathway covers the compression of the biomethane for dispensing at CNG fueling stations. All fueling stations covered by these pathways are located in California.

The KCLFG processing facility is powered by grid electricity and landfill gas. The landfill gas is used in the compressor, thermal oxidizer, and flare pilot. The thermal oxidizer 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 KCLFG pathways utilize the CA-GREET1.8b default values for LFG recovery. To determine combustion emissions from the consumed LFG, the flare, and the thermal oxidizer, the CA-GREET1.8b default values for natural gas combustion in a turbine were used. These emissions are more representative of operations at the KCLFG plant than are the emission factors for a compressor powered by a natural gas engine.

The biomethane Clean Energy purchases from the Kansas City 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 1,682 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 Kansas City Landfill in Shawnee, Kansas.

Carbon Intensity of the CNG, LNG, and L-CNG Produced

As shown in the table below, the applicant has calculated the CIs of its CNG, LNG, and L-CNG pathways to be 26.38, 30.80, and 32.92 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
CNG from LFG	CNG029	2B Application*: Kansas City landfill gas to pipeline-quality biomethane; delivered via pipeline; compressed to CNG in CA	26.38	0	26.38
L-CNG from LFG	CNG030	2B Application*: Kansas City landfill gas to pipeline-quality biomethane, delivered via pipeline, liquefied in CA; transported by trucks; re-gasified and compressed to L-CNG in CA	32.92	0	32.92
LNG from LFG	LNG024	2B Application*: Kansas City landfill gas to pipeline-quality biomethane; delivered via pipeline; liquefied to LNG in CA	30.80	0	30.80

* Specific Conditions Apply.

Operating Conditions

1. Actual pathway energy consumption values shall remain at or below the levels specified in Clean Energy’s application. These pathways were calculated using KCLFG production data covering calendar years 2012 and 2013 and LNG liquefaction and CNG compression data covering July 2011 through April 2013. The recovery and processing efficiency levels at the Kansas City Landfill in Shawnee, Kansas 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

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

values for these facilities are classified by the applicant as confidential business information.

2. 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 Kansas City Landfill.

Staff Analysis and Recommendations

Staff has reviewed Clean Energy's KCLFG application for the production of CNG, L-CNG, and LNG from LFG originating in Shawnee, Kansas. 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 CNG fueling stations. It has also provided the proposed volumes of LNG and CNG to be produced.

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