

Exhibit No.: SC-01R

Docket No.: A.25-10-008

ALJ: Camille Watts-Zagha

Witness: Grubert, Sahu

Exhibit SC-01R

Prepared Testimony of Emily Grubert and Ranajit (Ron) Sahu on Behalf of Sierra Club on
the Application of Southern California Gas Company for Approval of its Woody Biomass to
Methane Pilot Project (406G) (Errata) (Redacted)

Docket No.: A.25-10-008

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Date: March 16, 2026

Errata April 3, 2026

Witnesses: Dr. Emily Grubert

Dr. Ranajit Sahu

**PREPARED TESTIMONY OF EMILY GRUBERT AND RANAJIT (RON) SAHU ON
BEHALF OF SIERRA CLUB ON THE APPLICATION OF SOUTHERN CALIFORNIA
GAS COMPANY FOR APPROVAL OF ITS WOODY BIOMASS TO METHANE PILOT
PROJECT (904G)**

(PUBLIC VERSION)

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- all criteria pollutant emissions[.]” In your assessment, is this statement an accurate listing of the likely emitted pollutants? 24
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- Q. SoCalGas states in its February 23, 2026 Response 2-14a to Sierra Club’s February 9, 2026 data request that the flare will only be used 0.5% of the hours. It also states in its March 11, 2026 Response 5-9f to Sierra Club’s February 25, 2026 data request that “WBF estimates the flare will be used for a maximum of 10 minutes for an initial startup or emergency shutdown of the methanation system. In the first year, which includes commissioning, WBF anticipates up to 120 startups and shutdowns which is the basis for less than 0.5% of hours. After the facility is commissioned, WBF only anticipates approximately 8 to 10 startups/shutdowns annually.” Do these responses address your concerns with flare emissions? If not, why not? 25
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- Q. The next set of questions focus on fugitive methane, which you mention as a likely from all parts of the facility. SoCalGas states in its February 26, 2026 Response 5 to Cal Advocates’ February 11, 2026 data request that “[t]he WBF Bio-SNG production infrastructure (Lanes 2-5) are not permitted to operate with leakage for safety reasons. The WBF Facility uses gas-tight reactor vessels, valves, and compressors and methane

impervious stainless-steel piping that are not expected to have any leakage during normal operations.” It concludes that “[t]herefore, no continuous leakage assumption was used in the GREET modeling.” Do you believe it is reasonable to assume no leakage is expected given these assertions? If not, why not?..... 28

- Q. In its February 23, 2026 Response 2-3 to Sierra Club’s February 9, 2026 data request, SoCalGas states that “[f]or indoor and confined facilities, gas detectors will be installed that would immediately detect leakages from equipment to the building and trigger an immediate shutdown to assess and correct the leakage issue. For outdoor piping and equipment, daily leak checks will be performed using portable gas detection equipment. For each leakage event, the total leakage amount will be estimated based on size and duration of the leakage.” Does this description of the proposed gas detection methods address your concerns about fugitive methane leakage from the Project? If not, why not. 29
- Q. In its December 5, 2025 Response 1-5(c) to Sierra Club’s November 4, 2025 data request, SoCalGas states that it “assume[s] no fugitive methane emissions as the level of leakage is expected to be negligible.” Do you believe this assumption is support? If not, why not. 30
- Q. Without such measurement and reporting, do you think SoCalGas can credibly claim that it has demonstrated GHG reductions in this Application? 30
- Q. In its February 26, 2026 Response 4 to Cal Advocates’ February 11, 2026 data request, SoCalGas indicates that “WBF employs regular scheduled inspections using advanced methane detection technologies, such as handheld detectors, optical gas imaging cameras, and continuous monitoring systems within confined areas and buildings. Inspections are conducted at key points, including production equipment, pipeline connections, and transfer points.” In your opinion, is this methane leak detection sufficient to ensure no fugitive methane leakage occurs..... 30
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Q.	In its February 26, 2026 Response 3b to CalAdvocates’ February 11, 2026 data request asking what analyses SoCalGas and/or West Biofuels “have conducted regarding the feasibility and/or effectiveness of fugitive emission monitoring technologies or methodologies for the Woody Biomass Project[,]” SoCalGas states that “SoCalGas and/or WBF have not conducted this type of specific analysis for the SB 1440 Woody Biomass Pilot Project.” Do you believe that such an analysis is needed in order to monitor methane leakage?	40
Q.	With respect to the monitoring of exhaust emissions, SoCalGas states in its March 3, 2026 Response 3-2d to Sierra Club’s February 18, 2026 data request that “[i]t is likely the local air district will require monitoring of	

the exhaust emissions. This will likely entail continuous recording of facility throughput, continuous monitoring of stack O₂ and NO_x, and periodic third-party testing of all criteria pollutant emissions from the exhaust.” Does this response present a monitoring method?..... 40

Q. Let’s turn to the monitoring of flare emissions. As noted above, in its March 3, 2026 Response 3-2c to Sierra Club’s February 18, 2026 data request, SoCalGas states, “[t]he total hours of use of the flare will be monitored, and the emissions can be estimated using the emissions factors for the flare. The flare is designed as an emergency flare and is expected to operate infrequently. Its use will adhere to the requirements of the local air district.” In your opinion, is the flare emissions monitoring for the proposed Project sufficient to ensure such emissions are detected? 40

Q. SoCalGas states that “[t]he air district is unlikely to require continuous emissions monitoring because the flare is used only rarely. However, ports are typically added to the stack to conduct a source test if required and gas flow to the flare is continuously monitored and recorded to determine the total flare usage.” Does this response provide any assurance that the flare will be appropriately monitored? 41

Q. In its February 9, 2026 Response 2-6 to Sierra Club’s February 9, 2026 data request, SoCalGas states that “[c]ommercially available gas analyzers will be utilized to measure the direct carbon dioxide and criteria pollutant emissions from the facility. WBF uses commercial flue gas analyzers from Horiba and Testo and industry standard procedures at its current facilities.” It indicates that “[t]he specific make and model of the gas analyzers for the proposed project will be selected following CPUC approval of the application. For the gas analyzers used at other WBF facilities, the model of the Horiba gas analyzer is Horiba PG 250 Portable Gas Analyzer.” It also indicates that “[t]he specific make and model of the gas analyzers for the proposed project will be selected following CPUC approval of the application. For the gas analyzers used at other WBF facilities, the model of the Testo gas analyzer is Testo 300-LL-C-KIT Flue Gas Analyzer Kit with NO_x Sensor.” In your opinion, do these statements ensure that emissions will be properly monitored?..... 42

Q. SoCalGas also says it will use “industry standard practices” and states that “[a]n example of industry standard procedures is the guidance of USEPA for good practices in stack testing can be found at <https://www.epa.gov/compliance/clean-air-act-nationalstack-testing-guidance>, which includes recommended use, for example, of EPA Methods 1, 2, 3A, 7E, 10 for procedures for gas analyzers, setup of sampling lines, and measurement of flow rates.” Is following this “standard practice” relevant here? 42

- Q. Based on the information that is available, do you believe the monitoring that is currently contemplated by SoCalGas and WBF is sufficient to detect the facility’s emissions? 43
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- Q. In D.22-02-025, the Commission required the pilot projects to “study and report fugitive methane, pollutant, and particulate matter emissions and emissions reduction or elimination methods in the gasification or pyrolysis process, the methanation process, and pipeline infrastructure.” In your view, has SoCalGas met this requirement? If not, why not? 44
- Q. Do you think it is reasonable for the Commission to order pilot projects, as a general matter? 44
- Q. What is your opinion of West Biofuels’s track record in terms of its ability to operate woody biomass gasification and methanation projects that produce useful information about these technologies for the public? 44
- Q. In your view, does the proposed Pilot Project serve this purpose?..... 45
- Q. Given these deficiencies and the likely emissions increases, is it your opinion that the Commission should approve the Application? 45
- Q. Please summarize why, in your opinion, denial is appropriate..... 45
- Q. Does this conclude your testimony? 46

1 Sierra Club submits the following testimony on the Application of Southern California
2 Gas Company (“SoCalGas”) Proposing Woody Biomass Pilot Project (904G) (“Pilot Project” or
3 “Project”). The Application seeks authority to execute a Pilot Project that would direct ratepayer
4 funds to a SoCalGas pipeline upgrade in Tulare County and use any leftover funds for the
5 construction of a new, woody biomass gasification facility located over 50 miles away in Fresno
6 County.¹ The facility would be owned and operated by West Biofuels LLC (“West Biofuels”).²
7 All produced methane would be trucked to SoCalGas’s modified interconnection point;
8 SoCalGas does not propose to procure the produced biomethane.³

9 The first section from Dr. Emily Grubert addresses the lifecycle greenhouse gas (“GHG”)
10 impacts of the proposed Project. The second section from Dr. Ranajit (“Ron”) Sahu covers issues
11 related to the direct air emissions from the proposed Project at the West Biofuels facility and to
12 the study and reporting of those emissions.

13 TESTIMONY OF EMILY GRUBERT

14 I. INTRODUCTION AND KEY FINDINGS AND RECOMMENDATIONS

15 Q. Please state your name, position, and organization.

16 A. My name is Emily Grubert. I am an Associate Professor of Sustainable Energy Policy
17 and, concurrently, of Civil and Environmental Engineering and Earth Sciences at the
18 University of Notre Dame.

19 Q. Please summarize your qualifications.

20 I am a licensed Professional Engineer and hold a PhD from Stanford University, an MA
21 and MS from The University of Texas at Austin, and a BS from Stanford University. I
22 served as Deputy Assistant Secretary for the Office of Carbon Management (2021-2022)
23 and as Senior Advisor for Energy Asset Transformation (2022-2023) at the US
24 Department of Energy. My specific expertise focuses on GHG (carbon) accounting, life
25 cycle assessment, and energy systems, including those involving carbon capture
26 technologies. I was the Chair of Argonne National Lab’s Greenhouse gases, Regulated
27 Emissions, and Energy use in Technologies (“GREET”) Model Review Committee in
28 2024 and also have other direct experience with the GREET model for evaluating GHG
29 intensities.

¹ SoCalGas Corrected Chapter 2 Testimony at JLMS-2, JLMS-8; SoCalGas Response to ALJ Ruling Seeking Additional Information (Jan. 7, 2026), Attachment A (map indicating approximately 60 miles distance between facility and injections point).

² SoCalGas Corrected Chapter 2 Testimony at JLMS-8.

³ SoCalGas Corrected Chapter 2 Testimony at JLMS-8.

1 I also have extensive experience as an expert witness, especially focused on evaluating
2 the GHG intensity of renewable gas projects. I have previously submitted testimony or
3 comments to the California Air Resources Board (“CARB”), the New York State Public
4 Service Commission, the Vermont Public Utility Commission, the Washington D.C.
5 Public Service Commission, the Colorado Air Quality Control Commission, the
6 Minnesota Public Utilities Commission, and the Multnomah County Circuit Court of the
7 State of Oregon, largely on issues related to GHG accounting.

8 My CV is included with this testimony as Attachment 1.

9 **Q. Are you familiar with other projects that have intentionally produced methane from**
10 **biogenic sources?**

11 **A.** Yes. Several of the cases for which I have testified in other states have involved the
12 intentional production of methane from biogenic sources, including by enhancing
13 methane ratios from sources with nondiscretionary methane production. My work in
14 these cases has included the evaluation of pilot projects including proposals for small-
15 scale biomethane interconnection and use proposals.

16 **Q. What is your experience evaluating carbon capture and storage (“CCS”) projects?**

17 **A.** As an academic, I have been modeling CCS in the energy sector since 2010. From 2021-
18 2022, I was the Deputy Assistant Secretary for Carbon Management at the US
19 Department of Energy, where I was responsible for an office with a ~\$1 billion/year
20 budget related to research and development on CCS for power, industrial, and carbon
21 removal purposes, as well as non-CCS based forms of carbon removal. I currently serve
22 on the Board of the Carbon Removal Institute, and I am an expert reviewer for carbon
23 removal for Frontier Climate, a major purchaser of carbon removal capacity. I note that
24 CCS capturing CO₂ from biomass-based processes is generally considered to be a form of
25 carbon removal and is a topic I am familiar with from my academic, government, and
26 board work.

27 **Q. What is the purpose of this testimony?**

28 The purpose of this testimony is to offer an assessment of the GHG impacts of the
29 proposed Pilot Project and specifically whether, in my opinion, the Application has
30 demonstrated GHG reductions as is required by the governing California Public Utilities
31 Commission (“CPUC”) decision (D.22-02-025) and the regulation governing the use of
32 Cap-and-Trade allowance action proceeds.

1 **Q. What are your key findings and recommendations regarding the proposed Pilot**
2 **Project?**

3 **A.** Based on my review of the record in this matter, as well as my experience in evaluating
4 numerous pilot projects over the past 5 years, including biomethane interconnection and
5 use proposals, it is my recommendation that the Application be denied. My key concerns
6 with the Application and basis for this recommendation are:

- 7 1) **Failure to demonstrate GHG reductions:** SoCalGas proposes to use Cap-and-
8 Trade allowance auction proceeds to fund the proposed Pilot Project, but in my
9 opinion, it has not demonstrated that the proposed Project will achieve GHG
10 reductions. My analysis of the evidence in the record shows that major
11 inconsistencies in accounting for biogenic carbon dioxide (“CO₂”) and failure to
12 consider methane emissions from the Project challenges the validity of
13 SoCalGas’s claims. In my opinion, SoCalGas has not met the requirement in
14 D.22-02-025 and in the applicable regulations that it demonstrate GHG reductions
15 in its Application.
- 16 2) **High risk of GHG increases.** My analysis also shows that there is a high risk and
17 near certainty that the proposed Project will *increase* GHG emissions without a
18 carbon capture and storage (“CCS”) component, and some risk that the proposed
19 Project will increase GHG emissions even with a questionably viable CCS
20 component. This conflicts with California’s GHG reduction goals and the
21 requirements of D.22-02-025.

22 **II. CONCERNS WITH SOCALGAS’S CLAIMS OF GHG REDUCTIONS**

23 **Q. Please describe your understanding of SoCalGas’s proposed Pilot Project.**

24 **A.** My understanding is that the Application seeks approval of a pilot project that would
25 direct ratepayer funds to a SoCalGas pipeline upgrade and use any leftover funds to the
26 construction of a new, woody biomass gasification facility located over 50 miles from the
27 point of pipeline injection. The facility would be owned and operated by West Biofuels
28 and would be collocated with an almond processing facility. It would use woody biomass
29 feedstock in the form of almond orchard waste and almond shells as feedstock to make
30 methane. It could potentially use CCS to capture roughly 80% of the CO₂ that would
31 otherwise be vented into the atmosphere. The produced methane would be trucked to the
32 new interconnection point and injected into the SoCalGas pipeline network.

1 **Q. Please describe your understanding of the basis for SoCalGas’s claim that it has**
2 **demonstrated GHG reductions from the proposed Pilot Project.**

3 **A.** I understand SoCalGas to claim of GHGs reductions to be based primarily on an analysis
4 conducted by an engineer at the National Renewable Energy Law (“NREL”), which is
5 presented in Attachment 1 to SoCalGas’s Corrected Opening Testimony of James Lucas
6 and Mathew Summers (“Corrected Opening Testimony”). That analysis assumes a “base
7 case” and compares the total carbon intensity (“CI”) of the “base case” to the estimated
8 CIs of two “use cases” for the proposed Project. As explained in the Corrected Opening
9 Testimony at Table 2, the two use cases are the Project as proposed with and without
10 CCS added to facility to capture carbon emissions.⁴

11 The testimony asserts that the NREL analyst used a model called Greenhouse gases,
12 Regulated Emissions, and Energy use in Technologies (“GREET”) and finds that the CI
13 scores for both Project “use cases” are lower than the base case.⁵ On that basis, it claims
14 that the Project will reduce GHGs.⁶

15 **Q. What is carbon intensity and why is it relevant here?**

16 **A.** Carbon intensity is a term used to describe the amount of climate-affecting GHG emitted
17 per unit of a given product, like a unit of electricity. It is usually presented in terms of
18 carbon dioxide-equivalents (“CO₂e”), which is why we refer to it as a “carbon” intensity
19 even though it should include the impacts of non-carbon-based GHGs (for example, N₂O)
20 as appropriate. CI does not include the impacts of emissions that are not contributing to
21 human-caused climate change, such as water. For the same reason, by convention, it does
22 not include biogenic CO₂ emissions (e.g., from biomass decomposing, or from burning
23 plant-based material), as the CO₂ is generally understood to be taken up by new plants in
24 the near-term as they are replanted, rather than contributing to accumulating carbon
25 dioxide stocks in the atmosphere.

26 Carbon intensities expressed in CO₂e depend on a choice of equivalency factor that
27 attempts to characterize the relative impacts of different GHGs on climate warming,
28 usually a Global Warming Potential (“GWP”). For gases that do not last as long in the
29 atmosphere as CO₂, which persists for many generations, the CI is highly sensitive to the
30 policy choice of timeframe. For example, methane (“CH₄”), the principal component of
31 fossil and renewable natural gas, degrades in the atmosphere within a few decades and
32 thus has much greater climate impact in the near term. Evaluating impacts over 20 years

⁴ SoCalGas Corrected Chapter 2 Testimony at JLMS-13 to JLMS-16.

⁵ SoCalGas Corrected Chapter 2 Testimony at JLMS-13 to JLMS-16; *see also* SoCalGas Corrected Chapter 2 Testimony, Attach.1.

⁶ SoCalGas Corrected Chapter 2 Testimony at JLMS-16.

1 suggest that methane is about 80 times as impactful as CO₂, while evaluating them over
2 100 years suggests that methane is about 30 times as impactful as CO₂. Using the 100-
3 year timeframe is most typical, but many scholars and some jurisdictions (including New
4 York State and Maryland) require evaluation of methane’s impacts on a 20-year basis, in
5 part due to the point that near-term climate warming poses immediate risks.

6 “CI score” is a term sometimes used to refer to carbon intensity for a particular group of
7 produces, like electricity from different sources, when their climate impacts are being
8 directly compared, usually for the purpose of compliance or subsidy allocation. It is not
9 strictly a technical term, and CI scores might reflect policy decisions to declare carbon
10 intensities by definition for the purposes of particular policy implementations, rather than
11 to require full analysis of individual projects.⁷

12 **Q. What is the GREET model, and why is it relevant here?**

13 **A.** The GREET model is an Excel-based life cycle analysis tool developed by Argonne
14 National Laboratory for the U.S. government. There are multiple versions of GREET,
15 including both a research and development (“R&D”) model primarily for academic and
16 research use and several specific GREET implementations for specific policies (e.g.,
17 California’s Low Carbon Fuel Standard and the federal 45V hydrogen tax credit). The
18 model versions vary across assumptions, usually in service of ensuring that specific
19 policy choices are reflected in the calculation of CIs. Again, a CI or CI score is not an
20 objective measurement of emissions, in part because it necessarily includes factors for
21 comparing non-like things (e.g., different GHGs). Policy implementation priorities, such
22 as certainty for project developers, also mean that some policies declare rather than
23 measure inputs that are important for estimating the GHG impacts of a given project.
24 Different versions of GREET reflect these different policy goals.

25 **Q. Do you have concerns with the validity of SoCalGas’s stated claim that it has**
26 **demonstrated GHG reductions, specifically via analysis based on a GREET model?**

27 **A.** Yes. I have several concerns.

28 **Q. Please summarize your concerns with SoCalGas’s claim of GHG reductions.**

29 **A.** In my expert opinion, there are at least three reasons why the analysis upon which
30 SoCalGas relies is invalid and does not sufficiently demonstrate GHG reductions.

⁷ See, e.g., Grubert, Emily, Wilson Ricks, and Danny Cullenward. 2025. “Greenhouse Gas Offsets Distort the Effect of Clean Energy Tax Credits in the United States.” Environmental Research: Energy 2 (1): 015001. <https://doi.org/10.1088/2753-3751/ad9f65>.

1 First, SoCalGas has not demonstrated that its assessment of GHG reductions is consistent
2 with validated models of carbon intensity, despite claiming the estimates are from
3 GREET.

4 Second, even if SoCalGas were using GREET validly, which the documents available to
5 me suggest it is not, the assumptions embedded in the base case are questionable and
6 inconsistently applied. As a result, SoCalGas's conclusion that the Project's CI scores
7 indicate that the Project will reduce GHG emissions is unsupported.

8 Third, SoCalGas did not account for methane emissions associated with biosynthetic
9 natural gas ("Bio-SNG") (aka methane) manufacturing. As a result, it failed to account
10 for a major source of GHG emissions from the Project.

11 Fourth, SoCalGas's analysis of a potential CCS component for the Project has not
12 demonstrated viability. As a result, claims that my concerns about emissions are solvable
13 using CCS are unsupported.

14 **Q. Let's first discuss the first basis for your concern. Please elaborate on why it is your**
15 **expert opinion that SoCalGas's CI scores are misrepresented as validated estimates.**

16 **A.** Based on the documents made available to me, SoCalGas did not actually provide a
17 GREET model file in response to a data request but rather an Excel workbook containing
18 some assumptions derived from what it describes as the R&D GREET 2024 model, and
19 others from other sources.⁸ As such, I cannot comment on whether SoCalGas's claims
20 are consistent with California's implementation of GREET in other CI calculation
21 contexts, though I do note that the version of GREET referenced in the provided Excel
22 workbook ("R&D GREET 2024") is not California's state-specific GREET. The current
23 version was released in July 2025.⁹ Although CA-GREET is primarily used for the
24 implementation of the California's Low Carbon Fuel Standard, I would generally expect
25 a GREET-based analysis for California compliance to be consistent with, or at least very
26 clear on its lack of consistency with, the state-approved CI calculation model for fuels
27 like biomethane.

28 More generally, SoCalGas is claiming to be using GREET to calculate the CI score of the
29 Proposed Project but has not provided any evidence that its CI scores were actually
30 generated with any GREET model. The documentation provided suggests that CIs were
31 calculated in a bespoke workbook that happens to derive some assumptions, particularly

⁸ Attach. 3, SoCalGas Response to Sierra Club Data Request, Confidential SoCalGas Modeling Spreadsheet.

⁹ California Air Resources Board, CA-GREET4.0 Model,
<https://ww2.arb.ca.gov/resources/documents/lcfs-life-cycle-analysis-models-and-documentation>.

for fossil fuel comparators (which appear to be Low Sulfur Diesel and North American-Compressed Natural Gas) from the R&D GREET 2024 model.

Q. Let's now discuss your second concern, which is around the base case assumptions. What is your primary concern?

A. The concern I evaluated most carefully involves the claim that whole orchard recycling ("WOR") generates GHG emissions of 1700 g CO₂/kg applied biomass.¹⁰ I believe that this number is a substantial overestimate of the actual climate change-causing GHG emissions associated with WOR and reflects both inconsistent application of assumptions through the analysis and a math error.

Q. Please explain what methods you used to evaluate this assumption.

A. I reviewed the relevant literature and SoCalGas's Application, data request responses, and also changed inputs in the spreadsheet model that SoCalGas shared (which, as I noted above, is not GREET) to evaluate how changes in inputs and assumptions affected the model outputs which include GHG emissions and CI scores for the base case and use cases.

Q. In your opinion, what is the correct approximate WOR GHG emissions estimate?

A. Based on my evaluation of the relevant literature and my adjustments to the assumptions used in the spreadsheet model that SoCalGas disclosed, it is my opinion that the WOR GHG estimate is approximately -110 g CO₂e/kg biomass applied if soil carbon sequestration is considered, or 10 g CO₂e/kg if not.

Q. How does SoCalGas's use of an incorrect, inflated number for WOR GHG emissions affect its overall conclusion that the Project will reduce GHGs?

A. As explained above, SoCalGas claims GHG reductions based on a comparison of a base case (aka business as usual) CI scores to two project use case CI scores (with and without CCS). Based on this comparison, SoCalGas finds that because the project use case CI scores are lower than the base case, there are GHG reductions from the Project, regardless of whether CCS is used.¹¹ Given this methodology, it is critical to have correct base case GHG estimates and CI score.

In my opinion, the use of an incorrect, inflated estimate for the baseline WOR GHG emissions estimate undermines SoCalGas's conclusion that the Proposed Project will

¹⁰ Attach. 3, SoCalGas Response to Sierra Club Data Request, Confidential SoCalGas Modeling Spreadsheet, Baseline Case sheet at cell B30.

¹¹ SoCalGas Corrected Chapter 2 Testimony at JLMS-16.

1 reduce GHGs. I specifically evaluated the WOR base case both because the underlying
2 data were accessible to me and because it accounts for the majority of the biomass under
3 consideration (70% of 90%, or 63%).¹² Although all base case disposal method emissions
4 factors have a listed source, only the value for “Incorporation direct” cites to a source I
5 could access with high confidence that the value is the one being used – in this case, a
6 journal article.¹³

7 As such, what I claim is a very substantial overestimate of emissions – at minimum, 170
8 times what it should have been – has a high impact on the final Baseline Carbon Intensity
9 (“Baseline CI”, also referred to as “base case CI”) provided.

10 The inflated estimate for the base case emissions means that, when comparing base case
11 CI score to the Project’s use case CI score, the Project appears to produce lower GHG
12 emissions than the base case. In my opinion, if the correct base case WOR GHG
13 emissions estimates were used, the CI score for the base case would be lower, and the
14 Project would show higher GHG emissions than business as usual. This outcome is in
15 direct conflict with SoCalGas’s claim that a comparison of the CI score for the base case
16 to the CI scores of the use cases shows GHG reductions.

17 **Q. Please provide more information as to why you believe the WOR base case estimate**
18 **is incorrect and inflated, leading to an inaccurate and inflated base case CI score.**

19 The SoCalGas assumption in the spreadsheet that WOR generates GHG emissions of
20 1700 g CO₂/kg of applied biomass relies on a citation to Culumber et al. 2025, an
21 academic study that I read while preparing this testimony. In SoCalGas’s March 6, 2026
22 Response 4-1 to Sierra Club’s February 20, 2026 data request, SoCalGas states:

23 According to Culumber et al. (2025), most of the biogenic CO₂ is expected to
24 decompose and return to the atmosphere over time, with only 4.05 Mg C/ha
25 projected to remain in the soil after 20 years with whole orchard recycling
26 application rate of 61.6 Mg C/ha.¹⁴

¹² SoCalGas Corrected Chapter 2 Testimony at JLMS-15 (Table 1); SoCalGas Corrected Chapter 2 Testimony, Attach. 1, p. 3 (Table 1).

¹³ Attach. 3, SoCalGas Response to Sierra Club Data Request, Confidential SoCalGas Modeling Spreadsheet, Baseline Case sheet at cell I30.

¹⁴ Attach. 3, SoCalGas Response to Sierra Club Data Request 4, Question 4-1.

1 Based on my review of Culumber et al. 2025, I agree with this summary of the paper's
2 findings. However, SoCalGas goes on to state:

3 Considering that the biomass was 46.1% C and the relative molecular weights of
4 CO₂ and C, this results in flux of 1690 g CO₂e/kg of biomass applied.¹⁵

5 I disagree with this statement for several reasons.

6 Most importantly, in my opinion, the flow of biogenic CO₂ (from the decomposition of
7 plant matter) should not be counted toward the CI score, which measures GHG emissions
8 that contribute to climate change, as described above. Essentially, SoCalGas is claiming
9 that all of the carbon embodied in the woody biomass contributes to climate change,
10 including the component that remains in the soil for at least 20 years. This assumption is
11 inconsistent both with scientific convention, which assumes that biogenic CO₂ is carbon
12 neutral,¹⁶ and with assumptions elsewhere in SoCalGas's analysis. For example, the
13 analysis assumes that when methane derived from woody biomass is burned, the CO₂ is
14 carbon neutral.¹⁷ It is incorrect to assume that if woody biomass decomposes over time,
15 the resultant CO₂ emissions contribute to climate change, but if the same woody biomass
16 is converted to methane and then burned, the CO₂ emissions from the same carbon do not
17 contribute to climate change. This assumption is highly influential on the overall Baseline
18 CI, contributing 100.3 g CO₂e/MJ,¹⁸ or 70%, to the Baseline CI. Correcting for biogenic
19 CO₂ neutrality would adjust the GHG intensity of WOR to 10 g CO₂e/kg of applied
20 biomass.

21 Secondly, in my opinion, there is a math error in the analysis presented by SoCalGas.
22 Specifically, the estimate of 1690 g CO₂e/kg of biomass provided in SoCalGas's
23 Response 4-1 to Sierra Club's data request corresponds to the incorrect assumption that
24 all 61.6 million grams of carbon per hectare (Mg C/ha) returns to the atmosphere.¹⁹ As
25 stated in the response quoted above, Culumber et al. find that 4.05 Mg C/ha of the
26 originally applied 61.6 Mg C/ha remain in the soil after years. As such, the biogenic CO₂

¹⁵ Attach. 3, SoCalGas Response to Sierra Club Data Request 4, Question 4-1. Note that there are also 10 g CO₂e/kg of applied biomass attributed to other gas emissions, which I do not review here: this is the difference between the values of 1690 and 1700 (see same response).

¹⁶ See, e.g., Intergovernmental Panel on Climate Change ("IPCC"), Sixth Assessment Report, Climate Change 2023 Synthesis Report (2023), https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf.

¹⁷ Attach. 3, SoCalGas Response to Sierra Club Data Request, Confidential SoCalGas Modeling Spreadsheet, WIW sheet at row 28.

¹⁸ The original assumption is that 1700 gCO₂e/kg biomass are associated with WOR, driving a contribution of 100.9 gCO₂e/MJ to the Baseline CI: the value of 100.3 gCO₂e/MJ is the share of 100.9 associated with the 1690 gCO₂e/kg of biogenic CO₂, excluding the 10 gCO₂e/kg from other gases.

¹⁹ Attach. 3, SoCalGas Response to Sierra Club Data Request 4, Question 4-1.

emissions are ~1580 g CO₂/kg of biomass applied, not 1690 g CO₂/kg, using the calculation approach provided in the response. The impact of this error is minor numerically but demonstrates a lack of close attention to the source data.

In sum, after looking carefully at SoCalGas's model and the conclusions it drew from it, it is my opinion that SoCalGas's analysis and conclusions regarding the Project's CI score are insufficiently rigorous and thus unsupported.

Q. Do you see other problems with the assumptions used for the base case in the CI score analysis?

Yes. In my opinion, the SoCalGas analysis also fails to address the long-term carbon sequestration in soil of the "base case," which is another way it incorrectly inflates the CI score of the base case. In addition to not counting biogenic CO₂ emissions as climate contributors (as discussed above), it is relatively common practice to count decadal-scale carbon sequestration in soil as a negative emission (or net uptake).²⁰ Although this assumption is somewhat controversial when used to offset a long-term fossil-based CO₂ emission because of the impermanence of soil sequestration, it is common in carbon assessment settings, so I note also that accounting for the 4.05 Mg C/ha that Culumber et al. 2025 estimate are still stored in soil after 20 years post-WOR application as a sequestration would mean that WOR has a CI of -101 g CO₂e/kg of applied biomass, contributing to net carbon dioxide removal rather than emissions for this practice.

Q. Did you evaluate the other base case assumptions? If not, why not?

A. I did not carefully review the assumptions related to treatment of biogenic emissions for the Dairy Bedding Direct, Air Curtain Incinerator Direct, or Biomass Plant Direct because the sources were not easily available (e.g., the source for Dairy Bedding Direct is listed as "NREL data").

Q. Although you have not evaluated these other base case assumptions, do you have an opinion about what would occur if an error were present for these factors similar to the error that is present for the WOR assumption?

A. Yes. If a similar error is present for these factors, the baseline CI for the woody biomass is likely negative, indicating that the Project would need to demonstrate net GHG removals to claim better climate performance than the business-as-usual fate for woody biomass.

²⁰ See, e.g., U.S. Dep't of Energy, "DOE Explains...Carbon Sequestration," <https://www.energy.gov/science/doe-explainscarbon-sequestration>; Paustian, Keith, Eric Larson, Jeffrey Kent, Ernie Marx, and Amy Swan. 2019. "Soil C Sequestration as a Biological Negative Emission Strategy." *Frontiers in Climate* 1 (October). <https://doi.org/10.3389/fclim.2019.00008>.

1
2 **Q. Please summarize your concerns with SoCalGas’s methodology for calculating the**
3 **CI score of the Project.**

4 In my opinion, SoCalGas has not provided a CI score estimate that is consistent with
5 California’s validated approaches for calculating CI (e.g., through CA-GREET or a
6 modified version of that model that has been vetted and approved by the CPUC), and as
7 explained above, it appears to have misrepresented that its CI calculations—which have
8 grave inconsistencies embedded—were done through a widely used, validated model
9 (e.g. GREET). In fact, in my expert opinion based on the documentation made available
10 to me, SoCalGas did not use GREET. Further, the CI scores it reports are inaccurate such
11 that SoCalGas’s statements in the Corrected Testimony that the Project will reduce GHGs
12 are unsupported by the record.

13 **Q. Your third concern is about methane emissions. Please explain why, in your view,**
14 **methane emissions are a problem.**

15 **A.** In my opinion, excluding methane emissions associated with the Bio-SNG plant from the
16 analysis of the Project’s CI is a highly concerning decision, both because SoCalGas is
17 required to consider these emissions and because the Project is predicated on the intent to
18 manufacture a GHG: Bio-SNG (also known as RNG or biomethane) is essentially pure
19 methane, and but for this Project, the methane in question would not have existed. As
20 such, any methane that escapes from the system contributes to climate change. Note that
21 the methane in this case contributes to climate change even if one assumes that the CO₂
22 does not, because the methane would not have existed without this Project, but the CO₂
23 would have because that is what biomass becomes when it breaks down in the presence
24 of oxygen. Methane is a powerful GHG, creating a warming impact of ~30-80 times that
25 of CO₂ on a mass basis.

26 Operational data on methane emissions from plants like the one proposed by SoCalGas
27 are rare, but literature estimates from other methane-generating activities suggest they
28 can be quite high, as with a study of biogas plants that found emissions of 0.4-14.9% of
29 methane by mass.²¹ As I have modeled in my peer-reviewed, published research,²² any
30 project that creates new methane must factor in these emissions when evaluating the
31 project’s CI scores, and SoCalGas should be responsible for providing conservative

²¹ Scheutz, Charlotte, and Anders M. Fredenslund. 2019. “Total Methane Emission Rates and Losses from
23 Biogas Plants.” Waste Management 97 (September): 38–46.

<https://doi.org/10.1016/j.wasman.2019.07.029>.

²² Grubert, Emily. 2020. “At Scale, Renewable Natural Gas Systems Could Be Climate Intensive: The
Influence of Methane Feedstock and Leakage Rates.” Environmental Research Letters 15 (8): 084041.

<https://doi.org/10.1088/1748-9326/ab9335>.

engineering estimates for potential methane losses. Also, in my analysis, CCS would not address these emissions, as it only manages CO₂.

Q. Please describe how you think methane emissions of this Proposed Project should be evaluated.

A. I have developed a peer-reviewed model for this purpose, and, in my expert opinion, I believe it can be used to evaluate methane emissions from this Project. Using my model²³ for intentionally produced methane, as for this Project, emissions for both the Bio-CNG and Bio-CNG w/ CCS cases would be 2-88 g CO₂e/MJ higher than the emissions range above (i.e. 0.4-14.9% methane emissions, mass basis) using CA-GREET4.0's GWP-100 for methane of 25. This value (i.e., 25 kg CO₂e/kg CH₄, 100 year basis) is lower than the most current international consensus on methane's warming impact (27 kg CO₂e/kg CH₄, 100 year basis, non-fossil methane),²⁴ which would suggest additional CO₂e impact of 2-95 g CO₂e/MJ on a 100-year basis, or 6-280 g CO₂e/MJ on a 20-year basis. I further observe that according to SoCalGas's March 6, 2026 Response 4-2 to Sierra Club's February 20, 2026 data request, it notes use of a GWP-100 of 30 for methane, citing "AR5," (i.e., the IPCC 5th Assessment Report).²⁵ This GWP-100 value is neither the one used by the State of California (which is 25), nor the one that has been internationally accepted since the publication of the IPCC 6th Assessment Report several years ago (which is 27 for non-fossil methane).²⁶

It is difficult to establish the threshold at which fugitive methane emissions would make even the Bio-SNG w/ CCS case a larger emitter than the baseline disposal practices for the woody biomass in question given the inconsistencies related to biogenic CO₂ described above. If all CI contributors for the alternative fate cases are biogenic; WOR results in some carbon sequestration; and the Bio-SNG plant's direct CO₂ emissions are also entirely biogenic, the threshold would be around 15% over 100 years, which is high but within the range of observations; on a 20-year basis, the threshold would be around 5.6%. A full evaluation would require complete information on the nature of the CO₂ emissions across biomass fates.

²³ Grubert, Emily. 2020. "At Scale, Renewable Natural Gas Systems Could Be Climate Intensive: The Influence of Methane Feedstock and Leakage Rates." Environmental Research Letters 15 (8): 084041. <https://doi.org/10.1088/1748-9326/ab9335>.

²⁴ See IPCC, Sixth Assessment Report, Climate Change 2023 Synthesis Report (2023), https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf.

²⁵ Attach. 3, SoCalGas Response to Sierra Club Data Request 4, Question 4-2.

²⁶ See IPCC, Sixth Assessment Report, Climate Change 2023 Synthesis Report (2023), https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf.

1 **Q. Your fourth concern is around the viability of the potential carbon capture and**
2 **sequestration component of the Project. Please explain why, in your view, CCS**
3 **success is highly uncertain.**

4 **A.** In my opinion, which is informed by my experience running the federal Carbon
5 Management program through the Department of Energy, SoCalGas's description of a
6 potential CCS element of this Project does not account for major challenges and
7 uncertainties with CCS deployment. Woody biomass gasification with CCS has not been
8 commercially demonstrated, to my knowledge, and analysis has suggested that even if the
9 technology succeeds, costs would be extremely high.²⁷ In this case, my expert opinion is
10 that proposing a pilot where leftover funds from pipeline upgrades would be used to
11 construct a biomass gasification plant, and maybe a CCS component, signals a lack of
12 rigorous engineering work focused on the technological and cost challenges of
13 successfully completing such a project. Without far more detail on the CCS project's
14 technological challenges, costs, and contingencies, it is my opinion that the CCS element
15 should be considered unlikely to move forward, and that the Project's CI scores should be
16 evaluated primarily based on the no-CCS case.

17 Even if the CCS element were successfully implemented, CI scores would need to be
18 estimated much more carefully than the current analysis has done. In addition to
19 accounting for biogenic versus non-biogenic CO₂ shares across base and project cases
20 and accounting for methane emissions, which CCS does not reduce, the CI score should
21 reflect the ultimate fate of the captured CO₂. For a small project like this one, given the
22 lack of commercially available CO₂ storage facilities, I would be concerned about
23 reemissions of the CO₂—for example, if the captured CO₂ were converted to a fuel
24 (which releases the CO₂ when burned), used for commercial purposes like beverages or
25 greenhouse agriculture, or stored in a manner that offsets natural CO₂ uptake (e.g., in
26 concrete). If the CO₂ were to be geologically stored, in my opinion, SoCalGas would
27 need to provide estimates of reservoir leakage in addition to demonstrating access to
28 funding and permits to secure CO₂ transportation and geologic storage, which is typically
29 understood to rely on a type of well (Class VI) that had never been permitted in the State
30 of California before the end of 2024.²⁸

²⁷ See, e.g., California Energy Commission, Renewable Natural Gas Production from Woody Biomass via Gasification and Fluidized-Bed Methanation (2020), <https://www.energy.ca.gov/publications/2020/renewable-natural-gas-production-woody-biomass-gasification-and-fluidized-bed>.

²⁸ California Resource Corporation, CRC's Carbon TerraVault Receives EPA Permits for CO₂ Injection and Storage in California (Dec. 31, 2024), <https://www.crc.com/news-releases/news-release-details/crcs-carbon-terravault-receives-epa-permits-co2-injection-and> (last visited Mar. 13, 2026).

1 **III. RISK OF GREENHOUSE GAS INCREASES**

2 **Q. Do you also have concerns about this Project increasing GHG emissions.**

3 **A.** Yes.

4 **Q. Please explain why, in your opinion, there is a risk that this proposed Project will**
5 **increase GHGs.**

6 **A.** In my opinion, there are several reasons why this Project will likely increase GHG
7 emissions relative to the stated counterfactual fates for the biomass in question.

8 First, as noted above, my research has demonstrated that because of system methane
9 leakage, any intentionally produced methane will increase emissions – regardless of
10 source.

11 Second, *even assuming methane emissions are 0*, which is extremely unlikely based on
12 the way that essentially all other methane-based systems work, the analytical
13 inconsistencies related to accounting for biogenic CO₂ suggest that in fact, the
14 counterfactual baseline has lower GHG emissions than the Project. Thus, on its face, the
15 Project will increase GHG emissions relative to what would have happened anyway.

16 Third, simply demonstrating that the emissions from this Project could be lower than
17 fossil fuel-based vehicle fuels is not the same as demonstrating reduced GHGs from this
18 potential Project, particularly given that California's strict GHG constraints mean that
19 fossil fuel-based vehicle fuels are not an appropriate comparator.

20 **Q. In your evaluation, based on modifications of the spreadsheet that SoCalGas**
21 **provided, does the base case have lower GHG emissions than the Project use case**
22 **without CCS?**

23 **A.** Yes, based on my best expert opinion of which emissions are likely to be biogenic,
24 without access to full information. In my evaluation, based on modifications of the
25 SoCalGas-provided spreadsheet, the base case has lower GHG emissions than the no-
26 CCS use case, even without accounting for methane. This is the case when 1) only the
27 WOR incorporation CI is biogenic or 2) all direct GHG emissions associated with the
28 biomass – both for the Bio-SNG plant and for all alternative fates – are biogenic. It is
29 possible that some end uses have mixed biogenic and non-biogenic CO₂ and other GHG
30 emissions, which would require additional evaluation to confirm this claim.

1 **Q. Is there sufficient information about the fate of captured CO₂ to evaluate the GHG**
2 **emissions from the CCS use case?**

3 **A.** No. In my opinion, there is insufficient information about the fate of captured CO₂ to
4 evaluate the GHG emissions of the CCS use case. Therefore, in my opinion, the reported
5 CI score for this use case is not supported.

6 **Q. Given your conclusions about GHG risk, in your opinion, is this Project consistent**
7 **with California’s goal of reducing short-lived climate pollutants, as expressed in**
8 **Commission decision D.22-02-025?**

9 **A.** No. In my opinion, this Project is not consistent with the California goal, reiterated in
10 D.22-02-025, of reducing short-lived climate pollutants (“SLCPs”) and GHGs. Rather
11 than reduce SLCPs and GHGs, the Project risks increasing them.

12 **Q. In D.22-02-025, the Commission requires gas utilities to “require biomethane**
13 **producers to include a methane leak standard in the . . . life cycle carbon intensity**
14 **accounting in the modified [GREET] Model.”²⁹ Based on your review of the**
15 **Application, does such standard exist in the lifecycle model presented in the**
16 **Application?**

17 **A.** No, it does not.
18

19 **Q. What role, if any, do you think the intentional production of methane from woody**
20 **biomass could play in California’s effort to reduce SLCPs?**

21 **A.** Intentionally producing methane from woody biomass is unlikely to reduce SLCP
22 emissions, as methane is an SLCP and methane-based systems emit some methane.
23 Methane production from woody biomass and other resources could plausibly contribute
24 to overall GHG reduction goals if it is used only in cases where methane specifically is
25 required (as for feedstocks) and where fossil methane systems have been fully phased
26 out. That is, because the combustion emissions from biogenically derived methane do not
27 contribute to climate change as much as those from fossil derived methane, some
28 methane emissions might be acceptable in exchange for continued access to truly
29 methane-dependent services once fossil methane is gone.

30 **Q. Given these deficiencies and the likely emissions increases, is it your opinion that the**
31 **Commission should approve the Application?**

32 **A.** No. In my view, the Commission should deny the Application.

²⁹ CPUC, D.22-02-025, Ordering Paragraph 49.

1 **Q. Please summarize why, in your opinion, denial is appropriate.**

2 I reach this opinion because of the near certainty that this proposed Project will increase,
3 rather than decrease, GHG emissions and other pollutants. Having read the relevant
4 sections of D.22-02-025, I understand the Commission to have ordered SoCalGas to
5 propose a pilot project that complies with the CARB regulations governing the use of
6 Cap-and-Trade allowance auction proceeds. Further, I understand that California is a
7 state with GHG and SLCP reduction targets that it is attempting to meet. And my
8 understanding of the regulations that apply to the use of Cap-and-Trade allowance
9 auction proceeds is that utilities must demonstrate that they are being used to
10 demonstrably reduce GHGs or else return the proceeds to ratepayers. Given SoCalGas's
11 failure to demonstrate emissions reductions, and the risk of GHG emissions increases, I
12 do not think these requirements have been met, and as a result, I believe denial of the
13 Application is appropriate.

14 **Q. Does this conclude your testimony?**

15 **A. Yes.**

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Q. Please state your name, position, and organization.

Q. Please summarize your qualifications.

I have over thirty years of project management experience and have successfully managed and executed hundreds of projects in this time period. This includes basic and applied research projects, design projects, regulatory compliance projects, permitting projects, energy studies, risk assessment projects, and projects involving the communication of environmental data and information to the public.

I have provided consulting services to numerous private sector, public sector and public interest group clients. My major clients over the past three decades include various trade associations as well as individual companies such as steel mills, petroleum refineries, chemical plants, cement manufacturers, aerospace companies, power generation facilities, lawn and garden equipment manufacturers, spa manufacturers, chemical distribution facilities, land development companies, and various entities in the public sector, including the U.S. Environmental Protection Agency (“U.S. EPA”), the U.S. Department of Justice, several states (including New York, New Jersey, Connecticut, Kansas,

Oregon, New Mexico, Pennsylvania, and others), various agencies such as the California Department of Toxics Substances Control, and various cities and municipalities. I have executed projects in all 50 U.S. states, numerous local jurisdictions, and internationally.

In addition to consulting, for approximately two decades, I taught numerous courses in several Southern California universities as adjunct faculty, including University of California (“UC”) Los Angeles (air pollution), UC Riverside (air pollution, process hazard analysis), and Loyola Marymount University (air pollution, risk assessment, hazardous waste management). I also taught at Caltech, my alma mater (various engineering courses), at the University of Southern California (air pollution controls), and at California State University, Fullerton (transportation and air quality).

Over the past three decades I have evaluated at least 30-40 pilot projects in a number of industries, including material processing, waste disposal, energy generation, chemical transformations, and others.

My CV is included with this testimony as Attachment 2. It includes a summary of the expert testimony I have provided before various administrative and judicial bodies, including state and Federal courts and public utility commissions.

Q. What is the purpose of this testimony?

A. The purpose of this testimony is to offer an assessment of the emissions impacts of the proposed Pilot Project facility and specifically whether, in my opinion, the Application has met the requirements of the governing California Public Utilities Commission (“CPUC”) Decision (“D.”) 22-02-025 to study and report emissions, including methane leakage, and to demonstrate greenhouse gas (“GHG”) reductions given facility emissions. I will also offer an opinion on the impacts of the Project’s emissions on any environmental and social justice communities.

Q. Are you familiar with other projects that have intentionally produced methane from biogenic sources?

A. Yes.

Q. Please describe those other projects.

A. I evaluated the Application of Pacific Gas & Electric submitted to the CPUC in 2023. It proposed to convert woody biomass to methane at a different West Biofuels Facility in Woodland, California. I was involved in projects in the mid-1990s in Hawaii where methane was produced from sugarcane bagasse. In the last decade, I have reviewed and provided technical comments on the quantification of emissions from projects that convert livestock waste and other agricultural waste to livestock.

1 **Q. What are your key findings and recommendations regarding the proposed Pilot**
2 **Project?**

3 **A.** Based on my review of the record in this matter, as well as my experience in evaluating
4 numerous pilot projects over the last three-plus decades, it is my recommendation that the
5 Application be denied. My key concerns with the Application and basis for this
6 recommendation are:

- 7 1) **Air pollutants and impacts on environmental and social justice communities:**
8 In addition to emitting GHGs, the proposed Project will also emit other health-
9 harming air pollutants. My review of the available data shows that the facility will
10 emit a range of air pollutants, and in greater quantities than at present, that are
11 harmful to human health. These emissions will occur in and around Kerman, CA,
12 the location of the proposed Project, which is ranked in the 88th percentile for
13 pollution burdens in CalEnviroScreen.³⁰ CalEnviroScreen also indicated that
14 Kerman, CA is a “disadvantaged community,”³¹ which means it may include
15 areas “disproportionately affected by environmental pollution and other hazards
16 that can lead to negative public health effects, exposure, or environmental
17 degradation” or areas “with concentrations of people that are of low income, high
18 unemployment, low levels of homeownership, high rent burden, sensitive
19 populations, or low levels of educational attainment.”³² In my opinion, as a result
20 of the facilities’ emissions, there will be increased air pollution in this community.
21
- 22 2) **Air emissions study and reporting:** Based on my assessment of the available
23 information, SoCalGas has not shown that the emissions from the proposed Pilot
24 Project will be studied and reported as the Commission required in D.22-02-
25 025.³³ There is insufficient information about the proposed Project’s design, the
26 emissions that would result from the Project, the emissions monitoring
27 technologies that will be used, where such monitors will be located, and how
28 frequently emissions will be monitored and reported. It is my opinion that without

³⁰ State of California Office of Env’t Health Hazard Assessment, “CalEnviroScreen 4.0 Indicator Maps” (last visited Mar. 9, 2026), <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40> (a search for “8325 S Madera Ave, Kerman, CA, 93630, USA.” in the Map of CalEnviroScreen 4.0 Indicator generated an 88th percentile result for Pollution Burden).

³¹ State of California Office of Env’t Health Hazard Assessment, “SB 535 Disadvantaged Communities” (last visited Mar. 9, 2026), <https://oehha.ca.gov/calenviroscreen/sb535> (a search for the address of the proposed Project—i.e. “8325 S Madera Ave, Kerman, CA, 93630, USA” as indicated in SoCalGas’s December 22, 2025 Response 4 to Cal Advocates’ December 8, 2025 data request—in the SB535 Disadvantaged Communities map generated a “Disadvantaged Community” designation as indicated by red shading).

³² Cal. Health & Safety Code § 39711(a).

³³ D. 22-02-025, Ordering Paragraph 43.

important additional details relating to project design emissions estimates, and how emissions are to be monitored including monitor types, locations, and durations, it is impossible to determine whether the proposed Project complies with D.22-02-025 and whether the proposed Project will ensure emissions are properly characterized and avoided to protect air quality for impacted communities and prevent GHG increases.

This absence contravenes the very purpose of a pilot project, which, in my experience, is to gather detailed information about the pilot's performance, including emissions, so that impacts can be fully evaluated and disclosed, thereby informing decision-making. It is my opinion that SoCalGas has failed to build in such a process for this proposed Pilot Project.

- 3) **Greenhouse gases:** SoCalGas proposes to use Cap-and-Trade allowance auction proceeds to fund the proposed Pilot Project, but in my opinion, it has not demonstrated that the proposed Project has any chance of achieving GHG reductions, since presumed GHG reductions are all based on a speculative use of carbon capture and sequestration ("CCS") of a portion of the CO₂ that will result from the Pilot Project. My analysis of the evidence in the record shows that there is a high risk and near certainty that the proposed Project will *increase* GHG emissions as well as other types of health-harming pollutants. In my opinion, this conflicts with the Commission's D. 22-02-025 and California's climate goals.

II. PROPOSED PROJECT EMISSIONS CONCERNS

Q. What is your understanding of what SoCalGas proposes to fund with the Cap-and-Trade allowance auction proceeds?

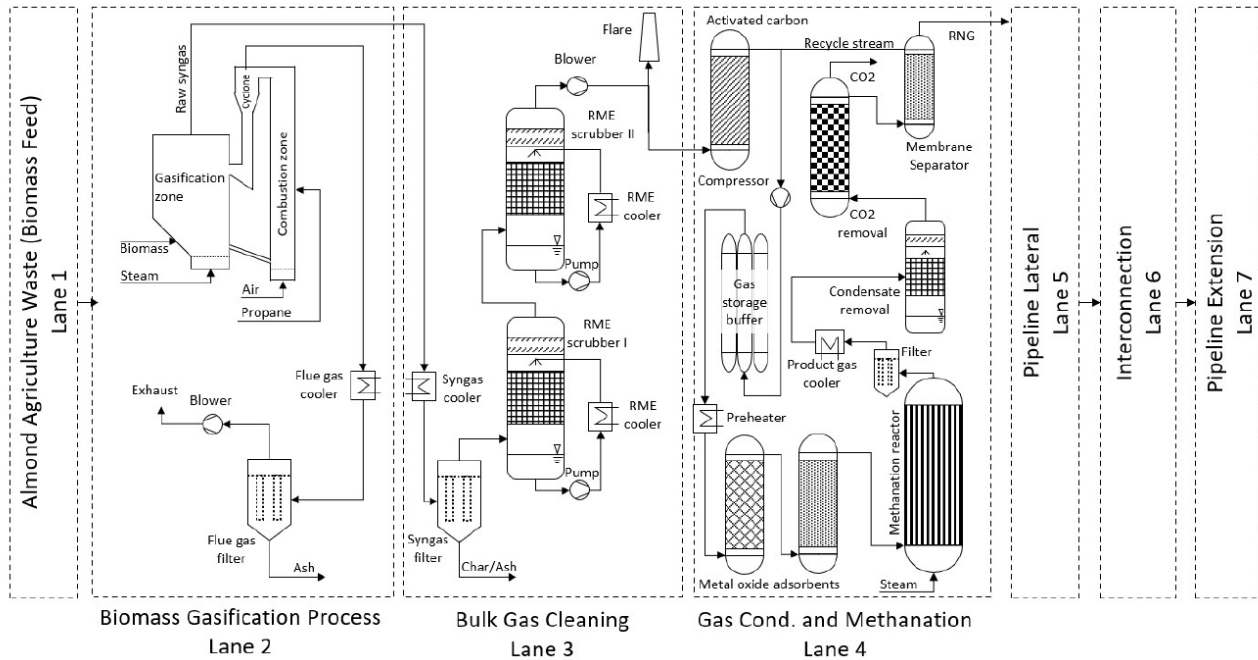
- A.** My understanding, which is based on my review of SoCalGas's Application and Corrected Opening Testimony, is that SoCalGas proposes to use Cap-and-Trade allowance auction proceeds to fund modifications to its pipeline system and related infrastructure in Visalia, CA. If funds remain after these modifications, SoCalGas proposes to use those remaining funds to support the construction of a biomass gasification facility in Kerman, California. This facility will be owned and operated by West Biofuels LLC.

Q. What is depicted in this schematic, which we will call Figure 1?

- A.** This figure is from SoCalGas's December 22, 2025 Response 4 to California Public Advocates' ("Cal Advocates") December 8, 2025 data request. It depicts a "process flow diagram" of the West Biofuels facility that would be built as part of the Pilot Project, if there are funds remaining after SoCalGas's investment in its own pipeline infrastructure.

Figure 1: WBF Process Flow Diagram

WBF Process Flow Diagram



Q. Please describe your understanding of the basic proposed Pilot Project facility design.

A. My understanding, which is based on the descriptions provided in the SoCalGas Application, the Corrected Opening Testimony of James Lucas and Matthew Summers (“Corrected Testimony”), and SoCalGas’s responses to Intervenor’s data requests, is that the facility would be designed to convert woody biomass into methane via gasification and methanation. Specifically, based on the description provided in Figure 2, Section III.A, and Section III.C of the Corrected Testimony, my understanding is that the basic proposed design is the gasification of the biomass to create syngas, followed by the cleanup of the syngas to enable its methanation to form bio-synthetic natural gas (“Bio-SNG”). According to my review, these are accomplished in Lanes 2 and 3 of Figure 2 in the Corrected Opening Testimony. This Bio-SNG is then processed in Lanes 4-10 in Figure 2 in the Corrected Opening Testimony to enable its transport via truck to an injection point, where it would be injected into the SoCalGas pipeline system in Visalia.

Additional details of the process in Lanes 2 and 3 are shown in Figure 1 (referenced above), which as noted was provided in SoCalGas’s December 22, 2025 Response 4 to

1 Cal Advocates' December 8, 2025 data request. I note that Lanes 2 and 3 steps in
2 Corrected Testimony Figure 2 are shown as Lanes 2, 3, and 4 in Figure 1.

3 **Q. To your knowledge, what does the gasification of woody biomass entail?**

4 **A.** Gasification seeks to convert biomass (or carbonaceous raw materials) into synthesis gas
5 (or syngas), composed mainly of carbon monoxide ("CO") and hydrogen.³⁴ Typically
6 gasification occurs in a gasifier, a high temperature/pressure vessel, in which the
7 feedstock biomass and steam are reacted to form syngas. In the proposed design of the
8 gasified discussed below, combustion is a part of the gasification process. Therefore, a
9 range of combustion-generated air pollutants will be created, which will include so-called
10 criteria air pollutants such as NOx, CO, and particulate matter as well as other, which I
11 will collectively refer to as "air toxics."

12 **Q. To your knowledge, in this proposed Project, how will gasification occur?**

13 **A.** Based on my review of SoCalGas's Application, Opening Testimony, and responses to
14 Intervenor data requests, and my knowledge of gasification more generally, the
15 gasification step in the Project will used a Fast Internally Circulating Fluidized Bed
16 ("FICFB"), which will used a dual fluidized bed gasification system using synthetic bed
17 material to transfer heat from the combustion zone to the gasification zone. Biomass will
18 be fed into the gasification zone via a screw auger where it will be thermochemically
19 converted to raw syngas via contact with the hot fluidized bed material and steam. The
20 steam will be provided from other parts of the process via heat recovery.³⁵ The bed
21 material and the non-gasified remaining char will be transported to the combustion side
22 by gravity where air will be injected and the char will be combusted to heat the bed
23 material. The hot bed material will be lifted up the riser with the combustion flue gases
24 into a cyclone where the bed material and flue gases will be separated. The reheated bed
25 material will be reintroduced into the fluidized bed gasification chamber while the flue
26 gases continue through the flue gas treatment system.

27 The raw syngas from gasification will then be cleaned to remove impurities (see Lane 3
28 in the excerpted Figure 1 above) before proceeding to methanation.

³⁴ See U.S. Dep't of Energy, "Hydrogen Production: Biomass Gasification,"
<https://www.energy.gov/eere/fuelcells/hydrogen-production-biomass-gasification#:~:text=Biomass%20gasification%20is%20a%20mature,and%20other%20products%2C%20without%20combustion.>

³⁵ Attach. 3, SoCalGas Response to Sierra Club Data Request 3, Question 3-2a.

1 **Q. To your knowledge, will this Project include some amount of biomass combustion?**

2 **A.** Yes. The FICFB explicitly has a combustion zone.

3 **Q. To your knowledge, what does the methanation of woody biomass entail?**

4 **A.** Methanation is the conversion, after gasification, of the remaining CO₂ in the syngas to
5 methane.

6 **Q. To your knowledge, how will methanation occur in this proposed Project?**

7 **A.** As described in SoCalGas's Corrected Testimony Section III.C, and as shown in Lane 4
8 in the excerpted Figure 1 above, the conversion of the syngas into Bio-SNG is to be
9 accomplished through a catalytic methanation process followed by cleaning of the Bio-
10 SNG stream via removal of water, unreacted hydrogen and carbon monoxide. These
11 recovered impurity gases from the process supposed to be recycled back to the
12 methanation unit for further conversion to Bio-SNG.

13 **Q. Have you evaluated a similar facility design? If so, where?**

14 **A.** Yes. A very similar facility design and gasification and methanation process using FICFB
15 was presented in the Application of Pacific Gas & Electric Company, A.23-6-023, which
16 proposed to fund modifications to an existing biomass gasification owned and operated
17 by West Biofuels in Woodland, California.³⁶ I submitted testimony analyzing the
18 potential emissions impacts of that facility.³⁷ To provide that testimony I examined the
19 facility design and emissions data carefully. I note that SoCalGas references the
20 performance and operation of this West Biofuels facility as relevant to this proceeding.³⁸

21 **Q. Please summarize how, in your opinion, the proposed Pilot Project will impact**
22 **emissions from each "Lane" presented in Figure 1?**

23 **A.** Based on what is shown in just Lanes 2-4 in Figure 1, as well as prior processing of the
24 biomass before it can be gasified and the steps after methanation up to pipeline injection,

³⁶ PG&E Application, A.23-6-023 at 2,
<https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M512/K707/512707890.PDF>; PG&E Prepared
Testimony (Public Version) at 1-7,
<https://docs.cpuc.ca.gov/PublishedDocs/SupDoc/A2306023/6419/513343059.pdf>.

³⁷ Testimony of Ranajit (Ron) Sahu and Sasan Saadat on Behalf of the Sierra Club, A.23-06-023 (Feb. 16,
2024), <https://docs.cpuc.ca.gov/PublishedDocs/SupDoc/A2306023/7054/525583319.pdf>; Supplemental
Testimony of Ranajit (Ron) Sahu on Behalf of the Sierra Club, A.23-06-023 (Apr. 29, 2024),
<https://docs.cpuc.ca.gov/PublishedDocs/SupDoc/A2306023/7272/530646456.pdf>.

³⁸ Attach. 3, SoCalGas Response to Sierra Club Data Request 2, Question 2-13(a)-(b); Attach. 4,
SoCalGas Response to Cal Advocates Data Request 2, Question 9a; *see also* SoCalGas Corrected Chapter
2 Testimony at JLMS-22 (noting experience working at the facility).

1 there are multiple potential sources of air pollutant emissions consisting of a wide range
2 of pollutants. Specifically:

- 3 1. Lane 2 – Biomass Gasification Process. This lane will include emissions of GHGs,
4 criteria pollutants and air toxics from the exhaust, as well as fugitive methane, also a
5 GHG.
- 6 2. Lane 3 and 4 – Bulk Gas Cleaning and Gas Conditioning and Methanation. This lane
7 will include emissions of GHGs, criteria pollutants and air toxics from the flare, as
8 well as fugitive methane.

9 **Q. In your assessment, what will be the likely emissions from Lane 2, the biomass**
10 **gasification process?**

11 **A.** It is my opinion that air pollutants will be emitted from the emission point noted as
12 “Exhaust” in Figure 1, Lane 2. Specifically, given the FICFB combustion zone, this
13 exhaust stream will contain a range of criteria pollutants, GHG, and combustion-
14 generated air toxics. Further, fugitive emissions of methane from various components in
15 this Lane, such as connectors, valves, pump seals, and storage devices, as indicated in
16 Figure 1 will also occur.

17 **Q. In its March 3, 2026 Response 3-2d to Sierra Club’s February 18, 2026 data request,**
18 **SoCalGas lists exhaust emissions to be monitored by the local air district as O₂ and**
19 **NO_x, as well as “periodic third-party testing of all criteria pollutant emissions[.]”³⁹**
20 **In your assessment, is this statement an accurate listing of the likely emitted**
21 **pollutants?**

22 **A.** No, because, in my expert opinion, Response 3-2d to the Sierra Club states that this
23 exhaust will only contain NO_x and “criteria pollutants” alone. SoCalGas omits other
24 pollutants that, in my opinion, will be emitted including GHGs such as CO₂ and N₂O as
25 well as a range of combustion air toxics such as benzene, toluene, xylenes, hexane,
26 formaldehyde, and acetaldehyde, among others.

27 **Q. In your opinion, why will the emissions from Lane 2 increase as a result of the**
28 **proposed Project?**

29 **A.** These emissions described above from Lane 2 “exhaust” would not occur but for the
30 proposed Pilot Project. Therefore, they are directly emissions increases as a result of the
31 proposed Project.

³⁹ Attach. 3, SoCalGas Response to Sierra Club Data Request 3, Question 3-2d.

1 **Q. Based on your knowledge, please explain the potential emissions from Lane 3, the**
2 **bulk gas cleaning process.**

3 **A.** Emissions from Lane 3, gas cleaning, will consist of emissions from the “flare” indicated
4 in Figure 1 when the downstream methanation process cannot accept the syngas from
5 Lane 3. In my opinion, flaring of the syngas will produce a wide range of combustion-
6 generated pollutants including criteria pollutants such as NO_x, CO, PM_{2.5} as well as CO₂,
7 uncombusted methane, N₂O and also a range of air toxics such as benzene, toluene,
8 xylenes, hexane, formaldehyde, acetaldehyde, and others. Furthermore, as with Lane 2, it
9 is my opinion that there will likely be fugitive methane leakage from various components
10 in this lane such as connectors, valves, pump seals, and storage devices.

11 **Q. In its March 3, 2026 Response 3-2c to Sierra Club’s February 18, 2026 data request,**
12 **SoCalGas states that this flare will be used “infrequently.”⁴⁰ Does this statement**
13 **impact your conclusion that emissions from the flare are likely?**

14 **A.** No. In my opinion, even though this flare is supposed to be used “infrequently[,]”⁴¹ it is
15 my experience that flaring can be considerable in pilot projects because of the very nature
16 of these projects, in which there is no assurance that the new methanation process will
17 always be available. It is my opinion that considerable downtimes in the various
18 processes in methanation will mean that the syngas cleaned in Lane 3 has to be flared.

19 **Q. SoCalGas states in its February 23, 2026 Response 2-14a to Sierra Club’s February**
20 **9, 2026 data request that the flare will only be used 0.5% of the hours.⁴² It also**
21 **states in its March 11, 2026 Response 5-9f to Sierra Club’s February 25, 2026 data**
22 **request that “WBF estimates the flare will be used for a maximum of 10 minutes for**
23 **an initial startup or emergency shutdown of the methanation system. In the first**
24 **year, which includes commissioning, WBF anticipates up to 120 startups and**
25 **shutdowns which is the basis for less than 0.5% of hours. After the facility is**
26 **commissioned, WBF only anticipates approximately 8 to 10 startups/shutdowns**
27 **annually.”⁴³ Do these responses address your concerns with flare emissions? If not,**
28 **why not?**

29 **A.** No, these responses do not address my concerns. In my opinion, there is a high risk if not
30 certainty that the flare will operate much more frequently than anticipated by SoCalGas,
31 thereby releasing a substantial amount of health-harming emissions. I based this opinion
32 on several factors: first, this is a pilot project where experimentation with the process,

⁴⁰ Attach. 3, SoCalGas Response to Sierra Club Data Request 3, Question 3-2c.

⁴¹ Attach. 3, SoCalGas Response to Sierra Club Data Request 3, Question 3-2c.

⁴² Attach. 3, SoCalGas Response to Sierra Club Data Request 2, Question 2-14a.

⁴³ Attach. 3, SoCalGas Response to Sierra Club Data Request 5, Question 5-9f.

1 especially the methanation step, will occur regularly. Indeed, based on the information I
2 have reviewed and based on my experience reviewing West Biofuels's project at
3 Woodland proposed by Pacific Gas & Electric Company ("PG&E") in A.23-06-023,
4 West Biofuels does not have much experience with syngas generation or methanation.
5 The associated experimentation necessarily entails many stops and starts and generation
6 of syngas that is off-spec and must therefore be flared. Similarly, there will be
7 substantial experimentation in the methanation lane of the proposed Project. Second, the
8 scale of the proposed Project is substantial and much larger than any gasification and
9 methanation project that West Biofuels has operated before. This large size means that a
10 lot of syngas will be produced that may be off-spec and that needs to be flared. So, based
11 on how much as well as how often the flare will be used in this experimental proposed
12 Project, the emissions from flaring will be considerable.

13 **Q. In its March 3, 2026 Response 3-2e to Sierra Club's February 18, 2026 data request,**
14 **SoCalGas lists the composition of the gas that would be flared. Does this**
15 **information indicate what the flare emissions will be?**

16 **A.** No, it does not. These are not emissions from the flare. Those emissions will be based on
17 combusting the inlet gases and will have a very different composition, for which we have
18 no information other than that provided in SoCalGas's March 3, 2026 Response 3-2d to
19 the Sierra Club's February 18, 2026 data request, where SoCalGas indicates that West
20 Biofuels expects to have a NOx continuous monitor and do stack testing. In its March 11,
21 2026 Response 5-9c to Sierra Club's February 25, 2026 data request, West Biofuels
22 confirms its lack of knowledge of the flare emissions since those will be "estimated by
23 the supplier[.]"⁴⁴

24 **Q. In your opinion, why will the emissions from Lane 3 increase as a result of the**
25 **proposed Project?**

26 **A.** These emissions described above from Lane 3 flare would not occur but for the proposed
27 Pilot Project. Therefore, there are direct emissions increases as a result of the proposed
28 Project.

29 **Q. In your view, what will be the emissions from Lane 4, the gas conditioning and**
30 **methanation lane?**

31 **A.** To the extent that preheating will be needed as contemplated by the existence of a
32 "preheater" (as indicated in Lane 4 of Figure 1), additional combustion-related emissions
33 may occur if combustion is needed to generate this heat. In my opinion, these

⁴⁴ Attach. 3, SoCalGas Response to Sierra Club Data Request, Question 5-9c.

combustion-generated emissions will include CO₂, criteria pollutants such as NO_x and CO, as well as a range of air toxics previously noted.

Further, as described in the record and as shown in Lane 4 on excerpted Figure 1 earlier, there will be fugitive emissions of methane and CO₂ from the Lane 4 processes. This air pollution fugitive leakage will occur from various components in this Lane such as connectors, valves, pump seals, and storage devices.

Q. Why, in your opinion, will there be fugitive emissions in Lane 4?

A. Since gases will flow through pipes and connections through this overall methanation Lane 3, fugitive emissions cannot be avoided due to leaking through connectors, valves, pump seals, and storage devices, as indicated in Figure 1. It is my opinion that the only way to avoid these fugitive leaks is to have specially designed components such as seal-less pumps, leakless valves, and the elimination of connectors (which, in my view, is practically impossible).

Q. In Lane 4, what is your understanding of what the proposed Project will do with the CO₂?

A. SoCalGas states that a portion of the CO₂ that will be emitted from the Pilot Project will be reduced by the use of CCS.⁴⁵ In fact, SoCalGas takes credit for this CCS and arrives at its conclusion that the carbon intensity (“CI”) for the Pilot Project will be lower than its “base case” scenario. However, it provides no details as to how CCS will be implemented. First, it speculates about which technologies it may use to separate CO₂ from the waste gases before that CO₂ can be compressed to enable later sequestration.⁴⁶ Second, it is not consistent in the amount of CO₂ project emissions that it will capture. In the Corrected Testimony, SoCalGas states that the capture rate will be 80%.⁴⁷ But in at least one other instance, it estimates 78%.⁴⁸ In either case, large quantities of CO₂ will still be vented directly into the atmosphere from the Pilot Project. Third, and critically, regardless of whether the level of capture is 78% or 80% (which is important), SoCalGas says nothing about how that captured CO₂ will be sequestered in order to provide the

⁴⁵ SoCalGas Corrected Chapter 2 Testimony at JLMS-12 to JLMS-13; Attach. 3, SoCalGas Response to Sierra Club Data Request 2, Question 2-14e.

⁴⁶ SoCalGas Corrected Chapter 2 Testimony, JLMS-12 to JLMS-13; Attach. 3, SoCalGas Response to Sierra Club Data Request 2, Question 2-14e (“CO₂ in the flue stream will also be captured, labeled ‘exhaust’ in Lane 2 of the Process Flow Diagram. There are supplier technologies being considered that separate the CO₂ from this stream including adsorption and filtration.”).

⁴⁷ SoCalGas Corrected Chapter 2 Testimony at JLMS-15 (“While the CCS requires energy, it captures about 80% or more of the plant CO₂ emissions.”).

⁴⁸ Attach.3, SoCalGas Response to Sierra Club Data Request 4, Question 4-3 (“[e]ffectively, the overall capture rate estimate is 78% compared to the pre-CCS case.”).

1 speculative CI benefit it simply assumes. SoCalGas admits that “[c]ontinuously capturing
2 CO₂ for long term onsite storage will not be practical so implementation of [carbon
3 dioxide removal] will be dependent on having an offtake partner for carbon dioxide.”⁴⁹
4 To my knowledge, there is no offtake agreement in place. Therefore, the feasibility of
5 carbon capture at the Project is still unclear. As a result, it is my opinion that the CCS
6 discussion in the Application, which is important to the justification of the Project and the
7 claim that it will reduce GHGs, is completely speculative and unsupported.

8 **Q. What is the GHG impact of CO₂ venting?**

9 **A.** CO₂ is a GHG. Venting CO₂ means that there will be additional GHG emissions to the
10 atmosphere.

11 **Q. Beyond Lanes 2-4, do you have concerns with any other Lanes of the Project?**

12 **A.** Yes. With respect to Lane 1, in my opinion, there may be emissions from feedstock
13 handling that could include particulate matter of a variety of sizes including particulate
14 matter (“PM”), PM₁₀, and PM_{2.5}. Also, with respect to Lane 5, there will be emissions
15 from trucking the methane from the facility to the injection point. These emissions will
16 include NO_x and PM as well as other pollutants emitted by trucks. Based on my review
17 of the record, SoCalGas has not fully characterized these emissions.

18 **Q. The next set of questions focus on fugitive methane, which you mention as a likely**
19 **from all parts of the facility. SoCalGas states in its February 26, 2026 Response 5 to**
20 **Cal Advocates’ February 11, 2026 data request that “[t]he WBF Bio-SNG**
21 **production infrastructure (Lanes 2-5) are not permitted to operate with leakage for**
22 **safety reasons. The WBF Facility uses gas-tight reactor vessels, valves, and**
23 **compressors and methane impervious stainless-steel piping that are not expected to**
24 **have any leakage during normal operations.”⁵⁰ It concludes that “[t]herefore, no**
25 **continuous leakage assumption was used in the GREET modeling.”⁵¹ Do you believe**
26 **it is reasonable to assume no leakage is expected given these assertions? If not, why**
27 **not?**

28 **A.** No, I do not. SoCalGas conflates and confuses the term “leakage.” Leakage, from an air
29 pollution fugitive emissions standpoint, means the escaping of gases from their
30 containment (such as in pipes or vessels), often at low concentrations that may not pose
31 potential safety risks such as flammability or explosions. While lower than concentrations
32 that can cause flammability or explosions, these “low” concentrations can themselves be

⁴⁹ SoCalGas Corrected Chapter 2 Testimony at JLMS-13.

⁵⁰ Attach. 4, SoCalGas Response to Cal Advocates Data Request 2, Question 5.

⁵¹ Attach. 4, SoCalGas Response to Cal Advocates Data Request 2, Question 5.

1 substantial (tens to hundreds or even thousands of parts per million) and are often
2 persistent and therefore important from an air pollution standpoint. These fugitive air
3 pollution emissions need to be minimized and quantified. Using instruments that are
4 appropriate for measuring and then quantifying these “low” levels.

5 In contrast, leakage of high levels of flammable gases, such as methane from
6 containment, can reach concentrations that could pose flammability and explosion risks.
7 SoCalGas rightly monitors for this type of leakage using instruments and protocols that
8 are geared towards detection and safeguarding against flammability/explosion risks.
9 However, the instruments used for this monitoring are not the same as those needed for
10 detecting the “low” levels of fugitives that are concerning from an air pollution and GHG
11 impact standpoint.

12 In my opinion, based on the context above and as confirmed by SoCalGas itself,
13 SoCalGas’s use of “gas-tight” equipment may safeguard against large leaks from a safety
14 standpoint. But that does not mean that smaller fugitive leaks of methane and other gases
15 will not occur from this same equipment or others such pipeline connections, valves, or
16 pump seals. It is these low-level fugitive leaks that SoCalGas has not addressed from
17 proper monitoring (i.e., exactly what instruments or protocols it will use), quantification,
18 and reporting standpoints.

19 **Q. In its February 23, 2026 Response 2-3 to Sierra Club’s February 9, 2026 data**
20 **request, SoCalGas states that “[f]or indoor and confined facilities, gas detectors will**
21 **be installed that would immediately detect leakages from equipment to the building**
22 **and trigger an immediate shutdown to assess and correct the leakage issue. For**
23 **outdoor piping and equipment, daily leak checks will be performed using portable**
24 **gas detection equipment. For each leakage event, the total leakage amount will be**
25 **estimated based on size and duration of the leakage.”⁵² Does this description of the**
26 **proposed gas detection methods address your concerns about fugitive methane**
27 **leakage from the Project? If not, why not.**

28 **A.** No. Based on my review of the available information, there is no evidence that the
29 leakage detection methods contemplated will detect, measure and prevent fugitive
30 leakage. In response to questions about the exact “gas detectors” and “portable gas
31 detection equipment” that will be used, SoCalGas responded that the “specific make and
32 model” will be selected “following CPUC approval of the application.”⁵³ Therefore, there
33 no assurance that the Project will detect and prevent methane leakage from the Project.

⁵² Attach. 3, SoCalGas Response to Sierra Club Data Request 2, Question 2-3.

⁵³ Attach. 3, SoCalGas Response to Sierra Club Data Request 5, Question 5-2(a)-(b).

1 **Q. In its December 5, 2025 Response 1-5(c) to Sierra Club’s November 4, 2025 data**
2 **request, SoCalGas states that it “assume[s] no fugitive methane emissions as the**
3 **level of leakage is expected to be negligible.”⁵⁴ Do you believe this assumption is**
4 **support? If not, why not.**

5 **A.** No, it is not supported or reasonable. It is speculative. Fugitive methane leakage rates
6 from the proposed Project might seem “negligible” to SoCalGas because it is used to
7 large leak concentrations that are relevant to safety (see prior discussion above), but there
8 is no basis for this “negligible” assumption in the context of leakage that is relevant to the
9 Project’s GHG emissions.⁵⁵ Fugitive emissions need to be properly monitored,
10 quantified, and reported in order to determine GHG impacts.

11 **Q. Without such measurement and reporting, do you think SoCalGas can credibly**
12 **claim that it has demonstrated GHG reductions in this Application?**

13 **A.** No, I do not. In my opinion, no claim of GHG reductions from this Project is credible if
14 fugitive emissions are simply assumed to be non-detect or zero. In my opinion, they will
15 not be zero and could be substantial.

16 **Q. In its February 26, 2026 Response 4 to Cal Advocates’ February 11, 2026 data**
17 **request, SoCalGas indicates that “WBF employs regular scheduled inspections**
18 **using advanced methane detection technologies, such as handheld detectors, optical**
19 **gas imaging cameras, and continuous monitoring systems within confined areas and**
20 **buildings. Inspections are conducted at key points, including production equipment,**
21 **pipeline connections, and transfer points.”⁵⁶ In your opinion, is this methane leak**
22 **detection sufficient to ensure no fugitive methane leakage occurs.**

23 **A.** No, in my expert opinion, it is not. Optical imaging is typically for large leaks, not
24 smaller fugitive leaks that can persist for long periods of time. Continuous monitoring is
25 typically used in confined spaces to prevent safety risks, not detecting fugitive leaks
26 throughout the system. With respect to handheld monitors, it is unclear what model they
27 would use and whether it would be sufficient to detect fugitive leaks. As a result, I do not
28 believe the proposed Project ensures sufficient methane leak detection to prevent
29 methane leakage and a net increase in GHG emissions from the Project.

⁵⁴ Attach. 3, SoCalGas Response to Sierra Club Data Request 1, Question 1-5(c).

⁵⁵ Attach. 3, SoCalGas Response to Sierra Club Data Request 1, Question 1-5(c).

⁵⁶ Attach. 4, SoCalGas Response to Cal Advocates Data Request 2, Question 4.

1 **Q. I will now ask questions about what if any information is missing about Project**
2 **emissions. In your opinion, what aspects of the facility’s emissions are unknown?**

3 **A.** Based on my assessment, SoCalGas has not provided sufficient information about the
4 level and range of emissions that are going to occur as a result of the Project, including
5 NOx and other criteria pollutants from the Lane 2 “exhaust” and criteria pollutants from
6 the flare in Lane 3 as well as the numerous air toxics that will be emitted at least from
7 these sources within the proposed plant. In addition, as noted above, the emissions from
8 processing the feedstock and trucking the methane are not known nor are the quantities of
9 fugitive emissions from throughout the Project lanes, as explained above.

10 **Q. What is your assessment of the information on emissions intensities and factors**
11 **provided by SoCalGas in Table 2 of the Corrected Testimony at JLMS-16 and in**
12 **the associated Attachment 1?**

13 **A.** SoCalGas presents emissions intensities and emission factors that, in my opinion, are not
14 useful to determining actual emissions from the proposed Project. I have several specific
15 concerns with the information as presented in Table 2 at JLMS-16.⁵⁷

16 First, Table 2 contains no information for the air toxic compounds that will be emitted
17 due to combustion. Those are nowhere to be found in the record.

18 Second, I am concerned about SoCalGas’s March 11, 2026 Response 5-8a to Sierra
19 Club’s February 25, 2026 data request suggesting that the Table 2 entry “Bio-SNG plant
20 direct emissions” includes only exhaust emissions (Lane 2) and fails to account for other
21 emissions such as emissions from the flare (Lane 3) and, potentially, the preheater (Lane
22 4). I am concerned that this is the case because SoCalGas states that “[t]he exhaust
23 emissions are the ‘Bio-SNG plant direct emissions’ in Table 2.”⁵⁸ If this is indeed the
24 case, then it is my opinion that the Table 2 emissions factors for the “Bio-SNG plant
25 direct emissions” is greatly underestimating the facility emissions since the CO₂ from
26 Lane 4 is not included.

27 Second, if the emissions entry for the “Bio-SNG plant direct emissions” in Table 2 does
28 intend to include different sources of emissions (e.g., exhaust, flare, preheater) to create
29 an overall Project NOx intensity, it is my opinion that the units of the intensity noted in
30 Table 2 makes no sense. As I indicated above, criteria pollutants such as NOx will be
31 emitted from several locations at the facility, such as the flare and the exhaust and
32 potentially the preheater. The pollution intensities from these separate sources will be

⁵⁷ SoCalGas Corrected Chapter 2 Testimony at JLMS-16 (Table 2); SoCalGas Corrected Chapter 2 Testimony, Attach. 1, pp. 4 (Table 2).

⁵⁸ Attach. 3, SoCalGas Response to Sierra Club Data Request 5, Question 5-8a.

different and expressed differently. For example, flare emissions are typically measured as the amount of pollutant mass generated or released per unit of heat release. While exhaust emissions would typically be expressed as amount of pollutant mass per unit amount of syngas produced. Therefore, SoCalGas's combined intensity in Table 2 from these disparate source types to create an overall "Bio-SNG Plant" emissions intensity is technically unsupported. If SoCalGas were properly reporting the emissions intensities of the Bio-SNG plant, it would do so separately from each source type (i.e., exhaust, flare, preheater). In its Table 2, SoCalGas should have disaggregated the criteria pollutant emissions from individual sources instead of plant-wide "Intensity" for each such pollutant.⁵⁹ It did not do so. And, as noted prior, Table 2 simply omits any and all air toxics that will be emitted.

Q. Do you think SoCalGas could provide more information about air emissions at this juncture?

Yes. In my view, SoCalGas's characterization of this lack of basic information as a data gap that will be filled in via the Pilot Project is puzzling to me when, according to SoCalGas, there is already a FICFB that has operated at the West Biofuels in Woodland, CA, including as recently as [REDACTED], which should have been characterized for emissions of all air pollutants.⁶⁰ Indeed, SoCalGas states that "[s]yngas was tested at the Woodland Biomass Research Center under a number of operating conditions by varying temperature, pressure, hydrogen to carbon ratio, and residence time to determine best performance for the methanation catalyst."⁶¹ Further, West Biofuels has a "pilot system" that "has been used to test multiple methanation catalysts under a number of operating parameters including pressure, temperature, fluidization rate, space velocity, syngas composition, steam addition, etc."⁶² Given this information, SoCalGas should be able to provide more information about the range and level of pollutant emissions expected from this Project. These prior operations should have been the basis for substantial air pollution characterization. No such information is provided in the record.

Q. To summarize, in your opinion, what pollutants will be emitted from the proposed Pilot Project?

A. In my assessment, in addition to GHG emissions such as methane and CO₂, additional pollutants that will be emitted from the proposed Pilot Project include additional GHG

⁵⁹ SoCalGas Corrected Chapter 2 Testimony at JLMS-16 (Table 2); SoCalGas Corrected Chapter 2 Testimony, Attach. 1, pp. 4 (Table 2).

⁶⁰ Attach. 3, SoCalGas Response to Sierra Club Data Request 5, Question 2-13b, 2-13(c); SoCalGas Response to Sierra Club Data Request 5, Question 5-6a.

⁶¹ Attach. 3, SoCalGas Response to Sierra Club Data Request 5, Question 5-6d.

⁶² Attach. 3, SoCalGas Response to Sierra Club Data Request 5, Question 5-6e.

emissions from N₂O, resulting from combustor exhaust and the flare, and numerous criteria and hazardous air pollutants from the combustor venting and flare.⁶³ These include NO_x, CO, and various sizes of particulate matter, including PM₁₀ and PM_{2.5},⁶⁴ which are considered “criteria pollutants.”⁶⁵ It also includes volatile organic compounds and air toxics such as benzene, toluene, xylenes, hexane, formaldehyde, various polycyclic aromatic compounds, and numerous metals.

Q. On what basis do you conclude that the proposed Project will emit these pollutants?

A. SoCalGas presented some of these pollutants in Table 2 of the Corrected Testimony on page JLMS-16. Others like the air toxics I have noted prior are unavoidable due to the nature of combustion. These pollutants are created unavoidably as a result of combustion of carbon-based fuels in the FICFB exhaust vent gas and will therefore be emitted. I provide my opinion about the types of pollutants that will be emitted based on my education (combustion engineering) and over 34 years of consulting experience for a wide range of clients and industrial processes. Just combustion-generated pollutants alone will consist of criteria pollutants, GHGs, and air toxics.⁶⁶

In addition, as explained above, fugitive emissions are inevitable from pipeline connections as well as fittings such as valves, flanges, connectors, and the like. I note that even if the concentrations of these fugitive emissions appear to be non-detectable using safety-focused monitoring devices not capable of measuring the lower concentrations of fugitive emissions, that does not mean that fugitive emissions below the detection limit of these inappropriate devices are not being emitted.

Q. In Corrected Testimony, SoCalGas states that “[t]he results also show that for almost all of the major criteria pollutants, the Bio-SNG production use cases generate less emissions than the baseline practices.”⁶⁷ Do you concur with this conclusion? If not, why not?

A. No, I do not concur because, as I explained above, I do not believe that the figures presented in Table 1 for the “Use Case” scenarios, both with and without CCS, are

⁶³ See Attach. 3, SoCalGas Response to Sierra Club Data Request 3, Question 3-2d.

⁶⁴ See Attach. 3, SoCalGas Response to Sierra Club Data Request 3, Question 3-2d.

⁶⁵ See California Air Resources Board, “Criteria Air Pollutants,” [https://ww2.arb.ca.gov/our-work/programs/criteria-air-pollutants#:~:text=Criteria%20air%20pollutants%20are%20air,5](https://ww2.arb.ca.gov/our-work/programs/criteria-air-pollutants#:~:text=Criteria%20air%20pollutants%20are%20air,5;);

⁶⁶ U.S. EPA, Compilation of Air Emissions Factors from Stationary Sources, AP-42 1.4, Supplement D, Natural Gas Combustion (July 1998), Table 1.4-2 https://www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf (indicating that burning natural gas, essentially methane, produces a wide variety of air toxics, including VOC species as well as metals).

⁶⁷ SoCalGas Corrected Testimony, JLMS-16.

correct or supported by the available evidence. Therefore, a comparison of the base case and use cases will not show the emissions effects of the Project.

Q. What are the potential health impacts of these emissions?

A. The criteria pollutants such as NO_x, CO, and PM_{2.5} have known adverse health impacts. That is why they are regulated. Specifically, each of these criteria pollutants are subject to National Ambient Air Quality Standards (“NAAQS”), and the NAAQS are periodically revised as needed based on toxicological data and evidence.

Each of the non-criteria, toxic pollutants including examples listed in the previous answers have adverse health impacts over multiple time scale – including acute, chronic (non-cancer), and chronic (cancer).⁶⁸ These include pollutants such as benzene and formaldehyde are known human carcinogens,⁶⁹ for example. Again, as noted above, these are not identified as being potential pollutants from the proposed Project at all.

Q. To your knowledge, which of these likely Project emissions are considered short-lived climate pollutants?

A. At least methane is a short-lived climate pollutant, given its intense global warming potential for a relatively short period of time in the atmosphere once emitted.

Q. To summarize, in your opinion, what would be the effect of the proposed Pilot Project with respect to emissions?

A. The effect of the proposed Project would be to increase criteria, GHG, and air toxic pollutants that would otherwise not occur but for the Project.

⁶⁸ See, e.g., U.S. EPA, “AirToxScreen Frequent Questions,”

<https://www.epa.gov/AirToxScreen/airtoxscreen-frequent-questions#background1>; U.S. EPA, Enviro Atlas Fact Sheet, Cumulative Cancer Risk Per Million from Air Toxics, <https://enviroatlas.epa.gov/enviroatlas/DataFactSheets/pdf/Supplemental/Cancerriskcumulative.pdf>.

⁶⁹ U.S. EPA, <https://www.epa.gov/formaldehyde/facts-about-formaldehyde>; U.S. EPA, “Volatile Organic Compounds Impact on Indoor Air Quality” (last updated July 5, 2025), <https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality>; National Cancer Institute, “Formaldehyde and Cancer Risk, National Cancer Institute, “Formaldehyde and Cancer Risk” (last visited Mar. 9, 2025), <https://www.cancer.gov/about-cancer/causes-prevention/risk/substances/formaldehyde/formaldehyde-fact-sheet#can-formaldehyde-cause-cancer>.

III. ENVIRONMENTAL AND SOCIAL JUSTICE COMMUNITY IMPACT CONCERNS.

Q. We will now turn the topic of impacts to environmental and social justice communities and consistency with the Commission’s environmental and social justice action plan. We will start with the area near the proposed WBF facility. To your knowledge, where would the gasification facility be located?

A. As I explained above, according to my understanding of the Application, the proposed facility would be located in Kerman, California.

Q. What is CalEnviroScreen?

A. My understanding is that it is a tool developed by the Office of Environmental Health Hazard Assessment to identify California communities disproportionately burdened by multiples sources of pollution.⁷⁰

Q. Based on your understanding of the available CalEnviroScreen data, what is the pollution status of the area in Kerman, CA where the facility will be located?

A. Based on my interpretation of the results of CalEnviroScreen 4.0, the area ranks in the 88th percentile for pollution burden.⁷¹

Q. Based on your understanding of the available CalEnviroScreen data, what is the socio-economic status of the area in Kerman, CA where the facility will be located?

A. Based on my interpretation of the results of CalEnviroScreen 4.0, the area is majority low-income⁷² and Hispanic.⁷³

⁷⁰ State of California Office of Env’t Health Hazard Assessment, “CalEnviroScreen4.0” (last visited Mar. 13, 2026); <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40>.

⁷¹ State of California Office of Env’t Health Hazard Assessment, “CalEnviroScreen 4.0” (last visited Mar. 13, 2026), <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40> (a search for “8325 S Madera Ave, Kerman, CA, 93630, USA.” in the Map of CalEnviroScreen 4.0 Indicators generated an 88th percentile result for pollution burden).

⁷² State of California Office of Env’t Health Hazard Assessment, “CalEnviroScreen 4.0” (last visited Mar. 13, 2026), <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40> (a search for “8325 S Madera Ave, Kerman, CA, 93630, USA.” in the Map of CalEnviroScreen 4.0 Indicators revealed that, in this area, “the percent of people living below twice the poverty level is higher than 74% of the census tracts in California”).

⁷³ State of California Office of Env’t Health Hazard Assessment, “CalEnviroScreen 4.0” (last visited Mar. 13, 2026), <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40> (a search for “8325 S Madera Ave, Kerman, CA, 93630, USA” in the CalEnviroScreen 4.0 Data Dashboard generated a majority Latino race/ethnicity result).

- 1 **Q. Is the region considered “a disadvantaged community” under CalEnviroScreen?**
- 2 **A.** Yes. Based on my review of CalEnviroScreen 4.0, Kerman, CA is designated a
3 “disadvantaged community.”⁷⁴
- 4 **Q. The Commission defines an “Environmental and Social Justice Community” as one**
5 **which includes low-income or communities of color, including Disadvantaged**
6 **Communities.⁷⁵ Does the region meet this definition?**
- 7 **A.** Yes, the region meets the definition for an Environmental and Social Justice Community.
- 8 **Q. With regard to your understanding of the Clean Air Act, is this region in attainment**
9 **for Particulate Matter-2.5 (PM_{2.5})?**
- 10 **A.** No. Based on my review of the U.S. EPA data, it is not.⁷⁶
- 11
- 12 **Q. What is the severity level of nonattainment for PM_{2.5} in this region?**
- 13 **A.** The severity level is listed by the U.S. EPA as “serious.”⁷⁷

⁷⁴ State of California Office of Env’t Health Hazard Assessment, “SB 535 Disadvantaged Communities” (last visited Mar. 13, 2026), <https://oehha.ca.gov/calenviroscreen/sb535> (a search for “8325 S Madera Ave, Kerman, CA, 93630, USA.” in the SB535 Disadvantaged Communities map generated a “Disadvantaged Community” designation, as indicated by red shading).

⁷⁵ CPUC, “Environmental & Social Justice Action Plan, Version 2.0” at 11-12, (Apr. 7, 2022) (defining Environmental and Social Justice Communities as “low-income or communities of color that have been underrepresented in the policy setting or decision-making process, are subject to a disproportionate impact from one or more environmental hazards, and likely to experience disparate implementation of environmental regulations and socio-economic investments in their communities[.]” as well as “Disadvantaged Communities, defined as census tracts that score in the top 25% of CalEnviroScreen 3.0, along with those that score within the highest 5% of CalEnviroScreen 3.0’s Pollution Burden but do not receive an overall CalEnviroScreen score; all Tribal lands; low-income households; and low-income census tracts”).

⁷⁶ U.S. EPA, “Current Nonattainment Counties for All Criteria Pollutants” (last updated Feb. 28, 2026, <https://www3.epa.gov/airquality/greenbook/ancl.html#CA>).

⁷⁷ U.S. EPA, “Current Nonattainment Counties for All Criteria Pollutants” (last updated Feb. 28, 2026, <https://www3.epa.gov/airquality/greenbook/ancl.html#CA>).

1 **Q. Is this region in attainment under the Clean Air Act for ozone?**

2 **A.** No. Based on my review of the U.S. EPA data, it is not.⁷⁸

3 **Q. What is the severity level of nonattainment for ozone in this region?**

4 **A.** The severity level is “extreme,” which is the most concerning designation for a
5 nonattainment level.⁷⁹

6 **Q. What does it mean to be out of attainment for a pollutant under the Clean Air Act?**

7 **A.** It means that, with respect to the particular pollutant, it is at levels in the region that do
8 not meet national air quality standards.⁸⁰ This essentially means that the air is unhealthy
9 for humans to breathe. The further out of attainment a region is for a particular criteria
10 pollutant, the less healthy (and more dangerous) the air is for human health.

11 **Q. In your opinion, will the proposed Project improve the air quality in and around**
12 **Kerman, CA?**

13 **A.** No. As explained above, I believe and the Application admits that the proposed facility
14 will cause additional pollution. That pollution will worsen air quality in the region.

15 **Q. Will the Project bring the region closer to attainment for PM_{2.5} and Ozone under the**
16 **Clean Air Act?**

17 **A.** No. In my view, it will do the opposite—that is, it will bring it further out of attainment
18 for PM_{2.5} and ozone because it will emit PM and NO_x, which is a precursor to ozone.

19 **Q. To your knowledge, what will be the effects of this worsened air quality?**

20 **A.** As noted above, the pollution from the proposed Project will have adverse health
21 impacts. The Project is adding additional emissions to an area that is already out of
22 attainment. In my view, this additional pollution risks exacerbating the health harms
23 caused by polluted air and will add to the high pollution burden that this disadvantaged
24 community already bears.

⁷⁸ U.S. EPA, “Current Nonattainment Counties for All Criteria Pollutants” (last updated Feb. 28, 2026, <https://www3.epa.gov/airquality/greenbook/ancl.html#CA>).

⁷⁹ U.S. EPA, “Current Nonattainment Counties for All Criteria Pollutants” (last updated Feb. 28, 2026, <https://www3.epa.gov/airquality/greenbook/ancl.html#CA>).

⁸⁰ U.S. EPA, “Process to Determine Whether Areas Meet the NAAQS (Designations Process)” (last updated Nov. 5, 2025), <https://www.epa.gov/criteria-air-pollutants/process-determine-whether-areas-meet-naaqs-designations-process>.

1 **Q. In your opinion, what will be the impacts of the Project on environmental and social**
2 **justice communities?**

3 **A.** As noted above, it will have an adverse impact in and around Kerman, California in the
4 form of additional health-harming air pollution.

5 **Q. Are you familiar with the Commission’s Environmental and Social Justice (“ESJ”)**
6 **Action Plan (“the Plan”)?**

7 **A.** Yes.

8 **Q. Are you familiar with Goal 2 in the Plan?**

9 **A.** Yes.

10 **Q. Please describe Goal 2 and any relevant objectives.**

11 **A.** Goal 2 involves investing in clean energy to benefit environmental and social justice
12 communities, “especially to improve local air quality and public health.”⁸¹ Objective 2.4
13 pertains to “address[ing] ongoing and legacy impacts in ESJ communities in the resilient,
14 clean energy space[.]” and Objective 2.5 sets a goal to “[c]ontinue to make prioritized
15 resilient, clean energy investments in ESJ communities.”⁸²

16 **Q. In your opinion, how will the proposed Project impact the achievement of the Goal 2**
17 **in the Plan?**

18 **A.** I believe the proposed Project is inconsistent with Goal 2 because it increases health-
19 harming air pollutants in an environmental and social justice community. It will worsen,
20 rather than improve, local air quality and public health.

21 **Q. Are you familiar with Goal 9 in the Plan?**

22 **A.** Yes.

23 **Q. Please describe Goal 9 and any relevant objectives.**

24 **A.** Goal 9 involves monitoring the CPUC’s environmental and social justice efforts to
25 understand whether they are achieving their objectives.⁸³ Objective 9.1 pertains to
26 “pursu[ing] opportunities to standardize metrics related to ESJ communities in CPUC

⁸¹ CPUC, Environmental & Social Justice Action Plan, Version 2.0 (Apr. 7, 2022) at 23-24.

⁸² CPUC, Environmental & Social Justice Action Plan, Version 2.0 (Apr. 7, 2022) at 24.

⁸³ CPUC, Environmental & Social Justice Action Plan, Version 2.0 (Apr. 7, 2022) at 26.

1 programs and proceedings,” and Objective 9.2 relates to cultivating feedback “from the
2 public and demonstrate[ing] resulting impact back to members of the public.”⁸⁴

3 **Q. In your opinion, how will the proposed Project impact the achievement of the Goal 9**
4 **in the Commission’s Plan?**

5 **A.** I believe the proposed Project is inconsistent with Goal 9 because there is no monitoring
6 plan included in the Application. Therefore, there is no insight into the proposed Project’s
7 resulting emissions or impact nor means to communicate these impacts to the community
8 or the public more broadly.

9 **IV. EMISSIONS MONITORING CONCERNS**

10 **Q. This next line of questioning will address emissions study and reporting. To your**
11 **knowledge, how will West Biofuels monitor emissions from the facility?**

12 **A.** In my opinion, very little monitoring is proposed for the proposed Project. SoCalGas
13 states that “SoCalGas and WBF have not established or considered methods to document,
14 study and report emissions.”⁸⁵ This indicates to me that the study and reporting of
15 emission is lacking as a general matter. Further, from the information that they have
16 provided regarding methane, exhaust, and flare emissions monitoring, I have
17 confirmation that there is insufficient monitoring of emissions to ensure they are detected
18 and avoided.

19 **Q. Let’s first discuss study and reporting of methane emissions. In its February 26,**
20 **2026 Response 4 to Cal Advocates’ February 11, 2026 data request, SoCalGas lists a**
21 **method for methane leak detection and remediation at the West Biofuels facility and**
22 **the SoCalGas interconnection point. Do you believe these methods will provide**
23 **sufficient monitoring?**

24 **A.** No. As described above, SoCalGas intends to monitor methane to detect leaks that are
25 prohibited for safety reasons.⁸⁶ Such methods do not detect low levels of leakage that in
26 my opinion will occur as a result of the Project. Such low levels of leakage are highly
27 relevant for purposes of determining the Project’s GHG emissions impacts. Further,
28 SoCalGas, as indicated above, has not determined the exact equipment it will use to
29 monitor methane. It indicates it will do so only after the CPUC approves the
30 Application.⁸⁷

⁸⁴ CPUC, Environmental & Social Justice Action Plan, Version 2.0 (Apr. 7, 2022) at 26.

⁸⁵ Attach. 4, SoCalGas Response to Cal Advocates Data Request 2, Question 3a.

⁸⁶ Attach. 4, SoCalGas Response to Cal Advocates Data Request 2, Question 5.

⁸⁷ Attach. 3, SoCalGas Response to Sierra Club Data Request 5, Question 5-2(a)-(b).

1 **Q. In its February 26, 2026 Response 3b to CalAdvocates’ February 11, 2026 data**
2 **request asking what analyses SoCalGas and/or West Biofuels “have conducted**
3 **regarding the feasibility and/or effectiveness of fugitive emission monitoring**
4 **technologies or methodologies for the Woody Biomass Project[,]” SoCalGas states**
5 **that “SoCalGas and/or WBF have not conducted this type of specific analysis for the**
6 **SB 1440 Woody Biomass Pilot Project.”⁸⁸ Do you believe that such an analysis is**
7 **needed in order to monitor methane leakage?**

8 **A. Yes.**

9 **Q. With respect to the monitoring of exhaust emissions, SoCalGas states in its March 3,**
10 **2026 Response 3-2d to Sierra Club’s February 18, 2026 data request that “[i]t is**
11 **likely the local air district will require monitoring of the exhaust emissions. This will**
12 **likely entail continuous recording of facility throughput, continuous monitoring of**
13 **stack O2 and NOx, and periodic third-party testing of all criteria pollutant**
14 **emissions from the exhaust.”⁸⁹ Does this response present a monitoring method?**

15 **A. No. SoCalGas does not commit to using any form of exhaust monitoring. It merely states**
16 **that such monitoring, if it is required by the air district, may include these methods.**

17 **Q. Let’s turn to the monitoring of flare emissions. As noted above, in its March 3, 2026**
18 **Response 3-2c to Sierra Club’s February 18, 2026 data request, SoCalGas states,**
19 **“[t]he total hours of use of the flare will be monitored, and the emissions can be**
20 **estimated using the emissions factors for the flare. The flare is designed as an**
21 **emergency flare and is expected to operate infrequently. Its use will adhere to the**
22 **requirements of the local air district.”⁹⁰ In your opinion, is the flare emissions**
23 **monitoring for the proposed Project sufficient to ensure such emissions are**
24 **detected?**

25 **A. No. Based on my review of the available information, flare emissions are to be monitored**
26 **by simply monitoring the hours of operation of the flare and then using emission factors**
27 **(which it will get from its supplier) to estimate emissions.⁹¹ I do not believe this is**
28 **sufficient because, in my opinion and to the best of my knowledge, the flare (thermal**
29 **oxidizer) emissions can be directly measured at the stack using continuous monitoring**
30 **systems (“CEMS”) for NOx, PM_{2.5} (filterable), CO, and other emissions and also by**
31 **conducting periodic, representative, stack testing for other pollutants including air toxics.**

⁸⁸ Attach. 4, SoCalGas Response to Cal Advocates Data Request 2, Question 3b.

⁸⁹ Attach. 3, SoCalGas Response to Sierra Club Data Request 3, Question 3-2d.

⁹⁰ Attach. 3, SoCalGas Response to Sierra Club Data Request 3, Question 3-2c.

⁹¹ Attach. 3, SoCalGas Response to Sierra Club Data Request 3, Question 3-2c; Attach. 3, SoCalGas Response to Sierra Club Data Request, Question 5-3c.

1 Continuous monitoring for NOx and CO has been implemented by U.S. EPA for
2 numerous sources for at least the last 30 years.⁹² In fact, as discussed above, SoCalGas
3 itself noted that it may be required to use such monitoring for NOx from the exhaust.⁹³ In
4 my view, if CEMS can use it for the exhaust, it can be used for the flare.

5 **Q. SoCalGas states that “[t]he air district is unlikely to require continuous emissions**
6 **monitoring because the flare is used only rarely. However, ports are typically added**
7 **to the stack to conduct a source test if required and gas flow to the flare is**
8 **continuously monitored and recorded to determine the total flare usage.”⁹⁴ Does this**
9 **response provide any assurance that the flare will be appropriately monitored?**

10 **A.** No, it does not. Even if the air district does not require West Biofuels to use CEMS, it is
11 my opinion that it should given the risk of emissions levels that far exceed levels that are
12 expected and the fact that this is a pilot project. The very purpose of a pilot project is to
13 test hypotheses and experiment with new potential technologies, while collecting data.
14 This requires testing and monitoring processes comprehensively to gain as much
15 information as possible about the pilot project’s operations and effects. The fact that
16 SoCalGas and West Biofuels only intend to monitor emissions at the minimum level
17 required suggests that they are not proposing a project that will meet this purpose.

⁹² See, e.g., U.S. EPA, “California Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants” (last updated Feb. 28, 2026), https://www3.epa.gov/airquality/greenbook/anayo_ca.html.

⁹³ Attach. 3, SoCalGas Response to Sierra Club Data Request 3, Question 3-2d.

⁹⁴ Attach. 3, SoCalGas Response to Sierra Club Data Request, Question 5-9e.

1 Q. In its February 9, 2026 Response 2-6 to Sierra Club’s February 9, 2026 data request,
2 SoCalGas states that “[c]ommercially available gas analyzers will be utilized to
3 measure the direct carbon dioxide and criteria pollutant emissions from the facility.
4 WBF uses commercial flue gas analyzers from Horiba and Testo and industry
5 standard procedures at its current facilities.”⁹⁵ It indicates that “[t]he specific make
6 and model of the gas analyzers for the proposed project will be selected following
7 CPUC approval of the application. For the gas analyzers used at other WBF
8 facilities, the model of the Horiba gas analyzer is Horiba PG 250 Portable Gas
9 Analyzer.”⁹⁶ It also indicates that “[t]he specific make and model of the gas
10 analyzers for the proposed project will be selected following CPUC approval of the
11 application. For the gas analyzers used at other WBF facilities, the model of the
12 Testo gas analyzer is Testo 300-LL-C-KIT Flue Gas Analyzer Kit with NOx
13 Sensor.”⁹⁷ In your opinion, do these statements ensure that emissions will be
14 properly monitored?

15 A. No, because this is not continuous emissions monitoring. It is just a spot check. In my
16 opinion, these analyzers are proper for internal process monitoring as part of the research
17 and development effort, but the results are not appropriate for regulatory monitoring and
18 reporting, which have more rigorous requirements, or to ensure overall emissions are
19 minimized and that underreporting is not occurring.

20 Q. SoCalGas also says it will use “industry standard practices”⁹⁸ and states that “[a]n
21 example of industry standard procedures is the guidance of USEPA for good
22 practices in stack testing can be found at <https://www.epa.gov/compliance/clean-air-act-nationalstack-testing-guidance>, which includes recommended use, for example,
23 of EPA Methods 1, 2, 3A, 7E, 10 for procedures for gas analyzers, setup of sampling
24 lines, and measurement of flow rates.”⁹⁹ Is following this “standard practice”
25 relevant here?
26

27 A. No. Based on my knowledge of Methods 1 and 2, 3, 7E, and 10, they are of no relevance
28 to a handheld criteria pollutant measurement, which is what SoCalGas says it will use for
29 this Project.

⁹⁵ Attach. 3, SoCalGas Response to Sierra Club Data Request, Question 2-6.

⁹⁶ Attach. 3, SoCalGas Response to Sierra Club Data Request, Question 5-3a.

⁹⁷ Attach. 3, SoCalGas Response to Sierra Club Data Request, Question 5-3b.

⁹⁸ Attach. 3, SoCalGas Response to Sierra Club Data Request, Question 2-6.

⁹⁹ Attach. 3, SoCalGas Response to Sierra Club Data Request, Question 5-3c.

1 **Q. Based on the information that is available, do you believe the monitoring that is**
2 **currently contemplated by SoCalGas and WBF is sufficient to detect the facility's**
3 **emissions?**

4 **A.** It is my opinion that the monitoring proposed is woefully inadequate.

5 In fact, as noted above, it appears that SoCalGas does not understand what fugitive
6 emissions are from an air pollution standpoint (as opposed to the larger leaks that can
7 cause safety issues).

8 For the exhaust, SoCalGas does not provide sufficient detail to ensure all emissions will
9 be monitored continuously

10 For the flare, there is neither knowledge of its exhaust emissions and no monitoring
11 proposed at all, other than its hours of operation.¹⁰⁰ Since the quantities of syngas that
12 will be flared are not being monitored, simply monitoring hours cannot provide estimates
13 of pollutant mass emissions.

14 **Q. Do you have concerns with this lack of information about monitoring?**

15 **A.** Yes. In my opinion, lack of information about emissions monitoring means that there is
16 no ability to adequately study and report the emissions from this proposed Project. Using
17 emission factors for the flare that will be provided by a supplier for a research pilot
18 project with varying compositions of the flared gases makes no sense.¹⁰¹ Similarly, in my
19 view, “looking” for fugitive emissions using the wrong instruments and concluding that
20 there are none, is misleading and underestimates emissions.

21 **Q. Are there emissions from the proposed Project that cannot be monitored?**

22 **A.** Yes. In my opinion, not all air toxics emissions from the exhaust and the flare can be
23 continuously monitored. It is my view that, while periodic stack tests can provide some of
24 this emissions information, even those periodic stack tests cannot account for variability
25 in the compositions of these emissions on a continuous basis.

26 **Q. Can these flare emissions be credibly estimated?**

27 **A.** In my opinion, given that the flare in question is an enclosed thermal oxidizer, stack
28 monitoring using continuous emissions monitors and periodic stack testing can provide

¹⁰⁰ Attach. 3, SoCalGas Response to Sierra Club Data Request 3, Question 3-2c.

¹⁰¹ Attach. 3, SoCalGas Response to Sierra Club Data Request, Question 5-9c (“Criteria pollutant emissions from this type of flare will be estimated by the supplier during the procurement process.”).

much better data than what is currently proposed (i.e., hours of operation and emission factors from a supplier, which are presumed to be constant but are in fact not).¹⁰²

Q. In its February 26, 2026 Response 4 to Cal Advocates' February 11, 2026 data request, SoCalGas describes "methane leak detection and remediation" that it will use.¹⁰³ Do you believe the listed actions are sufficient to prevent all methane leakage? If not, why not?

A. No. As noted, the plan is premised on detection of leaks using technology that does not detect the low level of methane leakage that will, in my opinion, occur as a result of the proposed Project.

Q. In D.22-02-025, the Commission required the pilot projects to "study and report fugitive methane, pollutant, and particulate matter emissions and emissions reduction or elimination methods in the gasification or pyrolysis process, the methanation process, and pipeline infrastructure."¹⁰⁴ In your view, has SoCalGas met this requirement? If not, why not?

A. No, it has not. For the reasons stated above, the current monitoring plans are insufficient to detect the indicated pollutants. Furthermore, SoCalGas has not presented any information suggesting that it will properly study and report these pollutants in the future.

Q. Do you think it is reasonable for the Commission to order pilot projects, as a general matter?

A. Yes, provided that a pilot project has some maturity and has a reasonable chance of success. In my view, pilot projects are a reasonable way for any public agency like the Commission to test hypotheses and experiment with new potential technologies so that it can develop optimal policies and programs.

Q. What is your opinion of West Biofuels's track record in terms of its ability to operate woody biomass gasification and methanation projects that produce useful information about these technologies for the public?

A. In my opinion, West Biofuels does not have a reliable track record in this regard. As noted, I reviewed PG&E proposed pilot project with West Biofuels in A.23-06-023 and found it to be lacking evidence of emissions reductions and a study and reporting plan.¹⁰⁵

¹⁰² Attach. 3, SoCalGas Response to Sierra Club Data Request 3, Question 3-2c; Attach. 3, SoCalGas Response to Sierra Club Data Request 2, Question 2-14a.

¹⁰³ Attach. 4, SoCalGas Response to Cal Advocates Data Request 2, Question 4.

¹⁰⁴ D.22-02-025, Ordering Paragraph 43.

¹⁰⁵ See PG&E Application, A.23-6-023, <https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M512/K707/512707890.PDF>; Testimony of Ranajit

1 I also note that as SoCalGas indicated the Woodland facility operated for only [REDACTED] in
2 [REDACTED] and [REDACTED] in [REDACTED].¹⁰⁶ SoCalGas indicated that daily volumes of syngas produced
3 during these years “are not available”¹⁰⁷ and that “[t]he volume of syngas ‘tested’ has not
4 been quantified.”¹⁰⁸ Given this information, I do not believe that West Biofuels has a
5 track record of producing valuation information for public decision-makers at its
6 facilities.

7 **Q In your view, does the proposed Pilot Project serve this purpose?**

8 **A.** It does not. In my opinion, this is a research project at best, proposed by West Biofuels
9 whose track record, even with respect to research projects, does not indicate a
10 contribution to public knowledge. Further, the project design does not set the proposed
11 Pilot Project up for success in reducing emissions. As detailed above, there are numerous
12 problems with the proposed Project that will very likely lead to emissions increases,
13 contrary to the requirements attached to use of ratepayer funds and the CPUC’s ESJ
14 Action Plan. Further the monitoring and evaluation protocols are not in place to ensure
15 that the results are properly analyzed and vetted to inform future Commission decisions.
16 Because they are experiments, pilot projects must set up systems to evaluate and disclose
17 results to decision makers and stakeholders. SoCalGas has failed to do so here.

18 **Q. Given these deficiencies and the likely emissions increases, is it your opinion that the**
19 **Commission should approve the Application?**

20 **A.** No, I do not believe the Commission should approve the Project.

21 **Q. Please summarize why, in your opinion, denial is appropriate.**

22 **A.** Denial is appropriate because there will almost certainly be increases in GHG emissions
23 and emissions of criteria pollutants and air toxics. Increases of health-harming pollutants
24 will add to the pollution burden of a disadvantaged community, in conflict with the
25 CPUC’s Environmental and Social Justice Action Plan. Further, the Application does not
26 contain sufficient information about the air pollutant emissions or reliable plans to
27 monitor, study and report them. As a result, there is no assurance that the Pilot Project

(Ron) Sahu and Sasan Saadat on Behalf of the Sierra Club, A.23-06-023 (Feb. 16, 2024),
<https://docs.cpuc.ca.gov/PublishedDocs/SupDoc/A2306023/7054/525583319.pdf>; Supplemental
Testimony of Ranajit (Ron) Sahu on Behalf of the Sierra Club, A.23-06-023 (Apr. 29, 2024),
<https://docs.cpuc.ca.gov/PublishedDocs/SupDoc/A2306023/7272/530646456.pdf>.

¹⁰⁶ Attach. 3, SoCalGas Response to Sierra Club Data Request 5, Question 5-6a.

¹⁰⁷ Attach. 3, SoCalGas Response to Sierra Club Data Request 5, Question 5-6b.

¹⁰⁸ Attach. 3, SoCalGas Response to Sierra Club Data Request 5, Question 5-6c.

1 will reduce GHG emissions, avoid harms to nearby residents, or generate information that
2 is useful to CPUC policymaking.

3 Thus, given the increase in criteria pollutants, air toxics, and GHGs that will result from
4 the Project, the risk of adverse impacts to environmental and social justice communities,
5 and the lack of sufficient study and reporting, it is my expert view that the Commissions
6 should not approve this Application.

7 **Q. Does this conclude your testimony?**

8 **A.** Yes.

1

Attachments

2 Attach. 1 – Resume of Emily Grubert

3 Attach. 2 – Resume of Ron Sahu

4 Attach. 3 – SoCalGas Responses to Sierra Club Data Requests (Public Version)

5 Attach. 4 – SoCalGas Responses to California Public Advocates Data Requests