

Clean Energy (for MDU – Billings, Montana Pathways) CA-GREET Model

The applicant has conducted its analysis of direct effects on carbon intensity for this pathway using CA-GREET, v.1.8b (Dec. 2009) (See http://www.arb.ca.gov/fuels/lcfs/ca_greet1.8b_dec09.xls). The standard inputs and parameters specified in CA-GREET remain unchanged except as noted in the input table below. The input table below specifies the spreadsheet location of the CA-GREET inputs and other parameters that were claimed as confidential business information or trade secret by the applicant, but it does not disclose the actual value of such inputs and parameters because they are claimed to be confidential business information or trade secret.

Clean Energy Input data table (Locations of cells containing Confidential Business Information are shown, but the actual values of such confidential information are not disclosed):

Parameter	Unit	Value	CA-GREET Cell Changed
LFG Recovery and Transport			
Thermal	Btu/MMBtu	0	CA-GREET Default (L85)
Electricity	Btu/MMBtu	4,639	CA-GREET Default ¹ (L91)
Total Energy	Btu/MMBtu	4,639	N/A
LFG Plant		NG Tab	
LFG Processing Efficiency	%	Confidential	AI66 (via C182)
Electricity Fuel Share	%	Confidential	AI79 (via C184)
LFG Fuel Share	%	Confidential	AI75 (via C183)
Natural Gas Fuel Share	%	Confidential	AI76 (via C185)
Electricity	kWh/MMBtu	Confidential	N/A
Electricity	Btu/MMBtu	Confidential	Calculated in CA-GREET (AI91)

¹ http://www.arb.ca.gov/fuels/lcfs/022709lcfs_lfg.pdf, pages 9-10.

Natural Gas	Btu/MMBtu	Confidential	Calculated in CA-GREET (AI85)
LFG	Btu/MMBtu	Confidential	Calculated in CA-GREET (AI87)
Credit for Not Flaring	Btu/MMBtu	Confidential	Calculated in CA-GREET (AJ88)
Total Energy	Btu/MMBtu	Confidential	N/A
NWPP Electricity Grid Mix			Regional LT Tab
Residual oil	%	0.48	J83
Natural gas	%	64.24	J84
Coal	%	29.83	J85
Nuclear	%	0.00	J86
Biomass	%	1.09	J87
Other (renewables)	%	4.36	J88
LNG Natural Gas Transport			T&D Flowcharts Tab (via NG Tab)
LNG Pipeline Distance	mi	Confidential	F479 (via E147/8)
Liquefaction			NG Tab
Electricity	kWh/GGE	Confidential	N/A
Liquefaction Efficiency	%	Confidential	AA66
Electricity Fuel Share	%	Confidential	AA79
Natural Gas Fuel Share	%	Confidential	AA75
Electricity	Btu/MMBtu	Confidential	Calculated in CA-GREET (AD91)
LNG Transport			T&D Tab
Truck LNG Fuel Share	%	Confidential	CD97
Truck Diesel Fuel Share	%	Confidential	CD95
LNG Storage			Inputs Tab
Boil-Off Rate: % per Day	%/day	0.05 / 0.1	E171 / F171
Duration of Storage or Transit: Days	Days	5 / 0.1	E174 / F174
Recovery Rate for Boil-Off Gas	%	Confidential	E179 / F179
L/CNG			NG Tab
L/CNG Conversion	gCO2e/MJ	Confidential	J171
CNG Natural Gas Transport			T&D Flowcharts Tab (via NG Tab)
CNG Pipeline Distance	mi	Confidential	F479 (via E148)
Compression			NG Tab
Electricity	kWh/GGE	Confidential	N/A
Compression Efficiency	%	Confidential	AA66
Electricity Fuel Share	%	Confidential	AA79
Natural Gas Fuel Share	%	Confidential	AA75
Electricity	Btu/MMBtu	Confidential	Calculated in CA-GREET (AA91)