Docket	:	A.25-02-013
Exhibit Number	:	CalAdv-001
Commissioner	:	J. Reynolds
Admin. Law Judge	:	L. Goldberg
Public Advocates Office	:	M. Ammermuller
Project Mgr.	:	
Public Advocates Office	:	Various
Witnesses	:	

PUBLIC ADVOCATES OFFICE
CALIFORNIA PUBLIC UTILITIES COMMISSION

PREPARED TESTIMONY
ON
APPLICATION OF PACIFIC GAS AND ELECTRIC COMPANY (U 39 E) FOR COMPLIANCE REVIEW OF UTILITY OWNED GENERATION OPERATIONS, PORTFOLIO ALLOCATION BALANCING ACCOUNT ENTRIES, ENERGY RESOURCE RECOVERY ACCOUNT ENTRIES, CONTRACT ADMINISTRATION, ECONOMIC DISPATCH OF ELECTRIC RESOURCES, UTILITY OWNED GENERATION FUEL PROCUREMENT, AND OTHER ACTIVITIES FOR THE PERIOD JANUARY 1 THROUGH DECEMBER 31, 2024

(PUBLIC VERSION)

San Francisco, California
September 15, 2025

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CHAPTER 1 : EXECUTIVE SUMMARY

(Witness: Michael Ammermuller)

I. INTRODUCTION AND RECOMMENDATIONS

This testimony presents the Public Advocates Office's (Cal Advocates) review of Pacific Gas and Electric Company's (PG&E) Energy Resource Recovery Account (ERRA) Compliance Application for the period from January 1, 2024, through December 31, 2024 (Record Period). PG&E filed its annual ERRA compliance application pursuant to Decision (D.) 02-10-062. In that Decision, the California Public Utilities Commission (Commission or CPUC) required certain utility procurement activities to be reviewed annually in the ERRA proceeding.

Pursuant to D.02-10-062, D.02-12-074, and California Public Utilities Code (Pub. Util. Code) § 454.5(d)(3), the purpose of the ERRA is to record and recover power costs and ensure timely recovery of procurement costs incurred related to an investor-owned utility's (IOU) approved procurement plan.[1] Pub. Util. Code § 454.5(d)(3) allows the Commission to establish balancing accounts to track the differences between recorded revenues and costs incurred related to the approved procurement plan.[2]

PG&E filed its ERRA compliance application on February 28, 2025, requesting Commission approval for costs associated with activities that occurred during the 2024 Record Period. The scope of Cal Advocates' review of PG&E's application includes a review of least-cost dispatch (LCD), demand response, utility-owned generation operations, contract administration, and an audit of balancing and memorandum account entries. In addition, Cal Advocates reviewed other ERRA issues summarized below.

[1] Decision (D.) 02-10-062, *Final Decision on Procurement OIR,* October 25, 2002, Finding of Fact (FOF) 23 and 26, at 71, 71 – 72; issued in Rulemaking (R.) 01-10-024.

[2] Pub. Util. Code §454.5(d)(3) states: "The commission shall establish power procurement balancing accounts to track the differences between recorded revenues and costs incurred pursuant to an approved procurement plan. The commission shall review the power procurement balancing accounts, not less than semiannually, and shall adjust rates or order refunds, as necessary, to promptly amortize a balancing account, according to a schedule determined by the commission."

In this testimony Cal Advocates presents its analyses and recommendations associated with PG&E's request. This testimony focuses exclusively on the 2024 Record Period and is based on analysis of information submitted by PG&E that includes, but is not limited to, PG&E's testimony and workpapers submitted with its application and responses to data requests.

The issues that Cal Advocates reviewed for the 2024 Record Period are listed in the table below and summarized in this chapter. For those issues or topic areas for which no testimony is filed, Cal Advocates does not have recommendations or disallowances. The qualifications of Cal Advocates' witnesses and their testimony declarations are contained in Appendix A of this report.

List of the Cal Advocates Witnesses and Respective Chapters

Chapter #	Description	Witness(es)
1	Executive Summary	Michael Ammermuller
2	Least-Cost Dispatch and Economically-Triggered Demand Response	Sarah Cornett
3	Utility-Owned Generation – Fossils and Renewables	Michael Yeo
4	Contract Administration	Stanley Kuan
5	Review of Balancing and Memorandum Accounts	Brian Lui, Craig Jenquin, Michael Ammermuller
N/A	Resource Adequacy[3]	Patrick Cunningham
N/A	Greenhouse Gas Compliance Instrument Procurement[4]	Thomas Gariffo

[3] Cal Advocates reviewed PG&E's testimony, workpapers, and data requests responses demonstrating its compliance with its Bundled Procurement Plan and Commission Resource Adequacy (RA) directives but is not filing a separate testimony chapter on RA compliance.

[4] Cal Advocates reviewed PG&E's workpapers reporting its costs and demonstrating its calculations in compliance with the methodologies, but is not filing a separate testimony chapter on GHG compliance.

II. SUMMARY OF FINDINGS & RECOMMENDATIONS

The following summary provides an overview of each chapter presented and sponsored by the witnesses for the 2024 Record Period. This summary is provided strictly for the reader's convenience.

1. Executive Summary (Michael Ammermuller)

2. Least-Cost Dispatch And Economically Triggered Demand Response (Sarah Cornett)

Overall, Cal Advocates finds that PG&E managed its thermal, hydro, storage, renewable, and demand response resources reasonably and does not recommend any disallowances.

3. Utility-Owned Generation – Fossil and Renewables (Michael Yeo)

Cal Advocates recommends the Commission order PG&E to:

- Hire an outside consultant, such as a metallurgist, to determine the cause of the premature failure of the exhaust valve at Humboldt Station Unit 3 on August 9, 2024 and to prepare a root cause evaluation report.
- Provide, in the next ERRA Compliance filing following the completion of the metallurgy analysis, a copy of the metallurgical report of the failed Unit 3 exhaust valve and its follow-up actions.

4. Contract Administration (Stanley Kuan)

Cal Advocates does not contest PG&E's contract administration activities during the 2024 Record Period.

5. Review of Balancing and Memorandum Accounts (Brian Lui, Craig Jenquin, Michael Ammermuller)

- Cal Advocates recommends that the Commission direct PG&E to adjust the $[redacted] credit associated with Portfolio Allocation Balancing Account (PABA) tariff line-item 5.ae for Cost-Allocation Methodology (CAM) replacement Resource Adequacy (RA) using the most recent RA Market Price Benchmark (MPB).
- Cal Advocates recommends that the Commission direct PG&E to adjust the credit of $[redacted] associated with PABA tariff line-item 5.p for the gain on sale of the Burney Gardens property to $[redacted] because of errors in PG&E's initial assessment of the

time the asset spent as Non-Utility Property (NUP) and a minor error in the stated purchase date of an asset.

- Cal Advocates finds that the 2024 accounting entries recorded in the ERRA balancing account are reasonable, appropriate, accurate, and in compliance with Commission Decisions
- Cal Advocates finds the costs recorded in the Disadvantaged Community – Green Tariff Balancing Account (DACGTBA), Community Solar – Green Tariff Balancing Account (CSGTBA), Green Tariff Shared Renewables Balancing Account (GTSRBA), Green Tariff Shared Renewables Memorandum Account (GTSRMA), Disadvantaged Community – Single-Family Affordable Solar Homes Balancing Account (DACSASHBA), Disadvantaged Community – Single-Family Affordable Solar Homes Memorandum Account (DACSASHMA) and the Central Procurement Entity (CPE) entries to the Centralized Local Procurement Sub-Account (CLPSA) are reasonable and in compliance with the applicable tariffs and Commission directives.

6. Resource Adequacy (Patrick Cunningham)

Cal Advocates finds that PG&E's RA activities were in compliance with its Bundled Procurement Plan (BPP) and Commission directives during the 2024 Record Period.

7. Greenhouse Gas Compliance Instrument Procurement (Thomas Gariffo)

The Commission requires the utilities to record and demonstrate greenhouse gas (GHG) Cap-and-Trade compliance with methodologies per D.21-05-004. During Record Period 2024, PG&E recorded $[redacted] worth of GHG compliance costs from utility-owned generation (UOG) to its balancing accounts as well as $[redacted] worth of GHG compliance costs from tolling contracts, for a total of $[redacted]. PG&E appears to have accurately recorded and demonstrated its Record Period 2024 GHG compliance costs in accordance with Commission requirements.

CHAPTER 2 : LEAST-COST DISPATCH AND ECONOMICALLY-TRIGGERED DEMAND RESPONSE

(Witness: Sarah Cornett)

I. INTRODUCTION AND RECOMMENDATIONS

This chapter of testimony reviews PG&E's dispatch and demand response[5] activities for the Record Period from January 1, 2024, through December 31, 2024, and considers whether PG&E met the Commission's least- cost dispatch (LCD) standard. Cal Advocates examined Chapter 1 of PG&E's 2024 ERRA compliance testimony and workpapers and reviewed past ERRA testimony. Both PG&E's energy scheduling and demand response dispatch decisions were reviewed using the least-cost dispatch standard of review, as described below.

II. FINDINGS AND RECOMMENDATIONS

A. Price Forecasting Accuracy

PG&E's day-ahead (DA) price forecasts during Record Period 2024 were on average [redacted] than in 2023. However, price forecasts for the 100 highest energy value days in 2024 were [redacted] than in 2023. Given that the [redacted], Cal Advocates finds PG&E's price forecasting activities in the 2024 Record Period to be reasonable.

B. Load Forecasting Accuracy

The proportion of load cleared in the real-time market (RTM) in Record Period 2024 was [redacted] than in the 2023 Record Period. Analysis of hourly load bids shows [redacted] than shown in analysis of daily load bids. Although [redacted]. Cal Advocates finds PG&E's load bidding calculations to be reasonable.

[5] PG&E manages several types of Demand Response programs, but the LCD chapter, and therefore the Public Advocates Office's analysis, focuses on demand response resources with economic dispatch triggers.

C. Assessment of Management of Thermal Resources

In the 2024 Record Period, PG&E submitted 222,452 DA hourly bids to the California Independent System Operator (CAISO) for its thermal resources. Of these thermal bids, there was one bidding event that resulted in a bid price variance of over $0.10 due to a [redacted]. The rate of non-awards and errors in bidding activity were higher in 2024 than in prior Record Periods but did not result in a cost impact. Cal Advocates finds PG&E's bid cost calculation activities to be reasonable.

D. Assessment of Management of Hydroelectric Resources

PG&E has demonstrated that it bids its hydro resources during times when the price and value of energy is high according to least-cost dispatch principles. [redacted] Cal Advocates notes that PG&E's hydro resources were, on average, [redacted], but finds PG&E's hydro bidding practices reasonable overall.

E. Assessment of Management of Energy Storage and Renewable Resources

As noted in Cal Advocates' prior testimonies, there are currently no Commission-directed reporting guidelines for energy storage dispatch. Cal Advocates will review for compliance once reporting requirements for energy storage dispatch are established.

F. Assessment of Management of Demand Response Programs

Based on the average hourly price at the Sub-Load Aggregation Point (Sub-LAP) for instances in which a Capacity Bidding Program (CBP) or SmartAC resource was dispatched versus the average hourly Sub-LAP price for all instances wherein the trigger condition was met, PG&E dispatched its CBP and SmartAC resources reasonably. Cal Advocates encourages PG&E to closely evaluate the cost-effectiveness of its programs and make necessary changes accordingly.

III. BACKGROUND

A. Standard of Conduct for Least-Cost Dispatch and Demand Response

The Commission's Decision (D.) 02-10-062 instituted rules for the utilities' procurement responsibilities, established ERRA as the cost recovery mechanism for short-term procurement costs, and set minimum standards of behavior.[6] A subsequent decision, D.02-12-074, described the utilities' "up-front standard"[7] of least-cost dispatch as a guide for their short-term procurement plans as well as for the Commission to determine compliance. The decision elaborated upon Standard of Conduct (SOC) #4:

> Least-cost dispatch refers to a situation in which the most cost-effective mix of total resources is used, thereby minimizing the cost of delivering electric services…[P]ure economic dispatch of resources may need to be constrained to satisfy operational, physical, legal, regulatory, environmental, and safety considerations. The utility bears the burden of proving compliance with the standard set forth in its plan.[8]

In the settlement agreement resulting from PG&E's 2014 Record Period ERRA compliance proceeding, Cal Advocates, then the Office of Ratepayer Advocates, and PG&E agreed that the Commission would review economically dispatched demand response programs and hold PG&E to the least-cost dispatch standard of review described above.[9]

B. Clarification of Least-Cost Dispatch Expectations Following PG&E's 2010 Record Period and Southern California Edison's 2012 Record Period ERRA Compliance Proceedings

Cal Advocates' analysis of each investor-owned utility's ERRA Record Period 2010 least-cost dispatch testimony concluded that the utilities did not achieve least-cost dispatch and recommended disallowances for each utility. The Commission reviewed

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[6] D.02-10-062, at 2.

[7] D.02-12-074, *Decision on Procurement Plans*, December 19, 2002 at 54; issued in Rulemaking (R.) 01-10-024.

[8] D.02-12-074 at 54.

[9] D.16-12-045, *Decision on Pacific Gas and Electric Company 2014 Energy Resource Recovery Account Compliance Review*, December 20, 2016, Conclusion of Law 4 at 31; issued in A.15-02-023.

PG&E's least-cost dispatch showing in Application (A.) 11-02-011 and issued D.13-10-041, stating that while the Commission would not approve the disallowance recommendation, the showing was below expectations.[10] The Decision served to "ameliorate these shortcomings and provide specific direction to PG&E to improve its showings in the future."[11]

To improve least-cost dispatch showings, the Decision directed PG&E to include "precise numerical calculations that either demonstrate that PG&E achieved least-cost dispatch during the Record Period or quantify the amount of overspending by PG&E" in its 2014 ERRA compliance proceeding (and going forward).[12] Additionally, the Decision directed the Commission's Energy Division to facilitate a workshop with all investor-owned utilities, wherein a set of proposed criteria would be developed for determining what constitutes least-cost dispatch compliance and the methodology required to demonstrate this compliance.[13]

Finally, in response to Southern California Edison's (SCE) Record Period 2012 ERRA reporting, Cal Advocates asserted that the utility did not provide adequate proof that it achieved least-cost dispatch.[14] The Commission further clarified least-cost dispatch responsibilities by issuing D.14-05-023 in which it established that, following the Market Redesign Technology Update in 2009, the CAISO is responsible for dispatching energy generation.[15] In other words, the regulated utilities are responsible for scheduling and bidding, but the actual dispatch is performed by the CAISO.

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[10] D.13-10-041, *Decision on Compliance Review of Pacific Gas and Electric Company Procurement Activities and Entries to the Energy Resource Recovery Account and Renewables Portfolio Standard Cost Memorandum Account for the Record Period of January 1, through December 31, 2010,* October 21, 2013 at 14-15; issued in A.11-02-011.

[11] D.13-10-041 at 15.

[12] D.13-10-041 at 43.

[13] D.13-10-041 at 25.

[14] D.14-05-023, *Decision Adopting Southern California Edison Company's 2012 Energy Resource Recovery Account Compliance Request*, May 16, 2014 at 9; issued in A.13-04-001.

[15] D.14-05-023 at 19.

C. Joint Proposal, Interim Ruling, and Final Decision for A.11-02-011

The utilities and subject matter experts proposed least-cost dispatch criteria and methodologies and submitted them to the Commission in 2014 as the "Joint Proposal for the Demonstration of Least-Cost Dispatch" (Joint Proposal).[16] Cal Advocates reviewed the proposal and provided recommendations, but the utilities and Cal Advocates disagreed on the format for reporting their demand response programs in ERRA compliance applications.

The Commission issued the "Interim Ruling Providing Guidance for 2014 ERRA Compliance Proceedings," (Interim Ruling) directing the utilities to comply with the uncontested portions of the Joint Proposal, which are as follows:

a. The least-cost dispatch Proposal shall be modified to include a background summary table in testimony.

b. The utilities shall use the 500 instead of 100 highest hourly Locational Marginal Prices in metric 4 of the Joint Proposal.

c. The summary reporting of daily self-commitment decisions shall be modified to show both "profit positions" and "loss positions."

d. The utilities shall include a comparison of the accuracy of the utilities' forecast of prices in the DA market compared to actual CAISO results.[17]

Finally, the Commission's Interim Ruling addressed the dispute between Cal Advocates and the utilities by ordering that the utilities show the "metrics for demand response" in the format proposed by Cal Advocates in its response to the Joint Proposal.[18] The Commission's Decision affirming the guidance and direction in the Interim Ruling[19] was issued on May 7, 2015, and the standards were expanded to apply to all three utilities on December 3, 2015.[20]

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[16] D.15-05-006, *Decision Adopting Methodology and Closing Proceeding,* May 15, 2015, at 7; issued in A.11-02-011.

[17] D.15-05-006 at 12.

[18] D.15-05-006 at 12.

[19] D.15-05-006 at 13-14.

[20] D.15-12-015, *Decision Granting Petition for Modification*, December 4, 2015; issued in A.11-02-011 et

IV. DISCUSSION AND ANALYSIS

A. Price Forecasting Accuracy

1. Overview

PG&E conducts load and price forecasts to support its DA market bidding and to procure fuel to supply its thermal resources. The load forecast is performed seven days in advance and is based on temperatures and actual hourly-updated load data. The price forecast is intended to reflect energy demand given market dynamics of supply, congestion, solar concentration, and transmission-constrained local area differences. This forecast also enables PG&E to evaluate the opportunity costs of use-limited dispatchable resources, such as hydroelectric powerhouses. Finally, PG&E combines the load (supply) with the price (demand) forecasts to predict market clearing prices and the marginal cost of providing energy during the optimization process, which informs the price of resources bid into the CAISO's DA market.[21]

PG&E's DA forecast accuracy can be estimated by comparing the load and price forecasts with the actual CAISO load and clearing price to get the average mean absolute percentage error (MAPE), which measures the magnitude of errors proportional to the magnitude of the target value. This metric can grow unreasonably large in hours when load volumes are small, but typically provides a useful approximation of forecast accuracy. This information is provided in PG&E's testimony in its comparison of forecast and actual price and load for the 100 highest energy value days (ranked based on the total cost of the load cleared in the DA market)[22] as well as for every day of the Record Period.[23] In addition to verifying forecast accuracy, the MAPE analysis provides insight into how well PG&E values its dispatchable resources to ensure that they are bid economically, consistent with least-cost dispatch principles.

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[21] Trading floor tour during the Public Advocates Office's site visit to PG&E office on March 16, 2016.

[22] Attachment 2.1, A.25-02-013, Chapter 1 Workpapers, LCD_2024_Workpaper_6_HighestEnergyValueDays_CONF.

[23] Attachment 2.1, A.25-02-013, Chapter 1 Workpapers, LCD_2024_Workpaper_6_HighestEnergyValueDays_CONF.

2. Analysis

The statistical bias of MAPE means that MAPE tends to be higher at times when the real-time price is lower. PG&E had an average daily MAPE of [redacted] in the 100 highest energy value days of the 2024 record period with a median of [redacted]. This average value was [redacted] than the 2023 Record Period value of [redacted], while the median value is [redacted] than the previous value of [redacted].

The median price MAPE value for all 366 days of the year, [redacted] of the median value for the 100 highest value energy days in 2024. However, the average value for all 366 days in 2024 is [redacted] compared to [redacted] for the 100 highest value energy days. [redacted] Table 2-1 indicates that daily price forecasts were [redacted] in 2024 and continue an [redacted] trend that began last year. [redacted][24]

Table 2-1: Mean and Median Price MAPE Values for 2021- 2024 (Confidential)[25]

		2021	2022	2023	2024
Top 100 Energy Value Days	Average MAPE	[redacted]	[redacted]		
	Median MAPE				
All Days in the Record Period	Average MAPE	[redacted]			
	Median MAPE				

[24] Attachment 2.2, PG&E Response to Data Request, ERRA-2024-PGE-Compliance_DR_CalAdvocates_008-Q001.

[25] Attachment 2.2, LCD_2024_Workpaper_6_HighestEnergyValueDays_CONF, A.24-02-012 Cal Advocates Testimony at 2-8.

Figure 2-1: Average Forecasted Day Ahead Market (DAM) Default Load Aggregation Point (DLAP) Price and Cleared CAISO Day-Ahead Market Price with MAPE Values for 2024 (Confidential)[26]

Figure 2-1 shows that PG&E's average daily price forecasts (in blue) in the 2024 Record Period were [redacted] with the actual clearing price (in orange). Average daily MAPE (in green) [redacted] and on [redacted] highest energy value days. Figure 2-1 shows [redacted]. Price increases in [redacted] resulted in [redacted]. [redacted]. Cal Advocates finds PG&E's daily price forecasting activities for the 2024 Record Period to be reasonable given that [redacted]

[26] Attachment 2.3, ERRA-2024-PGE-Compliance _LCD_Price Forecast Analysis Tables_CONF, Tab [Table 6.2 Chart]

[redacted].

Figure 2-2: Average Forecasted Hourly DAM DLAP Price and Cleared Hourly CAISO DAM DLAP Price for 2024 (Confidential)[27]

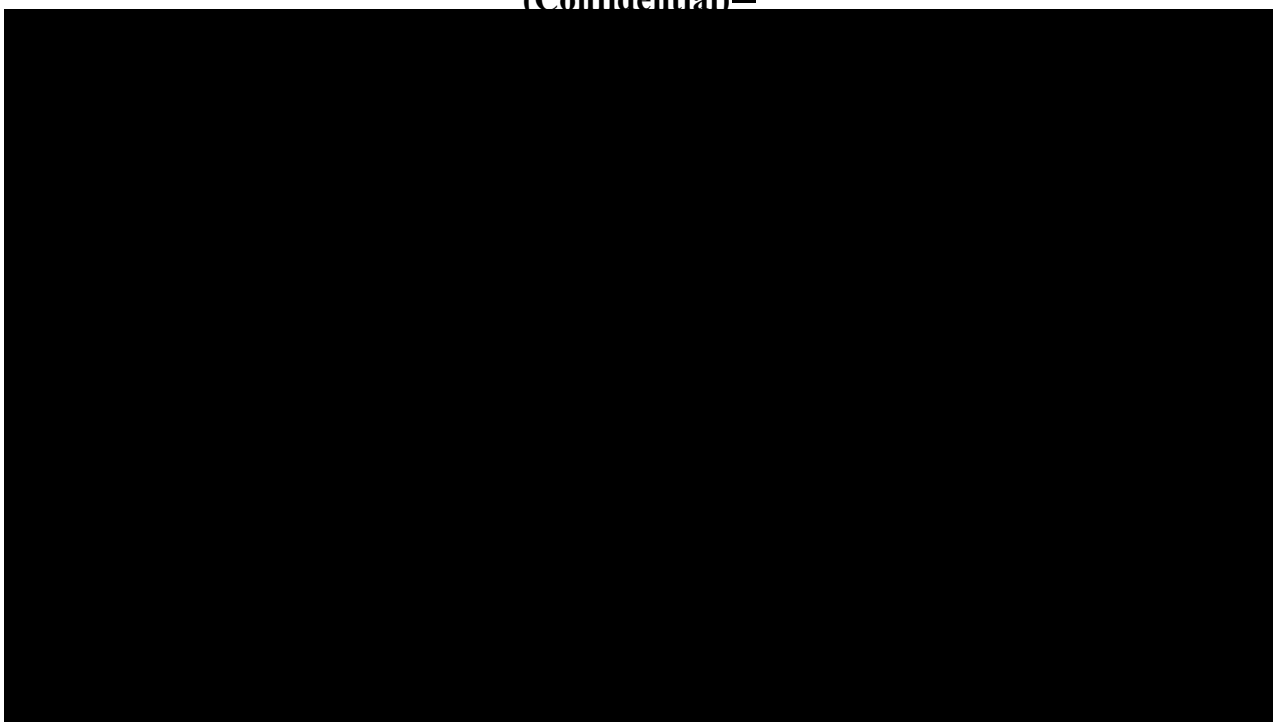

Figure 2-2 shows the difference between PG&E's hourly price forecast and the cleared hourly price. Overlap in the gray and orange lines indicates alignment between forecasted and actual hourly prices, while diverging lines in which red or green is not tightly tracking its opposite indicate forecasting errors. Figure 2-2 shows that PG&E forecasts are [redacted], but also indicates [redacted]. Overall, Cal Advocates finds PG&E's hourly price forecasting activities for the 2024 Record Period to be reasonable.

[27] Attachment 2.3, ERRA-2024-PGE-Compliance _LCD_Price Forecast Analysis Tables_CONF, Tab [Table 6.3 Chart].

3. Summary and Recommendations

PG&E's DA forecasts for every day of the year in the 2024 Record Period were [redacted] than those in 2021-2023. However, the DA forecasts in the top 100 energy value days were [redacted] than in 2023, and [redacted] with 2021-2023 MAPE values.

During the 2024 Record Period, the [redacted]. However, PG&E also shows high MAPE values during a stretch of days in [redacted]. Though some portion of these [redacted] can be attributed to price fluctuations due to abnormally high natural gas prices, the frequency of price forecast MAPEs [redacted] shows that PG&E's price forecasting methodologies are not sufficiently flexible to adapt to the market conditions experienced in 2024. PG&E notes that, in general, "forecast algorithms are trained to perform well on average," though extreme prices are difficult to forecast.[28] Given that high MAPEs corresponded to unusual external weather and market events, Cal Advocates finds PG&E's load and price forecasting activities for the 2024 Record Period to be reasonable. Cal Advocates recommends that PG&E continue analyzing patterns in hourly forecast errors and consider adjustments when DAM prices or other market conditions exceed usual levels.

B. Load Forecasting Accuracy

1. Background

PG&E bids "[redacted]"[29] [redacted]. PG&E's load summary shows the total number of megawatt-hours (MWh) cleared each month in the DA market and actual settled load. The difference indicates the amount of load scheduled in RT. Load Serving Entities (LSEs) that procured more energy in the DAM than required in RT are typically able to sell

[28] Attachment 2.4, A.25-02-13, PG&E Workpaper 2024_LCD_6_Highest_Energy_Value_Days_and_Price_Forecast_Summary_CONF

[29] Application (A.) 25-02-013, PG&E Testimony at 1-14.

excess hourly energy back into the RTM at the RTM price. A high proportion of load cleared in the DA market indicates that PG&E forecasted and procured sufficient energy resources relative to consumer demand, and then appropriately calculated the value of its resources and translated these values into bids that would allow the resources to be economically dispatched.

The most common metric used to evaluate the relative quality of load forecasts in the utility industry is also the MAPE. Cal Advocates adjusted the MAPE value of all hours exceeding 100% MAPE to equal 100% MAPE prior to calculating MAPE averages across multiple days or hours to prevent outliers from distorting summary statistics.

Table 2-2[30]: PG&E Daily and Hourly Load MAPE 2022-2024

Year	Average MAPE (100 HVE[31] Days)	Average Daily MAPE (Cleared)	Average Daily MAPE (Average Forecast)	Average Hourly MAPE (Adjusted)
2024	[redacted]	[redacted]	[redacted]	[redacted]
2023	[redacted]	[redacted]	[redacted]	[redacted]
2022	N/A	N/A	[redacted]	N/A

Table 2-2 shows average MAPE values of PG&E's load forecasts in the 2024 Record Period. Overall, the average daily MAPE values are [redacted] than the average hourly MAPE. Over the course of a day, some hours are over-forecasted while others are under-forecasted. Hours are over-forecasted if PG&E's DA electrical load forecast is greater than the RT electrical load of its customers. Similarly, hours are under-forecasted if the DA load forecast is less than reported RT load. The information in the error of these individual hours is lost when the MAPE is calculated over a whole day instead of by hour. [redacted]

[30] Attachment 2.1, 2022-LCD_Workpaper_6_HighestEnergyValueDays_CONF, A.24-02-012 Cal Advocates Testimony.

[31] Highest-Value Energy Days, or the days in the record period where average LMPs were the highest.

[redacted].

PG&E develops least-cost load bids using a short-term area forecast provided by the vendor Enverus.[32] Inputs to the short-term load forecast include historical load data and historical and forecast temperature data. PG&E adjusts the short-term load forecast by subtracting transmission losses, municipal loads, and forecasts of Direct Access and Community Choice Aggregation loads.[33] PG&E states that the average daily MAPE of the short-term area load forecast was [redacted] in the 2024 Record Period.[34] As shown in Table 2-2, PG&E's average daily and hourly MAPE values are [redacted] and [redacted] respectively. This indicates that adjustments to the short-term load forecast may be contributing to errors in DA load forecasting.

2. Comparative Scenarios

Cal Advocates analyzed the difference in MAPE values between the load awarded to PG&E in the DAM and the actual RT load required by PG&E customers in each hour. Cal Advocates calculated all hourly values for the net cost of energy in the DAM and RTM based on PG&E's reported trade volumes and the clearing price in each market. PG&E states that [redacted].[35] When price and load forecasts are accurate, this strategy should result in 100% of RT load being procured in the DAM at the DA price.

Cal Advocates developed two hypothetical scenarios to serve as comparisons to PG&E's actual hourly energy procurements: an "ideal load" scenario and a "perfect forecast" scenario. The "ideal load" scenario assumes that PG&E has the ability to

[32] A.25-02-013, PG&E Testimony at 1-11.

[33] A.25-02-013, PG&E Testimony at 1-12.

[34] A.25-02-013, PG&E Testimony at 1-13.

[35] A.25-02-013, PG&E Testimony at 1-14.

perfectly forecast its hourly RT load. Cal Advocates calculated the hourly cost of energy in the ideal load scenario by applying the hourly DA market price to PG&E's hourly RT load. The "perfect forecast" scenario assumes that PG&E has the ability to perfectly forecast both its hourly RT load and the optimal clearing price in each hour. Cal Advocates calculated the hourly cost of energy in the perfect forecast scenario by applying the minimum of hourly DA and RT prices to PG&E's hourly RT load.

Cal Advocates acknowledges that executing the "perfect forecast" and "ideal load" scenarios would require flawless knowledge of market clearing prices and/or RT load and is relatively impossible to achieve. Cal Advocates uses these alternative scenarios to indicate the maximum possible cost savings associated with improvements to price and load forecasting. In its analysis, Cal Advocates primarily compares the performance of PG&E's actual load forecast to the ideal load scenario because the ideal scenario relies only on improved load forecasting and does not involve additional knowledge of DA and RT clearing prices.

3. Potential Cost Savings

Cal Advocates calculated that DAM and RTM energy trading cost PG&E a total of $[redacted] in 2024. Using the "ideal load" scenario, Cal Advocates calculates that $[redacted] or 0.83% of PG&E's total energy trading costs in 2024, was incurred due to errors in hourly load forecasts during the Record Period. This is roughly on par with the 2023 Record Period, in which [redacted] PG&E's total energy trading costs occurred due to mis-forecasting. The $[redacted] in cost difference between actual and "ideal load" bids in 2024 indicates the scope of potential cost savings associated with improvements to load forecasts alone. This cost difference decreased in the current Record Period compared to the previous Record Period, in which PG&E incurred $[redacted] in costs due to mis-forecasting.

PG&E's actual energy expenses in the RTM and DAM are [redacted] greater than the cost of the "perfect" scenario, which calculated the annual cost of DA and RT energy at $[redacted] The [redacted] cost difference between actual and "perfect" energy

bids in 2024 indicates the scope of potential cost savings associated with improvements to both price and load forecasts.

Table 2-3: Annual Cost of DA and RT Energy
In 000s

Record Year: 2024	**Actual**	**"Ideal"**	**"Perfect"**
Dollar Value			
Difference from Actual			
% of Actual			
Record Year: 2023	**Actual**	**"Ideal"**	**"Perfect"**
Dollar Value			
Difference from Actual			
% of Actual			

4. Summary Trends

Cal Advocates generated tables using data received from PG&E to analyze seasonal patterns in PG&E load forecasting, which are available in the attachments to this testimony. Cal Advocates used these tables to identify patterns of high error rate and cost impact in 2024 with the potential to be improved by targeted adjustments to PG&E's load forecasts.[36]

However, the frequency and cost impact of indicates that minor adjustments to PG&E's load forecast could have provided significant cost savings in the 2024 Record Period.

[36] Attachment 2.5, ERRA-2025-PGE-Compliance_LCD_Load Forecast _CONF.

[redacted][37][redacted]
[redacted]
[redacted]
[redacted][38]

PG&E's rates of [redacted] When asked about the over-forecasting, PG&E noted that it conducted an analysis during the Record Period that identified over-forecasting as a persistent issue during varying hours and months of the year.[39] The analysis did not reveal a specific cause, though PG&E noted that departing customers, "new distributed energy resources such as rooftop solar being interconnected to PG&E customers, and bias due to systematic variance of rooftop solar production may all have contributed to systematic over-forecasting."[40] In response to the consistent over-forecasting, PG&E implemented an hourly varying Load Adjustment Factor (LAF) starting on July 15, 2024. The LAF was calculated based on historical load forecasts to correct for the bias. PG&E notes in its testimony that the load MAPE for the second half of 2024 dropped to [redacted] in the first half of the year due to the LAF.[41] PG&E clarified that the LAF values are fixed, but that it conducted a review of these values in the first quarter of 2025 which led to adjustments to boost accuracy.[42]

5. Additional Analysis

Cal Advocates requested additional load forecast data and details of PG&E's load forecast review methodologies to understand how PG&E generated and optimized its

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[37] [redacted]

[38] [redacted]

[39] Attachment 2.6, A.25-02-013, PG&E response to Cal Advocates Data Request 12, ERRA-2024-PGE-Compliance_DR_CalAdvocates_012-Q004.

[40] Attachment 2.6, A.25-02-013, PG&E response to Cal Advocates Data Request 12, ERRA-2024-PGE-Compliance_DR_CalAdvocates_012-Q004.

[41] A.25-02-013, PG&E Testimony at 1-13.

[42] Attachment 2.7, A.25-02-013, PG&E response to Cal Advocates Data Request 12, ERRA-2024-PGE-Compliance_DR_CalAdvocates_012-Q007CONF.

load bids. Based on PG&E's data, [redacted] of PG&E's total load was cleared in the DA market.[43] This is a [redacted], in which PG&E cleared [redacted] in the DA market. Figure 2-3 below compares PG&E's total load cleared in the DA market versus load cleared in the RT market from 2015-2024.

Figure 2-3: Percent of Load Cleared in the RTM from 2015-2024 (Confidential)[44]

[redacted]

[redacted]. In 2024, PG&E appeared to [redacted] its load forecast as its goal is to clear all load in the DAM. Both over- and under-procuring can result in financial inefficiencies. However, PG&E's proportion of DAM-cleared load is still [redacted] and in line with trends over

[43] Attachment 2.8, ERRA-2024-PGE-Compliance_LCD_Total Load Analysis_2015-2024_CONF.

[44] Attachment 2.8, ERRA-2024-PGE-Compliance_LCD_Total Load Analysis_2015-2024_CONF.

the past several years of [redacted] Therefore, Cal Advocates finds PG&E's load bidding calculations reasonable.

6. Recommendations

Cal Advocates recommends that PG&E continue to improve its average hourly load MAPE, reported at [redacted]% ([redacted] from last year's [redacted]%). PG&E's new LAF appears to be improving forecasting accuracy since its adoption in July 2024. Cal Advocates recommends that PG&E continue to review the new LAF and refine as necessary.

C. Management of Thermal Resources

PG&E is required to bid its utility-retained and contracted thermal resources at their incremental (marginal) costs, subject to safety, regulatory, legal, operational, and financial requirements. PG&E is prohibited from taking any actions that result in a preference for its utility-retained thermal generation resources relative to those under contract with outside counterparties.[45] PG&E states that it "makes no distinction between its own resources and contracted resources in its bidding practices".[46] [redacted].[47]

1. Commitment Cost Decisions

Prior to April 1, 2019, a Scheduling Coordinator (SC) could choose whether the CAISO calculated the start-up and minimum load costs of its resources using Registered costs recorded in the resource Master File, or Proxy costs which are calculated in a 2-month period. Phase 3 of CAISO's Commitment Cost Enhancements initiative retired the registered cost option except for "resources that have less than 12 months of 15-

[45] Decision (D.) 02-12-069, , *Ordering PG&E, SDG&E and Edison to Enter Into and Comply with The Attached Operating Order*, December 19, 2002, at 62-63; issued in R.01-10-024.

[46] A.25-02-013, PG&E Testimony at 1-15.

[47] Attachment 2.25, ERRA-2023-PGE-Compliance_DR_CalAdvocates_002-Q003CONF

minute [locational marginal price] data."[48] In the 2024 Record Period, none of PG&E's thermal resources met the exception (resources that have less than 12-months of 15-minute data). Therefore PG&E did not use the registered cost option for any of its resources in 2024 which eliminated the need for PG&E to make a Proxy/Registered cost determination for thermal resources. Accordingly, PG&E did not submit Workpaper 1 – Commitment Cost Decisions.

2. Incremental Bid Cost Calculations

PG&E "schedules or bids[49] resources that have dispatch flexibility into the CAISO markets at the incremental cost of providing energy, considering the variable resource operating cost and the most current market price forecast."[50] Resource costs that increase or decrease with resource output are treated as incremental costs.[51] Incremental energy bid costs include costs that vary directly with the generation of each additional MWh above the minimum operating point such as fuel costs, GHG costs, and variable operations and maintenance costs.[52] PG&E submits its calculated bids to the CAISO's DA market, and the CAISO dispatches resources with the lowest bid prices to meet total electrical load. Resources dispatched by CAISO are compensated at the LMP, which corresponds to the bid price of the highest-cost resource dispatched to meet electrical load in a local area. In addition to its portfolio of utility-owned resources, PG&E bids and schedules contracted resources and calculates the incremental costs of these resources based on their contract terms.[53]

In the 2024 Record Period, PG&E submitted 222,452 DA hourly bids to CAISO for its thermal resources.[54] [redacted]

[48] A.25-02-013, PG&E Testimony at 1-16.

[49] Schedules commonly refer to self-schedules whereas bids refer to price-quantity offers to sell or buy in the CAISO Market (A.25-02-013, PG&E Testimony at 1-8, footnote 12).

[50] A.25-02-013, PG&E Testimony at 1-8.

[51] A.25-02-013, PG&E Testimony at 1-8.

[52] A.25-02-013, PG&E Testimony at 1-9.

[53] A.25-02-013, PG&E Testimony at 1-9.

[54] Attachment 2.9, A.25-02-013, Chapter 1 Workpapers,

[redacted][55] [redacted][56] PG&E noted that it made internal changes to reduce the likelihood of a similar event occurring in the future.[57] Cal Advocates finds PG&E's bid cost calculation activities to be reasonable.

3. Bidding Activity

During the 2024 Record Period, PG&E submitted bids for dispatchable thermal resources during all available hours. [redacted][58] PG&E submits bids for resources even during outage periods to prevent traders from forgetting to bid the resource once it is operational again. The outage card communicates to the CAISO that although a bid has been submitted, the resource is either fully or partially unavailable.[59]

Among the 222,452 hourly bids that PG&E submitted to the CAISO for its thermal resources, [redacted] or [redacted] were flagged as "non-awards," meaning that they were not fully dispatched although the incremental bid cost was lower than the LMP.[60] In all [redacted] instances, the non-award was justifiable because the resource had an outage card

2024_LCD_2_Bid_Cost_Calculation_Summary_CONF

[55] Attachment 2.9, A.25-02-013, Chapter 1 Workpapers, 2024_LCD_2_Bid_Cost_Calculation_Summary_CONF

[56] Attachment 2.10, A.25-02-013, PG&E response to Cal Advocates Data Request 8, ERRA-2024-PGE-Compliance_DR_CalAdvocates_008-Q007CONF.

[57] A.25-02-013, PG&E Testimony at 1-29.

[58] Attachment 2.9, A.25-02-013, Chapter 1 Workpapers, 2024_LCD_2_Bid_Cost_Calculation_Summary_CONF.

[59] Attachment 2.24, A.16-02-019, PG&E response to the DR 012, Q3

[60] Attachment 2.11, A.25-02-013, Chapter 1 Workpapers, 2024_LCD_Workpaper_2_BidCostCalculation_CONF, Table 2.4-Annual Non-Award.

limiting its available capacity, was providing ancillary services, was receiving regulation awards, or was a multi-stage generator transitioning from one configuration to another. In 2023, PG&E flagged [redacted] as non-awards.[61]

PG&E did not report any scheduling errors with a cost-impact. The single scheduling error noted above resulted in [redacted] hours of incorrect bids but there was no cost impact. Cal Advocates finds that PG&E responded in a timely manner to this error and appropriately revised its systems and processes to reduce the likelihood of the error reoccurring.

4. Self-Scheduling and Must-Take Resource Bidding

PG&E's portfolio includes resources which have no economic flexibility due to safety, environmental and license constraints, regulatory requirements, contract terms, or because they are inherently non-dispatchable.[62] Rather than submit economic bids to the CAISO for these resources, PG&E self-schedules the must-take and must-run supply in the DAM based on its forecast of PG&E's generation, and then modifies these self-schedules in real-time if the forecast of generation changes.[63] Dispatchable resources may be self-scheduled during resource testing or scheduling error.

[redacted][64] [redacted]. Cal Advocates finds PG&E's management of self-schedules and must-take resources reasonable.

[61] A.24-02-012, PG&E Testimony at 1-30.

[62] A.25-02-013, PG&E Testimony at 1-10.

[63] A.25-02-013, PG&E Testimony at 1-10.

[64] Attachment 2.12, A.25-02-013, Chapter 1 Workpapers, 2023_LCD_3_SelfCommitment_Summary

[65] Attachment 2.12, A.25-02-013, Chapter 1 Workpapers, 2023_LCD_3_SelfCommitment_Summary

D. Management of Hydroelectric Resources

1. Overview

Generation from hydroelectric resources is limited by the availability of water. Water may be considered a zero-cost fuel, but the availability of this zero-cost fuel (except in the case of pumped storage hydro) is typically limited by rainfall, runoff, and reservoir levels.[66] While some hydro resources such as run-of-river resources cannot be controlled at all, other hydro resources can be stored behind a dam and may be considered dispatchable generation. PG&E attempts to dispatch its hydro resources when DA and RT market prices are highest to perform least-cost dispatch. To limit inefficient dispatch, PG&E bids and schedules hydro resources based on the estimated opportunity costs of utilizing the resource at a future time when it may be more valuable.[67] Least-cost dispatch of hydro resources must take into consideration the uncertainty of weather conditions such as the likelihood of precipitation and high temperatures, the future availability of water, and any potential operating constraints. PG&E utilizes the hydro modeling tools PLEXOS and Xpress for forecasting and optimizing hydropower generation.[68]

2. Analysis

PG&E's hydro resources were, on average, dispatched during [redacted] of the 500 highest energy value hours, as determined by ranking the highest hourly locational marginal price values.[69] This is [redacted] than the 2023 Record Period, when hydro resources were dispatched during [redacted] of the 500 highest value energy hours, and also [redacted] than the 2022 Record Period, when hydro resources were dispatched [redacted] of the 500 highest value energy hours.[70] [redacted]

[66] A.25-02-013, PG&E Testimony at 1-16.

[67] A.25-02-013, PG&E Testimony at 1-16 and 1-17.

[68] Attachment 2.13, A.25-02-013, Chapter 1 Workpapers, 2024_LCD_4_Hydro_Resources_Summary.

[69] Attachment 2.13, A.25.02-013, Chapter 1 Workpapers, 2024_LCD_4_Hydro_Resources_Summary.

[70] A.24-02-012 Cal Advocates Testimony

[redacted].[71] When asked why its hydro resources, [redacted], were [redacted] as in the prior three record periods PG&E noted that [redacted]."[72] Cal Advocates finds this explanation reasonable given that the LMP spikes in early 2024 were neither seasonal nor predictable.

3. Summary and Recommendations

Overall, PG&E demonstrated that it dispatched its hydro resources during times when the price and value of energy was high according to least-cost dispatch principles. Cal Advocates finds that PG&E appropriately dispatched its hydro resources in the 2024 Record Period.

E. Management of Energy Storage and Renewable Resources

1. Overview

PG&E contracts with and owns renewable resources with economic bidding rights.[73] The economic bidding of these resources captures the incremental and opportunity costs associated with contractual and operational constraints [redacted] [74] In addition to calculating the cost components making up the bid cost for the economic dispatch of renewable energy in the DA market, PG&E evaluates

[71] Attachment 2.14, A.25-02-013, Chapter 1 Workpapers, 2024_LCD_Workpaper_4_Hydro_Top_500.

[72] Attachment 2.15, A.25-02-013, ERRA-2024-PGE-Compliance_DR_CalAdvocates_014-Q002CONF

[73] A.25-02-013, PG&E Testimony at 1-25.

[74] A.25-02-013, PG&E Testimony at 1-25.

market prices and opportunity costs associated with the curtailment of renewables. For example, sometimes the CAISO-reported net energy demand approaches the minimum must-offer threshold and increases the risk of overgeneration.

Overgeneration can burden distribution and transmission lines and lead to surges and outages. At these times, energy prices are often negative to provide a financial incentive for generators to "turn off" and reduce the amount of energy flowing into the grid. This scenario typically occurs at midday when solar generation is at its peak. Much like hydro resources, renewables do not have explicit fuel costs, but, unlike hydro resources, renewables can be economically curtailed at times when the CAISO system is approaching overgeneration conditions and energy costs are negative.

Scheduling coordinators curtail renewables after other thermal resources with flexible operating protocols have already been turned off. However, to ensure compliance with California's Renewables Portfolio Standard (RPS) and LCD requirements, the utilities assess the opportunity cost of not generating the Renewable Energy Credits (RECs) associated with renewable generation when determining their curtailment bids. [redacted].[75]

PG&E's renewable portfolio includes battery storage resources that can store energy during times of the day when energy is least expensive, then generate the stored energy at times when energy is most expensive. The 182.5 megawatt (MW) Elkhorn Battery Energy Storage System (BESS) began bidding into CAISO markets in April of 2022 and was PG&E's only utility-owned energy storage resource in 2024.[76]

In 2024, PG&E's portfolio included [redacted] contracted energy storage resources that began commercial operation prior to the Record Period. PG&E contracted [redacted] energy

[75] A.25-02-013, PG&E Testimony at 1-25 and 1-26.

[76] A.25-02-013, PG&E Testimony at 1-22.

storage resources with Commercial Operation Dates within the 2024 Record Period. In total, PG&E states that it paid [redacted] to counterparties for contracted energy storage resources in 2024. PG&E began the year with [redacted] of BESS capacity and ended the Record Period with [redacted] of BESS capacity.[77]

PG&E considers both charging costs and Variable Storage Operations Costs when calculating default energy bids for the Elkhorn BESS.[78] PG&E relies on a third-party forecast provider, Fluence Mosaic, to produce optimized charging schedules and dispatch bids for Elkhorn in both the DAM and RTM. [redacted] PG&E does not include a description of how it generates DAM and RTM bids for contracted BESS resources in its testimony.

2. Analysis

The Commission has pledged to "consider whether to institute a rulemaking proceeding covering all affected IOUs regarding storage resources, including consideration of the development of more detailed standards governing LCD compliance."[80] As of the filing date of this testimony, the Commission has not established reporting or dispatch requirements for energy storage resources. Cal Advocates retrieved summary details of PG&E's contracted and UOG battery storage resources in response to its Master Data Request (MDR).

3. Summary and Recommendations

Cal Advocates recommends that starting in the 2025 ERRA Compliance proceeding, PG&E submit workpapers documenting the least-cost dispatch of its battery

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[77] Attachment 2.16, A.25-02-013, PG&E Response to Cal Advocates MDR 1.2.8, ERRA-2023-PGE-Compliance_DR_CalAdvocates_MDR001-Q033Atch02CONF, Tab [1.2.8.3, 1.2.9.1 ES]

[78] A.25-02-013, PG&E Testimony at 1-22.

[79] A.25-02-013, PG&E Testimony at 1-22.

[80] D.21-07-018, *Decision Approving San Diego Gas & Electric Company's 2019 Energy Resource Recovery Account-related Activities and Costs*, July 21, 2021, at 16issued in A.20-06-001.

energy storage resources. Given that BESS has energy storage and dispatch capabilities, Cal Advocates recommends that the Commission directs PG&E provide workpapers detailing the dispatch frequency of its UOG and contracted BESS resources in the top 500 highest-value energy hours in each Record Period.

F. Management of Demand Response Programs

1. Overview

PG&E manages several types of demand response (DR) programs. Cal Advocates reviews PG&E's management of the Capacity Bidding Program (CBP) and the SmartAC Program because these programs have economic triggers or may be economically dispatched. These DR programs are "represented as Proxy Demand Response (PDR) resources in PG&E's portfolio and bid into the DA markets based on calculated availabilities and dispatch trigger prices."[81]

There are opportunity costs associated with demand response dispatch. In addition to the opportunity cost of dispatching a resource at a future time, PG&E considers customer fatigue, or when a demand response customer experiences frequent dispatch and, as a result, does not believe that the value of the dispatch outweighs the burden placed on their own operations and may be less likely to participate in the demand response program in the future.[82]

2. Capacity Bidding Program

The CBP is a "voluntary DR program that offers customers capacity and energy payments for being on standby to reduce load and for reducing energy consumption when requested by PG&E."[83] Program participants enroll through a third-party aggregator who receives the capacity payments and awards the payments to subscribing customers.[84] There was only one program option during the Record Period— the Elect option. The

[81] A.25-02-013, PG&E Testimony at 1-32.

[82] A.25-02-013, PG&E Testimony at 1-42.

[83] A.25-02-013, PG&E Testimony at 1-33.

[84] PG&E Electric Bidding Schedule E-CBP, July 23, 2018. Accessed at http://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_SCHEDS_E-CBP.pdf.

Elect option program runs from May to June and typically operates between 4:00pm to 9:00pm, Monday-Saturday, excluding holidays. The maximum number of dispatch hours is 30 hours per month.[85] Aggregators are given the option to choose the CAISO DA price trigger in each dispatch hour (capped at $650/MWh).[86] The Elect option was updated during the Record Period to require participation in Saturday events. In addition, CAISO Flex Alerts were added to potential event types as part of CBP.[87] In 2024, [redacted].[88]

During the times that CBP resources were dispatched in 2024, the average hourly net cost was [redacted] in 2024. This is [redacted] than in 2023, when the same value was [redacted]. In comparison, the average hourly potential price for the times that the CBP trigger conditions were forecast, whether they were dispatched or not, was [redacted] in 2024 versus [redacted] in 2023. [redacted]

[85] A.25-02-013, PG&E Testimony at 1-34.

[86] A.25-02-013, PG&E Testimony at 1-34.

[87] A.25-02-013, PG&E Testimony at 1-34.

[88] Attachment 2.17, ERRA-2024-PGE-Compliance-DR_CalAdvocates_010_Q010CONF.

[89] Attachment 2.17, ERRA-2024-PGE-Compliance-DR_CalAdvocates_010_Q010CONF.

[redacted][90] This resulted in a higher number of retail event hours relative to market awards, and retail events typically have lower trigger prices compared to market awards.[91] Unlike in 2023, in 2024 there were no hours where the CBP triggers were met but resources were not dispatched.[92] Given the range of DA prices observed in May through October 2024, PG&E dispatched CBP resources at appropriately high-value hours in the Record Period.

3. Smart AC Programs

i. Background

PG&E's SmartAC program is a voluntary DR program available to residential customers.[93] Participants in the program allow PG&E to install a device that temporarily switches off their primary Air Conditioning (A/C) unit to reduce power consumption. PG&E targets high usage A/C periods and allows up to 100 hours of cycling per customer each year, though it targets 20 hours due to attrition concerns.[94] PG&E previously operated multiple programs as part of SmartAC; however it now only operates the single residential customer A/C program (formerly known as "SmartAC Switch"). In A.22-05-002, PG&E recommended a slow sunset of SmartAC programs and proposed a more cost-effective Automated Response Technology (ART) program, portions of which would serve similar functions as existing SmartAC programs. The Commission has authorized PG&E to use up to $1.6 million of its approved ART budget to transition customers from the Smart AC program to the ART.[95]

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[90] Attachment 2.18, A.25-02-013, PG&E response to Cal Advocates Data Request 10, ERRA-2024-PGE-Compliance_DR_CalAdvocates_010-Q002CONF.

[91] A.25-02-013, PG&E Testimony at 1-38.

[92] A.25-02-013, PG&E Testimony at 1-38.

[93] A.25-02-013, PG&E Testimony at 1-38.

[94] Attachment 2.23, March 19, 2025 PG&E Presentation to Cal Advocates Staff: 2024 ERRA Compliance Overview of DR, Slide 8.

[95] D.23-12-005, *Decision Directing Certain Investor-Owned Utilities' Demand Response Programs, Pilots, and Budgets for the Years 2024-2027*, December 20, 2023, at 65; issued in A.22-05-002 et al.

Customers participated in Smart AC during [redacted] [redacted][96]

ii. Program Dispatch

SmartAC is "both a reliability program used during emergencies and an economic program based on wholesale energy prices," and can be dispatched under the following conditions:[97]

a) Upon the CAISO's order:

   i. After the dispatch of Condition 2 Reliability Must-Run units and prior to canvasing other entities and Balancing Authorities for available Manual Dispatch Energy/Capacity on interties;

   ii. Based on its forecasted system conditions and operating procedures; or

   iii. During emergency or near-emergency situations;

b) At the discretion of PG&E's energy operations center in response to a CAISO economic award in the wholesale market or high wholesale energy prices; or

c) During program testing.[98]

In 2024, [redacted].[99] To determine economical dispatch of the SmartAC program, PG&E uses sub-LAP (Load Aggregation Point) temperatures to forecast periods of significant load reduction potential. When sub-LAP temperatures exceed a certain threshold and the economic trigger is forecast to be met, PG&E lowers the bid price from the default level.

[96] Attachment 2.19, ERRA-2024-PGE-Compliance-DR_CalAdvocates_010_Q012Atch01CONF.

[97] A.25-02-013, PG&E Testimony at 1-38.

[98] A.25-02-013, PG&E Testimony at 1-38.

[99] Attachment 2.20, ERRA-2024-PGE-Compliance_DR_CalAdvocates_016-Q002CONF.

During the 2024 Record Period, PG&E dispatched its SmartAC resources on [redacted] occasions for a total of [redacted].[100] By comparison, PG&E dispatched its SmartAC resources on [redacted] occasions for a total of [redacted] in the 2023 Record Period. During actual SmartAC dispatch events in 2024, the average hourly net cost was [redacted], versus [redacted] in 2023.[101] In 2023, the average hourly potential price for all times that the SmartAC Switch trigger conditions were forecasted in 2023, whether they were dispatched or not, was [redacted], versus [redacted] in 2023.[102] The difference in price in 2024 between the average hourly LMP and the average hourly potential LMP is [redacted]. PG&E dispatched SmartAC resources at appropriately high-value hours in the Record Period.[103]

Most SmartAC dispatch events achieved [redacted] during the Record Period. When asked about this, PG&E explained that there was a [redacted]

[redacted][104] [redacted]

[redacted]

[redacted]

[redacted][105]

iii. Dispatch Exceptions

PG&E reports that in 2024, there were no instances in which SmartAC resources received a market award, but were not dispatched.[106] PG&E does note that in some instances, the bid price of SmartAC resources were not lowered when temperature

[100] A.25-02-013, PG&E Testimony at 1-41.

[101] A.23-02-018, PG&E Testimony at 1-48; A.22-02-015, PG&E Testimony at 1-46.

[102] A.23-02-018, PG&E Testimony at 1-48; A.22-02-015, PG&E Testimony at 1-46.

[103] Attachment 2.21, A.25-02-013, PG&E Workpapers, ERRA_2024_PGE_Compliance_Test_PGE_Chp1Workpaper_DR1_Confidential

[104] Attachment 2.22, ERRA-2024-PGE-Compliance_DR_CalAdvocates_010-Q013CONF.

[105] Attachment 2.22, ERRA-2024-PGE-Compliance_DR_CalAdvocates_010-Q013CONF.

[106] A.25-02-013, PG&E Testimony at 1-42.

triggers were met due to system error, customer fatigue, or the expectation of higher-yield dispatch later in the season.[107] There were more higher temperature days in 2024 compared to previous years, resulting in more dispatched events for sub-LAP resources. PG&E observed instances in earlier months in the year where resources reached a low or middle temperature trigger, but bids were not lowered as is PG&E's practice in order to conserve resources for expected higher temperature days later in the year.[108] There were no instances in which temperature trigger conditions were met but the resource was not dispatched.[109]

4. Summary and Recommendations

Average LMP for forecasted trigger event days and actual dispatch days for the CBP and SmartAC Program indicate PG&E optimized its demand response resources during the hours with higher energy values. Cal Advocates finds that PG&E managed its CBP and SmartAC resources reasonably. Cal Advocates also notes the large disparity in the programs' operational costs versus the costs avoided when the programs are activated, and encourages PG&E to continually monitor and evaluate the cost effectiveness of its programs.

V. CONCLUSION

Overall, Cal Advocates finds that PG&E managed its thermal, hydro, storage, renewable, and demand response resources reasonably and does not recommend any disallowances.

[107] A.25-02-013, PG&E Testimony at 1-42.

[108] A.25-02-013, PG&E Testimony at 1-43.

[109] A.25-02-013, PG&E Testimony at 1-43.

CHAPTER 3 : UTILITY-OWNED GENERATION – FOSSIL AND RENEWABLES

(Witness: Michael Yeo)

I. INTRODUCTION AND RECOMMENDATIONS

This chapter addresses PG&E's management and operation of its utility-owned non-nuclear facilities (fossil-fuel, fuel cell, and photovoltaic) and the outages that occurred at these facilities during the 2024 Record Period (January 1, 2024 to December 31, 2024)[110].

After reviewing PG&E's testimony and responses to data requests, Cal Advocates recommends the Commission order PG&E to:

(a) Hire an outside consultant, such as a metallurgist, to determine the cause of the premature failure of the exhaust valve at Humboldt Station Unit 3 on August 9, 2024 and to prepare a root cause evaluation report. This was the second time in two years that an exhaust valve failed at Humboldt Station. The exhaust valve in the August 9, 2024 outage was only in service for approximately a year when it failed, and the failure caused a 6.40-day outage that cost ratepayers $115,312 in contract labor and for material and parts.

(b) Provide, in the next ERRA Compliance filing following the completion of the metallurgy analysis, a copy of the metallurgical report of the failed Unit 3 exhaust valve and its follow-up actions. Cal Advocates may, at a later time, seek a disallowance based on the findings of the metallurgical report.

II. GENERATION FACILITIES

During the 2024 Record Period, PG&E owned, operated, and maintained three fossil-fuel generating stations, one battery energy storage project, and ten ground-mounted photovoltaic (PV) solar stations.[111] In addition, PG&E owns, in San Francisco, two small PV facilities that entered commercial operations in 2007.[112]

[110] A.25-02-013, PG&E Testimony, at 1-1, line 8.

[111] PG&E Testimony, at 3-1, line 12 to 14.

[112] PG&E Testimony, at 3-1, line 14, footnote 1.

Because these PV facilities total less than 180 kilowatt (kW), PG&E did not address them in its Direct Testimony.[113]

The three fossil-fuel generating stations are Gateway Generating Station (Gateway Station), Colusa Generating Station (Colusa Station), and Humboldt Bay Generating Station (Humboldt Station).[114] These three generating facilities have a combined maximum normal operating capacity of 1,400 MWs.[115]

In Commission Resolution E-4949, PG&E received approval to design, permit, construct, and maintain the Elkhorn BESS, a 20 lithium-ion battery installation that delivers 182.5 MWs of power at the Moss Landing Substation in Monterey County.[116] The project began operation on April 7, 2022.[117]

The ten ground-mounted PV generating stations are Cantua, Five Points, Gates, Giffen, Guernsey, Huron, Stroud, Vaca Dixon, West Gates, and Westside Solar Station.[118] In Decision (D.) 10-04-052[119], the Commission approved these facilities that were built as part of the UOG portion of PG&E's five-year solar PV Program.[120]

A. Fossil Facilities

1. Gateway Generating Station

The Gateway Generating Station (Gateway Station), located in Antioch, California,[121] is a 530 MW combined cycle power plant consisting of two General Electric (GE) Frame 7FA combustion turbine (CT)-generators, each with its own Vogt-Net Energy Metering (NEM) heat recovery steam generator (HRSG), and a single GE

[113] PG&E Testimony, at 3-1, line 14, footnote 1.

[114] PG&E Testimony, at 3-1, line 14-16.

[115] PG&E Testimony, at 3-1, line 16-17.

[116] PG&E Testimony, at 3-1, line 18-21.

[117] PG&E Testimony, at 3-1, line 21-22.

[118] PG&E Testimony, at 3-1, line 23-25.

[119] D.10-04-052, *Decision Adopting a Solar Photovoltaic Program for Pacific Gas & Electric Company,* May 28, 2010; issued in A.09-02-019.

[120] PG&E Testimony, at 3-1, line 25-27.

[121] PG&E Testimony, at 6-2, Table 6-1.

steam turbine (ST)-generator.[122] In this standard 2 × 1 configuration (i.e., two CTs and one HRSG), each CT generates power and exhausts directly into its own HRSG where the exhaust heat is captured and generates steam for use in the ST.[123]

2. Colusa Generating Station

The Colusa Generating Station (Colusa Station), located in the town of Maxwell, Colusa County, California,[124] is a 530 MW combined cycle power plant consisting of two GE Frame 7FA CTs, each with its own HRSG, and a single GE ST.[125] In this standard 2 × 1 configuration, each CT generates power and exhausts directly into its own HRSG where the exhaust heat is captured and generates steam for use in the ST.[126]

Additionally, Colusa Station is equipped with a capacity enhancing technology to improve output during peak generation periods.[127] Duct burners are used to increase steam production in the HRSGs resulting in increased ST output.[128] The duct burners allow Colusa Station to increase its output by approximately 127 MW above the 530 MW nominal capacity.[129]

3. Humboldt Bay Generating Station

The Humboldt Generating Station (Humboldt Station), located in the town of Eureka, California,[130] is a 163 MW reciprocating engine power plant consisting of ten

[122] PG&E Testimony, at 3-2, line 3 to 6.

[123] PG&E Testimony, at 3-2, line 6 to 9.

[124] PG&E Testimony, at 6-2, Table 6-1.

[125] PG&E Testimony, at 3-2, line 21 to 22.

[126] PG&E Testimony, at 3-2, line 23 to 25.

[127] PG&E Testimony, at 3-2, line 29 to 31.

[128] PG&E Testimony, at 3-2, line 31 to 32.

[129] PG&E Testimony, at 3-2, line 32 to 3-3, line 2.

[130] PG&E Testimony, at 6-2, Table 6-1.

Wärtsilä 18V50 Dual Fuel, natural gas-fired reciprocating units.[131] The capacity of each engine is 16.27 MW, and each of the ten engines has the same capacity.[132]

Each unit has 18 cylinders, each with a bore of 50 centimeters, and operates at 514 revolutions per minute.[133] Each unit is designed to run on natural gas with one percent of total fuel input provided by low sulfur distillate as the pilot fuel.[134]

The units are also designed to run on low sulfur distillate or biodiesel.[135] There is no change in the 16.27 MW generating capacity when low sulfur distillate/biodiesel is used instead of natural gas.[136] Low sulfur distillate/biodiesel is used in emergency situations when there is a shortage of natural gas.[137] It is also used during annual emission testing.[138] The Commission, in D.06-11-048[139], gave PG&E the authority to use non-natural gas fuel to run Humboldt Station.[140]

Each unit is equipped with a separate independent closed loop cooling system.[141] The emission control is accomplished with Selective Catalytic Reduction.[142]

[131] PG&E Testimony, at 3-3, line 4 to 5.

[132] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 009.

[133] PG&E Testimony, at 3-3, line 6 to 7.

[134] PG&E Testimony, at 3-3, line 7 to 9.

[135] PG&E Testimony, at 3-3, line 9 to 10.

[136] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 012.

[137] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 012.

[138] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 012.

[139] D.06-11-048, *Opinion Approving Results of Long-Term Request for Offers,* December 4, 2006; issued in A.06-04-012.

[140] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 012.

[141] PG&E Testimony, at 3-3, line 10 to 11.

[142] PG&E Testimony, at 3-3, line 11 to 12.

B. Battery Energy Storage Facilities

1. Elkhorn Battery Energy Storage System[143]

The Elkhorn BESS is a lithium-ion battery installation that delivers 182.5 MW of power at the Moss Landing Substation in Monterey County.[144] The project includes the installation of 256 Tesla Megapack battery units on 33 concrete slabs.[145] Each unit houses batteries and associated equipment in a steel cabinet.[146] Transformers and switchgears connect energy stored in the batteries with the 115-kilovolt (kV) transmission system.[147] It has the capacity to store and dispatch up to 730 MWh of energy to the electrical grid at a maximum of 182.5 MW for up to four hours during periods of high demand.[148]

Non-Generating Resources, such as the Elkhorn BESS, are important to the grid due to their flexibility and ability to respond to regulation signals.[149] They have the capability to serve as both generation and load and can be dispatched to any operating level within their entire capacity range.[150] Elkhorn BESS also enhances reliability, without adding new fossil fuel resources to the grid, by addressing capacity deficiencies resulting from local load growth.[151] Elkhorn BESS participates in the CAISO markets, and provides energy and ancillary services, such as serving as an operating reserve that can quickly be dispatched to facilitate sufficient capacity to the CAISO-controlled grid.[152] Elkhorn BESS's ability to serve as a load during the times of the day when prices are highest, and throughout the year, are integral to helping the state integrate

[143] PG&E Testimony, at 3-3.

[144] PG&E Testimony, at 3-3, line 16 to 18.

[145] PG&E Testimony, at 3-3, line 19 to 20.

[146] PG&E Testimony, at 3-3, line 20 to 21.

[147] PG&E Testimony, at 3-3, line 21 to 23.

[148] PG&E Testimony, at 3-3, line 23 to 26.

[149] PG&E Testimony, at 3-3, line 27 to 29.

[150] PG&E Testimony, at 3-3, line 29 to 31.

[151] PG&E Testimony, at 3-3, line 31 to 3-4, line 2.

[152] PG&E Testimony, at 3-4, line 2 to 6.

those renewable resources (e.g. wind and solar) that are intermittent or have a generation profile that does not match with customer demand.[153]

C. Solar Station Facilities[154]

The ten PV facilities are:

1. Cantua Solar Station

The Cantua Solar Station, a 20 MW PV solar station located near Cantua Creek, California, consists of approximately 110,000 solar modules.[155] The station has 32 inverters, 16 transformers that increase the voltage from 320 Volt (V) to 12.47 kV, and an electrical switchgear.[156]

2. Five Points Solar Station

The Five Points Solar Station, a 15 MW PV solar station located near Five Points, California, consists of over 75,000 solar modules.[157] The station has 24 inverters, 12 transformers that increase the voltage from 320 V to 12.47 kV, and an electrical switchgear.[158]

3. Gates Solar Station

The Gates Solar Station, a 20 MW PV solar station located adjacent to the Huron Solar Station near Huron, California, consists of 91,490 solar modules.[159] The station has 28 inverters, 31 transformers that increase the voltage from 420 V to 12.47 kV, and an electrical switchgear.[160]

[153] PG&E Testimony, at 3-3, line 6 to 10.

[154] PG&E Testimony, at 3-4 to 3-6.

[155] PG&E Testimony, at 3-5, line 16 to 18.

[156] PG&E Testimony, at 3-5, line 18 to 21.

[157] PG&E Testimony, at 3-5, line 2 to 4.

[158] PG&E Testimony, at 3-5, line 4 to 7.

[159] PG&E Testimony, at 3-5, line 30 to 32.

[160] PG&E Testimony, at 3-5, line 32 to 3-6, line 2.

4. Giffen Solar Station

The Giffen Solar Station, a 10 MW PV solar station located near Cantua Creek, California, consists of nearly 55,000 solar modules.[161] The station has 16 inverters, 8 transformers that increase the voltage from 320 V to 12.47 kV, and an electrical switchgear.[162]

5. Guernsey Solar Station

The Guernsey Solar Station, a 20 MW PV solar station located near Hanford, California, consists of 89,400 solar modules.[163] The station has 40 inverters, 11 transformers that increase the voltage from 420 V to 12.47 kV, and an electrical switchgear.[164] The PV facility also includes single-axis trackers that move the solar modules to optimize their position with the sun.[165]

6. Huron Solar Station

The Huron Solar Station, a 20 MW PV solar station located near Huron, California, consists of over 90,000 solar modules.[166] The PV facility has 40 inverters, 10 transformers that increase the voltage from 420 V to 12.47 kV, and an electrical switchgear.[167]

7. Stroud Solar Station

The Stroud Solar Station, a 20 MW PV solar station located near Helm, California, consists of 88,000 solar modules.[168] The station has 40 inverters, 20

[161] PG&E Testimony, at 3-5, line 23 to 25.

[162] PG&E Testimony, at 3-5, line 25 to 28.

[163] PG&E Testimony, at 3-6, line 11 to 13.

[164] PG&E Testimony, at 3-6, line 13 to 16.

[165] PG&E Testimony, at 3-6, line 16 to 18.

[166] PG&E Testimony, at 3-5, line 9 to 11.

[167] PG&E Testimony, at 3-5, line 11 to 14.

[168] PG&E Testimony, at 3-4, line 28 to 29.

transformers that increase the voltage from 440 V to 12.47 kV, and an electrical switchgear.[169]

8. Vaca Dixon Solar Station

The Vaca Dixon Solar Station, a 2 MW PV solar station located in Vacaville, California, consists of 9,672 solar modules.[170] The PV facility has five inverters that convert the direct current energy to alternating current; one transformer that increases the voltage from 480 V to 12.47 kV; and other equipment, including a communications enclosure, two weather stations, and an electrical switchgear.[171]

9. West Gates Solar Station

The West Gates Solar Station, a 10 MW PV solar station located near Huron, California, consists of over 45,752 solar modules.[172] The station has 14 inverters, 14 transformers that increase the voltage from 420 V to 12.47 kV, and an electrical switchgear.[173]

10. Westside Solar Station

The Westside Solar Station, a 15 MW PV solar station located near Five Points, California, consists of over 66,000 solar modules.[174] The PV facility's equipment includes 30 inverters, 15 transformers that increase the voltage from 440 V to 12.47 kV, and an electrical switchgear.[175]

[169] PG&E Testimony, at 3-4, line 30 to 33.

[170] PG&E Testimony, at 3-4, line 13 to 15.

[171] PG&E Testimony, at 3-4, line 15 to 19.

[172] PG&E Testimony, at 3-6, line 4 to 6.

[173] PG&E Testimony, at 3-6, line 6 to 9.

[174] PG&E Testimony, at 3-4, line 21 to 23.

[175] PG&E Testimony, at 3-4, line 23 to 26.

III. OUTAGES

A. Battery Energy Storage Facilities

In its testimony, PG&E states that there was no reportable forced outage lasting longer than 24 hours at its Elkhorn BESS for 2024 Record Period.[176]

B. Fossil Facilities

For this year's review, Cal Advocates conducted further analysis and review of one specific forced outage at Humboldt Station.

1. Humboldt Station Unit 3 Outage – August 9, 2023 at 00:49 to August 15, 2024 at 10:29 for 6.40 days (6 days, 9 hours and 30 minutes)[177]

On August 9, 2024, at 00:49, Unit 3 tripped on multiple indications including high gas pressure, high crankcase pressure, and high temperature.[178] After an investigation, it was found that one of the exhaust valves had failed and caused damage to the head, liner, and piston.[179] The head, rocker arm, piston, and connecting rod were replaced, and the unit was tested and returned to service on August 15, 2024, at 10:19.[180]

2. Humboldt Station Characteristics and Operation

Humboldt Station provides base load and ancillary services.[181] During high customer natural gas demand or during unavailability of the gas transmission line feeding the Humboldt area, Humboldt Station natural gas use is curtailed, requiring the facility to transfer to distillate fuel to generate electricity and support local reliability.[182] Likewise, during high customer electrical demand or unavailability of electric

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[176] PG&E Testimony, at 3-25, line 25 to 26.

[177] PG&E Testimony, at 3-23, Table 3-3, at 3-23, line 13 to 20; and Attachment 3.2, PG&E response to Cal Advocates Master Data Request (Data Request 01), Question 1.1.13, Attachment 3.1, Data Request #18, Question 016 and Question 017.

[178] PG&E Testimony, at 3-23, line 13 to 15.

[179] PG&E Testimony, at 3-23, line 15 to 17 and Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 137.

[180] PG&E Testimony, at 3-23, line 17 to 20.

[181] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 003.

[182] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 003.

transmission import capability feeding the Humboldt area, the highly flexible Humboldt Station is available to support the Humboldt area electrical needs (electrical demand and voltage support).[183]

The Commission, in Ordering Paragraph #2 of D.06-11-048[184], granted PG&E's request for a Certificate of Public Convenience and Necessity for the Humboldt Bay Generating Station.

A reciprocating engine works differently than a gas turbine used in a combined-cycle generating unit. Reciprocating engines convert pressure into rotating motion using pistons, while a gas turbine engine uses the pressure from the exploding fuel to turn a turbine.[185] Also, reciprocating engines use the expansion of gases to drive a piston within a cylinder and convert the piston's linear movement to the circular (or rotating) movement of a crankshaft to turn a generator to generate power.[186]

The dual-fuel type reciprocating engines were selected over a gas turbine for the following reasons:[187]

i. Due to the lack of redundancy in the natural gas supply and the risk of natural gas curtailment during cold weather in the area, reciprocating engines can operate solely on low sulfur distillate fuel during emergencies.

ii. The heat rate curve for the dual-fuel type reciprocating engine is relatively flat over the entire load range (0-163 MW). The heat rate for combustion turbines varies greatly with output (higher heat rate at low output).

[183] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 003.

[184] D.06-11-048, at 45.

[185] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 006.

[186] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 008.

[187] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 007.

The 16.27 MW[188] output from each of the ten engines is independently connected (connected in parallel) to a common electrical bus which feeds the 60KV distribution or 115KV transmission lines.[189] So, if one engine is out of service, the other engines can operate to provide power to the grid.[190]

All ten engines were installed in September 2010, and none, to date, have been replaced.[191]

Figure 3-1 Humboldt Station Engine Layout – Schematic View[192]

[188] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 009 and 014.

[189] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 010.

[190] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 010, 129 and 132.

[191] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 014 and 015.

[192] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 004, Attachment "ERRA-2023-PGE-Compliance_DR_CalAdvocates_018-Q004Atch01."

Figure 3-2: Image of Humboldt Station Engine – External View[193]

[193] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 005, Attachment: ERRA-2023-PGE-Compliance_DR_CalAdvocates_018-Q005Atch01.

Figure 3-3: Humboldt Station Engine Layout – Cylinder Heads and Crankcase[194]

Each unit has 18-cylinder heads, which are labeled A1-A9 and B1-B9.[195]

[194] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 013, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q013Atch01", Question 044, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q044Atch01", Question 065, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q065Atch01", Question 094, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q094Atch01", Question 111, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q111Atch01", Question 114, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q114Atch01." Question 117, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q117Atch01" Question 120, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q120Atch01" and Question 123, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q123Atch01"

[195] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 013.

Figure 3-4: Humboldt Station Engine – Cylinder Head[196]

[196] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 013, Attachment "ERRA-2023-PGE-Compliance_DR_CalAdvocates_018-Q013Atch01" and Question 111, Attachment "ERRA-2023-PGE-Compliance_DR_CalAdvocates_018-Q111Atch01."

Figure 3-5: Humboldt Station Engine – Cross-Sectional View of a Cylinder Head with Valves[197]

The functions and descriptions of other activities, parts, personnel, and systems affected and/or referenced in the August 9, 2024, forced outage are as follows:

a) Connecting Rod: a machine part that acts as a link between the piston and crankshaft; its purpose is to convert the linear motion of the piston to the circular motion of the crankshaft.[198] See Figure 3-3, 3-6, and 3-8.

[197] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 111, Attachment "ERRA-2023-PGE-Compliance_DR_CalAdvocates_018-Q111Atch02."

[198] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 123.

Figure 3-6: Humboldt Station Engine – Diagram of a Connecting Rod and Piston[199]

a) Crankcase: the main structural housing of an engine that encloses and protects the crankshaft and connecting rod assembly.[200] It forms the lower portion of the engine block and serves as the foundation for the entire engine structure (see Figure 3-3).[201]

[199] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 123, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q123Atch02", Question 164, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q164Atch04" and Question 171, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q171Atch04."

[200] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 044.

[201] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 044.

There is no high crankcase pressure system.[202] Neither is there a low crankcase pressure system.[203] There is a crankcase, a crankcase pressure sensor, and high crankcase pressure trip that is designed to prevent safety hazards such as fire and/or explosion.[204] The high crankcase pressure trip is activated automatically.[205] Because low pressure in the crankcase is not a safety issue, there is no low crankcase pressure trip.[206]

The crankcase pressure, which is the pressure inside the sealed crankcase housing, is at atmospheric pressure.[207] It is monitored by a crankcase pressure sensor located at the engine.[208] The atmosphere within the crankcase typically consists of air mixed with oil vapor.[209]

There is a high crankcase pressure alarm and a high crankcase pressure trip that is designed to prevent safety hazards such as fire and/or explosion.[210] The crankcase pressure is continuously monitored by the engine control system and overseen in the control room by the power plant technicians.[211]

The Humboldt Station unit is designed to trip at 6 millibar above atmospheric; this is to prevent safety hazards such as fire and/or explosion.[212] The high crankcase pressure alarm is initiated at 3 millibar above atmospheric pressure to alert PG&E technicians.[213] There is no low crankcase pressure alarm.[214]

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[202] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 047, 050 and 058.

[203] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 053 and 058.

[204] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 050, 051 and 053.

[205] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 057.

[206] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 053, 054 and 057.

[207] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 045.

[208] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 049.

[209] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 046, 047 and 051.

[210] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 055.

[211] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 058.

[212] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 048 and 052.

[213] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 056.

[214] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 056.

b) Cylinder: an enclosed engine space chamber where a piston moves back and forth and where gas combustion occurs (see Figure 3-1, 3-2 and 3-4).

The cylinder liner, also referred to as "liner," located in the cylinder, is a component of the engine.[215] Its function is to serve as a durable, replaceable inner wall for the cylinder bore.[216] Figure 3-3 shows the site of the cylinder liner for one of the cylinders, Figure 3-7 shows a cylinder liner (shaded in green) being removed from an engine, and Figure 3-8 shows the location of the cylinder liner in a cross-sectional view of the engine.

[215] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 066 and 114.

[216] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 066 and 114.

Figure 3-7: Humboldt Station Engine – Diagram of a Cylinder Liner Being Removed[217]

[217] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 065, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q065Atch02", Question 114, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q114Atch02", Question 164, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q164Atch02" and Question 171, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q171Atch02."

The type of fluid near the cylinder liner is the gaseous product of combustion.[218] There is also cooling water that flows through passages within the cylinder liner.[219]

The cylinder liner is subject to high temperature.[220] Its temperature is measured by temperature sensors at two locations on each of the 18-cylinder liners.[221] The cylinder liner temperature is continuously monitored by the engine control system and overseen in the control room by power plant technicians.[222]

High temperature at the cylinder liner causes a unit trip to protect personnel from explosion or fire and to protect the engine from damage caused by excessive heat.[223] The high-temperature alarm is set at 266 degrees Fahrenheit (deg F) and the trip is set at 284 deg F.[224] There is no cylinder liner low temperature trip.[225]

c) Cylinder Head[226], or Head: an engine component which sits on top of the engine block and covers the cylinders.[227] See Figure 3-1 to 3-4 for Humboldt Station Engine Layout and Parts.

d) Exhaust Valve: a device that allows the byproducts of combustion to pass out of the engine cylinder to the exhaust manifold.[228] The exhaust valves are located in the cylinder head.[229] See Figure 3-3 for location of the exhaust valve for one of the cylinders.

[218] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 067.

[219] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 067.

[220] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 063 to 065.

[221] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 065 and 070.

[222] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 075.

[223] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 068.

[224] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 069.

[225] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 071.

[226] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 111:
Another appellative for "cylinder head" is "engine head."

[227] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 111.

[228] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 094 and 096 .

[229] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 095.

Figure 3-8: Humboldt Station Engine – Cross-Sectional View Showing Location of Cylinder Liner, Connecting Rod (Con Rod), Exhaust Valve, Manifold and Rocker Arm[230]

[230] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 094, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q094Atch03", Question 114, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q114Atch03", Question 117, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q117Atch03" and Question 120, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q120Atch03" and Question 123, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q123Atch03."

Figure 3-9: Humboldt Station Engine – Cut-Away View Showing the Pistons[231]

[231] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 117, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q117Atch02."

Figure 3-10: Humboldt Station Engine – Exhaust Valve[232]

e) Gas Pressure: refers to the pressure of the natural gas system at Humboldt Station; it is being monitored by a pressure device, a pressure transmitter.[233] There is no high gas pressure system.[234] Nor is there a low gas pressure system.[235]

The function of the pressure monitoring device is to provide the operator with an indication of natural gas system pressure, and to initiate a transfer from natural gas to diesel if the natural gas system pressure is above or below an operating

[232] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 094, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q094Atch02."

[233] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 029 to 031, 034 and 041.

[234] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 029 to 031, 039 and 041.

[235] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 034, 039 and 041.

range.[236] The gas pressure level that initiates a transfer from natural gas to diesel is 7 pounds per square inch (psi) above setpoint.[237] The setpoint is variable depending on the desired output from the unit.[238]

When the natural gas pressure exceeds the safe operating limits, as specified by the original engine manufacturer (OEM), Wärtsilä[239], it initiates a transfer from natural gas to diesel.[240] The high gas pressure transfer scheme is part of a protection mechanism designed by Wärtsilä.[241] Unabated high gas pressure can lead to natural gas system ruptures or leaks and uncontrolled combustion or explosions.[242] Low gas pressure, similarly, can result in a transfer from natural gas to diesel.[243]

When the natural gas pressure is outside the operating range, alarms pertaining to this and other abnormal conditions are sent to the Wärtsilä human machine interface in the control room where a power plant technician continuously monitors the units.[244] Additionally, there are two display units mounted near each engine that have alarm logs on them.[245] High or low pressure in the natural gas system automatically initiates the transfer from natural gas to diesel.[246]

f) Indicator:[247] a device or signal that provides information about the status, condition, or state of a system or piece of equipment. The indicator itself does not cause directly the trip; rather, it is part of a protection system that monitors the

[236] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 030 and 036.

[237] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 033.

[238] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 033.

[239] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 106.

[240] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 032.

[241] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 032.

[242] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 032.

[243] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 035.

[244] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 037, 039 and 128.

[245] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 037.

[246] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 038.

[247] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 028.

condition of the system or equipment and initiates a trip when abnormal conditions are detected.

g) Pilot Fuel: a light fuel oil (LFO) used to ignite the natural gas burned in the engine cylinder.[248] Alternatively, burning natural gas in a diesel engine can be ignited using a spark plug.[249] Each unit is designed to run on natural gas with one percent of total fuel input provided by low sulfur distillate as the pilot fuel.[250] The units are also designed to run on low sulfur distillate fuel or biodiesel.[251]
Operating in dual-fuel mode each engine is required to utilize California Air Resources Board–certified LFO as pilot fuel to ignite the natural gas burned in the cylinder, in this case low-sulfur distillate.[252]

Burning natural gas in the engine requires the use of either a spark plug or a small amount of LFO to ignite the natural gas.[253] The natural gas enters the engine with the combustion air on the intake stroke, and pilot fuel is injected just prior to the pistons reaching top dead center on the compression stroke.[254] The fuel ignites during compression.[255]

The quantity of pilot fuel needed to ignite the gas is extremely small when compared to the amount of natural gas utilized to generate the electricity.[256]

h) Piston:[257] a movable component within the cylinders in a reciprocating engine. It converts the force of an expanding gas, as a result from combustion, into mechanical motion. (See Figure 3-3, 3-6 and 3-9.)

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[248] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 011.

[249] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 011.

[250] PG&E Testimony, at 3-23, line 7 to 9.

[251] PG&E Testimony, at 3-23, line 9 to 10.

[252] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 011.

[253] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 012.

[254] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 012.

[255] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 012.

[256] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 012.

[257] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 117.

i) Rocker Arm:[258] a lever to transfer the rotating motion of the camshaft into the linear motion in order to open and close the intake and exhaust valves. (See Figure 3-3, 3-7 and 3-10.)

Figure 3-11: Diagram of the Rocker Arm[259]

j) Trip:[260] the shutdown of a unit: in the case of the August 9, 2024, Unit 3 incident, the shutdown occurred automatically and immediately.

On August 9, 2024, at 00:49, Unit 3 tripped on multiple indications including high gas pressure, high crankcase pressure, and high temperature.[261]

However, it was a cylinder liner's high temperature that tripped Unit 3.[262] For Humboldt Station, there is a cylinder liner high temperature alarm to alert PG&E of high temperatures.[263] In addition, an automatic control system trip can be activated by

[258] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 120.

[259] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 120, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q120Atch02", Question 164, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q164Atch03" and Question 171, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q171Atch03."

[260] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 027.

[261] PG&E Testimony, at 3-23, line 13 to 15.

[262] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 027, 064, 072, 081, 085 and 092.

[263] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 073.

the cylinder liner's high temperature.[264] There are also other associated alarms, both visible and audible in the control room.[265]

There are dozens of sensors that are associated with various systems, parts, and components that PG&E monitors.[266] Each of the Humboldt units has many sensors that are programmed to cause an automatic unit trip or that alert an operator to initiate a unit shutdown.[267]

For example, the high gas pressure that occurred during the August 9, 2024 outage pertained to that of a Humboldt Station natural gas system whose pressure was monitored by a device for any pressure digression.[268] Just before the outage incident, the natural gas pressure reached 47.85 psi.[269] It was high enough to trigger a visible and audible alarm to the control room.[270] However, high natural gas pressure does not initiate a unit trip.[271]

The August 9, 2024 Unit 3 trip was initiated by the cylinder liner's high temperature.[272] Besides the cylinder liner high temperature alarm, the high natural gas pressure and the high crankcase pressure alarm were triggered as well.[273] Around the time of the Unit 3 trip, there were also other indications whose alarms were initiated to

[264] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 019, 064, 068, 069, 072 and 074.

[265] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 073.

[266] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 089.

[267] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 085 and 087.

[268] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 029.

[269] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 042.

[270] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 042.

[271] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 042.

[272] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 027, 064, 072, 081, 085 and 092.

[273] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 027 and 084.

alert PG&E technicians.[274] In a table provided by PG&E, there were a total of 26 alarms around the time of the trip, though not all were activated simultaneously.[275]

The Unit 3 cylinder B8 exhaust valve D failed.[276] A portion of the exhaust valve broke off.[277] As a result, the valve was no longer able to close properly at the valve seat.[278] The exhaust valve failure caused the crankcase pressure to rise and the cylinder liner to fail due to the high temperature.[279]

Unit 3's B8 cylinder liner began to experience a rapid rise in temperature.[280] The alarm came in at 275 deg F, as designed, with an audible and visible indication in the control room.[281] Unit 3 tripped automatically as intended because of the cylinder liner's high temperature.[282]

The automatic trip initiated at 284 deg F, the set point, and included an audible and visible indication in the control room.[283] The Unit automatically trips when the cylinder liner temperature exceeds the set point.[284] This set point was established by Wärtsilä to protect personnel and to protect the engine from damage caused by excessive heat.[285] No indications or sensors failed at the time of the outage.[286]

[274] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 082, 086 and 092.
[275] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 082 and 083.
[276] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 097 and 137.
[277] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 098, 099 and 100.
[278] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 100.
[279] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 102 and 104 and 105.
[280] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 079.
[281] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 079.
[282] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 079 and 129 to 134.
[283] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 079.
[284] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 069 and 134.
[285] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 068 and 134.
[286] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 133.

An exhaust valve failure does not directly cause a unit trip.[287] When a piece dislodged, the superheated gases that escaped past the failed valve caused thermal shock, localized overheating, and material degradation of the cylinder head.[288] The broken piece of the exhaust valve caused impingement damage to the sides of the cylinder liner, the top of the piston, the connecting rod, the rocker arm, and the cylinder head in multiple locations.[289]

Therefore, an exhaust valve failure affects certain parameters such as crankcase pressure and cylinder liner temperature.[290] It is those other parameters that could cause the unit to automatically trip, not the exhaust valve failure itself.[291]

There is no Instrumentation and Controls (I&C) system that directly monitors the exhaust valves for failure.[292] Consequently, there is no alarm that directly alerts PG&E of an exhaust valve failure.[293] There are sensors that monitor the effect of an exhaust valve failure, viz., the crankcase pressure and the cylinder liner temperature.[294] These sensors may initiate an alarm if the alarm setpoint is exceeded.[295]

At the time of the outage, the crankcase pressure reached a value of 3.117 millibar above atmospheric pressure.[296] This was high enough to trigger an alarm but not high enough to trigger a trip.[297] The power plant technicians were alerted to the high crankcase pressure by an alarm in the control room.[298]

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[287] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 104 and 105.

[288] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 112.

[289] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 112, 115, 118, 121 and 124.

[290] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 104 and 105.

[291] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 104 and 105.

[292] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 102.

[293] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 103.

[294] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 102 and 103.

[295] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 102.

[296] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 061.

[297] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 061.

[298] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 061.

Figure 3-12: Diagram of Exhaust and Inlet Valve and Photo of Failed Exhaust Valve[299]

[299] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 097, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q097Atch01", Question 099, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q099Atch01", Question 100, Question 109, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q109Atch01", Question 113, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q113Atch01", Question 140, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q140Atch01", Question 164, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q164Atch01", and Question 171, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q171Atch01."

Figure 3-13: Photo Showing the Inlet and the Exhaust Undamaged Valve, Newly In Situ[300]

[300] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 109, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q109Atch02", Question 113, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q113Atch02" and Question 140, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q140Atch02."

Figure 3-14: Photo Showing the Damaged Cylinder Liner After Removal from the Engine in Unit 3[301]

[301] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 116, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q116Atch01."

Figure 3-15: Photo Showing an Undamaged Piston[302]

[302] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 119, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q119Atch02."

Figure 3-16: Photo Showing the Damaged Piston in Unit 3[303]

[303] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 119, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q119Atch01", Question 164, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q164Atch05" and Question 171, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q171Atch05."

Figure 3-17: Photo Showing the Rocker Arm Damaged Contact Surface[304]

Wärtsilä supplies all parts for the engines, including the exhaust valves.[305] Unit 3's cylinder head was refurbished, and the exhaust valves were replaced by Wärtsilä during the last 36,000 engine operating hour outage that occurred during the 2023 Record Period (January 1, 2023 to December 31, 2023).[306]

The previous hour-based maintenance outage for Unit 3 was the 34,000-hour maintenance outage that started on November 15, 2021 at 06:00 and ended on

[304] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 164, Attachment "ERRA-2024-PGE-Compliance_DR_CalAdvocates_018-Q164Atch01."

[305] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 147.

[306] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 147.

November 19, 2021 at 09:00.[307] The Unit 3 exhaust valve was not replaced during that 34,000-hour maintenance outage.[308]

The Unit 3 36,000 hour planned maintenance planned outage during the 2023 Record Period was from January 17, 2023 at 06:00 to April 6, 2023 at 21:20.[309] And the outage happened on August 9, 2024.[310] Therefore, the new exhaust valve that was replaced during the 2023 Record Period lasted approximately 16 months or 491 days (from April 6, 2023, the last day of the planned outage, to August 9, 2024, the outage incident date).[311]

PG&E did not provide the depreciation life of the exhaust valve in its data request response,[312] but it appears that the failure of the exhaust valve after an approximate year in service is short and premature.

A root cause evaluation was not completed for this outage.[313] Upon removal of the cylinder head, PG&E established that the cause of the forced outage was obviously due to the failed exhaust valve.[314] PG&E could not determine any obvious contributing factors for the cause of the valve failure.[315]

PG&E is also unsure of the exact cause of the Unit 3 exhaust valve failure.[316] It did not offer any explanation as to why the valve failed and why the valve's period in service was short and premature.

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[307] Attachment 3.3, PG&E response to Cal Advocates Data Request 24, Question 002.

[308] Attachment 3.3, PG&E response to Cal Advocates Data Request 24, Question 002.

[309] Attachment 3.3, PG&E response to Cal Advocates Data Request 24, Question 002.

[310] PG&E Testimony, at 3-23, Table 3-3, at 3-23, line 13 to 20; Attachment 3.2, PG&E response to Cal Advocates Master Data Request (Data Request 01), Question 1.1.13, Attachment 3.1, Data Request #18, Question 016 and Question 017.

[311] Attachment 3.3, PG&E response to Cal Advocates Data Request 24, Question 002.

[312] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 150.

[313] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 101 and 136.

[314] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 101 and 136.

[315] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 098 and 138.

[316] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 143.

No emission violations occurred as a result of the exhaust valve failure.[317] Humboldt Station complies with its Title V Permit number NCU 059-12 (Federal Operating & District Permit to Operate) issued by the North Coast Unified Air Quality Management District.[318]

Humboldt Station was not totally shut down; even though Unit 3 was out of service, the other nine units were available.[319]

3. North American Electric Reliability Corporation Classification and Generation Availability Data System Cause Code

The Generation Availability Data System (GADS) is North American Electric Reliability Corporation's (NERC's) official reporting system for collecting information about the performance of electric generating equipment.[320] The requirement to report NERC event types and NERC cause codes is specified in the NERC GADS Data Reporting Instructions.[321] As of January 1, 2013, GADS reporting became mandatory for conventional generating units that are 20 MW and larger.[322]

According to PG&E, the August 9, 2023 Unit 3 forced outage event was classified as a NERC Event Type U1.[323] A U1 outage is an immediate unplanned or forced outage that requires immediate removal of the unit from service, another outage state, or a reserve shutdown state.[324] PG&E used NERC Event Type U1 classification

[317] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 157.

[318] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 156.

[319] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 010, 129 and 132.

[320] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 018.

[321] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 024 and 026.

[322] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 024.

[323] Attachment 3.2, PG&E response to Cal Advocates PG&E response to Cal Advocates Master Data Request 01, Question 1.1.13, and Attachment 3.1, Data Request 18, Question 019.

[324] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 019.

for this outage because Unit 3 tripped offline on high cylinder liner temperature: a high cylinder liner temperature is an automatic control system trip.[325]

PG&E classified this outage with Cause Code 5710, described as "cylinders," even though the outage was caused by the failure of the exhaust valve.[326] PG&E explains that the GADS Data Reporting Instructions, Appendix B11: Index To Internal Combustion/Reciprocating Engine Unit Cause Codes, provides a list of available Cause Codes from which to choose.[327] PG&E has chosen what it deemed as the appropriate Cause Code for this outage since the exact cause had not yet been determined when the Cause Code was initially assigned.[328] PG&E, in its Cal Advocates Data Request responses, did not state what the appropriate Cause Code number should be, or explained whether it provided, in its report to NERC, a different Cause Code number to reflect the appropriate cause of failure.[329]

There are two Event Types that are reported in GADS: Inactive and Active.[330] The Inactive Event Type includes Inactive Reserve, Mothballed, and Retired.[331] The Active Event type includes U1, U2, U3, SF, D1, D2, D3, D4, DM, PD, DM, MO, ME, PO and PE: the NERC GADS Data Reporting Instructions at https://www.nerc.com/pa/RAPA/gads/Pages/Data%20Reporting%20Instructions.aspx provide a description of those Event Types.[332]

The August 9, 2024 Humboldt Station Unit 3 outage was a U1 Active Event.[333]

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[325] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 019.

[326] Attachment 3.2, PG&E response to Cal Advocates PG&E response to Cal Advocates Master Data Request 01, Question 1.1.13, and Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 020 and 021.

[327] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 020 and 021.

[328] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 020 and 021.

[329] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 020 and 021.

[330] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 022.

[331] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 022.

[332] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 022.

[333] Attachment 3.2, PG&E response to Cal Advocates Master Data Request 001, Question 1.1.13, and Attachment 3.1, Data Request 18, Question 018 and 019.

PG&E reports the NERC Event Types and GADS Cause Codes each quarter to NERC, consistent with the NERC GADS Data Reporting Instructions.[334] PG&E also provides this information to the CPUC and various parties in PG&E's CPUC proceedings upon request.[335]

Besides NERC, PG&E has not submitted any required reports regarding the Unit 3 August 9, 2024 forced outage to government/regulatory agencies.[336] PG&E is not aware of any reports submitted by any government/regulatory agencies regarding the Unit 3 August 9, 2024 forced outage.[337]

PG&E was not cited by any various government/regulatory agencies for this August 9, 2024 incident.[338]

4. Outage Duration

The August 9, 2024 outage lasted 6 days, 9 hours, and 30 minutes, or 6.40 days.[339] PG&E and its contractor, Stephens Mechanical[340,341], provided the following major events to account for the outage time:[342]

a. August 9, 2024 - Outage Starts at 00:49, the time of the Unit 3 trip.

b. August 10, 2024 – While the unit cooled down, PG&E removed lube oil and coolant from Unit 3 in preparation for disassembly. PG&E implemented the Lockout Tagout

[334] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 023 and 024.

[335] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 023 and 025.

[336] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 158.

[337] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 159.

[338] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 160.

[339] PG&E Testimony, at 3-23, Table 3-3, at 3-23, line 13 to 20; and Attachment 3.2, PG&E response to Cal Advocates Master Data Request (Data Request 01), Question 1.1.13, and Attachment 3.1, Data Request #18, Question 016 and Question 017.

[340] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 127 and 161: Stephens Mechanical, 497 Edison Court, Suite D Fairfield, CA 94534.

[341] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 163: PG&E selected Stephens Mechanical as the contractor based on their expertise on reciprocating engines and several years of past performance at Humboldt Station.

[342] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 126 and 170.

(LOTO) procedure to assure the unit was safe to begin disassembly.

c. August 11, 2024 - PG&E began engine disassembly. PG&E removed the B8 cylinder head and found the broken exhaust valve.

d. August 12, 2024 –Stephens Mechanical, mobilized on site, performed LOTO walkdown and signed on to LOTO. Stephens Mechanical continued disassembly that PG&E started on 8/11/24 and removed, from cylinder B8, the piston, rod assembly, and cylinder liner. Stephens Mechanical inspected and honed the replacement liner. Stephens Mechanical cleaned the engine block and liner and installed the liner with new O-rings.

e. August 13, 2024 - Stephens Mechanical completed a PG&E safe work permit (SWP) and conducted daily tailboard. Stephens Mechanical performed the following work:

i. disassembled and inspected connecting (con) rod bearing and gudgeon pin;

ii. measured for reassembly with new piston;

iii. assembled and installed piston assembly for B8 cylinder;

iv. disassembled, cleaned, and reassembled two more high temperature (HT) water pipes for leak repair;

v. torqued connecting rod to the big end bearing;

vi. polished gudgeon pin because it showed wear, and then it had to be reinstalled;

vii. installed new start air valve and injector on the replacement cylinder head; and

viii. installed cylinder head and made necessary connections.

f. August 14, 2024 - Stephens Mechanical completed PG&E SWP and conducted daily tailboard. Stephens Mechanical performed the following work: Completed fuel lines for B8 cylinder. Cleaned and assembled HT water pipes for cylinder B8. Removed and replaced rocker arm contact surfaces on exhaust rocker arm. Install new pushrod for exhaust and reused intake pushrod. Installed and torqued rocker arm and assembled lower valve cover. Removed water LOTO and

checked for leaks upon filling. No leaks detected. Sump cleaned out and close out completed with PG&E.

g. August 15, 2024 - Stephens Mechanical completed PG&E SWP and conducted a daily tailboard. Stephens Mechanical performed a valve lash adjustment on cylinder B8 and the upper valve cover was assembled. Stephens Mechanical performed oil checks for the B8 cylinder in preparation for unit start-up. Stephens Mechanical replaced the beautification covers and wiped down the engine once it was returned to service.

h. August 15, 2024, at 10:19 - Outage ends when the breaker closed. PG&E performed run-in test.

In its data request response, PG&E provided a copy of Stephens Mechanical's daily work log documenting their above work.[343]

In addition, PG&E stated that it was able to minimize the outage time because parts were available in inventory and to further reduce engine outage downtime by having staff work overtime.[344] Also, to expedite the repairs, PG&E began the equipment disassembly before Stephens Mechanical was mobilized to the site.[345]

Cal Advocates accepts PG&E's above explanation for the amount of time spent to restore the Unit 3 outage.

5. Post Mortem and Corrective Actions

PG&E contracted with its consultant, Stephens Mechanical, to finish disassembling the engine, replace the failed and damaged parts, and reassemble the engine.[346] The contractor performed the repair and corrective work with PG&E oversight.[347]

[343] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 164 and 175.

[344] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 170.

[345] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 170.

[346] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 154.

[347] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 126, 135 and 162.

PG&E explained its corrective actions to restore Unit 3 back to service, as well as its operational and preventive program.

1) The parts/items that were replaced during the shutdown to restore Humboldt Station Unit 3 back to service were:[348]
   a. the failed exhaust valve was replaced; and
   b. the head, liner, rocker arm, piston, and connecting rod were replaced as a result of the damage caused by the failed exhaust valve.

   The piece of the exhaust valve that broke off caused damage to the piston due to impingement.[349] Since the piston is connected to the connecting rod, PG&E determined that the resulting damage might have also affected the connecting rod.[350] Therefore, PG&E determined it would be prudent to replace both the piston and the connecting rod.[351]

2) The tests/inspections performed by PG&E and Stephens Mechanical at the conclusion of the repair to assure that the work was done correctly were:
   a. Stephens Mechanical performed exhaust and inlet valve clearance checks/adjustments that occurred after the unit was hot prior to return to service;[352]
   b. PG&E performed periodic inspections during the disassembly, repair, and reassembly process that was performed by Stephens Mechanical.[353] PG&E also conducted a run-in procedure activities that began when the forced outage ended;[354] and
   c. PG&E conducted a run-in procedure that began when the forced outage ended.[355]

3) Corrective/inspection/cleaning activities:

[348] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 164 and 171.

[349] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 124.

[350] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 124.

[351] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 124.

[352] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 127, 135, 168 and 175.

[353] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 127, 135, 168 and 175.

[354] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 135, 168 and 175.

[355] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 127 and 135.

a. All failed and damaged parts were recycled.[356]

4) Routine preventive maintenance operation of exhaust valve:

For each of the ten engines at Humboldt Station, PG&E follows the inspection recommendation from Wärtsilä for the frequency of exhaust valve inspections and maintenance.[357]

a. PG&E follows the inspection recommendation from Wärtsilä for the frequency of exhaust valve inspections and maintenance.[358] That frequency is every 2,000 engine operating hours for certain inspections and every 18,000 engine operating hours for a more thorough inspection and refurbishment/replacement.[359]

PG&E provided records that show it performed, prior to this trip, its Unit 3's Wärtsilä-recommended inspections and maintenance activities for the last three Record Periods.[360] PG&E did not find any nonconformances related to the exhaust valve.[361]

b. PG&E had a Unit 3, 42,000-hour maintenance outage scheduled for July 2025.[362] During this outage, the exhaust valve clearances should have been checked as recommended every 2,000 engine operating hours by Wärtsilä.[363] After that, Unit 4 will be the next unit scheduled for an 18,000 engine-hour inspection in the near future.[364]

5) Corrective/inspection/cleaning activities for natural gas pressure:

a. The natural gas system pressure is continuously monitored by the engine control system and overseen in the control room by power plant technicians.[365] PG&E performs inspections of natural gas pressure sensors in accordance with Wärtsilä's recommended

[356] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 155.

[357] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 176.

[358] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 106, 107, 139, 141 and 169.

[359] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 106, 107, 139, 141, 169 and 176.

[360] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 107.

[361] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 108 and 110.

[362] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 139.

[363] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 139.

[364] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 141.

[365] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 039.

maintenance schedule, which recommends sensor inspections and maintenance every 8,000 engine operating hours.[366] Prior to this trip, PG&E last performed the Wärtsilä recommended inspections and maintenance natural gas system pressure activities on Unit 3 during its June 24, 2024, 40,000 hour scheduled outage.[367] The previous natural gas pressure sensor inspections happened during the 32,000 hour scheduled outage, and it occurred earlier than the last three Record Periods.[368]

b. The natural gas system is monitored by a pressure device.[369] PG&E did not find any issues with its natural gas system pressure monitoring device in past inspections.[370] Prior maintenance inspections did not show any problem with the natural gas pressure indication.[371] As a matter of fact, the indication performed as expected in this situation during the August 9, 2024 outage.[372]

6) Routine preventive maintenance operation of crankcase pressure:

a. The crankcase pressure is continuously monitored by the engine control system and overseen in the control room by the power plant technicians.[373] PG&E performs inspections of pressure sensors in accordance with Wärtsilä's recommended maintenance schedule, which recommends sensor inspections and maintenance every 8,000 engine operating hours.[374] Prior to this trip, PG&E last performed the Wärtsilä recommended crankcase pressure inspections and maintenance activities on Unit 3 during its June 24, 2024, 40,000 hour scheduled outage.[375] The previous crankcase pressure sensor inspections happened during the 32,000 hour scheduled outage, and it occurred earlier than the last three Record Periods.[376]

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[366] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 039 and 040.

[367] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 039 and 040.

[368] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 040.

[369] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 041.

[370] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 041.

[371] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 043 and 093.

[372] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 043.

[373] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 058.

[374] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 058 and 059.

[375] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 058 and 059.

[376] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 059.

b. PG&E's prior maintenance inspections did not disclose any problems.[377] There was no problem with the crankcase pressure indication; it performed as expected in this situation.[378]

7) Routine preventive maintenance operation of cylinder liner temperature:

a. The cylinder liner temperature is continuously monitored by the engine control system and overseen in the control room by power plant technicians.[379] PG&E performs inspections of the cylinder liner and temperature sensors in accordance with Wärtsilä's recommended maintenance schedule, which recommends cylinder liner inspections every 18,000 engine operating hours.[380] Prior to this trip, PG&E last performed the Wärtsilä recommended cylinder liner inspections and maintenance activities on Unit 3 during its June 24, 2024, 40,000 hour scheduled outage.[381]

b. PG&E performs inspections of cylinder liner temperature sensors in accordance with Wärtsilä's recommended maintenance schedule, which recommends sensor inspections and maintenance every 8,000 engine operating hours.[382] The previous sensor inspections were performed during the 32,000-hour scheduled outage, which happened earlier than the last three Record Periods.[383] These previous sensor inspections occurred before Unit 3's 40,000 hour scheduled outage on June 24, 2024, when PG&E performed Wärtsilä-recommended inspections and maintenance activities.[384]

c. PG&E's prior maintenance inspections of the temperature sensors and cylinder liner did not disclose any problems.[385]

[377] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 060.

[378] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 062.

[379] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 075.

[380] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 075 and 077.

[381] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 075 and 077.

[382] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 077, 088 and 090.

[383] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 077 and 090.

[384] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 077, 088 and 090.

[385] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 078, 080 and 093.

PG&E states that all failed parts were "replaced or rebuilt."[386] All corrective work was approved by the local plant management at Humboldt Sation with Wärtsilä, providing guidance for the repair.[387] The parts installed during the repair were identical to the original design specifications.[388]

Wärtsilä did not recommend any additional preventative recurring maintenance.[389] PG&E will continue to conduct inspections and hour-based maintenance as prescribed in the OEM Operations & Maintenance manual.[390]

A root cause evaluation was not completed for this outage.[391] Upon removal of the cylinder head, PG&E established that the cause of the forced outage was obviously due to the failed exhaust valve.[392] PG&E could not determine any obvious contributing factors for the cause of the valve failure.[393]

PG&E is also unsure of the exact cause of the Unit 3 exhaust valve failure.[394] It did not offer any explanation as to why the valve failed and why the valve's period in service was short and premature. PG&E did not state, in its Testimony and data request responses, whether it planned to hire a metallurgist consultant or a subject matter expert to examine the cause of the exhaust valve's premature failure.

PG&E did not explain why the premature failure of the exhaust valve does not warrant further technical evaluation.[395] The August 9, 2024, 9.23-day outage cost ratepayers $115,312 ($32,423 for Contract Labor and $82,889 for Material and

[386] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 164 and 171.

[387] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 165, 166, 172 and 173.

[388] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 167 and 174.

[389] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 177.

[390] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 177.

[391] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 101 and 136.

[392] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 101 and 136.

[393] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 098 and 138.

[394] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 143.

[395] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 110.

Parts),[396] and PG&E has not indicated, in its testimony or data request responses, that it intends to pursue the effort of valve failure analysis to ensure that such failure does not recur.

6. Premature Failure of the Exhaust Valve

A root cause evaluation was not completed for this outage.[397] Upon removal of the cylinder head, PG&E established that the cause of the forced outage was obviously due to the failed exhaust valve.[398] PG&E could not determine any obvious contributing factors for the cause of the valve failure.[399]

In PG&E's fossil portfolio, there was another similar type of outage previously: Humboldt Station Unit 9 experienced an exhaust valve failure in 2022.[400] The Unit 9 exhaust valve that failed was in service from July 14, 2022 to September 1, 2022; it was in service for approximately 48 days.[401]

According to PG&E, the investigation into the failure of the 2022 Unit 9 exhaust valve failure was inconclusive.[402] A third-party vendor, [redacted][403], performed the inspection and valve failure analysis, and the results confirmed that there were valve fatigue cracks.[404]

[redacted], the cause of the valve fatigue, according to PG&E, was inconclusive.[405] [redacted]

[396] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 152.

[397] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 101 and 136.

[398] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 101 and 136.

[399] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 098 and 138.

[400] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 142.

[401] Attachment 3.4, PG&E response to Cal Advocates Data Request 24, Question 001.

[402] PG&E response to Cal Advocates Data Request 18, Question 143 and Attachment 3.4, Data Request 24, Question 001.

[403] Attachment 3.5, PG&E response to Cal Advocates Data Request 24, Question 001 Atch 01 CONF.

[404] Attachment 3.4, PG&E response to Cal Advocates Data Request 24, Question 001.

[405] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 143 and Attachment 3.4, Data Request 24, Question 001.

[redacted] why the valve fatigue happened after 48 days in service.[406] According to PG&E, the possible contributing causes to the fatigue included improper installation, misalignment, valve seat sealing and/or valve rotation issues; however, none of these were determined conclusively to be the cause.[407]

PG&E is also unsure of the exact cause of the Unit 3 August 9, 2024 exhaust valve failure.[408] It did not offer any explanation as to why the valve failed and why the valve's period in service was short and premature.[409] This Unit 3 exhaust valve previously replaced during the 2023 Record Period lasted approximately 16 months or 491 days (from April 6, 2023, the end of the 36,000 engine operating hour planned outage, to August 9, 2024, the outage incident date).[410]

There was no mention as to whether it performed any investigation, similar to the previous incident in 2022, or what led PG&E to make the determination of uncertainty for this August 9, 2024 valve failure.[411]

Over the 14 years that Humboldt Station has been in service, PG&E has experienced only the two aforementioned exhaust valve failures.[412] There are 360 total exhaust valves that have operated nearly 400,000 engine operating hours.[413] The exhaust valve failure rate per operating hour is 0.0000014%.[414]

PG&E, considering the extremely low exhaust valve failure rate of 0.0000014%, reasoned that the inspection of the failed Unit 3 exhaust valve did not lead PG&E to

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[406] Attachment 3.4, PG&E response to Cal Advocates Data Request 24, Question 001.

[407] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 143 and Attachment 3.4, Data Request 24, Question 001.

[408] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 143.

[409] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 143.

[410] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 148 and Attachment 3.3, Data Request 24, Question 002.

[411] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 143.

[412] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 143.

[413] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 143.

[414] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 143.

believe that a valve analysis, similar to what was done for Unit 9, was warranted.[415] In addition, PG&E did not offer any technical justification for not performing any analysis for this Unit 3 failure.[416] Also, In light of the fact that the cause of Unit 9's valve failure was deemed inconclusive[417] and PG&E is unsure[418] of Unit 3's failure, it seems untenable for PG&E not to perform a valve failure analysis and root cause evaluation.

Given that this is the second incident of exhaust valve failures in two years, it would be prudent for PG&E to hire a metallurgist consultant or a subject matter expert to examine the cause of the exhaust valve's premature failure and to prepare a root cause evaluation report to determine the valve failure to prevent its recurrence. After all, the two valves failed within a short period of time: 48 days for Unit 9 and 16 months for Unit 3.

The next exhaust valve failure could cost more for ratepayers because it may incur substantial replacement power costs.

7. Cost of Outage

The cost of the outage consists of two components: the cost of energy purchased to replace the unavailable generation facility and the cost of the repair work at Humboldt Station Unit 3 Outage on August 9, 2024. Unit 3 was unable to generate any power during this exhaust valve failure outage.[419] However, the other Humboldt Bay Generating Station units that were available were able to generate power.

PG&E indicated that the replacement energy cost for this outage was negative $8,290.13.[420] This negative cost is due to the buyback of DA awards in the RT market

[415] Attachment 3.3, PG&E response to Cal Advocates Data Request 24, Question 002.

[416] Attachment 3.3, PG&E response to Cal Advocates Data Request 24, Question 002.

[417] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 143 and Attachment 3.4, Data Request 24, Question 001.

[418] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 143.

[419] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 145.

[420] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 145.

during the initial 24-hours of the outage.[421] For the remainder of the outage period, the available engine capacity exceeded the market awards for the site.[422] Because of this, PG&E has determined that the outage resulted in having no replacement cost impact.[423]

For the repair work, the material and contract cost to perform the inspection and repairs, including part costs, was approximately $115,312 ($32,423 for Contract Labor and $82,889 for Material and Parts).[424] This cost does not include PG&E labor.[425]

The repair was performed using funds collected in customer rates approved by the CPUC in D.23-11-069[426], the decision in PG&E's 2023 General Rate Case.[427] The operation and maintenance costs and capital costs for PG&E's utility owned generation, among other things, are recovered in rates established in PG&E's General Rate Case.[428]

PG&E did not pursue compensation (equipment and replacement power cost) for the outage from the manufacturer or other vendors.[429] There was no active warranty on the equipment in question at the time of the exhaust valve failure.[430]

Wärtsilä supplies all parts for the engines, including the exhaust valves.[431] Unit 3's cylinder head was refurbished, and the exhaust valves were replaced by Wärtsilä on April 6, 2023 during the last 36,000 engine operating hour planned outage.[432] So the new exhaust valve replaced during the 2023 Record Period lasted approximately 16

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[421] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 145.

[422] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 145.

[423] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 145.

[424] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 152.

[425] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 126.

[426] D.23-11-069, *Decision on Test Year 2023 General Rate Case for Pacific Gas and Electric Company;* issued in A.21-06-021.

[427] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 151 to 153.

[428] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 151 to 153.

[429] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 146 and 149.

[430] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 146 and 149.

[431] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 147.

[432] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 147 and Attachment 3.3, Data Request 24, Question 002.

months or 491 days (from April 6, 2023, the last day of the planned outage, to August 9, 2024, the outage incident date).[433] However, the warranty period for the Unit 3 36,000 hour head rebuild and valve replacement work that was performed by Wärtsilä was for 6 months.[434] This warranty ended on October 6, 2023 before the Unit 3 exhaust valve failed.[435]

PG&E did not provide the depreciation life of the exhaust valve in its data request response,[436] but it appears that the failure of the exhaust valve after 16 months in service in service is short, and that PG&E should have sought compensation from Wärtsilä,

The total cost of the August 9, 2024 Unit 3 outage was $115,312 in contract labor and for material and parts; there was no replacement power cost for this incident. The next exhaust valve failure could cost more for ratepayers if it incurs higher replacement power costs.

IV. CONCLUSIONS AND RECOMMENDATIONS

After reviewing PG&E's testimony and responses to data requests, Cal Advocates recommends the Commission order PG&E to:

(a) Hire an outside consultant, such as a metallurgist, to determine the cause of the premature failure of the exhaust valve at Humboldt Station Unit 3 on August 9, 2024 and to prepare a root cause evaluation report. This was the second time in two years that an exhaust valve failed at Humboldt Station. The exhaust valve in the August 9, 2024 outage was only in service for approximately a year when it failed, and the failure caused a 6.40-day outage that cost ratepayers $115,312 in contract labor and for material and parts.

(b) Provide, in the next ERRA Compliance filing following the completion of the metallurgy analysis, a copy of the

[433] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 148, and Attachment 3.1, Data Request 24, Question 002.

[434] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 148.

[435] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 148 and Attachment 3.3, Data Request 24, Question 002.

[436] Attachment 3.1, PG&E response to Cal Advocates Data Request 18, Question 150.

metallurgical report of the failed Unit 3 exhaust valve and its follow-up actions. Cal Advocates may, at a later time, seek a disallowance based on the findings of the metallurgical report.

CHAPTER 4 : CONTRACT ADMINISTRATION

(Witness**:** Stanley Kuan)

I. INTRODUCTION AND SUMMARY

This chapter presents Cal Advocates' review PG&E's contract administration activities during the 2024 Record Period. Cal Advocates examined PG&E's administration of its energy and capacity procurement contracts. The purpose of Cal Advocates' analysis in this chapter is to evaluate whether the utility prudently administered its contracts for the benefit of ratepayers and under the guidance set forth by the Commission.

II. BACKGROUND

The ERRA Compliance proceeding requires that each IOU is assessed on an annual basis for compliance regarding their energy resource contract administration. Decision (D.) 02-10-062 outlines the minimum standards of conduct that the IOUs shall follow in their ERRA Compliance applications, including SOC 4, which states that "the utilities shall prudently administer all contracts and generation resources and dispatch the energy in a least-cost manner."[437] These standards are upheld by a "regulatory process to verify and ensure that each contract was administered in accordance with the terms of the contract, and contract disputes that may arise are reasonably resolved."[438] The ERRA framework provides the IOUs with "flexibility in transacting for energy to meet their obligation to serve their customers so that the utilities can take advantage of market opportunities that result in the low and stable prices."[439]

[437] D.02-10-062 at 74.

[438] Pub. Util. Code Section 454.5(d)(2).

[439] D.02-10-062 at 2.

III. DISCUSSION

A. New Contracts and Contracts Beginning Delivery

PG&E executed 157 energy, capacity, renewable energy sales, and GHG-free energy sales contracts during the Record Period.[440] Of the 157 executed contracts, 92 were RA; 28 were GHG-free Energy sales; 14 were for RPS Energy REC sales or RPS contracts resulting from the Mid-Term Reliability (MTR) Requests for Offers (RFO); and 23 were for Edison Electric Institute (EEI) Master, Energy Storage from the MTR RFO, Renewable Market Adjusting Tariff (ReMAT), or Bioenergy Market Adjustment Tariff (BioMAT) contracts.[441] PG&E also had 110 contracts that began delivery or achieved commercial operation during the Record Period totaling 6,759.90 MW.[442] In total, PG&E managed or settled 529 contracts during the Record Period, resulting in net energy deliveries of 11,046 gigawatt-hours (GWh) (17,262 GWh energy purchased and 6,216 GWh energy credits sold).[443] The net payments of energy, RA, and RECs totaled $1.97 billion.[444]

B. Contract Amendments and Modifications

PG&E executed 48 contract amendments during the Record Period. PG&E requests the Commission approve four of the contract amendments in its 2024 ERRA Compliance application, while all other amendments and transactions entered into during the 2024 Record Period that were not considered routine and/or administrative were submitted to the Commission for review and approval through separate advice letters or applications.[445] Cal Advocates reviewed PG&E's contract amendments to determine PG&E met the following criteria:

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[440] A.25-02-013, PG&E Testimony at 9-14, Table 9-1.

[441] PG&E Testimony at 9-14, Table 9-1.

[442] PG&E Testimony at 9-15, Table 9-2.

[443] PG&E Testimony at 9-1.

[444] PG&E Testimony at 9-2. The total includes $2.41 billion in purchase costs of energy and RA, and $444.47 million in sales revenues of RA, RECs and Voluntary Allocation and Market Offers Energy Credits.

[445] PG&E Testimony at 9-21.

- Did PG&E adequately justify the rationale for the contract amendment?
- Is the contract amendment necessitated by operational needs?
- Is the contract amendment in the best interest of PG&E ratepayers?
- What is the actual or notional value of the contract amendment?
- How is the actual and/or notional value of the amendment accounted for in PG&E's expense and/or revenue account?

The four contract amendments PG&E requests approval for are summarized below:

1. Solar Alpine LLC, Agua Caliente Solar, LLC, and Daggett Solar Power 2 LLC; Alpine Solar Project, Agua Caliente Solar Project, and Daggett 2 BESS Project (PG&E Log Nos. 33R078, 33R084, and 40S022)

PG&E requests Commission review and approval of three amendments related to: a 1) Power Purchase and Sale Agreement (PPA) with Solar Alpine LLC; 2) PPA with Agua Caliente Solar, LLC; and 3) Long-Term Resource Adequacy Agreement (LTRAA) with Daggett Solar Power 2 LLC. Although each of these contracts involves a different counterparty name, the projects associated with the contracts are owned by the same parent company, Clearway Energy.[446]

[redacted]

[446] PG&E Testimony at 9-21.

[redacted][447]

[redacted]

[redacted][448]

[redacted][449]

[redacted]

[447] PG&E Testimony at 9-21.

[448] Attachment 4.1, ERRA-2024-PGE-Compliance_DR_CalAdvocates_MDR001-Q039CONF

[449] PG&E Testimony at 9-22.

[redacted][450]

Cal Advocates finds these amendments to be reasonable and favorable to ratepayers.

2. Poblano Energy Storage, LLC; Inland Empire Energy Storage Project (PG&E Log No. 40S033)

Poblano Energy Storage, LLC (Poblano) and PG&E executed an LTRAA with Energy Settlement resulting from the MTR RFO Phase 1[451] on December 20, 2021. Poblano Energy Storage is a 50 MW battery storage project contracted with PG&E for energy with RA.[452] [redacted][453] [redacted][454] [redacted][455]

[450] PG&E Testimony at 9-22.

[451] Pursuant to D.21-06-035, *Decision Requiring Procurement to Address Mid-Term Reliability (2023-2026)*, June 30, 2021, issued in R.20-05-003, PG&E was directed to issue an MTR RFO to procure capacity resources.

[452] Attachment 4.1, ERRA-2024-PGE-Compliance_DR_CalAdvocates_MDR001-Q039CONF

[453] PG&E Testimony at 9-22.

[454] Attachment 4.2, ERRA-2024-PGE-Compliance_DR_CalAdvocates_013-Q002CONF at 1.

[455] The Energy Settlement serves as a financial hedge against the CAISO DA Market by reducing PG&E's monthly capacity payment to the resource. This reduction is calculated based on the simulated market revenue that could be earned from one full cycle of charging and discharging the battery each day. While PG&E does not receive physical energy under the LTRAA, it receives the Energy Settlement. See ERRA-2024-PGE-Compliance_DR_CalAdvocates_013-Q002CONF, part b at 2.

[redacted][456] [redacted]

[redacted][457]

[redacted].[458]

[redacted]

[redacted]

[redacted].[459]

Cal Advocates finds these amendments to be reasonable and favorable to ratepayers.

C. Expired and Terminated Contracts

There were 110 contracts that expired and 7 contracts that were terminated during the Record Period.[460] PG&E collected termination payments and liquidated damages in the amount of $55,527,035.50 during the Record Period from the projects that did not meet their performance obligations, including missed milestones and Guaranteed Energy Production (GEP).[461] Cal Advocates does not oppose PG&E's conduct in the termination of contracts in this Record Period.

[456] Attachment 4.2, ERRA-2024-PGE-Compliance_DR_CalAdvocates_013-Q002CONF, part a at 1.

[457] Attachment 4.2, ERRA-2024-PGE-Compliance_DR_CalAdvocates_013-Q002CONF, part c at 2.

[458] PG&E Testimony at 9-22.

[459] Attachment 4.1, ERRA-2024-PGE-Compliance_DR_CalAdvocates_MDR001-Q039CONF.

[460] PG&E Testimony at 9-18, Table 9-3.

[461] PG&E Testimony at 9-2.

D. Disputes

PG&E managed three disputes during the Record Period. Two disputes were initiated pursuant to the dispute resolution process in connection with the contract, two disputes were closed, and one dispute remains ongoing.

1. Collins Pine Company; Collins Small Bionenergy Project (PG&E Log No. 33R481BIO)

On January 20, 2023, Collins Pine Company (Collins) issued a Notice of Force Majeure (FM) asserting that [redacted][462] [redacted] On December 19, 2023, Collins invoked the dispute resolution procedure pursuant to the PPA in response to [redacted]. [redacted] Parties resolved the [redacted] and the dispute is now closed.

The resolution of this dispute was reasonable and favorable to ratepayers.

2. Tulare CSG LLC; Tulare CSG Project (PG&E Log No. 33R502)

On May 25, 2023 Tulare CSG LLC (Tulare) issued a Notice of FM asserting [redacted]

[462] PG&E Testimony at 9-15.

[redacted][463] [redacted]. The dispute is now closed.

Cal Advocates does not oppose the resolution of this dispute.

3. Zero Waste Energy Development Company LLC, Zero Waste Energy Project (PG&E Log No. 33R405BIO)

On November 15, 2024, Zero Waste Energy Development Company (Zero Waste) sent a letter to PG&E asserting that [redacted].[464] On December 26, 2024, PG&E invoked the dispute resolution process pursuant to the PPA, in response to [redacted] The dispute is ongoing and has not been resolved at the time of this filing.

[463] PG&E Testimony at 9-16.

[464] PG&E Testimony at 9-17.

Since the dispute is ongoing, Cal Advocates does not have an evaluation or determination on whether the dispute was resolved in compliance with SOC4.

E. Force Majeure Claims

PG&E administered 25 FM claims during the Record Period.[465] Of those, PG&E closed 22 FM claims and continues to monitor three. During the Record Period, 10 FM claims were initiated. Of the 22 FM claims that were closed, PG&E accepted three claims.[466]

Cal Advocates does not oppose PG&E's decision to grant these three FM claims.

F. Other Issues

1. Geysers Power Company, LLC; Bear Canyon Storage Project and West Ford Flat Storage Project (PG&E Log No. 40S041 and 40S042)

[redacted].[467] [redacted].[468] [redacted].[469] [redacted]

[465] PG&E Testimony at Table 9-10.

[466] PG&E Testimony at Table 9-10; Accepted FM claims were for 1) RPS contract initiated in August 2021 and closed November 2024 related to [redacted]; 2) Energy Storage contract initiated in January 2023, partially accepted in September 2023, and closed in April 2024 related to [redacted] and 3) Disadvantaged Community-Green Tariff (DAC-GT) contract initiated May 2023 and closed August 2024 related to [redacted].

[467] PG&E Testimony at 9-18.

[468] PG&E Testimony at 9-18.

[469] PG&E Testimony at 9-18.

[redacted]

Cal Advocates does not oppose PG&E's decision [redacted]

G. Beaumont ESS, LLC; Beaumont Energy Storage Project (PG&E Log No. 40S038)

[redacted]

[470] Attachment 4.3, ERRA-2024-PGE-Compliance_DR_CalAdvocates_015-Q001CONF.

[471] Attachment 4.4, ERRA-2024-PGE-Compliance_DR_CalAdvocates_015-Q002CONF, part b.

[472] PG&E Testimony at 9-19.

[473] PG&E Testimony at 9-19.

[redacted].[474]

Cal Advocates does not oppose PG&E's decision [redacted].

H. North Fork Community Power, LLC; North Fork Community Power Project (PG&E Log No. 33R433BIO))

[redacted]

[redacted][475] [redacted] Cal Advocates does not have an evaluation or determination on whether the dispute was resolved in compliance with SOC4.

I. Caballero CA Storage, LLC; Caballero (PG&E Log No. 40S034-AR)

[redacted]

[redacted][476] [redacted]

[redacted][477] [redacted]

[474] PG&E Testimony at 9-20.

[475] PG&E Testimony at 9-20.

[476] PG&E Testimony at 9-20.

[477] PG&E Testimony at 9-20.

[redacted].[478] Cal Advocates does not oppose PG&E's decision [redacted]

IV. CONCLUSION/RECOMMENDATION

Based on this review and analysis of PG&E's contracts and other information provided to support their testimony, Cal Advocates does not contest PG&E's contract administration activities during the 2024 Record Period.

[478] PG&E Testimony at 9-21; and Attachment 4.5, ERRA-2024-PGE-Compliance_DR_CalAdvocates_021-Q001CONF, part b.

CHAPTER 5 - REVIEW OF BALANCING AND MEMORANDUM ACCOUNTS

(Witnesses: Brian Lui, Michael Ammermuller, Craig Jenquin)

I. INTRODUCTION AND SUMMARY

This testimony addresses Chapters 5, 11, 12, 13, 15 and 16 of PG&E's 2024 ERRA compliance application, which cover the financial activity recorded in the following balancing and memorandum accounts for the Record Period of January 1, 2024 through December 31, 2024:

A. Chapter 5: Disadvantaged Community – Green Tariff (DAC-GT) Balancing Account (DACGTBA) and Community Solar – Green Tariff (CS-GT) Balancing Account (CSGTBA)

B. Chapter 11: Green Tariff Shared Renewables Balancing Account (GTSRBA) and Green Tariff Shared Renewables Memorandum Account (GTSRMA)

C. Chapter 12: Portfolio Allocation Balancing Account (PABA)

D. Chapter 13: Energy Resource Recovery Account (ERRA)

E. Chapter 15: Disadvantaged Community – Single-Family Affordable Solar Homes Balancing Account (DACSASHBA) and Disadvantaged Community – Single-Family Affordable Solar Homes Memorandum Account (DACSASHMA)

F. Chapter 16: Central Procurement Entity (CPE) to the Centralized Local Procurement Sub-Account (CLPSA)

II. SUMMARY OF RECOMMENDATIONS

- Cal Advocates recommends that the Commission direct PG&E to adjust the $[redacted] credit associated with PABA tariff line-item 5.ae for CAM replacement RA using the most recent RA MPB.
- Cal Advocates recommends that the Commission direct PG&E to adjust the credit of $[redacted] associated with PABA tariff line-item 5.p for the gain on sale of the Burney Gardens property to $[redacted] because of errors in PG&E's initial assessment of the time the asset spent as Non-Utility Property (NUP) and a minor error in the stated purchase date of an asset.
- Cal Advocates finds that the 2024 accounting entries recorded in the ERRA are reasonable, appropriate, accurate, and in compliance with Commission decisions, while the costs recorded in the DACGTBA, CSGTBA, GTSRBA, GTSRMA, DACSASHBA, DACSASHMA

and the CPE entries to the CLPSA other balancing and memorandum accounts are reasonable and in compliance with the applicable tariffs and Commission directives.

III. ANALYSIS

Cal Advocates reviews PG&E's accounting documentation for the Record Period to determine whether entries recorded in each account were reasonable, appropriate, correctly stated, and compliant with applicable Commission Decisions.[479] Cal Advocates' audit procedures included, but were not limited to, the following:

- Review of PG&E's application, testimony, workpapers, and data request responses;
- Review of Balancing and Memorandum Account Electrical Preliminary Statements and associated tariff line-items;
- Review of applicable advice letters, resolutions, and Commission Decisions;
- Sample selection of monthly financial activity recorded to account subledgers to determine the adequacy of supporting documentation;
- Virtual meetings with PG&E to discuss details of requested documents;[480]
- Reconciliation of PG&E workpapers with General Ledger entries;[481]
- Examination of invoices, journals, and general ledger entries;
- Verification of the mathematical accuracy of accounting worksheets and supporting documentation;
- Review of proof of payments for invoices selected during the audit process; and

[479] Pursuant to the Scoping Ruling in this proceeding, only the ERRA and PABA entries are reviewed to be reasonable, appropriate, accurate, and in compliance with Commission decisions; the remaining accounts are reviewed whether the costs incurred and recorded are reasonable and in compliance with the applicable tariffs and Commission directives.

[480] Between August 19 and 23, 2025 Cal Advocates reviewed judgement samples (a nonrandom sample selected based on the judgment/opinion of the auditor) of accounting entries in virtual audits with PG&E. Auditor assessments of risk include but are not limited to: internal control environment, financial impact, results of prior reviews, changes to accounting practices.

[481] General Ledger entries are recorded by PG&E in SAP accounting software and may also be referred to as "SAP entries" in this testimony.

- Review of monthly interest rates and calculation of monthly interest amounts.

In the remainder of this chapter, Cal Advocates will provide a summary of each account, the recorded entries, and any relevant findings or recommendations for each account.

A. DACGTBA & CSGTBA

1. Background

The California Public Utilities Commission (CPUC or Commission) issued D.18-06-027 implementing Assembly Bill (AB) 327. AB 327 required the Commission to develop alternatives to increase the adoption and growth of renewable generation in Disadvantaged Communities (DAC). Pursuant to D.18-06-027, PG&E filed AL 5351-E to establish the Public Policy Charge Balancing Account (PPCBA) with two subaccounts to track the costs and revenues associated with the DAC-GT and CS-GT programs.[482]

The DACGTBA tracks the annual funding of the program through GHG and public policy revenues compared to costs incurred to implement, operate, maintain, and administer the program.[483]

Table 5-1 below reflects DACGTBA's accounting entries for the 2024 Record Period.

[482] PG&E Advice Letter 5351-E available at: https://www.pge.com/tariffs/assets/pdf/adviceletter/ELEC_5351-E.pdf. Accessed July 29, 2025.

[483] PG&E Electric Preliminary Statement Part HM, p. 1. Available at: https://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_PRELIM_HM.pdf. Accessed July 29, 2025.

Table 5-1: DACGTBA 2024 Recorded Costs[484]

#	Description	Amount
1	Interim Renewable Resource Cost	$5,136,052
2	Dedicated Resource Costs	$(78,338)
3	Revenue Shortfall Based on 20% Discount	$4,660,124
4	Administrative Costs	
a	DAC-GT Information Technology (IT) (IT/Billing System)	$120,307
b	Program Management	$152,958
c	Contract Center Operations	$1,410
d	Energy Procurement	$120,505
4(a+b+c+d)	Subtotal of Administrative Costs	$395,180
5	Marketing	$8,045
6	Community Choice Aggregation Integration Costs	$6,108
(1+3+4+5+6)	**Total DACGT Expense Activity**	**$10,127,171**

The CSGTBA tracks the annual funding of the program through GHG and public policy revenues compared to costs incurred to implement, operate, maintain, and administer the program.[485]

Table 5-2 below reflects CSGTBA's accounting entries for the 2024 Record Period.

Table 5-2 CSGTBA 2024 Recorded Costs[486]

#	Description	Amount
1	Administrative Costs	
a	CSGT IT (IT/Billing System)	$51,915
b	Program Management	$26,690
c	Energy Procurement	$34,364
1(a+b+c)	Subtotal of Administrative Costs	$112,968
2	Marketing	$10,167
(1+2)	**Total CSGT Expense Activity**	**$123,136**

[484] A.25-03-013, PG&E's Errata Testimony at 5-5, Table 5-1.

[485] PG&E Electric Preliminary Statement Part HM, p. 1. Available at: https://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_PRELIM_HM.pdf. Accessed July 29, 2025.

[486] A.25-02-013, PG&E's Testimony at 5-9, Table 5-2.

2. Recommendation

Cal Advocates finds that the 2024 costs recorded into the DACGTBA and CSGTBA are reasonable and in compliance with applicable Commission Decisions. Cal Advocates does not recommend accounting adjustments and does not object to the costs recorded in the DACGTBA and CSGTBA.

B. GTSRBA & GTSRMA

1. Background

In D.15-01-051, the Commission required that administrative and marketing costs for the Green Tariff Shared Renewable (GTSR) program be tracked in a memorandum account and be subject to reasonableness review in each IOU's annual ERRA compliance review. Costs that are found to be unreasonable cannot be collected from program participants and will be borne by shareholders. Program startup costs that are found to be reasonable can be amortized.[487]

Table 5-3 shows the breakdown of costs for the GTSRMA by category.

Table 5-3[488] GTSRMA 2024 Recorded Costs

#	Description	Amount
1	Program Management	$145,915
2	IT/Billing System	$11,044
3	Energy Procurement	$141,650
4	Contact Center Operations	$30,539
5	Outreach/Marketing	$1,105
6 (1+2+3+4+5)	Expenses Subtotal	$330,254
7	Interest	$292,387
8 (6+7)	**Total GTSRMA Expense Activity**	**$622,641**

[487] D.15-01-051, *Decision Approving Green Tariff Shared Renewables Program for San Diego Gas & Electric Company, Pacific Gas and Electric Company, and Southern California Edison Company Pursuant to Senate Bill 43*, February 2, 2015, at 113; issued in A.12-01-008 et al.

[488] PG&E Testimony at 11-4, Table 11-1.

The purpose of the GTSRBA is to track revenues received and actual expenses incurred to procure renewable generation resources for customers participating in the GTSR program.[489]

Table 5-4 shows the breakdown of expenses and revenues for the Green Tariff Shared Renewables Balancing Account.

Table 5-4: GTSRBA 2024 Recorded Entries[490]

#	Description	Amount
1	GTSRBA Beginning Balance	$5,834,290
2	Billed Revenues	$(51,553,176)
3	Net Expenses – GT Subaccount	$61,174,831
4	Interest	$264,851
5 (2+3+4)	**Total GTSRBA Activity**	**$9,886,506**
6 (1+5)	**GTSRBA Ending Balance**	**$15,720,796**

2. Recommendation

Cal Advocates finds that the 2024 cost recorded into the GTSRBA and GTSRMA are reasonable and in compliance with applicable Commission Decisions. Cal Advocates does not recommend accounting adjustments and does not object to the costs recorded in either of these accounts.

C. PABA

1. Background

D.18-10-019, issued in the Power Charge Indifference Adjustment (PCIA) Rulemaking (R.) 17-06-026, significantly modified the accounting for the PCIA by requiring that PCIA revenues from customers and costs be trued-up on an annual basis. Pursuant to D.18-10-019 Ordering Paragraph 7, the investor owned utilities were required to establish the PABA, a two-way cost balancing account with subaccounts for each

[489] PG&E Electric Preliminary Statement Part GR, p. 1. Available at: https://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_PRELIM_GR.pdf. Accessed July 29, 2025.

[490] PG&E's Testimony at 11-11, Table 11-4.

vintaged portfolio including categories for billed revenues, generation resource costs, net CAISO market revenues associated with energy and ancillary services, and revenues associated with the renewable energy Adder and the RA capacity. Pursuant to D.18-10-019 Ordering Paragraph 8, each utility was required to modify its ERRA balancing account and any other balancing accounts, as necessary, to be consistent with the PABA vintaged subaccount structure adopted in D.18-10-019.

PG&E submitted AL 5440-E to implement the changes in D.18-10-019. The Commission approved PG&E AL 5440-E on May 3, 2019 with an effective date of January 1, 2019. PG&E AL 5440-E established the PABA, and updated the ERRA balancing account, Modified Transition Cost Balancing Account, and Utility Owned Balancing Account to be consistent with the PABA.

The purpose of the PABA is to record the above-market costs for all generation resources eligible for recovery through PCIA rates. The PCIA is recovered from both bundled and departing load customers. The PCIA assigns cost responsibility for vintages of generation resources based upon when the customer departed bundled service. The PABA is composed of subaccounts for each year's vintage portfolio that records the costs and revenues associated with the categories of activity for all generation resources executed or approved by the Commission for cost recovery that year.

D.22-01-023, issued in (R.)17-06-026, requires that IOUs transfer the year-end balance of the ERRA to the most recent vintage subaccount of the PABA following approval of a Tier 2 advice letter.

Activity recorded to the PABA includes the following categories: Revenues from Customers; RPS Activity; RA Activity; Adopted UOG Revenue Requirements; CAISO Related Charges and Revenues, Fuel Costs, Contract Costs, GHG costs, and Miscellaneous costs.

Table 5-5 below reflects PG&E's PABA accounting entries for the Record Period.

Table 5-5: PABA 2024 Recorded Entries[491]

#	Description	Amount
1	**PABA Beginning Balance – 1/1/2024**	**$821,963,513**
2	**2024 Net PABA Revenues**	**$(564,334,210)**
a	UOG Costs	$2,208,314,345
b	Fuel & Contract Costs	$2,464,079,783
c	RA Costs and Revenues	$(1,703,997,732)
d	RPS Costs and Revenues	$(1,030,550,194)
e	ISO Costs and Revenues	$(1,569,123,264)
f	Other Expenses	$240,304,999
3 (a-f)	**2024 Net PABA Expenses**	**$609,027,943**
4 (2+3)	PABA Net Activity Before Interest	$44,693,732
5	**PABA Net Interest**	**$47,394,558**
6 (1+4+5)	**PABA Ending Balance – 12/31/2024**	**$914,051,803**

Cal Advocates' PABA audit sample included reviews of 22 tariff line-items and 53 entries to the general ledger. Sample entries were selected using a combination of auditor judgement, risk-based assessment of dollar value, and risk-based assessment of supporting information.

2. Identified Issues

PG&E recorded a credit of $[redacted] associated with PABA tariff line-item 5.ae for CAM replacement RA [redacted].[492] The initial value was calculated using the 2023 RA MPB and was therefore updated to a $[redacted] credit upon the release of the 2024 RA MPB in October 2024. PG&E did not reverse the initial recording of $[redacted] associated with the replacement RA in 2024[493] which resulted in the CAM replacement

[491] PG&E Testimony at 12-29, Table 12-8.

[492] Attachment 5.1, PG&E response to Cal Advocates DR 07 Q16 Atch 01 CONF.

[493] Attachment 5.2, PG&E response to Cal Advocates DR 19 Q8.c CONF.

RA being valued twice. PG&E has stated its intent to correct the PABA by reversing the $[redacted] in the next available month end close.[494]

PG&E recorded a credit of $[redacted] associated with PABA tariff line-item 5.p for the gain on sale of the Burney Gardens property in Shasta County, pursuant to AL 7225-E. Analysis of PG&E's supporting workpapers[495] indicated that the overall calculation methodology used by PG&E to determine the gain on sale due to ratepayers was appropriate. Cal Advocates' Data Request 19 requested follow-up information regarding outliers in the in-service date of some sold assets and the time assets spent as NUP.

PG&E's response to Data Request 19 confirmed errors regarding the in-service date of some sold assets and errors regarding NUP duration of all assets included in the Burney Gardens donation, both of which impacted the gain on sale due to ratepayers. The error regarding in-service dates resulted in a $[redacted] credit shift from ratepayers to shareholders.[496] The error regarding NUP duration resulted in a $[redacted] credit shift from ratepayers to shareholders.[497] Cal Advocates recommends that PG&E adjust the credit of $[redacted] regarding the Burney Gardens gain on asset sale to the correct credit entry for $[redacted], and adjust the credit of $[redacted] recorded as ratepayer gain to the correct credit entry for $[redacted].

3. Recommendation

After reviewing PG&E's testimony and responses to data requests related to the PABA, Cal Advocates recommends that the Commission:

- Direct PG&E to adjust a $[redacted] credit associated with PABA tariff line-item 5.ae for CAM replacement RA.
- Direct PG&E to adjust the credit of $[redacted] associated with PABA tariff line-item 5.p for the gain on sale of the Burney Gardens property to a credit of $[redacted].

[494] Attachment 5.2, PG&E response to Cal Advocates DR 19 Q8.c CONF.

[495] Attachment 5.3, PG&E response to Cal Advocates DR 07, Q09 CONF.

[496] Attachment 5.4, PG&E response to Cal Advocates DR 19, Q04 CONF.

[497] Attachment 5.5, PG&E response to Cal Advocates DR 19, Q02 CONF.

D. ERRA

1. Background

Pursuant to D.02-10-062, D.02-12-074, and Public Utilities Code Section 454.5(d)(3), the purpose of the ERRA balancing account is to account for the actual ERRA revenues and electric procurement costs for revenue recovery. The ERRA balancing account was substantially modified by D.18-10-019, issued in the PCIA rulemaking, R.17-06-026. D.18-10-019 ordered the implementation of the PABA and included revisions to the ERRA balancing account. The revised ERRA records power procurement costs applicable solely to PG&E's bundled customers. Power procurement costs incurred on behalf of both bundled and departing load customers are recorded either in the PABA, the Modified Transition Cost Balancing Account, the New System Generation Balancing Account (NSGBA), the Tree Mortality Non-Bypassable Charge Balancing Account, the PPCBA, or the BioMAT Non-bypassable Charge Balancing Account.[498]

Table 5-6: ERRA 2024 Recorded Entries[499]

#	Description	Amount ($)
1	ERRA Beginning Balance – 1/1/2024	$ 47,980,191
2	ERRA Net Activity Before Interest[500] - FY 2024 YTD	$ (284,443,510)
3	ERRA Interest and Other	$ (7,302,923)
4 = (1+2+3)	ERRA Ending Balance	$ (243,766,243)
5	PCIA Subaccount Beginning Balance	$ (98,898)
6	PCIA Subaccount Net Activity – FY 2024 YTD	$ 96,193
7 = (5+6)	PCIA Subaccount Ending Balance	$ (2,706)
8 = (4+7)	**Total ERRA Ending balance – 12/31/2024**	**$ (243,768,949)**

[498] PG&E Testimony at 13-1, Lines 19-23 and Footnote 2.

[499] PG&E Testimony at 13-10, Table 13-2.

[500] Amount includes ERRA Revenues (credit) totaling $(4,011,267,245) and ERRA Net Costs and Expenses (debit) totaling $3,726,823,734.

2. Recommendation

Cal Advocates finds that the 2024 accounting entries recorded into ERRA are appropriate, correctly stated, and in compliance with applicable Commission Decisions. Cal Advocates does not recommend accounting adjustments and does not object to the costs recorded in the ERRA.

E. DACSASHBA & DACSASHMA

1. Background

Assembly Bill 327 required the Commission to develop alternative programs to increase the adoption and growth of renewable generation in disadvantaged communities. Commission Decision D.18-06-027 adopted the Disadvantaged Community – Single-Family Affordable Solar Housing (DAC-SASH) Program, along with the Disadvantaged Community Green Tariff (DAC-GT) and Community Solar Green Tariff (CS-GT) programs.

Pursuant to Ordering Paragraph 8 of D.18-06-027, the DAC-SASH Program has an annual budget of $10 million per year beginning on January 1, 2019 and continuing through the end of 2030, and will collect those costs first through available GHG allowance proceeds. PG&E's proportionate share of the $10 million per year is 43.7 percent, or $4.37 million per year.[501]

Table 5-7: DACSASHBA 2024 Recorded Expenses[502]

#	**Description**	**Amount ($)**
1	PG&E Program Management	$ 97,498
2	Independent Evaluation Contract Expenses	$ 0
3	Program Administrator Expenses	$ 625,343
4 = (1+2+3)	Interest	$ (215,147)
5	Incentives	$ 4,606,801
	Total DACSASHBA Activity	**$ 5,114,495**

[501] D.18-06-027, *Alternate Decision Adopting Alternatives to Promote Solar Distributed Generation in Disadvantaged Communities*, June 22, 2018, Appendix A, P. A-6; issued in R.14-07-002.

[502] PG&E Testimony, at 15-2, Table 15-1.

D.25-06-045 directs PG&E to close the DACSASHMA after transferring any funds remaining in the DACSASHMA to the DACSASHBA.[503]

2. Recommendation

Cal Advocates finds that the 2024 costs recorded into the DACSASHBA and DACSASHMA are reasonable and in compliance with applicable Commission Decisions. Cal Advocates does not recommend accounting adjustments and does not object to the costs recorded in these accounts.

F. CPE ENTRIES TO THE CLPSA

1. Background

The Commission issued D.20-06-002 on June 17, 2020. D.20-06-002 ordered PG&E to serve as the CPE for PG&E's distribution service area for the multi-year local RA program beginning for the 2023 RA compliance year.[504] D.20-06-002 directed PG&E to submit the administrative costs in the ERRA forecast and compliance proceedings.[505]

The Commission approved PG&E AL 5919-E, effective September 16, 2020.[506] PG&E AL 5919-E established the CLPSA as a sub-account of the NSGBA. The CPE administrative costs are among other costs outlined in the CLPSA. PG&E's ERRA Compliance Chapter 16 deals solely with the CPE administrative costs in the CLPSA.

[503] D.25-06-045, *Decision Approving Pacific Gas and Electric Company's 2021 Energy Resource Recovery Account Entries and Related Matters*, July 3, 2025, at 33; issued in A.22-02-015.

[504] D.20-06-002, *Decision on Central Procurement of the Resource Adequacy Program*, June 17, 2020 at 91, Ordering Paragraph 2; issued in R.17-09-020.

[505] D.20-06-002, at 55-56.

[506] PG&E AL 5919-E available at: https://www.pge.com/tariffs/assets/pdf/adviceletter/ELEC_5919-E.pdf.

Table 5-8: PG&E CPE 2024 Administrative Costs[507]

#	Description	Amount ($)
1	CPE Implementation Team Cost	$ 1,159,579
2	CPE Supporting Functions Costs	$ 541,417
3	IE Cost	$ 157,935
	Total CPE Activity	**$ 1,858,931**

2. Recommendation

Cal Advocates finds that the 2024 administrative costs recorded into the CLPSA are reasonable and in compliance with applicable Commission Decisions. Cal Advocates does not recommend accounting adjustments and does not object to the costs recorded in the CPE entries to the CLPSA.

IV. CONCLUSION

Regarding entries in the PABA, Cal Advocates recommends that the Commission:

- Direct PG&E to adjust the $[redacted] credit associated with PABA tariff line-item 5.ae for CAM replacement RA because PG&E did not reverse the stated amount after updating the CAM replacement RA costs using the most recent RA MPB.
- Direct PG&E to adjust the credit of $[redacted] associated with PABA tariff line-item 5.p for the gain on sale of the Burney Gardens property to $[redacted] because of errors in PG&E's initial assessment of the time the asset spent as NUP and a minor error in the stated purchase date of an asset.

Otherwise, Cal Advocates finds that the 2024 accounting entries recorded in the ERRA are reasonable, appropriate, accurate, and in compliance with Commission Decisions, while the costs recorded in the DACGTBA, CSGTBA, GTSRBA, GTSRMA, DACSASHBA, DACSASHMA and the CPE entries to the CLPSA are reasonable and in compliance with the applicable tariffs and Commission directives.

[507] PG&E's Testimony at 16-2, Table 16-1.

APPENDIX A

QUALIFICATIONS OF WITNESSES

QUALIFICATIONS AND PREPARED TESTIMONY
OF
MICHAEL AMMERMULLER

Q.1. Please state your name and address.

A.1. My name is Michael Ammermuller. My business address is 505 Van Ness Ave, San Francisco, California, 94102.

Q.2. By whom are you employed and what is your job title?

A.2. I am employed by the California Public Utilities Commission (CPUC) as a Public Utilities Regulatory Analyst in the Public Advocates Office, Electricity Planning & Policy Branch.

Q.3. Please describe your educational and professional experience.

A.3. I hold a Master of Science in Economics from the State University of New York – at Buffalo. I joined the CPUC in 2017 and worked in both Energy and Communications Divisions prior to joining the Electricity Policy and Planning Branch at the Public Advocates Office in 2023. My experience at the CPUC includes implementing consumer protection and broadband deployment programs, telephone General Rate Cases, Energy Resources Recovery Account (ERRA) Compliance, ERRA Forecast, and Diablo Canyon Power Plant Extended Operations proceedings. My other relevant experience includes three years with Citigroup Inc. (trade settlement, risk management) and 19 months at an Iowa-based electric and gas utility MidAmerican Energy Co. (accounting and finance).

Q.4. What is your area of responsibility in this proceeding?

A.4. I am responsible for the Executive Summary and co-sponsor of Chapter 5: Review of Balancing and Memorandum Accounts.

Q.5. Does that complete your prepared testimony?

A.5. Yes, it does at this time.

PREPARED TESTIMONY AND QUALIFICATIONS
OF
SARAH CORNETT

Q1. Please state your name, business address, and position with the California Public Utilities Commission ("Commission").

A1. My name is Sarah Cornett and my business address is 505 Van Ness Avenue, San Francisco, California. I work in the Electricity Planning and Policy Branch of the Public Advocate Office of the California Public Utilities Commission (Cal Advocates) as a Regulatory Analyst.

Q2. Please summarize your education background and professional experience.

A2. I graduated from Whitman College with a B.A. in History. I also obtained a Masters of Public Policy degree from UC Berkeley. I have been employed by Cal Advocates on the Procurement Cost Recovery team of the Electricity Planning and Policy Branch for one year and one month. Before that, I was the energy and climate analyst for the California Legislative Analyst's Office, where I advised the Legislature on energy, electricity, and climate policy. I have also worked as a climate policy advocate for nonprofit organizations in Seattle, Washington. In total, I have worked on climate, energy, and electricity policy issues for seven years.

Q3. What is your responsibility in this proceeding?

I am responsible for Chapter 2: Least Cost Dispatch

Q4. Does this conclude your prepared direct testimony?

A4. Yes.

QUALIFICATIONS AND PREPARED TESTIMONY
OF
MICHAEL YEO

Q.1 Please state your name and business address.

A.1 My name is Michael Yeo. My business address is 505 Van Ness Avenue, San Francisco, California.

Q.2 By whom are you employed and in what capacity?

A.2 I am employed by the California Public Utilities Commission as a Senior Utilities Engineer in the Public Advocates Office.

Q.3 Briefly state your educational background and experience.

A.3 I graduated from the University Of Toronto with a Bachelor of Applied Science in Civil Engineering, and am a registered Professional Engineer. Since joining the Commission in 1992, I have worked in various assignments in the Public Advocates Office, Energy Division and the Consumer Protection and Safety Division. Immediately prior to joining the Commission, I worked for the California Department of Transportation.

Q.4 What is the scope of your responsibility in this proceeding?

A.4 I am responsible for Chapter 3 – Utility-Owned Generation – Fossil and Renewables.

Q.5 Does this complete your testimony at this time?

A.5 Yes, it does.

PREPARED TESTIMONY AND QUALIFICATIONS
OF
STANLEY KUAN

Q1. Please state your name, business address, and position with the California Public Utilities Commission ("Commission").

A1. My name is Stanley Kuan and my business address is 505 Van Ness Avenue, San Francisco, California. I work in the Electricity Planning and Policy Branch of the Public Advocate Office of the California Public Utilities Commission (Cal Advocates) as a Regulatory Analyst.

Q2. Please summarize your education background and professional experience.

A2. I graduated from University of California, San Diego with a B.A. in Economics. I also obtained a law degree from the George Washington University Law School. I have been employed by Cal Advocates on the Procurement Cost Recovery team of the Electricity Planning and Policy Branch for five (5) years. Before that, I was an analyst with the Cal Advocates on the Customer Programs team of the Electric Pricing and Customer Programs Branch for four (4) years. In my experience at the CPUC I have worked on proceedings related to the Energy Resources Recovery Account (ERRA), the Power Charge Indifference Adjustment (PCIA) Rulemakings (R.25-02-005 and R.17-06-026), the Provider of Last Resort Rulemaking (R.21-03-011), the Net Energy Metering (NEM) Disadvantaged Communities (DAC) (Rulemaking (R.) 14-07-002, San Joaquin Valley (SJV) DAC proceeding (R.15-03-010), Demand Response Auction Mechanism (DRAM) (Application (A.) 17-01-012, SDG&E Maritime Rate Application (A.17-09-005).

Q3. What is your responsibility in this proceeding?

A3. I am responsible for Chapter 4: Contract Administration.

Q4. Does this conclude your prepared direct testimony?

A4. Yes.

QUALIFICATIONS AND PREPARED TESTIMONY
OF
BRIAN LUI

Q.1 Please state your name and business address.

A.1 My name is Brian Lui. My business address is 505 Van Ness Ave, San Francisco, California, 94102.

Q.2 By whom are you employed and in what capacity?

A.2 I am employed by the California Public Utilities Commission (CPUC) as a Public Utilities Financial Examiner in the Public Advocates Office, Electricity Planning & Policy Branch.

Q.3 Please describe your educational and professional experience.

A.3 I hold a Masters Degree in Accounting from Golden Gate University in San Francisco. I also received a Bachelors of Science Degree in Biochemistry from the University of California, Riverside. I joined the Commission on January 7, 2014 in the Public Advocates Office's Electricity Planning and Policy Branch. In the Public Advocates Office, I am involved in the ERRA Forecast and ERRA Compliance proceedings. Immediately prior to joining the Commission, I worked for the California State Board of Equalization as a tax auditor. I have over 9 years of experience working as an auditor in the public sector.

Q.4 What is the scope of your responsibility in this proceeding?

A.4 I am co-sponsor for Chapter 5: Review of Balancing and Memorandum Accounts.

Q.5 Does this complete your testimony at this time?

A.5 Yes, it does.

QUALIFICATIONS AND PREPARED TESTIMONY
OF
CRAIG JENQUIN

Q.1 Please state your name and business address.

A.1 My name is Craig Jenquin. My business address is 320 4th St, Los Angeles, California, 90013.

Q.2 By whom are you employed and in what capacity?

A.2 I am employed by the California Public Utilities Commission (CPUC) as a Public Utilities Regulatory Analyst in the Public Advocates Office, Electricity Planning & Policy Branch.

Q.3 Please describe your educational and professional experience.

A.3 I hold a Bachelors of Science in Applied Mathematics and a Bachelors of Arts in Linguistics from the University of California, San Diego (UCSD). I joined the Commission on August 29th, 2022 in the Electricity Planning and Policy branch of Public Advocates Office in the Procurement Cost Recovery Department. At the Public Advocates Office, I am involved in ERRA Forecast and ERRA Compliance proceedings. Prior to joining the Commission, I worked for over a year as a quality assurance assistant for a neurological and sociological study operating out of UCSD.

Q.4 What is the scope of your responsibility in this proceeding?

A.4 I am co-sponsor for Chapter 5: Review of Balancing and Memorandum Accounts.

Q.5 Does this complete your testimony at this time?

A.5 Yes, it does.

QUALIFICATIONS AND PREPARED TESTIMONY
OF
PATRICK CUNNINGHAM

Q.1 Please state your name and business address.

A.1 My name is Patrick Cunningham. My business address is 505 Van Ness Avenue, San Francisco, CA 94102.

Q.2 By whom are you employed and what is your job title?

A.2 I am employed by the California Public Utilities Commission as a Public Utilities Regulatory Analyst in the Electricity Planning and Policy Branch of the Public Advocates Office.

Q.3 Will you please briefly state your educational background and experience?

A.3 I hold a Master of Pacific and International Affairs degree from the University of California San Diego, a Master of Arts degree in History from the American Military University, and a Bachelor of Arts degree in History from the University of California Santa Cruz. I joined the Public Advocates Office in May of 2016 and have devoted my work to the study and analysis of ERRA cases and resource adequacy policy. Including the current Application, I have conducted ERRA analysis as the expert witness of least-cost dispatch nine times and contract administration eight times. I have also been the expert witness for hydroelectric administration for PG&E's 2016 ERRA and resource adequacy for PG&E's 2019, 2020 and 2023 ERRA applications. I also coordinated and conducted analysis on SDG&E's 2018 ERRA Forecast and SCE's 2020 and 2021 ERRA Forecasts.

Q.4 What is your area of responsibility in this proceeding?

A.4 I am responsible for analysis of the resource adequacy chapter of PG&E's testimony.

Q.5 Does this complete your testimony at this time?

A.5 Yes, it does.

QUALIFICATIONS AND PREPARED TESTIMONY
OF
THOMAS GARIFFO

Q.1 Please state your name and business address.

A.1 My name is Thomas Gariffo. My business address is 505 Van Ness Avenue, San Francisco, California.

Q.2 By whom are you employed and in what capacity?

A.2 I am employed by the California Public Utilities Commission as a Public Utilities Regulatory Analyst in the Public Advocates' Office (Cal Advocates) Electricity Planning and Policy Branch.

Q.3 Briefly state your educational background and experience.

A.3 I have a Master of Public Policy degree from the Luskin School of Public Affairs at the University of California, Los Angeles. I also have a Bachelor of Arts degree in Political Science with a minor in Public Policy from the University of California, Berkeley. I have worked as a greenhouse gas policy subject matter expert in the Climate Change Initiatives section of Cal Advocates for seven years, along with providing analysis for policies in proceedings regarding transportation electrification, Low Carbon Fuel Standards (LCFS), the Electric Program Investment Charge (EPIC), California's Renewable Portfolio Standards (RPS), and biofuels.

Q.4 What is the scope of your responsibility in this proceeding?

A.4 I am responsible for reviewing GHG compliance reporting in the filing.

Q.5 Does this complete your testimony at this time?

A.5 Yes, it does.

APPENDIX B

SUPPORTING ATTACHMENTS

LIST OF ATTACHMENTS FOR APPENDIX B

CHAPTER 2		
#	**Attachment**	**Description**
1	Attachment 2.1 (Confidential)	A.25-02-013 – Chapter 1 Workpapers, LCD_2024_Workpaper_6_HighestEnergyValueDays_CONF.xlsx **(Available via e-mail)**
2	Attachment 2.2	PG&E Response, ERRA-2024-PGE-Compliance_DR_CalAdvocates_008-Q001
3	Attachment 2.3 (Confidential)	A.25-02-013, Cal Advocates Workpapers – ERRA-2024-PGE-Compliance_LCD_Price Forecast Analysis Tables_CONF.xlsx **(Available via e-mail)**
4	Attachment 2.4 (Confidential)	A.25-02-013 – PG&E Chapter 1 Workpapers, 2024_LCD_6_Highest_Energy_Value_Days_and_Price_Forecast_Summary_CONF
5	Attachment 2.5 (Confidential)	A.25-02-013, Cal Advocates Workpapers – PGE 2024 ERRA-C_LCD_Load Forecast_CONF.xlsx **(Available via e-mail)**
6	Attachment 2.6	PG&E response to Cal Advocates Data Request 12, ERRA-2024-PGE-Compliance_DR_CalAdvocates_012-Q004
7	Attachment 2.7 (Confidential)	PG&E response to Cal Advocates Data Request 12, ERRA-2024-PGE-Compliance_DR_CalAdvocates_012-Q007CONF
8	Attachment 2.8 (Confidential)	A.25-02-013, Cal Advocates Workpapers – ERRA-2024-PGE-Compliance_LCD_Total Load Analysis_2015-2024_CONF.xlsx **(Available via e-mail)**
9	Attachment 2.9 (Confidential)	A.25-02-013 – PG&E Chapter 1 Workpapers, 2024_LCD_Bid_Cost_Calculation_Summary_CONF
10	Attachment 2.10 (Confidential)	PG&E response to Cal Advocates Data Request 8, ERRA-2024-PGE-Compliance_DR_CalAdvocates_008-Q007CONF.

#	Attachment	Description
11	Attachment 2.11 (Confidential)	A.25-02-013 – PG&E Chapter 1 Workpapers, 2024_LCD_Workpaper_2_BidCostCalculation_CONF.xlsx **(Available via e-mail)**
12	Attachment 2.12 (Confidential)	A.25-02-013 – PG&E Chapter 1 Workpapers, 2024_LCD_3_Self_Committment_Summary
13	Attachment 2.13 (Confidential)	A.25-02-013 – PG&E Chapter 1 Workpapers, 2024 LCD_4_Hydro_Resources_Summary_CONF
14	Attachment 2.14 (Confidential)	A.25-02-013 – PG&E Chapter 1 Workpapers, 2024 LCD_Workpaper_4_Hydro_Top_500_CONF.xlsx **(Available via e-mail)**
15	Attachment 2.15 (Confidential)	ERRA-2024-PGE-Compliance_DR_CalAdvocates_014-Q002CONF
16	Attachment 2.16 (Confidential)	A.25-02-013, PG&E Response to MDR 1.2.8 ERRA-2024-PGE-Compliance_DR_CalAdvocates_MDR001-Q033Atch02CONF.xlsx **(Available via e-mail)**
17	Attachment 2.17 (Confidential)	ERRA-2024-PGE-Compliance-DR_CalAdvocates_010_Q01001CONF.
18	Attachment 2.18 (Confidential)	ERRA-2024-PGE-Compliance_DR_CalAdvocates_010-Q002CONF
19	Attachment 2.19 (Confidential)	ERRA-2024-PGE-Compliance-DR_CalAdvocates_010_Q012Atch01CONF.xlsx **(Available via e-mail)**
20	Attachment 2.20 (Confidential)	ERRA-2024-PGE-Compliance_DR_CalAdvocates_016-Q002CONF

#	Attachment	Description
21	Attachment 2.21 (Confidential)	A.25-02-013 – PG&E Chapter 1 Workpapers, ERRA_2024_PGE_Compliance_Test_PGE_Chp1Workpaper_DR1_CONF.xlsx **(Available via e-mail)**
22	Attachment 2.22 (Confidential)	ERRA-2024-PGE-Compliance_DR_CalAdvocates_010-Q013CONF.
23	Attachment 2.23	2024 ERRA Compliance Overview of DR, Slide 8
24	Attachment 2.24	A.16-02-019, PG&E response to DR 012, Q3
25	Attachment 2.25 (Confidential)	ERRA-2023-PGE-Compliance_DR_CalAdvocates_002-Q003CONF

CHAPTER 3		
#	**Attachment**	**Description**
26	Attachment 3.1	PG&E Responses to Cal Advocates Data Request 18, Abridged to only include responses cited in testimony
27	Attachment 3.2	PG&E Response to Cal Advocates Master Data Request, Question 1.1.13 and Atch 01
28	Attachment 3.3	PG&E response to Cal Advocates Data Request 24, Question 002
29	Attachment 3.4	PG&E response to Cal Advocates Data Request 24, Question 001
30	Attachment 3.5 (Confidential)	PG&E response to Cal Advocates Data Request 24, Question 001 Atch 01 CONF

CHAPTER 4		
#	**Attachment**	**Description**
31	Attachment 4.1 (Confidential)	ERRA-2024-PGE-Compliance_DR_CalAdvocates_MDR001-Q039CONF
32	Attachment 4.2 (Confidential)	ERRA-2024-PGE-Compliance_DR_CalAdvocates_013-Q002CONF
33	Attachment 4.3 (Confidential)	ERRA-2024-PGE-Compliance_DR_CalAdvocates_015-Q001CONF
34	Attachment 4.4 (Confidential)	ERRA-2024-PGE-Compliance_DR_CalAdvocates_015-Q002CONF
35	Attachment 4.5 (Confidential)	ERRA-2024-PGE-Compliance_DR_CalAdvocates_021-Q001CONF

CHAPTER 5		
#	**Attachment**	**Description**
36	Attachment 5.1 (Confidential)	PG&E response to Cal Advocates DR 07 Q16 Atch 01 CONF.xlsx **(Available via e-mail)**
37	Attachment 5.2 (Confidential)	PG&E response to Cal Advocates DR 19 Q8.c CONF
38	Attachment 5.3 (Confidential)	PG&E response to Cal Advocates DR 07, Q09 CONF
39	Attachment 5.4 (Confidential)	PG&E response to Cal Advocates DR 19, Q04 CONF
40	Attachment 5.5 (Confidential)	PG&E response to Cal Advocates DR 19, Q02 CONF

APPENDIX C

LIST OF ACRONYMS

Acronym	Description
AB	Assembly Bill
AC or A/C	Air Conditioning
ART	Automated Response Technology
BESS	Battery Energy Storage System
BioMAT	Bioenergy Market Adjustment Tariff
BPP	Bundled Procurement Plan
CAISO	California Independent System Operator
Cal Advocates	Public Advocates Office at the California Public Utilities Commission
CAM	Cost-Allocation Methodology
CBP	Capacity Bidding Program
CLPSA	Centralized Local Procurement Sub-Account
COD	Commercial Operation Date
CPE	Central Procurement Entity
CPUC	California Public Utilities Commission
CSGTBA	Community Solar – Green Tariff Balancing Account
CT	Combustion turbine
DA	Day-ahead
DAC	Disadvantaged Communities
DACGTBA	Disadvantaged Community – Green Tariff Balancing Account
DACSASH	Disadvantaged Community – Single-Family Affordable Solar Homes
DACSASHBA	Disadvantaged Community – Single-Family Affordable Solar Homes Balancing Account
DACSASHMA	Disadvantaged Community – Single-Family Affordable Solar Homes Memorandum Account
DAM	Day Ahead Market
deg F	degrees Fahrenheit

Acronym	Description
DLAP	Default Load Aggregation Point
DR	Demand Response or Data Request*
EEI	Edison Electric Institute
ERRA	Energy Resource Recovery Account
FM	Force Majeure
GADS	Generation Availability Data System
GCOD	Guaranteed Commercial Operation Date
GE	General Electric
GEP	Guaranteed Energy Production
GHG	Greenhouse gas
GTSR	Green Tariff Shared Renewable
GTSRBA	Green Tariff Shared Renewables Balancing Account
GTSRMA	Green Tariff Shared Renewables Memorandum Account
GWh	Gigawatt-hours
HRSG	Heat recovery steam generator
I&C	Instrumentation and Controls
IDD	Initial Delivery Date
IOU	Investor-owned utility
kV	Kilovolt
kW	Kilowatt
LAF	Load Adjustment Factor
LAP	Load Aggregation Point
LCD	Least-Cost Dispatch
LFO	Light fuel oil
LMP	Locational Marginal Price
LOTO	Lockout Tagout

Acronym	Description
LSE	Load Serving Entity
LTRAA	Long-Term Resource Adequacy Agreement
MAPE	Mean absolute percentage error
MDR	Master Data Request
MPB	Market Price Benchmark
MTCBA	Modified Transition Cost Balancing Account
MTR	Mid-Term Reliability
MW	Megawatt
MWh	Megawatt-hours
NEM	Net Energy Metering
NERC	North American Electric Reliability Corporation
NPV	Net Present Value
NUP	Non-Utility Property
OEM	Original engine manufacturer
PABA	Portfolio Allocation Balancing Account
PCIA	Power Charge Indifference Adjustment
PDR	Proxy Demand Response
PG&E	Pacific Gas & Electric Company
PPA	Power Purchase and Sale Agreement
PPCBA	Public Policy Charge Balancing Account
psi	Pounds per square inch
PSPS	Public Safety Power Shutoff
Pub. Util.	Public Utilities
PV	Photovoltaic
RA	Resource Adequacy
REC	Renewable Energy Credit

Acronym	Description
ReMAT	Renewable Market Adjusting Tariff
RPS	Renewables Portfolio Standard
RT	Real-Time
RTM	Real-time market
RTO	Requests for Offers
SC	Scheduling Coordinator
SCE	Southern California Edison
SOC	Standard of Conduct
ST	Steam turbine
SWP	Safe Work Permit
UGBA	Utility Owned Balancing Account
UOG	Utility-Owned Generation
V	Volt

*DR is used in place of Data Request in footnote citations