Method 2B Application

Element Markets

Landfill Gas from Pennsylvania to LNG

Deemed Complete Date: August 15, 2013
Certified and Posted Date: August 30, 2013

Pathway Summary

Element Markets Renewable Energy, LLC (hereinafter Element Markets), a marketer of renewable natural gas and environmental asset management services, has applied for a Low Carbon Fuel Standard (LCFS) pathway for the production of liquefied natural gas (LNG) from landfill gas (LFG) produced in Pennsylvania. Element Markets purchases the LFG from Johnstown Regional Energy LLC (JRE), an operator of LFG processing facilities at three Eastern Pennsylvania landfills: Raeger Mountain Landfill, Southern Alleghenies Landfill, and Shade Landfill. All three landfills are owned and operated by Waste Management Inc. Together, the three facilities produce up to 2,500 million Btu/day (912,500 million Btu/year) of LFG. Elements Markets purchases the processed LFG and injects it into an interstate pipeline system operated by Dominion Transmission Inc. This system primarily collects natural gas from North American wells in the region. The gas Element Markets purchases is transported 3,000 miles by pipeline to California, where it is liquefied at an average liquefaction efficiency of 80%[1]. This LNG fuel is used in LNG vehicles.

Carbon Intensity of LNG Produced

Each facility separately collects, processes, and compresses LFG to pipeline quality biomethane. The resulting biomethane is transmitted by pipeline from each landfill to a central collection point, from which it is injected into a primary interstate pipeline for transport to California. In California, the gas is liquefied then transported by heavy duty diesel truck to LNG fueling stations. The carbon intensity (CI) of the electricity used to extract, process, and inject the resulting biomethane into the pipeline was calculated using the U. S. EPA's eGRID electrical energy generation database[2]. The Johnstown operations are located within the RFC East eGRID region, which includes eastern Pennsylvania. The eGRID database reports average electrical energy generation mixes. In order to convert these energy mixes into marginal mixes, all electricity generated from hydroelectric and nuclear sources is reallocated to natural-gas-powered generation. Marginal electricity is used to account for the fact that additional demand would be met primarily by natural gas rather than hydroelectric or nuclear generation capacity.

[1] (LNG006) CA Landfill Gas to LNG with 80% efficiency: http://www.arb.ca.gov/fuels/lcfs/092309lcfs_lfg_lng.pdf

[2] The Emissions & Generation Resource Integrated Database (eGRID) of U.S. EPA can be accessed at: http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html

The biomethane Element Markets purchases from JRE is commingled with fossil natural gas when it enters both the regional and the interstate pipeline systems. As such, Element Markets will be obligated to retain records that unequivocally demonstrate that the credits it earns under the pathway described in this summary correspond directly with the volumes of biomethane it purchased from JRE.

The CI of this pathway, as calculated by Element Markets, is 32.53 gCO_2e/MJ of LNG produced (see Table 1). This CI is based on energy consumption records from the LFG processing plant covering the last eight months of 2011 and all of 2012, and an average liquefaction efficiency of 80%. By comparison, the Lookup Table CI for California LFG liquefied in California is 26.31 gCO_2e/MJ (LNG006)[3]. The Element Markets pathway CI is higher than the CI of LNG006 due to a lower LFG processing efficiency, a longer pipeline transmission distance, and a regional electricity generation mix characterized by higher GHG emissions.

Table 1: Proposed Lookup Table Entry

Fuel	**Pathway Identifier**	**Pathway Description**	**Carbon Intensity in gCO_2e/MJ (Including Indirect Effects)**		
			Direct Emission	Land Use or Other Indirect Effect	Total
LNG from LFG	LNG015	2B Application*: Pennsylvania landfill gas to biomethane delivered via pipeline; liquefied in California; 80% liquefaction efficiency	32.53	0	32.53

*Specific Conditions Apply

Operating Conditions

1. ARB requires that the CIs appearing in Method 2 applications be based on operational data covering two years whenever possible. The Element Markets' CI is based on data covering only one year and eight months. Following the posting of this pathway on the LCFS Method 2 web page, Element Markets will submit energy consumption data covering the next

four months of operation. If that data indicates that Element Markets' actual CI is higher than the CI posted on the Method 2 web site, staff may increase the applicant's pathway CI to reflect that new information.

2. Actual plant performance (including energy consumption) shall remain within the bounds established in Element Markets application. The plant's energy and electricity usage values are classified by the applicant as confidential business information.

3. The LNG pathway described in the application 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.

Staff Analysis and Recommendation

Staff has reviewed Element Markets' application for LNG from Pennsylvania LFG and has replicated, using the CA-GREET spreadsheet, the CI value calculated by the applicant (32.53 gCO_2e/MJ). Element Markets has provided documentation of the LFG processing plant's energy use, renewable natural gas production, and gas transport for most of 2011 and all of 2012. The liquefaction efficiency used by Element markets is an LCFS default value of 80%. Staff therefore recommends that Element Markets' application for a Method 2B LNG pathway be approved, subject to the operating conditions stipulated above.