



# Life-Cycle Assessment of McCommas Landfill Gas to Delivered LNG and LCNG 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]

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 LNG liquefaction 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), Liquefaction, and Transportation and Distribution.

### LFG Production Plant

(This Section contains Confidential Business Information)

[Redacted]

[Redacted]





## Liquefaction

(This Section contains Confidential Business Information)

Based on the submitted Confidential Business Information from Clean Energy Fuels for two (2) years (2011-2012), the Boron facility requires [REDACTED] kWh/gal of LNG for liquefaction ([REDACTED]).

[REDACTED]

Table 5 below shows the calculation from kWh per gallon to process efficiency and the cells that were changed. Table 6 shows the results from cells G163- G169.

Table 5. Boron LNG Plant Operating Energy

(This Table contains Confidential Business Information)

All Units in Btus per Gal of LNG	Boron LNG Plant	Input Value	Changed Cells – NG Tab
Feed Gas	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Table 6. Boron LNG Plant Greenhouse Gas Emissions

(This Table contains Confidential Business Information)

Recovery and Processing Emissions	Boron LNG Plant
[REDACTED]	[REDACTED]

## LNG Transport to Refueling Station

In addition the CA-GREET default LNG transport distance of 50 miles was used but the fuel shares were modified to utilize the Westport HPDI trucks consuming 90% LNG and 10% diesel with an EER of 1.0. The numbers were inputted in cells CD95 (% diesel consumption) and CD97 (% LNG consumption) on the “T&D” tab and the results were taken from cells H153-H159 on the “NG” tab.

Table 7. LNG Transport Greenhouse Gas Emissions

(This Table contains Confidential Business Information)

	California LNG Plant – 50 miles 10% Diesel and 90% LNG
[REDACTED]	[REDACTED]

## LNG Storage

In addition the CA-GREET default for LNG storage was used. The default values are listed in Table 8 below and yield the results in Table 9 (the results were taken from cells I163-I169 on the “NG” tab.).

Table 8. LNG Storage CA-GREET Default Values

	Bulk Terminal Storage	CA-GREET Cells Inputs Tab	Distribution	CA-GREET Cells Inputs Tab
Boil-Off Rate: % per Day	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Table 9. LNG Storage Greenhouse Gas Emissions

	LNG Storage
[REDACTED]	[REDACTED]

