

**Staff Summary
Method 2B Application**

**Shell Energy North America (US), L.P.: East Texas Renewables, LLC
Landfill Gas from Tyler, Texas, to Compressed Natural Gas, Liquefied
Natural Gas, and Liquefied-Compressed Natural Gas Delivered in California
(Pathway Codes: CNG040, CNG041, and LNG031)**

Deemed Complete Date: May 20, 2015
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Certified Date: September 28, 2015

Pathway Summary

Shell Energy North America (US), L.P. (Shell Energy) has applied for three landfill-gas-to-biomethane fuel pathways. The landfill gas (LFG) for all three pathways is extracted from the Greenwood Farms Landfill in Tyler, Texas. The first 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 second 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.

LFG from the Greenwood Farms Landfill is treated using grid electricity. Purified LFG is used in the thermal oxidizer and flare pilot. The thermal oxidizer and flare are used to destroy LFG when the processing plant is not fully operational.

The Shell Energy pathway utilizes the CA-GREET1.8b default values for LFG recovery. To determine combustion emissions from the consumed purified 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 Greenwood Farms Landfill plant than emission factors for a natural gas powered compressor.

The biomethane Shell Energy purchases from the Greenwood Farms 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 1,466 miles. As such, Shell 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 Greenwood Farms Landfill in Tyler, Texas.

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

As shown in table below, the applicant has calculated the CIs of its CNG, LNG, and L-CNG pathways to be 21.42, 25.91, and 28.03 gCO₂e/MJ, respectively.

Operating Conditions

1. Actual pathway energy consumption values shall remain at or below the levels specified in Shell Energy's application. These pathways were calculated using LFG production data covering calendar years 2012 and 2013 and LNG liquefaction and CNG compression data covering calendar years 2011 and 2012. The recovery and processing efficiency levels at the Greenwood Farms Landfill in Tyler, Texas shall remain at or above the levels specified in the Shell Energy's application¹. In addition, the liquefaction efficiency at the Boron LNG plant and the compression efficiency level at the 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.
2. Because the biomethane supplied under this pathway is commingled with fossil NG both when it enters the interstate pipeline system and when it enters Clean Energy's Boron liquefaction facility, Shell 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 Greenwood Farms Landfill.

¹ Shell Energy North America (US), L.P. assumed recovery and processing efficiencies equivalent to those used in pathway LNG007: http://www.arb.ca.gov/fuels/lcfs/022709lcfs_lfg.pdf

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	CNG040	2B Application*: Texas landfill gas to pipeline-quality biomethane; delivered via pipeline; compressed to CNG in CA	21.42	0	21.42
L-CNG from LFG	CNG041	2B Application*: Texas landfill gas to pipeline-quality biomethane, delivered via pipeline, liquefied in CA; transported by trucks; re-gasified and compressed to L-CNG in CA	28.03	0	28.03
LNG from LFG	LNG031	2B Application*: Texas landfill gas to pipeline-quality biomethane; delivered via pipeline; liquefied to LNG in CA	25.91	0	25.91

* Specific Conditions Apply.

Staff Analysis and Recommendations

Staff has reviewed Shell Energy’s application for the production of CNG, L-CNG, and LNG from LFG originating in Tyler, Texas. Staff has replicated the CI values calculated by Shell Energy using the CA-GREET1.8b spreadsheet. Shell Energy has provided documentation in support of the key components of its pathways: energy consumption at the Texas LFG processing plant, the California liquefaction plant, and Clean Energy’s California CNG fueling stations. It has also provided the volumes of LNG and CNG produced. Staff is satisfied that the energy consumption levels reported in Shell Energy’s application accurately represent actual usage for the time period for which records were submitted, and that Shell Energy is capable of maintaining CIs that are at or below those shown in the table above. Therefore, staff recommends that Shell Energy’s application for Method 2B LFG-to-CNG, LFG-to-LNG, and LFG-to-L-CNG pathways be certified.