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Date: November 5, 2021
Witness(es): Various

PACIFIC GAS AND ELECTRIC COMPANY

2023 GENERAL RATE CASE

EXHIBIT (PG&E-2)

RISK MANAGEMENT, SAFETY, OPERATING RHYTHM, AND CLIMATE RESILIENCE

[INCLUDES NOVEMBER 5, 2021 ERRATA]

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-2)
RISK MANAGEMENT, SAFETY, OPERATING RHYTHM, AND CLIMATE RESILIENCE

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[1] New witness from the June 30, 2021 submission.

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ENTERPRISE AND OPERATIONAL RISK MANAGEMENT PROGRAM

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ENTERPRISE AND OPERATIONAL RISK MANAGEMENT PROGRAM

A. Introduction and Chapter Overview

Pacific Gas and Electric Company's (PG&E) Enterprise and Operational Risk Management (EORM) program supports data-driven, risk-based decision-making for measurable risk reduction by providing a consistent framework, tools, and risk management program governance across the enterprise. The safety of our customers, employees, contractors, and communities is our first consideration. Risk management is central to providing safe, reliable, affordable, and clean energy.

This chapter discusses PG&E's current EORM program and the long-term vision for EORM including the organizational structure and processes that support internal and external stakeholder interface with the EORM program. It also discusses the California Public Utilities Commission's (CPUC or Commission) decision approving PG&E's plan of reorganization (POR),[1] and other on-going risk-related regulatory activities. Finally, throughout this chapter, PG&E describes how it is addressing each of the elements in the CPUC risk-based decision-making framework that is shown in Figure 1-1 below. The CPUC's risk-based decision-making framework was developed to increase transparency and accountability of how utilities prioritize and manage safety risk.[2]

The CPUC's risk-based decision-making framework starts with the Safety Model Assessment Proceedings (S-MAP) that establishes a framework to assess safety risks and identify mitigation options. In several sections of this chapter PG&E describes how it is complying with the S-MAP Settlement Agreement.[3]

The next element in the risk management framework is the Risk Assessment and Mitigation Phase (RAMP). PG&E is required to file a RAMP

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1 D.20-05-053, Decision Approving Reorganization Plan (May 28, 2020).

2 https://www.cpuc.ca.gov/riskassessment/.

3 D.18-12-014, Phase Two Decision Adopting S-MAP Settlement Agreement with Modifications (December 20, 2018).

application including a RAMP Report describing: its risk assessment and modeling process using the S-MAP framework; the risk modeling outcomes; and, the options to mitigate its risks. PG&E filed its 2020 RAMP Report on June 30, 2020.[4] In this chapter, PG&E introduces how it has incorporated the findings and feedback provided by the Commission and parties during PG&E's 2020 RAMP Report proceeding into this General Rate Case (GRC).

The GRC is the next step in the risk-based decision-making framework. In the GRC, PG&E includes a description of the risk modeling process and outcomes and requests funding for its proposed mitigation programs. PG&E describes its risk modeling process and requests funding for mitigations and controls in the line of business (LOB) exhibits.[5]

Two other elements of the CPUC risk management framework are the Risk Spending Accountability Report (RSAR) and the Safety and Performance Metrics (SPM) Report. PG&E describes these reports in Section F.2 below.

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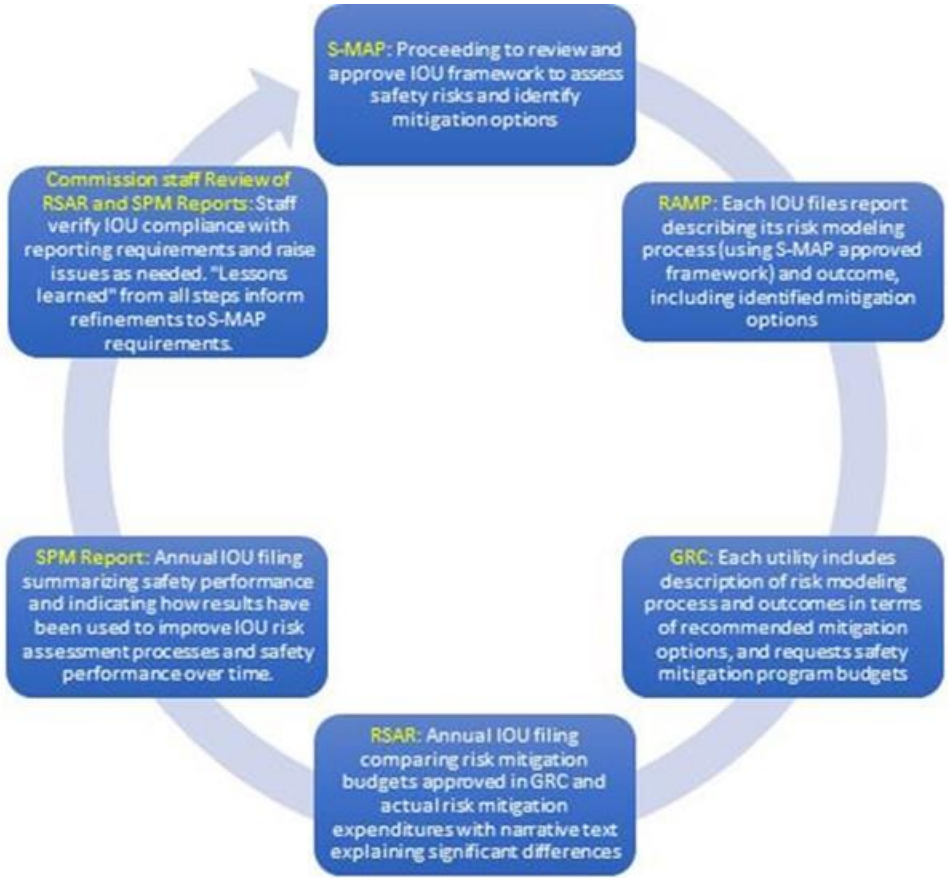
4 A.20-06-012, PG&E's 2020 RAMP Report.

5 Refer to: Exhibit (PG&E-2), Ch. 4; Climate Resilience; Gas Operations, Exhibit (PG&E-3), Chapter 3; Electric Operations, Exhibit (PG&E-4), Chapter 3; Energy Supply, Exhibit (PG&E-5), Chapter 2; and Shared Services, Exhibit (PG&E-7), Chapter 1 (Enterprise Health and Safety), Chapter 2 (Aviation and Transportation Services), Chapter 5 (Real Estate), Chapter 6 (Land and Environmental Management), Chapter 7 (Enterprise Records and Information Management and Data Governance), Chapter 8 (IT), Chapter 9 (Cyber and Corporate Security), Chapter 10 (Geosciences).

FIGURE 1-1
THE CPUC'S RISK-BASED DECISION-MAKING FRAMEWORK



Note https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M344/K081/344081678.PDF. See p. 10.

B. Enterprise and Operational Risk Management

1. EORM Program Objectives

The objective of PG&E's EORM program is to facilitate risk-based, data-driven decision-making that results in measurable risk reduction. To accomplish this, PG&E's EORM program provides the lines of business with tools, methods, and technical support to:

- Identify risks that can lead to severe or catastrophic safety, reliability, and financial consequences for our customers;
- Develop and implement mitigations and controls that have the greatest potential to reduce those risks and are the most cost-effective options, or most compelling Risk Spend Efficiency (RSE), for managing risk; and

- Drive accountability and transparency in monitoring and reporting risk-related information.

EORM's processes are based on the principles of the widely-respected International Organization for Standardization (ISO) 31000 risk management standard. The EORM program helps the Company to systematically identify, evaluate, prioritize, mitigate, and monitor risk inherent in our operations. In addition to applying the ISO 31000 risk management framework, PG&E is currently pursuing ISO 55001 asset management recertification in Gas Operations and new ISO 55001 certifications in Electric Operations, Power Generation and Information Technology (IT) to improve asset performance and achieve more effective risk reduction for our asset investments.[6] Asset management (ISO 55001) identifies risk management as an enabler to achieve asset management objectives.

In addition to pursuing ISO 55001 certifications PG&E is also implementing a Lean Operating System throughout the Company.[7] In 2021, PG&E created a Wildfire Risk Management organization focused on ensuring that the most effective mitigations are selected and delivered for PG&E's highest priority risks. The Wildfire Risk Management organization is headed by the Chief Risk Officer (CRO) and comprised of a cross functional team with responsibility for all aspects of wildfire risk mitigation. The Wildfire Risk Management organization will use Lean Operating System principles to: (1) provide greater line-of-sight from risk-informed planning through execution by improving cross functional communication; and (2) stabilize operational systems leading to more effective delivery of our wildfire risk

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6 ISO 55001 is an asset management standard, the main objective of which is to help organizations manage the lifecycle of assets more effectively. ISO-55001 requires that organizations take actions to address risks and opportunities associated with managing their assets, taking into account how these risks and opportunities can change with time, by establishing processes for: identification of risks and opportunities; assessment of risks and opportunities; and implementation of the appropriate treatment and monitoring of risks and opportunities.

7 The Lean Operating System will further improve coordination and accountability, as well as standardize a culture of continuous improvement across the enterprise and at the local level. The Lean Operating System will improve safety and operational outcomes by providing clear visibility into performance as measured by the Company's most important metrics, creating a daily dialog about results, and reinforcing a consistent problem-solving approach to rapidly address issues and continuously improve operations. See Exhibit (PG&E-1), Ch. 1.

reduction mitigation and control programs. The Wildfire Risk Management organization will help PG&E establish a blueprint for more effective implementation of mitigation and control programs that can be applied to other enterprise risks.

2. EORM Programmatic Improvements

EORM strives to continually improve the identification and management of risk. As such, EORM has identified a series of risk management improvements for this GRC period. These improvements impact risk management across the entire risk register. Areas targeted for improvement are:

- Advanced risk analytics;
- Additional standardization of policies and procedures; and
- Instituting risk management verification.

These improvements are described in more detail in Exhibit 7, Chapter 11.

One of the key programmatic improvements PG&E has instituted for managing risk is instituting steering committees and implementation teams focused on ensuring that the most effective mitigations are selected and delivered for PG&E's highest priority risks. PG&E recognized the need for additional governance around managing its highest scoring safety risk and in 2020, formed the Wildfire Governance Steering Committee to ensure that: (1) the wildfire workplan is comprised of the highest priority, risk-mitigating work consistent with safety focused investments, asset strategy and operational needs; (2) the approved risk-informed work plan is completed; and (3) the execution and the associated quality of the work has appropriate oversight.

The Wildfire Risk Governance Steering Committee is initially focused on system hardening, enhanced vegetation management, inspections and repairs/replacements, the Public Safety Power Shutoff (PSPS) program and other wildfire work. The Wildfire Governance Steering Committee is chaired by the CRO and includes as its members senior leaders in Electric Operations Asset Management, Risk Management, Major Projects and Programs, Wildfire Safety and Public Engagement, Public Safety Specialists, and PG&E's Chief Audit Officer.

The Wildfire Risk Governance Steering Committee has brought increased rigor and discipline to the prioritization of wildfire risk reduction in wildfire mitigation work planning for 2021. Based on enhanced modeling there is a direct link between the work planned to be done and the risk model's ranking of high-risk circuits and Circuit Protection Zones. Leaders in various areas who are responsible for wildfire mitigation efforts convene to discuss risk models, work prioritization for 2021, and executing work against the approved risk-informed work plans. Under this new structure, risk reduction is the predominant factor for selecting wildfire mitigation work.[8]

C. Risk Management Long-Term Vision

1. The Relationship between Enterprise and Compliance Requirements

PG&E recognizes that there is a fundamental relationship between enterprise risks and compliance requirements. Historically PG&E has managed enterprise risk management and compliance requirements as two separate programs. Going forward PG&E will begin to manage the programs concurrently, recognizing the interrelationships between enterprise risks and compliance requirements.

The risk exposure from failing to evidence conformance with compliance requirements can impact safety, reliability, regulatory, financial, and reputation if the utility fails to comply with laws, regulations, company code of conduct or internal policies. Enterprise risks may be associated with one or more compliance requirements. Co-managing enterprise risks and compliance requirements will better inform the scope and requirements of work that mitigates enterprise risks.

Ultimately, improving the line of sight from enterprise risks to compliance commitments and related risk mitigations and controls will allow PG&E to consider compliance commitments when developing and prioritizing its work plans. In 2021 PG&E began mapping compliance requirements to key safety and reliability risk events and cross-cutting factors. The mapping

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8 Letter from Kirkland & Ellis LLP to The Honorable William H. Alsup, Case 3:14-cr-00175-WHA, Document 1277-1, Filed 12/29/20, Re: Court Request for Monitor Comments on PG&E Vegetation Management Matters, p. 2.

process includes: identifying the compliance requirements and the mitigations and controls that address them; determining if any compliance requirements are not currently addressed by a mitigation or control; identifying mitigations and controls that impact the highest priority risks; and evaluating data to determine if the mitigation and/or control program can achieve the desired compliance objectives or if the programs need to be modified.

2. Risk Management in the Planning Process

Previously PG&E evaluated the top safety risks through its integrated planning process, specifically the risk phase known as Session D. The key outcome of Session D was alignment on the areas of focus for the coming year.[9] PG&E adopted a new framework to run the business when it emerged from its Chapter 11 proceeding in 2020 called the Operating Rhythm. The work previously done in Session D will be incorporated into the new planning process and into the LOB Risk and Compliance Committees. The new planning process will assess work plans, resources, finances, risk assessments, performance indicators and performance targets. PG&E describes the planning process in Exhibit (PG&E-2), Chapter 3.

One change to the planning process is the way PG&E prioritizes spending. PG&E is retiring its Risk Informed Budget Allocation (RIBA) standard. PG&E's RIBA standard was criticized for its lack of transparency in scoring mechanisms and its over-reliance on subject matter expert (SME) opinion. Additionally, RIBA only applied to Gas Operations, Electric Operations and Power Generation. Ultimately, PG&E determined it was no longer effective for risk-based decision-making.[10]

When PG&E developed its prioritized portfolio for this GRC, PG&E was transitioning between retiring the RIBA standard and implementing a new process. In this transition period the lines of business relied on different

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9 A.18-12-009, HE-2: Exhibit (PG&E-2), p. 2-4, line 31 to p. 2-5, line 8.

10 Gas Operations did consider RIBA scores as one factor among many (e.g., risk spend efficiency values and compliance commitments) when it developed its forecast for this GRC. See Exhibit (PG&E-3), Ch. 2, Section E. Going forward, RIBA will be permanently retired.

methods to evaluate and prioritize their risk-informed work portfolio. Gas Operations conducted a series of prioritization investment decision meetings where proposed programs were evaluated based on contribution to risk reduction, code compliance and reasonableness.[11] Electric Operations applied an approach centered around its risk-based Loading Order, Circuit/Protection Zone Ranking and work execution analyses.[12] Energy Supply prioritized its spending based on assuring the safe, reliable and efficient operations of PG&E's generation assets, addressing compliance activities, and identifying and mitigating safety risks and regulatory compliance issues identified through the risk management program.[13] Even though the lines of business relied on different methods to develop their GRC forecast, the overall objectives for each LOB were to prioritize safety and risk-reduction initiatives, to focus on improving reliability and to address customer related and load growth work.

PG&E continues working through this transition period and is developing new procedures for prioritizing its work on a risk-informed basis.[14] In January 2021 PG&E introduced the Risk Based Portfolio Prioritization Framework (RBPPF).[15] The RBPPF applies to all lines of business and will ultimately be used to establish a consistent and complete approach to categorizing and prioritizing work. One element of the RBPPF is to establish five work types (into which all PG&E's work can be classified). The five work types are: Emergency Restorative and Preventative; Customer Commitments and Load Growth; Compliance; Risk Reduction; and Operational Coordination. In this GRC, Gas Operations[16] categorizes their

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11 See Exhibit (PG&E-3), Ch. 2, Section E.

12 See Exhibit (PG&E-4), Ch. 2, Section D.

13 See Exhibit (PG&E-5), Ch. 1, Section B.

14 In the 2020 GRC, PG&E committed to improving its prioritization process by incorporating risk quantification – outputs from its MAVF—into the prioritization process. PG&E will incorporate outputs from the MAVF into the new prioritization procedures it develops. A.18-12-009, HE-10: Exhibit (PG&E-3), p. 3-23, lines 3-7 and A.20-06-012, RAMP Report, p. 2-14, lines 2-6.

15 RBPPF. Utility Risk Standard: RISK 5400S, Publication Data 12/31/2020, Exhibit (PG&E-2), WP 1-1.

16 Exhibit (PG&E-3), Ch. 2.

forecasts into the five work types and Electric Operations[17] groups its spending into similar work type categories.[18]

3. The Corporate Risk Register

Since the 2020 GRC PG&E transitioned to an event-based risk register that is developed on an enterprise-wide basis and is governed and supported by EORM.[19] The Corporate Risk Register (CRR) includes 32 event-based risks. Some of the individual risks previously included on the risk register are now considered drivers or controls for event-based risks.[20] The CRR also includes 8 cross-cutting factors. A cross-cutting factor is not a risk event itself but can impact multiple risk events.[21] For example, Emergency Preparedness and Response (EP&R) examines the drivers and consequences of inadequate planning or response to catastrophic emergencies. EP&R is a cross-cutting factor that impacts several risk events such as Aviation, loss of containment (LOC) risks and Real Estate and Facilities Failure.

Attachment A lists the 40 risk events and cross-cutting factors on PG&E's CRR. The table: defines the risk event or cross-cutting factor; shows the 2023 test-year (TY) risk score and 2023 TY safety risk score; indicates if the risk was included in the 2020 RAMP Report; and lists where additional information about the risk event or cross-cutting factor is included in PG&E's 2023 GRC. Attachment B of this chapter is a cross-cutting factor mapping table that lists each of the cross-cutting factors and identifies which risk events they impact.

4. Risk Management Tools

PG&E uses the Multi-Attribute Value Function (MAVF), bow-tie methodology and RSE to evaluate risk and risk mitigation and control initiatives for all its risks. The S-MAP Settlement Agreement requires that

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17 Exhibit (PG&E-4), Chapter 2.

18 Energy Supply did not categorize its work into the five work types because they had completed prioritizing their portfolio before the RBPPF was introduced in January 2021.

19 A.20-06-012, RAMP Report, p. 1-7, line 33 to p. 1-8, line 1.

20 A.20-06-012, RAMP Report, p. 1-8, lines 3-7.

21 A.20-06-012, RAMP Report, p. 1-8, line 21 to p. 1-9, line 1.

PG&E compute a Safety Risk Score for each Corporate Risk Register risk using the safety attribute of the MAVF.[22]

The S-MAP Settlement Agreement requires utilities to build a MAVF to evaluate and rank alternative risk mitigation programs.[23] PG&E's MAVF reflects our focus on low-frequency/high-consequence risk events without neglecting high-probability/low-consequence risk events.[24]

PG&E develops a bow-tie for its safety risks and certain reliability risks.[25] The bow-tie is a visual summary of the risk event, the risk drivers, the likelihood or frequency of the risk event and the potential consequences of the risk event and the risk score.[26]

RSE is a metric for representing the benefit to cost ratio of a mitigation, where benefit is described in terms of risk reduction.

PG&E describes its MAVF (and how it complies with the S-MAP Settlement Agreement), the bow-tie methodology and the RSE in its 2020 RAMP Report.[27]

As a result of lessons learned and feedback during the 2020 RAMP proceeding, PG&E is evaluating how to improve the granularity of its RAMP risk models, its operational models and is exploring how those two types of models will interact.[28] PG&E discusses this further in Section E (5) below.

Along with the Enterprise risk management tools, PG&E LOB risk teams have developed and use their own risk management tools that are described in the individual Electric Operations, Gas Operations and Energy Supply risk management chapters and in certain Shared Services LOB forecast chapters.

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22 D.18-12-014, p. 22, Step 2A.

23 D.18-12-014, p. 22, Step 1A.

24 A.20-06-012, RAMP Report, p. 3-3, lines 7-9.

25 PG&E analyzes the safety, reliability and financial consequences of each risk but does not create a bow-tie for risks that have only financial consequences.

26 PG&E includes bow-ties for its 2020 RAMP risks in the testimony describing the RAMP risk and bow-ties for other safety and reliability risks in WPs in this GRC. References to the WP where the bow-tie is located is included in the testimony describing the other safety and reliability risks.

27 A.20-06-012, RAMP Report, Chapter 3.

28 A.20-06-012, PG&E's Opening Comments, p. 3.

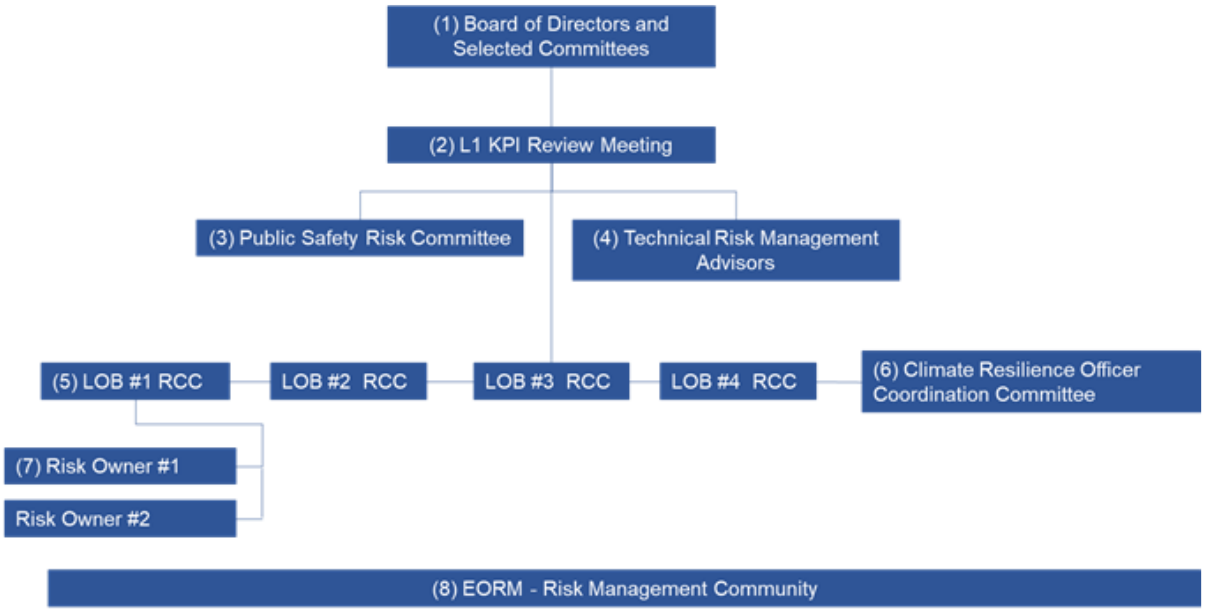
D. Enterprise and Operational Risk Management Organization

PG&E recognized that the existing risk governance framework faced challenges. Board oversight relative to risk management lacked context and utility oversight focused more on process than results. A real-time view of risk trajectory was lacking across oversight forums and accountability mechanisms linking risk indicators to operating performance were immature.

Given the challenges with the existing risk governance framework, PG&E is transforming its risk management framework in 2021. Key steps in this transformation center on: (1) clarifying the objective and scope of the governance process; (2) updating decision-making processes; and (3) engaging industry leaders in risk management and operations to review and advise PG&E around risk management strategy and implementing mitigations for top safety risks.

The new risk governance framework has several levels of governance with varying responsibilities that are facilitated by the CRO and EORM staff. Figure 1-2 below sets forth the EORM Risk Governance Framework.

FIGURE 1-2
PG&E'S RISK GOVERNANCE FRAMEWORK 2021



1) Board of Directors and Select Board Committees – Relevant Board committees are responsible for providing oversight of the appropriate Enterprise risks aligned with their charter;

2) Key Performance Indicator (KPI) Monthly Operating Review Meeting – Senior leaders meet to review KPI. Key Risk Indicators (KRIs) are a subset of the KPIs monitored by senior leaders. KRIs and mitigation effectiveness are monitored to ensure resources are allocated to achieve risk reduction objectives;
3) Public Safety Risk Committee (PSRC) – The PSRC develops and monitors risk management strategic planning and execution and provides independent review of risk management activities;
4) Technical Risk Management Advisors – Industry leaders in risk management and operations advise PG&E regarding ongoing risk-management strategy;
5) Risk and Compliance Committee (RCC) – LOB RCCs are chaired by the most senior leader in the LOB and are the forum for managing risk in the LOB;
6) Climate Resilience Officer Coordination Committee – This committee is chaired by the Climate team and focuses on climate-related risk issues across PG&E's lines of business;
7) Risk Owner and Risk Manager – Each risk has a risk owner and risk manager in the LOB who are responsible for managing risk-related activities and implementing EORM processes; and
8) Risk Management Community (RMC): The RMC meetings are open to and attended by risk managers, risk owners and SMEs from all the lines of business to discuss current topics in PG&E risk management.

Along with the changes to the risk governance framework the organization of the Office of the CRO is also transitioning to further address POR requirements, as described in section F.3 below, and to strengthen the links between the EORM programs and operational risk management. The key changes PG&E made to address POR requirements are: the CRO's new reporting relationship to the Board of Directors Safety and Nuclear Oversight Committee; the improvements in the risk governance structure; and EORM's increased oversight of the work the lines of business are undertaking in order to reduce risk.

This transition will enable EORM to better support data-driven decision-making across PG&E. Figure 1-2 outlines PG&E's new CRO

organization. PG&E further describes this organizational structure and forecast staffing changes in Exhibit (PG&E-7), Chapter 11.

FIGURE 1-3
PG&E'S RISK ORGANIZATION

E. RAMP to GRC Integration

1. Introduction

PG&E filed its RAMP Report on June 30, 2020 (Application (A.) 20-06-012).[29] The Safety Policy Division (SPD) filed a report evaluating PG&E's RAMP Report on November 25, 2020 (SPD Report).[30] PG&E also received comments from other interested parties on January 15, 2021 including the Public Advocates Office at the California Public Utilities Commission, The Utility Reform Network (TURN), Mussey Grade Road Alliance (MGRA), FEITA Bureau of Excellence, and the Coalition of

[29] PG&Es 2020 RAMP Report is included herein as Exhibit (PG&E-2), WP 1-136.

[30] A.20-06-012, SPD Staff Evaluation Report on PG&E's 2020 RAMP Application (November 25, 2020).

California Utility Employees (CUE).[31] PG&E filed opening and reply comments on January 15[32] and 29, 2021, respectively.[33]

SPD confirmed that PG&E's methodology conforms to the steps outlined in the Settlement Agreement. Further, SPD found that PG&E's 2020 RAMP showed marked improvements in risk modeling rigor, data quality and transparency over previous rate cases.[34]

PG&E appreciates SPD and parties' review and feedback and believes that this collaborative method for analyzing PG&E's safety risk events will ultimately result in a more robust approach to managing those risks.

2. Responding to Safety Policy Division's Comments on PG&E's 2020 RAMP Report

The SPD Report examined the soundness and adequacy of PG&E's overall risk assessment and evaluation approach, whether that approach complied with the MAVF process specified in the S-MAP Settlement Agreement, and then evaluated each risk chapter in detail.[35]

PG&E reviewed SPD's comments and detailed analysis for each of PG&E's top 12 safety risks and other factors impacting its risk assessment.[36] We appreciate SPD's feedback and have incorporated much of it into the risk analysis presented in this GRC. To ensure that SPD comments were evaluated and are addressed in this GRC, PG&E

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31 Parties commenting on PG&E's 2020 RAMP Report are: Public Advocates Office, California Public Utilities' Commission; TURN; FEITA Bureau of Excellence; MGRA; and CUE.

32 A.20-06-012, PG&E's Comments on SPD's Evaluation of PG&E's RAMP Report (January 15, 2021) (PG&E Opening Comments).

33 A.20-06-012, PG&E's Reply Comments in Response to Comments on PG&E's RAMP Report and SPD's Evaluation (January 29, 2021).

34 A.20-06-012, SPD Report, p. 4.

35 A.20-06-012, SPD, Report, p. 8.

36 A.20-06-012, SPD, Report, pp. 19-139.

developed workpapers listing SPD and party comments and PG&E's response.[37]

In its review, SPD identified two key areas for improvement: (1) increased granularity; and (2) more RSE calculations for controls. These findings suggest that PG&E should provide more detailed information in its risk analysis to provide the Commission, SPD and other interested parties with sufficient information to evaluate PG&E's GRC proposals.[38] PG&E prioritized these two key areas of feedback and has reflected them in the revised risk analyses used in this GRC.

To facilitate improved granularity, SPD recommends that PG&E review its tranches and identify areas where a tranche can be divided into finer tranches.[39] In its comments to the SPD Report, PG&E explained that it is important to distinguish between different types of risk models, specifically "enterprise risk models" and "operational risk models." Enterprise risk models conform to the risk management framework outlined in the S-MAP Settlement Agreement and allow PG&E to demonstrate that safety is a key consideration when forecasting work for the GRC. Operational risk models, however, are asset-based models that provide a detailed view of asset and risk conditions.[40] Given that the enterprise risk models and operational risk models serve different purposes, PG&E's efforts are best served by focusing on increasing granularity in its operational risk models, which are used to identify the most appropriate and effective mitigations on individual assets.[41] Work to incorporate increased granularity in both operational and enterprise risk models has already begun.

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37 Exhibit (PG&E-2), WP 1-2. While the workpaper listing SPD and party comments about PG&E's 2020 RAMP Report and PG&E's response is included as an attachment to this chapter, the line of business that sponsors each risk event (e.g., Wildfire is sponsored by Electric Operations) is responsible for PG&E's responses to SPD and party comments. This witness is responsible for the responses to SPD and party feedback regarding EORM.

38 A.20-06-012, PG&E Opening Comments, p. 2.

39 A.20-06-012, SPD Report, p. 14.

40 A.20-06-012, PG&E Opening Comments, pp. 3-5.

41 A.20-06-012, PG&E Opening Comments, pp. 5-6.

SPD's second principal area for improvement was to provide RSEs for control programs in the GRC. PG&E committed to providing RSEs for all 2020 RAMP risk and non-RAMP risk mitigations, the 2020 RAMP risk controls as well as for all controls required by the S-MAP Settlement Agreement Step-3 Supplemental Analysis.[42] As a result, PG&E is providing 114 RSEs for mitigations in the GRC compared to the 52 mitigation RSEs provided in the 2020 RAMP Report and 172 RSEs for controls in the GRC compared to 2 control RSEs provided in the 2020 RAMP Report.[43] Workpapers in the Gas Operations, Electric Operations and Energy Supply exhibits list the results of the Step-3 Supplemental Analysis for the non-RAMP risks.[44]

In all, PG&E identified approximately 500 items in the SPD Report and party comments that EORM and the LOBs are responding to in this GRC. Attachment C shows where in the GRC testimony PG&E's addresses SPD's comments.

3. Responding to Parties' Comments on PG&E's 2020 RAMP Report

Parties' comments generally focused on three themes: (1) wildfire-related issues; (2) risk modeling and the MAVF; and (3) other considerations. In our review, PG&E identified certain comments that are more appropriately addressed in other proceedings. For example, FEITA was concerned about staffing levels in PG&E's Gas Operations Process Safety Team.[45] PG&E considers staffing levels outside the scope of the RAMP proceeding and does not address this comment in the GRC. To ensure that parties' comments were addressed, PG&E developed workpapers listing comments and PG&E's response.

Parties generally agreed with the SPD Report's recommendations to develop a more granular approach for wildfire risk tranches. Parties also addressed individual wildfire issues such as PSPS and disaggregating RSE calculations for wildfire mitigations. Each of these issues is addressed in the

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42 A.20-06-012, PG&E Opening Comments, p. 8.

43 Exhibit (PG&E-1), WP 1-69.

44 The Step-3 analyses are included in the LOB workpaper packages.

45 FEITA Bureau of Excellence Opening Comments to PG&E's 2020 RAMP Report, p.71.

Electric Operations exhibit in this GRC starting with the Electric Operations risk policy chapter.[46]

Parties' comments related to risk modeling and the MAVF framework focused on technical issues including: the linear scaling function; using a power law distribution; operational failure as a risk driver; and the value of a statistical life.[47] As stated in PG&E's Reply Comments, many of these items should be considered in the on-going *Order Instituting Rulemaking to Further Develop a Risk-Based Decision-Making Framework for Electric and Gas Utilities*[48] and not addressed in a one-off basis by PG&E in the GRC. However, PG&E did revise its MAVF models based on SPD's and parties' input, as summarized in Section E.5 below.

PG&E summarizes and responds to five other comments raised by interested parties in its Reply Comments. As discussed in Reply Comments, certain issues will be addressed in this GRC. For example, TURN recommended that PG&E should model operational failures as a risk driver for its 2023 GRC.[49] PG&E agrees with this recommendation and has included operational failures in its Wildfire risk models. Going forward, PG&E will add operational failure to other risk models where possible. Other issues will be addressed in PG&E's 2024 RAMP Report and some will be addressed through other procedural means.[50]

Attachment C shows where PG&E's responses to Parties' comments are addressed in PG&E's testimony.

4. Updating Information Provided in the 2020 RAMP Report

In response to SPD and Parties' feedback and the S-MAP requirements, PG&E updated certain information provided in the 2020 RAMP Report.

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46 Exhibit (PG&E-4), Ch. 3.

47 A.20-06-012, PG&E Reply Comments, pp. 5-7.

48 *Order Instituting Rulemaking to Further Develop a Risk-Based Decision-Making Framework for Electric and Gas Utilities*, R.20-07-013 (July 16, 2020).

49 A.20-06-012, Opening Comments of TURN on Pacific Gas and Electric Company's RAMP Report and The SPD's November 25, 2020 Evaluation Report (January 15, 2021) p. 7.

50 A.20-06-012, PG&E Reply Comments, pp. 8-10.

- For the risks evaluated in RAMP Report, PG&E updated its risks analyses and cost forecasts for the GRC. This includes incorporating 2020 recorded data into the risk models such as cost data, exposure data and event data.
- PG&E updated certain of its risk models. PG&E significantly updated its wildfire risk model to include feedback received during the RAMP process (see Exhibit (PG&E-4), Chapter 3).
- PG&E refreshed all the RAMP risk mitigation RSEs and provides tables comparing RAMP RSEs to GRC RSEs and explains the differences between the results.[51]
- PG&E calculated RSEs for all non-RAMP risk mitigations.
- PG&E calculated RSEs for all RAMP risk controls.
- PG&E calculated RSEs for non-RAMP risk controls as required by the Step-3 Supplemental Analysis.[52]
- PG&E updated its PSPS risk analyses, including analyses evaluating PSPS impacts, based on feedback provided in the RAMP proceeding. This updated analysis will inform the various safety and reliability programs PG&E will present in the 2023 GRC.

PG&E describes in testimony the changes to its risk models, risk model results and changes to the forecast mitigation and control programs. Attachment C includes a table showing where each of these elements in addressed in PG&E's opening testimony.

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51 The differences between the RSEs presented in RAMP and those presented in the GRC are due to either: (1) changes in MAVF risk modeling and RSE calculation methodology applied to all risk models; (2) changes to the data included in individual risk models; (3) changes to individual risk models; and/or (4) a combination of items 1, 2 and/or 3. The changes in MAVF risk modeling methodology applied to all risk models are described in Section E5 below. Changes related to individual risk models are described in the Exhibit level risk policy testimony for Gas Operations (Exhibit (PG&E-3), Ch. 3), Electric Operations (Exhibit (PG&E-4), Ch. 3), Energy Supply (Exhibit (PG&E-5), Ch. 2) or in individual Shared Services chapters describing RAMP risk events (Exhibit (PG&E-7). PG&E describes the differences between RSEs for the RSEs with the largest change in the LOB risk policy chapters.

52 D.18-12-004, Row 28.

5. Improving the Multi-Attribute Value Function Framework

Since filing the 2020 RAMP Report, PG&E identified areas where it could improve the enterprise risk model and RSE calculations.[53] PG&E has made the following updates.

- RSE Methodology: In the 2020 RAMP Report, PG&E employed a portfolio view of risk reduction wherein PG&E calculated an individual RSE for each mitigation based on the portfolio risk reduction (from all of the mitigations in the risk mitigation portfolio) allocated to each mitigation. PG&E modified this approach and is now calculating an incremental risk reduction. For incremental risk reduction, PG&E calculates one RSE for each mitigation or control starting with the test year baseline risk scores and does not consider the portfolio of mitigations. This approach allows one to compare mitigation RSEs to control RSEs.
- Present Value of Revenue Requirements (PVRR): In its 2020 RAMP Report, PG&E stated that it was considering using an estimated Revenue Requirement associated with capital spend to account for the incremental expenses associated with the capital investments such as depreciation and return on equity over the book life of an asset. Using the Revenue Requirement to calculate Net Present Value (NPV) allows for a direct comparison between the RSEs for capital programs and the RSEs for expense programs by normalizing the risk reduction per customer's dollar spent.[54] The RSEs presented in the GRC include a PVRR factor to convert capital dollars to NPV of a revenue requirement for each capital investment subject to cost-of-service ratemaking.
- Qualitative Methodology: In the GRC, PG&E is introducing a method for qualitatively assessing program effectiveness when no other data is available. The qualitative method is based on a questionnaire that teams complete to evaluate program effectiveness. It provides a consistent framework for evaluating program or project effectiveness by

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53 Track 1 of the Risk Order Instituting Rulemaking (OIR), A.20-07-013, considers certain updates to the MAVF, Estimate Quality, and other potential updates to S-MAP requirements.

54 A.20-06-012, RAMP Report, p. 3-27, lines 8-19.

defining effectiveness categories (e.g., elimination, engineered barrier, etc.) and the risk drivers impacted by the mitigation program (e.g., human error, functional failure, natural forces, etc.). For example, the team may be evaluating the effectiveness of a program for installing fencing around certain electric assets. This fencing program is defined as an engineered barrier (defined as, "program represents a barrier installed between the risk driver and risk event"). Next, the team identifies which risk drivers the fencing program mitigates and selects malicious/negligent action. Based on these selections, the qualitative effectiveness model produces an effectiveness value that is used in the risk model. Risk managers using the qualitative effectiveness model are required to develop a plan for converting program effectiveness to a quantitative approach.

6. Updating PG&E's Response to the Pandemic

In the 2020 RAMP Report, PG&E provided an initial assessment of how PG&E was addressing the novel coronavirus (COVID-19) with respect to the health and safety needs of customers and employees and to ensure that critical energy services were available to the public.[55] SPD recognized that PG&E's analysis was understandably limited and recommended that as PG&E prepares its GRC it should continue to evaluate the risk exposure and mitigation.[56]

Since PG&E filed the 2020 RAMP Report it has identified Severe Workforce Disruption as a new business risk to be monitored and managed by PG&E's Human Resources department. Severe Workforce Disruption is defined as a significant reduction in workforce that affects PG&E's ability to perform critical work and/or provide safe, reliable gas or electric service. Causes of this type of disruption include pandemic, labor action and natural disasters. In response to the pandemic, PG&E developed COVID-19 protocols, guidance documents, policy documents, and safety and compliance requirements. Going forward, PG&E will: maintain and periodically refresh business continuity plans; update its pandemic response

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55 A.20-06-012, RAMP Report, p. 6-1, lines 23-29.

56 A.20-06-012, SPD Report, p. 21.

plan; and launch new efforts to increase employee emergency preparedness. The objective of these actions is to ensure that when a major emergency occurs the impacts of workforce disruption are minimized.

F. Key Developments in Enterprise and Operational Risk Management since the 2020 GRC

1. Risk Management Progress Since the 2020 GRC

In its 2020 GRC, PG&E committed to move to a more quantitative approach for assessing and managing risk. We identified certain areas where progress was already being made; others where we would focus attention in later years.[57] PG&E made progress against the goals set forth in the 2020 GRC as described below.

Ensure all risks are event-based: PG&E has transitioned from a SME-informed 7x7 risk selection tool to an event-based risk register grounded in repeatable risk events. In the 2020 RAMP Report, PG&E introduced its CRR that now consists of event-based risks.[58]

Identifying and Using both New and Existing Data for Modeling: PG&E has improved its data to enable a transition from a risk management process that primarily relied on the judgment of SMEs and industry data to a process driven largely by PG&E-specific data from historical events, supplemented as necessary with SME and industry data.[59] For example, the LOC on Gas Distribution Main or Service data set has been augmented by the use of the Distribution Integrity Management Program RiskFinder dataset, PG&E's historical distribution incident database, where it previously depended primarily on industry data.

Developing and Enhancing Enterprise Risk Models: As required by MAVF Principle 5 in the S-MAP Settlement Agreement,[60] PG&E's MAVF uses actual distributions as opposed to a single P95 point estimate used for the 2020 GRC. The MAVF uses a probabilistic approach to modeling Attribute levels. The Attributes are specified by well-defined conditional

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57 A.18-12-009, HE-2: Exhibit (PG&E-2), p. 3-25, line 2 to p. 3-27, line 32.

58 A.20-06-012, RAMP Report, p. 1-4, fn. 13.

59 A.20-06-012, RAMP Report, p. 1-6, lines 3-6.

60 D.18-12-014, Attachment A, Appendix A, p. A-5.

probability distributions with parameters derived from data and/or calibrated SME input. Monte Carlo methods are used to simulate Attribute levels from these distributions.[61] Employing the techniques established in the S-MAP Settlement Agreement allow us to more accurately measure risk.

PG&E's MAVF also includes the ability to quantitatively evaluate alternative risk mitigation strategies, and subsequently choose a portfolio of preferred mitigations based, in part, on estimated risk reduction per dollar spent.[62] For example, for all the risks presented in the 2020 RAMP Report, PG&E provided RSE scores for each proposed and alternative mitigation and also calculated RSEs for risk mitigation plans that were comprised of different groupings of mitigations.[63]

Quantitative Risk Modeling: PG&E's transition to a more probabilistic and quantitative approach to risk modeling has involved developing new skills, techniques, and data sources. EORM conducted training sessions for risk managers and risk owners focused on quantitative risk modeling techniques. PG&E continues to improve the data is uses to analyze risk. In the 2020 RAMP Report, all PG&E risk models for its top 12 safety risks included PG&E-specific data from historical events, supplemented as necessary with SME and industry data. Relying on PG&E-specific data more accurately captures both the consequences and likelihood of risk events in our service area.

Tracking of Associated Financials: In this GRC, PG&E introduced a standard risk identification nomenclature that it can use to identify risk-related costs (forecast costs for mitigations and controls). PG&E continues to work to adapt its management accounting system for reporting on risk-related spending.

PG&E also made changes to its governance and oversight models as described above in Section D.

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61 A.20-06-012, RAMP Report, p. 3-7, line 22 to p. 3-8, line 2.

62 Measurable risk reduction is referred to by the CPUC as risk/spend efficiency or RSE.

63 For example, see A.20-06-012, RAMP Report, p. 7-35, Table 7-15, that compares the RSEs for three risk mitigation plans for the Gas Operations LOC, Transmission risk.

2. Risk Management Accountability and Transparency

PG&E is committed to improving its accountability and transparency around its risk management processes, procedures and results. PG&E is strengthening risk management governance across the LOBs to ensure maximum transparency, accountability, and assurance as required by the EOEP.[64] The EOEP provides a roadmap for how the Commission will closely monitor PG&E's performance in delivering safe, reliable, affordable, clean energy. PG&E describes its new governance and oversight frameworks in Section D above.

To fulfill its commitment to improve accountability and transparency around risk management, PG&E provides detailed safety and risk management data to the Commission and interested parties through a variety of reports.

Safety Performance Metrics Report: PG&E files an annual Safety Performance Metrics Report in compliance with Commission Decision (D.) 19-04-020.[65] This decision requires PG&E to annually report on 26 safety performance metrics to measure achieved safety performance.[66] In its Safety Performance Metrics Report, PG&E provides an overview of 25[67] safety metrics, its performance over the last 10 years, notes if the metric is used to determine executive compensation or incentives or individual or group performance goals and progress against rate case safety goals.

Risk Spending Accountability Report: On March 30, 2021, PG&E filed its 2020 Risk Spending Accountability Report in compliance with D.19-04-020. The RSAR includes detailed comparisons of PG&E's imputed adopted and recorded costs for 2020 by Major Work Category (MWC) or Maintenance Activity Type (MAT) code for Gas Operations, Electric

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64 D.20-05-053, p. 122, Ordering Paragraph (OP) 4 and Appendix A, Enhanced Oversight and Enforcement Process.

65 A.15-05-003, Pacific Gas and Electric Company's 2019 Safety Performance Metrics Report in Compliance with California Public Utilities D.19-04-020 (April 1, 2020).

66 D.19-04-020, Phase Two Decision Adopting Risk Spending Accountability Report Requirements and Safety Performance Metrics for Investor-Owned Utilities and Adopting a Safety Model Approach for small and Multi-Jurisdictional Utilities, p. 2.

67 One of the 26 metrics identified by the Commission – Percentage of the Gas System that can be Internally Inspected – is not applicable to PG&E. See D.19-04-020, Attachment 1, p. 5, row 13.

Distribution, Energy Supply, Customer Care and Shared Services/IT. The report provides variance explanations for safety, reliability, and maintenance work subject to established thresholds.

Wildfire Mitigation Plan Report: PG&E filed its 2021 Wildfire Mitigation Plan (WMP) on February 5, 2021 in compliance with Assembly Bill 1054 and direction from the CPUC's Wildfire Safety Division. The WMP provides details on PG&E's comprehensive Community Wildfire Safety Program and outlines programs planned from 2021 to 2023 to prevent catastrophic wildfires.[68] Key elements of the WMP include:

- Reducing wildfire potential by inspecting and repairing/replacing equipment, conducting enhanced vegetation management, and investing in grid technology and system hardening;
- Improving situational awareness by installing weather stations and high-definition cameras throughout PG&E's service area, investing in PG&E's Wildfire Safety Operations Center that monitors high-fire threat areas in real time, and investing in meteorology to monitor weather conditions; and
- Continuing to make the PSPS Program better and build on the improvements from the 2020 program by upgrading the electric system to ensure PSPS is a measure of last resort and improving support for impacted customers and communities when PSPS is necessary.

2020 RAMP Report: PG&E submitted its 2020 RAMP Report to the CPUC pursuant to D.20-01-002.[69] The RAMP Report reflects the continued evolution of PG&E's EORM program and enables PG&E to: (1) Identify those risks that could lead to catastrophic safety consequences; (2) implement actions that have the highest and most cost-effective potential to reduce risk; and (3) transparently monitor and report results.[70]

Enhanced Oversight and Enforcement Reporting: As described in Section C(2)(d) above, PG&E is subject to an EOEP to provide a roadmap

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68 PG&E, 2021 WMP Report, R.18-10-007 (February 5, 2021).

69 PG&Es 2020 RAMP Report is included herein as Exhibit (PG&E-2), WP 1-136.

70 A.20-06-012, RAMP Report, p. 1-1, lines 23-28.

for how the Commission will closely monitor PG&E's performance in delivering safe, reliable, affordable, clean energy.

3. Risk Management Changes Resulting from PG&E's Plan of Reorganization

On May 28, 2020 the Commission issued D.20-05-053 approving PG&E's reorganization plan (the POR Decision). The Commission's decision considered several factors in analyzing the PG&E plan, generally broken down into categories of safety-related issues, financial issues, and other issues.[71]

a. Establish an Executive Level Chief Risk Officer and Chief Safety Officer

The POR Decision requires PG&E to have a CRO and CSO.[72] The CRO is required to receive direct reporting from safety officers in the field with LOB issues reported to the CRO. The CRO should have regular contact with PG&E employees and contractors working in the field and should be empowered to report directly to the Safety and Nuclear Oversight (SNO) Committee and the Chief Executive Officer's (CEO) of PG&E and PG&E Corporation. PG&E should consult with the State regarding the appointment of the initial CRO. The CRO will be required to provide regular periodic reports to the Commission or Commission staff.[73]

On August 3, 2020, Sumeet Singh assumed the role of Senior Vice President and CRO reporting directly to the CEO of PG&E Corporation. As CRO, Mr. Singh oversees all risk management associated with operations and public safety. Mr. Singh has regular contact with the CEO of PG&E, and he is empowered to report directly to the SNO Committee.

Mr. Singh, other representatives from the office of the CRO meet with the CPUC to report on and discuss PG&E's risk management efforts. In December 2020, PG&E met with the CPUC and presented a

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71 D.20-05-053, p. 16.

72 Testimony sponsored by PG&E's CSO is presented in Exhibit (PG&E-7), Ch. 1.

73 D.20-05-053, pp. 20-21.

deep-dive into PG&E wildfire risk modeling. The discussion included background information on existing wildfire risk model, in-flight and planned enhancements to the risk models and areas where risk modeling has been operationalized for risk reduction activities.[74]

b. Safety and Operational Metrics (SOM)

The Commission adopted an EOEP designed to provide a roadmap for how the Commission will closely monitor PG&E's performance in delivering safe, reliable, affordable, clean energy.[75]

On January 15, 2021, PG&E proposed 12 Safety and Operational Metrics for consideration.[76] PG&E's proposed SOMs are anchored on the risks related to the majority of the safety and reliability exposure in the Gas, Electric and Energy Supply operating units. The SOMs include: a mix of leading and lagging risk indicators; metrics that are outcome-based; metrics influenced by factors PG&E can control; metrics that rely on objective data; and metrics that can be benchmarked against other utilities.

In April 2021, the SPD issued a draft staff proposal regarding SOMs and other metrics. A Commission decision adopting a suite of SOMs is expected in the third or fourth quarter of 2021.

c. The Expanded Safety and Nuclear Oversight Committee Authority

The POR Decision expands the authority of the SNO Committees of PG&E's boards of directors. Specifically, the SNO Committees have oversight over PG&E's WMP, PSPS Program, and compliance with the SOMs.[77]

In his role as CRO, Mr. Singh is responsible for reporting to the SNO Committee about PG&E's top safety risks including Wildfire and the

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74 PG&E presentation deck to the CPUC, 12.08.20 Wildfire Risk Model Review Final v.1, Exhibit PG&E-2, WP 1-78.

75 D.20-05-053, p. 122, OP 4 and Appendix A, Enhanced Oversight and Enforcement Process.

76 Response of Pacific Gas and Electric Company to Assigned Commissioner's Ruling Regarding Development of Safety and Operational Metrics, R.20-07-013 (January 15, 2021).

77 D.20-05-053, p. 25.

PSPS programs and the status of PG&E's compliance with Safety and Operational metrics.

G. Risk Management Issues Under Review at the Commission: The Risk Based Decision Making Framework OIR (R.20-07-013)

The Commission opened the Risk-Based Decision-Making Framework OIR (R.20-07-013) in July 2020 with the goal of strengthening the risk-based decision-making framework that regulated energy utilities use to assess, manage, mitigate, and minimize safety risks.[78] PG&E is an active participant in the proceeding which will consider issues along three tracks.

Track One seeks to drive improvement on the Risk-Based Decision-Making Framework's technical requirements including how to treat uncertainty in risk-related proceedings, aligning terminology across Investor-Owned Utilities (e.g., controls), and to consider updates to how risks are modeled.

Track Two is focused on determining safety and operational metrics for the purposes of the EOEP which are largely based on the company's top risks and updating the safety performance metrics that are provided in the annual Safety Performance Metrics report.

Track Three, in conjunction with the Rate Case Plan proceeding, looks to refine procedural requirements for risk-related proceedings.

PG&E anticipates a Decision for Track One and Track Two in the third or fourth quarter of 2021. A Decision on Track 3 is expected early 2022.

H. Attachment A: PG&E's Corporate Risk Register

Attachment A, Table 1-1 is PG&E's CRR. The CRR lists all of PG&E's enterprise risk events and cross-cutting factors. A cross-cutting factor is an item that is not a risk event itself, but rather impacts either the likelihood or consequence of other items on the CRR. Along with the name and definition of each risk event and cross-cutting factor, Table 1-1 also includes:

- The 2023 test year risk score and 2023 test year safety score for each GRC risk;
- Whether the risk event or cross-cutting factor was included in PG&E's 2020 RAMP Report and, if so, the applicable 2020 RAMP Report chapter number; and

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78 R.20-07-013, p. 2.

- An exhibit and chapter reference to where the risk event or cross-cutting factor is discussed in the 2023 GRC.

TABLE 1-1
PG&E'S CORPORATE RISK REGISTER

Line No.	Name of Risk Event or Cross-Cutting Factor	2023 TY Risk Score/2023 TY Safety Risk Score	Definition	Included in PG&E's 2020 RAMP Report	2023 GRC
1	Aviation Incident	Risk Score: 80 Safety Score: 80	Accident associated with the operation of fixed wing aircraft or helicopter during the time any person boards the aircraft with the intention of flight and until all persons have disembarked.	Yes (Ch. 19)	Exh. 7, Ch. 2
2	Climate Change (Cross-Cutting Factor)	N/A	Impact of climate change on PG&E's risk drivers and consequences.	Yes (Ch. 20)	Exh. 2, Ch. 4
3	Contract Management (Cross-Cutting Factor)	N/A	Impact of contract management controls that affect PG&E's risk drivers and consequences.	No	Exh. 7, Ch. 4
4	Contractor Safety Incident	Risk Score: 79 Safety Score: 79	Any event resulting in a contractor recordable injury or fatality, excluding events resulting from asset failure	Yes (Ch. 17)	Exh. 7, Ch. 1
5	Cyber Security Incident (Risk Event and Cross-Cutting Factor)	Risk Score: 143 Safety Score: 0	Impact of cyber-attack events that affect PG&E's risk drivers and consequences.	Yes (Ch. 20)	Exh. 7, Ch. 9
6	Data Loss Event	Risk Score: 34 Safety Score: 0	A confirmed incident in which sensitive, confidential, or otherwise protected data has been accessed and/or disclosed in an unauthorized fashion.	No	Exh. 7, Ch. 9
7	Electric Transmission System Wide Blackout	Non-GRC Risk	A system-wide disturbance leading to a cascading event that causes a blackout of PG&E's electrical system with the inability to restore the grid in a timely fashion.	No	N/A – Outside CPUC Jurisdiction
8	EP&R (Cross-Cutting Factor)	N/A	Impact of EP&R controls that affect PG&E's risk drivers and consequences.	Yes (Ch. 20)	Exh. 4, Ch. 3
9	Employee Safety Incident	Risk Score: 94 Safety Score: 90	Any event resulting in a contractor recordable injury or fatality, excluding events resulting from asset failure	Yes (Ch. 16)	Exh. 7, Ch. 1

TABLE 1-1
PG&E'S CORPORATE RISK REGISTER
(CONTINUED)

Line No.	Name of Risk Event or Cross-Cutting Factor	2023 TY Risk Score/2023 TY Safety Risk Score	Definition	Included in PG&E's 2020 RAMP Report	2023 GRC
10	Extended Unplanned Shutdown of a Critical Power Generation Asset	Risk Score: 15 Safety Score: 0	Extended Unplanned Shutdown of a Critical Power Generation Asset	No	Exh. 5, Ch. 2
11	Failure of Electric Distribution Network Assets	Risk Score: 17 Safety Score: 17	Failure of distribution network assets or lack of remote operation functionality may result in public or employee safety issues, property damage, environmental damage, or inability to deliver energy.	Yes (Ch. 12)	Exh. 4, Ch. 3
12	Failure of Electric Distribution Overhead Assets	Risk Score: 539 Safety Score: 15	Failure of distribution overhead assets or lack of remote operation functionality may result in public or employee safety issues, property damage, environmental damage, or inability to deliver energy.	Yes (Ch. 11)	Exh. 4, Ch. 3
13	Failure of Electric Distribution Underground Assets	Risk Score: 116 Safety Score: 8	Failure of distribution underground assets or lack of remote operation functionality may result in public or employee safety issues, property damage, environmental damage, or inability to deliver energy.	Yes (Ch. 19)	Exh. 4, Ch. 3
14	Failure of Electric Transmission Overhead Assets	Non-GRC Risk	Failure of transmission overhead assets or lack of remote operation functionality may result in public or employee safety issues, property damage, environmental damage, disruption of major generation sources and inability to deliver energy.	No	N/A – Outside CPUC Jurisdiction
15	Failure of Electric Transmission Underground Assets	Non-GRC Risk	Failure of transmission underground assets or lack of remote operation functionality may result in public or employee safety issues, property damage, environmental damage, reduced operational redundancy in critical urban centers, or large-scale prolonged outages.	No	N/A – Outside CPUC Jurisdiction

TABLE 1-1
PG&E'S CORPORATE RISK REGISTER
(CONTINUED)

Line No.	Name of Risk Event or Cross-Cutting Factor	2023 TY Risk Score/2023 TY Safety Risk Score	Definition	Included in PG&E's 2020 RAMP Report	2023 GRC
16	Failure of Substation Assets	Risk Score: 42 Safety Score: 3	Failure of substation assets or lack of remote operation functionality may result in public or employee safety issues, property damage, environmental damage, disruption of major generation sources or inability to deliver energy.	Yes (Ch. 19)	Exh. 4, Ch. 3
17	Hazardous Material Release	Risk Score: 34 Safety Score: 0	Release of hazardous materials; current and historical; sudden and accidental, or continual; by PG&E or by an agent acting on behalf of PG&E or under PG&E's authority. Natural gas, solid waste, non-hazardous waste, and 3rd party facilities are out of scope.	Yes (Ch. 19)	Exh. 7, Ch. 6
18	Insufficient Capacity to Meet Customer Demand	Risk Score: 7 Safety Score: 2	Failure to maintain capacity on the system on high demand days.	No	Exh. 3, Ch. 3
19	IT Asset Failure	Risk Score: 89 Safety Score: 0	Impact of technology hardware and software failure that affects PG&E's risk drivers and consequences.	Yes (Ch. 20)	Exh. 3, Ch. 3
20	Large Overpressure Event Downstream of Gas Measurement and Control Facility	Risk Score: 11 Safety Score: 11	Failure of a Gas Measurement and Control station to perform its pressure control function resulting in a large overpressure event that can lead to significant impact on public safety, employee safety, contractor safety, property damages, financial losses, and the inability to deliver	Yes (Ch. 9)	Exh. 3, Ch. 3
21	Large Uncontrolled Water Release (Dam Failure)	Risk Score: 73 Safety Score: 43	Given the inherent risk of owning and operating hydro assets, there is potential for a large uncontrolled water release adversely impacting the company, the public, or federal lands	Yes (Ch. 13)	Exh. 5, Ch. 2
22	Liquidity Shortage	Financial Risk Only	The lack of sufficient liquidity to meet PG&E's financial obligations (liquidity is defined as the availability of cash)	No	Exh. 9, Ch. 2

TABLE 1-1
PG&E'S CORPORATE RISK REGISTER
(CONTINUED)

Line No.	Name of Risk Event or Cross-Cutting Factor	2023 TY Risk Score/2023 TY Safety Risk Score	Definition	Included in PG&E's 2020 RAMP Report	2023 GRC
23	LOC at Gas Measurement and Control or Compression and Processing Facility	Risk Score: 2 Safety Score: 1	Failure at a Gas Measurement and Control or Compression and Processing station resulting in a LOC that can lead to significant impact on public safety, employee safety, contractor safety, property damages, financial losses, and the inability to deliver natural gas to customers.	Yes (Ch. 19)	Exh. 3, Ch. 3
24	LOC at Natural Gas Storage Well or Reservoir	Risk Score: 4 Safety Score: 2	Failure at a gas storage well or reservoir resulting in LOC, with or without an unplanned ignition, that can lead to significant impact on public safety, employee safety, contractor safety, property damages, financial losses, and the inability to deliver natural gas to customers.	Yes (Ch. 19)	Exh. 3, Ch. 3
25	LOC on CNG Station Equipment	Risk Score: 2 Safety Score: 2	Failure of CNG station equipment during operations resulting in a LOC that can lead to significant impact on public safety, employee safety, contractor safety, property damages, financial losses, and the inability to deliver natural gas to customers.	Yes (Ch. 19)	Exh. 3, Ch. 3
26	LOC on Gas Customer Connected Equipment	Risk Score: 7.5 Safety Score: 7.5	Failure of gas customer connected equipment resulting in a LOC, with or without ignition, that can lead to significant impact on public safety, employee safety, contractor safety, property damages, financial losses, and the inability to deliver natural gas to customers.	Yes (Ch. 19)	Exh. 3, Ch. 3
27	LOC on Gas Distribution Main or Service	Risk Score: 84 Safety Score: 61	Failure of a gas distribution main or service resulting in a LOC, with or without ignition, that can lead to significant impact on public safety, employee safety, contractor safety, property damages, financial losses, and the inability to deliver natural gas to customers.	Yes (Ch. 8)	Exh. 3, Ch. 3

TABLE 1-1
PG&E'S CORPORATE RISK REGISTER
(CONTINUED)

Line No.	Name of Risk Event or Cross-Cutting Factor	2023 TY Risk Score/2023 TY Safety Risk Score	Definition	Included in PG&E's 2020 RAMP Report	2023 GRC
28	LOC on Gas Transmission Pipeline	Risk Score: 284 Safety Score: 247	Failure of a gas transmission pipeline resulting in a LOC, with or without ignition, that can lead to significant impact on public safety, employee safety, contractor safety, property damages, financial losses, and the inability to deliver natural gas to customers.	Yes (Ch. 7)	Exh. 3, Ch. 3
29	LOC on Liquefied Natural Gas (LNG)/Compressed Natural Gas (CNG) Portable Equipment	Risk Score: 0.4 Safety Score: 0.4	Failure of LNG/CNG portable equipment during operations resulting in a LOC that can lead to significant impact on public safety, employee safety, contractor safety, property damages, financial losses, and the inability to deliver natural gas to customers.	Yes (Ch. 19)	Exh. 3, Ch. 3
30	Motor Vehicle Safety Incident	Risk Score: 14 Safety Score: 13	Any motor vehicle accident involving a PG&E vehicle (or one operated on behalf of PG&E) resulting in recordable injuries or fatalities for employees or the public	Yes (Ch. 18)	Exh. 7, Ch. 2
31	Nuclear Core Damaging Event	Risk Score: 4 Safety Score: 1	Nuclear reactor core-damaging event with the potential for radiological release at the Diablo Canyon Power Plant (DCPP) due to equipment failure, natural disaster, or some other significant event.	Yes (Ch. 19)	Exh. 5, Ch. 2
32	Nuclear Extended Shutdown	Risk Score: 290 Safety Score: 0	An extended shutdown of the DCPP (for longer than three months or with a financial impact greater than $100 million) due to equipment failure, natural disaster, regulatory action, or some other significant event.	No	Exh. 5, Ch. 2
33	Physical Attack (Cross-Cutting Factor)	N/A	Impact of physical-attack events that affect PG&E's risk drivers and consequences.	Yes (Ch. 20)	Exh. 7, Ch. 9

TABLE 1-1
PG&E'S CORPORATE RISK REGISTER
(CONTINUED)

Line No.	Name of Risk Event or Cross-Cutting Factor	2023 TY Risk Score/2023 TY Safety Risk Score	Definition	Included in PG&E's 2020 RAMP Report	2023 GRC
34	Real Estate and Facilities Failure	Risk Score: 128 Safety Score: 108	Due to a seismic, flood, landslide, building fire, or physical security event, a building, facility, or property is deemed unsafe, or inaccessible for operation or occupancy such that we are unable to perform work and support operational needs.	Yes (Ch. 14)	Exh. 7, Ch. 5
35	Records and Information Management (Cross-Cutting Factor)	N/A	Not implementing fully an effective records & information management program and controlling data quality may result in the failure to construct, operate, or maintain a safe system. Additionally, inadequate business processes and system controls related to the collection, maintenance and disposition of records and information can result in non-compliance, security gaps and insufficient or inaccurate data for critical decision making.	Yes (Ch. 20)	Exh. 7, Ch. 7
36	Seismic (Cross-Cutting Factor)	N/A	Seismic events can be a significant driver to failure in all LOB assets. Seismic events contribute to the likelihood of asset failure events and to the associated safety, reliability, and financial consequences of those events	Yes (Ch. 20)	Exh. 7, Ch. 10
37	Skilled and Qualified Workforce (Cross-Cutting Factor)	N/A	Impact of human performance, workforce continuity and employee skills and qualifications that affect PG&E's risk drivers and consequences. The risk of an employee or non-employee performing a job, or working on the system, without the approved skills and/or qualifications may result in an event with adverse impact to workers or members of the public.	Yes (Ch. 20)	Exh. 8, Ch. 6

TABLE 1-1
PG&E'S CORPORATE RISK REGISTER
(CONTINUED)

Line No.	Name of Risk Event or Cross-Cutting Factor	2023 TY Risk Score/2023 TY Safety Risk Score	Definition	Included in PG&E's 2020 RAMP Report	2023 GRC
38	Third-Party Risk	Financial Risk Only	Impact of vendor actions involving insurance, credit, security, and privacy that affect PG&E's risk drivers and consequences.	No	Exh. 9, Ch. 3
39	Third-Party Safety: Incident	Risk Score: 923 Safety Score: 863	Recordable third-party (public) injuries or fatalities due to interaction with or during the use of a PG&E facility, not involving asset failure	Yes (Ch. 15)	Exh. 7, Ch. 1
40	Wildfire	Risk Score: 23,143 Safety Score: 7,810	PG&E assets or activities that may initiate a fire that is not easily contained, endangers the public, private property, sensitive lands, or environment.	Yes (Ch. 10)	Exh. 4, Ch. 3

I. Attachment B: Cross-Cutting Factor to Risk Event Mapping Table

Attachment B, Table 1-3 lists each of the RAMP risk event and RAMP cross-cutting factors and identifies which risk events are impacted by which cross-cutting factor(s).

For two of the cross-cutting factors, Cyber Event and IT Asset Failure, the table indicates if the cross-cutting factor acts as a risk driver or consequence multiplier. A consequence multiplier reflects an adjustment to the Consequence of a Risk Event, due to the impact of the cross-cutting factor and is generally used to represent the cumulative effect of the concurrent occurrence of the RAMP risk event and the cross-cutting factor.

Cyber Event and IT Asset Failure are both risk events and cross-cutting factors. Therefore, they appear in the table twice – on the list of risk events and in the list of cross-cutting factors.

The table below includes three designations:

1) Yes – The cross-cutting factor influences the baseline risk, and risk has been quantified such that the cross-cutting factor contribution to risk can be distinguished;
2) Yes* - The cross-cutting factor influences the baseline risk, but risk from the cross-cutting factor has not been explicitly quantified (Enterprise Preparedness and Response meets this criteria and has been assigned this status; however, PG&E acknowledges that EP&R's status as a control program is unique among cross-cutting factors, for which risk contribution to baseline risk could be explicitly assessed with sufficient resources/data/modeling); and
3) No – The cross-cutting factor does not meaningfully influence the baseline risk.

TABLE 1-2
MAPPING CROSS-CUTTING FACTORS TO RISK EVENTS

ID	LOB	Risk Event Name	CLIMT 1. Climate Change	CYBER 2A. Cyber Attack (Direct Driver to LOC)	CYBER 2B. Cyber Attack (Consequence Multiplier)	EPNDR 3. Emergency Preparedness and Response	ITAFL 4A. IT Asset Failure (Direct Driver)	ITAFL 4B. IT Asset Failure (Consequence Multiplier)	PHYSA 5. Physical Attack	RECIM 6. Records and Information Management	SSMIC 7. Seismic	SQWKF 8. Skilled and Qualified Workforce
AVATN	SS	Aviation	No	No	No	Yes*	No	No	No	Yes	No	No
LGUWR	PGEN	Large Uncontrolled Water Release (Dam Failure)	Yes	Yes	No	Yes*	Yes	No	Yes	Yes	Yes	No
GSHUT	PGEN	Extended Unplanned Shutdown of a Critical PwrGen Asset	No	No	No	No	Yes*	No	No	Yes	Yes	No
NCORE	NGEN	Nuclear Core Damaging Event	No	No	No	No	Yes*	No	No	Yes	Yes	Yes*
NSHUT	NGEN	Nuclear Operations and Safety Extended Shutdown	No	No	No	No	Yes*	No	No	Yes	Yes	Yes*
HZMAT	SS	Hazardous Material Release	No	No	No	Yes*	No	No	Yes	Yes	No	No
ITAFL	IT	IT Asset Failure	Yes*	Yes*	Yes*	Yes*	No	No	Yes*	Yes	Yes*	Yes*
REFFL	CRESS	Real Estate and Facilities Failure	Yes*	No	No	Yes*	No	No	Yes	Yes	Yes	No
LOCDM	GO	Loss of Containment on Gas Distribution Main or Service	No	No	No	Yes*	No	No	Yes	Yes	Yes	Yes
LOCTM	GO	Loss of Containment on Gas Transmission Pipeline	No	No	No	Yes*	No	No	Yes	Yes	Yes	Yes
LRGOP	GO	Large Overpressure Event Downstream of Gas Measurement and Control Facility	Yes	No	No	Yes*	No	No	No	Yes	No	Yes
CCEPQ	GO	Loss of Containment on Gas Customer Connected Equipment	No	No	No	Yes*	No	No	Yes	Yes	Yes	Yes
NGSWR	GO	Loss of Containment at Natural Gas Storage Well or Reservoir	Yes	Yes	No	Yes*	No	No	Yes	Yes	Yes	Yes
MCCPF	GO	Loss of Containment at Gas Measurement and Control or Compression and Processing Facility	Yes	Yes	No	Yes*	No	No	Yes	Yes	Yes	Yes
CNGEQ	GO	Loss of Containment on CNG Station Equipment	No	No	No	Yes*	No	No	Yes	Yes	No	Yes
LNCNG	GO	Loss of Containment on LNG/CNG Portable Equipment	No	No	No	No	No	No	Yes	Yes	No	Yes
CPCTY	GO	Insufficient Capacity to Meet High Demand	No	No	No	Yes*	No	No	No	Yes	No	No
WLDFR	EO	Wildfire	Yes	No	No	Yes*	No	No	No	Yes	Yes	No
DNTWK	EO	Failure of Distribution Underground Network Assets	Yes*	No	Yes*	Yes*	No	Yes*	Yes	Yes	Yes	Yes
DOVHD	EO	Failure of Distribution Overhead Assets	Yes	No	Yes*	Yes*	No	Yes	Yes	Yes	Yes	Yes
DUNGD	EO	Failure of Distribution Underground Assets	Yes	No	Yes	Yes*	No	No	Yes	Yes	Yes	Yes
SBSTN	EO	Failure of Distribution Substation Assets	Yes*	Yes*	Yes*	Yes*	No	No	Yes	Yes	Yes	Yes
TPTSI	EHS	3rd Party Safety Incident	No	No	No	No	No	No	No	No	No	No
MTRSI	EHS	Motor Vehicle Safety Incident	Yes*	No	No	No	No	No	No	Yes	No	No
EMPSI	EHS	Employee Safety Incident	Yes*	No	No	No	No	No	Yes	Yes	No	Yes
CNTSI	EHS	Contractor Safety Incident	No	No	No	No	No	No	Yes	No	No	No
DTALS	CYB	Data Loss Event	No	Yes	Yes*	Yes*	No	No	Yes	Yes	No	No
CYBER	CYB	Cyber Incident	No	No	No	No	No	No	No	Yes	No	No

J. Attachment C: RAMP Safety Risk and Cross-Cutting Factors to GRC Integration Roadmap

Attachment BC Table 1-2 lists each of the RAMP risks and RAMP cross-cutting factors and identifies where in testimony and WPs in this GRC PG&E addresses SPD and party feedback. The table also refers to the WP where PG&E compares the estimated costs for mitigations and pilot controls[79] in the 2020 RAMP Report to the forecast costs for RAMP Risk mitigations and pilot controls in the GRC.

[79] The 2020 RAMP Report included two pilot controls: Leak Management in the LOC Distribution Main or Service risk and Enhanced Inspections in the Failure of Electric Distribution Overhead Assets risk. These two controls were considered "pilot controls" because they were the two controls for which PG&E calculated an RSE in the 2020 RAMP.

TABLE 1-3
MAPPING PG&E'S 2020 RAMP INFORMATION TO THE 2023 GRC

Line No.	Name of Risk Event or Cross-Cutting Factor	Risk Policy Chapter	Location in PG&E's 2023 GRC			
			LOB Forecast Chapter	Testimony Response to SPD and Party RAMP Comments	WP Response to SPD and Party RAMP Comments	WP Comparing RAMP to GRC Forecasts [b]
1	EORM[a]	Exh. 2, Ch. 2	N/A	Section E.1 and E.2	(PG&E-2), WP 1-12	N/A
2	Climate Change (Cross-Cutting Factor)	N/A	Exh. 4, Ch. 2			N/A
3	Contractor Safety Incident	N/A	Exh. 7, Ch. 1	Section B.2.c.1 and B.2.c.2	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
4	Cyber Attack (Cross-Cutting Factor)	N/A	Exh. 7, Ch. 9	N/A	N/A	(PG&E-2), WP 1-117
5	EP&R (Cross-Cutting Factor)	Exh. 4, Ch. 3	Exh. 4, Ch. 5	Section D.4.b	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
6	Employee Safety Incident		Exh. 7, Ch. 1	Section B.2.b.1	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
7	Failure of Electric Distribution Network Assets	Exh. 4, Ch. 3	Exh. 4, Ch. 14	Section D.3.b	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
8	Failure of Electric Distribution Overhead Assets	Exh. 4, Ch. 3	Exh. 4, Chs. 4.3, 9, 10, 11, 12, 13, 16, 17, and 22	Section D.2.b	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
9	IT Asset Failure	N/A	Exh. 7, Ch. 1	N/A	N/A	(PG&E-2), WP 1-117
10	Large Overpressure Event Downstream of Gas Measurement and Control Facility	Exh. 3, Ch. 3	Exh. 3, Ch. 6	Section E.3.b	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
11	Large Uncontrolled Water Release (Dam Failure)	Exh. 5, Ch. 2	Exh. 5, Ch. 4	Section D.3	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
12	LOC on Gas Distribution Main or Service	Exh. 3, Ch. 3	Exh. 3, Ch. 4	Section E.2.b	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
13	LOC on Gas Transmission Pipeline	Exh. 3, Ch. 3	Exh. 3, Ch. 5	Section E.1.b	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
14	Motor Vehicle Safety Incident	N/A	Exh. 7, Ch. 2	Section B.2.d.1 and B.2.d.2	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
15	Physical Attack (Cross-Cutting Factor)	N/A	Exh. 7, Ch. 9	N/A	N/A	(PG&E-2), WP 1-117
16	Real Estate and Facilities Failure	N/A	Exh. 7, Ch. 6	Section B.2.a.3	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
17	Records and Information Management (Cross-Cutting Factor)	N/A	Exh. 7, Ch. 7	Section B.2.b	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
18	Seismic (Cross-Cutting Factor)	N/A	Exh. 7, Ch. 10		(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
19	Skilled and Qualified Workforce (Cross-Cutting Factor)	N/A	Exh. 8, Ch. 6		NA	(PG&E-2), WP 1-117
20	Third-Party Safety Incident	N/A	Exh. 7, Ch. 1	Section B.2.a.1	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117
21	Wildfire	Exh. 4, Ch. 3	Exh. 4, Ch. 4, 9, 12, 23	Section D.1.b	(PG&E-2), WP 1-12	(PG&E-2), WP 1-117

(a) EORM responds to SPD and Party comments related to RAMP Report Chapter 3, Risk Modeling and RSE.

(b) While the workpaper comparing the estimated costs for mitigations in the 2020 RAMP Report to the forecast costs for mitigations in the 2023 GRC is included as an attachment to this chapter, the line of business that sponsors each risk event (e.g., Wildfire is sponsored by Electric Operations) is sponsoring those costs.

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE

Testimony _____X_____ Workpapers _____ SOQ _____

Exhibit Number: _____2____ Chapter Number: ____1____

Chapter Title: Enterprise and Operational Risk Management Program

Witness Name: Yumi Oum and Rick Ito on behalf of Sumeet Singh

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of November 5, 2021				
1-31, Table 1-1	4: Contractor Safety Incident	2023 TY Risk Score/2023 TY Safety Risk Score[1]	Risk Score: 85 Safety Score: 85	Risk Score: 79 Safety Score: 79
1-31 Table 1-1	6: Data Loss Event	2023 TY Risk Score/2023 TY Safety Risk Score	Risk Score: 35 Safety Score: 0	Risk Score: 34 Safety Score: 0
1-32, Table 1-1	10: Extended Unplanned Shutdown of a Critical Power Generation Asset	2023 TY Risk Score/2023 TY Safety Risk Score	Risk Score: 28 Safety Score: 0	Risk Score: 15 Safety Score: 0
1-32, Table 1-1	13: Failure of Electric Distribution Underground Assets	2023 TY Risk Score/2023 TY Safety Risk Score	Risk Score: 117 Safety Score: 9	Risk Score: 116 Safety Score: 8
1-33, Table 1-1	16: Failure of Electric Distribution Substation Assets	2023 TY Risk Score/2023 TY Safety Risk Score	Risk Score: 44 Safety Score: 3	Risk Score: 42 Safety Score: 3
1-33, Table 1-1	20: Large Overpressure Event Downstream of Gas Measurement and Control	2023 TY Risk Score/2023 TY Safety Risk Score	Risk Score: 12 Safety Score: 11	Risk Score: 11 Safety Score: 11

[1] Rounded to whole numbers. See line of business testimony for additional details.

Page No.	Line No.	Item	As Filed	As Corrected
	Facility			
1-33, Table 1-1	21: Large Uncontrolled Water Release (Dam Failure)[2]	2023 TY Risk Score/2023 TY Safety Risk Score	Risk Score: 73 Safety Score: 43	Risk Score: 80 Safety Score: 43
1-35, Table 1-1	28: LOC on Gas Transmission Pipeline	2023 TY Risk Score/2023 TY Safety Risk Score	Risk Score: 234 Safety Score: 204	Risk Score: 284 Safety Score: 247
1-35, Table 1-1	32: Nuclear Extended Shutdown	2023 TY Risk Score/2023 TY Safety Risk Score	Risk Score: 289 Safety Score: 0	Risk Score: 290 Safety Score: 0
1-36, Table 1-1	34: Real Estate and Facilities Failure	2023 TY Risk Score/2023 TY Safety Risk Score	Risk Score: 130 Safety Score: 110	Risk Score: 128 Safety Score: 108
1-37, Table 1-1	39: Third Party Safety Incident	2023 TY Risk Score/2023 TY Safety Risk Score	Risk Score: 924 Safety Score: 864	Risk Score: 923 Safety Score: 863
1-37, Table 1-1	39	Third Party Safety Incident Definition	Any event resulting in a contractor recordable injury or fatality, excluding events resulting from asset failure	Recordable third-party (public) injuries or fatalities due to interaction with or during the use of a PG&E facility, not involving asset failure
1-37, Table 1-1	40: Wildfire	2023 TY Risk Score/2023 TY Safety Risk Score	Risk Score: 23,033 Safety Score: 7,774	Risk Score: 23,143 Safety Score: 7,810

[2] There is a difference between the risk score for Large Uncontrolled Water Release presented in this errata table and the risk score presented in the Energy Supply, Exhibit (PG&E-5) testimony due to timing differences when issues were identified and corrected. The risk score presented in this errata package is the most up-to-date. Remaining differences will be corrected in a subsequent errata filing.

PACIFIC GAS AND ELECTRIC COMPANY

CHAPTER 2

SAFETY POLICY

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 2
SAFETY POLICY

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 2
SAFETY POLICY

A. Introduction

This chapter describes Pacific Gas and Electric Company's (PG&E or the Company) policies and programs to safeguard our employees, contractors, and the public. Our focus is to build an organization in which every work activity is designed to be performed safely, every member of our workforce knows and practices safe behaviors, and everyone is encouraged to speak up if they see an unsafe behavior or condition with full confidence that their concerns will be addressed. Our safety stand is "Everyone and Everything is Always Safe." A strong safety culture is fundamental to our operations and consistent with PG&E's mission, vision, and values.

The safety of the public, our employees and contractors must come before anything else, all the time, everywhere. Each leader is responsible for the safety of the employees they manage. This commitment must be reflected in every decision, every action, and in our planning and prioritization of work.

PG&E has experienced numerous challenges and undergone significant change since filing the 2020 General Rate Case (GRC) in December 2018. These changes include the appointment of new Boards of Directors (BOD) and Executive Leadership, entry and exit from bankruptcy, devastating wildfires, and the resulting loss of trust from our customers and communities.

Tragically, PG&E employees and contractors have experienced serious injuries and fatalities while working for PG&E. In 2020, one employee and four contractors lost their lives. Three of the five 2020 fatalities were due to a helicopter crash in June. In addition, three employees and four contractors sustained serious injuries. In 2021, as of June, three contractors lost their lives and one contractor sustained a serious injury. On March 3, a contractor performing vegetation management pre-inspection work lost her life when a third-party vehicle left the roadway and struck the contractor who was walking off the roadway. On May 28 and June 15, two contractors were fatally injured in separate incidents involving the rollover of vehicle/equipment down steep grades. The May 28 rollover incident involved a Groundman utilizing a

mini-excavator while performing electric construction work. The excavator lost traction, rolled down the slope and stopped on top of the contract employee. The June 15 rollover incident involved a half ton pickup truck driving on a remote access road performing electric transmission inspection work when the vehicle rolled down a hillside and into a ravine. Due to these occurrences, PG&E initiated a safety stand down for driving on all hazardous and unpaved roads. The safety stand down requires the review of a defined list of safety standards and practices relevant to these hazards prior to restarting work for all employees and contractors.

While the safety stand down and other investments discussed in this chapter represent positive steps the Company is taking towards mitigating serious injuries and fatalities, they are not intended to diminish the pain and loss experienced by the families and friends of those fallen employees and contractors. Investing in safety mitigations and controls are not just in service of our safety metrics, they are in service of our employees, contractors and the public first. Bottom line, no one should lose their life or sustain a serious injury at work. PG&E is committed to changing our Company and improving our safety culture and safety outcomes. PG&E can do better and must do better. This chapter describes our Company-wide efforts to improve employee, contractor, and public safety.

This remainder of this chapter is organized as follows:

- Section B – Safety Program Developments, including an overview of Enterprise Health & Safety (EHS) organizational structure and a description of PG&E's 2025 Workforce Safety Strategy; and
- Section C – Public Safety Leadership, including the roles of the Chief Risk Officer and the major Lines of Business (LOBs) to improve safety standards, practices, and outcomes throughout the Company.

B. Safety Program Developments Since the 2020 GRC

PG&E has significantly increased our focus on employee, contractor, and public safety in recent years, as described in the sections below.

1. Enterprise Health & Safety Overview

a. Safety Leadership

As discussed in Exhibit (PG&E-1), Chapter 1, Patti Poppe became the new Chief Executive Officer (CEO) of PG&E Corporation in January 2021. Ms. Poppe brings deep industry knowledge and decades of operational, safety and leadership experience. Ms. Poppe has brought a fresh approach to the safety conversation – one that emphasizes the human impact of decisions, actions, and safety incidents.

I was hired in March 2020 as PG&E's Chief Safety Officer (CSO), leading the Enterprise Health & Safety (EH&S) organization, and I report directly to Ms. Poppe.[1] I bring 30 years of industrial safety, health, and environmental experience to PG&E, and have a proven track record of reducing injury rates, eliminating fatalities, and reducing the rate of high-potential incidents. Since joining PG&E, I have led the development of the EH&S future state organizational design, filled critical safety leadership roles with experienced leaders to build strength and skills within the safety leadership team, and developed the 2025 Workforce Safety Strategy. Additionally, while public safety is a shared responsibility between EH&S, Risk Management and the LOBs, I play a critical role in the oversight of public safety.

Additional information about the EH&S organization is in Exhibit (PG&E-7), Chapter 1 (Safety & Health).

b. Regional Safety Directors

PG&E proposed in the Plan of Reorganization (POR) rulemaking to regionalize its operations to improve safety and customer service. The California Public Utilities Commission (Commission) adopted PG&E's regionalization proposal and directed PG&E to hire a new Regional Safety Director for each region by June 1, 2021.[2] The five Regional Safety Directors report to me and will support the Regional Vice

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1 Please see Mr. Benavides' Statement of Qualifications for more information.

2 D.20-05-053, p. 114.

Presidents and success of the regions. The Regional Safety Directors will be responsible for:

- Monitoring and reporting on key performance metrics around health and safety (H&S), auditing the implementation of H&S policies and programs, and tracking compliance with external regulations and internal standards;
- Implementing the Companywide 2025 Workforce Safety Strategy in the regions and providing independent oversight of safety practices at a regional level;
- Collaborating with the other Regional Safety Directors, central safety professionals, and grass roots safety teams in their regions to monitor performance, train others, share best practices, and ensure consistency in safety programs across regions;
- Providing each region with a clear path to escalate issues, request and receive assistance, and obtain hands-on, day-to-day support, guidance, and help in improving safety performance; and
- Managing a team of Field Safety Specialists who are responsible for providing support, coaching and education delivery within the region.

PG&E will consolidate all Field Safety resources into the regional structure with the Field Safety resources reporting to the Regional Safety Directors. This change involves moving field safety resources out of the core LOBs and into the regionalization safety leadership structure.

c. Internal Governance

As part of PG&E's safety governance, leaders and employees throughout the Company have a voice in raising safety issues and identifying solutions. They share best practices and lessons learned through the following forums:

- *Safety and Nuclear Oversight (SNO) Committees:* Each BOD of PG&E and PG&E Corporation has a SNO Committee which serves as the primary safety oversight body of each entity. The SNO Committees are responsible for oversight and review of public and workforce safety policies, practices, goals, and risks. They are also

responsible for compliance issues related to PG&E's nuclear, generation, gas and electric transmission, and gas and electric distribution operations and facilities. This oversight is intended to drive improvement of PG&E's safety policies and operational performance and promote a strong safety culture. The SNO Committees are also responsible for oversight of PG&E's wildfire mitigation plan and Public Safety Power Shutoff (PSPS) program. The SNO Committees periodically report to the Commission and BODs.

- *Senior Leadership Team (SLT):* The Senior Leadership Team is led by the CEO and includes her direct reports. The team meets monthly and reviews the key performance indicators and initiatives, including safety. I am a member of the SLT, which makes most critical decisions concerning our safety programs and strategy.
- *Public Safety Risk Council*: The Chief Risk Officer (CRO) and I are co-sponsors of this enterprise-wide Council, which provides oversight of the identification and mitigation of the Enterprise top risks, including safety risks. Council membership includes leadership from the Enterprise & Operational Risk Management team and all major business area risk leaders at the SVP level. LOBs represented include Electric Operations, Gas Operations, Power Generation, Information Technology, Cyber Security and Finance. This Council meets monthly to review the status of risk mitigations and provide assistance to the risk owners.
- *Safety Technical Council*: This Council includes LOB and EH&S safety leaders, union leadership, legal, communications and human resources representatives. I serve as the chair of this Council. This Council has a bi-weekly meeting that focuses on tactical problem solving, coordination across business areas on implementation of tools, fixes, and solutions, and contributions to the strategic approach and roadmap for workforce safety strategy. These safety leaders follow a risk-based approach to assess major adaptation needs, if any, with the objective of orchestrating PG&E's efforts in

managing safety risk in a coordinated, proactive, effective, and efficient manner.

- *LOB Safety Councils*: The LOB Safety Councils are led by a leader from each respective LOB. Each LOB Safety Council may include members of the LOB management team, Grassroots Safety Committee members, union representatives, and EH&S. These Councils provide overall governance, guidance, and resources related to the safety and health of the LOB and promote positive culture change.
- *Grassroots Safety Committees:* These committees are led by employees with support from unions and senior leadership. The committees promote safety and share information and best practices at a grassroots level within the LOBs.

2. 2025 Workforce Safety Strategy

a. Overview

PG&E's safety strategy has continued to evolve from the One PG&E H&S Plan described in the 2020 GRC. The 2025 Workforce Safety Strategy is the next evolution of our safety plan and retains all critical components of the One Plan. The 2025 Workforce Safety Strategy was reviewed by the BOD in the summer of 2020. The SNO Committees receive regular updates on implementation of the safety strategy throughout the year.

PG&E's 2025 Workforce Safety Strategy is built upon two core pillars: Safety Systems and Safety Culture.

The first pillar*, Safety Systems*, refers to the combination of processes, procedures, standards, programs, and technology solutions necessary to drive improvements in how PG&E manages critical risks, adheres to safety standards, and resolves audit findings. One significant system PG&E is implementing is a Health and Safety Management System (HSMS). The HSMS will become the way PG&E delivers the business of safety and will be based on a consistent and comprehensive enterprise safety controls framework reinforced with

system assurance. A holistic enterprise management of change (MOC) framework is being developed as part of the HSMS.

The second pillar, *Safety Culture,* refers to the organization's beliefs, behaviors, and shared values in relation to safety risk. The safety culture pillar consists of many companywide measures. One of the measures includes officers and directors taking the initiative to have informal safety conversations in the field at jobsites with those employees who perform critical risk activities. Another measure is the requirement that safety be part of the hiring criteria for all jobs. A safety-related performance objective is now included in annual performance plans. We are also revising safety leadership training and measuring safety culture using a detailed employee perception survey. These measures are covered in greater detail in the next section of this chapter.

The success of PG&E's workforce safety strategy will be measured by: (1) fatality elimination, (2) injury incident frequency and severity reduction, (3) culture survey results in the top quartile (4) Days Away, Restricted, or Transferred (DART) results in the best quartile; and (5) metrics adopted by the Commission in Phase I, Track 2 of the *Order Instituting Rulemaking to Further Develop a Risk-Based Decision-Making Framework for Electric and Gas Utilities,* Rulemaking 20-07-013.

b. Safety Systems

Table 2-1 below lists the main workstreams and sub-workstreams included within each of the nine Safety Systems strategy components. Detailed overviews of each strategy follow the table.

TABLE 2-1
SAFETY SYSTEMS STRATEGY

Line No.	Strategy Component	Workstreams
1	Critical Risk	• Hazard identification and risk assessment • Technical standards
2	Transportation Safety	• Motor vehicle safety programs • Vehicle technology • Contractor transportation risk • Department of Transportation compliance
3	Contractor Safety Management	• Training • Management • Performance requirements • On-boarding • Performance assessment
4	Serious Injury and Fatality Management	• Analyze SIF investigations and share key learnings • Improve timeliness and clarity of SIF-related communications
5	Enterprise Corrective Action Program	• Near Hit Program • Safety Observations – Expand technology solution user population – Evaluation of technology solution and product enhancements – Increase ownership of technology solution within the LOBs • Corrective Action Program Management
6	Health & Safety Management System	• System Implementation • Leadership and Engagement • Workforce Safety • Management of Change • Performance Improvement
7	Assurance	• Safety Compliance Register • Audit Program • Independent Safety Oversight Committee (ISOC) Assessment Execution

TABLE 2-1
SAFETY SYSTEMS STRATEGY
(CONTINUED)

Line No.	Strategy Component	Workstreams
8	Occupational Health	• Ergonomics – Office ergonomics – Industrial athlete program – Industrial ergonomics – Vehicle ergonomics • Health and Wellness • Injury Management – Live Health Online telemedicine – Condition management (targeting high-risk employees) – Onsite clinic strategy – Fit4U program – Return-to-Work Task Bank – Telephonic Nurse Case Management program
9	Field Safety Operations	• Field Safety Specialist skill development • Field observation execution and support • Tailboard/Job Safety Analysis redesign and execution • Supervisor training • Safety Connections facilitation • Safety Action Plans • SIF Incident Evaluation support • Emergency event safety support

1) Critical Risk

EH&S established a Critical Safety Risk (CSR) Department in 2021. CSR is led by a dedicated director. CSR focuses on the following three primary areas of safety risk management:

- **Risk Assessment**: Leverage existing data and establish new data requirements to assist the Enterprise Risk Management Organization to identify potential employee, contractor, community and asset risks and necessary mitigations at an

operational level. Additionally, CSR will coordinate with the LOBs to establish processes for the assessment and management of these risks. CSR will also implement internal processes for the monitoring of risk related performance and conducting operational level hazard identifications and risk assessment (e.g., hazard and operability, bowties) across LOBs.

- **Company Standard Development**: Institutionalize, enterprise- level risk mitigation measures, industry best practices, and regulatory requirements within the HSMS by issuing Critical H&S standards and technical guidelines. CSR will ensure processes are in place for the continuous monitoring of new or revised industry standards and best practices and regulatory requirements across LOBs.
- **Contractor Safety Management**: The Contractor Safety Program is one of many efforts by PG&E to manage contractor safety risks across the Company, as described in Section 3 below.

2) Transportation Safety

Through its Transportation Safety programs, PG&E protects employees and the public by establishing requirements and processes to control risks that can lead to motor vehicle accidents, improve safety performance, and increase awareness of all PG&E employees related to the operation of motor vehicles. This comprehensive program was established to reduce the number of motor vehicle incidents that have the potential for serious injury, including fatal injury, to PG&E's employees, contractors and the public. Driver performance data is used to identify specific risk drivers for targeted intervention, including driver training and implementing vehicle safety technology.

PG&E's Transportation Safety Department also ensures compliance with federal DOT and California state regulations and requirements which emphasize public and employee safety. The team manages a centralized compliance system of commercial

driver profiles (medical, drug, alcohol, and other compliance requirements) which enable PG&E to view and pair qualified drivers to vehicles they are qualified to drive, as well as to track Drug and Alcohol (D/A) Program enrollment and compliance. The department also tracks DOT-covered positions for the Gas Operations (GO) and Aviation Departments to maintain the random D/A testing pools.

3) Contractor Safety Management

The Contractor Safety Program (CSP) is included in PG&E's CSR Department. The Program consists of four primary elements:

- **Contractor Company Pre-Qualification** – PG&E leverages the capabilities of ISNetworld (ISN) to collect performance and safety compliance program information from all prime and subcontractors that conduct work classified as medium- or high-risk. ISN independently assesses that information to evaluate whether contractors meet PG&E's minimum performance standards and have the necessary programs in place to manage compliance. Both prime contractors and subcontractors must meet pre-qualification requirements for a contract to be awarded. PG&E is strengthening the requirements in the areas of fatalities and performance evaluation, including requiring a mitigation plan and additional review of companies who have experienced a fatality in the past three years, and adding the requirement of a safety observation program.
- **Job Safety Planning** – Safety is factored into every job plan for medium-and high-risk work activities from start to finish. Safety considerations in each job plan include formal training, job site work controls, specialized equipment to reduce hazards, and personal protective equipment. Each of PG&E's LOBs have safety plan requirements unique to its operations. During 2021, CSP program managers are working with each operating entity to consolidate safety plan best practices to further improve safety plan requirements throughout the Company.

- **Oversight** – Work activities are governed by qualified PG&E oversight personnel to ensure work follows the safety plan designed for the job. In 2020, much of the field safety oversight of contractors was consolidated within the EH&S organization. The consolidation is intended to provide more frequent independent assessment of contractor and subcontractor adherence to safety plans, PG&E safety requirements, and regulatory standards. A separate effort is currently underway to improve the consistency of the contractors' observations of their workers and the sharing of observation learnings with PG&E. Data collected by all observers (e.g., PG&E and contractors) will be analyzed to support continuous improvement efforts.
- ***Evaluation*** – PG&E conducts post-job evaluations to assess contractor safety performance, work quality, lessons learned and to assist in continuous improvement. In 2021, PG&E began conducting performance evaluations of contractors and subcontractors based on the level of risk associated with the work being performed.

Safety program requirements for contractors and subcontractors are and will continue to become more stringent as work process standards within the Company are developed or revised to ensure consistent implementation of industry best practices. Beginning in March 2020, a dedicated group of PG&E Safety Specialists completed Occupational Safety and Health Administration compliance inspections of contractors performing work for Electric Operations, GO, Power Generation and Vegetation Management. In 2020, this program led to 3,001 inspections yielding 1,649 non-conformances, 34 of which were identified as high-risk (e.g., fall protection, high-and low-voltage electrical safety orders, traffic control). For high-risk non-conformances, the contractor is required to provide a corrective action plan within 10 days that a PG&E Safety Specialist evaluates for quality assurance. The applicable LOB is responsible for monitoring and ensuring the corrective actions are executed by the contractor. The program goal

is to increase contractor awareness and focus on safety programs and execution.

4) Serious Injury or Fatality[3] Management

PG&E's Serious Injury or Fatality (SIF) program was deployed in 2016 to establish a cause evaluation process for serious safety incidents. This program was established to create consistency and guidance in classifying and evaluating serious safety incidents for all employees and contractors. The goal of PG&E's SIF program is to reduce the number and severity of safety incidents that result in a SIF. The program objective is to learn from safety incidents by performing cause evaluations on each SIF Actual (SIF A) and SIF Potential (SIF P) incident, implementing corrective actions, and sharing key findings across the enterprise.

PG&E implemented additional requirements in 2020 to strengthen the program. PG&E adopted a requirement to complete all SIF A and SIF P incident investigations within 30 calendar days. PG&E also expanded reviews for all SIF incidents to include executive review for SIF A events, LOB and Enterprise H&S leadership review of all SIF A and SIF P incidents, and joint investigations for all SIF A and SIF P incidents involving contractors. These requirements promote greater accountability and collaboration among leaders to ensure that action is taken, and barriers are removed to help mitigate future SIF A and SIF P incidents, while maintaining quality cause evaluations. Effective June 15, 2020, contractors who perform high- or medium-risk work must also notify PG&E of all SIF P incidents, in addition to SIF A incidents.

- **Safety Observations:** PG&E initially deployed this program in 2017 and relaunched it in 2020 as a component of the Company's strategy to reduce injuries and fatalities. The program utilizes a technology solution to collect and analyze

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3 SIF – Actual: Serious injury is a life-threatening or life-altering injury, or a fatality; SIF – Potential: Is an event that reasonably could have resulted in a SIF – Actual.

safety observation data. Throughout 2020, PG&E focused on revising the safety observation program and supporting software. These changes included creating new and revising existing observation checklists, to address existing gaps and to respond to emerging issues such as coronavirus (COVID-19) safety protocols.

PG&E revised training and guidance documentation to set new standards for observations and implemented technological enhancements for improved user interface and special project designation (e.g., specific wildfire or PSPS activations). Any "at risk" finding in the field now has a mandatory "actions taken" field to indicate what mitigations were implemented to eliminate or reduce the risk. With a technology solution foundation in place, the Safety Observation team is shifting its focus to prioritizing data quality, analytics, reporting, and observer training.

5) Enterprise Corrective Action Program

A Corrective Action Program (CAP) is required by federal law for all nuclear facilities and has been integrated into PG&E's Diablo Canyon Power Plant operations since its 1985 inception. In 2013, following the 2010 San Bruno pipeline incident, PG&E expanded the CAP program to Gas Operations and then implemented it throughout the enterprise by 2017. CAP's purpose is to enable and encourage employees to easily identify and report issues, or ideas, related to assets, and processes. Submissions include employee concerns and suggestions, operational events, internal or external audit findings, data requests, or issues with facilities, tools, records, training, and safety. CAP implementation also supports PG&E's goals to hold Publicly Available Specification 55 and International Organization for Standardization (ISO) 55001 certifications.

There are six LOB CAP teams that have a matrixed reporting relationship to the Enterprise CAP Director. Each LOB CAP team focuses on the key issues and opportunities within their respective organizations to meet operational goals. While each LOB is at its

own maturity level and uses the CAP system in different ways, all follow the basic tenets defined in the ECAP guidance documents.

The ECAP team provides governance and oversight of the Company's CAP. Key areas of responsibility include:

- Maintenance of the CAP database and software solution;
- Ownership of the CAP Policy, Standard, Procedures;
- Establishing metrics to monitor program adoption and performance; and
- Development of training and overall messaging.

A total of 144,705 CAPs were entered into the CAP system since program inception through December 31, 2020 (excluding nuclear). Only 2.9 percent of the CAP submissions since June 2017 were anonymous, which is an indicator of employee willingness to speak up.

PG&E's Near Hits program was relaunched in 2020 and is part of the Company's strategy to reduce injuries and fatalities. A Near Hit is defined as an unplanned event that did not result in harm or injury to employees, contractors, or the public, but had the potential to do so. Examples of a Safety Near Hit include damage to equipment or property, disruption of service, process safety events, personal safety and/or hazardous conditions, the Company's reputation, legal and/or financial performance, or damage to the environment. Near Hits are submitted through the CAP system.

6) Health and Safety Management System

Achieving PG&E's commitment to continually reduce risk to keep customers, communities, employees, and contractors safe requires a systematic approach to incident-free operations. The HSMS is the systematic management of PG&E's Health and Safety to prevent injury and illness. HSMS uses ISO 45001 – Occupational HSMS – as the framework. Through this program, PG&E enables the LOBs to effectively manage their H&S efforts and to continually improve their safety performance. HSMS provides a system for adopting leading practices and standards, helps PG&E to achieve high levels of safety performance and delivers sustained value.

A new Safety Assurance Director, with over two decades of relevant experience, joined PG&E in late 2020 to lead and provide oversight on HSMS and Safety Assurance activities (addressed in the following section).

HSMS is a critical driver for business success and an enabling strategy for PG&E. Using the HSMS, PG&E effectively integrates H&S objectives, plans, standards, procedures, and behaviors into operations and protects people and communities today and in the future. The HSMS consists of five elements: Leadership and Engagement, Workforce Safety, Management of Change, Performance Improvement and Safety Assurance.

- **Leadership and Engagement:** Leadership is the single most critical element for success in the implementation of the HSMS. Leaders establish a vision and objectives, personally direct the process for continuous improvement, visibly demonstrate involvement and commitment, and build a strong safety culture.
- **Workforce Safety:** Under this element, hazards and risks are identified; associated work and work-related activities are planned, controlled, resourced, and supported; planning for emergencies and non-routine tasks is ongoing; and H&S related objectives are identified and managed.
- **Management of Change (MOC):** Hazards and risks associated with changes that impact H&S are identified, evaluated, and managed within this element, and MOC is integrated into enterprise and LOB processes.
- **Performance Improvement**: H&S performance is periodically reviewed, actions to achieve and sustain industry leading safety performance are identified and built into business plans, and sharing of leading practices across the organization occurs within this element.
- **Safety Assurance:** Management and verification of critical H&S controls are established and functioning in this element, conformance with applicable workforce H&S requirements is assured, and risk to the enterprise is minimized.

HSMS and embedded requirements are fully applicable to PG&E LOBs. PG&E's use of ISO 45001, the industry standard management system for occupational H&S, as the framework aligns HSMS with other management systems established in Electric Operations, GO and Generation, such as ISO 55001, industry standard asset management system, and American Petroleum Institute 1173 – Pipeline Safety Management System. The format and core elements establish common intent, language, and processes (including the Plan-Do-Check-Act cycle) and focus on a specific subject.

The HSMS activities, Leadership and Engagement, and progress on performance will be assessed and necessary adjustments to plans will be identified to achieve industry leading H&S performance. PG&E will conduct Corporate Safety Audits to independently, and objectively, assess compliance with H&S requirements (including HSMS), verify that controls are designed appropriately and are in place and functioning, and evaluate H&S performance. In addition, PG&E will commission external assessments in 2022 to evaluate progress in achieving ISO 45001 certification.

Management of Change

MOC establishes requirements to systematically identify, evaluate and manage changes to facilities, operations, procedures, and the organization. These requirements are established to prevent incidents by ensuring that unacceptable risks are not introduced into the business. The enterprise and LOB are establishing a consistent approach that includes screening and prioritization, review and approval by competent individuals, evaluation and mitigation of hazards and risks, training, and communication, close-out and documentation of MOC, and roles and responsibilities.

PG&E agreed in the 2020 GRC to fully implement MOC software within its gas, electric, and dam operations by

December 31, 2021.[4] PG&E conducted an effectiveness review of the existing MOC program in Gas Operations (GO). The review identified opportunities to develop new guidance, improve existing documentation and enhance technology to support the process. Following the review, GO expanded its MOC to include field services, operational changes to manned and unmanned stations, integrity management programs, and organizational changes.

Enabling technology to support MOC will be selected, designed, and built with an implementation target of Q4 2021. The MOC workflow is being designed to be agile and capable of accommodating LOB-specific MOC controls and requirements. In 2020, PG&E hired an experienced program manager to lead HSMS development and implementation. The Company is making progress defining the scope of the HSMS and providing clarity of the critical elements.

7) Safety Assurance

Safety Assurance is an essential element of the HSMS. Safety Assurance is an integrated framework for assuring necessary critical controls are established and functioning to improve safety and conform with applicable H&S requirements. The integrated framework includes development and maintenance of H&S compliance registers, verification and validation of critical H&S controls, and execution of corporate safety audits. Safety Assurance wraps around all other elements of HSMS to conform with applicable HSMS requirements. PG&E identified three major safety assurance initiatives to meet the HSMS objectives:

- **Develop and maintain Safety Compliance Register:** With focus on critical safety risks and priorities, compliance registers will be developed and maintained to effectively manage and sustain compliance with H&S requirements. PG&E will perform measurement, analysis, and monitoring of conformance to the

[4] Settlement Agreement of the 2020 GRC, p. 44, Section 5.6.3.1.

requirements. The execution of this initiative began in May 2021.

- **Develop and implement Corporate Safety Audit Program**: Corporate Safety Audit Program will be developed and implemented to provide assurance on PG&E's safety governance, risk management and controls by assessing Leadership and Engagement, Contractor Safety, MOC and Critical Safety Standards, including applicable Cal/OSHA regulations. Corporate Safety Audits will be conducted to, independently and objectively, evaluate the current state of an auditable unit relative to the defined workforce H&S criteria. The audits will offer insights and recommendations on leading practices and serve as a source of advice for improved safety efficiency and effectiveness. Implementation of the program began in May 2021.
- **Execute External Safety Assessments**: PG&E will continue to coordinate and facilitate external safety assessments, such as ISOC. Through ISOC assessments, PG&E provides oversight on systems, processes and operations affecting safety. ISOC is one source of management review to improve PG&E's risk reduction effort. In addition, external safety management system assessments (i.e., ISO 45001) will be commissioned in 2022 to evaluate PG&E's progress on HSMS implementation. As a roadmap to excellence, PG&E is committed to implement HSMS and achieve ISO 45001 certification.

The ISOC committees identified 11 Key Insights in their 2020 LOB reviews. These Key Insights are assigned both a PG&E and ISOC Member lead, they work together to identify Key Deliverables and provide monthly status updates to track progress to closure. Work execution barrier removal in the following processes have been driven by ISOC: Permitting, Work and Resource Planning and PSPS execution.

8) Occupational Health

a) Ergonomics Programs

PG&E established new leadership in the Occupational Health organization to oversee all PG&E Ergonomic programs. The Ergonomic programs coordinate both prevention and injury management of muscular skeletal disorder injuries. Musculoskeletal Disorders (MSD) and sprains and strains are caused by overuse or exertion and can result in long-term injuries. These types of injuries currently account for 64 percent of all employee injuries at PG&E.[5] These ergonomic programs collectively aim to prevent and reduce the severity of injuries by proactively working with individuals to identify and mitigate ergonomic exposures. Four programs provide pre- and post-injury intervention for employees at risk of these injuries, namely:

- ***Industrial Ergonomics:*** This program assesses the potential ergonomic risk associated with a task or job. It assesses key contributing factors such as repetitive motions, forceful exertions and awkward postures and ensures ergonomic risk is mitigated. PG&E is taking a proactive approach to assess job tasks for ergonomic hazards and remove the hazards. PG&E implemented the use of ergonomic analysis software, artificial intelligence that can use video of a task being performed to assess the risk of that task and the reduction in risk based on an ergonomic solution.
- ***Office Ergonomics:*** This program addresses ergonomic risks and mitigations through workstation evaluations and rapidly responding to employees who have reported discomfort. PG&E developed a predictive model which uses data from computer usage to identify employees at risk

[5] See Exhibit (PG&E-7), Chapter 1a for a detailed review of the Integrated Disability Management programs and related costs.

of injury. This allows the evaluators to work with the employees to prevent an injury.

- ***Industrial Athlete:*** This program provides a team called On-Site Prevention Specialists to assess individuals for discomfort, provide prevention services, and perform observations to identify and mitigate ergonomic risk factors. PG&E has piloted a program in which the Specialists meet one-on-one with the employee on individual needs for example: stretching, first aid type interventions (taping, massage, etc.) and help with body posturing.
- ***Vehicle Ergonomics:*** This program conducts vehicle ergonomic evaluations, which range from preventative evaluations to discomfort resolution. Discomfort vehicle evaluations assess both the individual and the vehicle to provide an action plan for discomfort resolution.
- ***Home Ergonomics:*** In 2020, home office ergonomic evaluations became one of the top priorities due to the needs of employees working from their home offices. PG&E conducted 12,372 virtual home office evaluations and established a centralized ordering process to expedite ergonomic equipment orders.

b) Injury Management

Injury management is essential to employee safety. Injury management is important because it ensures quality and appropriate medical care for the employee; it promotes healing and early return to work; and it shows employees that their leaders are concerned with their well-being. Early injury reporting and early return to work are essential to injury management.

PG&E established a job task bank to accommodate medical restrictions associated with an injury that might otherwise prevent an employee from working. The program provides a temporary, transitional task assignment for employees with injuries for up to 6 months. In addition, PG&E has a program

called Fit4U that offers personal training and health coaching to employees who have had previous workers' compensation injuries. This program helps employees improve their overall conditioning to prevent repeat injuries and improve overall health and wellbeing through lifestyle change.

c) Health and Wellness

PG&E's health and wellness programs use employee education and engagement to help prevent illness and manage chronic conditions. To address these conditions, PG&E provides targeted healthcare decision support to the top 20 percent population with the highest utilization of medical care. Additionally, PG&E encourages and measures employee participation in annual health screenings, use of health coaching to support healthy habits and changes, and use of clinics and telemedicine for immediate care.

In 2020, PG&E's safety teams adopted new safety requirements due to the Pandemic. To reduce the spread of COVID-19, PG&E required face coverings and maintaining social distances as part of safety observations. PG&E released a daily self-assessment tool, administered through a smart phone application, which employees reporting to locations outside their homes are required to update daily. This application helps keep workers who have COVID-19 symptoms from reporting to work. These actions were in addition to implementing multiple state, California Occupational Safety and Health Administration (Cal/OSHA), and county-mandated orders to notify employees of positive cases in their area. PG&E also worked with over 500 COVID-19 positive employees to offer time off assistance through their quarantine period.

9) Field Safety Operations

The Field Safety Operations strategy is an evolving element of the 2025 Workforce Safety Strategy as PG&E conducts regional restructuring, hires Regional Safety Directors, and consolidates

Field Safety Operations into the EH&S organization. As PG&E continues to improve and develop the department to focus its efforts on employee safety, it is focusing on several initiatives. PG&E will continue to build upon the foundational safety programs that have already been created and established.

The Field Safety organization fosters a value-driven safety culture and self-directed workforce where employees see value in safe practices and promptly and effectively identify and control hazards. The EH&S Field Operations team objectives include:

- Focus on proactively facilitating safety connections with an aim to identify safe and at-risk behavior while providing success and guidance feedback;
- Provide the LOBs with consistent documentation, tracking, trending, and analysis of leading and lagging safety performance indicators;
- Partner with each LOB to develop and execute safety action plans to effectively reduce at-risk exposure and prevent recurrence of incidents;
- Support all SIF incident investigations using causal analysis methodologies and the implementation of corrective actions, per the Enterprise Cause Evaluation Standard;
- Promote PG&E's vision, mission, and values through regular engagements with employees and contractors; and
- Respond and support emergency events with safety needs, including filling safety roles within Incident Command Structure for major events.

PG&E assesses knowledge and skill to ensure field safety specialists are seasoned safety professionals with the technical experience required to effectively support the operational businesses.

PG&E is also focused on the way the workforce discusses and identifies hazards by requiring a safety lens before starting any task. This process is called a Tailboard or Job-Site Safety Analysis. Enhancing PG&E's Tailboard is one of the primary focus areas to

ensure employees and contractors are: (1) fit physically and mentally to work; (2) have all necessary tools; and (3) have the training and knowledge necessary to identify deficiencies that must be addressed before beginning work and to identify if a condition changes that requires a re-analysis of the safety plan.

All PG&E workforce safety improvements include PG&E's contractor workforce. Contractors typically perform the same tasks as employees and are faced with the same safety risks. PG&E's safety goals include improving contractor safety. PG&E has many continuous improvement efforts to align contractors' safety programs with those of PG&E.

PG&E also expects all employees and contractors to wear Personal Protection Equipment (PPE) when required. PPE is often the last line of defense from injuries like hand lacerations, head injuries and more. Each LOB identifies and communicates minimum PPE requirements to its workforce. A matrix that summarizes minimum PPE requirements across all LOBs for employees and contractors was communicated in May 2020. Moreover, PG&E established a "Direct to Home" process to allow employees to order PPE to be sent directly to their homes.

c. Safety Culture

The following table contains the main workstreams PG&E is using to improve our Safety Culture. Additional information on each strategy component is provided following Table 2-2.

TABLE 2-2
SAFETY CULTURE STRATEGY

Line No.	Strategy Component	Workstreams
1	Culture	• Safety Culture assessment • Safety Connections • Safety Leadership Development • Communications

Safety Culture Assessment: In the third quarter of 2020, PG&E partnered with the National Safety Council (NSC) to execute a safety culture assessment utilizing NSC's Safety Barometer employee perception survey. The survey was voluntary, anonymous, and provided to all employees and contractors. The survey had 50 standard questions and asked the individual to score their response on a five-point scale from strongly agree to strongly disagree. The objective of the Safety Barometer Survey was to establish a baseline measurement of employee perception of the safety culture and identify areas that point to the need for refinements to the 2025 Workforce Safety Strategy.

The survey results were received in early November 2020. PG&E achieved a 68.8 percentile score compared to the NSC's database of over 1,400 businesses. The NSC database has 175 utilities. Compared to the other utilities, PG&E had a lower average score than 64 companies and had a higher score than 111. 58 percent of PG&E employees and approximately 1,300 contractors completed the survey.

The Workforce Safety Strategy addressed many of the lower performing areas, including management participating in safety activities (Safety Connections), the role and availability of field safety specialist (field safety unification) and safety committee effectiveness (grassroots collaboration). The survey identified two opportunities and initiatives to add based upon the results: (1) Increasing safety presence in new employee orientation and (2) Communications of learnings from observation results.

PG&E plans to repeat the NSC Safety Barometer assessment in the future. This survey will serve as our most critical safety culture feedback tool as it is 100 percent safety focused and inclusive of our entire PG&E employee and contractor population. In addition to the NSC Safety Barometer assessments, PG&E will continue to utilize other available safety culture assessment feedback tools including: The Premier and Premier Pulse Surveys, The Wildfire Safety Division safety culture assessment process (new in 2021), and the Commission's Safety Culture Order Instituting Investigation results and action plans.

Safety Connections: As a core foundation of safety culture, all officers and directors are expected to conduct Safety Connections. During the fourth quarter of 2020, PG&E launched Safety Connections as one of the foundations of safety culture. A Safety Connection involves officers and directors investing time with employees in the field at their workplace to hold informal conversations about safety. This strengthens relationships, renews commitment to safety and builds trust, which makes it more likely that employees will raise concerns and suggestions. Many officers and directors in operations already spend time in the field. A pilot with non-operational directors began in November 2020. The pilot participants reported having a better understanding, not only of the need for safety in the field, but also for the work being performed. In the first quarter of 2021, Safety Connections were expanded to all officers and directors.

Safety Leadership Development: As mentioned in the HSMS section, PG&E revised the Leadership and Engagement standard to make it more specific and focused. The standard includes implementing safety into Talent Management processes as PG&E hires, manages, and promotes individuals, to ensure safety is consistently assessed. In the hiring process, hiring supervisors are required to ask one of the provided safety related questions and are provided a scale to assist in evaluating the responses. Similarly, safety will be assessed in the performance management, development planning and promotion processes.

Additionally, PG&E will improve Safety Leadership Development and supervisor coaching by developing an impactful, practical training course with refresher modules for front-line leaders. The development of these initiatives and implementation will occur throughout the course of the 2025 Workforce Safety Strategy.

Safety Communications: PG&E continues to review and enhance the safety communications and sharing of safety incidents with front-line employees. PG&E is working with Grassroots teams across the Company to improve the effectiveness of communication vehicles and sharing lessons learned, including quarterly meetings, implementation of

text messaging incidents to field workers, and establishing an Enterprise Grassroots forum.

In addition to driving the critical program components addressed above, PG&E identified and executed the following changes within the Safety Culture Program to help drive performance improvement:

Safety Incident Communications: Since May 2020, notifications of serious incidents or injuries are communicated via a Safety Flash to all relevant LOBs and include initial safety learnings, reminders and/or preventative actions. The communications are intended to raise awareness of the incidents to prevent recurrence of similar safety incidents and injuries. These Safety Flash communications are in addition to SIF communications that are sent once an incident is deemed a SIF event. 42 Safety Flashes were sent in 2020 from EH&S.

Daily Safety Incident Report: In March 2021, distribution of a daily incident safety report to all employees began. The daily incident report provides employees day-to-day knowledge of safety performance, the most recent safety incidents, a daily safety message and a link to the more detailed Safety Dashboard.

Safety Reporting: Safety reporting in 2020 was focused on bringing improved visibility to safety performance along with providing actionable information for both safety program leads and operational leaders. The EH&S Dashboard, which is the primary source of safety data for the enterprise, was moved from a monthly to a daily cadence to provide timely awareness to incident information. Leaders continue to receive immediate notification of injuries following calls to the Nurse Care Line. In addition, the dashboard provides a current snapshot of safety performance along with trending information and leading indicators. Accompanying this is map-based reporting, highlighting high-risk areas which can be used to assign extra resources, such as ergonomic intervention specialists, quickly.

PG&E is continuing this focus in 2021, starting with a daily incident report and safety message sent to all employees. The incident reports are supported by weekly incident review meetings—with the goal of moving to daily incident review meetings. The Company is also

developing customized reporting for supervisors highlighting areas of concern and providing actions they can take to address. The goal is continuous improvement in the speed and process efficiency of providing safety and health information to front-line employees.

3. Public Safety

In Exhibit (PG&E-2), Chapter 1 PG&E provides many of the details of our most critical public safety risk reduction programs, including the Community Wildfire Safety Program. This section further clarifies public safety roles and responsibilities, including those critical to my role and to the EH&S organization.

Public Safety and roles of the key functions: The LOBs, Risk Management and EH&S each play a critical role in protecting the public and learning and improving after an incident.

- **LOBs:** First, the highest priority of the operating LOBs is to operate Company assets safely. This priority protects employees, contractors, and the public. It is what PG&E does every day. This includes wildfire risk mitigation, asset management, safe work practices, and standards. This is the core mission and the LOBs are responsible for operational execution.
- **Risk Management:** Second, PG&E identifies public safety risks and mitigates them. This function is administered primarily by the Enterprise and Operational Risk Management Organization for enterprise-wide risk and by operating LOBs for LOB-specific risks. The risk function reviews potential risk, prioritizes, implements mitigations, and tracks those mitigations.
- **EH&S:** Third, PG&E investigates public safety incidents that involve Company assets. The casual evaluation standard requires serious public safety incidents to be reviewed, root causes determined, mitigations implemented, and learnings cascaded across the enterprise. PG&E also tracks public safety incidents in metrics, looks for trends and evaluates success in mitigating risks to the public. The causal review process is administered by EH&S, although the cause evaluations are typically conducted by the impacted LOB.

Safety Oversight: PG&E's EH&S Department has overall responsibility for implementing and improving the comprehensiveness, consistency and integration of the Company's safety programs, including certain programs that protect public safety. Programs within the EH&S Department that impact public safety include: (1) DOT regulatory compliance and motor vehicle safety; (2) CAP; (3) HSMS; (4) Contractor Safety (5) Critical Risk Management and (6) ISOC reviews.

As the CSO, I serve as an advisor for and provide additional oversight to Public Safety risk mitigation programs executed by EH&S and the LOBs. I perform this advisory role by engaging in the following activities:

- Active engagement with the BOD SNO Committees. I am the Company liaison to the SNO Committee Chair. I meet regularly with the SNO Committee Chair to discuss critical topics, develop the meeting agenda, and discuss safety performance. I provide safety tailboards, 2025 Workforce Safety Strategy, and safety performance updates at committee meetings;
- Involvement in Wildfire Mitigation Plan development and execution updates via management reviews, the Public Safety Risk Committee, and the SNO Committee;
- PSPS planning and after-action review participation;
- Public Safety Risk Council: The CRO and I co-sponsor this council, which is focused on Public Safety, as mentioned above in internal governance;
- Ensure compliance to Drug and Alcohol testing protocols via the transportation safety team processes; Execution of and reporting on transportation risk reduction programs;
- Lead the oversight and support for the CAP which supports the ability of employees to speak up and seek resolution on safety concerns, including public safety;
- Supervise contractor safety compliance and oversight to ensure contractors are safeguarding the public while performing work for PG&E;
- Serve as ISOC Lead Officer responsible for ensuring continuous operations of the committee by maintaining committee membership and appropriate knowledge base, determining appropriate assessment focus

areas, and driving assessment execution. The ISOC conducts operations, risk, and safety focused assessments including Public Safety risk areas; and

- Support and advise the LOBs on process safety. This includes EH&S taking the executional lead role for all third-party process safety system assessments.

In addition to the above activities, I am responsible for the execution of safety commitments and recommendations made through the regulatory oversight processes. The two regulatory proceedings and related actions that impact public safety (in addition to workforce safety) are the Safety Culture Order Instituting Investigation (OII) and the POR OII. Below are updates on these proceedings.

Commission oversight: In July 2018, at the request of the Commission's Safety and Enforcement Division SED, NorthStar Consulting continued its safety culture assessment which it originally began in 2015. On March 29, 2019, NorthStar provided PG&E with a supplemental report. This report identified an additional 22 recommendations for PG&E. PG&E has implemented nearly all NorthStar's recommendations from its 2017 report and 2019 supplemental report. PG&E is tracking on-going implementation and sustainability of the NorthStar recommendations and provides the Commission quarterly updates on significant changes being made to or impacting ongoing execution.

The Commission, in its decision approving PG&E's POR, approved new safety governance changes proposed by PG&E to improve safety performance. These changes include:

Implementation of an ISOC led by a Chief Safety Advisor. The ISOC is a committee of industry knowledgeable leaders that facilitates reviews of various LOBs to help identify opportunities to improve safety performance and ensure issues are satisfactorily addressed. ISOC's initial review occurred in late 2019 and was focused on Electric Operations and the Community Wildfire Safety Program. ISOC subsequently reviewed Gas Operations, Power Generation Fossil, and Shared Services.

Implementation of an Enhanced Oversight and Enforcement Mechanism which requires PG&E to identify systemic safety issues, report them to the

Commission and develop appropriate corrective action plans to address.[6] PG&E is developing and implementing the processes to support the identification and reporting of systemic safety issues.

Creating and hiring two critical risk management roles – a CRO and a CSO.[7] My duties as the CSO were expanded to include both public and workforce safety. Both the CRO and I have direct reporting from safety and risk officers in the field. The CRO and I have regular contact with PG&E employees and contractors working in the field and we report directly to the SNO Committees, the CEO of PG&E Corporation, and to the Company's executive leadership team.

C. Conclusion

PG&E recognizes and remains committed to eliminating fatalities, reducing injuries, and improving safety culture and safety performance. The one employee and seven contractor fatalities PG&E has experienced over the last one and a half years are tragic and unacceptable. Every serious injury or fatality experienced by a PG&E employee or contractor carries with it the burden of pain and loss suffered by their coworkers, family, and friends. These losses point to the critical and time sensitive nature of the mitigation and culture work needed to stop these incidents from occurring. PG&E will continue its focus on specific efforts to drive risk reduction in the high-risk vegetation management and electric construction environments, so critical to execution of the Community Wildfire Safety Program, and to provide better protection for our employees, contractors, and the public. The combination of experienced capable safety leadership, the execution of the 2025 Workforce Safety Strategy, building an aligned accountable safety organizational model and leveraging and acting upon learnings from external oversight and regulatory mechanisms will build the foundation needed for future success. PG&E is moving quickly to sustain the progress made with the Company's revamped 2025 Workforce Safety Strategy and to validate areas for improvement in 2021 and beyond.

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6 D.20-05-053, Appendix A.

7 D.20-05-053, pp. 19-21.

PACIFIC GAS AND ELECTRIC COMPANY

CHAPTER 3

OPERATING RHYTHM

PACIFIC GAS AND ELECTRIC COMPANY
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OPERATING RHYTHM

A. Introduction

This chapter describes Pacific Gas and Electric Company's (PG&E or the Company or the Utility) enterprise-wide planning and budgeting process, known as the Operating Rhythm. The Operating Rhythm is the successor planning and budgeting process to the Integrated Planning Process that was followed to prepare PG&E's 2020 General Rate Case (GRC) forecast. PG&E describes how the Operating Rhythm was used in the 2023 GRC planning process.

This chapter also addresses the Company's Plan of Reorganization (POR), which included a 5-year line of business (LOB) forecast from 2020-2025. It also includes an explanation of how the POR forecast was derived and how it was used in preparation of the 2023 GRC forecast.

This chapter also describes the Company's commitment to Customer Affordability.

Finally, this chapter addresses reprioritization of work within an approved forecast and compliance with a provision regarding "deferred work" in the 2020 GRC settlement.

B. Operating Rhythm

PG&E adopted a new framework to run the business when it emerged from its Chapter 11 proceeding in 2020 called the Operating Rhythm. The Operating Rhythm is an integrated enterprise-wide structure focused on three critical components: planning, performance management, and governance. The Operating Rhythm is enabled by the Lean Operating System, the overarching function of which is to provide clear line of sight to performance execution and accountability throughout the Company by utilization of a framework, forums and tools to align leaders on key desired business results, integrated work, resource and financial plans, monitoring of results, and quick identification, coordination, and resolution of gaps to achieve Company objectives.

The Operating Rhythm is comprised of weekly, monthly, quarterly, and annual forums. Weekly meetings, referred to as "huddles," provide a forum to share key business and operational updates, raise issues, provide

recommendations, seek input, and make timely decisions on pertinent topics. Monthly reviews focus on Key Performance Indicators (KPI), initiatives, or relevant planning forecast changes. Quarterly and annual reviews will focus on establishing goals and associated KPIs and initiatives, setting 5-year plans, setting more detailed 24-month plans and reviewing governance structures. These focus areas will change each quarter during the year.

Planning activities that are part of the Operating Rhythm include components of the Company's former Integrated Planning Process described in PG&E's 2020 GRC testimony.[1] Annual reviews of the Company's goals, 5-year plan, KPIs, and key initiatives will continue to occur as part of the Operating Rhythm as they did in the Integrated Planning Process. The Operating Rhythm will introduce a 24-month rolling plan on the details of our work, resources, and financials. This will be calibrated quarterly for checks and balances between goals, key decisions, and tradeoffs. Themes from the quarterly calibrations will be incorporated into the annual reviews for any changes to the Company's goals, 5-year plan, KPIs, and key initiatives.

Through the performance management pillar of the Operating Rhythm, PG&E has defined KPIs which are tracked and measured through the cadence of an ongoing series of meetings that align safety, operational and financial performance. At the senior officer level, PG&E holds a monthly, action-oriented meeting where each senior officer reports on drivers of performance deviation and action plans to contain any foreseen or identified problem as well as the countermeasure to address the root cause of the performance deviation. These meetings also serve to identify the need and effectiveness of enterprise-wide initiatives to address root causes of any performance deviation.

The Operating Plan Committee (OPC) is primarily responsible for the governance of the Operation Rhythm. This group is comprised of PG&E's Corporation's Chief Executive Officer and Chief Financial Officer and PG&E's Chief Risk Officer, Executive Vice President (EVP) Chief Operating Officer, EVP of Engineering, Planning & Strategy, EVP of Customer & Communications and EVP of People, Shared Service and Supply Chain. The OPC is charged with enterprise-level decision making for items materially impacting key Company

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[1] A.18-12-009; See Exhibit (PG&E-2), Ch. 2.

goals, work execution, resources, the financial profile of the Company as well as escalations of emerging issues from other governing bodies that are deemed to have potential impacts to the company's plan.

C. Lean Operating System

As described in Exhibit (PG&E-1), Chapter 1, PG&E will also implement a new Lean Operating System to manage daily work. The Lean Operating System will create a 'daily heartbeat' and new way of working where Lean Management will be implemented at all levels of the Company. Together the Lean Operating System and Operating Rhythm facilitate both horizontal and vertical alignment focused on safety, quality, and reliability across the enterprise.

D. 2023 GRC Planning Process

In June 2020 the bankruptcy court approved PG&E's POR and successfully exited the Chapter 11 bankruptcy process. PG&E's 2023 GRC forecast was developed around a set of guiding principles: the forecast must be risk informed; the forecast must meet key commitments made by the Company; and the forecast should be consistent with the financial targets included in PG&E's POR as updated through the OPC review and approval process.

As part of PG&E's POR, PG&E developed a five-year forecast. PG&E's 2023 GRC forecast is anchored to but not identical to the POR forecast. The POR included annual forecast targets for the 5-year period 2020-2025 for each LOB, which were derived from bottoms up plans for each LOB. The POR targets were anchored in the then-known/then-current regulatory adopted amounts at the LOB level. PG&E prepared its 2023 GRC forecast by starting with the POR forecast for the work included in the 2023 GRC and adding updates to address additional work needs, risk mitigations, and affordability initiatives that were later identified. The primary updates since the POR forecast include:

- Gas main replacements estimates were modified to include additional miles consistent with the 2020 GRC Decision;[2]
- Gas Transmission included additional work to comply with new federal regulations commonly referred to as "Mega Rule" requirements. The key themes of the rule are Integrity Management, Materials Traceability,

[2] See Exhibit (PG&E-3), Ch. 4.

Maximum Allowable Operating Pressure Reconfirmation, and Pipeline Material Verification;[3]

- Acceleration of our Butte County Community Rebuild Program;[4]
- Electric Operations (EO) Operational Management and Operational Support activities had increases for wildfire mitigation costs;[5]
- EO new business and work at the request of others to align to updated economic models and comply with a California Public Utilities Commission (Commission)-approved settlement with CalTrain;[6]
- Hydroelectric Department required additional funding for dam safety mitigations;[7]
- Customer Care Gas Advanced Metering Infrastructure modules replacement activities;[8] and
- Replacing our legacy Customer Care & Billing system.[9]

Additional Information Technology investments including the Palantir Foundry platform in support of the enterprise data management initiative, Application Health and Cloud investments, and re-platforming our Geographic Information System.[10] PG&E also updated the POR Forecast to incorporate the projects for mitigating and controlling PG&E's top safety risks as provided and updated through the Risk Assessment and Mitigation Phase (RAMP) process. PG&E filed its 2020 RAMP Report with the Commission in June 2020 with Application 20-06-012. The 2020 RAMP Report identified mitigations and controls associated with each of PG&E's top safety risks and included estimated costs for the mitigations and some controls. As part of the RAMP process, PG&E evaluated and ultimately selected a preferred portfolio of risk mitigations based on an analysis of risk reduction, risk spend efficiency scores, regulatory commitments, in-flight work and other priorities. Funding these risk mitigations

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3 See Exhibit (PG&E-3), Ch. 5.

4 See Exhibit (PG&E-4), Ch. 23.

5 See Exhibit (PG&E-4), Ch. 22.

6 See Exhibit (PG&E-4), Ch. 18.

7 See Exhibit (PG&E-5), Ch. 4.

8 See Exhibit (PG&E-6), Ch. 9.

9 See Exhibit (PG&E-6), Ch. 10.

10 See Exhibit (PG&E-7), Ch. 8.

was a top consideration in developing the 2023 GRC forecast. For additional information on the RAMP process, please see Exhibit (PG&E-2), Chapter 1.

E. Customer Affordability Program

PG&E seeks to drive long-term sustained efficiencies to offset future cost pressures associated with increased capital investment requirements, changing risk profiles and external demands with the goal of maximizing risk mitigation while minimizing impact to customer utility bills.

The Affordability Program Management Office spans across lines of business and includes multiple levels of leadership to help drive accountability. There are dedicated resources in these organizations that work together to quantify opportunities, establish targets, and develop roadmaps for initiatives. An Enterprise Affordability team has been established in the Business Finance & Planning organization. The team works with the affordability teams embedded within the lines of business through regular meetings and operating reviews.

These savings will be generated through three types of efforts (1) Operational Improvements, (2) Investment Optimization, and (3) Transactional. The customer affordability program will be informed by benchmarking, system performance, operational performance, and investment optimization modeling.

Operational Improvements result in reduction in the per unit cost of work through work planning & bundling, resource allocation, strategic sourcing negotiations and other process improvements. Investment Optimization savings are the result of right sizing investments relative to the value created (primarily risk reduction) through repair vs replace decisions, policy changes, work method enhancements and asset strategy refinement. Transactional savings are comprised of efforts such as selling real estate, renegotiating our power purchase agreements, and selling excess renewable energy credits. Savings will be realized at the time each transaction closes.

The customer affordability program is dynamic in nature and PG&E will pursue additional efficiencies opportunities through the 2023 GRC period.

F. Reprioritization

1. PG&E Prioritizes Spending to Provide Safe and Reliable Service

PG&E's work plans are subject to change during the rate case period to address emerging issues or changes in circumstances. These may require the reevaluation and reprioritization of the LOB work portfolios and may result in a reprioritization of work at the enterprise level to ensure the highest risk work and most important issues are addressed.

PG&E is expected to manage rate case approved funds reasonably, including by reprioritizing activities as necessary, consistent with its responsibility to provide safe and reliable service.[11] PG&E uses both its enterprise-wide planning and budgeting process and its governance procedures at the LOB and enterprise levels to manage this process.

As discussed earlier in this chapter, the Operating Rhythm and OPC are focused on performance indicators, decision making, governance and process management. This process is designed to ensure that PG&E allocates resources appropriately to maintain safe and reliable service. The Operating Rhythm and OPC process is closely connected to the rate case process, by providing inputs to and informing rate case requests, and incorporating the outcome of rate cases into ongoing planning and budgeting. From a spending perspective, LOBs formally identify and communicate emerging spending needs to the enterprise-wide planning and budgeting process that they are not able to internally prioritize, including emerging needs related to safety, compliance, and reliability work. The OPC determines whether and how to reprioritize activities across the enterprise to address those needs and reflects those decisions in the LOB operating budgets.

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[11] The Commission has said: "It is generally recognized that when a utility files a GRC, expenditure estimates are based on plans and preliminary budgets developed at least two years in advance of when they will actually be incurred. When the Utility finalizes its budget just prior to the year when costs will be incurred or adjusts the budget during the year, new programs or projects may come up, others may be cancelled, and there may be reprioritization. This process is expected and is necessary for the Utility to manage its operations in a safe and reliable manner." D.11-05-018, p. 27. The Commission made this point more succinctly in Finding of Fact 10: "A reprioritization process is expected and necessary for the Utility to manage its operations in a safe and reliable manner." *Id.* at p. 82.

Reprioritizing funding to address emerging safety, compliance and reliability needs also can occur after annual operating budgets are set. When possible and appropriate, emerging issues that must be addressed during a planning year are managed within the LOB in various ways, including by identifying efficiency opportunities or using the LOB's risk informed prioritization framework to adjust the LOB's work plan.

Emerging issues that cannot be solved within an LOB are identified, communicated, and solved through the enterprise-wide planning and budgeting process, and OPC review and approval.

2. Complying with the 2020 GRC Settlement Agreement on Deferred Work

As described in the testimony that follows and in the LOB exhibits, PG&E has complied with Section 5.2 of the 2020 GRC Settlement "Deferred Work Principles." The Settlement defines "deferred work" as any work proposed in the 2020 GRC or 2019 Gas Transmission and Storage (GT&S) rate case where: (1) the work was requested and authorized based on representations that it was needed to provide safe and reliable service; (2) PG&E did not perform all of the authorized and funded work, as measured by authorized (explicit or imputed) units of work; and (3) PG&E continues to represent that the curtailed work is necessary to provide safe and reliable service.

The Settlement lists six principles that were reflected in prior GRC decisions. The Settlement requires that for all work meeting the definition of deferred work:

> PG&E's direct showing in support of the reasonableness of its forecast in the rate case shall provide at a minimum, a demonstration of how the specific funding request is consistent with the principles.[12]

The Settlement further requires that for any work that meets the deferred work conditions, PG&E's direct showing in support of the reasonableness of its forecast in the rate case explain:

a) Why the authorized work was not performed in the time forecasted;
b) Whether the deferral of the authorized work resulted in lower than authorized spending for the authorized work;

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12 A.18-12-009, Settlement Agreement of the 2020 GRC of PG&E, p. 37.

c) How the funding was reallocated and whether such reallocation related to the provision of safe and reliable service; and

d) To the extent that authorized funding for safety-related work was used for other purposes, the reasonableness of the alternative work for the purpose of evaluating the appropriateness of the new funding request.

3. Showing Required for Deferred Work

PG&E's LOBs conducted an analysis of the work forecast in the 2020 GRC and the 2019 GT&S rate case expected to be completed between 2020 and 2022 (2019 and 2022 for GT&S work) to analyze whether deferred work exists. They also developed testimony and supporting workpapers describing the results of this analysis.

Table 3-1 at the end of this chapter identifies where LOB sponsors address these instances of deferred work in opening testimony. For identified deferred work, the LOB that sponsors that work has met the additional requirements set forth in the Settlement Agreement by addressing consistency with the six principles and responding to questions (a) through (d) listed above.

PG&E recognizes that the six principles also have a broader relationship to the enterprise planning and budgeting processes discussed in this chapter. Accordingly, in addition to being addressed in each LOB's testimony where specific deferred work is identified, the six principles also are discussed below in the context of PG&E's overall, enterprise-level processes.

The six principles should be viewed in totality and not in isolation, at both the enterprise level and the LOB level.[13] They balance factors that should be considered when determining whether PG&E's decisions are reasonable for the operation of its systems.

Because of some overlap among the various principles, I describe immediately below each principle the key element(s) of that principle in order to provide additional structure for this discussion.

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[13] 2020 GRC Settlement states "The Settling Parties agree to the following six principles (Principles), which will be applicable to PG&E's next GRC. The Settling Parties agree that the Principles should be viewed in totality." A.18-12-009, Settlement Agreement of the 2020 GRC of PG&E, p. 36, Section 5.2.

Principle 1: Where funds are originally collected from ratepayers based on representations that the work is necessary to provide safe and reliable service and, yet, PG&E does not perform all of the designated work, the fact that PG&E must pay for a higher priority activity or program does not nullify or extinguish its responsibilities to fund forecasted and authorized work unless such work is no longer deemed necessary for safe and reliable service.[14]

PG&E believes that the intention of this principle is to require funding by PG&E of all work needed to deliver safe and reliable service, regardless of other funding demands. PG&E has and will continue to use funds adopted in the 2020 GRC and 2019 GT&S rate case to provide safe and reliable service in 2019-2022.

First, as discussed throughout this Chapter and in Section B above, the Company's enterprise-wide planning and budgeting process ensures that necessary work is funded. The Operating Rhythm and OPC process provides an enterprise-level forum for LOBs to seek additional budget to address changing conditions and emergent high priority work. Within a given year, consistent with PG&E's responsibility and its discretion to adjust priorities to accommodate changing conditions (see Principle 5 below) each LOB manages and reprioritizes its spending as described above and in the LOB exhibits. When needed, an LOB may ask for additional resources via the Operating Rhythm and OPC process used to determine the enterprise solution for the LOB's need. These processes—the Operating Rhythm and OPC process, the individual LOB's management of their spending portfolio, and the ability of LOB's to seek additional resources at the enterprise level —align enterprise-level spending to fund forecasted and authorized work that is deemed necessary for safe and reliable service.

Furthermore, more specific to the current GRC and GT&S periods, PG&E expects to complete the vast majority of the safety and reliability work forecast in those cases between 2019 and 2022.

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14 The Principles stated in this discussion are directly taken from the Settlement Agreement of the 2020 GRC of PG&E, pp. 36-37, Section 5.2.

For expense deferred work at the Maintenance Activity Type (MAT) or Major Work Category (MWC) level, total underspending is estimated to be approximately $2.6 million,[15] or less than 0.1 percent of overall imputed adopted expense.[16] This represents one program: Gas Distribution Casing Short Mitigation.[17] Between 2019 and 2022 PG&E expects to exceed imputed adopted expense spending by approximately $3.8 billion.[18]

For capital deferred work at the MAT or MWC level, total underspending is estimated to be $239.9 million or approximately 0.6 percent of overall imputed adopted capital spending.[19] This capital was reprioritized, generally, to other capital work within the LOB that was deemed higher priority for safety and reliability, or compliance purposes, as discussed in LOB chapters.[20] Even with reallocation of these funds, between 2019 and 2022 PG&E expects to exceed imputed adopted capital spending by approximately $4 billion.[21]

For all of these reasons and the specific reasons identified in LOB testimony, PG&E is in compliance with Principle 1.

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15 Table 3-1, line 10.

16 Exhibit (PG&E-1), Ch. 2, Table 2-2. These dollars cover years 2020-2022 for the GRC and 2019-2022 for the GT&S case.

17 This expense underspend is offset by an overspend for identified deferred work of approximately $154.9 million more than imputed in the following programs: $2.7 million for Gas Distribution (Table 3-1, line 11) and $152.2 million for Electric Operations (Table 3-1, sum of lines 13-15). For overall authorized expense spending see Exhibit (PG&E-1), Ch. 2, Table 2-2.

18 Exhibit (PG&E-1), Ch. 2, Table 2-2. This includes balancing and memorandum accounts. Table 2-2 includes years 2020-2022 for the GRC and 2019-2022 for the GT&S case.

19 Capital underspending includes $74.1 million for Gas Distribution (Table 3-1, sum of lines 1, 6, 8, and 12), $66.9 million for GT&S (Table 3-1, sum of lines 3 and 4), and $98.9 million for Electric Operations (Table 3-1, sum of lines 16-24) for a total deferred work capital underspend of $239.9 million. This capital underspend is partially offset by an overspend of approximately $35 million more than imputed. For overall authorized capital spending see Exhibit (PG&E-1), Ch. 2, Table 2-2. These dollars cover years 2020-2022 for the GRC and 2019-2022 for the GT&S case.

20 Table 3-1.

21 Exhibit (PG&E-1), Ch. 2, Table 2-2. This includes balancing and memorandum accounts. Table 2-2 includes years 2020-2022 for the GRC and 2019-2022 for the GT&S case.

Principle 2. PG&E is responsible for providing safe and reliable customer service whether or not its overall spending matches funding levels authorized or imputed in rates.

PG&E understands this principle to mean that PG&E's responsibility to provide safe and reliable service is independent of PG&E's overall spending level. This principle should be read in conjunction with Principles 3 and 6 that acknowledge that there is a limit to how much overspending can occur before damaging the Utility's financial health to the detriment of ratepayers and investors.

As discussed under Principle 1, PG&E believes that it demonstrates compliance with this principle and with its responsibility to provide safe and reliable service by: allocating funding following its risk-informed enterprise and LOB planning, budgeting, and governance processes; completing the vast majority of work deemed in the 2020 GRC and 2019 GT&S rate case necessary for safety and reliability; and demonstrating through its overall capital spending levels its commitment to maintain safe, reliable service.

Principle 3. PG&E bears the risk that, as a result of meeting spending obligations necessary to provide safe and reliable service, the earned rate of return may be less than the authorized return.

PG&E understands that under this principle PG&E is not guaranteed its authorized rate of return and PG&E's obligation to provide safe and reliable service may cause PG&E's earnings to be less than authorized. Consistent with Principle 6 below, this principle should be balanced over time by years in which PG&E earns greater than its authorized rate of return because if PG&E consistently underperforms, it will not afforded "a reasonable opportunity to earn its rate of return and thereby attract capital to fund its infrastructure needs" as required by Principle 6.

As discussed under Principle 1, PG&E has met its obligation to provide safe and reliable service by allocating funding following its risk-informed enterprise and LOB planning, budgeting, and governance processes; by completing the vast majority of work deemed in the 2020 GRC and 2019 GT&S rate cases to be necessary for safety and reliability; and by demonstrating through its overall capital spending levels its commitment to maintain safe, reliable service. PG&E accepts the risk that spending to

ensure safe and reliable service may cause PG&E to earn less than its authorized rate of return.

Principle 4. While PG&E has finite funds to meet capital and operational needs, PG&E is not restricted to spending only up to the forecast adopted in a GRC.

PG&E understands this principle to be closely related to Principles 1, 2, and 6, with the important additional acknowledgment that PG&E has finite funds to meet its capital and operational needs. By complying with Principles 1, 2 and 6, PG&E has demonstrated compliance with this principle. In addition, as noted above, between 2019 and 2022 PG&E expects to exceed authorized capital spending under the 2020 GRC and the 2019 GT&S cases by approximately $4 billion,[22] including spending for safety and reliability projects.

Principle 5. PG&E bears the responsibility—and has discretion—to adjust priorities to accommodate changing conditions after test year forecasts are adopted. Readjusting spending priorities, however, only involves the ranking and sequence of spending. Reprioritizing spending for new projects does not automatically justify postponing projects previously deemed necessary for safe and reliable service.

PG&E understands this principle to be very similar to Principles 1-3, adding the explicit acknowledgment of PG&E's responsibility and discretion to readjust its spending priorities.

As described throughout this Chapter and under Principle 1, LOBs use PG&E's enterprise-level planning, budgeting, and forecasting processes to necessarily adjust their original plans to address emerging issues that were not included in the rate case request. PG&E complies with this principle because these processes use risk-informed planning and do not automatically postpone previously prioritized work when emerging requirements arise. In addition, PG&E completed the vast majority of the work deemed necessary in the 2020 GRC and 2019 GT&S rate case for

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22 Exhibit (PG&E-1), Ch. 2, Table 2-2. This includes balancing and memorandum accounts. Table 2-2 includes years 2020-2022 for the GRC and 2019-2022 for the GT&S case.

safety and reliability and expects to exceed the capital spending authorized in those rate cases in order to support its safety and reliability goals.

Principle 6. The GRC process is a tool in supporting PG&E's ongoing ability to provide safe and reliable service while affording a reasonable opportunity to earn its rate of return and thereby attract capital to fund its infrastructure needs. Adopted revenue requirements and the disposition of disputed ratemaking issues should be consistent with the goal of supporting PG&E's ability to provide safe and reliable service while maintaining its financial health and ability to raise capital.

PG&E understands this principle to balance the factors in Principles 1-5. PG&E has complied with this principle as discussed under Principles 1-5.

TABLE 3-1
DEFERRED WORK IN PG&E'S 2023 GRC AS DEFINED BY THE 2020 GRC SETTLEMENT AGREEMENT, SECTION 5.2

Line No.	Exhibit and Chapter	Deferred Work Program(s)	Reason for Deferred Work	Volume and Cost of Work ($000s) [a],[b]	
				Imputed/adopted units from the 2020 GRC (2020-2022) or the 2019 GT&S case (2019-2022)	From the 2023 GRC: 2020 Recorded + 2021 and 2022 Forecast (GRC) or 2019 and 2020 Recorded + 2021 and 2022 Forecast (GT&S)
1	Exhibit 3, Chapter 4: Asset Family – Gas Distribution Mains and Services	14A – Gas Pipeline Replacement Program	PG&E does not expect to complete 22.6 miles out of the imputed units of 547,457 feet (103.7 miles). The program will be underspent by $55.2 million compared to imputed funding. Reasons: Reprioritization/higher risk work: $38 million of MAT 14A funding was reprioritized to MAT 14B to complete copper service replacements. The copper service replacements are considered higher risk work than 14A pipe replacement. MAT 14B had no imputed funding and required approximately $49 million to perform the higher priority copper service replacements. The remaining MAT 14A funding was reallocated through Gas Operations Business Process Governance described in Section D of Exhibit (PG&E-3), Chapter 2.	• 547,457 feet of main • $378,381	• 428,293 feet of main • $323,145
2		50A – Reliability Main Replacement	PG&E spent over the imputed funding amount for MAT 50A. However, due to higher than forecast unit costs, PG&E completed 2.8 miles fewer than the imputed units of 234,624 feet (41.6 miles). The program is expected to spend $0.6 million more than imputed funding. Reasons: Reprioritization/higher risk work: Currently, additional funds have not been allocated to 50A given the priorities of higher risk work related to plastic pipe replacement (MAT 14D). However, PG&E will seek opportunities to complete these units.	• 234,624 feet of main • $142,190	• 219,737 feet of main • $142,784

TABLE 3-1
DEFERRED WORK IN PG&E'S 2023 GRC AS DEFINED BY THE 2020 GRC SETTLEMENT AGREEMENT, SECTION 5.2
(CONTINUED)

Line No.	Exhibit and Chapter	Deferred Work Program(s)	Reason for Deferred Work	Volume and Cost of Work ($000s) [a],[b]	
				Imputed/adopted units from the 2020 GRC (2020-2022) or the 2019 GT&S case (2019-2022)	From the 2023 GRC: 2020 Recorded + 2021 and 2022 Forecast (GRC) or 2019 and 2020 Recorded + 2021 and 2022 Forecast (GT&S)
3	Exhibit 3, Chapter 5: Asset Family – Gas Transmission Pipe	75I – Valve Automation	18 fewer valve automation units are expected to be completed compared to the 97 adopted/imputed units. The program expects to spend approximately $11 million less than imputed funding. Reasons: Reprioritization/higher risk work: The units not completed in MAT 75I were offset by additional valves replaced in MAT 75D, the Valve Safety and Reliability Program. These additional valves in the 75D program were over and above the imputed units in that MAT. These additional replaced valves provide more risk reduction than the postponement of the installation of the automated valves. The underspend in MAT 75I was allocated to MAT 75D which was significantly overspent compared to imputed.	• 97.17 valves (GT&S) • $110,852 (GT&S)	• 79 valves • $100,300
4		75M – Shallow Pipe	PG&E expects to complete 3.48 fewer miles than the imputed units of 3.87 miles in MAT 75M (Shallow Pipe), and to spend $56 million below imputed funding. Reasons: Reprioritization/higher risk work: The 3 fewer miles in 75M are offset by additional miles over imputed units in MAT 75K (Water and Levee Crossings) and MAT 75T (Exposed Pipe) both of which will spend significantly over imputed funding. The 75K and 75T projects address similar threats to MAT 75M, and the risks were determined to be higher than the originally forecast shallow pipe projects. No compliance projects are impacted by the delays in 75M work.	• 3.87 miles (GT&S) • $66,735 (GT&S)	• 0.39 miles • $10,403

TABLE 3-1
DEFERRED WORK IN PG&E'S 2023 GRC AS DEFINED BY THE 2020 GRC SETTLEMENT AGREEMENT, SECTION 5.2.
(CONTINUED)

Line No.	Exhibit and Chapter	Deferred Work Program(s)	Reason for Deferred Work	Volume and Cost of Work ($000s) [a],[b]	
				Imputed/adopted units from the 2020 GRC (2020-2022) or the 2019 GT&S case (2019-2022)	From the 2023 GRC: 2020 Recorded + 2021 and 2022 Forecast (GRC) or 2019 and 2020 Recorded + 2021 and 2022 Forecast (GT&S)
5	Exhibit 3, Chapter 6: Asset Family – Gas Facilities	50C – Gas Distribution Reg Station Rebuild	For the 2020-2022 period PG&E plans to complete 88 distribution regulator station rebuilds which is 11 units less than the 99 imputed units. The program is expected to spend $29.7 million more than the imputed funding. Reasons: COVID-19 delays: 7 units delayed by COVID- 19 and subsequent execution constraints that precluded catching up in 2021 and 2022. Deferring these units did not degrade the safety and reliability of these facilities. PG&E performs annual maintenance on regulator station facilities and will also pursue component replacement as needed to address equipment issues until the station can be rebuilt. Retirement/deactivation of units: Review of overall gas system needs resulted in rescoping some stations for deactivation instead of rebuilding which resulted in retiring 4 stations and mitigating the same risk as rebuilding the stations. PG&E has reduced its 2023 forecast to account for the 4 retirements.	• 99 Reg Stations • $125,269	• 88 Reg Stations • $155,000
6		2K – Gas Distribution high-pressure regulator (HPR) Program	2020-2022 units are expected to be 84 units fewer than the 1,008 imputed units. The program expects to spend approximately $8.7 million less than imputed funding. Reasons: COVID-19 delays: Deferral of 108 units in 2020 due to COVID 19 delays and execution constraints in catching up those units in 2021 and 2022. Other delays: Part of the deferral in 2020 was also due to delay driven by Gas Asset Strategy bundling. Several HPR projects were placed on hold in order to review the larger gas system needs which resulted in delays for 2020. The delay due to COVID-19 impact compounded the inability to complete those bundled units for the remainder of the 2021/2022 rate case period. Approximately 24 of the 108 delayed 2020/2021 units are planned to be caught up in 2022.	• 1,008 HPRs • $181,366	• 924 HPRs • $172,683

TABLE 3-1
DEFERRED WORK IN PG&E'S 2023 GRC AS DEFINED BY THE 2020 GRC SETTLEMENT AGREEMENT, SECTION 5.2.
(CONTINUED)

Line No.	Exhibit and Chapter	Deferred Work Program(s)	Reason for Deferred Work	Volume and Cost of Work ($000s) [a],[b]	
				Imputed/adopted units from the 2020 GRC (2020-2022) or the 2019 GT&S case (2019-2022)	From the 2023 GRC: 2020 Recorded + 2021 and 2022 Forecast (GRC) or 2019 and 2020 Recorded + 2021 and 2022 Forecast (GT&S)
7		763 – Gas Transmission (GT) Simple Station Rebuild	PG&E will complete 1.18 Simple Station Rebuilds fewer than the 7.18 imputed units. Spending is expected to be approximately equal to imputed funding and therefore no funding to reallocate. Reasons: Financial constraint: Due to one complex and high cost facility, PG&E was constrained by incremental costs for that facility and balancing account restrictions. PG&E chose to do one less unit for the 2019-2022 period compared to the imputed units. For the facility that was deferred, PG&E is planning to complete a component replacement project in 2021 the scope of which includes replacing regulators until the station can be rebuilt. This alternate mitigation of regulator replacement will address the safety and reliability impact of deferring the work.	• 7.18 Simple Station Rebuilt (GT&S) • $22,748 (GT&S)	• 6 Simple Station Rebuilt • $22,763
8		764 – GT Complex Station Rebuild	PG&E will complete 9 Complex Station Rebuilds out of the 10.77 imputed units, or 1.77 fewer units. The deferral of the authorized work is expected to result in spending of approximately $3.8 million less than the imputed funding amount to perform Complex Station Rebuilds. Reasons: COVID-19 delays: In 2020, COVID-19 related execution constraints caused one complex station rebuild to be delayed until 2021/2022. The particular station rebuild that was delayed will be completed during the rate case period, but the delay did not give PG&E enough flexibility to complete one additional unit to meet the rate case imputed units.	• 10.77 Complex Stations Rebuilt (GT&S) • $116,897 (GT&S)	• 9 Complex Stations Rebuilt • $113,131

TABLE 3-1
DEFERRED WORK IN PG&E'S 2023 GRC AS DEFINED BY THE 2020 GRC SETTLEMENT AGREEMENT, SECTION 5.2.
(CONTINUED)

Line No.	Exhibit and Chapter	Deferred Work Program(s)	Reason for Deferred Work	Volume and Cost of Work ($000s) [a],[b]	
				Imputed/adopted units from the 2020 GRC (2020-2022) or the 2019 GT&S case (2019-2022)	From the 2023 GRC: 2020 Recorded + 2021 and 2022 Forecast (GRC) or 2019 and 2020 Recorded + 2021 and 2022 Forecast (GT&S)
9		76P – GT Electrical Upgrades Hinkley and Topock	For the 2019-2022 period PG&E plans to complete one electrical upgrade unit at Topock which is 0.72 units less than the 1.72 imputed units. PG&E expects to spend approximately $4.6 million more than the imputed amount to perform electrical upgrades at Hinkley and Topock Reasons: COVID-19 delays: The second project at Hinkley was delayed due to COVID-19 related execution constraints. Due to logistics, resource, and COVID shutdown constraints it is not practical to execute major projects at both facilities concurrently. For Hinkley, 60 percent of the design is expected to be complete by end of 2021, and material procurement and construction will begin in 2022. PG&E is only forecasting the completion costs for 2023 when the project is expected to become operational. PG&E considers this as a construction delayed unit, not deferred work.	• 1.72 Upgrades (GT&S) • $15,270 (GT&S)	• 1 Upgrade • $19,887
10	Exhibit 3, Chapter 9 – Gas Operations Corrosion	DGH – Gas Distribution Casing short mitigation < 100 feet	Only 74 casings are expected to be mitigated compared to 247 imputed units. The program expects to spend $2.6 million less than imputed funding. Reasons: Reprioritization/higher risk work: Due to construction resource constraints resulting from COVID-19, work was shifted to casing mitigation greater than 100 ft. (MAT 50Q) that is more effective than DGH at mitigating risk. The underspending in MAT DGH was reallocated to distribution casing test station installations (MAT DGG). COVID-19 delays: 2020 underperformance of units also occurred due to COVID-19 safety concerns/delays. Other: A decline in shorted casing find rates supports a reduced pace or volume of work forecast, i.e., fewer projects <100 feet than were forecast materialized over the rate case period.	• 247 Casing Mitigated • $8,779	• 74 Casings Mitigated • $6,153

TABLE 3-1
DEFERRED WORK IN PG&E'S 2023 GRC AS DEFINED BY THE 2020 GRC SETTLEMENT AGREEMENT, SECTION 5.2.
(CONTINUED)

Line No.	Exhibit and Chapter	Deferred Work Program(s)	Reason for Deferred Work	Volume and Cost of Work ($000s) [a],[b]	
				Imputed/adopted units from the 2020 GRC (2020-2022) or the 2019 GT&S case (2019-2022)	From the 2023 GRC: 2020 Recorded + 2021 and 2022 Forecast (GRC) or 2019 and 2020 Recorded + 2021 and 2022 Forecast (GT&S)
11		DGG – Gas Distribution Install Casing Test Stations	207 units expected to be completed compared to 1,073 imputed units. Program expected to spend $2.7 million more than imputed funding. Reasons: COVID-19 delays: In 2020, a COVID-19 contractor safety shut down occurred for several months. Other: Increase in realized unit cost for the Casing Test Station project due to: Need to contract out this work due to a lack of Company resources; and refusal of municipalities to allow installation of test stations within roadways using keyhole technology resulting in high permit costs, and costly trenching and surface restoration due to need to install test facilities outside of roadways.	• 1,073 Casing Test Stations Installed • $2,410	• 207 Casing Test Stations Installed • $5,078
12	Exhibit 3, Chapter 11 – Gas System Operations	4A – Gas Distribution Ctrl Operations Assets	PG&E expects to complete all but 36 out of 366 of the imputed SCADA RTU installations. PG&E expects to spend $6.4 million less than the imputed funding. Reasons: Reprioritization/higher risk work: 4A funding was reprioritized in 2021 to fund MAT 50N (Gas Distribution Over-Pressure Protection Enhancements program) to offset additional costs necessary to perform an increased pace in regulator station retrofits and the installation of slam shut devices, which is considered to have higher over-pressure risk reduction than SCADA. MAT 4A funding not reallocated to 50N was reprioritized to other higher priority work. COVID-19 delays: 2020 installations were also delayed due to COVID-19 restrictions.	• 366 remote terminal units • $87,275	• 330 remote terminal units • $80,859

TABLE 3-1
DEFERRED WORK IN PG&E'S 2023 GRC AS DEFINED BY THE 2020 GRC SETTLEMENT AGREEMENT, SECTION 5.2.
(CONTINUED)

Line No.	Exhibit and Chapter	Deferred Work Program(s)	Reason for Deferred Work	Volume and Cost of Work ($000s) [(a),(b)]	
				Imputed/adopted units from the 2020 GRC (2020-2022) or the 2019 GT&S case (2019-2022)	From the 2023 GRC: 2020 Recorded + 2021 and 2022 Forecast (GRC) or 2019 and 2020 Recorded + 2021 and 2022 Forecast (GT&S)
13	Exhibit 4, Chapter 11 – Electric Distribution Overhead and Underground Maintenance	KAA – Overhead Notifications – Expense	PG&E does not expect to complete 11,617 notifications out of the imputed units of 93,673. The program will be overspent by $140 million. Reasons: Reprioritization/higher risk work: Resources were reprioritized to complete higher priority maintenance tags.	• 93,674 notifications • $56,886	• 82,057 notifications • $196,945
14		KBA – Underground Notifications – Expense	PG&E does not expect to complete 5,240 notifications out of the imputed units of 18,479. The program will be overspent by $8.1 million. Reasons: Reprioritization/higher risk work: Resources were reprioritized to complete higher priority maintenance tags.	• 18,479 notifications • $33,027	• 13,239 notifications • $41,092
15		2AF – Overhead Idle Facility Removal – Capital	PG&E does not expect to complete 1,783 removals out of the imputed units of 5,346. The program will be overspent by $4.1 million. Reasons: Reprioritization/higher risk work: Resources were reprioritized to complete higher priority maintenance tags.	• 5,346 removals • $24,124	• 3,563 removals • $28,198
16		2BA – Underground Notifications – Capital	PG&E does not expect to complete 2,632 notifications out of the imputed units of 7,676. The program will be underspent by $8.9 million. Reasons: Reprioritization/higher risk work: Resources and funding were reprioritized to complete higher priority maintenance tags.	• 7,676 notifications • $139,851	• 5,044 notifications • $130,936
17		2BF – Underground Idle Facility Removals – Capital	PG&E does not expect to complete 37 removals out of the imputed units of 51. The program will be underspent by $0.3 million. Reasons: Reprioritization/higher risk work: Resources and funding were reprioritized to complete higher priority maintenance tags.	• 51 removals • $583	• 14 removals • $263

TABLE 3-1
DEFERRED WORK IN PG&E'S 2023 GRC AS DEFINED BY THE 2020 GRC SETTLEMENT AGREEMENT, SECTION 5.2.
(CONTINUED)

Line No.	Exhibit and Chapter	Deferred Work Program(s)	Reason for Deferred Work	Volume and Cost of Work ($000s) [a],[b]	
				Imputed/adopted units from the 2020 GRC (2020-2022) or the 2019 GT&S case (2019-2022)	From the 2023 GRC: 2020 Recorded + 2021 and 2022 Forecast (GRC) or 2019 and 2020 Recorded + 2021 and 2022 Forecast (GT&S)
18	Exhibit 4, Chapter 13 – Overhead and Underground (UG) Asset Management and Reliability	08J – Overhead Conductor Replacement	PG&E does not expect to complete 128 miles out of the imputed units of 289. The program will be underspent by $67 million. Reasons: Reprioritization/higher risk work: Resources were reprioritized to complete higher priority work based on time dependency. Funding was used to support routine emergency and higher priority maintenance tags COVID-19 delays: Project delays occurred in 2020 due to COVID-19 related work stoppages	• 289 miles • $157,550	• 161 miles • $90,459
19		08S – Grasshopper Switch Replacements	PG&E does not expect to complete 26 switches out of the imputed units of 90. The program will be underspent by $0.9 million. Reasons: Reprioritization/higher risk work: Resources were reprioritized to complete higher priority work based on time dependency. Funding was used to support routine emergency and higher priority maintenance tags COVID-19 delays: Project delays occurred in 2020 due to COVID-19 related work stoppages	• 90 switches • $3,372	• 64 switches • $2,410
20		49C – Overhead Fuse Installations	PG&E does not expect to complete 66 fuses out of the imputed units of 297. The program will be underspent by $0.6 million. Reasons: Reprioritization/higher risk work: Resources were reprioritized to complete higher priority work based on time dependency. Funding was used to support routine emergency and higher priority maintenance tags COVID-19 delays: Project delays occurred in 2020 due to COVID-19 related work stoppages	• 297 Fuses • $3,285	• 231 Fuses • $2,713

TABLE 3-1
DEFERRED WORK IN PG&E'S 2023 GRC AS DEFINED BY THE 2020 GRC SETTLEMENT AGREEMENT, SECTION 5.2.
(CONTINUED)

Line No.	LOB and Chapter	Deferred Work Program(s)	Reason for Deferred Work	Volume and Cost of Work ($000s) [a],[b]	
				Imputed/adopted units from the 2020 GRC (2020-2022) or the 2019 GT&S case (2019-2022)	From the 2023 GRC: 2020 Recorded + 2021 and 2022 Forecast (GRC) or 2019 and 2020 Recorded + 2021 and 2022 Forecast (GT&S)
21		49T – Trip Saver Installations	PG&E does not expect to complete 92 units out of the imputed units of 239. The program will be underspent by $0.9 million. Reasons: Reprioritization/higher risk work: Resources were reprioritized to complete higher priority work based on time dependency. Funding was used to support routine emergency and higher priority maintenance tags COVID-19 delays: Project delays occurred in 2020 due to COVID-19 related work stoppages	• 239 units • $3,290	• 147 units • $2,403
22	Exhibit 4, Chapter 13 – Overhead and Underground Asset Management and Reliability	56A – UG Cable Replacement	PG&E does not expect to complete 5 miles out of the imputed units of 60. The program will be underspent by $5.0 million. Reasons: Reprioritization/higher risk work: Resources and funding were reprioritized to complete higher priority underground asset replacement work. COVID-19 delays: Project delays occurred in 2020 due to COVID-19 related work stoppages	• 60 miles • $100,539	• 55 miles • $95,556
23		56C – Underground Cable COE Replacements	PG&E does not expect to complete 164 units out of the imputed units of 662. The program will be underspent by $11.9 million. Reasons: Reprioritization/higher risk work: Resources and funding were reprioritized to complete higher priority underground asset replacement work. COVID-19 delays: Project delays occurred in 2020 due to COVID-19 related work stoppages	• 662 replacements • $100,250	• 498 replacements • $88,331

TABLE 3-1
DEFERRED WORK IN PG&E'S 2023 GRC AS DEFINED BY THE 2020 GRC SETTLEMENT AGREEMENT, SECTION 5.2.
(CONTINUED)

Line No.	LOB and Chapter	Deferred Work Program(s)	Reason for Deferred Work	Volume and Cost of Work ($000s) [(a),(b)]	
				Imputed/adopted units from the 2020 GRC (2020-2022) or the 2019 GT&S case (2019-2022)	From the 2023 GRC: 2020 Recorded + 2021 and 2022 Forecast (GRC) or 2019 and 2020 Recorded + 2021 and 2022 Forecast (GT&S)
24	Exhibit 4, Chapter 15 – Substation Asset Management	48C – Replace Substation Batteries	PG&E does not expect to complete 17 units out of the imputed units of 30. The program will be underspent by $3.3 million. Reasons: Reprioritization/higher risk work: Resources and funding were reprioritized to complete higher priority substation work.	• 30 • $6,779	• 13 • $3,488

(a) As explained in Section F.3 above, expense and capital underspending for deferred work in this table comprises 0.007 percent and 0.6 percent respectively of overall imputed/adopted funding in the 2020 GRC and 2019 GT&S proceedings. In addition, PG&E expects to spend $3.8 billion and $4 billion above imputed/adopted funding for expense and capital respectively. Note: this covers years 2019-2022 for GT&S, and years 2020-2022 for GRC.

(b) As stated in Exhibit (PG&E-1), Chapter 2, Section E.2: "[W]ith limited exceptions, PG&E had to freeze the inputs to its forecast for the period 2021 through 2026 as of March 5, 2021. The reasonableness of PG&E's forecast should thus be judged based on the information available to the Company as of this date." The same qualification applies to the deferred work analysis presented in this table. However, in managing the work portfolio, the LOBs regularly reevaluate the planned execution of work to take into account changing circumstances and other factors, resulting in changes to unit and spending forecasts.

(PG&E-2)

PACIFIC GAS AND ELECTRIC COMPANY

CHAPTER 4

CLIMATE RESILIENCE

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CLIMATE RESILIENCE

A. Introduction

California has long served as a global leader on the reduction of greenhouse gas (GHG) emissions. California has also experienced the catastrophic consequences of climate change in recent years, including extreme weather events and changing environmental conditions. Our experience with wildfire, extreme heat waves, atmospheric rivers, drought, and changing precipitation patterns shows us that climate change is already here. It also highlights the urgent need to take action to adapt and prepare for these changes in our operations.

Meeting the challenge of climate change is central to Pacific Gas and Electric Company's (PG&E or the Company) commitment to the triple bottom line – People, Planet, and Prosperity for all of California, underscored by strong operational performance. Our commitment includes aligning our resources and business strategy with California's clean energy goals and advocating for policies and programs that enable safe and reliable energy for our customers. We do so while also working to reduce the ever-growing threat of extreme weather and wildfires.

PG&E's core mission is to provide safe, reliable, affordable, and increasingly clean energy to our customers. To address this core mission in the coming years and decades, we must think of extreme weather conditions, as well as chronic conditions like sea level rise, not as unprecedented, but as expected. Our decisions on investments in our system must take into consideration the likelihood and consequences of changing climate conditions, so we can operate safely and reliably even as the environment around us continues to change.

In recent years, PG&E has taken action to further climate adaptation and resilience. The Company's Climate Resilience team was established in 2016 to assess the impact of climate change on PG&E's assets, employees, customers, and communities and prepare the Company to make climate-informed decisions. Since then, both the size of the team and its core mission have expanded. We recognize that climate adaptation requires a proactive mindset across the

Company, with a focus on forward-looking data and tools to better inform decision-making.

PG&E also recognizes the importance of meaningful engagement with communities, particularly disadvantaged and vulnerable communities, to better inform planning and operating decisions and services. Energy utilities provide a critical service to customers—especially during extreme weather events--and disadvantaged customers are least-equipped to respond to the risks posed by climate change.

PG&E's climate resilience work is based on three pillars: first, bringing forward-looking climate data into internal decision-making; second, working with policymakers and regulators to advance climate adaptation policies and initiatives; and third, collaborating with local governments and communities on adaptation solutions.

PG&E's climate resilience work was described in the Company's 2017 and 2020 Risk Assessment Mitigation Phase (RAMP) Reports and will be further informed by the Climate Vulnerability Assessment (CVA) that will support PG&E's 2027 General Rate Case (GRC). We explain below and further in Exhibit (PG&E-9) Chapter 8 our vision for using climate data in decision-making, with a continued focus on providing safe, affordable, reliable, and clean energy for the benefit of our customers and the communities we serve.

B. Expected Climate Conditions for This GRC Period

Climate is defined as the average weather conditions in a place over an extended period, usually on the scale of decades. Projections of climate provide statistical characteristics for future environmental conditions such as temperature and precipitation. Climate models are like any other mathematical model – they are based on well documented physical processes and project climate conditions in the future under a set of defined assumptions. One key assumption in a climate model is the choice of a Representative Concentration Pathway (RCP) which represents the projected atmospheric concentration of GHG over time. Different RCPs describe different climate futures, all of which are considered possible depending on the volume of GHGs emitted in the future. Climate change projections are quasi- probabilistic, characterized by a range of potential scenarios with a greater or lesser change of occurring, based on uncertainty in future GHG concentrations, climate sensitivity to GHG increases,

natural climate variability, and other factors. Informed judgments can point with some level of confidence toward scenarios that are more or less likely to occur, though some portion of the uncertainties involved remains difficult to quantify.

That being said, the impacts of climate change on PG&E infrastructure are already a reality. Record breaking extreme heat and heat waves are now a regular occurrence throughout California. In the past two decades, PG&E's electric distribution system has experienced multiple, major outage causing events associated with heat waves and peak loads. Peak loads are expected to increase with increasing temperature due to direct impacts of ambient temperatures on equipment and direct impacts on electricity demand driven by rising air conditioning installation and usage. In 2006, a record-breaking heat wave in the San Francisco Bay Area resulted in nearly 750,000 sustained customer outages. A 2017 heat wave resulted in approximately 400,000 customer outages—many of those in the Bay Area mostly as a result of distribution transformer failures due high heat. Recently, an August 2020 heat wave was associated with over 200 distribution transformer outages across PG&E's service area.

Extreme heat is not the only climate hazard that PG&E must address. PG&E assets on the coast and in or near watersheds face potential increased exposures to coastal, riverine (fluvial), and precipitation related (pluvial) flooding because of climate-driven changes in precipitation and sea level rise. Flooding at coastal assets such as substations is predicted to worsen over time due to sea level rise.

Climate change will also continue to intensify the potential for wildfire throughout California. Models incorporating future temperature and precipitation projections suggest that landscape susceptibility to wildfire within PG&E's service territory will continue to increase over time, with an expansion of areas that may become High Fire Threat Districts (HFTD) and an intensification of risk within the fuel-dense HFTD. This could result in increased potential of lines to cause ignitions or to require Public Safety Power Shutoffs (PSPS) (notwithstanding the aggressive mitigation actions PG&E is taking), as well as the potential for PG&E equipment to sustain damage from wildfires of any origin.

The 2023-2026 GRC period represents a very near-term view of the changing climate. We summarize the estimated impact of the following climate

conditions for the years 2023-2026 (with a reference year of 2025) in the table below.

TABLE 4-1
2025 CLIMATE VARIABLE PROJECTIONS FOR PG&E SERVICE AREA, RCP 8.5[1]

Line No.	Variable		1996-2005 Baseline	Projected 2025 50th percentile (25th-75th)*	Projected change from baseline to 2025
1	Temperature (Territory-wide avg.)	1-in-2 annual max temperature (°F) (Territory)	99.2	101.6 (100.9-102.6)	+2.4
2		1-in-10 annual max temperature (°F)	102.8	105.9 (104.6-107.3)	+3.1
3		Annual average number of 5-day heat waves (#)	2.3	3.8 (3.4-4.3)	+1.5
4	Precipitation (Territory-wide avg.)	Average annual 24-hour Pmax (mm)	48.7	51.0 (47.1 – 55.5)	+2.3
5		Longest average annual consecutive dry days	244.7	247.0 (243.2 – 250.5)	+2.3
6	Drought	While mean annual precipitation is projected increase slightly within northern California, *interannual variability* is projected to increase, leading to more extreme dry years or multi-year dry periods (drought).[1] There is medium-high confidence within the scientific community that droughts will become increasingly common by the end of the century.[2] Future dry spells are also expected to become more intense, on average, with extreme periods of dryness similar to the 2012-2016 California drought becoming more common.[3] As such, climate science suggests that the near-term probability of drought is elevated relative to the historical baseline.			
7	Sea-Level-Rise	Coastal land area in PG&E service area inundated during 100-year storm (hectares)***	8,425**	9,247	+822
8	Wildfire (Territory-wide avg.)	Annual average hectares burned (per ~3600 hectare grid cell)****	24.6	26.5	+1.9

* Temperature and precipitation variables are presented with 50th, 25th, and 75th percentiles as indicated by legend. Sea level rise assumes 0.25 meters of sea level rise, which is the projection level in United States Geological Survey models most closely matches a conservative assessment of 2025 sea levels. Wildfire projections represent the average of the four models analyzed in the California Fourth Climate Assessment (Westerling et al. 2018).

** 2010-2015 baseline.

*** Sea level rise figures do not cover coastline north of Point Arena, which USGS has not yet fully modeled.

**** Wildfire modeling covers combined State and Federal Responsibility Areas. Areas outside these are typically low fire risk (e.g., much of the Central Valley and non-vegetated urban areas).

C. Preparing PG&E for Climate Change

A key element of preparing PG&E for the physical risks of climate change is a system-wide CVA of the Company's assets, operations, and services. PG&E was an active participant in the CPUC's first proceeding focused on climate

[1] California Public Utilities Commission (CPUC) D.19-10-054 specifies planning standards and directs California's energy utilities "to use business-as-usual [GHG emission RCPs] 8.5 for planning, investment, and operational purposes. D.19-10-054, p. 57, Ordering Paragraph 4.

adaptation and resilience. In August 2020, the CPUC issued Decision (D.) 20-08-046, which instructs California's Investor Owned Utilities (IOU) to conduct vulnerability assessments and offer options for climate adaption in their subsequent GRCs. PG&E will file its first vulnerability assessment in 2024 and will include a dedicated chapter on climate adaptation proposals in its 2027 GRC.

The CVA will improve PG&E's understanding of its exposure to climate hazards and the sensitivity of assets and operations to these hazards. It will also inform PG&E's assessment of the ease or difficulty of adapting to changing conditions. While the CPUC decision instructs the IOUs to offer adaptation solutions in their following GRC filings, California's, and PG&E's experience with the accelerating pace of climate change means that climate adaptation projects should begin as soon as possible and be designed and launched in tandem with the timing of expected risk.

Data collected through the vulnerability assessment process should be used in relevant and timely decision-making across the Company. To achieve this, PG&E will use data gathered from the CVA in multiple areas, including:

- Design Standards: PG&E design standards engineers, in collaboration with the Climate Resilience team, are developing a Climate Change Design Guidance document that will give design standards experts access to climate change data and scenarios that can be used for asset design purposes. This project will also identify assets for which physical climate risks are highest and that should be prioritized for design standards updates. The Climate Resilience team will work with design standards teams to update relevant design standards to account for climate risk.
- Asset Management: PG&E's major lines of business (LOB) (other than nuclear, which has different standards and requirements) have been working towards ISO 55001 certification (or recertification, in the case of gas), which outlines a set of standards for asset management. Asset managers develop Asset Management Plans as part of the annual asset management process. A climate risk section that draws from the CVA findings will be included, and updated, in annual asset management plans across PG&E's electric, gas, and generation LOBs.

- Risk modeling: In the 2020 RAMP Report, PG&E quantified the impact of climate change into two risk models, including Wildfire and Electric Distribution Overhead Risk. Climate change will affect other top safety risks, such as employee safety, dam failures, and failure of electric distribution substation and underground assets. Continued work is needed to improve risk models to estimate how this risk will change over time. Data from the CVA will enhance the Company's ability to quantify climate risk for these enterprise risk models, as well as asset-level, operational risk models.
- Extreme-weather scenario planning: PG&E is increasing its capabilities related to emergency planning and response and has made substantial strides recently to prepare the Company, its coworkers, customers, and communities its services for wildfire risk. The results of the CVA will be used to better inform the Company's preparation for climate-driven extreme weather scenarios, including extreme heat waves, extreme storms, flooding, and cascading events that may involve multiple climate hazards.
- Building strong community partnerships: While PG&E will make investments to increase the resilience of its assets, operations, and services, the Company will only be as resilient as the communities it serves. PG&E's customers are these communities—and customer and community resilience are integral to the sustainability of PG&E's customer base. Community and local government funding are under strain from the economic impact of coronavirus and wildfires. This has caused them to pause necessary climate adaptation projects.

PG&E recognizes it has a role to play in supporting and even facilitating the climate resilience of local communities. PG&E's assistance can come in the form of financial and technical support for local government adaptation programs and grant proposals. The Climate Resilience team, with the collaboration of six other PG&E departments (substation asset management; local public affairs; electric operations, land and environmental management; law; and federal affairs) tested a partnership in collaboration with the City of Menlo Park, the San Francisco Joint Powers Authority, and Facebook to apply for a competitive $50 million grant offered by Federal Emergency Management Agency's (FEMA) Building Resilience Infrastructure and Communities grant program. The grant

application was vetted by California Governor's Office of Emergency Services and is currently under consideration by FEMA.

D. Incorporating Climate in the GRC Forecast

PG&E is already working to incorporate forward-looking climate data into its risk management processes, including its wildfire mitigation efforts. PG&E is actively working to mitigate wildfire risk across its service territory by undertaking a series of targeted measures, many of which are outlined in the 2021 Wildfire Mitigation Plan. These include vegetation management, more intensive and widespread inspections, system hardening, enhanced control programs, and the initiation of PSPS when necessary. PG&E also used climate data on future wildfire projections into its wildfire risk modeling within the 2020 RAMP filing. Climate projections has been used to screen areas for additional analysis as asset upgrades, microgrids and other investments are designed and developed. As improvements are made in climate science—including more granular data on wildfire projections and future wind conditions—such data could be used in additional decision-making.

Climate data is also being used to help inform the company's distribution transformer prioritization plan. Data from the CVA, which includes information on the projected frequency and intensity of future heat waves, is being used to determine the likelihood of transformer failure in heat-prone areas. This information can help narrow down assets that are most likely to fail during heat waves, which is when customers need reliable energy the most.

E. Conclusion

California is at the forefront of efforts to mitigate the threat of climate change, as well as experiencing its devastating impacts. Climate change mitigation and adaptation activities are mutually supportive, as every investment in climate change mitigation and greenhouse reductions can help avoid the worst-case scenarios in terms of climate change impacts. While meeting this challenge requires a collective approach, PG&E recognizes that change must start with us in our own decision and operations, with a clear-eyed vision of the future to provide our customers with the energy they expect and deserve.