



# Life-Cycle Assessment of McCommas Landfill Gas to Delivered CNG in California

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**Submitted to:**

Clean Energy Renewable Fuels, LLC

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## General Information

(This Section contains Confidential Business Information)

Dallas Clean Energy McCommas Bluff, LLC (DCEMB) owns the McCommas Bluff Landfill Gas Plant (MBGP), a gas collection and processing facility located at the McCommas Bluff Landfill in the city of Dallas, Texas. The landfill was permitted in 1980 and is 2,025 acres in southeast Dallas, of which 1,029 acres are designated for buffer, roads, and utilities and 996 acres are designated for waste disposal.

[REDACTED]

[REDACTED]

[REDACTED]. The following pathway was produced using two (2) years (July 2011 - June 2013) of landfill gas production data and two (2) years (2011-2012) of CNG compression data.

## Process Description

(This Section contains Confidential Business Information)

[REDACTED]

[REDACTED]

[REDACTED]

## Data Collection and Process Results

To estimate GHG emissions, the energy and materials necessary for the following processes needs to be determined: LFG Production Plant, Transport of Gas to California (Pipeline), and Compression.

### LFG Production Plant

(This Section contains Confidential Business Information)

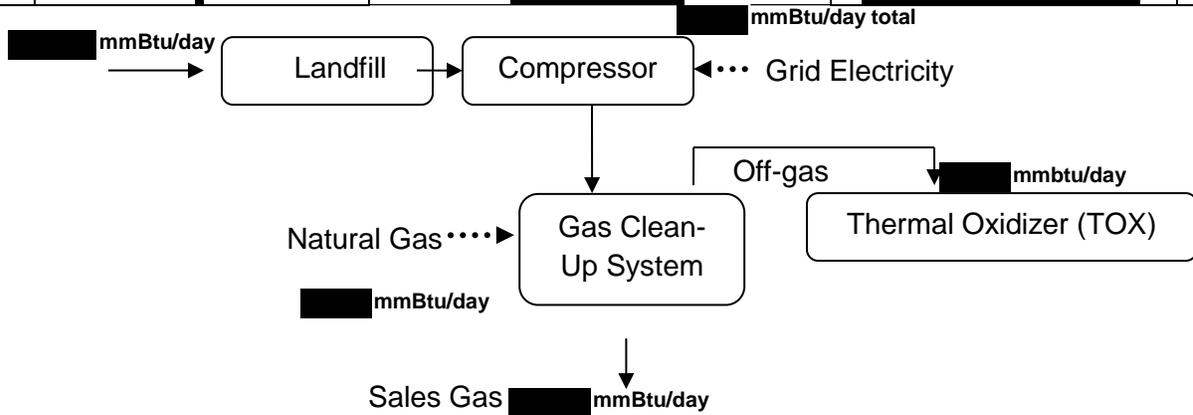
[Redacted]

[Redacted]

Table 1. McCommas LFG Plant Operating Energy and Flare Credit

(This Table contains Confidential Business Information)

	July 2011 – June 2013 Data	Btu/MMBtu of Product Gas	Input Value	Changed Cells – NG Tab
LFG Produced	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]



The GREET model LFG pathway was then modified to adjust efficiency gas and process energy shares as listed in Table 1. The Southeast Asia region on the Regional LT tab was changed to the ERCT Region to represent the eGRID where MBGP is located and this was used for McCommas. The ARB methodology of converting eGRID electricity mix to marginal mix was employed. This changed the electric mix cells of J83-J88 on the Region LT tab to those shown in Table 2. The remaining values from the Southeast Asia Region (now the ERCT Region) were changed to match the US Average.

Table 2. ERCT Electricity Grid Mix

	eGRID Grid Mix	Marginal Grid Mix	CA-GREET Cell Regional LT Tab
Residual oil	1.2%	1.2%	J83
Natural gas	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

This produced the results for LFG to LNG shown in the table below taken from cells on the NG Tab. Conversion from g/MMBtu to g/MJ was done using the conversion factor of 1055.055 MJ/MMBTU as is done in the CA-GREET model.

The recovery energy and emissions are based on ARB LFG pathway defaults of 4621.25 Btu of electricity/MMBtu of landfill gas.<sup>1</sup>

Table 3. McCommas LFG Plant Greenhouse Gas Emissions

(This Table contains Confidential Business Information)

	Recovery		
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

### Transportation to California by Pipeline

The pipeline transport distance was modified to [REDACTED] miles from Dallas, TX to Boron, CA where the gas will be compressed. The distance was determined by the using the driving route most similar to the pipeline map. Google Maps was used to determine the driving routes with the I-40 route most similar to the pipeline map. The emissions were determined by linked cell E148 on the NG tab to cell F479 on the T&D\_Flowcharts tab for LFG to CNG, and this same distance will be used for LNG and CNG. The table below shows the pipeline transport emissions from cells F163-F169 on the NG Tab.

Table 4. McCommas LFG Transport Greenhouse Gas Emissions

(This Table contains Confidential Business Information)

Transport Emissions	McCommas LFG Transport
[REDACTED]	[REDACTED]

<sup>1</sup> [http://www.arb.ca.gov/fuels/lcfs/022709lcfs\\_lfg.pdf](http://www.arb.ca.gov/fuels/lcfs/022709lcfs_lfg.pdf); page 9.

## Compression

(This Section contains Confidential Business Information)

Based on the submitted Confidential Business Information from Clean Energy Fuels, Clean Energy will be submitting for one pathway for their CNG Stations based on two (2) years of data (2011-2012). The weighted average energy consumption is [REDACTED]. [REDACTED] The tables below show the calculation from kWh/GGE to process efficiency and the cells that were changed and the results from cells G151- G157.

Table 5. CNG Station Plant Operating Efficiency

(This Table contains Confidential Business Information)

All Units in Btus per GGE	Compression	Input Value	Changed Cells – NG Tab
CNG Produced	[REDACTED]		
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Table 6. CNG Compression Greenhouse Gas Emissions

(This Table contains Confidential Business Information)

Recovery and Processing Emissions	Compression
[REDACTED]	[REDACTED]

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<sup>2</sup> 109,772 Btu/GGE default CA-GREET value

