

ARB Staff Summary

Clean Energy

Method 2B Application: Landfill Gas from Cedar Hills, Washington to Compressed Natural Gas, Liquefied Natural Gas, and Liquefied Natural Gas to Compressed Natural Gas

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Pathway Summary

Clean Energy has applied for three landfill-gas-to-biomethane fuel pathways. The landfill gas (LFG) for all three pathways is extracted from the Cedar Hills (CH) landfill in Maple Valley, Washington. 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 vaporization and compression of the liquefied natural gas into compressed natural gas (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.

Bio Energy Washington owns and operates the plant that processes the extracted LFG into pipeline-quality biomethane. Puget Sound Energy (PSE) purchases the resulting biomethane and stores it in tanks adjacent to the Cedar Hills landfill for resale to BP Energy Company (BPEC). BPEC subsequently resells the biomethane to various buyers, including Clean Energy. BPEC supplies biomethane to Clean Energy via the interstate pipeline system. Clean Energy liquefies the biomethane it purchases at its Boron, California LNG plant. LNG from the Boron plant is transported by truck to vehicle fueling stations in California. Processed LFG is also pipelined directly to more than 30 CNG dispensing stations throughout California. The resulting LNG and CNG are used to fuel LNG and CNG-powered vehicles.

The biomethane Clean Energy purchases from BPEC is commingled with fossil natural gas both when it enters BP's storage tanks and when it enters the interstate pipeline system. 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 BPEC purchased from the CH landfill and subsequently sold to Clean Energy.

Clean Energy currently supplies the California transportation fuels market with fossil natural gas under three existing LCFS pathways: LNG002¹ covers LNG from liquefaction facilities in California; LNG010² covers LNG from Clean Energy's Ehrenberg, Arizona facility; and CNG002³ covers CNG compressed in California. An existing LFG-to-LNG pathway (LNG013⁴) is also available to Clean Energy. This pathway covers LFG originating in Michigan.

Carbon Intensity of LNG and CNG Produced

As shown in Table 1, the applicant has calculated the CIs of its LNG, CNG, and L-CNG pathways to be 18.14, 13.29, and 20.23 gCO₂e/MJ, respectively. Clean Energy's LFG-to-LNG and LFG-to-CNG pathway CIs are somewhat higher than the corresponding California LFG-to-biomethane pathway CIs. California LFG-based LNG (LNG007⁵) has a CI of 15.56 gCO₂e/MJ, while CNG from California LFG (CNG003⁶) comes in at 11.26 gCO₂e/MJ.

The CIs of Clean Energy's CH pathways are higher than the CIs of the corresponding California pathways (LNG007 and CNG003) for the following reasons:

- The sources of the electricity used at the LFG processing and pressurization plants: The CH plant consumes electricity generated from a Northwest energy mix (as defined in the U. S. Environmental Protection Agency's eGRID system⁷). LFG processing plants operating under LNG007 and CNG003 consume California marginal electricity.
- Pipeline transportation Distance: Biomethane from the CH plant is transported 1,113 miles by pipeline to the Boron liquefaction plant, while biomethane from California processing plants moves only 50 miles by pipeline.

These two factors are slightly offset by two factors that reduce the CI of the Clean Energy CH fuel pathways relative to the California LFG pathways:

¹ (LNG002) North American fossil natural gas delivered to California by pipeline; liquefied in California at 90 percent efficiency: http://www.arb.ca.gov/fuels/lcfs/092309lcfs_lng.pdf

² (LNG10) North American fossil natural gas delivered to a liquefaction plant in Ehrenberg, Arizona; LNG trucked to California: (<http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/cle-ehr-ncbi-011011.pdf>)

³ (CNG002) North American fossil natural gas delivered to California by pipeline for compression to CNG: http://www.arb.ca.gov/fuels/lcfs/022709lcfs_cng.pdf

⁴ (LNG013) Michigan LFG to LNG pathway: <http://www.arb.ca.gov/fuels/lcfs/2a2b/apps/ce-sth-051713.pdf>

⁵ (LNG007) California LFG liquefied in California: http://www.arb.ca.gov/fuels/lcfs/022709lcfs_lfg.pdf

⁶ (CNG003) California LFG for compression to CNG in California: http://www.arb.ca.gov/fuels/lcfs/022709lcfs_lfg.pdf

⁷ The U.S. Environmental Protection Agency's Emissions and Generation Resource Integrated Database (eGRID) can be found at http://www.epa.gov/cleanenergy/documents/eGRID2012V1_0_year09_SummaryTables.pdf. The CH plant falls within the eGRID WECC region.

- Trucking technology: ten percent of the trucks that deliver LNG from Clean Energy's Boron plant are natural gas powered and use high pressure direct injection (HDPI) technology. The remaining 90 percent of the Clean Energy fleet consists of standard heavy-duty diesel trucks. Pathway LNG007 assumes that all LNG is transported by standard heavy duty diesel trucks.
- The liquefaction efficiency of the Boron plant exceeds the 90 percent value assumed for pathway LNG007. Clean Energy demonstrated this efficiency advantage by providing electricity consumption data covering the years 2011-2012.

Operating Conditions

1. In support of its CH pathway application, Clean Energy provided electricity consumption and LFG production records covering three months of operation at the CH processing plant (January 2013 to March 2013). Records covering a total of two years are required for LCFS Method 2 pathway applications. Staff is able to prospectively certify applications, however, if the applicant can submit a full two-year data record as it becomes available. Clean Energy will therefore submit electricity consumption and LFG production records, no less frequently than quarterly, until staff is in receipt of records covering a full two years of operations at the CH LFG processing plant. If these records indicate that the certified pathway CI is lower than the actual CI, staff may adjust the certified CI to reflect actual electricity consumption at the CH plant.
2. Actual pathway energy consumption and efficiency values shall remain at or below the levels specified in Clean Energy's application. This condition applies to the Cedar Hills landfill gas processing and compression plant in Washington, the LNG liquefaction plant in Boron, California, and the Clean Energy-owned CNG dispensing stations in California. 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 NG both when it enters BP's storage tanks and when it enters the interstate pipeline system, 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 CH.

Table 1: Proposed Lookup Table Entries

Fuel	Pathway Identifier	Pathway Description	Carbon Intensity in gCO ₂ e/MJ (Including Indirect Effects)		
			Direct Emission	Land Use or Other Indirect Effect	Total
LNG from LFG	LNG014	2B Application (Specific Conditions Apply): Washington landfill gas to biomethane; delivered by pipeline; liquefied in Boron, CA	18.14	0	18.14
CNG from LFG	CNG009	2B Application (Specific Conditions Apply): Washington landfill gas to biomethane; delivered by pipeline; compressed in CA	13.29	0	13.29
LNG from LFG	CNG011	2B Application (Specific Conditions Apply): Washington landfill gas to biomethane, delivered by pipeline, liquefied in Boron CA; re-gasified and compressed to CNG	20.23	0	20.23

Fuel	Pathway Identifier	Pathway Description	Carbon Intensity in gCO ₂ e/MJ (Including Indirect Effects)		
CNG from LFG ^a	CNG009_1	2B Application (Specific Conditions Apply): Washington landfill gas to biomethane; delivered by pipeline; compressed in CA	13.67	0	13.67

^a Pathway CNG009_1 corrects an error in pathway CNG009. CNG009 will be discontinued once all transactions under it have been completed.

Staff Analysis and Recommendation

Staff has reviewed Clean Energy’s application for the production of LNG and CNG from LFG originating in Washington State. Staff has replicated, using the CA-GREET spreadsheet, the CI values calculated by Clean Energy. Clean Energy has provided documentation in support of the key components of its pathways: energy consumption at the Washington State 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 Clean Energy’s application accurately represent actual usage for the time period for which records were submitted, and that Clean Energy is capable of maintaining CIs that are at or below those shown in Table 1. Therefore, staff recommends that Clean Energy’s application for Method 2B LFG-to-LNG, LFG-to-L-CNG and LFG-to-CNG pathways be approved.