

**ARB Staff Summary**  
**Clean Energy**  
**Method 2B Application: Landfill Gas from Sauk Trail Hills, Michigan**  
**May 24, 2013**

Plant Summary

The Sauk Trail Hills (STH) landfill gas (LFG) plant, located 25 miles West of Detroit in Canton, Michigan, is owned and operated by Canton Renewables, LLC a wholly owned subsidiary of Clean Energy. The plant will be processing, cleaning, and pressurizing LFG from the Sauk Trail Hills Landfill for injection into the interstate pipeline system. Clean Energy extracts the LFG from the pipeline for liquefaction at its Boron, California liquefied natural gas (LNG) plant. The resulting LNG is used to fuel LNG-powered vehicles. Clean Energy currently supplies the California transportation fuels market with fossil LNG from its Boron facility under an existing Low Carbon Fuel Standard (LCFS) pathway (LNG002).<sup>1</sup>

Carbon Intensity of LNG Produced

The carbon intensity (CI) of this LFG to LNG pathway, as calculated by Clean Energy, is 30.09 gCO<sub>2</sub>e/MJ of LNG produced. For comparison, the CI of pathway LNG007 (LFG liquefied in California at 90 percent efficiency) is 15.56 gCO<sub>2</sub>e/MJ. The factors that increase the CI of the STH pathway relative to pathway LNG007 are the following:

- The sources of the electricity used at the LFG processing and pressurization plants: The STH plant consumes Midwest marginal electricity, while plants operating under LNG007 consume California marginal electricity
- LFG transport: processed LFG from the STH plant is transported 2,275 miles by pipeline to the Boron liquefaction plant, while the pipeline transport distance for plants operating under LNG007 is only 50 miles

These two factors are slightly offset by two CI advantages enjoyed by the STH pathway:

- 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 heavy duty diesel trucks.
- The liquefaction efficiency of the Boron plant exceeds the 90 percent value assumed for pathway LNG007. Clean Energy demonstrated this

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<sup>1</sup> North American natural gas delivered to California by pipeline; liquefied in California at 90 percent efficiency

efficiency advantage by providing electricity consumption data covering two years.

Operating Conditions

1. Actual pathway energy consumption and efficiency values shall remain at or below the levels specified in Clean Energy’s application. This condition applies to both the STH landfill gas processing and compression plant in Michigan and the LNG liquefaction plant in Boron, California. Energy consumption values for both plants are classified by the applicant as confidential business information.
2. Because the biomethane supplied under this pathway is commingled with fossil NG once it is injected into 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 transportation fuel sold and reported under the LCFS can be associated with an equal unit of biomethane purchased.
3. This pathway applies to, and may only be used for, LNG used in LNG-powered vehicles. It would not apply, for example, to LNG that is vaporized, compressed into CNG, and used in CNG vehicles.

**Table 1: Proposed Lookup Table Entries**

Fuel	Pathway Identifier	Pathway Description	Carbon Intensity in gCO <sub>2</sub> e/MJ (Including Indirect Effects)		
			Direct Emission	Land Use or Other Indirect Effect	Total
LNG	LNG013	2B Application (Specific Conditions Apply): Michigan landfill gas to biomethane, delivered via pipeline; liquefied to LNG in Boron, CA	30.09	0	30.09

## Staff Analysis and Recommendation

Staff has reviewed Clean Energy's application for a Michigan LFG-to-LNG pathway, and has replicated, using the CA-GREET spreadsheet, the CI value calculated by Clean Energy. Clean Energy has provided documentation of the energy use at both the Michigan and California facilities, as well as the volume of LNG produced under this pathway. Staff is satisfied that the energy consumption levels reported in the application accurately represent the plant's actual usage, and that Clean Energy is therefore capable of maintaining a CI that is at or below 30.09 gCO<sub>2</sub>e/MJ for its STH LFG-to-LNG pathway. Therefore, staff recommends that Clean Energy's application for a Method 2B LFG-to-LNG pathway be approved.