

SOUTHERN CALIFORNIA GAS COMPANY (SOCALGAS)
SIERRA CLUB-SCG-04
WOODY BIOMASS PILOT PROJECT APPLICATION (A.25-10-008)
DATE REQUESTED: February 20, 2026
RESPONSE DUE: March 6, 2026

QUESTION 4-1:

Please state the basis for the value of 1700 g CO₂e/kg biomass incorporated to soil as indicated in the GREET spreadsheet provided by SoCalGas to Sierra Club. Culumber et al. 2025 is cited (cell I30 in in the “Baseline Case” tab); please indicate what in that publication or elsewhere provides the basis for the 1700 g CO₂e/kg figure.

RESPONSE 4-1:

According to Culumber et al. (2025), most of the biogenic CO₂ is expected to decompose and return to the atmosphere over time, with only 4.05 Mg C/ha projected to remain in the soil after 20 years with whole orchard recycling application rate of 61.6 Mg C/ha. Considering that the biomass was 46.1% C and the relative molecular weights of CO₂ and C, this results in flux of 1690 g CO₂e/kg of biomass applied. In addition, the article looks at the net flux of non-biogenic CO₂ and N₂O for the whole orchard recycling case and measures a net flux of 137.6 kg CO₂e/ha and 476.8 kg CO₂e/ha respectively. The study found negligible CH₄ emissions. Once corrected for the biomass carbon application rate, these come out to 7.7 g CO₂e/kg and 2.2 g CO₂e/kg respectively making the total flux of 1700 g CO₂e/kg for whole orchard recycling.

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QUESTION 4-2:

Please state the basis for the CO₂e calculation by gas as provided in the GREET spreadsheet. Specifically, what are the base numbers for 1) CO₂, 2) CH₄, and 3) N₂O, alongside the GWP values that are used to calculate CO₂e for the baseline and project scenarios?

RESPONSE 4-2:

The emission factor base numbers for CO₂e calculation are based on various sources. See the summary table below with GHG base numbers broken out by gas: CO₂, CH₄ and N₂O. It is expected that carbon dioxide emissions constitute the main contributor to greenhouse gas CO₂e for both baseline and project scenarios. GWP values applied from GREET R&D 2024 are shown in the second table below.

Emission Factors

	GHG	CO ₂	CH ₄	N ₂ O	Unit	Source
Biomass transportation	92.06	88.89	1.03E-01	3.26E-04	g/ton.mi	R&D GREET 2024; CIDI Combination Long-Haul Trucks: Conventional and LS Diesel
Biomass preprocessing	7.02	6.74	8.02E-03	1.69E-04	g/kg	R&D GREET 2024; Chipping & Loading
Electricity (CA)	290.53	272.77	5.41E-01	5.95E-03	g/kWh	R&D GREET 2024; Electricity (WECC)
RNG transportation	79.94	70.94	2.88E-01	1.54E-03	g/ton.mi	R&D GREET 2024; SI Combination Long-Haul Trucks: CNG, NA NG
Bio-SNG Plant Direct	3797	3797	--	--	kg/hr	West Biofuels design data, CAP based on comparable oxidizer performance
Dairy Bedding Direct	866.0	866.0	--	--	g/kg	NREL data
Incorporation Direct	1700	1693	--	2.63E-02	g/kg	Culumber et al (2025)
Air Curtain Incinerator Direct	1445	1445	--	--	g/kg	EPA Biomass Air Curtain Incinerator
Biomass Plant Direct	1742	1710	1.60E-01	9.90E-02	g/kg	R&D GREET 2024; Large Industrial Boiler

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GWP Values

Gas	GWP (100-year, AR5)
CO ₂	1
CH ₄	30
N ₂ O	265

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Both the question and response contains confidential information provided pursuant to PUC Section 583, D.21-09-020 and GO 66-D (Revision (Rev.) 2) along with the accompanying declaration. This information is being provided pursuant to a Non-Discloser Agreement between Sierra Club and SoCalGas.

QUESTION 4-3:

Please explain the relationship between the assertion that █ % of baseline (pre-CCS) CO₂ is captured and the assertion that the capture unit is running at █ % capture efficiency. Both figures are presented in the “Bio SNG Use Case” tab of the GREET spreadsheet provided by SoCalGas to Sierra Club.

RESPONSE 4-3:

The assumption is that █ % of the CO₂ gas is available to the capture unit and the capture efficiency of the unit itself is █ % (ie █ % losses) per R&D GREET 2024 emission factors. Effectively, the overall capture rate estimate is █ % compared to the pre-CCS case. This can be tracked by following the formulas in the spreadsheet.

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QUESTION 4-4:

What is the fuel for the CCS capture unit?

RESPONSE 4-4:

Grid electricity is the energy used for the CCS capture unit.

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QUESTION 4-5:

Is the stated 0. [REDACTED] kWh/kg entirely electricity? If not, what is the breakdown of heat versus electrical demand for the capture unit? This figure is presented

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in the “Bio SNG Use Case” tab of the GREET spreadsheet provided by SoCalGas to Sierra Club.

RESPONSE 4-5:

[REDACTED]