

# Analysis of the Gas Companies' June 15, 2023, Natural Gas Leak and Emission Reports

CALIFORNIA PUBLIC UTILITIES COMMISSION AND  
CALIFORNIA AIR RESOURCES BOARD JOINT STAFF  
REPORT

January 29, 2024

SB 1371 (Leno) Natural Gas: Leakage Abatement | *R.15-01-008, D.17-06-015, D.19-08-020*



**California Public  
Utilities Commission**

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# Executive Summary

This is the ninth annual report (2023 Joint Report) compiled jointly by the California Public Utilities Commission (CPUC or the Commission) and the California Air Resources Board (CARB) in compliance with Senate Bill (SB) 1371 (Leno, 2014) on natural gas emissions, as ordered by the CPUC decision approving the Natural Gas Leak Abatement program (NGLA program) (D.17-06-015).

The 2023 Joint Report compiles and analyzes the 2022 natural gas emissions estimates from sources of fugitive leaks and vented emissions in the natural gas transmission and distribution system in California, as reported by California natural gas utilities and independent storage providers (ISPs) (collectively “gas companies” or “respondents”).<sup>1</sup> This report also presents and discusses natural gas emissions estimates by system category, source classification, and company.<sup>2</sup>

Respondents filed their 2022 natural gas emissions estimates and related information by June 15, 2023, pursuant to the data request issued by CPUC Staff on March 30, 2023. The data request included reporting templates and associated guidelines for gas companies.

CPUC and CARB Staff (Staff) used the respondents’ filings, including their responses to Staff follow-up questions and comments on the initial report filings, to prepare the 2023 Joint Report. Staff also adjusted in this report the 2021 natural gas emissions estimates reported in the 2022 Joint Report to update data identified by the respondents.

Gas companies have been developing improved methods to estimate emissions for several system categories since the inception of the NGLA program. Before gas companies can incorporate the improved methods into annual reporting, gas companies must receive approval from CPUC staff. Gas companies have also been developing adjustments to the 2015 Baseline to account for improved methodologies, emission factor (EF) updates, and other adjustments needed to allow for a direct comparison of the 2015 Baseline with current-year emissions estimates. Gas companies must present proposed adjustments to the 2015 Baseline for CPUC review and approval. Developing and approving improved emissions estimation methods and adjustments to the 2015 Baseline is an ongoing process.

In the 2022 Joint Report, the CPUC/Safety Policy Division (SPD) approved by letter, after consultation with CARB, proposed 2015 Baseline changes and new estimation methods for the 2020 and 2021 emission data for Pacific Gas and Electric (PG&E) and Southern California Gas (SoCalGas). These approval letters and supporting documentation were included in Appendix A of the 2022 Joint Report.

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<sup>1</sup> For the purposes of this report, “emissions” include both fugitive leaks and vented emissions of natural gas, unless otherwise noted.

<sup>2</sup> The term “system category” is used to describe the grouping of natural gas emissions based on where the emissions occur in the natural gas transmission and distribution system. The Joint Report groups emissions into seven distinct system categories (see Table 2 for the list of system categories). The term “source classification” refers to the grouping of natural gas emissions by emission type, including the manner in which the emission occurs or the method by which emissions are estimated (see Table 3 for the list of source classifications).

On July 19, 2023, the CPUC/SPD approved by letter, after consultation with CARB, two additional adjustments to the 2015 Baseline emissions for PG&E. On August 21, 2023, the CPUC/SPD also approved by letter, after consultation with CARB, one adjustment to the 2015 Baseline emissions for West Coast Gas Company. These two approval letters are included in Appendix A.

CPUC/SPD's approval of new emission estimation methods and adjustments to 2015 Baseline emissions will allow CPUC and CARB to more accurately evaluate progress towards overall methane emissions reduction targets for the NGLA program and California's 2045 carbon neutrality goal; and to estimate the System-wide Leak Rate more accurately, as required by SB 1371. These approvals will also assist CPUC and the gas companies in estimating forecasted emissions reductions of proposed measures more accurately and more effectively evaluate the absolute and relative cost-effectiveness of proposed measures in future Compliance Plans. To verify the accuracy of emission measurement practices used in the NGLA program, the CPUC may audit gas company practices through site visits and/or review of records used to determine baseline adjustments and current emissions.

Reporting Year (RY) 2023 represents the second year CPUC and CARB have considered baseline adjustments in the NGLA Program. Last year, CPUC and CARB discussed and implemented process improvements regarding submittal of baseline adjustments. CPUC and CARB staff are considering further development and implementation of standards and guidelines for the submission of baseline adjustments to ensure that emission reduction estimates are based on real, accurate and verifiable data. As recommended in CPUC Final Resolution G-3595<sup>3</sup>, CPUC and CARB look forward to jointly identifying options for verifying emission estimates.

Stakeholders should use the information in this report to help determine general emission trends over time and identify where potential emission reductions can be achieved to meet the State's overall goal of reducing methane emissions by 40% from 2013 levels by 2030,<sup>4,5</sup> while maintaining the safe, reliable, and affordable operation of the regulated natural gas storage and delivery systems, as stated in SB 1371.

## Key Findings

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The 2022 total statewide estimated natural gas emissions from sources of fugitive leaks and vented emissions in the transmission and distribution system are 3,166 million standard cubic feet (MMscf) which is 2% lower (72 MMscf) than the 2021 adjusted emissions, and 27% below (1,158 MMscf) the 2015 Baseline emissions estimate (see Table 1).

Natural gas emissions decreased from 2021 to 2022 in five of the seven reported system categories. Reported data indicates that Transmission Compressor Stations show the largest overall Year-over-year

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<sup>3</sup> CPUC Final Resolution G-3595. <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M512/K907/512907380.PDF>

<sup>4</sup> This goal was established by SB 1383 (Lara, 2016).

<sup>5</sup> CPUC Decision D.17-06-015. <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M190/K740/190740714.PDF>, specified that the 2015 baseline emissions estimates will provide the starting point to measure future natural gas emissions reductions for the NGLA program.

(YOY) emissions decrease (48 MMscf decrease). Emissions from Transmission Pipelines increased by 20% (34 MMscf increase, see Table 2).

A detailed analysis of natural gas emissions estimates from individual system categories is provided later in this report.

The total statewide 2022 reported natural gas emissions of 3,166 MMscf equate to 1.42 million metric tonnes of carbon dioxide equivalents (MMT CO<sub>2</sub>e) using the Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report (AR4), 100-year methane Global Warming Potential (GWP) of 25 or 4.08 MMT CO<sub>2</sub>e, using the 20-year methane GWP of 72.

<b>Table 1: Total Statewide Natural Gas Emissions Reported Under SB 1371</b>							
Sector Emissions	2015 Baseline*	2021**	2022***	2015 Baseline to 2022 Change		2021 - 2022 YOY Change	
				MMscf, MMT CO <sub>2</sub> e	% Change	MMscf, MMT CO <sub>2</sub> e	% Change
Volume of Natural Gas (MMscf)	4,324	3,238	3,166	(1,158)	(27%)	(72)	(2%)
Mass Equivalent, 100-Yr GWP, AR 4 (MMT CO <sub>2</sub> e)	1.94	1.45	1.42	(0.52)	(27%)	(0.03)	(2%)
Mass Equivalent, 20-Yr GWP, AR 4 (MMT CO <sub>2</sub> e)	5.58	4.18	4.08	(1.49)	(27%)	(0.09)	(2%)

\*The adjustments to the 2015 baseline emissions approved by the CPUC on July 19, 2023 and August 21, 2023 reduced the 2015 baseline emissions reported in the 2021 Joint Report by 113 MMscf (approximately 3%).

\*\* The 2021 total has been modified from the 2022 Joint Report, which is described in the section, "2021 Data Adjustments and Corrections". The total also uses the 2021 posted emissions for SoCalGas for Distribution Mains and Services and Customer Meters. SoCalGas has provided revisions to these two system categories estimates that are under review.

\*\*\* The 2022 total also uses the 2021 posted emissions for SoCalGas for Distribution Mains and Services and Customer Meters. SoCalGas has provided revisions to these two system categories estimates that are under review.

Subsequent sections of this report analyze the total natural gas emissions for 2022 by examining individual system categories and source classifications. Table 2 shows total estimated natural gas emissions and emissions trends grouped by system category, and Table 3 shows total estimated natural gas emissions and emissions trends grouped by source classification.

Natural Gas Emissions by System Category

As indicated in Table 2, there was a 2% reduction in the total 2021 to 2022 YOY natural gas emissions.

<b>Table 2: Total Natural Gas Emissions by System Category<sup>6</sup></b>										
System Category	2015 Baseline		2021		2022		2015 Baseline to 2022 Change		2021 – 2022 YOY Change	
	MMscf	% Total	MMscf	% Total	MMscf	% Total	MMscf	% Change	MMscf	% Change
Transmission Pipeline	589	14%	174	5%	208	7%	(381)	(65%)	34	20%
Transmission M&R Station	777	18%	716	22%	705	23%	(72)	(9%)	(11)	(2%)
Transmission Compressor Station	181	4%	141	4%	93	3%	(88)	(49%)	(48)	(34%)
Distribution Mains & Services	1,328	31%	948	29%	919	29%	(409)	(31%)	(29)	(3%)
Distribution Metering & Regulating Stations	284	7%	267	8%	269	9%	(15)	(5%)	2	1%
Customer Meters	823	19%	851	26%	848	27%	25	3%	(3)	(<1%)
Underground Storage	342	8%	142	4%	125	4%	(217)	(63%)	(17)	(12%)
<b>Total</b>	<b>4,324</b>	<b>100%</b>	<b>3,238</b>	<b>100%</b>	<b>3,166</b>	<b>100%</b>	<b>(1,158)</b>	<b>(27%)</b>	<b>(72)</b>	<b>(2%)</b>

The first system category, Transmission Pipelines, accounts for about 7% of the total 2022 emissions but showed a 20% YOY increase of 34 MMscf from 2021. See more details in Summary of Gas Company–Estimated Natural Gas Emissions.

Transmission Meter and Regulation (M&R) Stations’ 23% proportional share of the total 2022 emissions remained similar to the 22% share from 2021 emissions. The YOY emissions decreased 11 MMscf or 2% from a total of 716 MMscf in 2021 to 705 MMscf in 2022.

The share of the 2022 total emissions from Transmission Compressor Stations remained similar to last year at 3%. The 2022 Compressor Station emissions decreased by 48 MMscf YOY from 2021. The Component

<sup>6</sup> For more sub-category details see Table 9: Natural Gas Emissions by System Category, Emission Source, and Source Classification. In addition, in 2015 and 2016 the Aliso Canyon storage well leak was excluded from Unusual Large Leaks because it was accounted for by other state agencies.

Fugitive Leaks subcategory is also described in the section of this report titled “Impacts of CARB’s Oil and Gas Methane Regulation.”

Distribution Mains and Services pipeline emissions decreased by 29 MMscf from 948 MMscf in 2021 to 919 MMscf in 2022. This decrease was due to revisions in the calculation methodology approved for one of the two largest utilities.

Distribution Metering and Regulating (M&R) Stations emissions increased by 2 MMscf YOY from 267 MMscf in 2021 to 269 MMscf in 2022.

Customer Gas Meters emissions decreased by 3 MMscf YOY from 851 MMscf in 2021 to 848 MMscf in 2022. The 2021 and 2022 emissions use a population-based approach by some utilities (Alpine, SDG&E, Southwest Gas, and West Coast Gas Storage) and a leaker-based approach by others (PG&E and SoCalGas). YOY changes are not estimated for SoCalGas due to concerns with data reporting (see Summary of Gas Company section below). The population-based approach relies on the total number of gas meters and a single weighted-average emission factor (EF) for the entire population to estimate the total emissions. The leaker-based approach is based on the number of leaking meters and disaggregated EFs by leak size. The latter approach offers a better YOY progress in reducing emissions.

Underground Storage emissions decreased by 17 MMscf or 12% YOY from 142 MMscf in 2021 to 125 MMscf in 2022. The Component Fugitive Leaks subcategory and Storage Leaks & Emissions subcategory are also described in the section of this report titled, “Impacts of CARB’s Oil and Gas Methane Regulation.”

Lastly, no unusual large leaks were reported in 2022.



Natural Gas Emissions by Source Classification

Natural gas emissions can be grouped into the six main source classifications, from largest to smallest: Population-Based Emissions, Graded Pipeline Leaks, Leaker-Based Emissions, Blowdowns, Vented Emissions, and Damages. An additional source classification, Other Leaks, is used for emission sources that do not fit one of the six main source classifications. Table 3 shows the YOY changes by source classification.<sup>7</sup>

<b>Table 3: Total Natural Gas Emissions by Source Classification</b>										
Source Classification	2015 Baseline		2021		2022		2015 Baseline to 2022 Change		2021 - 2022 YOY Change	
	MMscf	% Total	MMscf	% Total	MMscf	% Total	MMscf	% Change	MMscf	% Change
Population-Based Emissions	1,136	26%	1,103	34%	1,127	36%	(9)	(1%)	23	2%
Graded Pipeline Leaks	1,092	25%	831	26%	782	25%	(310)	(28%)	(49)	(6%)
Leaker-Based Emissions	680	16%	680	21%	673	21%	(7)	(1%)	(7)	(1%)
Blowdown	603	14%	248	8%	207	7%	(396)	(66%)	(41)	(16%)
Vented	363	8%	203	6%	172	5%	(191)	(53%)	(31)	(15%)
Damages	318	7%	141	4%	186	6%	(132)	(42%)	45	32%
Other Leaks	131	3%	31	1%	19	1%	(112)	(85%)	(12)	(38%)
<b>Total Sector Emissions</b>	<b>4,324</b>	<b>100%</b>	<b>3,238</b>	<b>100%</b>	<b>3,166</b>	<b>100%</b>	<b>(1,158)</b>	<b>(27%)</b>	<b>(74)</b>	<b>(2%)</b>

YOY emission changes by source classification are summarized as follows, ordered by largest emissions to smallest:

- Consistent with the prior year, the Population-Based Emissions classification makes up the single largest source classification of emissions at 36% of the 2022 total emissions. The four individual emission sources that are part of this category are provided in Table 6, Population-Based Natural Gas Emissions.
- Graded Pipeline Leaks decreased from 831 MMscf in 2021 to 782 MMscf in 2022. Overall, this category decreased YOY by 6% or 49 MMscf.

<sup>7</sup> See Table 9: Natural Gas Emissions by System Category, Emission Source, and Source Classification, in the body of the report.

- The Leaker-Based Emissions classification makes up the third largest source classification of emissions at 21% of the 2022 total emissions.
- Blowdowns decreased by 16% YOY from 248 MMscf in 2021 to 207 MMscf in 2022. This category has emissions that are cyclical and vary with annual operating conditions. For a more detailed analysis, see Table 7, Blowdown Natural Gas Emissions.
- Vented Emissions remained nearly constant at 5% of the percentage share with 203 MMscf in 2021 and 172 MMscf in 2022. Overall, this category decreased YOY by 15% or 31 MMscf. For a more detailed analysis, see Table 8, Vented Natural Gas Emissions.
- Emissions from Damages increased from the previous year from 141 MMscf in 2021 to 186 MMscf in 2022.
- Other Leaks decreased from 31 MMscf in 2021 to 19 MMscf in 2022.

# Introduction and Background

On September 14, 2014, Governor Jerry Brown signed into law SB 1371 (Leno, 2014) requiring reporting and mitigation of emissions from California Public Utilities Commission (CPUC)-regulated gas pipeline facilities.<sup>8</sup> The bill requires gas corporations to file a report summarizing utility leak management practices, a list of new natural gas leaks by grade, a list of open leaks that are being monitored or are scheduled to be repaired, and a best estimate of gas loss due to leaks. In accordance with SB 1371, the CPUC and California Air Resources Board (CARB) prepared this annual report (2023 Joint Report), which analyzes and accounts for natural gas from leaks and vented emissions from natural gas transmission, distribution, and storage in California.<sup>9</sup>

SB 1371 also requires the adoption of rules and procedures to minimize natural gas leakage from Commission-regulated natural gas pipeline facilities consistent with Section 192.703(c) of Subpart M of Title 49 of the Code of Federal Regulation, the Commission's General Order (GO) 112-F, and the State's goal of reducing GHG emissions.

In January 2015, the Commission opened an Order Instituting Rulemaking (R.) 15-01-008 to implement the provisions of SB 1371.

On June 15, 2017, the Commission in decision (D.)17-06-015 approved the Natural Gas Leak Abatement (NGLA) Program consistent with SB 1371. This decision established Best Practices (BPs) and reporting requirements for the NGLA Program to be developed by the CPUC in consultation with CARB.<sup>10</sup> The decision implements the following to support the State's goal of reducing 2015 Baseline natural gas emissions 40% by 2030:

1. Annual reporting for tracking natural gas emissions;
2. Twenty-six mandatory BPs for minimizing natural gas emissions pertaining to policies and procedures, recordkeeping, training, experienced trained personnel, leak detection, leak repair, and leak prevention;
3. Biennial Compliance Plan (CP) incorporated into the respondents' annual Gas Safety Plans, beginning in March 2018; and
4. Cost recovery process to facilitate Commission review and approval of incremental expenditures to implement BPs, Pilot Programs and Research & Development.

In D.17-06-015, the Commission affirms that the 2015 Baseline emissions estimates will provide the starting point to measure future natural gas emissions reductions.<sup>11</sup>

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<sup>8</sup> Leno, Chapter 525, Statutes of 2014.

<sup>9</sup> Unless specified as a fugitive leak or vented emission, for the purposes of this report "emissions" include both fugitive leaks, and vented emissions of natural gas.

<sup>10</sup> Leno, 2014; Pub. Util. Code §§ 975, 977, 978.

<sup>11</sup> <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M190/K740/190740714.PDF>, Findings of Fact #13, Pg. 145.

To culminate the second phase of R.15-01-008, on August 15, 2019, the Commission approved D.19-08-020 establishing additional policies and mechanisms for the NGLA program pursuant to SB 1371 and SB 1383 (Lara, 2016).<sup>12</sup> This decision requires:<sup>13</sup>

- Utility Proposed Cost-Effectiveness Methodology and two Cost-Benefit Analyses for evaluating proposed methane reduction measures and the Biennial Methane Leaks Compliance Plans (Compliance Plans).
- Adopting a restriction on rate recovery beginning in 2025, for emissions greater than 20% below the 2015 Baseline levels for Pacific Gas and Electric Company (PG&E) and Southern California Gas Company (SoCalGas) to ensure they achieve their intended emissions reductions.<sup>14</sup>
- Two workshops to refine the scope and detail of the Compliance Plans and Tier 3 Advice Letters pertaining to cost-effectiveness and cost-benefit analysis and other elements as directed in D.17-06-015.
- Developing a process that gas companies can rely on, prior to submittal of the next Compliance Plans in March 2020, to adjust Emission Factors (EFs) used for annual reports to account for methane reduction measures in consultation with CARB.
- Extending the timeframe from 2020 to 2021 for the CPUC's Safety and Enforcement Division<sup>15</sup> and Energy Division Staff to complete a written program evaluation of the NGLA program after Commission approval of the second set of Compliance Plans in late 2020. In June 2021, the due date for this program evaluation was further extended to December 2022.
- Commission direction of the NGLA program moving forward, following submission of the third set of Best Practices Biennial Compliance Plans submitted in March 2022 and the NGLA program evaluation, which was due by the end of 2022.

All directives of D.17-06-015 remain in effect unless they are superseded by directives and/or guidance provided by this decision. Lastly, in D.19-08-020 the Commission closed R.15-01-008.

In addition, SB 32 (Pavley, 2016), which sets a 40% GHG reduction target from 2013 levels by 2030, was passed and signed into law in 2016.<sup>16</sup> SB 605 (Lara, 2014)<sup>17</sup> directed CARB to develop plans to reduce statewide natural gas emissions, which it did in the Short-Lived Climate Pollutant Reduction Strategy.<sup>18</sup> SB

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<sup>12</sup> Lara, Chapter 395, Statutes of 2016.

<sup>13</sup> D.19-08-020: <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M311/K449/311449621.PDF>

<sup>14</sup> D.20-05-038, Order Correcting Error in D.19-08-020, states at pg. 1 that: "For SoCalGas, any necessary reductions in rate recovery for methane emissions for 2025 and beyond as directed in this Decision should be identified in its Annual Regulatory Account Balance Update for rates effective January 1, 2027."

<sup>15</sup> Since the Decision was issued, the SED RASA Staff who have responsibility for preparation of the NGLA program evaluation have moved to the Safety Policy Division (SPD).

<sup>16</sup> Pavley, Chapter 249, Statutes of 2016.

<sup>17</sup> Lara, Chapter 523, Statutes of 2014.

<sup>18</sup> CARB, 2017: <https://ww2.arb.ca.gov/resources/documents/slcp-strategy-final>.

1383 (Lara, 2016) required CARB to develop and begin implementation of the Short-Lived Climate Pollutant Reduction Strategy by January 1, 2018.<sup>19</sup>

## Purpose of the Annual Natural Gas Leak Abatement Report

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This report estimates natural gas emissions from the storage and delivery systems in aggregate, by company, system category, source classification, and leak grade. The information should be used to help determine where emission reductions can be achieved while maintaining safe and reliable operation of commission-regulated natural gas pipelines and other facilities. The metrics used to compile this report provide operators, the Commission, and the public with information about the type, number, and severity of natural gas emissions and the leaked quantity of natural gas emitted to the atmosphere over time.

This report provides a summary of the 2022 emissions submitted to CPUC by the gas companies on June 15, 2023 and differs from prior year reports as a result of the following two communications from CPUC to the list serve or gas companies.

1. With the issuance to the list serve of the March 30, 2023 reporting templates:
  - Staff updated the blowdowns worksheet in Appendix 1, Transmission Pipelines with three new columns:
    - “Reason” column: utilities will enter the reason why each blowdown was necessary. Utilities will select a reason from one of the options indicated in the column header comment. These reasons include: maintenance (M), repair or replacement (R), integrity management (IM), pressure reduction or deactivation (PR), or other (O). If utilities indicate the reason as “O” (other), utilities must also provide a short description of the reason for the blowdown.
    - “Emission Reduction Strategy” column: utilities will enter the emission reduction strategy used for each blowdown event. Utilities will select a strategy from one of the options indicated in the column header comment. These reasons include drafting (D), cross compression (XC), gas capture (GC), flaring or thermal oxidation (FTO), project bundling (PB), multiple methods (M), none (N), or other (O). If utilities indicate that there were multiple emission reduction strategies “M” (multiple methods), utilities must also list each emission reduction strategy. If utilities indicate the emission reduction strategy as “O” (other), utilities must also provide a short description of the emission reduction strategy.
    - “Methane Abatement” column: utilities will provide an estimation of the volume of captured natural gas in units of thousands of standard cubic feet (Mscf).
  - Staff updated the Meter Set Assembly (MSA) worksheet for the reporting of identified MSA leaks. Staff have added an additional column labeled “Leak Discovery Method”, that requires

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<sup>19</sup> Lara, Chapter 395, Statute of 2016.

utilities to record the leak discovery method as either Routine Leak Survey (S) or Operation & Maintenance (M).

- Staff updated the worksheet name, “Wellhead Leaks & Emissions” to “Storage Leaks & Emissions” in Appendix 7, Underground Storage. The latter name is consistent with the corresponding row name in the “Year Over Year Comparison” worksheet in Appendix 8.
- Staff removed eight columns in the Underground Storage, Compressor Vented Emissions worksheet. For example, one of these was “Emission Factor: Pressurized Operating – Wet Seal Oil Degassing Vent.”
- Staff added a new column in the Summary Appendix 8, labeled as “Approved 2015 Baseline Emissions”, to document the current CPUC-approved 2015 Baseline emissions for each Emission Source Category.
- Staff added notes in red font to the “Emissions Source Category” column in the section for Appendix 7, Underground Storage in Appendix 9, Emission Factors. These notes clarify the worksheet name (i.e., tab name) in the Appendix 7 reporting template where the emission factor(s) are applied.
- Staff updated the Supplemental Questionnaire to remove questions 2 through 6 from the previous year’s version. Additionally, Question 1 has been updated to include new informational requests in items (a) through (f)

2. With the email from CPUC/SPD to the list serve on March 13, 2023:

- The CPUC/SPD informed the utilities that April 10<sup>th</sup>, 2023 will be the deadline for any baseline adjustment requests for the upcoming NGLA 2022 data submission.
- CPUC and CARB will process these requests by August 1<sup>st</sup>.

This report includes general discussions of changes to operational practices, new methods for leak and emission detection, and mitigation programs. Lastly, Staff tried to include information on any improvements in the data capture resulting from gas company efforts (e.g., verification of asset inventory, integrating system databases, etc.), changes to methodology for estimating emissions (e.g., calculating emissions for all blowdowns not just those above a specific threshold), and corrections to the classification of data or errors in the data that may provide greater accuracy in reporting.

## Basis for the Annual Natural Gas Leak Abatement Report

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On March 30, 2023, Staff issued a data request to CPUC jurisdictional natural gas utilities and independent storage providers (ISPs) in California to collect the information required by Article 3, Section 975 (c) and (e)(6), using templates jointly developed by CPUC and CARB Staff (See Appendix C for detailed wording).

The data were tabulated into the following seven systems categories (which included subgroupings by type):

1. Transmission Pipelines (leaks, damages, blowdowns, components, and odorizers);
2. Transmission Meter and Regulation (M&R) stations (station leaks and emissions, and blowdowns);

3. Compressor stations (compressor leaks and emissions, blowdowns, components leak and emissions, and storage tanks);
4. Distribution Mains and Services (M&S) (leaks, damages, and blowdowns),
5. Distribution M&R stations (station leaks and emissions, and blowdowns),
6. Customer Meters (leaks, and venting); and
7. Underground Storage Facilities (leaks, compressors leaks and emissions, blowdowns, and component leaks and emissions).

The respondents provided contextual information and explanations for their data to help Staff understand the composition of the emissions, emission sources, and related calculations underlying the emission estimates. The respondents summarized the data and provided their system-wide leak information.

Staff analyzed the data and requested supplementary information needed for clarification. The “Lessons Learned” section of this report identifies insights Staff acquired about potential improvements to the process and opportunities to enhance future data requests.

## Basis for Updating Emissions Methodologies and Adjusting the 2015 Baseline Values

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Since the NGLA reporting process began, Staff and respondents have identified opportunities for improving reporting methodology, emission factors, and record keeping. Had some of these improved emissions data been known or used at the time of the 2015 reporting year they would have had a material impact on the level of 2015 Baseline emissions in the Joint Report.

While the June 2017 Commission D.17-06-015 does not order a process for updating the 2015 Baseline, it does order that:

“The Natural Gas Leak Abatement Program Annual Reporting Framework contained in Section 5.2 ... of this decision is adopted consistent with the process detailed below: The Commission’s Safety and Enforcement Division (SED)<sup>20</sup>, in consultation with the Air Resources Board [C](ARB), shall direct the annual report process...”<sup>21</sup>

This is interpreted to include the consideration and evaluation of any changes to 2015 Baseline emissions based on new methods of emissions accounting, better record keeping and information, and updated EFs used for estimating emissions.

D.19-08-020 modifies the approach to updating EFs by allowing gas companies to propose EF changes that more accurately account for the emissions from their Compliance Plan emissions mitigation programs. In

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<sup>20</sup> Since the Decision was issued, the SED RASA Staff who have responsibility for directing the annual report process have moved to the Safety Policy Division (SPD) and maintained this responsibility.

<sup>21</sup> D.17-06-015, Pg. 157.



addition, changes to 2015 Baseline EFs may be warranted based on the supporting data and evidence used to develop EFs for emission mitigation programs included in their Compliance Plans.

The discussion within D.17-06-015 further clarifies the roles and responsibilities for managing the emissions reporting processes.

“...[T]he development of EFs and an official Baseline to manage this initiative in the long term is still in flux. Therefore, while, [C]ARB is ultimately responsible for the development of EFs in collaboration with stakeholders, both [C]ARB and CPUC should continue to collaborate to ensure that updates to EFs are completed in a timely fashion consistent with the Commission’s annual reporting process. Following this year’s example, if changes are required to the annual reporting template, [C]ARB and CPUC Staff will conduct a workshop to discuss EFs and ongoing changes to the reporting template. This workshop should take place during the first quarter of each year before SED<sup>22</sup> issues the annual data request at the end of the first quarter.”<sup>23</sup>

On June 6, 2022, the CPUC/SPD approved new estimation methods for the 2020 and 2021 emission data. The CPUC/SPD approved leaker-based methodologies developed by PG&E and SoCalGas to replace population-based methodologies for estimation of natural gas emissions from Distribution M&R Stations and Customer Meters systems categories. Population-based emissions estimates are calculated based on the number of units within a system category (e.g., number of Distribution M&R stations) multiplied by an EF. Therefore, population-based emissions stay constant from year to year unless a change is made to the number of units or to the EFs. Population-based emissions estimates are generally unable to capture emissions changes associated with the gas companies’ emissions mitigation practices. On the other hand, leaker-based emissions estimates are calculated by using surveyed or estimated number of leaks and are more effective in capturing emissions changes associated with gas companies’ mitigation practices. The ability to accurately estimate emissions reduction is critical to measuring progress toward the targeted goal and evaluating the mitigation process’s cost-effectiveness.

On October 26, 2022, CPUC/SPD approved adjustments to the 2015 Baseline emissions for PG&E and SoCalGas to account for methodological changes, EF updates, and other adjustments that are needed to allow for a direct comparison of 2015 Baseline emissions with current-year emissions estimates. Letters from the CPUC/SPD to PG&E and SoCalGas approving the adjustments to 2015 Baseline emissions are included in the 2022 Joint Report.

On July 19, 2023, CPUC/SPD approved two adjustments to the 2015 Baseline emissions for PG&E. For the first adjustment, PG&E has made several improvements in the accounting of component vented emissions on Transmission Pipelines since the original reporting of this category. This 2015 Baseline adjustment for this category aligns the baseline to match the improvement in reporting via the GIS system of the pressure relief valves (Calendar Year (CY) 2019) emissions and to account for the addition of automated valve emissions (CY 2020/2021). For the second adjustment to Distribution Mains and Services,

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<sup>22</sup> Since Decision D.17-06-015 was issued, the SED RASA Staff who have responsibility for issuing the annual data request have moved to the Safety Policy Division (SPD) and maintained this responsibility.

<sup>23</sup> Ibid, Pg. 39.



PG&E collected pipeline leak data in 2014-2020 that aligns with Washington State University (WSU) study data and finds that the WSU study best characterizes leaks on the PG&E system overall, compared to the initial set of EFs used to establish a baseline and measure performance. CPUC/SPD in consultation with CARB met with PG&E a number of times to evaluate the methodologies, and reached a final approval of the WSU Adjusted methodology as proposed by PG&E. The letter from the CPUC/SPD to PG&E approving the adjustments to 2015 Baseline emissions is included in Appendix A.

On August 21, 2023, CPUC/SPD approved a single adjustment to the 2015 Baseline emissions for West Coast Gas Company (WCGC). In the utility's original 2015 Baseline data for Customer Meters (Appendix 6) – Meter Leaks, West Coast Gas reported a value of 2.8 Mscf based on an estimation of observed leaks for the year 2015. This, however, was contrary to the population-based methodology established as the standard by participating parties. Following the submittal of 2022 emissions data on June 15, 2023, SPD staff, in consultation with CARB, identified and resolved the discrepancy between West Coast Gas's original 2015 Baseline emissions value (of 2.8 Mscf) and the 194.177 Mscf value that West Coast Gas was now providing as the 2015 Baseline in its annual data submittals. The letter from the CPUC/SPD to WCGC approving the adjustments to 2015 Baseline emissions is included in Appendix A.

CPUC/SPD's approval of new emission estimation methods and adjustments to 2015 Baseline emissions allows the CPUC and CARB to more accurately estimate the System-wide Leak Rate, as required by SB 1371, and to evaluate progress towards goals of the NGLA program and the State to reduce methane emissions (i.e., a 20% reduction in methane emissions for PG&E and SoCalGas by 2025 relative to 2015 for the NGLA program, and a 40% reduction in methane emissions by 2030 relative to 2013 across all sectors state-wide). These approvals will also assist CPUC and the gas companies in estimating forecasted emissions reductions of proposed measures more accurately and more effectively evaluate the absolute and relative cost-effectiveness of proposed measures in future Compliance Plans.

# Findings and Discussion

## Natural Gas Leaks and Emissions

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As described in the Executive Summary, the 2022 estimated natural gas emissions totaled approximately 3,166 MMscf, which equates to 1.42 MMTCO<sub>2</sub>e using the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) 100-year methane Global Warming Potential (GWP) of 25, or 4.08 MMTCO<sub>2</sub>e using the 20-year methane GWP of 72 (see Table 1). This is a 2% YOY decrease from the 2021 estimated natural gas emissions of 3,238 MMscf.

## System-wide Leak Rate

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The System-wide Leak Rate is an important metric that shows the relative natural gas emissions to throughput from all respondents. SB 1371 requires annual reporting of the System-wide Leak Rate for the transmission and distribution system.<sup>24,25</sup>

The 2022 System-wide Leak Rate was 0.17% and was comparable to the previous year's 2021 System-wide Leak Rate of 0.16%. The System-wide Leak Rate is calculated by dividing the Total Emissions by the Total Throughput, as shown in Table 4. Accordingly, the consistent percentage in System-wide Leak Rate from 2021 to 2022 can be attributed to the decrease in Total Throughput from 1,964,547 MMscf in 2021 to 1,907,011 MMscf in 2022 and a decrease in Total Emissions from 3,238 MMscf in 2021 to 3,166 MMscf in 2022.

System-wide Leak Rates for the intermediate years (i.e., 2016 to 2020) are not shown because updated emission estimation methodologies have not been applied to emissions for these years.

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<sup>24</sup> For the purposes of SB 1371, the definitions of “leak” and “gas loss” and the formula for calculating a “System-wide Leak Rate” were defined in a different manner than elsewhere. For the purposes of calculating the System-wide Leak Rate, a “leak” was defined as any breach, whether intentional or unintentional, whether hazardous or non-hazardous, of the pressure boundary of the gas system that allows natural gas to leak into the atmosphere. Any vented or fugitive emission to the atmosphere is considered a “leak.” See Appendix B.

<sup>25</sup> Refer to Appendix C for Public Utilities Code Section 975(e)(6), Article 3.

**Table 4: System-wide Throughput, Emissions, and Leak Rate - 2015, 2021, and 2022**

Throughput Category	Natural Gas Volume (MMscf)		
	2015 Baseline	2021	2022
Total Storage Annual Volume of Injections to Storage	199,522	166,893	144,321
Total Storage Annual Volume of Gas Used by the Gas Department	N/A	1,732	1,687
Total Transmission Annual Volume of Gas Used by the Gas Department	7,717	7,018	6,185
Total Transmission Volume of Annual Gas transported to or for Customers in state	1,832,676	1,775,141	1,739,384
Total Transmission Volume of Annual Gas transported for Customers out of state	16,775	13,335	14,894
Total Distribution Annual Volume of Gas Used by the Gas Department	261	428	540
<b>Total Throughput</b>	<b>2,056,950</b>	<b>1,964,547</b>	<b>1,907,011</b>
<b>Total Emissions</b>	<b>4,324</b>	<b>3,238</b>	<b>3,166</b>
<b>System-wide Leak Rate</b> $\left(\frac{\text{Total Emissions}}{\text{Total Throughput}}\right)$	<b>0.21%</b>	<b>0.16%</b>	<b>0.17%</b>

## 2021 Data Adjustments and Corrections

This report reflects adjustments to the 2021 data reported in the 2022 Joint Report. The change in emissions accounting in the 2021 respondent filings was updated for consistency and comparability with the current 2022 data. Staff reviewed with gas companies to confirm changes to the 2021 data.

The corrections made to 2021 values include:

- PG&E:
  - The Pipeline Leaks category of Distribution Mains and Services pipelines, changed from 548,175 Mscf to 352,633 Mscf. This resulted from applying the WSU Adjusted methodology, which was approved by CPUC/SPD in consultation CARB this year, from the 1996 US EPA/GRI methodology.
  - As a result of this change, the total emissions for PG&E changed from 1,765,965 Mscf to 1,570,423 Mscf.
- SoCalGas:
  - The odorizers category of Transmission Pipelines changed from 2,675 Mscf to 2,727 Mscf. SoCalGas noted that during the 2023 Report data collection, that there was a line item for Big GEMS GCs/Analyzers that was missing from last year’s report.
  - The Station Leaks and Emissions, Leaker-Based category of Distribution Meter and Regulating stations changed from 7,185 Mscf to 7,184 Mscf.

- The Compressor Emissions category of Underground Storage changed from 1,502 Mscf to 6,470 Mscf. SoCalGas noted that they identified errors in the emission factors from last year's report.
- The Component Emissions category of Underground Storage changed from 2,439 Mscf to 2,460 Mscf.
- As a result of these changes, the total emissions for SoCalGas changed from 1,156,566 Mscf to 1,161,606 Mscf.
- San Diego Gas & Electric:
  - The Odorizers category of Transmission Pipelines changed from 82 Mscf to 88 Mscf. SDG&E noted that during the 2023 Report data collection, that there was a line item for Big GEMS GCs/Analyzers that was missing from last year's report.
  - The Station Leaks and Emissions, Leaker-Based category of Transmission Meter and Regulating stations changed from 21,767 Mscf to 21,792 Mscf.
  - The Pipeline Leaks category of Distribution Mains and Services pipelines, changed from 12,291 Mscf to 11,110 Mscf.
  - As a result of these changes, the total emissions for SDG&E changed from 254,000 Mscf to 252,850 Mscf.

## Impacts of CARB's Oil and Gas Methane Regulation

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CARB's Oil and Gas Methane Regulation<sup>26</sup> (COGR) became effective January 1, 2018, and 2022 was the fifth year of implementation. The regulation has impacted SB 1371-related efforts by increasing leak survey frequency at transmission compressor stations and storage facilities to a quarterly cycle and requiring repair within specified timeframes of components found to be leaking above the allowed threshold. In 2020, the COGR leak concentration threshold decreased from 10,000 ppm to 1,000 ppm. This threshold is in effect from 2020 onward.

Both the NGLA program and COGR require descriptive entries, such as compressor facility name, types of compressors, and facility address. The data collected under the NGLA program are used to determine the total annual emissions, whereas COGR collects and evaluates quarterly reports of compressor component leaks to determine whether the reported leaks exceed the concentration thresholds. COGR also requires annual emissions flow rate measurements from reciprocating compressor rod packing and centrifugal compressor wet seals to verify emissions are below the allowable emission flow rates. If component leaks or compressor emission rates exceed the thresholds in COGR, operators are required to complete repairs within the timeframes specified in the rule.

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<sup>26</sup> The CARB Oil and Gas Methane Regulation is promulgated under 17 California Code of Regulations (CCR), Division 3, Chapter 1, Subchapter 10, Article 4, Subarticle 13.

In the reporting of data for the NGLA program, both PG&E and SoCalGas reporting are affected by COGR. CPUC/CARB Staff have compared both submittals and need to follow-up in the next reporting year with both utilities regarding consistency in reporting (see Lessons Learned Section). The following provides a summary of the two companies' reporting of Transmission Compressor Stations and Underground Storage.

The Compressor and Component Fugitive Leaks subsection of Transmission Compressor Stations includes the leaks on the transmission compressor units, such as connectors, valves, and pressure relief valves. For PG&E, the emissions from this category decreased from 12,436 Mscf in 2021 to 5,571 Mscf in 2022. The leak count also decreased from 579 leaks identified in 2021 to 438 leaks in 2022. PG&E provided the explanation for the change with, "PG&E saw a decrease in emissions due to a decrease in the number of leaks and quicker repairs. In 2021, PG&E average 118 number of days leaking. In 2022, this decreased to 88 number of days leaking. Please note that this value includes the leaks between 1,000 to 10,000 ppm."

The Storage Fugitive Leaks and Emissions subsection of Underground Storage includes the leaks from wellhead valves, surface casing leakage, and downhole safety valve tests. For PG&E, the emissions from this category decreased from 2,526 Mscf in 2021 to 2,064 Mscf in 2022. The leak count also decreased from 817 leaks identified in 2021 to 229 leaks in 2022. PG&E provided the explanation for the change with, "PG&E experienced a decrease in the emissions due to a decrease in the number of leaks."

The Compressor and Component Fugitive Leaks subsection of Underground Storage includes the valves on the underground storage compressor units, such as from connectors, valves, and pressure relief valves. For PG&E, the emissions from this category decreased from 8,836 Mscf in 2021 to 5,341 Mscf in 2022. The leak count also decreased from 301 leaks identified in 2021 to 258 leaks in 2028. PG&E provided the explanation for the change with, "PG&E saw a decrease in emissions due to a decrease in the number of leaks and quicker repairs. In 2021, PG&E averaged 122 number of days leaking. In 2022, this decreased to 88 number of days leaking. Please note that this value includes the leaks between 1,000 to 10,000 ppm."

SoCalGas reported an emissions decrease from 1,587 Mscf in 2021 to 1,335 Mscf in 2022 in its Component Fugitive Leaks subsection of Transmission Compressor Stations. The leak count also increased from 124 leaks identified in 2021 to 185 leaks in 2022. SoCalGas provided the explanation for the change with, "The increase in leak counts can be attributed to increased project activity leading to the commissioning of new equipment and components. The decrease in emissions can be attributed to lower average leak durations in 2022 (56 days) relative to 2021 (69 days)."

In SoCalGas's Storage Fugitive Leaks and Emissions subsection of Underground Storage, the emissions decreased from 94 Mscf in 2021 to 34 Mscf in 2022. While the leak count decreased from 131 leaks identified in 2021 to 107 leaks in 2022.

For SoCalGas's Component Fugitive Leaks subsection of Underground Storage, the emissions decreased from 2,956 Mscf in 2021 to 1,802 Mscf in 2022. The leak count also decreased from 223 leaks identified in 2021 to 124 leaks in 2022.

## Summary of Gas Company– Estimated Natural Gas Emissions

In 2022, the overall natural gas emissions decreased 2% from 2021. Table 5 shows the YOY change in natural gas emissions for each gas company from 2021 to 2022. Table 5 also highlights that the four largest gas companies are responsible for approximately 99% of the total natural gas emissions in 2021 and 2022, while the remaining six gas companies account for approximately 1% of the total natural gas emissions. Changes in natural gas emissions for individual gas companies from 2021 to 2022 are described in this section.

**Table 5: Total Natural Gas Emissions by Gas Company**

Entity	2015 Baseline		2021		2022		2015 Baseline to 2022 Change		2021-2022 YOY Change	
	Mscf	% Total	Mscf	% Total	Mscf	% Total	Mscf	% Change	Mscf	% Change
Pacific Gas & Electric	2,204,823	51%	1,570,423	49%	1,490,564	49%	(714,259)	(32%)	(79,859)	(5%)
Southern California Gas	1,592,024 <sup>27</sup>	37%	1,161,606	36%	1,180,099	37%	(411,925)	(26%) <sup>27</sup>	18,493	2%
San Diego Gas & Electric	282,041	7%	252,850	8%	250,077	8%	(31,964)	(11%)	(2,773)	(1%)
Southwest Gas	214,307	5%	222,979	7%	229,905	7%	15,598	7%	6,926	3%
Wild Goose Storage	24,003	0.56%	15,108	0.47%	7,392	0.23%	(16,611)	(69%)	(7,716)	(51%)
Gill Ranch Storage	3,636	0.08%	9,777	0.30%	4,368	0.14%	732	20%	(5,409)	(55%)
Lodi Gas Storage	1,638	0.04%	3,687	0.11%	2,494	0.08%	856	52%	(1,193)	(32%)
Central Valley Gas Storage	806	0.02%	821	0.03%	432	0.01%	(374)	(46%)	(389)	(47%)
West Coast Gas	700	0.02%	343	0.01%	257	0.01%	(443)	(63%)	(86)	(25%)
Alpine Natural Gas	6	<0.01%	256	0.01%	275	0.01%	269	4,811%	19	7%
<b>Total</b>	<b>4,323,984</b>	<b>100%</b>	<b>3,237,850</b>	<b>100%</b>	<b>3,165,864</b>	<b>100%</b>	<b>(1,157,120)</b>	<b>(27%)</b>	<b>(71,986)</b>	<b>(2%)</b>

While natural gas emissions are expressed in units of MMscf in Tables 1 through 4 to provide a high-level overview of emissions, Tables 5 through 18 use units of thousands of standard cubic feet (Mscf) to provide

<sup>27</sup> This value is pending review of data for Appendix 4 and 6.

additional detail, consistent with the units that gas companies reported in their submittals for Appendix 8 of the reporting template. Staff have directed respondents to report units rounded to the nearest 1 Mscf in submittals for Appendix 8 of the reporting template to mitigate any rounding errors.

The following subsections provide a summary of the changes in natural gas emissions for each company by system category from 2021 to 2022. These summaries are based on information provided by respondents as part of their report filings, including gas company responses to Staff follow-up questions.

### Pacific Gas and Electric (PG&E)

PG&E reported natural gas emissions of 1,490,565 Mscf in 2022, a 79,858 Mscf YOY decrease of approximately 5% from 1,570,423 Mscf reported for 2021.

These totals include the use of two different methodologies that were approved in the previous 2022 Joint Reports. First, the leaker-based emission factors are used in the calculation of distribution metering and regulating station leaks, instead of population-based emission factors. Second, the leaker-based emission factors with bubble size leaks are used in the calculation of meter set assemblies, instead of population-based emission factors. This 2023 Joint Report is the second year of implementing this change, and this will be ongoing.

Additionally, in this 2023 Joint Report, the CPUC/SPD, in consultation with CARB, has approved PG&E's 2015 Baseline and methodology change for Distribution Mains and Services to no longer use the 1996 US EPA/GRI emission factors, but instead to use the Washington State University (WSU) Adjusted methodology, with the consequent set of emission factors. Effectively, the 2015 Baseline and the recent years of 2021 and 2022 are all on the same basis for this category and can provide meaningful comparisons.

The YOY changes in emissions or changes in inventory counts are summarized below by reporting category:

- Transmission Pipelines
  - For the Pipeline Leaks category, the small decrease from 3,656 Mscf in 2021 to 3,636 Mscf in 2022 was due to the decrease in pipeline mileage from 6,463 miles in 2021 to 6,426 miles in 2022. PG&E provided additional explanation: "The pipeline mileage is attributed to pipeline sales, downrate to distribution pressure, or deactivation/retirement of transmission pipeline."
  - In the All Damages category, the emissions decreased from 2,534 Mscf in 2021 to 2,134 Mscf in 2022. This change was due to fewer damage events from 4 events in 2021 to 3 events in 2022. The utility provided additional explanation in Appendix 8: "PG&E continues to make important efforts to reducing pipeline dig-ins and continues to strengthen this program as a part of BP-24."
  - For the Blowdowns category, the emissions increased from 115,818 Mscf in 2021 to 122,745 Mscf in 2022.
  - In the Component Vented Emissions category, the emissions decreased from 32,566 Mscf in 2021 to 28,742 Mscf in 2022. This decrease was explained by the removal of components from 289 components in 2021 to 283 components in 2022.



- For the Odorizers category, there was a small change in emissions from 168 Mscf in 2021 to 156 Mscf in 2022. An explanation was provided in Appendix 8: “PG&E experienced a decrease in the number of odorizers due [to] an improvement in reporting that removed odorizers from the inventory.”
- Transmission M&R Stations
  - In the Station Leaks and Emissions category, the increase in emissions from 542,205 Mscf in 2021 to 554,619 Mscf in 2022 was due to an increase of 9 intraconnects. PG&E provided the explanation in Appendix 8: “The changes are based on 3 intraconnects no longer classified as Transmission M&R Stations and 12 stations reassessed as an intraconnect.”
  - For the Blowdowns category, the decrease from 30,994 Mscf in 2021 to 680 Mscf in 2022 was the second largest reduction of all emission source categories. In 2021, this category included 230 blowdowns, with the largest being 2,531 Mscf and 28 blowdowns had more emissions than 200 Mscf. In comparison, in 2022, this category included 28 blowdowns, with the largest being 208 Mscf.
- Transmission Compressor Stations
  - In the Compressor Vented Emissions category, the emissions decrease by about half from 17,305 Mscf in 2021 to 9,964 Mscf in 2022. The utility provided an explanation in Appendix 8: “PG&E experienced a decrease in emissions due to a decrease in rodpacking leakage and operating hours. The operating hours decreased from 111.4k to 99.9k.”
  - For the Blowdowns category, the emissions decreased from 37,034 Mscf in 2021 to 26,253 Mscf in 2022. PG&E had four larger blowdown station records in 2021 than the largest station record in 2022.
  - In the Component Vented Emissions category, the emissions increased from 18,725 Mscf in 2021 to 19,748 Mscf in 2022. The utility provided an explanation in Appendix 8: “PG&E saw a decrease in the number of valves due to several valves being converted to instrument air in 2022, however, saw an increase in the emissions due to an increase in the pressure relief valve for compressors count.”
  - For the Component Fugitive Leaks category, the emissions decreased by about half from 12,436 Mscf in 2021 to 5,571 Mscf in 2022. The utility provided an explanation in Appendix 8: “PG&E saw a decrease in emissions due to a decrease in the number of leaks and quicker repairs.” Also, the average number of days leaking decreased from 118 days in 2021 to 88 days in 2022.
- Distribution Main & Services Pipelines
  - In the Pipeline Leaks category, the emissions decreased from 352,633 Mscf in 2021 to 302,684 Mscf in 2022 using the approved WSU Adjusted methodology. PG&E provided the explanation in the Supplemental Questionnaire: “The reduction is due to plats surveyed in the year of interest contain less miles of main and lower servie [service] counts.”
  - For the Blowdowns category, the emissions increased from 68 Mscf in 2021 to 100 Mscf in 2022. PG&E provided the explanation in Appendix 8: “In 2022, PG&E refined the



blowdown calculation process by improving the GIS data capture [capture] to include abandoned pipe.”

- In the All Damages category, the emissions increased from 37,611 Mscf in 2021 to 53,569 Mscf in 2022. This increase was due to 238 more damage events from 1,656 events in 2021 to 1,894 events in 2022.
- Distribution M&R Stations
  - For the Station Leaks & Emissions, Leak-Based category, the emissions decrease by about half from 6,269 Mscf in 2021 to 3,534 Mscf in 2022. PG&E explained in Appendix 8 that “There was a decrease of emissions due to a decrease in the number of farm taps operating in 2022.”
  - For the Blowdowns category, the emissions decrease from 258 Mscf in 2021 to 197 Mscf in 2022. The decrease was due to a reduced number of farm taps operating in 2022 and a decrease in the count of leaks found.
- Customer Gas Meters
  - In the Meter Leaks – Leak Based category, the emissions decreased from 255,977 Mscf in 2021 to 250,445 Mscf in 2022. The utility provided the following explanation in Appendix 8:
    - “In 2022, PG&E experienced a decrease in the emissions due to less leaks found during survey. PG&E has improved in prioritizing the larger MSA leaks (Class A and B) for repair. After collecting 3 years of data, PG&E applied the distribution of leaks found per class from 2020 - 2022 to estimate unknown leak emissions for 2022. In prior years, unknown leak emissions were calculated by applying the distribution of leaks found per class in the year of interest.”
  - For the All Damages category, the emissions increased from 5,368 Mscf in 2021 to 5,592 Mscf in 2022. This change was due to an increase of 126 damage events from 199 events in 2021 to 325 events in 2022.
  - In the Vented Emissions category, the emissions increased from 183 Mscf in 2021 to 197 Mscf in 2022. The change was due to the increased number of events from 110,149 events in 2021 to 130,254 events in 2022.
- Underground Storage
  - For the Storage Leaks and Emissions category, the emissions decreased from 2,526 Mscf in 2021 to 2,064 Mscf in 2022. This change was due to the reduction of 588 leaks from 817 leaks in 2021 to 229 leaks in 2022.
  - In the Compressor Vented Emissions category, the emissions decreased by about half from 2,193 Mscf in 2021 to 885 Mscf in 2022. This change was due to reduced compressor vented emissions at two facilities.
  - For the Blowdowns category, there was an emission increase from 7,850 Mscf in 2021 to 11,313 Mscf in 2022.
  - In the Component Vented Emissions category, the emissions increased from 77,210 Mscf in 2021 to 80,319 Mscf in 2022. The utility provided an explanation in Appendix 8: “PG&E

- experienced an increase in the emissions due to an increase in the number of pressure relief valves.”
- For the Component Fugitive Leaks category, the emissions decreased from 8,836 Mscf in 2021 to 5,341 Mscf in 2022. The utility provided the following explanation in Appendix 8:
    - “PG&E saw a decrease in emissions due to a decrease in the number of leaks and quicker repairs. In 2021, PG&E averaged 122 number of days leaking. In 2022, this decreased to 88 number of days leaking. Please note that this value includes the leaks between 1,000 to 10,000 ppm.”
  - Supplemental Questionnaire
    - PG&E provided a summary table of the changes in their Supplemental Questionnaire. Staff requested this table be included in the 2023 Joint Report; it is included in Appendix E.

### Southern California Gas (SoCalGas)

SoCalGas’ reported natural gas emissions totaled 1,180,099 Mscf in 2022, an 18,493 Mscf increase of approximately 2% from 1,161,606 reported for 2021. This 2% YOY increase in emissions was mainly attributed to the category All Damages in Transmission Pipelines, which increased by 25,076 Mscf. This was followed by three categories with increases of approximately 5,000 Mscf. Both estimates of 1,180,225 Mscf and 1,161,732 Mscf use 2021 posted values from the 2022 Joint Report for Distribution Mains & Services and Customer Meter Set Assemblies due to ongoing concerns explained below.

As approved in the 2022 Joint Report, the Distribution Meter and Regulating station leaks have continued to use leaker-based emission factors in this year’s reporting. This replaced the use of population-based reporting that was originally used for 2015 Baseline, in Joint Reports published from 2016 through 2021. In this 2023 Joint Report, the evaluation of this category from 2015 to the recent years 2021 and 2022 are all on this consistent basis of leaker-based emission factors.

Also implemented in the 2022 Joint Report, MSAs have continued to use leaker-based emission factors in this year’s reporting instead of population-based emission factors. Until a more robust method for estimation of 2015 baseline emissions can be provided, the preferred solution is to use data from 2020, the first year that data were collected according to the leaker-based research study method, as the interim baseline.

In this 2023 Joint Report, the evaluation of this category from 2015 to the recent years 2021 and 2022 are all on the consistent basis of leaker-based emission factors.

CPUC and CARB staff have met with SoCalGas four times over the last year to discuss SoCalGas’ Appendix 6 (MSA) Baseline Adjustment request to replace the current interim MSA baseline of 415,362 Mscf. These discussions have been useful for both CARB and CPUC to better understand SoCalGas’ processes and methods by which they are estimating emissions from their territory. However, CARB did not recommend approval of a baseline adjustment to 2015 given some of the data concerns described below. Additionally, given numerous other issues regarding data quality, CARB has not recommended approval of a baseline adjustment using data before 2020.

On March 3, 2022, SoCalGas submitted a study to CPUC/CARB as a proposed leaker-based methodology to be used to estimate emissions for Appendix 6 in lieu of the population-based methodology previously used for Appendix 6 reporting. On May 16, 2022, CARB expressed approval to CPUC to use SoCalGas' proposed leaker-based methodology going forward. This approval was based, in part, on SoCalGas' 2022 MSA Study,<sup>28</sup> which supported the adoption of leaker-based methodology to demonstrate emission reductions from system and operational improvements. A subsequent evaluation of that study by CARB identified erroneous results as well as erroneous application of current accepted methodologies. SoCalGas attributed these results to two major process changes, the first of which was said to have reduced the number of average leaking days by half.<sup>29</sup> This finding was later determined to be a result of SoCalGas incorrectly reporting that 89% of leaks occurring in the year 2016 were all repaired on the single date of December 21, overstating the average number of leak days as 347 days. The average number of leaking days for SoCalGas' MSAs has not actually changed significantly from 2016 to 2022. It should be noted that the leaker-based method assumes that leaks found from a leak survey have been open from the first day of the year, so that an average duration for leaks found and repaired throughout the year of about half a year (i.e., 180 days) is expected. The second major claimed result of a process change was an increase in leaks discovered through survey.<sup>30</sup> However, survey is less relevant as support for a leaker-based methodology because SoCalGas classified more than 85% of its leaks as detected from O&M, not surveying.<sup>31</sup> This misclassification of leak discovery method directly leads to underreporting of unknown leaks for DM&S Pipelines and Customer Meters.

SoCalGas has submitted numerous datasets for MSA leaks to CPUC and CARB over the last year as part of its proposals for a baseline adjustment for this emission source. CARB is concerned about the differences in these datasets, which raise numerous data quality concerns, including, but not limited to, inconsistencies from previous annual reporting, including previously unreported leaks, underreporting of unknown leaks, and erroneous reporting of leaks. Additionally, conflicting narratives have raised concerns about previously submitted baseline proposals which CARB cannot overlook. CARB is not confident that data prior to 2020 can be used to set a baseline unless data can be verified through a verification program specific to meeting the goals of SB1371. Based on CARB's recommendation, CPUC did not approve a Baseline Adjustment for Appendix 6 - Customer Meter Leaks in 2023. For these reasons, CPUC will continue to use the previously established interim baseline value of 415,362 Mscf.

The changes in emissions and changes in inventory counts are included in the following, summarized by system category:

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<sup>28</sup> Draft Final Report, Southern California Gas Company (SoCalGas) Development of Leaker-Based Emission Factors for Above Ground Customer Meter Leaks. March 3, 2022.

<sup>29</sup> Ibid.

<sup>30</sup> Ibid.

<sup>31</sup> R1501008-SoCalGas-2023 Annual Emissions Report Appendix 6

- Transmission Pipelines
  - For the Pipelines category, the small decrease from 1,292 Mscf in 2021 to 1,271 Mscf in 2022 was due to the decrease in pipeline mileage from 3,440 miles in 2021 to 3,385 miles in 2022.
  - For the All Damages category, the large increase from 24 Mscf in 2021 to 25,100 Mscf in 2022 was due to a single event caused by a 3<sup>rd</sup> party in 2022 and was classified as an Other Outside Force damage. It was repaired within one day. There was no similar event in 2021.
  - For the Blowdowns category, the emissions increased from 12,757 Mscf in 2021 to 18,819 Mscf in 2022. SoCalGas provided an explanation in the Supplemental Questionnaire: “Project teams continued to mitigate Pipeline blowdown emissions through cross compression, gas capture, project bundling, drafting, and thermal oxidation throughout the year.”
  - For the Component Vented emissions category, the emissions stayed the same at 1,198 Mscf for both reporting years.
  - For the Odorizers category, the small increase from 2,727 Mscf in 2021 to 2,892 Mscf in 2022 due to a few more gas analyzers and the inclusion of big Gas Energy Measurement Systems (GEMs). Also, this category included a change from the previous reporting of 2,675 Mscf for 2021.
  
- Transmission M&R Stations
  - For the Station Leaks & Emissions category, the emissions increased from 109,930 Mscf in 2021 to 114,838 Mscf in 2022. This was due to an increase of 20 farm taps from 472 to 492, and an increase of 3 pressure limiting stations from 67 to 70.
  - For the Blowdowns category, there was a large increase in emissions from 289 Mscf in 2021 to 2,271 Mscf in 2022. The majority of the increase can be attributed to a single blowdown in 2022 with emissions of 1,177 Mscf. SoCalGas provided a description of this event: “The blowdown was performed in preparation for pipe replacement. Cross compression was used to reduce emissions.”
  
- Transmission Compressor Stations
  - For the Compressor Vented Emissions category, the emissions total decreased by about half from 22,334 Mscf in 2021 to 10,699 Mscf in 2022. SoCalGas provided the explanation in Appendix 8: “The decrease can be attributed to lower average emission flow rate measurements during 2022 relative to 2021. The two rod-packing replacements completed as part of the CARB Oil and Gas program during 2021 helped contribute to the lower average emission flow rates during 2022.”
  - For the Component Vented Emissions category, the emissions stayed the same at 2,922 Mscf, as both years reported 16 controllers and 123 actuators.
  - For the Blowdowns category, the emissions total decreased by about half from 22,809 Mscf in 2021 to 12,529 Mscf in 2022. Staff appreciate the explanation in Appendix 8 that the decrease in emissions was due to increased project activity because “...equipment was out of

service for extended periods of time, and the number of blowdowns from large equipment was reduced.”

- For the Component Fugitive Leaks category, the emissions decreased from 1,587 Mscf in 2021 to 1,335 Mscf in 2022. Staff appreciate the explanation in Appendix 8 that, “The decrease in emissions can be attributed to lower average leak durations in 2022 (56 days) relative to 2021 (69 days).”
- For the Storage Tanks Leaks & Emissions category, the emissions total stayed the same at 165 Mscf, as both years reported 4 condensate tanks and 1 aboveground waste condensate vessel.
- SoCalGas has been reporting leaks with a concentration between 1,000 and 10,000 ppm for informational purposes only, and subsequently reporting no emissions for these leaks. Discussions remain ongoing on which emission factors to use for these leaks moving forward to prevent underreporting of emissions in future annual reporting.
- Distribution Mains & Services (DM&S) Pipelines
  - CPUC and CARB cannot accept SoCalGas’ Annual Reporting of DM&S Pipelines for Reporting Year 2023, due to misclassification of leak discovery methods directly resulting in underreporting unknown leaks. Additionally, a large number of leaks reported in the previous year do not appear in this year’s report and have not been indicated as removed from the list by repair or other means. For these reasons, the 2021 posted emission total of 465,687 Mscf was used for the 2022 emission total in this report.
  - For the Blowdowns category, the emissions increased from 182 Mscf in 2021 to 271 Mscf in 2022. This change was due to the increased number of blowdown events from 23,061 events in 2021 to 23,313 events in 2022.”
  - For the All Damages category, the emissions increased from 68,708 Mscf in 2021 to 74,785 Mscf in 2022. SoCalGas provided this description in Appendix 8:
    - “Emissions associated with damages vary based on damage severity, damaged asset dimensions, and pipeline pressure. The slight uptick in emissions from excavation damages can be attributed to increased 3rd party construction activities in SoCalGas territory. Although emissions from damages increased, the number of 811 tickets also increased by more than 60,000 year-over year.”
- Distribution M&R Stations
  - For the Station Leaks & Emissions, Leak-Based category, SoCalGas does not enter emissions for this category in a single row, but instead used two categories “Component Vented Emissions” and “Component Fugitive Leaks.” CPUC/CARB Staff summed these two categories together to present a single emission total for “Station Leaks & Emissions, Leak Based.”
    - The emissions for the Component Vented Emissions category remained the same at 294 Mscf.
    - The emissions for Component Fugitive Leaks decreased from 6,890 Mscf in 2021 to 6,393 Mscf in 2022. SoCalGas explained in Appendix 8 that “SoCalGas’s efforts to

reduce emissions through increased greasing and exercising of valves during inspections may be contributing to the lower leak rate.”

- For the Blowdown emissions increased from 107 Mscf in 2021 to 117 Mscf in 2022. There were more inspections and more blowdown events in 2022 than 2021.

- Customer Meters

- CPUC and CARB cannot accept SoCalGas Annual Reporting for Reporting Year 2023 based on misclassification of leaks, as required by the leaker-based methodology, resulting in under-estimation of emissions volumes. Through review of data request responses and a presentation from SoCalGas on unknown leak calculations, it has been determined that SoCalGas has been classifying leaks as discovered by “O&M” activity in a way that is incompatible with the leaker-based methodology. The result is an underestimation of the total emissions volume. For this reason, the 2021 reported emissions were used for the 2022 emission value in this report. It should be noted, however, that previous year’s emissions are underestimated in the same way. CPUC and CARB will continue to work with SoCalGas to improve its leak classification and expect to resolve the issue in the coming year. This issue also affects Appendix 4.

- Underground Storage

- For the Storage Leaks and Emissions category, the total emissions decreased from 94 Mscf in 2021 to 34 Mscf in 2022. SoCalGas provided the following explanation: “The CARB Oil and Gas Rule requires leaks >1,000 ppm to be repaired. Consequently, the count of leaks >10,000 ppm (Appendix 9 threshold) is lower due to repairing leaks when detected at 1,000 ppm.”
- For the Compressor Vented Emissions category, the emissions decreased from 6,470 Mscf in 2021 to 4,206 Mscf in 2022. SoCalGas provided the description in Appendix 8:
  - “The decrease can be attributed to lower average emission flow rate measurements during 2022 relative to 2021. The CARB Oil and Gas program has helped to identify packings in need of replacement over the last several years, which is a contributing factor to the lower overall compressor flow rate emissions. Please note that an error in the 2021 calculations was identified and corrected so that this Appendix provides an accurate year-over-year comparison.”
- For the Blowdowns category, the emissions decreased from 2,154 Mscf in 2021 to 1,947 Mscf in 2022.
- For the Component Vented emissions, the emissions decreased from 2,460 Mscf in 2021 to 2,362 Mscf in 2022. SoCalGas provided the description in Appendix 8 with the following:
  - “Several devices were removed or converted to air by the end of 2021, and 4 additional devices were removed or converted to air during 2022. Please note that one device was inadvertently left out of the 2021 count. The 2021 count was corrected to provide for an accurate year-over-year comparison.”



- For the Compressor and Component Fugitive Leaks category, the emissions decreased from 2,956 Mscf in 2021 to 1,802 Mscf in 2022. SoCalGas provided the description in Appendix 8 with the following:
  - “The CARB Oil and Gas Rule requires leaks >1,000 ppm to be repaired. Consequently, the count of leaks >10,000 ppm (Appendix 9 threshold) is lower due to repairing leaks when detected at 1,000 ppm.”
- SoCalGas has been reporting leaks between 1,000 and 10,000 ppm for informational purposes only, and subsequently reporting no emissions for these leaks. Discussions remain ongoing on which emission factors to use for these leaks moving forward to prevent underreporting of emissions in future annual reporting.

### San Diego Gas and Electric (SDG&E)

SDG&E reported natural gas emissions of 250,077 Mscf in 2022, a decrease of 2,773 Mscf from 252,850 Mscf reported for 2021 (a 1% decrease).

The category with the largest decrease was the blowdowns category in Transmission Compressor Stations with a decrease of 2,238 Mscf from 3,201 Mscf to 963 Mscf. Also, the category with the largest increase was pipeline leaks in Distribution Mains and Services with an increase of 910 Mscf from 11,110 Mscf to 12,020 Mscf.

The YOY changes in emissions included the following, summarized by reporting category.

- Transmission Pipelines
  - In the Pipeline Leaks category, the emissions stayed about the same from 82 Mscf in 2021 to 81 Mscf in 2022 with the decrease being due to 215 miles reported in 2021 and 213 miles in 2022.
  - For the Blowdowns category, the emissions increased from 75 Mscf in 2021 to 181 Mscf in 2022. The change was due to one large blowdown event in 2022 with an emission of 114 Mscf.
  - In the Component Vented Emissions category, the emissions stayed the same at 589 Mscf in both reporting years 2021 and 2022, as both years had 28 intermittent bleed pneumatics.
  - For the Odorizers category, the emissions stayed about the same from 88 Mscf in 2021 to 89 Mscf in 2022.
- Transmission M&R Stations
  - For the Station Leaks & Emissions category, the emissions stayed the same at 21,792 Mscf in both reporting years 2021 and 2022.
  - In the Blowdowns category, the emissions stayed the same at 2 Mscf in both reporting years 2021 and 2022.
- Transmission Compressor Stations

- For the Compressor Vented Emissions category, the emissions stayed about the same from 2,065 Mscf in 2021 to 2,074 Mscf in 2022.
- In the Compressor and Component Fugitive leaks, the emissions decreased from 144 Mscf in 2021 to 136 Mscf in 2022. SDG&E provided the explanation in the Supplemental Questionnaire:
  - “The number of leaks  $\geq$  10,000 ppm decreased from 20 to 17 between 2021 and 2022. The decrease in emissions and leak counts can be attributed to the continued efforts to detect and repair leaks  $\geq$  1,000 ppm during quarterly CARB Oil and Gas Rule surveys.”
- For the Component Vented Emissions category, the emissions stayed the same at 336 Mscf in both reporting years 2021 and 2022, as both years reported 16 intermittent bleed pneumatics.
- In the Blowdowns category, the emissions decreased from 3,201 Mscf in 2021 to 963 Mscf in 2022. SDG&E explained that “Due to the increased project activity, equipment was out of service for extended periods of time, and the number of blowdowns from large equipment was reduced.”
- Distribution Mains & Services
  - In the Pipeline Leaks category, the emissions increased from 11,110 Mscf in 2021 to 12,020 Mscf in 2022. The explanation provided in the Supplemental Questionnaire was that “...the leak count increased from 705 to 822 between 2021 and 2022... Approximately 400 additional miles were surveyed in 2022.”
  - For the Blowdowns category, the emissions increased from 26 Mscf in 2021 to 41 Mscf in 2022. SDG&E explained that, “The number of blowdowns increased from 290 to 296 between 2021 and 2022. The increase can be attributed to increased project activity.”
  - In the All Damages category, the emissions decreased from 8,827 Mscf in 2021 to 7,845 Mscf in 2022. SDG&E explained in the Supplemental Questionnaire that the number of damage events decreased from 385 to 347.
- Distribution Metering & Regulating Stations
  - For the Station Leaks and Emissions, Population-Based category, the emissions stayed about the same from 72,616 Mscf in 2021 to 70,595 Mscf in 2022.
  - For the Blowdowns category, there was a small emissions increase from 16 Mscf in 2021 to 17 Mscf in 2022. SDG&E provided the explanation that, “Distribution M&R Blowdowns are a function of inspection activity level and can vary year-to-year.”
- Customer Meters
  - In the Meter Leaks – Population Based category, the emissions stayed about the same from 131,036 Mscf in 2021 to 131,592 Mscf in 2022. The number of customer meters in the SDG&E system increased from 906,136 meters in 2021 to 909,907 meters in 2022.



- For the All Damages category the emissions increase from 795 Mscf in 2021 to 1,661 Mscf in 2022. SDG&E provided the following explanation in the Supplemental Questionnaire:
  - “Between 2021 and 2022 the number of damage events increased from 145 to 194. 191 of the 194 damages in 2022 were repaired within one day, and the remaining three damages were repaired within two days.”
- For the Vented Emissions category, the emissions increased from 45 Mscf in 2021 to 63 Mscf in 2022. SDG&E provided the following explanation in the Supplemental Questionnaire:
  - “The number of blowdowns increased from 53,410 to 60,163. Customer Meter blowdowns are a function of activity level and can vary year-to-year. More O&M activities resulting in blowdowns took place in 2022 than 2021.”

### Southwest Gas (SWG)

SWG reported natural gas emissions of 229,906 Mscf in 2022, an increase of 6,926 Mscf from 222,979 Mscf reported for 2021 (a 3% increase). The emission total can be attributed to the following:

- For the Station Leaks & Emissions category of Transmission M&R Stations, the count of 7 Transmission-to-transmission interconnects remained the same from the previous year, and so the emissions of 10,884 Mscf was constant for the category.
- In the Station Leaks & Emissions category of the Distribution M&R Stations, the emissions increased from 180,178 Mscf in 2021 to 186,793 Mscf in 2022 due to the changes in the station count of the categories A1, A3 and B2.

### Wild Goose Storage (WGS)

WGS's natural gas emissions decreased by 7,716 Mscf from 15,108 Mscf reported in 2021 to 7,392 Mscf reported in 2022, or a 51% YOY reduction. All natural gas emissions from WGS are associated with underground storage, and summarized as follows:

- For the Compressor Vented Emissions category, the emissions decreased from 3,281 Mscf in 2021 to 1,509 Mscf in 2022. WGS provided the following description in the Supplemental Questionnaire: “Despite this increase in compressor runtime hours [from 18,235 hours to 22,558 hours] overall compressor vented emissions decreased year over year by 1,772 MCF due to the installation of low emissions packing on select compressors.”
- In the Blowdowns category, the emissions decreased by about half from 10,560 Mscf in 2021 to 4,423 Mscf in 2022. WGS provided the explanation in the summary Appendix 8 that the decrease was due to “improved compressor startup/shutdown logic and operating procedures.”

### Gill Ranch Storage (GRS)

In 2022, GRS reported natural gas emissions of 4,368 Mscf, a 5,409 Mscf decrease from the 9,777 Mscf reported for 2021. This approximately 55% YOY reduction was due to the following changes in emission subcategory:

- For the Compressor Vented Emissions category of Underground Storage, the emissions decreased from 6,033 Mscf in 2021 to 418 Mscf in 2022. Staff communicated with GRS that the 2021 used an emission factor for the offline status, while the 2022 data did not use one. GRS provided the following explanation: “The 2021 values for an offline emission factor was before the installation of Gill Ranch’s Packing Leak Detection System. For 2022 and moving forward, Gill Ranch is reporting the actual values from the Packing Leak Detection System which is reflected both in Columns N and Q of the relevant tab in Appendix 7.”

#### Lodi Gas Storage (LGS)

LGS observed a decrease of 1,193 Mscf in natural gas emissions from 3,687 Mscf in 2021 to 2,494 Mscf in 2022 (a 32% decrease). This decrease was due to the following change in emissions:

- For the Compressor Emissions category of Underground Storage, the emissions changed from 2,861 Mscf in 2021 to 1,159 Mscf in 2022. This change was due to the decrease in the total runtime hours for compressor units from 12,780 runtime hours in 2021 to 6,320 runtime hours in 2022.

#### Central Valley Gas Storage (CVGS)

CVGS reported natural gas emissions of 432 Mscf for 2021, a YOY 389 Mscf decrease from the 821 Mscf reported for 2021. This 47% reduction was due to the following changes in emissions:

- For the Blowdowns category of Transmissions Pipelines, the emissions changed from 10 Mscf in blowdowns in 2021 to no emissions in 2022. In 2021, there were 2 pig launcher and 2 pig receiver blowdown events. However in 2022, there were no M&R station blowdown events.
- In the Compressor Vented Emissions category of Underground Storage, the emissions changed from 689 Mscf in 2021 to 167 Mscf in 2022. CVGS provided the explanation that they replaced rod packings in 2021 and that resulted in decreased emissions after it was replaced.

#### West Coast Gas (WCG)

WCG’s natural gas emissions decreased by 86 Mscf from 343 Mscf reported in 2021 to 257 Mscf reported for 2022 or a 23% YOY decrease.

- This decrease was due to an excavation damage event in 2021 and no damage events in 2022.
- In addition, WCG completed a proposal for a 2015 Baseline adjustment, which was approved by SPD/CPUC and can be found in Appendix A.

#### Alpine Natural Gas (ANG)

ANG reported natural gas emissions of 275 Mscf in 2022, a 7% increase from 256 Mscf reported in 2021.

- This 7% YOY increase in emissions can be attributed to the Component Leaks category in distribution mains and services, which increased from no emissions in 2021 to 18 Mscf in 2022.

Nearly all of ANG's emissions continue to be from customer meter fugitive leaks with 255 Mscf in both reporting years.

## Summary of Natural Gas Emissions Grouped by Source Classification

As described in the Executive Summary, the natural gas emissions can be grouped and evaluated by source classification, which has been useful for helping gas companies identify strategies to reduce emissions. For example, natural gas emissions reductions in population-based source classifications can only be achieved through reducing the number of pieces of equipment. However, in other source classifications in which leaks are measured, natural gas emissions reductions can be achieved through strategies that reduce the measured leaks while keeping the same number of pieces of equipment. Table 3 in the Executive Summary provides a data analysis with 2022 natural gas emissions data.

Population-based natural gas emissions are the largest source classification with 1,126,690 Mscf in 2022. To provide a more detailed analysis of population-based emissions, Table 6 shows the four individual emission sources that are part of this source classification.

Population-based natural gas emissions, which are calculated based on the number of units within a system category multiplied by an emission factor, stay constant unless a change is made to the number of units, the emission factor, or both. The categories of Customer Meters and Distribution M&R Stations have undergone significant changes with the development of leak measurement methods, rather than population counts, for the larger utilities. Table 6 includes emissions from those categories that are still estimated by the population count method.

System Category, Population-Based Emissions	2015 Baseline [Mscf]	2021 [Mscf]	2022 [Mscf]	2015 Baseline to 2022 Change		2021 - 2022 YOY Change	
				Mscf	% Change	Mscf	% Change
Transmission Pipelines, Pipeline Leaks	5,238	5,030	4,988	(250)	(5%)	(42)	(1%)
Transmission M&R Stations, Station Leaks & Emissions	711,797	684,832	702,154	(9,643)	(1%)	17,322	3%
Distribution M&R Stations, Station Leaks & Emissions	265,057	252,794	257,895	(7,162)	(3%)	5,101	2%
Customer Meters, Meter Leaks	153,832	160,736	161,653	7,821	5%	917	1%
<b>Total Population-Based Emissions</b>	<b>1,135,924</b>	<b>1,103,392</b>	<b>1,126,690</b>	<b>(9,234)</b>	<b>(1%)</b>	<b>23,298</b>	<b>2%</b>

The next largest source classification, Graded Pipeline Leaks, with emissions of 781,760 Mscf in 2022, is described later in the report in the section that analyzes the results of Distribution Mains and Services.

The third largest source classification, Leaker-Based emissions includes only two categories of applying this methodology. They are distribution meter and regulating stations and customer meters, but still accounted for 673,141 Mscf in 2022 or 20% of the inventory.

The fourth largest source classification with 207,187 Mscf in 2022 is Blowdowns. Table 7 shows Blowdown emissions by system category. This source classification experienced a 16% decrease of 40,909 Mscf from 2021. The decrease from the 2015 Baseline emissions of 396,198 Mscf or 66% is primarily due to project bundling and implementation of cross-compression practices, which move natural gas that would otherwise be vented to an adjacent pipeline.

<b>Table 7: Blowdown Natural Gas Emissions</b>							
System Category	2015 Baseline [Mscf]	2021 [Mscf]	2022 [Mscf]	2015 Baseline to 2021 Change		2020 - 2021 YOY Change	
				Mscf	% Change	Mscf	% Change
Transmission Pipeline	455,055	128,665	141,754	(313,301)	(69%)	13,089	10%
Transmission M&R Stations	65,582	31,292	2,961	(62,621)	(95%)	(28,331)	(91%)
Transmission Compressor Stations	31,088	63,044	39,745	8,657	28%	(23,229)	(37%)
Distribution Mains and Services	5,046	327	570	(4,476)	(89%)	243	74%
Distribution M&R Stations	256	423	372	116	45%	(51)	(12%)
Underground Storage	46,358	24,345	21,785	(24,573)	(53%)	(2,560)	(11%)
<b>Total</b>	<b>603,385</b>	<b>248,096</b>	<b>207,187</b>	<b>(396,198)</b>	<b>(66%)</b>	<b>(40,909)</b>	<b>(16%)</b>

The fifth largest source classification with 172,179 Mscf in 2022 is Vented Natural Gas Emissions. Table 8 shows the detailed composition of Vented emissions. This classification includes the controlled release of natural gas from pneumatic devices across the various stages of the transmission, storage, and distribution.

<b>Table 8: Vented Natural Gas Emissions</b>							
System Category	2015 Baseline [Mscf]	2021 [Mscf]	2022 [Mscf]	2015 Baseline to 2022 Change		2021 – 2022 YOY Change	
				Mscf	% Change	Mscf	% Change
Transmission Pipelines, Components, Vented	44,095	34,353	30,529	(13,566)	(31%)	(3,824)	(11%)
Transmission Pipelines, Odorizers	2,570	2,925	3,137	567	22%	212	7%
Transmission Compressors Stations, Compressors	106,257	41,704	22,737	(83,520)	(79%)	(18,967)	(45%)
Transmission Compressors Stations, Components, Vented	15,558	21,983	23,006	7,448	48%	1,023	5%
Customer Meters, Vented	2,363	1,131	1,619	(744)	(31%)	488	43%
Underground Storage, Compressors	96,313	21,527	8,344	(87,969)	(91%)	(13,183)	(61%)
Underground Storage, Components, Vented	96,228	79,796	82,807	(13,421)	(14%)	3,011	4%
Underground Storage, Dehydrator Vented	13	0	0	(13)	(100%)	0	N/A
<b>Total</b>	<b>363,397</b>	<b>203,419</b>	<b>172,179</b>	<b>(191,218)</b>	<b>(52%)</b>	<b>(31,240)</b>	<b>(15%)</b>

The next category, All Damages, increased from 140,728 Mscf in 2021 to 185,815 Mscf in 2022. This includes damages from individuals and construction companies to transmission pipelines, distribution pipelines, and customer meters. Gas companies have mentioned in their best practices submittal that they fund communication and educational campaigns to encourage individuals to contact the company before digging.

The final source classification, Other Leaks, decreased from 31,153 Mscf in 2021 to 19,219 Mscf in 2022. This category includes Component Leaks in Distribution M&S, and Underground Storage, as well as Storage Leaks and Emissions in Underground Storage.

# Detailed Natural Gas Emissions

## Natural Gas Emissions by System Category, Emission Source, and Source Classification

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Table 9 summarizes and compares the 2015 Baseline, 2021, and 2022 natural gas emissions by system category, emission source, and source classification. In some cases, “N/A” is designated to show under a reporting year that the category was not available due to not being part of the template at that time. In other cases, “N/A” is used under the four rightmost columns to show that the emission total or percent change could not be calculated due to division by zero or because a category was not part of the template.

**Table 9: Natural Gas Emissions by System Category, Emission Source, and Source Classification**

System Category	Emission Source	Source Classification	2015 Baseline	2021	2022	2015 Baseline to 2022 Change		2021 - 2022 YOY Change	
			Mscf	Mscf	Mscf	Mscf	%	Mscf	%
Transmission Pipelines	Pipeline Leaks	Population-Based	5,238	5,030	4,988	(250)	(5%)	(42)	(1%)
	All Damages	Damages	81,793	2,558	27,234	(54,559)	(67%)	24,676	>100%
	Blowdowns	Blowdown	455,055	128,665	141,754	(313,301)	(69%)	13,089	10%
	Component V. Emissions	Vented	44,095	34,353	30,529	(13,566)	(31%)	(3,824)	(11%)
	Odorizers	Vented	2,570	2,983	3,137	567	22%	154	5%
Transmission M&R Stations	Station Leaks & Emissions	Population-Based	711,797	684,832	702,154	(9,643)	(1%)	17,322	3%
	Blowdowns	Blowdown	65,582	31,292	2,961	(62,621)	(95%)	(28,331)	(91%)
Transmission Compressor Stations	Compressor Emissions	Vented	106,257	41,704	22,737	(83,520)	(79%)	(18,967)	(45%)
	Blowdowns	Blowdown	31,088	63,044	39,745	8,657	28%	(23,299)	(37%)
	Component Ven. Emissions	Vented	15,558	21,983	23,006	7,448	48%	1,023	5%
	Component Fugitive Leaks	Other Leaks	27,712	14,167	7,042	(20,670)	(75%)	(7,125)	(50%)
	Storage Tank Leaks & Emissions	Other Leaks	278	170	165	(113)	(41%)	(5)	(3%)
Distribution Mains & Services	Pipeline Leaks	Pipeline Leaks	1,092,282	830,937	781,760	(310,522)	(28%)	(49,177)	(6%)
	All Damages	Damages	230,912	115,974	136,751	(94,161)	(41%)	20,777	18%
	Blowdowns	Blowdown	5,046	327	570	(4,476)	(89%)	243	74%
	Component Fugitive Leaks	Other Leaks	0	378	18	18	N/A	(360)	N/A
Distribution M&R Stations	Station Leaks & Emissions	Population-Based	265,057	252,794	257,895	(7,162)	(3%)	5,101	2%
	Station Leaks & Emissions	Leaker-Based	18,671	13,453	10,272	(8,399)	(45%)	(3,181)	(24%)
	Blowdowns	Blowdown	256	423	372	116	45%	(51)	(12%)
Customer Meters	Meter Leaks	Population-Based	153,832	160,736	161,653	7,821	5%	917	1%
	Meter Leaks	Leaker-Based	661,269	666,614	662,743	1,474	<1%	(3,871)	(1%)
	All Damages	Damages	5,233	22,196	21,831	16,598	>100%	(365)	(2%)
	Vented Emissions	Vented	2,363	1,131	1,619	(744)	(31%)	488	43%
Underground Storage	Storage Leaks & Emissions	Other Leaks	5,182	2,647	2,546	(2,636)	(51%)	(101)	(4%)
	Compressor Emissions	Vented	96,313	21,527	8,344	(87,969)	(91%)	(13,183)	(61%)
	Blowdowns	Blowdown	46,358	24,345	21,785	(24,573)	(53%)	(2,560)	(11%)
	Component Ven. Emissions	Vented	96,228	79,796	82,807	(13,421)	(14%)	3,011	4%
	Component Fugitive Leaks	Fugitive	97,946	13,791	9,447	(88,493)	(90%)	(4,344)	(31%)
	Dehydrator Ven. Emissions	Vented	13	0	0	(13)	(100%)	0	N/A
<b>Total</b>			<b>4,323,984</b>	<b>3,237,850</b>	<b>3,165,864</b>	<b>(1,157,994)</b>	<b>(27%)</b>	<b>(71,986)</b>	<b>(2%)</b>

## Description of the Seven System Categories

### Transmission Pipelines

PG&E, SoCalGas, SDG&E, LGS, and CVGS reported Transmission Pipelines natural gas emissions. The total natural gas emissions decreased from 260,757 Mscf in 2021 to 207,632 Mscf in 2022, with most of the decrease attributed to reductions in blowdown emissions.

- Pipeline Leaks decreased by 42 Mscf from 5,030 Mscf in 2021 to 4,988 Mscf in 2022. Typically, emissions for this category have remained constant because the emissions are based on the miles of transmission pipelines, which does not vary much YOY.



- In 2022, All Damages increased by 24,676 Mscf from 2,558 Mscf in 2021 to 27,234 Mscf in 2022. These emissions are event-based and can fluctuate significantly YOY.
- Blowdowns showed a YOY reduction of 13,089 Mscf from 128,665 Mscf in 2021 to 141,754 Mscf in 2022. There are several factors affecting blowdowns and the potential for YOY fluctuations, including the cyclical nature of O&M; the ability to bundle projects; the amount of pipeline replacement; the size, length and pressure of the pipelines affected; and the number of safety events occurring.
- Component Vented Emissions decreased by 3,824 Mscf from 34,353 Mscf in 2021 to 30,529 Mscf in 2022.
- Odorizer emissions remained relatively constant with 2,925 Mscf in 2021 and 3,137 Mscf in 2022.

**Table 10: Transmission Pipelines Natural Gas Emissions**

Source	2015 Baseline		2021		2022		2021 - 2022 YOY Change	
	Mscf	% Total	Mscf	% Total	Mscf	% Total	Mscf	% Change
Pipeline Leaks	5,238	1%	5,030	2%	4,988	2%	(42)	(1%)
All Damages	81,793	14%	2,558	1%	27,234	13%	24,676	>100%
Blowdowns	455,055	77%	128,665	49%	141,754	68%	13,089	10%
Component Vented Emissions	44,095	7%	34,353	13%	30,529	15%	(3,824)	(11%)
Odorizers	2,570	<1%	2,925	1%	3,137	2%	212	7%
<b>Total</b>	<b>588,731</b>	<b>100%</b>	<b>260,757</b>	<b>100%</b>	<b>207,642</b>	<b>100%</b>	<b>(53,115)</b>	<b>(20%)</b>

Transmission M&R Stations

PG&E, SoCalGas, SDG&E, SWG, and CVGS reported total Transmission M&R Stations emissions of 705,115 Mscf in 2022. This system category is largely population-based, except for the blowdowns, which are activity-based.<sup>32</sup>

- Station Leak & Emissions decreased 17,322 Mscf from 684,832 Mscf in 2021 to 702,154 Mscf in 2022.
- In 2022, Blowdowns decreased by about 91% YOY from 31,292 Mscf in 2021 to 2,961 Mscf in 2022.

<sup>32</sup> Population-based emissions in this category are calculated based on the number of Transmission M&R stations multiplied by an EF to obtain the emission estimate.

<b>Table 11: Transmission M&amp;R Stations Natural Gas Emissions</b>								
Source	2015 Baseline		2021		2022		2020 - 2022 YOY Change	
	Mscf	% Total	Mscf	% Total	Mscf	% Total	Mscf	% Change
Station Leaks & Emissions	711,797	92%	684,832	96%	702,154	100%	17,322	3%
Blowdowns	65,582	8%	31,292	4%	2,961	<1%	(28,331)	(91%)
<b>Total</b>	<b>777,379</b>	<b>100%</b>	<b>716,124</b>	<b>100%</b>	<b>705,115</b>	<b>100%</b>	<b>(11,009)</b>	<b>(2%)</b>

Transmission Compressor Stations

PG&E, SoCalGas, and SDG&E reported 2022 total Transmission Compressor Station emissions of 23,006 Mscf, which is a 1,023 Mscf increase from 2021 emissions of 21,983 Mscf.

- Compressor Emissions decreased by 18,967 Mscf or 45% YOY from 41,704 Mscf in 2021 to 22,737 Mscf in 2022. The decrease in emissions is due to variances in pressurized operating hours and compressor-specific emission factor.
- In 2022, Blowdowns decreased by 23,299 Mscf from 63,044 Mscf in 2021 to 39,745 Mscf in 2022.
- Component Vented Emissions decreased by 1,023 Mscf from 21,983 Mscf in 2021 to 23,006 Mscf in 2022.
- Compressor and Component Fugitive Leaks decreased by 7,125 Mscf, from 14,167 Mscf in 2021 to 7,042 Mscf in 2022. Compressor and Component Leaks are further described in the 2021 Joint Report section, “Impacts of CARB’s Oil and Gas Methane Regulation (COGR).”
- Storage Tank Leaks and Emissions decreased by 5 Mscf, from 170 Mscf reported in 2021 to 165 Mscf in 2022.

<b>Table 12: Transmission Compressor Stations Natural Gas Emissions</b>								
Source	2015 Baseline		2021		2022		2021 - 2022 YOY Change	
	Mscf	% Total	Mscf	% Total	Mscf	% Total	Mscf	% Change
Compressor Emissions	106,257	59%	41,704	30%	22,737	25%	(18,967)	(45%)
Blowdowns	31,088	17%	63,044	45%	39,745	45%	(23,299)	(37%)
Component Vented Emissions	15,558	9%	21,983	16%	23,006	25%	1,023	5%
Compressor and Component Fugitive Leaks	27,712	15%	14,167	10%	7,042	8%	(7,125)	(50%)
Storage Tank Leaks & Emissions	278	<1%	170	<1%	165	<1%	(5)	(3%)
<b>Total</b>	<b>180,893</b>	<b>100%</b>	<b>141,068</b>	<b>100%</b>	<b>92,695</b>	<b>100%</b>	<b>(48,373)</b>	<b>(34%)</b>

Distribution Mains & Services

PG&E, SoCalGas, SDG&E, SWG, and WCG reported total Distribution M&S Emissions of 919,099 Mscf in 2022, which is a decrease of 28,139 Mscf from 947,238 Mscf in 2021.

- The emissions from Pipeline Leaks showed a decrease of 49,177 Mscf from 830,937 Mscf in 2021 to 781,760 Mscf in 2022. This category is the single largest category in the whole inventory and is further described in the section below, “Detailed Description of Distribution Mains and Services Leaks and Emissions.”
- All Damages decreased by 20,777 Mscf from 115,974 Mscf in 2021 to 136,751 Mscf in 2022.
- In 2022, Blowdowns showed an increase of 243 Mscf from 327 Mscf reported in 2021 to 570 Mscf reported in 2022.
- Lastly, Component Fugitive Leaks showed a decrease of 360 Mscf in 2022 relative to 2021.

<b>Table 13: Distribution Mains and Services Natural Gas Emissions</b>								
Source	2015 Baseline		2021		2022		2021 - 2022 YOY Change	
	Mscf	% Total	Mscf	% Total	Mscf	% Total	Mscf	% Change
Pipeline Leaks	1,092,282	84%	830,937	88%	781,760	85%	(49,177)	(6%)
All Damages	230,912	17%	115,974	12%	136,751	16%	20,777	18%
Blowdowns	5,046	<1%	327	<1%	570	<1%	243	74%
Component Fugitive Leaks	0	0%	378	<1%	18	<1%	(360)	(95%)
<b>Total</b>	<b>1,328,240</b>	<b>100%</b>	<b>947,238</b>	<b>100%</b>	<b>919,099</b>	<b>100%</b>	<b>(28,139)</b>	<b>(3%)</b>

Detailed Description of Distribution Mains and Services Leaks and Emissions

The data provided by gas companies include leak discovery date, repair date, leak grade, pipeline classification as either main or service, pipeline material, method of discovery, and emissions calculation. Respondents also provided other parameters for informational purposes that were not used in any calculations, such as zip code location of leak, pipe size, pressure, and scheduled date of repair.

Table 14 shows the count of each leak grades 1 – 3, Un-surveyed leaks, and Above Ground Non-Hazardous leaks. The number of Un-surveyed (i.e., Unknown) leaks are estimated based on respondent’s leak rate, and as such, Staff does not proportionately allocate the Un-surveyed leaks by the proportion of graded leaks found in respondent’s service territory.

Grade 3 leaks make up 35% of the Distribution mains and services leaks inventory. A significant amount of the grade 3 leaks carryover from previous years. In addition, PG&E uses an approved protocol where it

prioritizes the repair of its “Super Emitters” to maximize the emissions reduction and as a result more grade 3 leaks are carried over to subsequent years. While the estimated un-surveyed leaks cannot be graded, these leaks make up 58% of the leak inventory by count.

**Table 14: Leak Count by Grade in 2022\***

Leak Grade	Carried Over from 2021	Discovered in 2022	Repaired in 2022	Estimated Un-surveyed	Total	% of Total
Grade 1	21	4,209	(3,935)	N/A	295	1%
Grade 2	768	3,023	(2,591)	N/A	1,200	4%
Grade 3	8,657	3,856	(3,130)	N/A	9,383	35%
Un-surveyed - No grade	N/A	N/A	N/A	15,953	15,953	58%
Above Ground – Hazardous	0	0	0	0	0	0%
Above Ground - Non-Hazardous	0	0	0	0	0	0%
<b>Total</b>	9,446	11,088	(9,656)	15,953	34,025	100%

\*The summarized data does not include results from Southern California Gas.

For further analysis on the repairing of the leaks, Table 15 shows the average days to repair per gas company and per grade, along with a weighted average for 2022.

As shown on Table 15, the Grade 1 leaks are repaired quickly, taking a weighted average of two days to fix. Grade 2 leaks show more variability across the four gas companies with a range from five to 272 days to repair, with a weighted average of 209 days to repair. Finally Grade 3 leaks show the most variability with a range from 32 to 826 days to repair, and a weighted average of 585 days to repair.

**Table 15: Average Days to Repair by Gas Company, 2022**

Entity	Average Repair Days		
	Grade 1	Grade 2	Grade 3
Pacific Gas & Electric	3	156	826
Southern California Gas*	1	272	452
San Diego Gas & Electric	2	29	N/A
Southwest Gas	1	5	32
<b>2022 - Weighted Average</b>	<b>2</b>	<b>209</b>	<b>585</b>

\*The average repair days for Southern California Gas uses the posted values from the 2022 Joint Report.

Distribution M&R Stations

PG&E, SoCalGas, SDG&E, SWG, and ANG reported 2022 total emissions in this category of 268,539 Mscf, which increased by 1,869 Mscf or 1% from the 266,670 Mscf reported in 2021 (see Table 16).

- The Station Leaks & Emissions, Population-Based category for SDG&E and SWG increased from 252,794 Mscf in 2021 to 257,895 Mscf in 2022.
- PG&E and SoCalGas reported Distribution M&R Station Leaks & Emissions using leaker-based methodologies, which showed a decrease from 13,453 Mscf in 2021 to 10,272 Mscf in 2022.
- The Blowdowns emission reported in 2022 Mscf were 372 Mscf, which was 12% less than the previous year's reporting of 423 Mscf.

<b>Table 16: Distribution M&amp;R Stations Natural Gas Emissions</b>								
Source	2015 Baseline		2021		2022		2021 - 2022 YOY Change	
	Mscf	% Total	Mscf	% Total	Mscf	% Total	Mscf	% Change
Station Leaks & Emissions, Population-Based	265,057	93%	252,794	95%	257,895	96%	5,101	2%
Station Leaks & Emissions, Leaker-Based	18,671	7%	13,453	5%	10,272	4%	(3,181)	(24%)
Blowdowns	256	<1%	423	<1%	372	<1%	(51)	(12%)
<b>Total</b>	<b>283,984</b>	<b>100%</b>	<b>266,670</b>	<b>100%</b>	<b>268,539</b>	<b>100%</b>	<b>1,869</b>	<b>1%</b>

Customer Meters

PG&E, SoCalGas, SDG&E, SWG, WCG, and ANG reported Customer Meter emissions totaling 847,845 Mscf in 2022 which decreased by 2,831 Mscf from 850,677 Mscf in 2021.

- Population-Based Meter Leaks, as reported by ANG, SDG&E, SWG, and WCGC increased by 917 Mscf from 160,736 Mscf in 2021 to 161,653 Mscf in 2022.
- PG&E and SoCalGas estimate Customer Meter emissions using a leaker-based methodology with a total reported emissions of 666,614 Mscf in 2022. The reduction in Customer Meter emissions, "Meter Leaks, Leaker-Based" Source, reported in Table 17 are attributable PG&E. YOY emissions are not reported for SoCalGas as discussed earlier..
- The All Damages category was not part of the 2015 reporting but was added in 2019. This category decreased by 365 Mscf from 22,196 Mscf in 2021 to 21,831 Mscf in 2022.
- Vented Emissions increased by 488 Mscf or 43% YOY from 1,131 Mscf in 2021 to 1,619 Mscf in 2022. These blowdown emissions are a function of O&M activity levels and vary YOY due to a variety of repair work and maintenance performed on Customer Meters.

<b>Table 17: Customer Meters Natural Gas Emissions</b>								
Source	2015 Baseline		2021		2022		2021 - 2022 YOY Change	
	Mscf	% Total	Mscf	% Total	Mscf	% Total	Mscf	% Change
Meter Leaks, Population-Based	153,832	19%	160,736	20%	161,653	20%	917	1%
Meter Leaks, Leaker-Based	661,269	80%	666,614	78%	662,743	78%	(3,871)	(1%)
All Damages	5,233	1%	22,196	3%	21,831	3%	(365)	(2%)
Vented Emissions	2,363	<1%	1,131	<1%	1,619	<1%	488	43%
<b>Total</b>	<b>822,697</b>	<b>100%</b>	<b>850,677</b>	<b>100%</b>	<b>847,845</b>	<b>100%</b>	<b>(2,831)</b>	<b>(&lt;1%)</b>



Underground Storage

PG&E, SoCalGas, CVGS, GRS, LGS, and WGS reported Underground Storage systems emissions for 2022. As seen in Table 18 below, Underground Storage emissions decreased by 15,894 Mscf from 142,106 Mscf in 2021 to 126,212 Mscf in 2022.

- The Storage Leaks and Emissions decreased by 101 Mscf from 2,647 Mscf in 2021 to 2,546 Mscf in 2022. This emission source is further described in the 2023 Joint Report section, “Impacts of CARB’s Oil and Gas Methane Regulation.”
- Compressor Emissions decreased by 13,183 Mscf from 21,527 Mscf in 2021 to 8,344 Mscf in 2022.
- Blowdown emissions decreased by 2,560 Mscf from 24,345 Mscf in 2021 to 21,785 Mscf in 2022.
- Component Vented Emissions remained relatively constant with an increase of 3,011 Mscf or 4% from 79,796 Mscf in 2021 to 82,807 Mscf in 2022.
- Compressor and Component Fugitive Leaks decreased by 4,344 Mscf from 13,791 Mscf in 2021 to 9,447 Mscf in 2022. The component leaks subsection is further described in the 2021 Joint Report section, “Impacts of CARB’s Oil and Gas Methane Regulation.”
- In the dehydrator source category, there were no emissions in 2021 and 2022. This is due to all dehydrator facilities using either a vapor recovery unit to reinject gas into the pipeline and/or thermally oxidize the glycol/methane mixture after dehydration.

<b>Table 18: Underground Storage Natural Gas Emissions</b>								
Source	2015 Baseline		2021		2022		2021 - 2022 YOY Change	
	Mscf	% Total	Mscf	% Total	Mscf	% Total	Mscf	% Change
Storage Leaks & Emissions	5,182	2%	2,647	2%	2,546	2%	(101)	(4%)
Compressor Emissions	96,313	28%	21,527	15%	8,344	8%	(13,183)	(61%)
Blowdowns	46,358	14%	24,345	17%	21,785	17%	(2,560)	(11%)
Component Vented Emissions	96,228	28%	79,796	56%	82,807	66%	3,011	4%
Compressor and Component Fugitive Leaks	97,946	29%	13,791	10%	9,447	7%	(4,344)	(31%)
Dehydrator Vent Emissions	13	0%	0	0%	0	0%	0	N/A
<b>Total</b>	<b>342,040</b>	<b>100%</b>	<b>142,106</b>	<b>100%</b>	<b>124,929</b>	<b>100%</b>	<b>(17,177)</b>	<b>(12%)</b>

Unusual Large Leaks

There were no unusual large leaks reported in 2022. For this category, the 2019 Winter Workshop included a review of the definition for categorizing this type of emission, and it was determined that each discrete

event depends on situational factors that should be reviewed and evaluated for inclusion in Unusual Large Leaks.

# Lessons Learned and Conclusion

## Lessons Learned

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In 2023, Staff worked with gas companies to evaluate and approve emission estimation methodologies and adjustments to the 2015 Baseline emissions, refine the reported annual data, and determine YOY changes in emissions. Processes for the submittal and review of the annual reported data collection were the same as previous years. As in prior years, there were lessons learned from this year's submittal and review process, some of which include:

- Methodologies to estimate emissions continue to improve and methods that are based on the population size of components and emission factors are being replaced as improved methods are developed. Staff require gas companies to provide comprehensive descriptions and justifications for proposals related to new or revised emission estimation methodologies and adjustments to baseline emissions, including supporting data, calculation files, and field documentation, as appropriate. This information and data are necessary for Staff to fully evaluate and approve such proposals.
- Staff continue to find improvements in the reporting templates and in the data reported once the data come in. For example, this year, Staff met with PG&E and noted potential improvements to the Appendix 4 Distribution Mains and Services template. Staff will aim to finalize all template revisions by the issue date of March 31, 2024 to avoid sending multiple reporting template updates.
- Staff continue to see different interpretations of reporting requirements. Staff will aim to clarify what is needed both within the reporting templates and in the responses to the accompanying survey questionnaire. If gas companies include thorough explanations of significant YOY changes and associated causes within their original submittal, this would lessen the need for Staff follow-up questions to understand the previous year's emissions.
- In order to facilitate additional follow-up questions to the utilities' data response from utilities, Staff will further evaluate the timeline. As an example of lessons learned for next year, Staff plans to send out the data responses earlier, possibly by July 20<sup>th</sup>, and request responses in three weeks.

## Conclusion

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CPUC and CARB Staff have continued to work together with gas companies to provide for the public the total estimated natural gas emissions associated with fugitive leaks and vented emissions from the natural gas transmission and distribution system in California and the system-wide natural gas leak rate while maintaining safety as the highest priority, as ordered by the CPUC decision approving the Natural Gas Leak Abatement Program, consistent with Senate Bill 1371 (D.17-06-015).

Changes in the 2022 estimated natural gas emissions are a result of application of best practices, the CARB's Oil and Gas Methane Regulation, and changes in the reporting templates.

Finally, we anticipate that the 2024 Winter Workshop will be an appropriate venue for further collaboration and discussion among CPUC, CARB, and gas companies on the following topics:

- Propose and/or provide additional guidance to utilities regarding their June 15, 2023 data submittal and response to comments.
- Provide guidance to utilities on a schedule to propose adjustment to the 2015 Baseline emissions, including: timelines for submitting proposals and CPUC and CARB review.
- Provide technical guidance and expectations regarding baseline adjustment proposals and submittal of reporting.
- Regarding leaks associated with COGR (<10,000 ppm), propose appropriate emission factors for use by PG&E and SoCalGas to ensure consistent reporting.
- With input from PG&E and other utilities, update the current Appendix 4, Distribution Mains and Services, template to remove unnecessary fields or to designate them as optional.
- Miscellaneous updates (including but not limited to): For the March 31, 2024 mailout, Staff will include a reminder to use the current version of each appendix to avoid any confusion regarding which templates to use.

# Appendices

## Appendix A: California Public Utilities Commission/Safety Policy Division Approval of Adjusted 2015 Baseline Emissions for Pacific Gas & Electric and West Coast Gas Company

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In the current reporting year, Pacific Gas & Electric (PG&E) and West Coast Gas Company (WCGC) developed proposed adjustments to the 2015 Baseline to account for improved methodologies, emission factor (EF) updates, and other adjustments that are needed to allow for a direct comparison of 2015 Baseline emissions with current-year emissions estimates. CPUC and CARB worked collaboratively with PG&E and WCGC to evaluate their proposed adjustments. On July 19, 2023, CPUC sent a letter to PG&E approving two adjustments to their 2015 Baseline emissions. On August 21, 2023, CPUC sent a letter to WCGC approving their single adjustment to their 2015 Baseline emissions.

CPUC/SPD's letters approving the adjusted 2015 Baseline emissions for PG&E and WCGC are provided in Sections A.1 and A.2, respectively, of this appendix.

### A.1 CPUC/SPD Letter Approving Adjusted Emission Factors and 2015 Baseline Emissions for PG&E

#### **California Public Utilities Commission/Safety Policy Division Approval of Adjusted Emission Factors and 2015 Baseline Emissions for Pacific Gas & Electric**

**SB 1371, R-15-01-008**

July 19, 2023

#### **1. Background**

Decision D.19-08-020 specified that the CPUC's Safety Enforcement Division (SED), in consultation with CARB, may approve adjustments to the utilities' emission factors and 2015 baseline emissions for the purpose of measuring emission reduction performance. The Safety Policy Division (SPD) has inherited this responsibility from SED.

On February 9, 2023, PG&E submitted their 2023 Request for Baseline Adjustment Approval letter for Transmission Pipelines (Appendix 1) – Component Vented Emissions and Distribution, and for Mains & Services (Appendix 4) – Pipeline Leaks. SPD, with input from CARB, submitted questions and comments to the PG&E on April 7, 2023. SPD/CARB received responses from PG&E on April 27, 2023.

#### **2. Introduction**

On October 25, 2022, Safety Policy Division SPD approved some adjustments to the 2015 Baseline Emission Levels<sup>33</sup> to align the baseline with evolving measurement methods. The current approval is a continuation of that process involving emissions from two system categories (Appendices 1 and 4) as shown below.

### 3. Summary of Approvals of Adjusted 2015 Baseline Emissions

Safety Policy Division approves the following adjusted 2015 baseline emissions for PG&E:

Appendix #	System Category	Emission Source Category	Original 2015 Baseline Emissions (Mscf)	Adjusted 2015 Baseline Emissions (Mscf)
1	Transmission Pipelines	Component Vented Emissions	4,591	35,912
4	Distribution Mains & Services	Pipeline Leaks (Fugitives)	626,590	481,638

The above adjustments to the 2015 baseline emissions are subject to CPUC audit and verification.

### 4. Explanation of Adjustments

#### a. Appendix 1 – Transmission Pipelines - Component Vented Emissions

PG&E has made several improvements in the accounting of component vented emissions on Transmission Pipelines. This adjustment aligns the baseline to match the improvement in reporting via the GIS system of the pressure relief valves (CY 2019) emissions and to account for the addition of automated valve emissions (CY 2020/2021), as follows:

2015 adjusted emissions = 2019 Pressure Relief Valves Emissions + 2020/2021 Automated Valves Emissions = 25,012 Mscf + 10,902 Mscf = 35,912 Mscf.

CONCLUSION: CPUC/SPD approves the 2015 baseline emissions to 35,912 Mscf, and inclusion of the improved accounting in annual component vented emission reporting.

#### b. Appendix 4 – Distribution Mains and Services Pipelines – Pipeline Leaks

PG&E collected pipeline leak data in 2014-2020 that align well with Washington State University (WSU) study data and finds that the WSU study best characterizes leaks on the PG&E system overall, compared to the initial set of EFs used to establish a baseline and measure performance. Based on the WSU data, PG&E proposed two possible sets of new emission factors (EFs): WSU Average and WSU Adjusted. The WSU

<sup>33</sup> California Public Utilities Commission/Safety Policy Division Approval of Adjusted 2015 Baseline Emissions for Pacific Gas & Electric, SB 1371, R-15-01-008, October 25, 2022

Average EFs were determined by categorizing WSU data into super emitter (SE) leaks (greater than 10 scfh) and non-SE leaks.

As a refinement to better represent PG&E SE data, PG&E supplemented the WSU data with additional SE leak measurements collected within PG&E's service territory to develop the proposed WSU Adjusted EFs. Either set could be used to determine total emissions, with a corresponding change in the baseline calculation. PG&E requested SPD to choose between the two options. SPD considered PG&E's advice that because super emitters occur infrequently, the WSU study did not include many SE data points. PG&E has collected many more data points for super emitters during the years of their SE program than were available for the WSU study, so that the Adjusted EF will better represent the emission volumes on the PG&E system.

- **CONCLUSION:** SPD approves the use of WSU Adjusted EFs for annual reporting and to adjust the 2015 baseline. The WSU Adjusted EFs adjusts the 2015 baseline emissions from 626,590 Mscf to 481,638 Mscf. This baseline approval is subject to reevaluation if 1) the leak threshold is increased to 100 ppm and 2) if the super emitter program does not continue at its current activity level.

The CPUC may decide to audit elements of the NGLA Program in future, including site visits and/or review of records used to determine baseline adjustments. Additional adjustments to the 2015 baseline emissions may be made in the future as a result of audit and verification activities.

These adjustments for Appendices 1 and 4 are approved.



Danjel Bout  
Director, Safety Policy Division

## A.2 CPUC/SPD Letter Approving Adjusted 2015 Baseline Emissions for West Coast Gas Company

### **California Public Utilities Commission/Safety Policy Division Approval of Adjusted 2015 Baseline Emissions for West Coast Gas Company, Inc.**

**SB 1371, R-15-01-008**

August 21, 2023

#### **1. Background**

Decision D.19-08-020 specified that the CPUC's Safety Enforcement Division (SED), in consultation with CARB, may approve adjustments to the utilities' emission factors and 2015 baseline emissions for the



purpose of measuring emission reduction performance. The Safety Policy Division (SPD) has inherited this responsibility from SED.

In its original 2015 baseline data for Customer Meters (Appendix 6) – Meter Leaks, West Coast Gas reported a value of 2.8 Mscf based on an estimation of observed leaks for the year 2015. This, however, was contrary to the population-based methodology established as the standard by participating parties. On January 29, 2020, SED staff contacted West Coast Gas regarding this discrepancy and West Coast Gas proceeded to submit annual emissions data using 2015 baseline emissions of 194.177 Mscf suggested by SED staff. However, no documentation for the approval of this baseline adjustment was generated.

Following West Coast Gas’s submittal of 2022 emissions data on June 15, 2023, SPD staff, in consultation with CARB, identified the discrepancy between West Coast Gas’s original 2015 baseline emissions value (of 2.8 Mscf) and the 194.177 Mscf value that West Coast Gas was now providing as the 2015 baseline in its annual data submittals. In its data requests created in response to West Coast Gas’s 2022 emissions data submittal, SPD and CARB staff noted this discrepancy and asked that West Coast Gas submit a Request for Baseline Adjustment Approval so that SPD may formally approve the corrected 2015 Meter Leaks baseline emissions value of 194.177 Mscf.

**2. Introduction**

On August 9, 2023, West Coast Gas submitted their 2023 Request for Baseline Adjustment Approval letter for Customer Meters (Appendix 6) – Meter Leaks. SPD, in consultation with CARB, confirmed that the updated baseline values adhere to the population-based methodology established as the standard established by participating parties.

**3. Summary of Approvals of Baseline Adjustments**

SPD approves the following adjusted 2015 baseline emissions for West Coast Gas:

Appendix #	System Category	Emission Source Category	Original 2015 Baseline Emissions (Mscf)	Adjusted 2015 Baseline Emissions (Mscf)
6	Customer Meters	Meter Leaks	2.8	194.177

The above adjustments to the 2015 baseline are subject to CPUC audit and verification.

**4. Explanation of Adjustments**

**a. Appendix 6 – Customer Meters – Meter Leaks**

West Coast Gas has accurately updated its 2015 baseline emissions for Appendix 6 (Customer Meters) – Meter Leaks to adhere to the population-based methodology established as the standard for participating parties, as shown below (Note that the values given for emission factors are standard for all utilities):

$$\text{Meter Leaks} = M_{\text{Res}}EF_{\text{Res}} + M_{\text{Com}}EF_{\text{Com}} + E_{\text{Vent}}$$

Where:

$M_{Res}$  = Total Residential Meters = 1271

$M_{Com}$  = Total Commercial and Industrial Meters = 119

$EF_{Res}$  = Residential Meter Emission Factor =  $0.148 \frac{Mscf}{yr}$

$EF_{Com}$  = Commercial and Industrial Meter Emission Factor =  $0.051 \frac{Mscf}{yr}$

$E_{Vent}$  = Estimated Vented Emissions from Utility Activities on Meters = 0 Mscf

This results in an adjusted 2015 baseline emissions value for Meter Leaks of 194.177 Mscf.

CONCLUSION: CPUC/SPD approves West Coast Gas's adjustment of their 2015 baseline emissions value for Appendix 6 (Customer Meters) – Meter Leaks to 194.177 Mscf.

The CPUC may decide to audit elements of the NGLA Program in the future, including site visits and/or review of records used to determine baseline adjustments. Additional adjustments to the 2015 baseline emissions may be made in the future as a result of audit and verification activities.

This adjustment for Appendix 6 is approved.



Daniel Bout  
Director, Safety Policy Division

## Appendix B: Definitions

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For the purposes of SB 1371, the definitions of “leak” and “gas -loss” and the formula for calculating a “system-wide gas leak rate” were defined in a different manner than elsewhere. A “leak” was defined as any breach, whether intentional or unintentional, whether hazardous or non-hazardous, of the pressure boundary of the gas system that allows natural gas to leak into the atmosphere. Any vented or fugitive emission to the atmosphere is considered a “leak”. Examples of leaking components include defective gaskets, seals, valve packing, relief valves, pumps, compressors, etc. Gas blowdowns during operations, maintenance, and testing (including hydro-testing) were also included as leaks. Consequently, this leak definition is broader than the Pipeline Hazardous Material and Safety Administration’s (PHMSA) definition.

The gas respondents are required by Federal Law, 49 CFR 192, to survey their systems for leaks, which could be hazardous to public safety or property. To accomplish this, the gas companies developed graded leak programs to detect, prioritize and repair the safety related types of leaks. The same definitions are used within this report and are as follows:

- Graded Leaks – hazardous leaks or, which could potentially become hazardous as described below:<sup>34</sup>
  - A "grade 1 leak" is a leak that represents an existing or probable hazard to persons or property and requiring prompt action, immediate repair, or continuous action until the conditions are no longer hazardous.
  - A "grade 2 leak" is recognized as being non-hazardous at the time of detection but justifies scheduled repair based on the potential for creating a future hazard.
  - A "grade 3 leak" is a leak that is not hazardous at the time of detection and can reasonably be expected to remain not hazardous.
- Vented Emissions are releases of gas to the atmosphere, which occur during operations or maintenance, for a safety reason. Some examples are:
  - Purging (i.e., “blowdown”) gas prior to hydro-testing a line.
  - Gas releases designed into the equipment function, such as gas emitting from relief valve vents or pneumatic equipment.
  - Gas releases caused by operations, maintenance, testing, training, etc.
  - Ungraded Leaks are the remaining leaks, which are not hazardous to persons and/or property.

For further information please see CPUC GO 112-F.

Lastly, in 2014 the system-wide gas leak rate was calculated as a percent of total input for the 12 months ending June 30 of the reporting year. However, Staff determined that there were problems with this calculation and opted not to report a leak rate using this formula. The formula for calculating a system-wide gas leak was written as follows:

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<sup>34</sup> Refer to GO 112-F for more information on grade 1, grade 2, and grade 3 leaks.

Pipeline Hazardous Material and Safety Administration (PHMSA) Modified Equation for Lost and Unaccounted for (LAUF) Gas:

[(Purchased gas + produced gas + transported gas entering the gas system) minus (customer use + company use + appropriate adjustments + gas injected into storage + transported gas leaving the gas system)] divided by (Purchased gas + produced gas + transported gas entering the gas system) = System Wide Gas Leak Rate.

Note: transported gas includes gas purchased by customers and transported in common carrier pipelines.

In section 5 of the 2015 Joint Report, “Baseline System-Wide Emissions Rate,” Staff determined the value for 2015 to be 0.32% by using the total emissions from all source categories (6,601.2 MMscf) divided by the Total Annual Volume of Gas Transported (2,056,950 MMscf). The five sources for Total Annual Volume of Gas Transported include:

- Gas Injected into Storage
- Storage – Gas Used by the Gas Department
- Gas Transported to Customers in the State
- Gas Transported to Customers out of State
- Distribution – Gas Used by the Gas Department

## Appendix C: Article 3, Section 975 (c) and (e)(6)

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### Article 3. Section 975

(c) As soon as practicable, the commission shall require gas corporations to file a report that includes, but is not limited to, all the following:

- (1) A summary of utility leak management practices.
- (2) A list of new natural gas leaks in 2013 by grade.
- (3) A list of open leaks that are being monitored or are scheduled to be repaired.
- (4) A best estimate of gas loss due to leaks.

(e) The rules and procedures adopted pursuant to subdivision (d) shall accomplish all the following:

(6) to the extent feasible, require the owner of each commission-regulated gas pipeline facility that is an intrastate transmission or distribution line to calculate and report to the commission and the State Air Resources Board a Baseline system-wide leak rate, to periodically update that system-wide leak rate calculation, and to annually report measures that will be taken in the following year to reduce the system-wide leak rate to achieve the goals of the bill.

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## Appendix D: Conversion of Natural Gas to Carbon Dioxide Equivalents

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The conversion of natural gas volume to carbon dioxide equivalent mass requires the use of a GWP value. CARB used the GWP value of 25 (100-year value) from the IPCC, AR4, for previous GHG emissions inventory. The following calculations show the conversion of the total emissions from this report. The conversion was done in two steps. In the first step, the calculation shows the volumetric natural gas that contains exactly one metric ton of methane.

$$1 \text{ MT CH}_4 * \frac{2,204.62 \text{ lbs CH}_4}{1 \text{ MT CH}_4} * \frac{1 \text{ lb mole}}{16.04246 \text{ lb CH}_4} * \frac{379.48 \text{ scf of CH}_4 \text{ gas}}{1 \text{ lb mole}}$$

$$* \frac{1.0 \text{ scf of natural gas}}{0.934 \text{ scf of CH}_4 \text{ gas}} * \frac{1 \text{ Mscf}}{1,000 \text{ scf}} = 55.835 \text{ Mscf of natural gas}$$

Using this volumetric unit, the 2022 total emissions, 3,165,864 Mscf, is equivalent to about 1.42 MMTCO<sub>2</sub>e, as shown below:

$$3,165,864 \text{ Mscf natural gas} * \frac{1 \text{ MT CH}_4}{55.835 \text{ Mscf of natural gas}} * \frac{25 \text{ CO}_2\text{e}}{1 \text{ CH}_4} = 1,417,565 \text{ MT CO}_2\text{e}$$

CARB has also used the GWP value of 72 (AR4, 20-year) in the Short-Lived Climate Pollutant Reduction Strategy and Oil and Gas Methane Regulation. Based on the higher GWP, the 2022 total emissions, 3,165,864 Mscf is about 4.08 MMTCO<sub>2</sub>e, as follows:

$$3,165,864 \text{ Mscf natural gas} * \frac{1 \text{ MT CH}_4}{55.835 \text{ Mscf of natural gas}} * \frac{72 \text{ CO}_2\text{e}}{1 \text{ CH}_4} = 4,082,588 \text{ MT CO}_2\text{e}$$

The use of 1.0 scf of natural gas per 0.934 scf of CH<sub>4</sub> gas accounts for composition of natural gas being not 100% methane. The American Gas Association (AGA) published a value of 93.4% to be used as a default

methane concentration that is comparable to what respondents reported.<sup>35</sup> The standard cubic foot “scf” for measuring gas is based on 60 degrees Fahrenheit at atmosphere pressure.

In addition, respondents reported trace amounts of concentration for ethane, inert gases, and other elements and compounds. There was not an entry for carbon dioxide explicitly, and so it cannot be assumed that all the inert gas was carbon dioxide. A calculation was performed that showed CO2 emissions from the inert gases would be less than 0.1% of the total and is excluded in this report.

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<sup>35</sup>AGA, GHG Guidelines, Pg. 39, April 18, 2008.



## Appendix E: PG&E, Effect of 2022 Changes on Total Reported Emissions

The table below was submitted by PG&E on page 9 as part of their SB 1371 Supplemental Questionnaire. Staff corresponded with PG&E and the utility approved including the table in the 2023 Joint Report.

*Table 2. Effect of 2022 Changes on Total Reported Emissions*

2022 Reporting Change	Change in Emissions Compared to Reporting Year 2021 (Mscf)	Percent Change in Emissions Compared to Reporting Year 2021
<b>Advances in Abatement Efforts</b>		
Transmission Pipeline Damages	-400	-16%
Transmission Pipeline Blowdowns	6,927	-16%
Transmission M&R Station Blowdowns	-30,314	
Transmission Compressor Station Blowdowns	-10,781	
Underground Storage Blowdowns	3,463	
Distribution Main & Service Pipelines, Pipeline Leaks	-49,949	
Transmission Compressor Station Compressor Emissions	-7,341	-44%
Underground Storage Facility Compressor Emissions	-1,308	
Transmission Compressor Stations Component Leaks	-6,865	-55%
Underground Storage Component Leaks	-3,495	-40%
<b>Change in Annual Activity</b>		
Transmission Pipeline Leaks	-21	-1%
Transmission Compressor Station Component Emissions	1,023	5.5%
Transmission Compressor Station Storage Tank Emissions	0	0%
Distribution Main & Service Pipelines All Damages	15,985	43%
Distribution M&R Station Emissions	-2,735	-44%
Distribution M&R Station - All Damages	51	--
Distribution M&R Station - Blowdowns	-61	-24%
Customer MSA Damages	224	4%
Customer MSA Vented and Blowdown Emissions	14	7%
Underground Storage Leaks & Emissions	-462	-18%
Underground Storage Component Emissions	3,109	4%
Underground Storage Dehydrator Vent Emissions	0	-100%
<b>Improvements in Reporting Practices</b>		
Transmission Pipeline Component Vented Emissions	-3,824	-12%
Transmission Pipeline Odorizers	-11	-7%
Transmission M&R Station Leaks and Emissions	12,414	2%
Distribution Main & Service Blowdown Emissions	32	46%
Customer Meters Aboveground MSA Leaks	-5,532	-2%
<i>Total Change</i>	-79,858	-5.1%

Not shown in this table since the emissions are N/A, are: Transmission Compressor Station Compressor Leaks, Distribution Main & Service Component Emissions, Distribution Main & Service Component Leaks, Distribution M&R Stations All Damages, and Underground Storage Compressor Leaks.