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Date: February 28, 2022
Witness(es): Various

PACIFIC GAS AND ELECTRIC COMPANY

2023 GENERAL RATE CASE

EXHIBIT (PG&E-7)

SHARED SERVICES AND INFORMATION TECHNOLOGY

**[INCLUDES ERRATA THROUGH
FEBRUARY 28, 2022]**

(PUBLIC VERSION)



PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-7)
SHARED SERVICES AND INFORMATION TECHNOLOGY

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¹ New witness from the June 30, 2021 submission.

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 1
ENTERPRISE HEALTH AND SAFETY
[INCLUDES ERRATA THROUGH
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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 1
ENTERPRISE HEALTH AND SAFETY

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 1
ENTERPRISE HEALTH AND SAFETY

A. Introduction

1. Scope and Purpose

The purpose of this chapter is to demonstrate that Pacific Gas and Electric Company's (PG&E or the Company) expense and capital forecasts for the Enterprise Health and Safety Department (EHS) are reasonable and should be adopted by the California Public Utilities Commission (Commission).

EHS is responsible for identifying, evaluating, and controlling hazards, risks, and exposures, with the objective to protect PG&E's employees and contractors, and the public. Through the One PG&E Occupational Health and Safety Plan (PG&E One Plan) and transition to the 2025 Workforce Safety Strategy, EHS provides a governance role over the elements of workforce and public safety, while the execution of programs that address public safety hazards is the responsibility of the operational Lines of Business (LOB). This chapter describes EHS's programs, initiatives, key metrics, mitigations, and controls in support of PG&E's commitment to safety performance. PG&E's forecast for Occupational Health program costs are addressed in greater detail in Exhibit (PG&E 7), Chapter 1A.

2. Summary of Request

PG&E requests that the Commission adopt its 2023 EHS expense forecast of \$38.3 million. Recorded adjusted expenses in 2020 were \$34.1 million. PG&E's 2023 expense forecast for EHS represents an 11.0 percent increase from 2020 recorded adjusted costs. The primary driver of this increase is an increase in staffing associated with regionalization, program maturation, and program enhancements. PG&E also requests that the Commission adopt its forecasted capital expenditures of \$1 million dollars for the years 2023 through 2026 to support routine updates of aging technology infrastructure such as servers.

PG&E also requests the Commission adopt its 2023 Companywide expense forecast of \$155.5 million in the areas of employee Health and

1 Wellness (including Wellness programs, Employee Assistance Program
2 (EAP), and Occupational On-Site Clinics); Injury Management (including
3 Workers' Compensation and Workers' Compensation cost containment,
4 Leave Management, and Short-Term Disability and Long-Term Disability);
5 Musculoskeletal Disorders (including Early Symptom Intervention program
6 and Office Ergonomics evaluations); and Transportation Safety (including
7 Department of Transportation (DOT) and Regulatory Compliance).

8 PG&E's 2023 forecast for Companywide expenses represents a
9 19.9 percent increase from 2020 recorded adjusted costs of \$124.6 million
10 for these same programs. The primary drivers of this increase are changes
11 in EAP administration and re-evaluation of the long-term disability program,
12 partially offset by a decrease in overall injury management costs.

13 Companywide expenses are included in this chapter, Exhibit (PG&E-7),
14 Chapter 1 – EHS, as controls and mitigation cost forecasts. Companywide
15 expenses for Injury Management, Musculoskeletal Disorders, and
16 Occupational On-Site Clinics are included in greater detail in
17 Exhibit (PG&E-7), Chapter 1A – Occupational Health.

18 Details about the activities, costs, and drivers for the EHS expense
19 forecast are provided in Section C below.

20 **3. Deferred Work Review**

21 Section 5.2 of the 2020 General Rate Case (GRC) Settlement
22 Agreement requires PG&E to make an additional showing in its 2023 GRC
23 testimony for work that was previously requested and authorized based on
24 representations that the work was needed to provide safe and reliable
25 service.

26 In the 2020 GRC, EHS did not request or receive authorized funding for
27 any work: (1) identified as safety, reliability or maintenance (SRM)-related in
28 the 2020 Risk Spending Accountability Report (RSAR); or (2) based on
29 representations in testimony and work papers that the work was needed to
30 provide safe and reliable service.

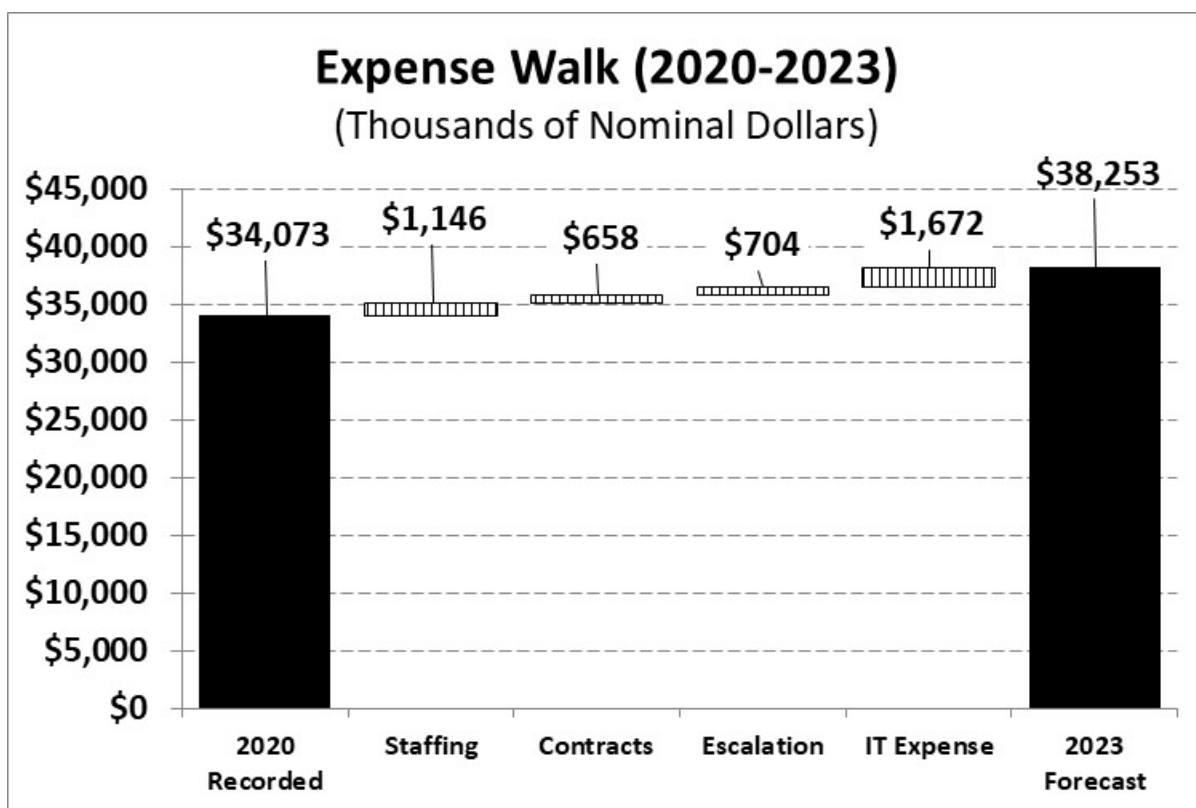
4. Overview of Recorded and Forecast Costs

a. Expense

Figure 1-1 below shows 2020 recorded expense for EHS of \$34.1 million and the incremental 2023 forecast expense of \$38.3 million. Specifically, PG&E forecasts an increase of \$1.15 million to regionalize its programs including adding five new Regional Health and Safety Directors in addition to the existing EHS leadership. An additional \$0.66 million in contracts costs and 1.67 million in Information Technology (IT) infrastructure costs are forecast for the implementation and maintenance of both the Transportation Safety cell phone activity blocking program, discussed in the 2020 Risk Assessment and Mitigation Phase (RAMP) report for the Motor Vehicle Safety Incident risk¹ and the 2025 Workforce Safety Strategy which includes implementation of the Health and Safety Management System (HSMS) across PG&E's LOBs. The remaining additional expense is associated with escalation.

¹ PG&E's 2020 RAMP Report (A.20-06-012) (June 30, 2020), Ch. 18, Motor Vehicle Safety Incident.

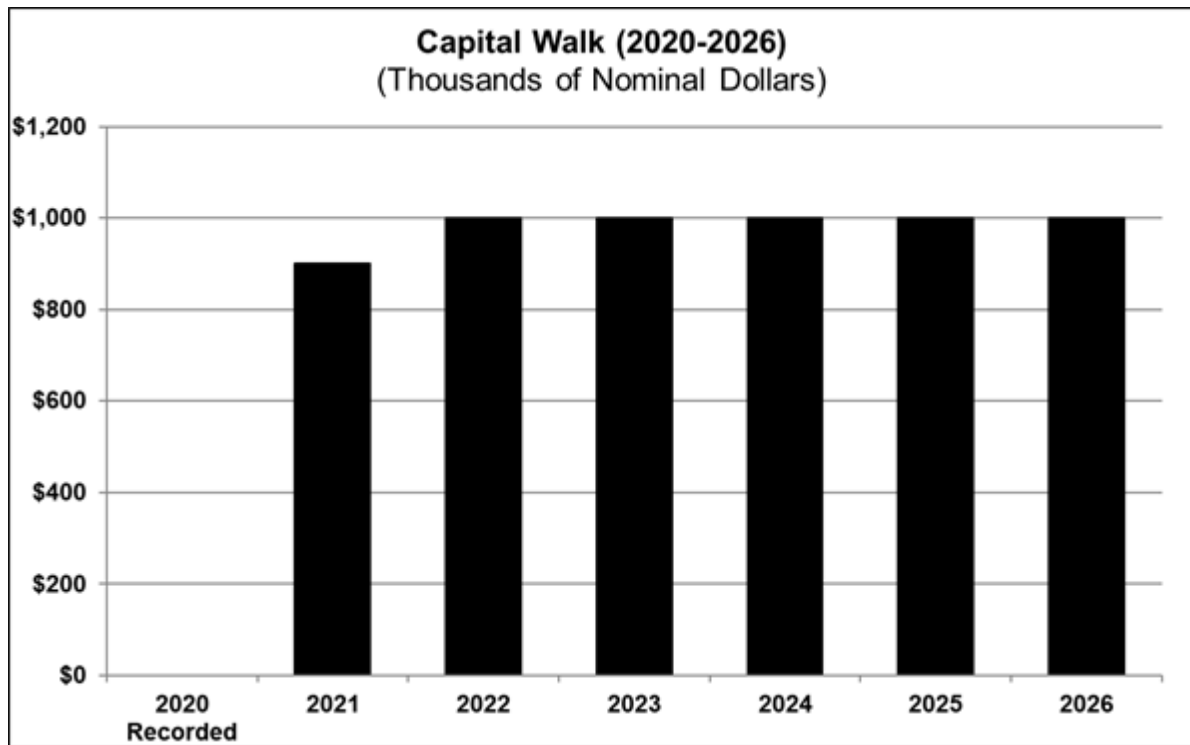
FIGURE 1-1
ENTERPRISE HEALTH AND SAFETY – EXPENSE WALK (2020-2023)
MWC FL, AB, KX, AND JV
(THOUSANDS OF NOMINAL DOLLARS)



b. Capital

Figure 1-2 shows the 2020 recorded capital spending and the incremental 2023 through 2026 forecast for EHS. The increase is needed for the replacement and upgrade of aging IT infrastructure. The 2023 capital forecast represents the annual average capital requirement to support routine upgrades of IT equipment, such as servers to support health and safety applications for program governance and compliance.

FIGURE 1-2
ENTERPRISE HEALTH AND SAFETY – CAPITAL WALK (2020-2026)
MWC 2F, MAT 2FA
(THOUSANDS OF NOMINAL DOLLARS)



5. Support for Request

PG&E's expense and capital forecasts for EHS are reasonable because they will enable PG&E to maintain existing health and safety (H&S) programs such as field support for the operating LOBs and incident investigations to address safety and health risks and eliminate serious injuries and fatalities. In addition, they will support the continued enhancement of the safety improvements made in response to the Safety Culture and Governance proceeding,² such as completion of the One PG&E Occupational Health and Safety Plan, roll out the HSMS and Management of Change (MOC) processes, EHS data analytics and reporting, implementation of safe driving technologies, and transitioning to the 2025 Workforce Safety Strategy; enhanced training and credential maintenance

² Order Instituting Investigation (OII) on the Commission's own Motion to Determine Whether PG&E and PG&E Corporation's Organizational Culture and Governance Prioritize Safety, Investigation (I.)15-08-019 (August 27, 2015).

for safety professionals; and process improvements in employee and contractor safety, communications, and LOB training.

6. Organization of the Remainder of This Chapter

The remainder of this chapter is organized as follows:

- Section B – Program and Risk Overview;
- Section C – Activities, Costs, and Forecast Drivers by Major Work Category (MWC);
- Section D – Estimating Methods; and
- Section E – Cost Tables.

B. Program and Risk Overview

1. Program Description

a. Program Overview

PG&E has approximately 22,000 employees who provide natural gas and electric services to approximately 16 million people throughout PG&E's 70,000 square mile service area.

EHS includes H&S professionals who focus on preventing workforce illness and injuries through strategic planning, governance, oversight, analytics and reporting functions; expert field safety support to drive strategy, programs and continuous improvement; workers' compensation case management and expertise helping our workforce stay at work and return to work; serious injury and fatalities prevention and life safety; safe operation of motor vehicles including regulatory compliance and governance, and workforce health programs, Safety Leadership Development and Safety Culture, field observations and inspections, and assessing safety program impact; and incident investigations and human factor analyses.

PG&E's safety strategy has continued to evolve since the testimony set forth in the 2020 GRC. Upon completion of the One PG&E Occupational Health and Safety Plan (PG&E One Plan) described in the 2020 GRC, the Company is transitioning to the 2025 Workforce Safety Strategy including continued implementation of the HSMS, previously known as the Enterprise Safety Management System (ESMS), which provides governance over the Company's workforce and public safety.

Consistent with its Chapter 11 bankruptcy Plan of Reorganization (POR), PG&E has proposed a regionalization plan that will enable the regions within our service territory to be effectively and efficiently managed by balancing size, operational challenges such as wildfire risk, and complexity where possible. Under this plan, EHS and regional director teams are responsible for certain aspects of safety, with other aspects remaining with the LOB, as shown in Table 1-1 below:

**TABLE 1-1
EHS REGIONAL DIRECTOR AND LOB RESPONSIBILITIES**

EHS and Regional Director Teams	LOBs
Define H&S strategic direction	Participate in strategy planning sessions
Develop PG&E H&S communications	Deliver communications
Manage H&S programs implementation and ensure consistent implementation	Lead programs through setting expectations. Own and reinforce program implementation (change management)
Perform field safety observations and inspections	Conduct leadership in the field observations
Provide enterprise-wide H&S regulatory expertise and H&S data management and analysis	Provide access to employee groups for LOB coordination and implementation (e.g., perform field ergonomic assessments)
Lead safety investigation processes	Participate in investigation processes take ownership of corrective actions implementation
Facilitate safety best practice sharing throughout the company	Assist in solution development (e.g., Learning Teams)
Develop and implement training programs and provide subject matter expertise to the PG&E Academy	Complete required training
Ownership, Accountability and Collaboration	

b. Management Structure

The EHS organization is led by the Senior Vice President (SVP) and Chief Safety Officer, who reports directly to the Chief Executive Officer (CEO) of PG&E Corporation, and is composed of seven key areas: (1) Field Safety Operations; (2) Safety Critical Risk; (3) Safety Assurance; (4) Occupational Health; (5) Transportation Safety, including DOT and Regulatory Compliance; (6) Enterprise Corrective Action Program (ECAP) including serious injury and fatality (SIF) incident management; and (7) Business Operations.

1) Field Safety Operations

Field Safety Operations works with the LOBs to deliver safety programs to improve safety culture, identify hazards, and reduce incidents and injuries in the field. It is an evolving element of the 2025 Workforce Safety Strategy and is integrated into Safety Assurance, Contractor Safety field inspections, Field Safety Observations, Safety Leadership and Safety Culture, H&S guidance, and SIF prevention. The goal of Field Safety Operations is to identify and reduce risk exposures through workforce observations and inspections, incident investigations support, training, hazard identification, safety tailboards, program implementation support and emergency response. This team of 76 is transitioning to leadership by five Directors with regional distributions of responsibilities. Key functional areas supporting workforce safety risk reduction include industrial hygiene, compliance with Occupational Safety and Health Administration (OSHA) and Division of Occupational Safety and Health (Cal/OSHA) requirements, and field observations and inspections.

Field Safety Operations continues to look for ways to improve the Company's overall safety program. Aligning support for consistency and regionalizing will allow Field Safety Specialists more time in the field to support the employees performing the high-risk tasks that have led to serious incidents. In addition, increased focus and support on field safety will play an important part in PG&E's overall safety improvement plan to reduce SIF events. These areas are all described in greater detail below.

a) Industrial Hygiene

Industrial hygiene is the science of protecting the H&S of workers by the anticipation, evaluation, prevention, and control of chemical, physical, and biological hazards. PG&E's Industrial Hygiene Program proactively addresses these hazards, monitors exposure, and responds to operational risks and emergency situations.

b) OSHA and Cal/OSHA Compliance

The OSHA and Cal/OSHA regulatory compliance team serves as the definitive Subject Matter Experts (SME) on the interpretation and application of compliance requirements (standards and training) for PG&E. They are the primary point of contact with the agencies and lead PG&E's response, resolution and mitigation efforts involving OSHA and Cal/OSHA investigations, proposed violations, issued citations, abatement requirements and appeals. As such, the team collaborates with the Law Department and the LOBs to examine all citations and abatement requirements to determine the extent of the impact on Safety, PG&E operations, and other business unit functions. The team communicates investigation outcomes, develops, and publishes enterprise-level OSHA and Cal/OSHA compliance standards as necessary, and provides subject matter expertise to aid LOB efforts to satisfy agency abatement requirements and PG&E-identified corrective actions.

c) Field Safety Workforce Observations and Inspections

In support of workforce risk reduction, the EHS field safety organization performs regular inspections of contractors performing medium- or high-risk work on PG&E projects to identify hazards, assess safety performance, identify best practices, and identify opportunities for improvement. These inspections allow the inspectors to immediately stop work when high-risk hazards are identified, proactively identify, and mitigate low- and medium-risk workplace hazards and provide a detailed, written summary evaluation of each contractor work site inspected when unsafe issues are identified.

In addition, EHS field safety personnel provide guidance for and participate in PG&E's Safety Observations Program. Field observations are routinely conducted by trained EHS professionals knowledgeable in the work being conducted. Observations are documented and any identified gaps in processes or trainings are communicated to leadership

including the PG&E Academy. Success stories are also shared with the LOB Leader/Supervisor. Events needing a follow-up resolution, are entered in the Enterprise Corrective Action Program (CAP) system for tracking to completion.

2) Safety Critical Risk

Safety Critical Risk oversees the Contractor Safety Program, H&S standards, and Safety Critical Risk management, all of which are described in greater detail below. This team is led by a Director and includes seven employees.

a) Contractor Safety

PG&E's Contractor Safety Program team is responsible for the program governance and mitigation enhancements associated with PG&E's Contractor Safety Program,³ as well as LOB and contractor assessments in partnership with the Field Safety organization. Field H&S professionals conduct LOB and contractor assessments, observe contractor work for OSHA compliance, provide feedback to contractors, and coach and support LOB resources to improve safety performance.

PG&E's Contractor Safety Program includes all contractors and subcontractors performing medium- and high-risk work on PG&E facilities and assets in alignment with the Kern Oil Settlement Agreement. Low risk contractors are also subject to the requirements. The Contractor Safety Program includes contractor and subcontractor pre-qualification coordination with Supply Chain prior to executing contracts and beginning work; safety planning integrated into the overall job plan; oversight procedures to monitor safe planning and work execution; and post-job evaluations to capture contractor safety performance including lessons learned, identify quality safety programs and support continuous improvement.

³ D.15-07-014, The program was implemented as required by the Kern Order Instituting Investigation (Kern Oil) Settlement Agreement with the CPUC.

b) H&S Standards

PG&E's H&S Standards team oversees the development and implementation of Company-wide technical standards for safety in alignment with PG&E's keys to life which assure the safety of PG&E co-workers and the public, consistent with leading industry practice, and in support of employee safety risk reduction. The organization is responsible for partnering with the LOBs and/or Regional Leaders to implement standard processes by providing direction on the development of specific procedures and oversees detailed process and procedure development, implementation and communication.

c) Safety Critical Risk Management

PG&E's Safety Critical Risk Management program is led by a Director and is aligned with enterprise guidance from PG&E's Enterprise and Operational Risk Management (EORM) organization.

Safety critical risk management is part of governance and leadership, contributes to the improvement of EHS management systems, and focuses on the prevention of serious injuries and fatalities, as well as incidents causing significant financial loss or business disruption to the organization. It assists with setting strategy and making informed decisions regarding PG&E's achievement of safety and operational objectives.

3) Safety Assurance

The Safety Assurance department oversees the implementation of the HSMS, including management of change and coordination of the Independent Safety Oversight Committee, as well as the newly implemented safety assurance audit program, and focused third-party assessments. The Safety Assurance team is led by a Director and includes eight employees.

1 **a) HSMS and Management of Change (MOC)**

2 The HSMS is a key tool for improving organizational safety,
3 managing risks and opportunities, and developing and
4 enhancing safety culture.

5 The HSMS is across PG&E and consists of a series of
6 capabilities (people, process, governance, and technology
7 systems) required to define, plan, implement, and continuously
8 improve safety. It is an integral part of the Employee Safety
9 Incident risk reduction program. PG&E's HSMS is based on a
10 consistent and comprehensive enterprise safety controls
11 framework reinforced with system assurance. PG&E's
12 commitment is to implement the system by 2022 so that it will
13 become the way PG&E delivers the business of safety.

14 Key components of the HSMS include:

- 15 • **Leadership and Engagement:** Leadership is the single
16 most critical factor for success in the implementation of the
17 HSMS. Leaders establish a vision and objectives,
18 personally direct the process for continuous improvement,
19 visibly demonstrate involvement and commitment, and build
20 a strong safety culture.
- 21 • **Workforce Safety:** Hazards and risks are identified,
22 associated work and work-related activities are planned,
23 controlled, resourced, and supported, planning for
24 emergencies and non-routine tasks is ongoing, and H&S
25 related objectives are identified and managed.
- 26 • **MOC:** Hazards and risks associated with changes that
27 impact H&S are identified, evaluated, and managed, and
28 MOC is integrated into enterprise and line of business
29 processes.
- 30 • **Performance Improvement:** H&S performance is
31 periodically reviewed, actions to achieve and sustain
32 industry leading safety performance are identified and built
33 into business plans and sharing of leading practices across
34 the organization occurs.

- **Safety Assurance:** Management and verification of critical H&S controls are established and functioning, conformance with applicable workforce H&S requirements is assured and risk to the enterprise is minimized.

b) Independent Safety Oversight Committee (ISOC)

Coordination

The ISOC conducts independent reviews and assessments to assist PG&E in its safety assurance duties. ISOC has the responsibility to provide input on the design and performance of safety and operations to senior leadership. The reviews are intended to help PG&E leadership assure the enterprise is operating effectively to improve safety performance for the public, our workforce, and the environment. The Safety Assurance organization serves as the key liaison between PG&E and the committee, providing reports, planning assessments, and helping to remove roadblocks for improvement action owners.

c) Safety Assurance Audits

Safety Assurance Audits are a key part of PG&E's long-term strategy to improve our systems and culture that support the safety of our workforce and the public. The Safety Assurance audit team will drive PG&E's comprehensive safety audit program and external assessments in a manner that adds value, supports improvement, and reduces the risk of workforce injury and illness. External assessments can also include focused safety assurance audits conducted by third-party consultants.

4) Occupational Health

The Occupational Health department oversees employee health and wellness programs. This team of 60 is led by a Director and consists of the Integrated Health and Wellness Management Program, Musculoskeletal Disorders Programs, and Integrated

1 Disability Management. The mitigations associated with the
2 programs support reduction of the Employee Safety Incident risk.

3 **a) Health and Wellness Management**

4 PG&E's Health and Wellness Management Program's goals
5 help employees and their dependents increase their awareness
6 of, and take actions to improve, their health, so as to produce an
7 engaged and healthy workforce, and thereby, safer and more
8 efficient utility operations.

9 PG&E provides a one-stop-shop resource for health
10 screenings, a tobacco-cessation program, health advocacy
11 services, telephonic health coaching and annual flu shots.
12 The health screenings include: a tobacco test, blood pressure,
13 cholesterol, glucose check and body mass index.
14 Early detection of serious conditions, such as diabetes and
15 hypertension, can improve an individual's health outcome and
16 lower future health care costs by mitigating health risks.
17 In addition to health coaching and tobacco cessation programs,
18 PG&E provides clinical support for those employees and their
19 dependents faced with complex health care decisions and
20 health benefits advocates for claims billing assistance, thus
21 allowing employees to become more actively engaged and
22 informed consumers.

23 PG&E also provides EAP services for all PG&E employees
24 and their covered dependents. The EAP offers one-on-one
25 confidential support for a variety of life events and concerns.
26 Individuals are eligible for up to six sessions per 6-month period.
27 The EAP can support many individual concerns, such as family
28 and relationship problems, workplace concerns, alcohol and
29 drug issues, depression, anxiety, and stress at home or work.
30 The EAP is an important component of the Health and Wellness
31 Management Programs since employee issues can negatively
32 affect work performance and safety on the job and at home.

b) Musculoskeletal Disorders (MSD) Program

The MSD Program has four focus areas: (1) office ergonomics, (2) industrial ergonomics; (3) vehicle ergonomics; and (4) industrial athlete. The program strategies are rooted in utilizing early intervention activities and ergonomic assessments. Continued enhancements to the MSD Programs support continued employee safety risk reduction through aiming to prevent and/or reduce the severity of injuries by proactively working with individuals to assess, address, and resolve discomfort, evaluate the physical demands of job tasks to identify and mitigate such demands, and to assess and address mis-matches between workers and the work. Injury data and risk assessments are used to target interventions at the areas of greatest need. Companywide expenses for the office ergonomics and industrial athlete programs are included in Chapter 1A, Occupational Health.

c) 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 wellbeing. Early injury reporting and early return to work are essential to injury management.

Injury Management including the Integrated Disability Management Program and associated corporate items costs are discussed in Exhibit (PG&E-7), Chapter 1A – Occupational Health. The associated expense forecast is included in this chapter.

5) Transportation Safety, Including DOT and Regulatory Compliance

PG&E's Transportation Safety Department programs protect employees and the public by establishing requirements and

processes to control risks that can lead to accidents, improve safety performance, and increase awareness related to the operation of motor vehicles by all PG&E employees. Ownership of the Motor Vehicle Safety Incident risk resides with the DOT and Regulatory Compliance Senior Manager. The Company's goal is to maintain a comprehensive program aimed at reducing the number of incidents that have the potential for serious injury, including fatal injury, to PG&E's employees and the public. Driving performance data is used to identify specific risk drivers for targeted intervention, including driver training and implementing vehicle safety technology.

The Transportation Safety department also ensures compliance with federal DOT and California state regulations and requirements, as prescribed by law with an emphasis public and employee safety.

The team of 20, led by a Director, manages a centralized compliance system of commercial driver profiles (medical, drug, alcohol and other compliance requirements) which provides PG&E with the ability to view and pair qualified drivers to vehicles they are qualified to drive, as well as to track Drug and Alcohol Program enrollment and compliance. The department also tracks DOT-covered positions for the Gas Operations (GO) and Aviation Departments to maintain the random Drug and Alcohol Program testing pools.

6) Enterprise Corrective Action Program (ECAP) Organization

ECAP consists of 24 employees and is led by a Director. It oversees the CAP including issue management system and CAP safety dashboard, and SIF Program and Investigations. Ownership of the Employee Safety Incident risk resides within the organization. Each of these programs is described in greater detail below.

a) Enterprise Corrective Action Program

The Enterprise CAP provides a centralized, standardized governance structure, and process for issue identification and resolution. The CAP process enables employees and contractors the ability to identify and report issues, or ideas,

1 related to gas assets, and processes. The CAP process
2 ensures that issues are categorized, assessed for risk, and
3 assigned to the appropriate owner to resolve issues and
4 implement effective corrective actions to help prevent
5 recurrence.

6 In 2020, PG&E employees and contractors submitted
7 approximately 28,000 CAP issues company wide. PG&E closed
8 approximately 37,000 CAP issues. Examples of how the CAP
9 plays a role in improving safety is materialized in the following
10 CAP issue examples. Each example is a separate issue or
11 concern that was raised and resolved through the CAP process.

- 12 • Electric Operations (EO): During a helicopter operation to
13 replace a wire on a steel structure, the helicopter picked up
14 two phases and attempted to set it place when the
15 aluminum sleeve that connects the wires failed. The event
16 was entered into CAP and researched to understand the
17 cause. The PG&E coordinated with the contractors and
18 held meetings to stand down all services until they received
19 clearance from the engineers to continue. It was identified
20 that the incorrect sleeve was used. Once the incorrect
21 sleeves were identified, they were purged from all PG&E
22 and contract crews. All personnel (internal and external)
23 were instructed of the correct work method and equipment
24 to use for transmission work, supporting future cost
25 avoidance and preventing potential safety issues.
- 26 • Gas Operations (GO): In 2019, Gas employees noted when
27 the team's externally facing First Responder Web Portal
28 (FRP) was being utilized by first responders in the field,
29 PG&E gas assets were not being accurately depicted. The
30 employees worked through the CAP process and ultimately
31 brought the FRP concerns to senior Gas leadership's
32 attention. This generated an IT project and the issue was
33 subsequently corrected, thereby enhancing the safety of
34 both first responders and the community.

- Power Generation (PGEN): A PG&E employee raised the issues that PG&E employees and contractors were using non-compliant personal flotation devices, per California Code of Regulations. Working through the CAP process, the Corporate Code of Safe Practices, using the Cal/OSHA Standard, was updated, and a Pilot Course was completed for Swift Water and Wader Safety and approved personal flotation devices were added to internal ordering catalog to ensure the proper devices are available for employees.

b) Near Hits Program

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.

c) SIF Prevention Program and Investigations

PG&E's SIF Prevention Program focuses on the specific exposures which have led to serious injuries and fatalities. All injuries and reported near-hits are investigated and evaluated relative to the SIF exposure factors, and the SIF Prevention Program team conducts in-depth Cause Evaluations for all incidents classified as SIF potential or SIF actual. The results of these investigations are monitored through the CAP as PG&E develops corrective actions to reduce the likelihood of recurrence. PG&E also observes field work groups and provides immediate feedback relative to potential safety issues and collects data about SIF exposure factors and risky behaviors.

d) Safety Leadership Development in the Field

PG&E's Safety Leadership development in the Field program including provides training for crew leaders (i.e., those individuals who lead teams of front-line employees doing field operations and maintenance work) so they have the necessary safety skills to create trust, set expectations, remove barriers to safety and identify and mitigate at risk behaviors. PG&E continues to improve Safety Leadership Development and supervisor coaching by developing an impactful, practical training course with refresher modules for front line leaders.

7) Business Operations including Reporting and Analytics

The Business Operations team provides project management, integrated planning, analysis, and reporting, including management of key PG&E EHS performance indicators, and Safety Observations Program Governance. Reporting governance also includes Safety OII implementation plan quarterly updates to the CPUC, and Safety Culture survey administration. EHS communications oversight includes safety leadership and grassroots communications, and coordination of leadership presence in the field for safe operations. This team of 27 is led by a Director and includes the following teams.

a) Safety Culture

Safety Culture refers to the organization's beliefs, behaviors and values shared in relation to safety risk. The safety culture pillar consists of a number of companywide measures, including officers and directors taking the initiative to have informal safety conversations in the field at jobsites with those employees who perform critical risk activities, establishing a requirement that safety be part of the hiring criteria for all jobs, developing and communicating a set of principles around safety beliefs, requiring that a safety related performance objective is included in individual's annual performance plan, revising safety

1 leadership training, and measuring safety culture using a
2 detailed employee perception survey.

3 **b) Safety Observations Program Governance**

4 Safety Observations Program Governance team provides
5 governance and resources for promoting the Safety
6 Observations Program across PG&E's LOBs. The Safety
7 Observations Program plays a critical role in helping to reduce
8 employee and contractor injuries and fatalities by increasing
9 awareness of hazards and exposures in the field, reinforcing
10 positive work practices, and driving PG&E's Speak-Up culture.
11 The Safety Observations Program Governance team's
12 responsibilities include promoting use of the SafetyNet
13 observation tool, escalation of program risks and barriers to
14 senior executives, promotion of continuous improvement, and
15 communication of safety successes and improvement
16 opportunities.

17 Safety Observations Program Governance is also
18 responsible for establishing realistic, measurable goals for
19 improving the Safety Observations Program across PG&E and
20 maintaining and supporting the use of the SafetyNet tool.
21 The team coordinates the development of training materials for
22 company-wide use, conducts trainings for the Safety
23 Observation Program as needed, and facilitates meetings with
24 all LOBs for feedback and sharing success stories.

25 PG&E Safety Specialists support the program through field
26 safety observations and compliance inspections of contractors
27 performing work for EO, GO, PGEN, and Vegetation
28 Management. For high risk non conformances, the contractor is
29 required to provide a corrective action plan within 10 days that is
30 evaluated for quality assurance by a Safety Specialist. The
31 applicable LOB is responsible for monitoring and ensuring the
32 corrective actions are executed in future tasks by the contractor.
33 The program goal is to increase contractor awareness and
34 focus on safety programs and execution.

The program is part of the risk management plan for the Employee Safety Incident and Contractor Safety Incident risks.

c. Current Safety Performance Metrics and Key Risk Indicators

EHS tracks its performance with specific metrics. A summary of the current Safety Performance Metrics and Key Risk Indicator (KRI) metrics and goals is shown in Table 1-2. The metrics are set forth and defined below.

1) Preventable Motor Vehicle Incident (PMVI) Rate

The Preventable Motor Vehicle Incident (PMVI) Rate is a measure of incidents that reasonably could have been prevented by the PG&E employee. This metric is a rate based on count of PMVIs and the total miles driven in company vehicles, company rentals, and reimbursed personal mileage normalized per 1 million miles driven. The 12-month rolling average PMVI rate is the KRI for the Motor Vehicle Safety incident risk. This metric is track and trend only.

2) Safe Driving Rate

The Safe Driving Rate measures the total number of Vehicle Safety Technology (VST) alerts for hard braking and hard acceleration per thousand miles driven. It is a leading indicator for the prevention of motor vehicle incidents and is included in the 2020 Safety Performance Metric Report (SPMR). This metric is track and trend only.

3) Hard Brake Rate

Hard Brake Rate is the total number of hard braking events (greater than or equal to 8 mph per second decrease in speed) per thousand miles driven in each period. It is a leading indicator for the prevention of motor vehicle incidents and is included in the 2020 SPMR. This metric is track and trend only.

4) Employee and Contractor Days Away, Restricted or Transferred Case Rate

This metric refers to the Days Away, Restricted or Transferred (DART) Cases, which include OSHA-recordable lost workday (LWD)

Cases and injuries that involve job transfer or restricted work activity. This metric is expressed as DART Cases times 200,000 divided by employee hours worked. These metrics are included in the 2020 SPMR. The employee DART rate metric has an enterprise annual target for 2021 of 0.91. The 12-month rolling average DART rate is a KRI for the Employee Safety incident risk and is track and trend only.

5) Employee and Contractor OSHA Recordables Rate

An OSHA recordable incident is an occupational (job-related) injury or illness that requires medical treatment beyond first aid, or results in time away from work, work restrictions, death or loss of consciousness. The OSHA Recordables Rate is calculated as OSHA recordable times 200,000 divided by contractor hours worked. These metrics are included in the 2020 SPMR and are track and trend only.

6) SIF Timeliness of Corrective Actions

SIF Timeliness of Corrective Actions is the total number of SIF corrective actions completed on time (as measured by the due date accepted by LOB Corrective Action Review Boards) divided by the total number of SIF corrective actions past due or completed. A SIF corrective action is one that is tied to a SIF Actual or SIF Potential or reported near hit. The scope of this metric includes all employee or contractor SIF Actual incidents regardless of LOB and SIF Potential incidents for selected LOBs (i.e., EO, GO, Generation Operations, Customer Care, IT, and Supply Chain). This metric is included in the 2020 SPMR. The target for 2021 is 92 percent.

7) Employee and Contractor Serious Safety Incidents (OSHA Definition Alignment)

Serious Safety Incidents for employees and contractors are defined as a work-related injury or illness that results in a fatality, inpatient hospitalization for more than 24 hours (other than for observation purposes), a loss of any member of the body, or any serious degree of permanent disfigurement.

In 2020, OSHA updated the definition of Serious Injury to a work-related injury or illness that results in a fatality, inpatient hospitalization (other than for observation purposes or testing), or in which an employee suffers an amputation, loss of an eye or any serious degree of permanent disfigurement but does not include any injury or illness or death caused by an accident on a public street or highway, unless the accident occurred in a construction zone. These metrics are included in the 2020 SPMR and are track and trend only.

8) Public (Third-Party) Serious Safety Incidents and Fatalities (OSHA Definition Alignment)

A Serious Safety Incident for the public is a fatality or personal injury requiring in-patient hospitalization involving utility facilities or equipment. Equipment includes utility vehicles used during the course of business. This metric is the KRI for the Third-Party Safety Incident risk and is also included in the 2020 SPMR. This metric is track and trend only.

9) Employee and Contractor SIF Actuals (Edison Electric Institute⁴ (EEI) Definition Alignment)

SIF Actuals are part of PG&E's safety and operational metrics and are KRIs for the Employee Safety Incident and Contractor Safety Incident risks. A SIF Actual is an incident that results in any of the following to employees, contractors, or directly supervised contractors resulting from work at or for PG&E:

- (1) A fatality—work-related fatal injury or illness; or
- (2) A life-threatening injury or illness, that if not addressed could lead to a fatality or work-related injury or illness that required immediate life-preserving rescue action, and if not applied immediately would likely have resulted in the death of that person; or
- (3) A life altering injury or illness, one that results in the loss or permanent impairment of a limb, organ or body

⁴ The EEI is the association that represents all U.S. investor-owned electric companies.

function—work-related injury or illness that resulted in a permanent and significant loss of a major body part or organ function.

The 2021 target for employee Serious Injury actuals is 4 (excluding fatalities).

**TABLE 1-2
CURRENT SAFETY PERFORMANCE METRICS AND KEY RISK INDICATORS**

Line No.	Metric Name	Risks	2020 Recorded	2021 Projected
1	Preventable Motor Vehicle Incident Rate	Motor Vehicle Safety Incident	2.61	2.48
2	Hard Brake Rate	Motor Vehicle Safety Incident	1.6	—
3	Driver's Check Rate	Motor Vehicle Safety Incident	4.3	—
4	Employee Serious Injuries and Fatalities (Cal/OSHA)	Employee Safety Incident	4	—
5	Employee DART Rate	Employee Safety Incident	1.34	1.91
6	Employee OSHA Recordables Rate	Employee Safety Incident	2.21	—
7	Contractor OSHA Recordables Rate	Contractor Safety Incident	0.81	—
8	Contractor DART	Contractor Safety Incident	0.42	—
9	Contractor Serious Injuries and Fatalities (Cal/OSHA)	Contractor Safety Incident	8	—
10	Public Serious Injuries and Fatalities (Consider Cal/OSHA)	Public Safety related to asset failure—see LOB risks	10	—
11	Percentage of SIF Corrective Actions Completed on Time	Employee Safety Incident, Contractor Safety Incident	79%	92%
12	Workforce SIF Actuals	Employee Safety Incident, Contractor Safety Incident	12	—

2. Risk Overview

The EHS enterprise risks discussed in this section were included in PG&E's 2020 RAMP Report. In this testimony, PG&E describes changes to the risk modeling and analysis, and the risk mitigation and control programs since filing the 2020 RAMP report. The risk modeling and analysis for EHS controls and mitigations programs combines forecasted costs from this Chapter and Chapter 1A for a complete assessment of program risk spend

1 efficiencies (RSE). This testimony also includes responses to feedback
2 received from the Safety Policy Division (SPD) and other third parties.

3 **a. Third-Party Safety Incident**

4 To place greater emphasis on third-party safety incidents, which do
5 not involve the failure of a PG&E asset, and in alignment with PG&E's
6 transition to an event-based risk register, with mutually exclusive risks
7 that can be clearly modeled, the Third-Party Safety Incident risk was
8 added to the PG&E risk register and included as a separate chapter in
9 the 2020 RAMP Report.

10 PG&E's 70,000 square mile service territory in northern and central
11 California consists of approximately 106,000 circuit miles of distribution
12 electric lines, 18,000 circuit miles of interconnected transmission lines,
13 42,000 miles of natural gas distribution pipelines, 6,400 miles of
14 transmission pipelines, 67 powerhouses, and an extensive collection of
15 facilities that support this infrastructure. Third-party interaction with
16 PG&E facilities is addressed by PG&E's operating LOBs: GO, EO and
17 PGEN, who have developed and have implemented or are continuing to
18 implement programs to address Third-Party Safety Incidents unique to
19 their facilities.

20 Third-party safety within the PG&E service territory is the focus of
21 the LOB programs and projects included in the Third-Party Safety
22 Incident risk chapter as controls and mitigations. Programs include
23 Public awareness programs (educational outreach and
24 communications), physical security controls, adherence to transmission
25 and distribution system safety design requirements, shallow and
26 exposed gas pipeline maintenance to reduce slip and trip hazards,
27 increased canals and waterways safety measures.

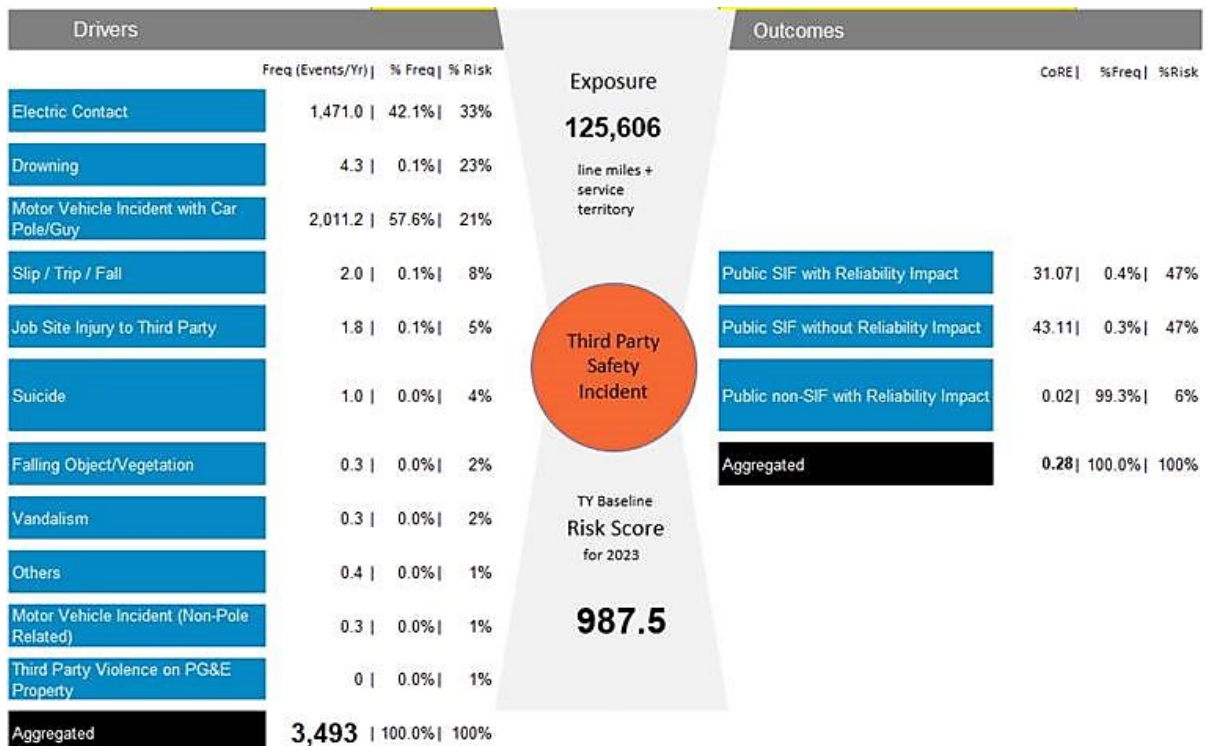
28 The Third-Party Safety Incident risk is defined as a PG&E
29 recordable third-party injury or fatality that is due to an interaction with or
30 during the use of a PG&E facility, not involving asset failure.

31 The continued successful implementation of the Third-Party Safety
32 Incident risk reduction mitigations and effective maintenance of the risk's
33 controls support a reduction in third-party safety incidents.

The initial forecasted capital costs for the mitigations associated with this risk reported in the RAMP report were \$0.74 million in 2023. For the 2023 GRC filing the forecasted capital costs for the mitigations associated with this risk are \$1.08 million in 2023.

The RAMP model drivers and consequences have been updated to include 2020 incidents. The Third-Party Safety Incident risk scores have changed since the 2020 RAMP filing. The 2023 test year (TY) safety score is now 928 (previously 887) and the 2023 TY total risk score is now 988 (previously 944). In response to SPD feedback, PG&E has also included a risk driver for Third Party Violence on PG&E owned or managed property in the bow tie analysis. The updated 2023 baseline bow tie is included in Figure 1-3 below.

**FIGURE 1-3
THIRD-PARTY SAFETY INCIDENT BOW TIE**



1) Response to SPD Feedback

On November 25, 2020, the SPD issued its Staff Evaluation Report on PG&E's 2020 RAMP Application (A.) 20-06-012.⁵ Subsequently on January 15, 2021 and January 29, 2021, other interested parties also provided feedback on PG&E's 2020 RAMP Report.

SPD and Parties identified two key areas for improvement: (1) increased granularity; and (2) more RSE calculations. These findings suggest that PG&E should provide more detailed information in its risk analysis to enable the Commission, SPD and other interested parties sufficient information to evaluate PG&E's GRC proposals.⁶ In response to the feedback provided by the SPD, PG&E has refined its risk tranches and included RSE calculations for controls associated with the Third-Party Safety Incident risk. The control RSEs can be found in Workpaper 1-19: Third-Party Safety Incident – Recorded and Forecast Control Costs – Expense (Nominal Dollars).

SPD also provided feedback that physical attack including vandalism, break-ins, and theft could be an important cross-cutting factor for the Third-Party Safety Incident risk. The physical attack cross cutting risk factor includes the PG&E workforce and does not include third-parties, thus PG&E has included a risk driver for Third Party Violence on PG&E owned or managed property in the bow tie analysis. There was a third-party physical attack event that occurred on PG&E property in 2015. See Figure 1-1 above.

a) Risk Tranche Further Refinement

In addition, and in alignment with the targeted third-party electric safety pilot discussed as Alternative Plan 1 in the Third-Party Safety Incident risk RAMP Chapter,⁷ tranches for

⁵ A.20-06-012, SPD Staff Evaluation Report on PG&E's 2020 RAMP Application (Nov. 25, 2020) (SPD Report).

⁶ A.20-06-012, PG&E Opening Comments (Jan. 15, 2021), p. 2.

⁷ PG&E's 2020 RAMP Report, A.20-06-012 (June 30, 2020), Ch. 15, Third-Party Safety Incident.

the Third-Party Safety Incident risk were refined to further evaluate third-party interactions with EO assets and job sites. The changes are based on the PG&E plan of regionalization which enables regions to be effectively and efficiently managed balancing size, operational challenges such as wildfire risk, and complexity where possible. Interaction with EO assets and job sites accounts for 76 percent of the Third-Party Safety Incident risk:

- Third-Party Interaction with EO Assets and Job Sites in planned Regionalization Region 1 – North Coast
- Third-Party Interaction with EO Assets and Job Sites in planned Regionalization Region 2 – Sierra
- Third-Party Interaction with EO Assets and Job Sites in planned Regionalization Region 3 – Bay Area
- Third-Party Interaction with EO Assets and Job Sites in planned Regionalization Region 4 – Central Coast
- Third-Party Interaction with EO Assets and Job Sites in planned Regionalization Region 5 – Central Valley

There were no changes to the other three tranches for the risk which include:

- Third-Party Interaction with GO assets and job sites
- Third-Party Interaction with PG&E managed land and water; and
- Third-Party Interaction with PGEN assets.

Findings from the further refinement of the EO tranches include the proposed Central Valley Region has the highest number of distribution outage incidents resulting in third-party car pole incidents per 100-line miles. The proposed Bay Area Region has the highest number distribution outage incidents resulting from electrical contact incidents per 100-line miles.

1 See Feedback to PG&E's 2020 Risk Assessment and
2 Mitigation Phase Report⁸ for a comprehensive overview of
3 PG&E's response to the feedback received on the 2020 RAMP
4 report.

5 **2) Response to Party Feedback**

6 No additional comments were received. No additional changes
7 were made to the Third-Party Safety Incident risk RAMP model
8 analysis based on feedback. See Feedback to PG&E's 2020 Risk
9 Assessment and Mitigation Phase Report for a comprehensive
10 overview of PG&E's response to the feedback received on the
11 2020 RAMP report.

12 **3) Changes to Controls**

13 PG&E has continued to strengthen controls related to the
14 Third-Party Safety Incident risk since it submitted its RAMP Report.
15 For the 2023 GRC, the controls costs are organized into programs
16 and are discussed further in their primary chapters (see Table 1-3
17 below).

⁸ Exhibit (PG&E-2), Ch. 1 Enterprise and Operational Risk Management Program, provides Feedback to PG&E's 2020 Risk Assessment and Mitigation Phase Report.

TABLE 1-3
THIRD-PARTY SAFETY INCIDENT CONTROLS
2023 FORECAST CAPITAL AND EXPENSE
(SEE WORKPAPER 1-19 FOR CONTROL PROGRAM RSEs)

Line No.	Control No.	Control Program	Description	2023	GRC Chapter
1	TPTSI-PRGA	EO Public Awareness and Safety	Public Awareness and Job Site Safety (RAMP C1, C2, C3, C7)	\$793 (E)	EO (Exhibit (PG&E-4), Ch. 22)
2	TPTSI-PRGB	GO Public Awareness and Safety	Public Awareness and Job Site Safety (RAMP C1, C5, C7)	\$48,355 (E)	GO (Exhibit (PG&E-3), Ch. 6)
3	TPTSI-PRGC	GO Physical Security	GO Physical security controls including Meter Protection (RAMP controls C4 and C6)	\$35,722 (C)	GO (Exhibit (PG&E-3), Ch. 4)
4	TPTSI-PRGD	EO Distribution and Transmission System Safety	EO T&D safety design requirements, and LED lighting (RAMP controls C10, C11, C12, and C13) ^{(a)(b)(c)}	--	EO (Exhibit (PG&E-4), Chapters 10 thru 12 (B))
5	TPTSI-PRGE	Hydroelectric Public Safety	Public Awareness and Safety, Dam Surveillance Monitoring, Warning Systems and Signage, (RAMP controls C1, C7, C8, C9, and C15)	\$1,226 (E)	
6			Controls Total (Capital and Expense)	\$86,095	
(a) C13 in RAMP is an Electric Transmission control and therefore not addressed in the GRC. (b) C11 Design Pole Locations is part of the work accounted for in MWC 07 (Pole Asset Management) and C012 Visibility Systems is part of the work accounted for in MWC BF (Inspections). (c) C10 LED Conventional Streetlights conversion to LED maintenance costs unavailable. Included as part of Exhibit (PG&E-4), Ch. 11 forecasts.					

4) Changes to Mitigations

PG&E has not changed the mitigations related to the Third-Party Safety Incident risk since it submitted its RAMP Report. For the 2023 GRC, the mitigation costs are included in Table 1-4 below and are also discussed further in their primary chapters.

Third-Party Safety Incident risk model and supporting workpapers are available upon request.

TABLE 1-4
THIRD-PARTY SAFETY RISK MITIGATION RSE COMPARISON
(UPDATED WITH GRC FORECAST)

Line No.	Program ID	Mitigation Name	2020	2021	2022	2023	2024	2025	2026	Total	RAMP RSE	GRC RSE
1	TPTSI-M004	Canals and Waterways(a) Barrier Installation	844	1,600	1,080	1,080	–	–	–	4,604	1.7	1.3
2	–	System Hardening ^(b)	484,915	415,654	927,949	908,947	879,971	864,454	817,209	5,299,099	–	See note ^(b)
3	–	M10- 3A and 4C Line Reclosure Replacement ^(c)	1,475	7,525	6,731	6,239	6,408	6,995	6,876	41,949	–	^(d)
4	–	Total	487,234	424,779	935,760	916,266	886,379	871,149	824,085	5,345,652	–	–

(a) The forecast capital costs for Mitigation 4 are excluded from EHS forecast ownership is with the PGEN organization.

(b) System Hardening is sponsored by EO, see RAMP Ch. 10, Wildfire. PG&E calculated two RSEs for System Hardening: System Hardening Overhead – the RSE is 6.2; and, System Hardening Underground – the RSE is 4.5 The benefits from these mitigations also apply to the Third Party Safety Incident risk. See Exhibit (PG&E 4), Ch. 4.3 for information about the System Hardening program forecast in this GRC..

(c) 3A and 4C Line Recloser Program is sponsored by EO, See RAMP Ch. 11, Failure of Electric Distribution Overhead Assets. The benefits of this mitigation also apply to the Third-Party Safety Incident risk. See Exhibit (PG&E-4), Ch. 13 for more information about this program.

(d) PG&E calculated two RSEs for this program: 3A and 4C Line Recloser Replacement [3A], RSE 0.6; and 3A and 4C Line Recloser Replacement [4C], RSE 1.4.

1 **b. Employee Safety Incident**

2 Exposure to this risk is measured as the approximately
3 22,000 PG&E employees who provide natural gas and electric services
4 to approximately 16 million people throughout PG&E's
5 70,000-square-mile service area.

6 The Employee Safety Incident risk is defined as any event resulting
7 in an employee OSHA-recordable injury or fatality, excluding events
8 resulting from asset failure.

9 The continued successful implementation of the Employee Safety
10 Incident risk reduction mitigations and effective maintenance of the risk's
11 controls will ensure that PG&E's workforce is fit-for-duty, trained,
12 equipped, and able to meet the needs of its customers in compliance
13 with all applicable requirements.

14 PG&E's 2020 RAMP report did not provide forecasted costs for
15 controls related to this risk. The initial forecasted expense costs for the
16 mitigations associated with this risk reported in the RAMP report were
17 \$11.8 million in 2023. There are no capital expenditure forecasts.
18 For the 2023 GRC filing the forecasted expense costs for the mitigations
19 associated with this risk are \$6.37 million in 2023.

20 The RAMP model drivers and consequences have been updated to
21 include 2020 incidents. The Employee Safety Incident risk scores have
22 changed since the 2020 RAMP filing. The 2023 TY safety score is now
23 90 (previously 86) and the 2023 TY total risk score is now 94 (previously
24 90). This is primarily due to the re-assessment of the MSD programs
25 mitigation effectiveness. Updated 2023 baseline bow tie is included in
26 Figure 1-2.

**FIGURE 1-2
EMPLOYEE SAFETY INCIDENT BOW TIE**



1) Response to SPD Feedback

PG&E agrees with SPD and parties that more granular tranching and more RSEs will improve risk analysis. For the GRC PG&E included additional tranches in the Employee Safety Incident risk model as discussed below. In addition, PG&E is providing additional RSE calculations. In the RAMP Report PG&E provided RSEs for its mitigations but not for controls. For the GRC PG&E calculated RSEs for both its mitigation and control programs. RSE calculations for controls associated with the Employee Safety Incident risk can be found in Workpaper 1-22: Employee Safety Incident – Recorded and Forecast Control Costs - Expense (Nominal Dollars)..

a) Risk Tranche Further Refinement

The Field Employees tranche was refined to improve the evaluation of field personnel with the following changes:

- Field EO (17 percent of field employees);
- Field GO (14 percent of field employees);

- Field Generation (2 percent of filed employees); and
- Field All Other (7 percent of field employees).

Refinement of the Employee Safety Field Employees tranche placed greater emphasis on SIF events and their origination. As previously indicated although the majority of recordable incidents are the result of overexertion and bodily reaction very few (~4%) of these result in a serious injury. Updates to model inputs and results reflect this. See Feedback to PG&E's 2020 Risk Assessment and Mitigation Phase Report⁹ for a comprehensive overview of PG&E's response to the feedback received on the 2020 RAMP report.

2) Response to Party Feedback

No additional changes were made to the Employee Safety Incident risk RAMP model analysis based on feedback received from FEITA Bureau of Excellence LLC (FEITA). See Feedback to PG&E's 2020 Risk Assessment and Mitigation Phase Report for a comprehensive overview of PG&E's response to the feedback received on the 2020 RAMP report

3) Changes to Controls

PG&E has continued to strengthen its controls related to the Employee Safety Incident risk since it submitted its RAMP Report. For the 2023 GRC, the controls are organized into Programs (see Table 1-5 below and accompanying Workpaper 1-22 for RSE calculations).

The 2023 cost forecast for controls related to the Employee Safety Incident risk is \$179.7 million. Of this, \$150.4 are Companywide costs and are discussed in greater detail in Exhibit (PG&E-7), Chapter 1A – Occupational Health. Occupational Health injury management programs support improved outcomes by advocating for injured/ill employees, providing timely and accessible medical attention, as well as options to recover at work performing

⁹ Exhibit (PG&E-2), Ch. 1 Enterprise and Operational Risk Management Program, provides Feedback to PG&E's 2020 Risk Assessment and Mitigation Phase Report.

1 meaningful tasks. The primary driver for the forecast is labor
 2 expenses for the organization to manage and sustain the controls.

TABLE 1-5
EMPLOYEE SAFETY INCIDENT CONTROLS
2023 FORECAST EXPENSE
(SEE RSES FOR CONTROLS WORKPAPER 1-22 FOR CONTROL PROGRAM RSEs)

Line No.	Control No.	Control Program	Description	MWC	2023
1	EMPSI-PRG A	Regulatory Compliance	H&S Guidance, Training, and Oversight (RAMP controls C1, C3, and C11).	FL, AB, ZC	\$5.5
2	EMPSI-PRGB	ECAP	ECAP (RAMP control C2).	AB	\$6.0
3	EMPSI-PRGC	SIF Prevention and Oversight	SIF Prevention Program and Field Oversight (RAMP controls C4, C5, C7, C8, C9, and C10).	FL	\$8.9
4	EMPSI-PGRD	Employee Health and Wellness	Employee Health and Wellness (RAMP controls C12, C13, and C14 and existing MSD programs).	FL, ZC	\$33.3
5	EMPSI-PRGE	Benefit Plans and Policy	Benefit Plans and Policy (RAMP controls C15, C16, and C17).	KX, ZC	\$126.0
6		Controls Total (Includes Corporate Items)		FL, AB, KX, ZC	\$179.7

3 **4) Changes to Mitigations**

4 PG&E has made one change to the RAMP filing proposed
 5 mitigation plan for the Employee Safety Incident risk.
 6 Mitigation M17, the Mobile Medics program was removed due to the
 7 pilot program results which demonstrated low utilization with only
 8 40 unique cases from February through October of 2020. Of those
 9 cases, 60 percent still required escalation to a doctor (either in a
 10 clinic or via telemedicine). This usage level does not demonstrate
 11 any significant impact on OSHA, DART or workers' compensation
 12 costs. For this reason, PG&E made the decision to discontinue the
 13 Mobile Medic program in 2020.

14 In addition, PG&E further refined cost estimates associated with
 15 the Occupational Health program mitigations including the MSD
 16 Programs and on-site clinics and the HSMS based on the final
 17 selection of the software applications vendor. The forecasted
 18 expense costs for the mitigations associated with this risk are

- 1 \$6.37 million in 2023. There are no capital expenditure forecasts.
- 2 Changes to the RSEs can be found in Table 1-6 below.
- 3 Employee Safety Incident risk model and supporting
- 4 workpapers are available upon request

TABLE 1-6
EMPLOYEE SAFETY RISK MITIGATION RSE COMPARISON
UPDATED FOR GRC FORECAST
(THOUSANDS OF DOLLARS)

Line No.	Mitigation No.	Mitigation Name	MWC	2020	2021	2022	2023	2024	2025	2026	Total	RAMP RSE	GRC RSE
1	EMPSI-M01B	HSMS Implementation ^(b)	FL	\$1,431	\$1,725	\$1,702	\$1,082	\$1,087	\$1,303	\$1,115	\$9,445	12.99	11.06
2	EMPSI-M06a	Office Ergonomics Program	FL, ZC	742	742	742	742	742	742	742	5,192	0.37	0.09
3	EMPSI-M06b	Industrial Ergonomics Program	FL, ZC	550	550	550	550	550	550	550	3,850	1.13	0.09
4	EMPSI-M06c	Industrial Athlete Program	FL, ZC	1,658	1,658	1,658	1,658	1,658	1,658	1,658	11,606	0.64	0.04
5	EMPSI-M06d	Vehicle Ergonomics Program	FL, ZC	225	225	225	233	233	233	233	1,608	7.11	0.18
6	EMPSI-M011	On-Site Clinics	ZC	428	915	1410	1,788	2,419	5,303	3,624	15,886	2.21	0.47
7	EMPSI-M013	Enhancing SafetyNet Use ^(a)	FL	127	64	—	—	—	—	—	—	—	—
8	EMPSI-M014	IH Program Compliance Improvement-Phase 1	FL	—	100	—	—	—	—	—	100	—	—
9	EMPSI-M016	Fit4U Program	ZC	—	—	309	318	327	336	345	1,635	—	0.05
10		Total (excludes M013 costs)		\$5,034	\$5,915	\$6,596	\$6,371	\$7,016	\$10,125	\$8,267	\$49,512	—	—

(a) Included in SIF Prevention and Oversight program control costs.

(b) This program is referred to as the ESMS Implementation in the risk models.

c. Contractor Safety Incident

Contractors included in the Contractor Safety Incident risk are those that perform medium or high-risk work on behalf of PG&E. The drivers analyzed with this risk include OSHA categorized recordable events. Contractor serious injuries and fatalities are included as risk consequences.

Exposure to this risk is measured as the approximately 27,000 contractors PG&E employs each year. The risk model includes an annual average of approximately 185 recordable injuries divided into workplace injury categories. Approximately 2 percent of the risk events result in a SIF. The mitigations PG&E will implement from 2020-2026 are designed to address the known risk drivers.

The Contractor Safety Incident risk is defined for the 2020 RAMP and the 2023 GRC as any event resulting in a contractor OSHA recordable injury or fatality, excluding events resulting from asset failure. Sustainability of the Contractor Safety Program pre-qualification and field oversight procedures are central to effective Contractor Safety risk management. Therefore, additional program rigor is essential to ensure that unsafe conditions and hazards are identified and mitigated.

Contractor Safety Incident 2023 TY safety and total scores have been updated to 79 (previously 97). The change in the risk scores is due primarily to the reclassification of five contractor fatalities related to Aviation Incidents:

- On June 2, 2020, a fatal helicopter crash involving three PG&E contractors who were performing critical power line work.
- On August 13, 2013, a fatal plane crash involving two contractors performing GO transmission pipeline surveillance.

These incidents are now included in the Aviation Incident risk analysis.

The continued successful implementation of the Contractor Safety Incident risk reduction mitigations and effective maintenance of the risk's controls will ensure that PG&E's contractor workforce is qualified, and that unsafe conditions and hazards are identified and mitigated.

The RAMP model drivers and consequences have been updated to include 2020 incidents. The physical attack cross cutter is also included as a driver, based on SME best judgement. The model uses the Employee Safety cross cutter data as a surrogate. Updated 2023 baseline bow tie is included in Figure 1-3 below.

Drivers				Outcomes			
	Freq (Events/Yr)	% Freq	% Risk		CoRE	%Freq	%Risk
Other	71.0	47.7%	47%	Exposure 27,274 Contract employees Contractor Safety Incident TY Baseline Risk Score for 2023 79.0			
Sprains, strains, tears	19.5	13.1%	13%				
Cuts and lacerations	16.4	11.0%	11%				
Bruises and contusions	14.0	9.4%	9%				
Fractures	8.8	5.9%	6%				
Back pain, hurt back	6.3	4.2%	4%				
Abrasions, scratches	5.7	3.8%	4%				
Animal or insect bites	3.8	2.5%	3%				
Punctures, except bites	2.8	1.9%	2%				
CC - Physical Attack	0.4	0.2%	1%				
Aggregated	149	100.0%	100%	Serious Injury or Fatality 27.46 2% 100% Aggregated 0.53 100% 100%			

12
13
14
15

The EHS department forecasted expense costs for the Contractor Safety risk mitigation programs are \$0.06 million in 2023. There are no

forecasted capital expenditures. This mitigation plan is in addition to existing processes, procedures and standards.

1) Response to SPD Feedback

PG&E agrees with SPD and parties that more RSEs will improve risk analysis. In response to the feedback provided by the SPD, PG&E has included RSE calculations for controls associated with the Contractor Safety Incident risk. These can be found in Workpaper 1-25: Contractor Safety Incident – Recorded and Forecast Control Costs - Expense (Nominal Dollars). See Feedback to PG&E's 2020 Risk Assessment and Mitigation Phase Report¹⁰ for a comprehensive overview of PG&E's response to the feedback received on the 2020 RAMP report.

2) Response to Party Feedback

No additional changes were made to the Contractor Safety Incident risk RAMP model analysis based on feedback received from FEITA. See Feedback to PG&E's 2020 Risk Assessment and Mitigation Phase Report for a comprehensive overview of PG&E's response to the feedback received on the 2020 RAMP report

3) Changes to Controls

For the 2023 GRC, the controls are organized into Programs (see Table 1-7 below). The control cost forecast for the Contractor Safety Incident risk for 2023 is \$2.46 million. The primary driver for the controls forecast is labor expenses for the organization to manage and sustain the Contractor Safety Program as required by the Kern Oil settlement agreement.¹¹

PG&E has continued to strengthen the Contractor Safety Incident risk controls since it submitted its RAMP Report including the transition of RAMP mitigation M14, Contractor Safety Field Inspections to a program control using existing H&S professionals in

¹⁰ Exhibit (PG&E-2), Ch. 1 Enterprise and Operational Risk Management Program, provides Feedback to PG&E's 2020 Risk Assessment and Mitigation Phase Report.

¹¹ I.14-08-022, Kern Order Instituting Investigation (Kern Oil) (Aug. 28, 2014) Settlement Agreement with California Public Utilities Commission (CPUC) see D.15-07-014.

1 the EHS organization. This expansion of the current Contractor
 2 Safety oversight assessments and observations focuses on
 3 contractor adherence to OSHA compliance. Contractor Safety Field
 4 Inspections have been included with the Contractor Safety
 5 Oversight and Compliance program controls as C22.

**TABLE 1-7
 CONTRACTOR SAFETY INCIDENT CONTROLS
 2023 EXPENSE FORECAST
 (SEE RSES FOR CONTROLS WORKPAPER 1-25 FOR CONTROL PROGRAM RSEs)**

Line No.	Control Number	Control Program	Description	MWC	2023
1	CNTSI-PRGA	Contractor Pre-Qualification	Contractor Pre-Qualification (RAMP controls C1 and C2).	FL	\$0.14
2	CNTSI-PRGB	Contractor Safety Oversight and Compliance	Contractor Safety Oversight and Compliance (RAMP controls C3 – C10, C13, C15, C18 – C22).	FL	\$2.32
3		Controls Total (No Corporate Items)		FL	\$2.46

6 **4) Changes to Mitigations**

7 PG&E has made one change to the proposed mitigation plan for
 8 the Contractor Safety Incident risk: RAMP mitigation M14,
 9 Contractor Safety Field Inspections was transitioned to a program
 10 control (C22) using existing H&S professionals in the EHS
 11 organization. This expansion of the current Contractor Safety
 12 oversight assessments and observations focuses on contractor
 13 adherence to OSHA compliance.

14 With the reclassification of five contractor fatalities related to
 15 Aviation Incidents, the risk reduction scores and RSEs for the
 16 remaining mitigations are lower than in the 2020 RAMP report.¹²
 17 Changes to the RSEs can be found in Table 1-8 below.

18 Contractor Safety Incident risk model and supporting
 19 workpapers are available upon request.

¹² PG&E 2020 RAMP Report, A.20-06-012 (June 30, 2020), Ch. 17, Contractor Safety Incident.

TABLE 1-8
CONTRACTOR SAFETY INCIDENT RISK MITIGATION RSE COMPARISON
UPDATED FOR THE GRC FORECAST
(THOUSANDS OF DOLLARS)

Line No.	Mitigation No.	Mitigation Name	MWC	2020	2021	2022	2023	2024	2025	2026	Total	RAMP RSE	GRC RSE
1	CNTSI-M11a	Safety Scorecard	NA – RAMP Only ^(a)	–	181	–	–	–	–	–	181	–	–
2	CNTSI-M11b	Work Permits	FL	–	–	–	58	17	17	17	109	215.9	147.8
3	CNTSI-M013	Contractor On-Boarding	NA – RAMP Only ^(a)	–	–	1,625	1,625	1,625	1,625	1,625	8,125	3.8	2.8
4	CNTSI-M015	Contractor Safety Handbook	NA – RAMP Only ^(a)	–	216	–	–	–	–	–	216	–	–
5	CNTSI-M016	Tracking Contractor Workers	NA – RAMP Only ^(a)	–	–	–	1,501	1,501	1,501	1,501	6,004	4.1	3.0
6	CNTSI-M017	OSHA Programs Training Requirements	NA – RAMP Only ^(a)	–	492	148	148	148	148	148	1,232	33.0	23.1
7	CNTSI-M018	Contractor Safety Officer Criteria	FL	–	17	17	–	–	–	–	34	–	–
8	Total (includes companywide costs)			–	906	1,790	3,332	3,291	3,291	3,291	15,901	–	–

(a) Costs associated with this mitigation are outside of the EHS organization and include companywide costs associated with contractor oversight.

d. Motor Vehicle Safety Incident

The Motor Vehicle Safety Incident (MVSII) risk exposure is based on the more than 139 million miles that PG&E employees drive each year. Of the 914 motor vehicle incidents that occur on average each year, 57 percent of those are classified as non-preventable motor vehicle incidents (NPVMI). The remaining 43 percent are considered PVMI.

The MVSII risk is defined as 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, property damage, and other consequences.

Specifically, any recordable motor vehicle incidents involving a PG&E vehicle (or one operated on behalf of PG&E), including both preventable and non-preventable incidents, are considered within scope of this risk.

Incidents considered out of scope for this risk include motorized equipment, off-road vehicles, off-road driving, unique or specialized vehicles, non-staff augmentation contractors, and other drivers.

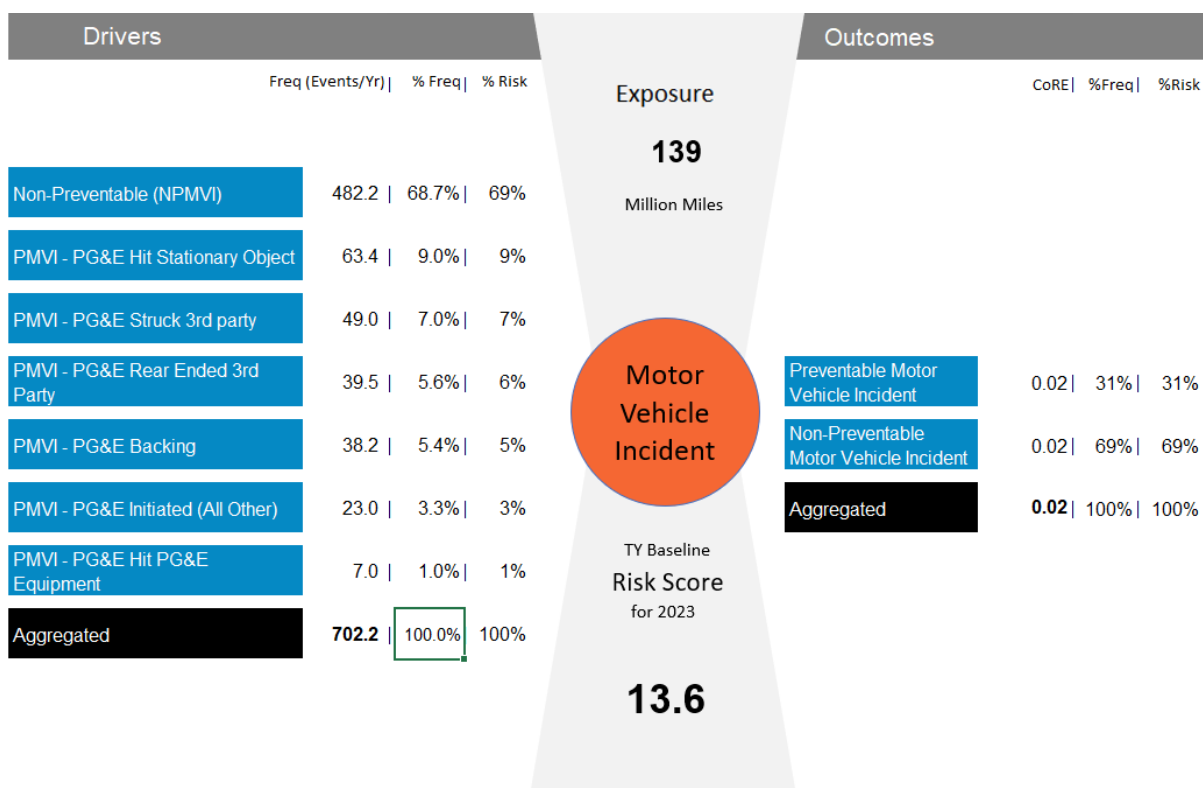
The MVSII controls and mitigations programs have continued to strengthen since PG&E submitted its RAMP Report. RAMP model drivers and consequences datasets have been updated to include 2020 incidents. The continued successful implementation of the Motor Vehicle Safety Incident risk reduction mitigations and effective maintenance of the risk's controls will ensure that PG&E's motor preventable vehicle incidents continue to be reduced.

PG&E's 2020 RAMP report did not provide forecasted costs for controls related to this risk. The initial forecasted expense costs for the mitigations associated with this risk reported in the RAMP report were \$1.03 million in 2023. There are no capital expenditure forecasts. For the 2023 GRC filing the forecasted expense costs for the mitigations associated with this risk remain as \$1.03 million in 2023. This mitigation plan is in addition to existing processes, procedures and standards.

The RAMP model drivers and consequences have been updated to include 2020 incidents. The MVSII 2023 TY baseline safety score is now 13.0 (previously 16.0). The 2023 TY baseline total risk score is

now 13.6 (previously 16.6). Updated 2023 baseline bow tie is included in Figure 1-4 below.

**FIGURE 1-4
MOTOR VEHICLE SAFETY INCIDENT BOW TIE**



1) Response to SPD Feedback

PG&E agrees with SPD and parties that more RSEs will improve risk analysis. In response to the feedback provided by the SPD, PG&E has included RSE calculations for controls associated with the MVSI risk. See Feedback to PG&E's 2020 Risk Assessment and Mitigation Phase Report¹³ for a comprehensive overview of PG&E's response to the feedback received on the 2020 RAMP report.

¹³ Exhibit (PG&E-2), Ch. 1 Enterprise and Operational Risk Management Program, provides Feedback to PG&E's 2020 Risk Assessment and Mitigation Phase Report.

2) Response to Party Feedback

No additional changes were made to the Motor Vehicle Safety Incident risk RAMP model analysis based on feedback received from FEITA. See Feedback to PG&E's 2020 Risk Assessment and Mitigation Phase Report for a comprehensive overview of PG&E's response to the feedback received on the 2020 RAMP report.

3) Changes to Controls

PG&E has continued to strengthen controls related to the Motor Vehicle Safety Incident risk since it submitted its RAMP Report. For the 2023 GRC, the controls are organized into a Transportation Safety Program (see Table 1-9 below). The 2023 control cost forecast for the Motor Vehicle Safety Incident risk is \$3.8 million. For RSE calculations see Workpaper 1-28: Motor Vehicle Safety Incident – Recorded and Forecast Control Costs - Expense (Nominal Dollars). The primary driver for the forecast is labor expenses for the organization to manage and sustain the Transportation Safety program controls.

TABLE 1-9
MOTOR VEHICLE SAFETY INCIDENT CONTROLS
2023 EXPENSE FORECAST
(SEE RSES FOR CONTROLS WORKPAPER 1-28 FOR CONTROL PROGRAM RSEs)

Line No.	Control No.	Control Program	Description	MWC	2023
1	MTRSI-PRGA	Transportation Safety	Transportation Safety (all RAMP controls, including DOT and regulatory compliance).	FL, AB, ZC	\$3.6
2		Controls Total (Includes Corporate Items)		FL, AB, ZC	\$3.6

4) Changes to Mitigations

PG&E has not changed the mitigations related to the Motor Vehicle Safety Incident risk since it submitted its RAMP Report. The mitigation effectiveness for Cell Phone Activity Blocking was revised to account for the program as an Engineered Barrier which resulted in an increased risk reduction score and RSE for the program.

1 PG&E is also continuing to evaluate the In-Cab Camera Technology
2 alternative 3 plan included in the 2020 RAMP filing.

3 Also, as discussed in the 2020 RAMP filing for the Motor
4 Vehicle Safety Incident risk, additional analysis was conducted
5 using the initial results of the University of California, Los Angeles
6 (UCLA) study. Many of the drivers selected for the study were not
7 applicable to the Motor Vehicle Safety Incident proposed plan
8 mitigations and thus did not provide significant additional insight into
9 mitigation effectiveness. The UCLA study will inform the data
10 enhancement/improvement plan for the risk which is included as a
11 RAMP mitigation. Changes to the RSEs can be found in Table 1-10
12 below.

13 MVSI risk model and supporting workpapers are available upon
14 request.

TABLE 1-10
MOTOR VEHICLE SAFETY RISK MITIGATION RSE COMPARISON
UPDATED WITH GRC FORECAST
(THOUSANDS OF DOLLARS)

Line No.	Mitigation No.	Mitigation Name	MWC	2020	2021	2022	2023	2024	2025	2026	Total	RAMP RSE	GRC RSE
1	MTRSI-M014	Post Incident Review	FL	\$67.8	\$67.8	-	-	-	-	-	\$136	-	-
2	MTRSI-M015	360 Walk Around App	FL	63	-	-	-	-	-	-	63	-	-
3	MTRSI-M018	Safe Backing Training TECH-9161	FL	36	-	-	-	-	-	-	36	-	-
4	MTRSI-M019	Cell Phone Activity Blocking (Transportation Safety Program)	FL	-	-	-	\$1,035	\$2,070	\$3,050	\$4,140	10,295	0.42	4.3
5	MTRSI-M02B	Update VST Installation and Activation (Cost Not Part of EHS Forecast)	NA	2,570	2,570	2,570	-	-	-	-	7,710	-	-
6		Total		\$2,737	\$2,638	\$2,570	\$1,035	\$2,070	\$3,050	\$4,140	\$18,240	-	-

C. Activities, Costs, and Forecast Drivers by MWC

1. Expense MWCs

a. MWC ZC – Companywide Expense

PG&E seeks authorization to recover the costs associated with several Companywide programs presented in Chapter 1A, including the DOT Expenses Program and Health and Wellness Programs. As discussed in section B.2, the forecasts for these programs are included in this chapter for risk modeling purposes and are identified under MWC ZC for risk modeling only. See Table 1-11 for a summary or recorded and forecast costs for these Companywide expenses.

1) Transportation Safety including DOT regulatory compliance

PG&E forecasts DOT Companywide expense of \$0.88 million in 2023. There is no change from the 2020 recorded cost of \$0.88

2) Occupational Health and Wellness Programs

PG&E forecasts Health and Wellness Companywide expenses of \$36 million in 2023. This is an increase of 27 percent from the 2020 recorded adjusted expense of \$26 million. The 2023 forecast includes \$7.3 million for the wellness programs, \$22.1 million for EAP which now includes costs that were previously managed by Human Resources, \$3.5 million for the MSD early symptom intervention programs, and \$3.3 million for the clinics and fitness for duty programs. The MSD early symptom intervention programs and the clinics and fitness for duty programs are also discussed in Chapter 1A. The forecasts support mitigation program implementation and controls maintenance for the Employee Safety incident risk.

3) Benefit Plans and Policy

PG&E forecasts Benefit Plans and Policy Companywide expenses of \$118.4 million in 2023, an increase of 18 percent over 2020 recorded adjusted expense of \$97.7 million. The benefits program is also discussed in Chapter 1A. The increase is due primarily to a re-evaluation of the long-term disability program based

on number of participants. This forecast supports mitigation program implementation and controls maintenance for the Employee Safety incident risk.

4) Cal/OSHA-Required Medical Surveillance

For 2019 and 2020, costs associated with medical surveillance that is required under Cal/OSHA was recorded to MWC FA but beginning in 2021 will be recorded as Companywide costs in the Wellness program. These costs include mobile vans that travel PG&E's utility system and provide audiometric testing (for the hearing conservation program) and provide respirator clearances and fit testing (for the respiratory protection program), as well as a second vendor that works with local clinics throughout the service territory to ensure that employees get asbestos and lead medical exams, including audiometric testing and respirator clearances.

b. MWC FL – Safety Engineering and OSHA Compliance

MWC FL includes labor associated with the Health and Wellness, MSDs, SIF Strategy and Prevention including Safety Leadership, the HSMS, Contractor Safety, and Transportation areas. Estimates for forecast expense amounts are based on an evaluation of 2020 planned and recorded labor and contract costs. MWC FL includes contract staff augmentation costs. The total forecasted cost MWC FL in 2023 is \$18.9 million. This forecast supports mitigation program implementation and controls maintenance for the Employee Safety Incident, Contractor Safety Incident risk, and Motor Vehicle Safety Incident risks

c. MWC AB – Miscellaneous Expense

MWC AB includes labor associated with DOT, ECAP, and Business Operations focus areas.

The total forecasted cost for MWC AB in 2023 is \$11.2 million. This forecast supports mitigation program implementation and controls maintenance for the Employee Safety Incident (regulatory compliance programs oversight, ECAP, and business operations support), and Motor Vehicle Safety Incident (DOT compliance) risks based on an evaluation of 2020 planned and recorded labor.

d. MWC KX – Provide Human Resources Services

MWC KX includes labor associated with Occupational Health Integrated Disability Management benefits programs. The total forecasted cost MWC KX in 2023 is \$7.6 million based on an evaluation of 2020 planned and recorded labor and is needed to continue to sustain and maintain EHS risk control programs allocated to MWC KX. This forecast supports Benefit Plans and Policy controls maintenance for the Employee Safety Incident risk.

e. MWC JV – Maintain IT Apps and Infrastructure

The total forecasted cost MWC JV in 2023 is \$0.55 million. Costs are associated with enhancements to safety data management systems and ECAP technology (e.g., updating reports to reflect organizational changes and responding to prioritized user requests). IT expense is forecast based on historical spend trends.

2. Capital MWCs

The Safety & Health Department has forecasted capital expenditures of \$4.0 million for 2023-2026 (\$1 million/year) to support upgrades of the EHS aging technology infrastructure (e.g., servers, as new software releases are installed, and system demands increase). Technology expense requirements in support of the Health & Safety Department are forecast to be \$1.0 million in 2023. This funding supports responding to changing compliance and reporting requirements and functional enhancements.

D. Estimating Method

The estimating methodology for EHS is based on headcount through the forecast period and in addition includes the increase in staffing for regionalization in alignment with the 2025 EHS strategy with associated labor escalation. Contract costs in total are assumed to gain sufficient efficiency to offset labor escalation, and still support the activities that are described in EHS objectives.

1 **E. Cost Tables**

TABLE 1-11
EHS COMPANYWIDE EXPENSES BY RISK CONTROL AND MITIGATION PROGRAMS
(THOUSANDS OF DOLLARS)

Line No.	Program	2021	2022	2023	Total
1	Occupation Health and Wellness, including MSD ^(a)	\$31,687	\$36,213	\$36,005	\$103,905
2	Benefits and Policy (Injury Management)	100,145	101,750	118,404	320,299
3	DOT Compliance ^(b)	840	856	876	2,572
4	OSHA Compliance ^(c)	204	204	204	613
5	Companywide Expense Total (See Chapter 1A for Additional Detail)	\$132,876	\$139,023	\$155,489	\$427,388

Note: The recorded and forecast values vary from the values listed in the Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

(a) Includes companywide EAP administration costs and associated wellness programs forecast for recovery in Chapter 1A.

(b) Includes companywide costs forecast for recovery in Chapter 1A.

(c) Includes companywide costs forecast for recovery in Chapter 1A.

TABLE 1-12
EHS DEPARTMENT EXPENSES BY RISK CONTROL AND MITIGATION PROGRAMS
(THOUSANDS OF DOLLARS)

Line No.	Program	2021	2022	2023	Total
1	Contractor Safety	\$2,473	\$2,473	\$2,514	\$7,461
2	Transportation Safety (includes DOT Compliance)	2,791	2,723	3,758	9,272
3	H&S Guidance, Training and Oversight (includes H&S regulatory compliance oversight and reporting, enterprise communications, critical risk assessments, HSMS and safety audits, Standards and tailboards)	3,920	4,655	4,527	13,102
4	Occupational Employee Health and Wellness	2,267	2,607	2,635	7,489
5	Benefit Plans and Policy (Injury Management)	6,523	7,573	7,573	21,669
6	SIF Strategy and Prevention (includes SIF Management, field safety observations, field leadership and Safety Culture)	6,102	7,712	8,858	22,672
7	Safety Assurance/HSMS ^(a)	1,725	2,258	1,809	5,792
8	ECAP (includes ECAP and Near Hits Program)	5,244	6,044	6,044	17,333
9	Department Expense Total	\$31,045	\$36,047	\$37,698	\$104,791

(a) Does not include ISOC costs. ISOC costs are not borne by customers and are therefore considered below the line as required by the CPUC for enforcement and monitoring activities.

TABLE 1-13
ENTERPRISE SAFETY AND HEALTH
EXPENSES BY MAJOR WORK CATEGORY
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	Description	Recorded Adjusted					Forecast		
			2016	2017	2018	2019	2020	2021	2022	2023
1	AB	Misc. Expense	\$9,129	\$10,891	\$9,829	\$9,707	\$12,018	\$9,676	\$11,235	\$11,235
2	FA	Spc A&G/Oth Csts-Bud Dept	—	18	186	242	166	—	—	—
3	FL	Safety Engineering & OSHA Cmpl	21,123	13,590	15,864	16,180	12,662	14,847	17,239	18,891
4	IG	Manage Var Bal Acct Processes	—	—	—	1,073	48	—	—	—
5	JV	Maintain IT Apps & Infra	440	381	533	307	574	564	554	554
6	KX	Prov Human Resource Svcs	6,198	5,772	6,972	7,381	8,605	6,523	7,573	7,573
7	Total		\$36,891	\$30,653	\$33,384	\$34,890	\$34,073	\$31,610	\$36,601	\$38,253

TABLE 1-14
ENTERPRISE SAFETY AND HEALTH
EXPENSES BY MAJOR WORK CATEGORY
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	Description	Recorded Adjusted					Forecast			
			2016	2017	2018	2019	2020	2021	2022	2023	2026
1	22	Maintain Buildings	\$161	—	\$30	\$125	—	—	—	—	—
2	2F	Build IT Apps & Infra	5,394	5,334	1,596	—	—	\$900	\$1,000	\$1,000	\$1,000
3	Total		\$5,555	\$5,334	\$1,626	\$125	—	\$900	\$1,000	\$1,000	\$1,000

(PG&E-7)

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 1A
OCCUPATIONAL HEALTH
[INCLUDES NOVEMBER 5, 2021 ERRATA]

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 1A
OCCUPATIONAL HEALTH

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 1A
OCCUPATIONAL HEALTH

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CHAPTER 1A
OCCUPATIONAL HEALTH

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PACIFIC GAS AND ELECTRIC COMPANY

CHAPTER 1A

OCCUPATIONAL HEALTH

A. Introduction

1. Scope and Purpose

The purpose of this chapter is to describe Pacific Gas and Electric Company's (PG&E or the Company) Workers Compensation (WC), Disability, and On-Site Healthcare Programs (collectively, the Occupational Health Programs) and to demonstrate that the associated expenses are reasonable and should be adopted by the California Public Utilities Commission (Commission). As described in Chapter 1, these Companywide expenses are overseen and managed by PG&E's Occupational Health Department (OH) within the Enterprise Health and Safety Organization.

2. Summary of Request

PG&E requests that the Commission adopt its total forecast of \$156 million for Occupational Health Programs.¹ This amount is \$31 million (25 percent) above 2020 recorded costs. The costs for the following activities and programs are included in this forecast: WC and related costs, Long-Term Disability (LTD) contributions, Short-Term Disability (STD) Voluntary Plan supplements, and Wellness Programs². Most of these costs are incurred to comply with legal, regulatory or contractual requirements. For the post-test year forecast (2024-2026), PG&E has included a workpaper to document specific program areas that require special attrition treatment.³

¹ See Table 1A-2, Line 20, below.

² See Chapter 1, Section C.1.a.2, for a discussion of the Wellness Programs.

³ See Exhibit (PG&E-7), WP 1A-134 for more information.

3. Overview of Recorded and Forecast Costs

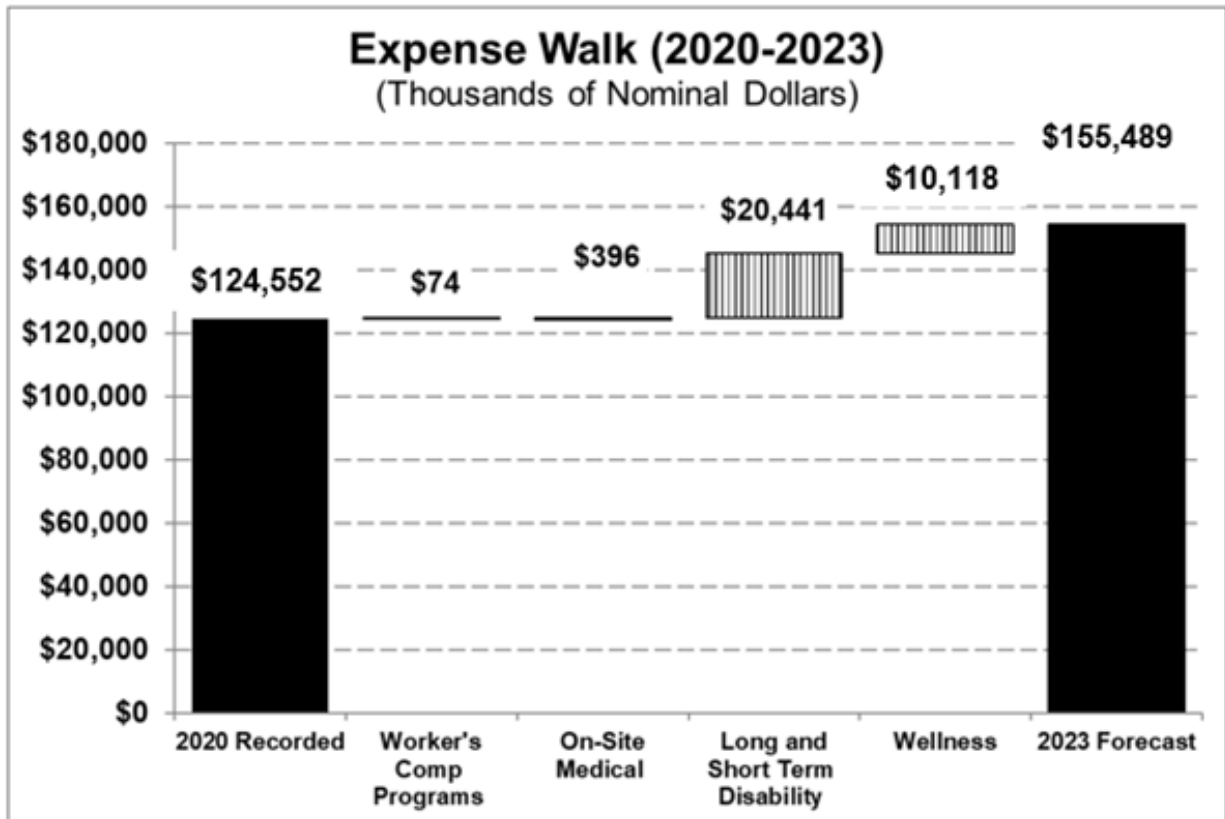
a. Expense

Figure 1A-1 below shows a “walk” of companywide expenses, consisting of: (1) WC benefits and related non-departmental costs; (2) On-Site Medical Care; and (3) Disability program costs, including STD, STD supplement costs, LTD trust contributions, and associated third-party disability (and leave) management costs.

PG&E’s forecasted increase of 24 percent in overall cost above 2020 is driven primarily by efforts to implement strategies to reduce WC and disability costs. These efforts include:

- Taking proactive steps to reduce the number and severity of employee injuries, reducing both the number of claims and their average cost;
- Expanding clinical services throughout PG&E territory to increase access to quality medical care and allow for early intervention;
- Providing high quality and appropriate care for injuries to improve outcomes and reduce recovery time; and
- Adopting proactive processes to improve the efficiency of managing claims and reduce costs of administration.

FIGURE 1A-1
OCCUPATIONAL HEALTH EXPENSE WALK (2020-2023)
(THOUSANDS OF NOMINAL DOLLARS)



Note: The recorded and forecast values vary from the values listed in the Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

4. Support for Request

PG&E's request for its Occupational Health Programs is reasonable because most of the costs are required to comply with legal, regulatory, and contractual requirements. By taking proactive steps to reduce employee injuries, the Occupational Health Program costs will reduce the number and cost of future claims, thereby promoting safety and customer affordability.

5. Organization of the Remainder of This Chapter

The remainder of this chapter is organized as follows:

- Section B – Occupational Health Program Overview
- Section C – Cost Table

B. Occupational Health Program Overview

PG&E's OH is responsible for the integrated management and administration of PG&E's time-off programs, including sick leave and similar absence programs, Family Medical Leave Act (FMLA), California Family Rights Act (CFRA), medical leaves not covered under FMLA or CFRA, and WC. On average, at any given time, PG&E has about 1,850 non-working employees due to an approved leave, occupational injury or illness, or non-occupational injury or illness. OH also manages PG&E's vacation and holiday policy.

1. Occupational Health Management Structure

PG&E's integrated approach includes OH managers responsible for the delivery of service for specific lines of business (LOB), and OH Supervisors leading integrated teams that:

- Administer PG&E's Self Insured and Self-Administered WC Program, ensuring compliance with all applicable federal, state, and local laws; and
- Manage all Leave of Absence (LOA) and employees return from leave, while ensuring compliance with all applicable federal, state, and local laws.

This integrated approach has allowed PG&E to improve the coordination of services to employees. The focus of OH is to ensure that these employees receive appropriate care and that the Company makes all reasonable efforts to return the employee back to productive work as quickly as possible. The OH Managers also identify developing trends regarding employee time off and work with the LOBs to develop proactive approaches to reduce the number of employees away from work due to injuries and illnesses. All these activities are pursued both to contain costs and maintain effective and efficient utility operations.

A complex legal and regulatory framework continues to govern employee absences. For example, the WC laws and regulations requiring independent medical and bill review provisions, and laws such as the FMLA and the CFRA combined with local regulations such as the City of San Francisco Health Care Security Ordinance require PG&E to maintain equally complex processes and programs to ensure compliance. PG&E uses a combination of contract and employee resources to manage and

administer its WC program and looks to leverage the expertise and processes of vendor partners when appropriate.

In addition, OH is responsible for conducting Fit for Duty (FFD) evaluations. Any time a Supervisor observes conduct or performance or has knowledge of a medical condition that might affect an employee's ability to safely and efficiently perform their job duties, the Supervisor contacts the OH team. OH has a dedicated nurse credentialed FFD Specialist who consults with Human Resources Delivery, Labor Relations, Supervisors or Managers whenever a FFD evaluation is requested. The evaluators conduct the evaluation only and do not provide the treatment.

Activities, Costs, and Forecast Drivers by Program.

2. WC Program Costs

PG&E requests that the Commission adopt its total 2023 forecast of \$53 million for WC benefits and related program costs.⁴ This forecast is \$0.7 million (0.1 percent) less than the 2020 recorded adjusted amount for WC benefits and related costs of \$53.1 million. This decrease reflects the efficacy of our cost containment programs, which include the Early Symptom Intervention (ESI) and office ergonomics programs, as well as the expansion of onsite clinics. These and the other cost containment efforts discussed below are aimed at reducing frequency of claims, the average cost per claim, and total benefit paid now and into the future.

The WC program includes:

- a) WC Benefit Payments and Related Programs, Fees and Costs;
- b) WC Alternative Security Program (ASP);
- c) Cost Containment Programs;
- d) Transitional Light Duty Payroll;
- e) On - or Near-Site Clinics; and
- f) ESI and Office Ergonomics.

a. WC Benefits Payments and Related Programs, Fees and Costs

WC Benefits: PG&E is self-insured and self-administered for WC in California. Under this program, PG&E provides WC benefits required by California law and by contract. PG&E provides the following to injured

⁴ See Table 1A-2, Line 8, below.

workers under its self-insured WC Program: medical treatment necessary to cure or relieve the effects of the injury, disability payments made directly to the injured worker if the injury results in temporary or permanent disability, vocational rehabilitation vouchers, death benefits, and supplemental benefits.

24/7 Nurse Care Line (NCL): PG&E uses a 24/7 NCL as its primary claim intake method. The NCL, initiated in 2012, simplifies the reporting process and puts the injured worker immediately in contact with a nurse. The NCL encourages early reporting of injuries which allows for timely and effective intervention and treatment, helping reduce the overall impacts of injuries. PG&E asks its employees to call the NCL within 24 hours of suffering an injury or illness they believe is or might be work-related. In 2020, 63 percent of injuries were called in to the NCL within one day of the injury.

Regulatory Fees: Self-Insured companies are assessed fees by California's Department of Worker's Compensation. These fees vary from year to year, based on state regulations and budgets, and PG&E's recorded WC benefit payments.

1) Costs

Overall, PG&E forecasts \$35.8 million in expense in 2023 for the programs described above.⁵ This represents a two percent reduction from 2020 recorded costs.

- WC: \$33.7 million
- 24/7 NCL: \$0.5 million
- Regulatory Fees: \$1.6 million

2) Estimating Method

PG&E's forecast of WC Benefits Payment costs is primarily based on actuarial analysis that considers over 30 years of loss development and payment history. Losses for future claim years (2021 through 2023) are estimated based on PG&E's loss history, and payments are projected based on historical development and payment patterns. This methodology appropriately reflects the

⁵ See Table 1A-2, line 1, below.

overall long-term trends in WC losses and payments, and does not overreact to short term fluctuations in payments. The methodology is discussed in detail in the “Workers’ Compensation General Rate Case Forecast for 2020-2023” prepared by Towers Watson, and is summarized below.

- Year to year paid and total loss (estimated) results development factors are identified and utilized to estimate total ultimate losses for each year, including forecasted losses for 2021 through 2023, and develop a payout pattern.
- Ultimate losses and the payout pattern are used to produce an expected payment for each claim year for each calendar year.
- Separate analyses are done for each major benefit type (Medical, Temporary Disability, Permanent Disability, and Supplemental Benefits).
- WC related regulatory fees and vocational rehabilitation costs are also included in this account. These are projected based on recorded figures using the weighted average methodology of 2015-2019 recorded data, giving the most weight to the latest year and gradually less weight to each prior year. The calculation is shown in “Workers’ Compensation General Rate Case Forecast for 2020-2023” prepared by Towers Watson.

3) Forecast Drivers

PG&E’s total 2023 forecast of \$35.8 million for WC benefits and related program costs is \$0.3 million (1 percent) less than the 2020 recorded adjusted amount for WC benefits and related costs of \$36.1 million. Primary drivers of this decrease are:

- A net reduction of \$3 million in WC benefits payments. This includes a decrease in payments due to accelerated claim settlements in 2019 that reduces future benefit costs;
- The forecast for WC also reflects the impact of additional programs discussed in Section 1.c below.

1 **b. WC ASP**

2 ASP costs are fees charged by the Self-Insurer's Security Fund
 3 (SISF). SISF is an organization created by the State legislature to
 4 ensure the continuity of WC benefits of self-insured employers that have
 5 defaulted on their WC obligations—usually due to bankruptcy. Under
 6 the ASP, SISF provides an aggregated security deposit for all
 7 investment-grade California self-insured companies and charges a fee
 8 to cover the cost of providing the collateral. PG&E's participation in the
 9 ASP is mandatory. The State requires a similar security posted by or on
 10 behalf of all WC self-insured entities and WC insurers.

11 **1) Costs**

12 PG&E requests the Commission adopt its forecast of WC ASP
 13 costs of \$1.9 million in expense for 2023.⁶

14 **2) Estimating Method**

15 PG&E's ASP cost projection is based on a weighted average of
 16 2015-2019 recorded data, giving the most weight to the latest year
 17 and gradually less weight to each prior year. The calculation is
 18 shown in "Workers' Compensation General Rate Case Forecast for
 19 2020-2023" prepared by Towers Watson.

20 **c. Cost Containment Programs**

21 The WC Program includes PG&E's cost of third-party contractors
 22 retained to help PG&E reduce overall WC costs. These program costs
 23 are discussed below.

- 24 • **Bill Review:** PG&E utilizes a third-party vendor to review bills
 25 received from WC Medical Providers and adjust payments to the
 26 amounts allowed under California's Official Medical Fee Schedule,
 27 and captures discounts below fee schedule, available through
 28 Preferred Provider Organization (PPO) Networks. PG&E's Bill
 29 Review and PPO Program achieved net savings in excess of

6 See Table 1A-2, Line 2, below.

\$20.7 million in 2020, which reduced the forecast of WC Benefits Payments.⁷

- **Utilization Review (UR):** Another form of cost containment includes the appropriate engagement of UR services. When a Workers' Compensation Representative (WCR) receives a request for medical treatment, the WCR can either authorize the treatment or send it to the Company's UR vendor, Rehab West, Inc., for a physician review. The physician reviews the request and determines if the requested treatment is reasonable and necessary in accordance with evidence based medical treatment guidelines. The review will result in certification, non-certification or a modification of the treatment plan. The requesting physician and patient have appeal rights first to the UR vendor, and then with an independent state review vendor.

In 2020, the UR Program resulted in PG&E avoiding costs of over \$4.4 million, while paying \$0.9 million in fees, resulting in net savings of \$3.5 million.⁸

- **Claim Related Costs:** PG&E verifies each WC claim received to ensure benefits are due under its WC Program. PG&E's internal claim staff collects facts and reviews each claim. When appropriate, PG&E's claim staff engages external resources to further investigate the claim. These investigations may include, but are not limited to:
 - Obtaining Medical Records;
 - Obtaining Information on Prior Claims for Prior WC or Other Injuries;
 - Obtaining Statements From Witnesses or Other Relevant Individuals; and
 - Performing Sub-Rosa Surveillance.⁹

These investigations help ensure that PG&E provides appropriate benefits to its injured workers and is not subject to WC fraud. Savings

⁷ See Exhibit (PG&E-7), WP 1A-6, line 16, for more details.

⁸ See Exhibit (PG&E-7), WP 1A-7, line 15, for more details.

⁹ Sub-Rosa Surveillance refers to undercover video surveillance.

1 due to these reviews and investigations are embedded in PG&E's
 2 recorded benefits costs, and in the forecasted benefits costs. The
 3 expense is included in the forecasted cost containment expense.

- 4 • **Nurse Case Management:** PG&E utilizes Nurse Case Managers
 5 (NCM) to serve as liaisons between the treating physician, the
 6 injured worker, and the WCR on catastrophic, surgical, and lost time
 7 claims. The NCMs are a key resource to facilitate accurate
 8 communication between the injured worker, the treating physician,
 9 and the claims examiner. The NCM assures the medical care is
 10 progressing effectively and identifies problems related to that care.
 11 The NCM can raise and address concerns about the medical care.
 12 The impact of NCMs is embedded in the benefits payment record,
 13 and thus in the forecast. The projected expense of NCMs is
 14 included in the cost containment expense forecast.

15 In September 2020, PG&E implemented the Telephonic Case
 16 Management (TCM) Program to provide early case management
 17 intervention through the assignment of a TCM nurse on all new WC
 18 claims requiring a clinic visit. The TCM nurse assists in managing
 19 employee care and helps employees get back to full duty sooner,
 20 providing better recovery outcomes. This program is an expansion
 21 of the NCM programs.

22 The savings and avoided costs from these cost containment
 23 expenses are embedded in PG&E's forecast of WC benefits payments.

24 **1) Costs**

25 Overall, PG&E forecasts \$5.4 million in expense in 2023 for
 26 these cost containment programs.¹⁰ This represents a 17 percent
 27 increase from 2020 recorded costs.

- 28 • Bill Review: \$2.9 million
- 29 • UR: \$1.2 million
- 30 • Claim Related Costs: \$0.8 million
- 31 • Nurse Case Management: \$0.5 million

¹⁰ See Exhibit (PG&E-7), WP 1A-8, line 5, for more details.

2) Estimating Method

PG&E's cost containment programs projection is based on the average spend from 2018, 2019, and 2020 budget.

3) Forecast Drivers

Increases in cost containment programs are driven by the continued efforts to reduce WC benefit payments. The \$1.2 million increase over 2020 costs of these programs has resulted in a \$3 million cost avoidance in WC benefit payments.

d. Transitional Light Duty Payroll

PG&E's light-duty payroll will pay the wages of employees who are returned to work in a light or transitional capacity and meet certain criteria.

Limiting the amount of time an injured worker is away from their usual and customary job due to an injury in effect reduces potential claim costs. The Light-Duty Payroll Program is a key tool PG&E uses to help return our injured workers to the job. The Light-Duty Payroll Program provides an incentive for supervisors to bring injured employees who have lost at least one workday back to their home department before the employee can work at full capacity. For a limited time (no more than six months) and only until the employee is released by his or her physician to unrestricted duty, the Light-Duty Payroll Program will pay the employee's wages in place of the employee's business unit. The program effectively reduces WC costs for the Company because by returning employees to work in some capacity; as a result, the Company avoids paying wage replacement to non-working employees. This program also benefits the Company's employees, as generally, the sooner an employee returns to the workforce in some capacity, the better the employee's recovery outcome.

In late 2017, PG&E enhanced the return to work program by creating a Transitional Task Bank to provide productive work for injured employees whose temporary work restrictions cannot be accommodated in their base classification. The Transitional Task Bank provides a

temporary, transitional task assignment for injured employees for up to six months for occupational injuries or illness.

This program has placed 320 employees since its launch and has helped PG&E reduce the number of 2020 Lost Workdays by 27 percent compared to 2019, and by 50 percent compared to 2013.¹¹ Employees on the light-duty payroll would otherwise be receiving temporary disability pay and supplemental benefits, so the program results in a direct reduction in WC benefits payments. These results are embedded in the data considered by our actuary while estimating our 2023 expenditures and the resulting savings are embedded in the forecast.

1) Costs

PG&E forecasts costs of \$5.6 million in expense for 2023 for this program.¹² This represents a 22 percent increase over 2020 recorded costs.

2) Estimating Method

PG&E's light duty payroll program projection is based on a weighted average of 2015-2019 recorded data, giving the most weight to the latest year and gradually less weight to each prior year. The calculation is shown in "Workers' Compensation General Rate Case Forecast for 2020-2023" prepared by Towers Watson.

3) Forecast Drivers

Increased utilization of light duty payroll is attributed to improved return to work and stay at work programs including Task Bank.

e. On- or Near-Site Industrial Clinics

PG&E has been operating two on- or near site industrial clinics at their Fresno and San Carlos Service Centers. These clinics are focused on evaluation and treatment of occupational injuries with the aim of increasing early reporting and reducing time away from work and incidence of Occupational Safety Hazards Act (OSHA) recordable injuries.

¹¹ See Exhibit (PG&E-7), WP 1A-9, line 10, for more details.

¹² See Table 1A-2, line 5, below.

In 2020, these clinics saw 163 employees for initial injury consultation, and held 550 follow up appointments. Of these injuries, 81 percent were held at first aid outcomes.

1) **Costs**

PG&E requests the Commission adopt its forecast of On-Site Industrial Clinics costs of \$0.5 million in expense for 2023.¹³

2) **Estimating Method**

PG&E's On-Site Industrial Clinics projection is based on planned expenditures.

3) **Forecast Drivers**

On-Site Industrial Clinic costs are dependent on contract negotiated vendor fees.

f. **ESI and Office Ergonomics**

PG&E have several programs, described below, designed to reduce the number and severity of injuries, thereby reducing long term costs.

ESI – ESI is based on sports medicine principles. Athletic trainers, under a vendor contract, assess early signs of discomfort and promote stretching and other self-care techniques. They also observe body mechanics in the field and promote ergonomics. In addition, they help ensure injuries are reported timely by referring employees with work-related injuries to the NCL. This has contributed to the improvement in timely reporting discussed in Section A above.

Work Conditioning – PG&E is also continuing its Work Conditioning Program for all International Brotherhood of Electrical Workers (IBEW) physical employees. The ESI Program is designed to reduce musculoskeletal-related injuries for employees in the highest risk positions. This voluntary program is designed to improve the physical conditioning of our employees, improving their resilience.

¹³ See Table 1A-2, line 6, below.

Participation in the program has steadily increased over the years. In 2020, 38 percent of PG&E's IBEW Physical Employees participated in the ESI or Work Conditioning programs.¹⁴ We believe this participation has contributed to the reduced severity and improved reporting of injuries. Savings resulting from this program are embedded in PG&E's base year, and thus reduces the 2023 forecast.

Office Ergonomics Program: PG&E contracts with an outside vendor to perform ergonomic evaluations of employees and their workstations. These evaluations help reduce the likelihood and severity of injuries and are part of the Musculoskeletal Disorders Program discussed in Chapter 1. To make the program simpler to access, PG&E has centralized the cost of these evaluations into its cost containment expense bucket. The benefits of the program are embedded into the benefits payment record, and thus into the forecasted expense.

1) Costs

PG&E requests the Commission adopt its forecast of \$3.5 million in expense in 2023 for these programs.¹⁵

2) Estimating Method

PG&E's forecast for ESI and office ergonomics costs is based on planned expenditures.

3) Forecast Drivers

In 2020, a large majority of the office-based workforce was transitioned to remote home locations due to the COVID-19 pandemic as well as projected reduction in PG&E office locations. Efforts to increase ergonomic awareness and remediation in both the office and field are directly impacting the cost of these programs.

¹⁴ See Exhibit (PG&E-7), WP 1A-10, line 3, for more details.

¹⁵ See Table 1A-2, line 7, below.

3. Disability Programs

PG&E requests that the Commission adopt its total 2020 forecast of \$69.4 million for PG&E's Disability Program and related program costs. This forecast is \$20.4 million (42 percent) more than the 2020 recorded adjusted amount for Disability Program Costs of \$48.9 million. Disability Program costs include:

- a) Voluntary Plan related costs, including STD Supplement;
- b) LTD Trust contributions;
- c) Third-Party Disability Program Management; and
- d) LTD and STD Insurance Premiums

PG&E's forecasts for these Costs are described below.

a. Voluntary Plan (STD and Paid Family Leave (PFL))

PG&E continues to offer a modified sick leave program, including a STD program paid through a Voluntary Plan. The programs are described below:

STD: Beginning January 1, 2018, PG&E introduced a new Voluntary STD Plan. This plan is offered in place of the California State Disability Insurance plan (the "State Plan"). Employees may be eligible for up to 52 weeks of short term disability benefits under the Voluntary or State plans. The State Plan pays benefits of 60 percent of the employees' base pay up to a maximum of \$1,216 per week. The Voluntary Plan also provides 60 percent of base pay, but without a cap. STD payments from the Voluntary and State plans are tax free to the employee.

The 60 percent partial wage continuation benefits are provided either by the Voluntary Plan or the State Plan based on the employees' election. These benefits are funded by employee contributions, not through rates. The supplemental amounts paid under the Voluntary Plan are funded by PG&E. These supplemental amounts are described in more detail below.

More than 98 percent of PG&E's eligible workforce choose to be covered under the Voluntary Plan, including both union- and non-union-represented employees.

1 In addition, for the employees in the Voluntary Plan, PG&E provides
 2 a supplemental payment increasing total pay from 60 to 70 percent,
 3 after tax. This amount is paid for by PG&E, not by Voluntary Plan funds.

4 In addition, the Voluntary Plan and State Plans provide PFL
 5 benefits. Under the State Plan, employees may be eligible for up to
 6 six weeks of PFL benefits, paying up to 60 percent of base wages, up to
 7 a maximum of \$1,216/week. Under the Voluntary Plan, employees may
 8 be eligible for up to eight weeks of PFL benefits, paying up to 60 percent
 9 of base wages with no cap. PFL benefits paid under the State and
 10 Voluntary Plans are federally taxable, and are funded by employee
 11 contributions, not through rates. For employees covered under the
 12 Voluntary Plan, PG&E supplements the benefit amount up to
 13 100 percent of pay, fully taxable. These benefits are paid through
 14 regular payroll by the operating departments, not centralized into a
 15 corporate account. PG&E's payroll amounts will be reduced by the
 16 PFL amount paid through the Voluntary Plan.

17 **1) Costs**

18 PG&E requests the Commission adopt its forecast of
 19 \$22.3 million for STD Supplemental payments.¹⁶

20 **2) Estimating Method**

21 PG&E's STD cost projection is based on 2017 to 2020 usage.

22 **3) Forecast Drivers**

23 Use of Voluntary Plan benefits drives the cost of the plan, which
 24 is dependent on number of employees on STD or PFL. Trends are
 25 extrapolated from historicals to arrive at projected use. Usage of the
 26 Voluntary Plan is predicted to increase steadily as capped sick time
 27 balances are drawn down. Although PG&E's 2023 forecast is
 28 89 percent higher than 2020 recorded costs, it is only 33 percent
 29 higher than 2019. It should be noted that 2020 usage was
 30 unusually low based on employees being less inclined to take time
 31 off for illness or injuries due to work from home requirements. In

¹⁶ See Table 1A-2, line 10, below.

2020, average hours of sick time used per employee were 26 percent lower than 2019, average STD hours were 10 percent lower, and average PFL hours were 13 percent lower.¹⁷

b. LTD Benefits and Funding

Disability benefits provide partial income replacement and continued medical and life insurance coverage to employees who are unable to work due to their disability. Disability benefits are funded by PG&E contributions to tax efficient trusts. Forecasted trust contributions (and not estimated disability payouts) are recovered in revenue requirements. The most recent LTD Trust Audit Report is included in workpapers supporting Exhibit (PG&E-7) Chapter 1A.

An employee is eligible for LTD benefits if the employee becomes disabled due to illness or accidental injury, can no longer perform the duties of their own job, and PG&E is unable to place the employee in a job suited to the employee's reduced work capabilities. Employees become eligible to receive monthly LTD benefits after being disabled for 52 weeks. This time period coincides with the voluntary plan's STD Program, which provides up to 52 weeks of eligibility. Employees receiving LTD income benefits are also eligible for continued health insurance and retirement benefit coverage.

The amount of income replacement and duration of benefit entitlement under the LTD Plan varies based on the date the disabled employee becomes eligible for benefits. Under current plan design, employees who become eligible for LTD benefits receive 70 percent of pre-disability pay offset by 100 percent of any Social Security Disability Insurance (SSDI) awards. The duration of LTD benefits has been limited to a maximum of two years unless the disabled employee qualifies for SSDI benefits. PG&E's Investments and Benefit Finance Department is responsible for ensuring appropriate funding and investment management of all external trust assets maintained by PG&E, including PG&E's Retirement Plan, post-retirement medical and

¹⁷ See Exhibit (PG&E-7), WP 1A-12 for more details.

1 life insurance plans (Post Retirement Benefits Other Than
2 Pensions (PBOP)), as well as its LTD Plan.

3 PG&E's employee benefit plan trust contribution costs are charged
4 to A&G Account 926 – Pensions and Benefits. As described below,
5 PG&E's employee benefit plan trust contribution costs are reasonable,
6 and its management of the costs is consistent with prudent employee
7 benefit trust funding principles, sound actuarial practices, and the
8 Commission's decisions regarding employee benefit trust contribution
9 recovery. In these decisions, the Commission allowed recovery for the
10 cost of these benefits, provided the costs can be contributed to the
11 trusts on a tax-deductible basis. The 2007 General Rate Case
12 Decision 07-03-044 approved PG&E's use of a consolidated approach
13 for adopted contribution amounts for the PBOPs and LTD. For example,
14 if the amount adopted for the contribution to the Post-Retirement
15 Medical Plan Trust could not be contributed to the plan's trust on a
16 tax-deductible basis, the amount could be contributed to the LTD Trust
17 (up to the maximum tax-deductible amount). Funds collected in rates
18 that cannot be contributed to the trusts on a tax-deductible basis must
19 be returned to customers through a true-up filing at the end of each rate
20 case cycle. To date, all amounts recovered in rates for contributions to
21 the PBOP medical, PBOP life insurance, and LTD Plan trusts have been
22 either contributed to the trusts on a tax-deductible basis or returned to
23 customers. LTD benefits and third-party administrative fees are paid
24 through pre-funded Voluntary Employees' Benefits Association trust.

25 **1) Costs**

26 PG&E requests the Commission adopt its forecast of
27 \$45.3 million for LTD Benefits costs.¹⁸

28 **2) Estimating Method**

29 PG&E's forecast of LTD Benefits costs is based on the study
30 "Postemployment Welfare Plan Projected Valuation Results for Plan
31 Years 2021 through 2025", performed by independent consultant,
32 Willis Towers Watson.

¹⁸ See Table 1A-2, line 11, below.

3) Forecast Drivers

The LTD costs are driven by a decrease in the discount rate and an increase in the number of plan participants becoming disabled and taking advantage of the new plan provisions.

c. Third-Party Disability Program Management

PG&E manages disability and other leave programs on a coordinated basis, using a single third-party administrator. The third-party administrator assures that PG&E's compliance is up-to-date with overlapping local, state and federal laws and regulations governing disability and other leave policies, including medical leaves and the FMLA. All costs are attributed to the Disability Program.

Each year the leave vendor processes and manages over 1,200 LOA applications for PG&E employees that are on continuous or intermittent LOA, ensures consistent compliance with FMLA and other federal and state leave requirements, and maximizes employee return to work success.

1) Costs

Third-party disability program management costs also include actuarial and return to work consulting fees associated with efficient administration of the LOA Program. Together with the cost of the LOA vendor, these third-party administrative costs are forecast to total \$1.8 million in 2023.¹⁹

2) Estimating Method

PG&E's projected amounts for the Third-party disability program are equivalent to 2020 budgeted amounts and based on contractual provisions.

3) Forecast Drivers

PG&E's Third-party disability program costs are driven by planned expenditures.

¹⁹ See Table 1A-2, line 12, below.

d. LTD and STD Insurance Premiums

1) Costs

In addition, PG&E requests the Commission adopt its forecast of LTD and STD insurance premiums for non-officer Corporation employees of \$0.03 million.²⁰ These employees are not covered under the LTD and STD programs described above.

2) Estimating Method

PG&E's forecast for LTD and STD insurance premiums is based on the 2020 premiums as applied to the forecast period.

3) Forecast Drivers

The primary driver for PG&E's LTD and STD insurance costs is the number of affected employees.

4. On-Site HealthCare Clinics

In addition to the on-site industrial clinics discussed above, PG&E has two non-occupational clinics, one at the General Office (GO) complex, and the second at the Concord RMC location. PG&E plans to continue offering on- or near-site health care clinics through the forecast period.

In 2017, PG&E opened a clinic on-site in its GO complex in San Francisco. In the first year, 22 percent of the employees headquartered at the GO complex were seen at the clinic at least once, and an average of 8 percent of employees receive the bulk of their treatment at the clinic (based on frequency).²¹ After the success of the GO clinic, PG&E opened a second on-site clinic at the Concord RMC location in Concord, CA in 2020. The clinic is considerably smaller in footprint and services offered, though continues to offer non-occupational injury care. Some of the treatment services include acute/urgent care, clinical laboratory services, preventative services, and health promotion services.

Between 2021 and 2023, PG&E plans to implement four additional locations offering similar services to both the GO and Concord locations, expanding access to clinical services to almost 7,000 employees. See table

²⁰ See Table 1A-2, line 13, below.

²¹ See Exhibit (PG&E-7), WP 1A-11, line 1, for more details.

below for locations and employee counts. Additionally, the GO and Concord locations will transition to Oakland before 2023 based on the planned closure of both locations.

**TABLE 1A-1
CLINIC IMPLEMENTATION**

Line No.	Planned Clinic Location	Approximate Number of Employees Accessible to Clinic
1	Auburn	1,093
2	Sacramento	1,980
3	Stockton	1,419
4	Fresno (in addition to Occ clinic)	2,380

1) Costs

PG&E requests the Commission adopt its 2023 expense forecast of \$2.6 million for both the operating costs of current locations as well as the costs for implementation of new locations.²²

2) Estimating Method

PG&E's forecast for the on-site healthcare clinics is based on planned expenditures for the planned roll out of new locations.

3) Forecast Drivers

PG&E's costs for the on-site healthcare clinics are dependent on contract negotiated vendor fees.

²² See Table 1A-2, line 9.

1 C. Cost Table

TABLE 1A-2
OCCUPATIONAL HEALTH EXPENSE RECORDED AND FORECAST (2016-2023)
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	Category	2016	2017	Recorded			2020	2021	Forecast	
				2018	2019	2020			2022	2023
1	WC Benefits and Payments and Related Fees	37,924	33,556	36,808	43,912	36,057	35,930	35,673	35,844	
2	WC Alternative Security Program (ASP)	2,326	1,982	799	2,725	3,557	1,979	1,979	1,979	
3	WC Preferred Provider Org Network	173	148	126	157	132	150	150	150	
4	WC Cost Containment Programs	3,767	3,668	4,470	5,413	4,637	5,410	5,410	5,410	
5	Transitional Duty (Light-Duty Payroll)	4,761	5,783	5,065	5,655	4,316	5,271	5,432	5,610	
6	OnSite Industrial Clinics	-	-	421	674	1,622	537	537	537	
7	Early Symptom Intervention and Work Conditioning	1,330	1,779	2,049	2,332	2,783	4,300	4,300	3,500	
8	Total Worker's Compensation Program Cost	50,282	46,917	49,738	60,867	53,105	53,577	53,481	53,030	
9	OnSite Clinics	-	-	1,710	1,668	2,276	1,368	3,686	2,636	
10	Voluntary Plan	-	7,704	7,141	16,872	17,508	18,798	20,498	22,297	
11	Long Term Disability	32,236	30,997	31,736	30,622	28,752	30,808	30,808	45,313	
12	Third Party Disability Program Management	2,052	2,283	1,817	2,647	2,692	1,772	1,772	1,772	
13	Long and Short Term Disability Insurance Premiums	50	61	47	21	18	28	28	28	
14	Total Long and Short Term Disability	34,338	41,046	40,742	50,163	48,970	51,406	53,105	69,411	
15	Fit for Duty (FFD)	68	61	63	170	46	79	81	83	
16	Subtotal Companywide Expense	84,689	88,024	92,253	112,867	104,398	106,429	110,354	125,160	
17	Wellness	7,224	7,237	3,762	3,459	4,292	5,718	6,090	6,340	
18	Employee Assistance Program	13,672	13,431	15,181	16,457	14,984	18,910	20,744	22,134	
19	DOT Testing	489	636	830	811	879	840	856	876	
20	Substance Abuse Intervention	-	-	-	-	-	979	979	979	
21	Grand Total Companywide Expense	106,075	109,328	112,026	133,595	124,552	132,876	139,024	155,489	

Note: The recorded and forecast values vary from the values listed in the Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

PACIFIC GAS AND ELECTRIC COMPANY 2023 GENERAL RATE CASE

Testimony: ☒ **Workpapers:** ☐ **SOQ:** ☐
Exhibit Number: 7 **Chapter Number:** 1
Chapter Title: Enterprise Health and Safety
Witness Name: Diane Thurman

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of November 5, 2021				
1-1	33	Incorrect Companywide expense forecast	\$154.5	\$155.5
1-2	9	Incorrect Percent increase	19.4 percent	19.9 percent
1-30, Table 1-4	1	Incorrect RSE	0.70	0.72
1-30, Table 1-4	2	Incorrect RSE/note for System Hardening	0.02	See note (b)
1-30, Table 1-4	Table Notes	Note (b)	System Hardening is sponsored by EO, see RAMP Ch. 10, Wildfire. PG&E calculated two RSEs for System Hardening: System Hardening Overhead – the RSE is 5.6; and, System Hardening Underground – the RSE is 4.5 The benefits from these mitigations also apply to the Third-Party Safety Incident risk. See Exhibit (PG&E-4), Ch. 4.3 for information about the System Hardening program forecast in this GRC.	System Hardening is sponsored by EO, see RAMP Ch. 10, Wildfire. PG&E calculated two RSEs for System Hardening: System Hardening Overhead – the RSE is 6.2; and, System Hardening Underground – the RSE is 4.5 The benefits from these mitigations also apply to the Third-Party Safety Incident risk. See Exhibit (PG&E-4), Ch. 4.3 for information about the System Hardening program forecast in this GRC.

Page No.	Line No.	Item	As Filed	As Corrected
1-30, Table 1-4	Table Notes	Incorrect Note (d)	(d) PG&E calculated two RSEs for this program: 3A and 4C Line Recloser Replacement [3A], RSE 0.08; and 3A and 4C Line Recloser Replacement [4C], RSE 0.13	(d) PG&E calculated two RSEs for this program: 3A and 4C Line Recloser Replacement [3A], RSE 0.6; and 3A and 4C Line Recloser Replacement [4C], RSE 1.4
1-33	27	Incorrect 2023 control costs	\$177.4	\$179.7
1-33	27	Incorrect 2023 companywide costs	\$148.1	\$150.4
1-34, Table 1-5	4	Incorrect 2023 forecast	\$32.3	\$33.3
1-34, Table 1-5	6	Incorrect 2023 forecast	\$178.7	\$179.7
ALL after 1-36		Incorrect page numbers after 1-36	Page numbers go from 1-36 to 1-34	Page numbers should run from 1-1 to 1-52
1-36 (as corrected), Table 1-6	1	Incorrect RSE	9.54	11.06
1-36 (as corrected), Table 1-6	3	Incorrect RSE	1.11	0.09
1-36 (as corrected), Table 1-6	5	Incorrect RSE	2.31	0.18
1-36 (as corrected), Table 1-6	9	Incorrect RSE	0.32	0.05
1-37 (as corrected)	21	Incorrect Risk Score	...been updated to 85 (previously 97)	...been updated to 79 (previously 97)
1-38 (as corrected), Figure 1-3	Bow tie	Incorrect Bow tie	bow tie has baseline risk score of 84.5	New bow tie has baseline risk score of 79.0
1-41 (as corrected), Table 1-8	2	Incorrect RSE	159.0	147.8
1-41 (as corrected), Table 1-8	6	Incorrect RSE	24.83	23.1
1-47 (as corrected)	16	Incorrect Health and Wellness Companywide expenses	\$35 million	\$36 million
1-47 (as corrected)	16	Incorrect Increase percentage	26 percent	27 percent
1-47 (as corrected)	18	Incorrect Wellness programs increase	\$6.3 million	\$7.3 million

Page No.	Line No.	Item	As Filed	As Corrected
1-48 (as corrected)	18	Typo	and Transportations	and Transportation
1-50 (as corrected), Table 1-11	1	Incorrect 2021 forecast	\$30,711	\$31,687
1-50 (as corrected), Table 1-11	1	Incorrect 2022 forecast	\$35,229	\$36,213
1-50 (as corrected), Table 1-11	1	Incorrect 2023 forecast	\$35,018	\$36,005
1-50 (as corrected), Table 1-11	1	Incorrect Total forecast	\$100,958	\$103,905
1-50 (as corrected), Table 1-11	2	Incorrect 2021 forecast	100,149	100,145
1-50 (as corrected), Table 1-11	2	Incorrect 2022 forecast	101,732	101,750
1-50 (as corrected), Table 1-11	2	Incorrect 2023 forecast	118,408	118,404
1-50 (as corrected), Table 1-11	2	Incorrect Total forecast	320,288	320,299
1-50 (as corrected), Table 1-11	5	Incorrect 2021 forecast	\$131,903	\$132,876
1-50 (as corrected), Table 1-11	5	Incorrect 2022 forecast	\$138,021	\$139,023
1-50 (as corrected), Table 1-11	5	Incorrect 2023 forecast	\$154,507	\$155,489
1-50 (as corrected), Table 1-11	5	Incorrect Total forecast	\$424,431	\$427,388

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of February 28, 2022				
1-26	8	Incorrect Risk Score	...safety score is now 864	...safety score is now 928
1-26	9	Incorrect Risk Score	...safety score is now 924	...safety score is now 988
1-26	N/A	Figure 1-3, Third Party Safety Incident Bow Tie	Risk Score for 2023 is 923.8	Updated Bow Tie: Risk Score for 2023 is 987.5
1-31, Table 1-4	1	Incorrect GRC RSE	0.72	1.3

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 2
TRANSPORTATION AND AVIATION SERVICES
[INCLUDES ERRATA THROUGH
FEBRUARY 28, 2022]

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 2
TRANSPORTATION AND AVIATION SERVICES

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 2
TRANSPORTATION AND AVIATION SERVICES

A. Introduction

1. Scope and Purpose

The purpose of this chapter is to demonstrate that Pacific Gas and Electric Company's (PG&E or the Company or the Utility) expense and capital forecasts for Transportation and Aviation Services (TAS) are reasonable and should be adopted by the California Public Utilities Commission (Commission).

TAS consists of two primary organizations: Transportation Services and Aviation Services. Together, these organizations manage over 14,000 vehicles and related equipment utilized across PG&E's 70,000-square-mile service territory. These assets include all vehicles, construction equipment, trailers, and aircraft that enable the Company to provide safe, reliable, and efficient service.

Since the 2020 General Rate Case (GRC), PG&E shifted budget accountability for Rentals from Transportation Services to the Lines of Business (LOB) (i.e., Electric, Gas and Power Generation).¹ However, Transportation Services still manages the operation and administration of the company's rental fleet. For this reason, the Rentals forecasts are presented in this chapter.

Consistent with the 2020 GRC, Aviation Services continues to use a chargeback method to allocate operating expenditures to all PG&E LOBs. Chargeback costs for Aviation Services are included in each LOB forecast and are not requested in this chapter. Information about Aviation Services' chargeback costs are referenced in this chapter's cost tables, where applicable, for the Commission's information only.

¹ Budget accountability for the other Transportation Services functions (Depreciation, Vehicles and Fuel) continues to remain with Transportation Services.

2. Summary of Request

PG&E requests that the Commission adopt its 2023 TAS net expense forecast of \$118.1 million. Recorded adjusted expenses in 2020 were \$105.2 million. The TAS net expense forecast includes expenses and overhead credits for Transportation Services, Aviation Services, and Information Technology (IT) costs related to TAS operations. PG&E's 2023 expense forecast for TAS represents a 12 percent increase from 2020 recorded adjusted costs.

PG&E also requests that the Commission adopt its TAS capital expenditure forecast of \$107.6 million in 2023, \$108.8 million in 2024, \$145.9 million in 2025, and \$246.1 million in 2026. Recorded adjusted capital expenditures in 2020 were \$113.5 million. As with its expense forecast, the capital forecasts for TAS include Transportation Services, Aviation Services, and IT.

Details about the activities, costs, and drivers for these forecasts are provided in Section C below.

3. Deferred Work Review

In the 2020 GRC, Transportation Services and Aviation Services were separate organizations but presented together for GRC purposes. The TAS expense and capital forecasted in the 2020 GRC were requested in order to provide safe and reliable utility service.

Section 5.2 of the 2020 GRC Settlement Agreement requires PG&E to make an additional showing in its 2023 GRC testimony for work that was previously requested and authorized based on representations that the work was needed to provide safe and reliable service. In the 2020 GRC, TAS did not request or receive authorized funding for any work: (1) identified as safety, reliability, or maintenance (S R M)-related in the 2020 Risk Spending Accountability Report or (2) based on representations in testimony and workpapers that the work was needed to provide safe and reliable service.

4. Overview of Recorded and Forecast Costs

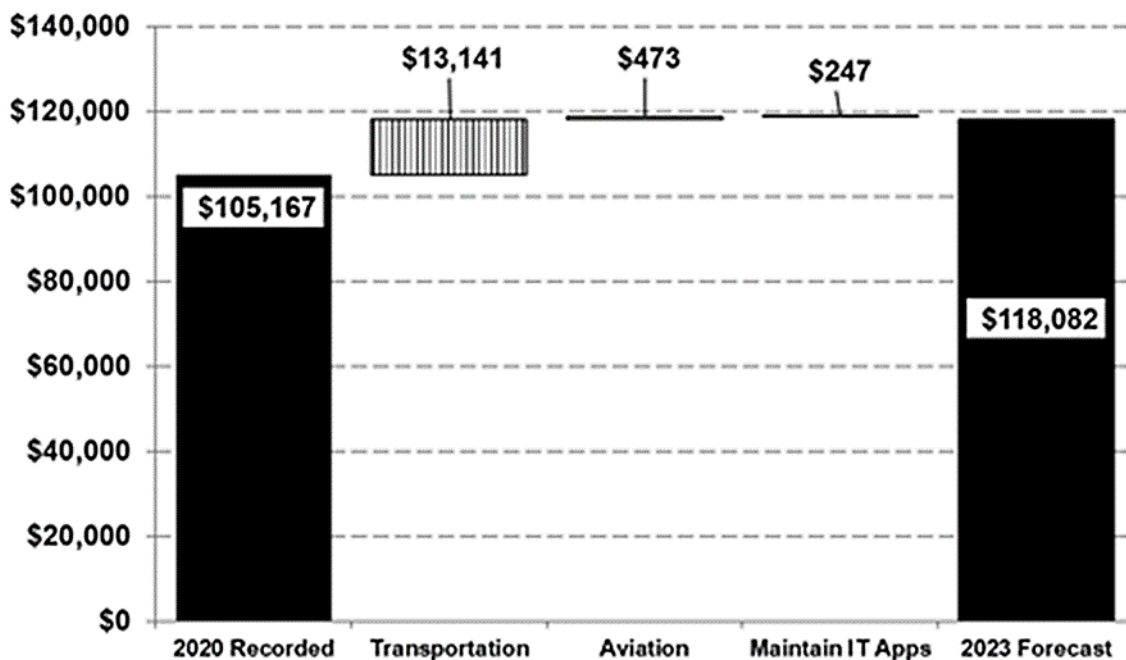
a. Expense

Figure 2-1 below shows the 2020 recorded adjusted expenses of \$105.2 million and 2023 net forecast of \$118.1 million for TAS, which

includes expenses for Transportation Services, Aviation Services, IT, and adjustments for Overhead Credit.²

PG&E's forecasted expense increases are primarily due to the following factors: (1) labor escalation; (2) higher costs to operate the company's fleet including maintenance, fuel, labor, and rentals; (3) increased depreciation costs inclusive of base fleet and additional book value associated with green fleet lifecycle replacements; and (4) new IT initiatives for system and database enhancements. These increases are partially offset by Aviation Services expense savings associated with sale of aviation assets and affordability efforts described in Continuous Improvement section B.1.d.

FIGURE 2-1
EXPENSE WALK (2020-2023)
(THOUSANDS OF NOMINAL DOLLARS)

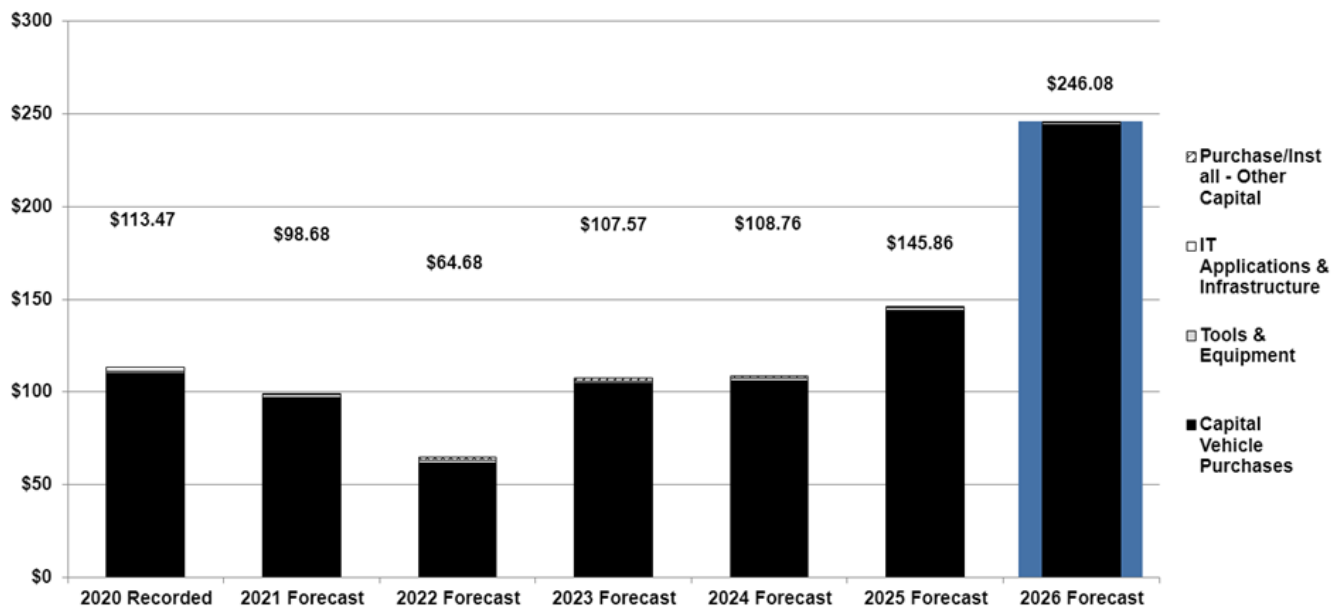


² Once the GRC Gross Forecast is determined, any portion of the forecast that is funded by capital or balancing account orders (Overhead Credit) is removed, resulting in the GRC Net Forecast. Rates for Overhead Credits are dependent on the allocation of labor to the type of work the labor (e.g., capital, expense, or balancing account funded work) supported. For example, in a year where more labor supports capital and balancing account-funded work for storm and wildfire support, the Overhead Credit is higher, resulting in a lower GRC Net Forecast.

b. Capital

Figure 2-2 below shows 2020 recorded adjusted capital and the 2021-2026 capital forecasts for TAS. The majority of the TAS capital forecast is driven by vehicle replacements that are based on the useful lifecycles of each asset type and a smaller portion of the forecast includes electric vehicle additions and accident replacements.

**FIGURE 2-2
CAPITAL EXPENDITURES (2020-2026)
(MILLIONS OF NOMINAL DOLLARS)**



5. Support for Request

PG&E's expense and capital forecasts for TAS are reasonable because they ensure that the Company efficiently maintains and deploys its fleet with safe, reliable, compliant, cost-effective vehicles and equipment to provide gas and electric services 24 hours a day, 365 days a year to our customers. In addition, TAS enables the Company to fully comply with or exceed safety, regulatory and environmental requirements.

6. Organization of the Remainder of This Chapter

The remainder of this chapter is organized as follows:

- Section B – Program and Risk Overview;

- Section C – Activities, Costs, and Forecast Drivers by Major Work Category (MWC);
- Section D – Estimating Methods; and
- Section E – Cost Tables.

B. Program and Risk Overview

1. Program Description

In the 2020 GRC, PG&E's transportation and aviation functions were two separate organizations that reported to separate senior officers, but the two functions were presented together in one chapter for GRC purposes. Currently, Transportation Services and Aviation Services both report to the Vice President (VP) of Shared Services, who in turn reports to the Executive VP of People, Shared Services & Supply Chain.

a. Department Overview

1) Transportation Services

The mission of Transportation Services is to support all LOBs with safe, reliable, compliant, and cost-effective vehicles and equipment 24 hours a day, 365 days a year. To help fulfill its mission, Transportation Services has 392 union employees ranging from mechanics, foremen, and clerical staff that are part of the International Brotherhood of Electrical Workers (IBEW). Transportation Services also has 71 management, administrative, and technical employees who are responsible for the acquisition, disposition, fueling, and administration of all rented and owned fleet assets.

Collectively, PG&E's 14,000 + fleet assets travel more than 112 million miles annually. Transportation Services operates 63 service locations over 70,000-square-miles and enables 23,000+ employees to deliver safe, reliable, affordable, and clean natural gas and electric services to over 16 million people throughout northern and central California. Other core functions for Transportation Services include: Field Operations, Asset Management, Engineering, Administration, Fuel Procurement, IT

Applications, Finance, Program Management, Fleet Sustainability, Vehicle Technology, and Safety & Compliance.

2) Aviation Services

The mission of Aviation Services is to provide a full range of services needed for PG&E organizations to utilize aerial operations safely and efficiently.

Aviation Services manages all enterprise flight operations, vendors, and aviation assets. Aviation Services provides scheduling and dispatching for passenger transport, aerial inspection, restoration, and construction with internal and third-party assets providing vendor governance, contract management and oversight for all enterprise aviation operations.

Aviation Services owns and operates two Cessna aircraft that regularly surveys electric and gas infrastructure. As of Q4 2020, the aircraft are maintained by an external service provider.³

Additionally, Aviation Services oversees the helicopter operations contracts to support enterprise construction, restoration, transportation, and patrol operations. This includes the operations and maintenance contracts for the four PG&E-owned heavy-lift Blackhawk (UH60) helicopters purchased in 2018-2019, which are used for firefighting and restoration work.

As of November 2019, Aviation Services created the Unmanned Aerial Systems (UAS)—commonly known as drone—Department, which operates and provides guidance and oversight for enterprise drone use. PG&E maintains a total of 40 drones: 22 drones of which are issued to the IBEW for Electric routine operations, and 18 drones of which are assigned to the Aviation Services drone department. These assets support enterprise inspection operations.

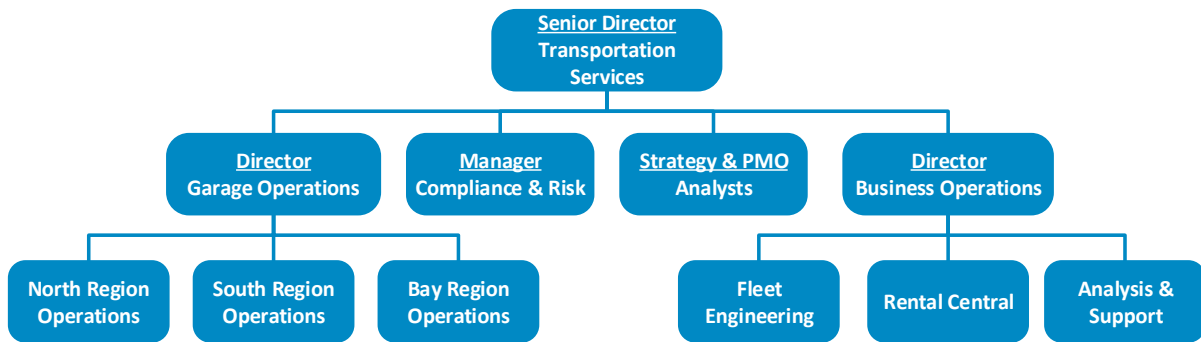
³ See Section B.d.8 below for more details.

b. Management Structure**1) Transportation Services**

Transportation Services is part of PG&E's Shared Services organization. The Senior Director of Transportation Services reports to the VP of Shared Services. Transportation Services is divided into Garage Operations, Business Operations, and Safety, Risk & Compliance as seen in Figure 2-4 below.

- Garage Operations team – Has three superintendents covering North, South, and Bay Area regions and is led by the Director of Garage Operations. Core responsibilities include maintenance, repairs and inspections, new vehicle deployment, crane inspections, emergency response, mobile command vehicle staffing, and emergency response.
- Business Operations team – Consists of the Manager of Rental Central & Asset Management, Supervisor of Fleet Engineering, and Supervisor of Fleet Administration reporting to the Director of Business Operations. Core responsibilities include capital planning, procurement, specifications, acquisition and disposition, rental management, fuel procurement, registration, reporting, and emergency response.
- Safety, Risk & Compliance group – Consists of the Supervisor of Application Support and a team of Safety & Compliance specialists reporting the Manager of Safety, Risk, & Compliance. Core responsibilities include managing safety and compliance programs, quality control assessments, Sarbanes-Oxley compliance, system applications, business intelligence, diagnostics, and policy documentation.

**FIGURE 2-4
TRANSPORTATION SERVICES ORGANIZATION CHART**



2) Aviation Services

Aviation Services is part of PG&E's Shared Services organization. The Director of Aviation Services reports to the VP of Shared Services. Aviation Services is comprised of four departments: Fixed-Wing, Helicopter, UAS, and Safety Operations.

**FIGURE 2-5
AVIATION SERVICES ORGANIZATION CHART**



- Fixed-Wing Operations – Conducts patrols and inspections utilizing aircraft equipped with Electro-Optical/Infra-Red capable camera systems for monitoring gas and electric assets. Additionally, the Fixed-Wing Operations manages the contractor portfolio for fixed-wing inspections, and aircraft maintenance.
- Helicopter Operations – Manages the helicopter contract portfolio, which includes overseeing all helicopter vendors,

1 pilots, and ISNetwork (ISN)⁴ qualifications. This operation also
 2 includes the aircraft Scheduling/Dispatching support to the LOB
 3 service requests, providing real-time weather reporting, and
 4 technical reviews.

- 5 • UAS Operations – Conducts inspections utilizing aircraft with
 6 photogrammetry equipment to support all LOBs. Additionally,
 7 the UAS department manages the contractor portfolio for the
 8 UAS inspections.
- 9 • Aviation Safety – Oversees all Aviation Services operations,
 10 standards, and procedures through Flight Safety Reviews
 11 (FSR). Additionally, the department is responsible for
 12 maintaining safe operations by ensuring that vendor audits,
 13 health checks, and FSRs are completed. Aviation Safety also
 14 leads the Aviation Occurrence (Incident/Accident)
 15 investigations.

16 **c. Key Metrics and Other Performance Measures**

17 TAS tracks a variety of safety, compliance, reliability, and
 18 sustainability metrics to support our mission. This section includes
 19 examples and descriptions of these metrics.

- 20 • Preventive Maintenance & Inspection Compliance – This metric
 21 identifies the percentage of preventive maintenance and inspections
 22 (PM&I) that are completed within their required timeframe against
 23 the total number due during a given timeframe. PM&I Compliance is
 24 required by the California Highway Patrol (CHP) and the Federal
 25 Motor Carrier Safety Administration (FMCSA). In addition to
 26 keeping the operators and public safe, the PM&I metric is also
 27 critical to maximizing the useful lives of the motor vehicles. Tracking
 28 preventive maintenance inspections ensures timeliness of
 29 preventive maintenance inspections, which in turn improves fleet
 30 safety and reliability by reducing failures in the field.

⁴ Information about ISN may be found at their website: <https://www.isnetworld.com/>.
 (as of Jun. 16, 2021).

TABLE 2-1
PREVENTIVE MAINTENANCE & INSPECTION COMPLIANCE 2017-2020
(PERCENT BY YEAR (%/YR))

Line No.	Preventative Maintenance (PM) and Inspection Compliance	2017	2018	2019	2020
1	%/yr.	97.3%	97.5%	98.7%	98.4%

- Task Efficiency – Task Efficiency is used to measure the average labor time charged for tasks across different asset types and is compared to a baseline calculated using the historical average of the previous three years. This metric helps manage vehicle and equipment downtime, as well as identify process inefficiencies and those instances where additional training may be needed.

TABLE 2-2
TASK EFFICIENCY 2019-2020
(AVERAGE TIME AND BASELINE BY YEAR)

Line No.	Task Efficiency	2019	2020
1	Average Task Time	2.55	2.57
2	3-Year Baseline Task Time (Task Labor by Vehicle Code)	2.54	2.56

- Asset Availability – Asset Availability tracks the time that mission-critical vehicles and equipment are available (or unavailable) between 6 a.m. – 6 p.m. for use by the LOBs to perform work. Performance targets for this new metric will be set for 2021 once a baseline has been established. Going forward, this metric will enable Transportation Services to improve work order management and to consolidate the number of separate inspections and repairs where opportunity exists. The purpose of this metric is to enable Transportation Services to maximize the time each asset is available for use to ensure crews can perform critical maintenance and emergency services for our customers.
- Aviation Mission Readiness – Aviation Mission Readiness identifies the percentage of the capability to maintain, schedule efficiently, and

1 deploy internal and contracted aviation assets. This metric is
 2 measured on a per-mission basis. A “miss” is defined as when a
 3 mission is not executed due to controllable factors associated with
 4 the required aviation asset, e.g., maintenance, scheduling, or
 5 vendor performance. The purpose of this metric is to ensure
 6 timeliness of PG&E’s work execution requiring aviation assets,
 7 thereby improving safety and reliability by reducing delays.

- 8 • Million-Ton Challenge – In 2018, PG&E launched the million-Ton
 9 Challenge, a company-wide goal to reduce 1 million tons of
 10 greenhouse gas emissions from company operations through 2022
 11 using 2016 emissions as a baseline.⁵ Transportation Services is
 12 supporting this goal through the introduction of hybrid and electric
 13 vehicles, renewable diesel, and renewable natural gas-powered
 14 vehicles. Although Transportation Services did not meet 2018 and
 15 2019 targets, green fleet and fuel programs were accelerated and
 16 Transportation Services achieved 54,728 tons reduced, exceeding
 17 the three-year total of 47,800 tons.

TABLE 2-3
MILLION-TON CHALLENGE RESULTS 2018-2020
(TONS REDUCED BY YEAR)

Line No.	Emission Reductions	2018	2019	2020
1	Goal	18,000	19,000	10,800
2	Results	17,609	13,962	23,157

- 18 • Environmental Leadership – PG&E operates one of the cleanest
 19 transportation fleets in the energy industry, comprised of nearly
 20 1,500 alternative fuel vehicles that range from hybrid-electric bucket
 21 trucks to compressed natural gas vehicles. By integrating the latest
 22 available technologies and partnering with automakers to meet
 23 needs unique to our fleet operations, PG&E is continuing to reduce
 24 emissions and operating costs.⁶

⁵ Exhibit (PG&E-7), WP 2-61, Million Ton Challenge Press Release.

⁶ Exhibit (PG&E-7), WP 2-64, Corporate Responsibility Report: Greening Our Fleet.

1 In 2020, PG&E partnered with Edison Electric Institute (EEI), the
 2 association that represents all United States investor-owned electric
 3 companies for public policy leadership and strategic business
 4 intelligence, to set a goal of electrifying our fleet.⁷ Specifically,
 5 100 percent of the light-duty fleet, 10 percent of the medium-duty fleet,
 6 and 5 percent of the heavy-duty fleet will be electrified by 2030 pending
 7 market availability. By setting this goal, EEI and PG&E are leading the
 8 way for electric vehicle adoption for the utility industry and its customers,
 9 and will be positioned for successful adoption of Governor Executive
 10 Order requiring 100 percent electric vehicle sales in 2035.⁸

11 **d. Continuous Improvement**

12 Embracing change, innovation and continuous improvement is part
 13 of PG&E's culture. TAS remains determined to find better ways to
 14 operate, new ways to grow, and how to best serve our customers. The
 15 efforts described in this section are key examples of how TAS is
 16 contributing to the Company's continuous improvement and change
 17 management efforts.

18 **1) Rental Sourcing**

19 Transportation Services, in partnership with Sourcing,
 20 rationalized rental contracts with over 100 vendors down to
 21 14 vendors based on factors including price, availability of
 22 equipment, and locations. Reducing the number of approved rental
 23 suppliers allows Transportation Services to concentrate its focus on
 24 compliance and safety, reduce equipment variability for operators,
 25 and negotiate the most competitive rates based on economies of
 26 scale. Transportation Services expects to reduce rental costs by
 27 10 percent per year with these improvements, which equates to
 28 approximately \$6 million per year.

7 Information about EEI is available at their website:
<https://www.eei.org/about/Pages/about.aspx> (as of Jun. 16, 2021).

8 Exhibit (PG&E-7), WP 2-25, Governor Executive Order N-79-20.

2) Rental Conversions

Many short-term rentals were being used to address long-term vehicle and equipment needs. Short-term rentals are the least cost-effective solution to fulfill vehicle and equipment needs for the Company. By strategically converting certain rental units to owned units, Transportation Services identified significant savings opportunities. Starting in 2019 and completing in 2020, Transportation Services converted 475 rental units and reduced annual rental expenses by \$14.6 million per year.

3) Asset Management

The primary purpose of Asset Management is to implement processes and controls that ensure continual right sizing of the fleet, maximize utilization, and reduce rental spend as a permanent role within Transportation Services. In 2020, a new Asset Assignment Policy⁹ was implemented limiting the eligibility for vehicle assignments and outlined specific conditions for obtaining fleet assets. There are multiple phases planned for policy governance and maturity of the program to sustain best practices within Transportation Services.

The initial efforts of Asset Management achieved a reduction of 70 vehicles and saved \$2.9 million per year. Asset Management initiatives will continue to target further reductions to the size of the fleet by using utilization metrics and data, implementing more cost-effective acquisition options, and maturing the program and policy controls as a permanent function of Transportation Services' Business Operations.

4) Take Home Vehicles

In January 2020, PG&E published a new enterprise policy addressing take home vehicles.¹⁰ The policy is designed to limit eligibility for take home vehicles to employees who respond to emergencies or who routinely report directly to the field. The policy

⁹ Exhibit (PG&E-7), WP 2-81, Asset Assignment Standard.

¹⁰ Exhibit (PG&E-7), WP 2-66, Take Home Vehicle Standard.

1 change resulted in a reduction of eligible job classifications from
2 156 to 80 and expense savings forecast at \$1.18 million per year.

3 The reduction in take home vehicles was achieved in
4 partnership with many LOB leaders, whose support helped
5 challenge existing practices to operate more efficiently without
6 negatively impacting reliability of service. Benefits of the new policy
7 include reduced costs in fuel, vehicle maintenance, and reduced
8 liability from fewer company vehicles stored at non-company
9 locations.

10 **5) General Office Vehicle Pool (GO Pool) Closure**

11 In late 2019, Transportation Services began the closure of the
12 vehicle pool located at our corporate headquarters (or General
13 Office) in San Francisco. In total, 60 passenger vehicles were part
14 of the vehicle pool and were available to employees on a short-term
15 basis for business travel. Annual cost savings for the removal of all
16 60 vehicles from the fleet is calculated to be \$0.5 million using the
17 average costs of maintenance, registration, fuel, and depreciation.

18 At the end of 2019, 30 of these vehicles were removed from the
19 fleet and the remaining 30 vehicles were planned for disposition in
20 the first quarter of 2020. Due to COVID-19, however, the remaining
21 30 vehicles previously set for disposition were repurposed to adhere
22 to COVID-19-related social distancing guidelines and to avoid
23 additional rental costs that would have been needed to separate
24 drivers and passengers.

25 Transportation Services plans to complete the disposition of
26 these remaining vehicles as soon as social distancing requirements
27 are no longer in effect and the extra vehicles are no longer
28 necessary.

29 **6) Fuel Request for Proposal (RFP) Initiative**

30 Since 2009, Transportation Services has partnered with our
31 current fuel service provider to manage fuel carriers, fuel payment
32 cards, on-site storage tanks, invoicing, mobile fueling, and
33 emergency support.

1 As part of its continuous improvement efforts, Transportation
2 Services has an RFP and competitive bid process that will be
3 completed in 2021 with the goal of improving the overall fuel
4 program to better support core LOB operations. The initiative will
5 determine the best supplier(s) by assessing and formally scoring
6 safety, compliance, services available, customer support, data
7 management, and costs.

8 **7) Aviation Jet Sale**

9 In response to the Utility's bankruptcy in 2019, PG&E's Utility
10 board of directors decided to evaluate the potential elimination of
11 Corporate Jet Services (CJS). During this evaluation, the board
12 considered changing energy markets, declining passenger loads,
13 and potential cost reductions.

14 In particular, the pending closure of Diablo Canyon Power Plant
15 (DCPP) and the commencement of the final stages of
16 decommissioning Humboldt Bay Power Plant (HBPP) has resulted
17 in reduced aircraft passenger loads and fewer flights. With a
18 material decrease in capital projects at both DCPP and HBPP,
19 aircraft utilization has decreased significantly.

20 In March 2021, PG&E sold the corporate jet.¹¹ Prior to the sale,
21 PG&E evaluated alternate aircraft service capabilities comparing the
22 cost of flying commercially or driving versus flying on the aircraft and
23 found for all aircraft passengers combined; the cost would have
24 been approximately \$870,000 for aircraft travel versus
25 approximately \$380,000 for driving or commercial flights. This
26 represents a difference of approximately \$490,000 annually.

27 Notably, PG&E continues to maintain contracts for access to a
28 variety of charter aircraft, available to PG&E personnel 24/7 for
29 emergency use to fulfill PG&E's Nuclear Regulatory Commission
30 Emergency Plan requirements.

31 The elimination of aircraft services yielded expense savings
32 starting in 2020, with some of those expense savings offset by

¹¹ Exhibit (PG&E-7), WP 2-21.

shared and net new resources to continue supporting the fixed-wing organization. All expense costs associated with operating the aircraft are funded through the overhead credit allocation, whereas all expense costs associated with operating the fixed-wing fleet are directly charged back to the LOBs based on number of hours flown. Therefore, there was a net reduction to the overhead credit allocation as a result of terminating aircraft services, with an offsetting increase in expense cost to the fixed-wing chargeback organization. This caused an overall reduction to capital and balancing account allocation, and a shift in LOB allocation of expense.¹²

8) Aviation Cessna Fleet Adjustment

As of early 2021, the Fixed-wing fleet consists of two Cessna Stationair aircraft and two Cessna Caravan aircraft to regularly survey gas and electric infrastructure. Aviation Services intends to sell the two Cessna Stationair aircraft by year-end 2021.

The sale of the corporate jet discussed in the previous section yielded gross savings of \$3.8 million to the Aviation Services overhead credit allocation in 2020 and \$5.9 million annually.

Some aircraft resources were retained and were allocated to the fixed-wing organization, which redeployed approximately \$1.2 million of costs (mostly labor), for a net savings of \$2.5 million in 2020 and \$1.2 million of in costs annually (due to further resource reductions in 2021 as a result of selling the two Stationair aircraft) for a net savings annually of \$4.6 million.¹³

The resource shift outlined above caused an overall reduction to capital and balancing account allocation and a change in the business allocation of expense. The Gas organization is the primary

¹² See Section B.1.d.8 (“Aviation Cessna Fleet Adjustment”) for further discussion of the net financial impact.

¹³ Exhibit (PG&E-7), WP 2-21 summarizes the financial impact of terminating aircraft services and the resulting reduction in associated overhead costs. The remaining overhead costs from retained resources was redeployed to the fixed-wing charge-back organization.

1 recipient of fixed-wing services for aerial pipeline patrols. The
 2 movement of pilot and management resources from the corporate
 3 jet organization resulted in a net increase of expense incurred by
 4 Gas. Alternatively, Electric and Power Generation organizations
 5 saw an overall decrease in expense impact, as those organizations
 6 were the primary users of the corporate jet. Accordingly, the
 7 elimination of the corporate jet service yielded more savings to
 8 those organizations through a reduction in the Overhead Credit.
 9 The net impact yielded both expense and capital savings to the
 10 Company overall.

11 **9) Aviation Operations Center**

12 Aviation Services manages all enterprise flight operations
 13 (fixed-wing, helicopter and drones), vendors and aviation assets.
 14 Aviation Services provides scheduling and dispatching for
 15 passenger transport, aerial inspection, and construction with our
 16 internal and third-party assets providing vendor governance,
 17 contract management and oversight for all enterprise aviation
 18 operations. PG&E's Aviation fleet consists of:

- 19 • Four heavy-lift helicopters purchased in 2018-2019 to enhance
 20 wildfire safety and support utility infrastructure projects. The
 21 helicopters guarantee heavy-lift resource availability for PG&E
 22 facility restoration and construction support during fire season.
 23 The helicopters are fitted with fire suppression equipment such
 24 as a Bambi Buckets. If needed and requested, they are
 25 available to aid in suppression efforts under the direction of the
 26 agency leading the response (e.g., California Department of
 27 Forestry and Fire Protection (CAL FIRE));
- 28 • Two Cessna fixed-wing assets used to perform electric system
 29 operations in a manner that reduces the possibility of wildfire
 30 ignition in times of elevated fire danger conditions and reduces
 31 fire spread in the use of Public Safety Power Shutoffs (PSPS);
 32 and
- 33 • 18 UAS to enhance wildfire safety and support utility
 34 infrastructure projects.

1 These aviation assets are critical to the success of PG&E's new
2 wildfire-related programs: Vegetation Inspection and Patrol, System
3 Hardening, Wildfire Restoration and Rebuild, Safety and
4 Infrastructure Protection Team, and PSPS-related inspections. The
5 increase in aerial operations associated with these wildfire-related
6 programs has resulted in the need to increase aviation support staff
7 to safely and efficiently manage aerial assets.

8 Historically, PG&E's aerial resources were located in various
9 non-industry standard locations and managed by each Aviation
10 Services department (in different locations) based on the asset type.
11 With the increase of both staffing and flight hours of helicopters,
12 fixed-wing, and drones, Aviation Services determined there is a
13 need to migrate to a centralized corporate aviation model.

14 A centralized Aviation Operations Center helps mitigate the
15 following risks:

- 16 • Weather Optimization – Aviation Services can operate more
17 regularly under a set of regulations under which a pilot operates
18 an aircraft in weather conditions generally clear enough to allow
19 the pilot to see where the aircraft is going without aided
20 instruments, known in the industry as Visual Flight Rules. This
21 form of flight decreases flight risks and allows for more
22 opportunities to fly, providing ideal meteorological conditions.
- 23 • Alignment – Aviation Services can improve alignment by
24 creating an in-house helicopter maintenance program to
25 improve heavy-lift availability, controls and oversight for Wildfire
26 Mitigation Operations, and a centralized location for all assets'
27 maintenance operations.
- 28 • Coordination and Consistency – Aviation Services can improve
29 accessibility, accountability, and consistent availability of
30 materials (i.e., maintenance, human external ropes, central
31 warehouse for job materials).

32 Through a centralized model, decisions of what assets are best
33 suited for the work type can be determined and communicated from
34 one location and one department. For example, there may be

instances where a helicopter may be scheduled to complete an aerial inspection or when there may be another asset, fixed-wing, drone, or a combination of assets available to complete the work needed. Having a centralized model would allow Aviation Services to select the most cost-efficient option and have a greater safety margin.

Under the proposed centralized model, PG&E's Aviation Services would consolidate operations to:

- Vacaville – Centralization of PG&E's aviation organization. Removing the current decentralized operations from physically managing and conducting operations from three locations (Concord Fixed-wing/UAS Drone, Vacaville Helicopter, Red Bluff Helicopter) to a centralized model; and
- Winters – Identified as a training center away from PG&E's Aviation Base. Due to Federal Aviation Administration Regulations, Drone Operations cannot be within five miles of an airport. This is a centralized location for Drone Operations maintenance and flight training.

PG&E anticipates that the aircraft would not be moved into the hangar until the 2022-2023 timeframe. As Aviation Services is a chargeback organization, all costs associated to the Aviation Operations Center project are in the Real Estate chapter five of the 2023 General Rate Case.¹⁴

10) Applications for Drones

Aviation Services has expanded the implementation and operationalization of UAS/Drone technology across the enterprise. The UAS organization plans to explore the following use cases: Beyond Visual Line of Sight, night use of drones for PSPS, infrared cameras and anti-collision beacons, and a general expansion of drone operations to further support system hardening inspections.

¹⁴ For costs associated to Aviation Services Operations Center, refer to Section B.1.f.5 in Exhibit (PG&E-7), Ch. 5.

1 This is a rapidly growing technology and PG&E is excited to
 2 innovate in this space.

3 **2. Risk Controls and Mitigations – Non-Risk Assessment and Mitigation** 4 **Phase**

5 **a. Aviation Occurrence (Incident) Risk**

6 In alignment with Code of Federal Regulations Title 49 Part 830, an
 7 aviation occurrence is defined as an incident or accident associated with
 8 the operation of fixed and rotary-wing aircraft during the time any person
 9 boards the aircraft with the intention of flight, and until all persons have
 10 disembarked the aircraft. This risk includes fixed and rotary-wing
 11 aircraft contracted by PG&E and owned or operated by PG&E.

12 As previously noted, Aviation Services is responsible for its
 13 fixed-wing aircraft and rotary-wing aircrafts which consists of
 14 two Cessna aircraft and four heavy lift helicopters.

15 Fixed-wing aircraft are used to survey electric and gas infrastructure
 16 and utilizes Electro-Optical/Infra-Red capable camera systems for
 17 monitoring gas transmission pipeline rights-of-way, or for potential
 18 encroachment hazards. Rotary wing aircraft support internal PG&E's
 19 heavy lift maintenance and construction work and are available for use
 20 by both PG&E and the CAL FIRE for emergency response.

21 In addition, Aviation Services provides oversight of contracted
 22 aviation services. PG&E also uses UAVs (drones) to perform
 23 surveillance work. The risks associated with the use of UAVs is
 24 substantially different from fixed-wing and rotary-wing work, and outside
 25 the scope of this risk.¹⁵

26 The Aviation Incident risk model includes six tranches: (1) Patrol or
 27 Inspection – Fixed-Wing, (2) Patrol or Inspection – Rotary, (3) Human
 28 External Cargo (HEC), (4) Cargo or Lift, (5) Passenger Ferry and

¹⁵ Aviation Services has assessed the risk associated with the use of UAVs and determined it to be low. Aviation Services will periodically review the use of UAVs and re-assess the risk. Based on these findings, risk mitigations will be considered as necessary.

(6) Insulator Wash. The cross-cutting factor that impacts Aviation Incident risk is Physical Threat.^{16,17}

The drivers of Aviation Incident risk are: (1) Human Element with sub-drivers Human Error and Pilot Incapacitation; (2) Equipment Failure with sub-drivers aircraft Equipment Failure and Fuel-related Issues; and (3) External Factor with sub-drivers Foreign Object Damage, aircraft Separation, Adverse Weather, and Vandalism Sabotage Terrorism.

PG&E models the exposure for the Aviation Incident risk based on flight hours. The 2023 Test Year baseline risk score for Aviation Incident is 80.1, and the 2026 post mitigation risk score is 60.9. A copy of the bow-tie illustrations for these risks is provided in PG&E's WPs.¹⁸ PG&E's risk models and accompanying source data are available upon request.

The Aviation Incident Risk was not a 2020 Risk Assessment and Mitigation Phase (RAMP) risk. Aviation – Fixed-Wing Incident and Aviation – Helicopter Incident were discussed as two of the thirteen non-RAMP risks. PG&E has combined them into a single risk.¹⁹

1) Risk Management Strategy – Mitigations and Controls

PG&E's strategy for managing this risk is as follows:

- Comply with all Federal, State, and local regulations;
- Ensure employees have appropriate training required and necessary for work expectations;
- Assure proper maintenance of aircraft and non-aircraft equipment; and
- Employ continual improvement processes and practices across all aviation operations.

¹⁶ Cross-cutting factors are described in individual LOB chapters as shown in Exhibit (PG&E-2), Ch. 1, Attachment C.

¹⁷ While physical threat is a cross cutting risk driver, there are no data from National Transportation Safety Board or PG&E to model.

¹⁸ Exhibit (PG&E-7), WP 2-146, Aviation Risk Management and Controls.

¹⁹ See PG&E's 2020 RAMP Report, A.20-06-012 (June 30, 2020).

In this 2023 GRC, PG&E is proposing several mitigations and controls to manage this risk. PG&E describes these mitigations and controls in this chapter, Section 3.

2) Safety Model Assessment Proceeding (S-MAP) Settlement Agreement, Step 3 Supplemental Analysis

The S-MAP Settlement Agreement²⁰ requires PG&E to conduct a “Step-3 Supplemental Analysis” (Step-3 Analysis) in the GRC for any program that was not addressed in the RAMP, that PG&E justifies primarily on the basis of reducing a safety or reliability risk and that the program is associated with the Electric Distribution or Gas Distribution, Transmission or Storage Facilities.²¹ The **Aviation Incident** risk is not subject to the Step-3 Analysis.

3) Risk Mitigations and Controls

Aviation Services is forecasting six mitigations and fourteen controls. These programs were determined to reduce the frequency or consequence of risk of aviation incidents. The six mitigation are: Safety Program Enhancements, Contractor Management Program Enhancements, Manual and Documentation Enhancements, ADS-B-In for helicopters, Additional Auditing, Safety Management Software (SMS).²² The 14 controls are: aircraft Maintenance Programs, Pre-flight Risk Assessment, Third-Party Vendor Compliance, Pilot Proficiency, Pilot Wellness, Non-aircraft Equipment Management, Redundant Lines, HEC Personnel Training, Safe Distance, Upset prevention and recover training (fixed-wing), ADS-B-In (fixed-wing), Adverse weather, and daylight only policies, Helicopter Patrol Personnel Training, Upset prevention, and recovery training (helicopter).²³

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

²¹ D.18-12-014, Attachment A, p. A-14 to A-15, Row 28.

²² Exhibit (PG&E-7), WP 2-146, Aviation Risk Management and Controls.

²³ *Id.*

4) Mitigation Cost Table

Table 2-4 below shows the recorded and forecast costs for mitigations. Recorded and forecast costs for controls are presented in workpapers.²⁴

²⁴ Exhibit (PG&E-7), WP 2-146.

**TABLE 2-4
AVIATION INCIDENT
RECORDED AND FORECAST MITIGATION COSTS 2020-2026 – EXPENSE
(THOUSANDS OF DOLLARS)**

Line No.	Mitigation No. (2023 GRC)	Mitigation Name (2023 GRC)	2020 Recorded Adjusted.	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total	Risk Spend Efficiency (RSE)
1	AVATN-M001	Safety Program Enhancements	–	\$464	\$473	\$482	\$492	\$502	\$512	\$2,924	44.0
2	AVATN-M002	Contractor Management Program Enhancements	–	464	946	964	984	1,003	1,023	5,384	38.2
3	AVATN-M003	Manual and Documentation Enhancements	–	167	84	85	87	–	91	89	175.2
4	AVATN-M004	ADS-B-In for Helicopters	–	1,120	–	–	–	–	–	1,120	–
5	AVATN-M006	Additional Auditing	–	95	97	99	101	103	110	605	184.7
6	AVATN-M007	Safety Management Software	–	56	57	58	59	61	65	356	247.3
7		Total	–	\$2,365	\$1,656	\$1,689	\$1,723	\$1,757	\$1,801	\$10,992	–

(PG&E-7)

3. Risk Controls and Mitigations – Operational Risks

a. Fleet Information Management System (FIMS) Replacement

PG&E's Transportation Services information systems and fleet management applications are over 20 years old, have reached the end of their useful lives, or are no longer supported. Transportation Services applications are used for work orders management, engineering, regulated preventative maintenance, daily vehicle inspection reports, acquisition and disposition management, and operational vehicle assignments.

Key regulatory agencies that rely on complete, accurate, and verifiable records include the California Highway Patrol (CHP), Occupational Safety and Health Administration (OSHA), Cal OSHA, Air Resource Board, Department of Motor Vehicles, California Title 13, and American National Standards Institute (ANSI). Transportation Services relies on system infrastructure to comply with these agencies, emergency response support and core daily operations. Furthermore, any issues with the IT and fleet management applications have the potential to impact PG&E's ability to legally operate its fleet in compliance with its obligations under the Motor Carrier Permit, which could impact core operations if vehicles are not permitted to operate on public roadways.

The cost and complexity of maintaining the current, non-integrated configuration is increasing and present a risk to the safe and compliant operation of the Company's fleet. Operational improvements are also more challenging to implement due to the limitations of outdated technology. Changes made to the systems often lead to frequent page-time outs, the need for complex middleware, manual and/or redundant processing of information, or other large-scale IT efforts.

To avoid these risks and improve overall fleet operations, Transportation Services is requesting additional funding in MWC 2F and JV for a new fleet management system that has the required integrations and modern functionality.²⁵

²⁵ Exhibit (PG&E-7), WP 2-93, FIMS Project Summary.

If PG&E defers the updating of Transportation Services information systems, it will increasingly become more difficult and expensive to maintain. More importantly, the risk of system failure may result in an inability to continually maintain proper record keeping and could lead to fines, penalties and the grounding of core fleet assets that are critical for maintaining day-to-day operations to provide service and emergency response.

b. Wildfire [Heavy-lift helicopters]

One of the mitigations focused on improving PG&E's response to ignitions and wildfire is additional Aviation Resources.

Wildfire poses a great risk to the state, our customers throughout the service territory, and the Company's critical infrastructure. In the past, PG&E has experienced difficulty accessing heavy lift helicopters for service restoration work during fire season, since heavy lift helicopters are used for firefighting. In late December of 2018, PG&E purchased four heavy lift helicopters to support fire response. All aircrafts will continue to be fitted with fire suppression equipment, and therefore, able to augment emergency response to wildfire threats in PG&E's service territory.

During fire season, PG&E's goal is to have the aircrafts available for both PG&E use for service restoration and CAL FIRE use for emergency response. Outside of fire season, the aircrafts will be available to support internal PG&E heavy lift maintenance and construction work.

The heavy-lift assets were purchased to help PG&E prepare for and respond to fire hazards. Owning heavy lift helicopters provides the following benefits:

- Guarantee heavy lift resource availability for PG&E's restoration and construction support during fire season;
- Provide CAL FIRE with access to additional resources equipped with fire response capabilities, thereby further reducing the wildfire risk to PG&E infrastructure; and
- Provide PG&E with management and oversight of PG&E-owned helicopters shared with CAL FIRE; PG&E can arrange for helicopter use for critical needs through contracts that share helicopter assets

with external fire-fighting agencies (e.g., “Call When Needed” arrangement with CAL FIRE to expand fire-fighting resources).

Since this mitigation involves improved response to fires after they have already started, this mitigation could reduce wildfire consequences, but not reduce the frequency of ignition drivers.

The heavy-lift aircraft were substantially utilized in 2020 by CAL FIRE. Approximately 30 percent of the total heavy-lift flight hours were flown in 2020 for CAL FIRE on a total of 11 wildfire suppression assignments. PG&E’s partnership and operational excellence were highly valued reflected in CAL FIRE post mission evaluations.

C. Activities, Costs, and Forecast Drivers by MWC

1. Expense MWCs

a. Transportation Services Expenses (MWC AB)

PG&E’s 2023 net expense forecast for Transportation Services in MWC AB, including overhead credits, is \$114.6 million. The 2023 net forecast increase an average of 4 percent year over year, while the GRC Gross Forecast increases below the rate of escalation at an average of 1 percent year over year, from 2020 recorded expenses.²⁶

The MWC AB expense forecast was determined by estimating the total company Transportation Services expense (Gross Expense), removing expenses recovered in other proceedings and any capitalized overhead amounts, resulting in the Net Expense.²⁷ The forecast is also adjusted to reflect expected savings from several department initiatives. There are four components used to estimate the Gross Expense: vehicles, depreciation, fuel, and rentals. The vehicle forecast is estimated primarily using historic costs that include labor, parts, registration, and freight. The depreciation forecast is based on the CPUC authorized fleet depreciation rates. The fuel and rentals forecasts are estimated using historic costs in relation to work plans and targets forecasted by core LOBs.

²⁶ Exhibit (PG&E-7), WP 2-5, Expense Summary.

²⁷ Exhibit (PG&E-7), WP 2-6, Gross to Net Expense Translation.

MWC AB includes several categories of expenses, which consist of the following activities, costs, and forecast drivers.

1) Vehicles

The vehicles component \$41.1 million and accounts for approximately 35 percent of the 2023 MWC AB Net Forecast for Transportation Services.²⁸ This component of the forecast includes expenditures for operating and maintaining PG&E's fleet. The forecast was derived using the 2021 planned labor (internal and external), contracts, materials, registration, vehicle technology subscription fees, and minor miscellaneous escalated costs. The 2023 Gross Forecast for vehicles is primarily driven by LOB demand which determines the size of the fleet and workforce required to effectively maintain the entire fleet.

2) Depreciation

The depreciation component is \$36.4 million and accounts for approximately 31 percent of the 2023 MWC AB Net Forecast.²⁹ The Depreciation expense forecast was determined using the current book cost of all owned assets by asset class as the baseline, 2020 GRC adopted depreciation rates, and forecasted capital additions and retirements for all asset classes. Depreciation rates are proposed in PG&E's depreciation study included in each GRC filing. Final depreciation rates are adopted by the CPUC in their GRC decisions.³⁰

3) Fuel

The fuel component is \$18.8 million and accounts for approximately 16 percent of the 2023 MWC AB Net Forecast.³¹ Fuel expenses were determined using the 2021 planned volume consumption with a 4.8 percent escalation on the price of diesel fuel

²⁸ Exhibit (PG&E-7), WP 2-7, Vehicles Forecast Details.

²⁹ Exhibit (PG&E-7), WP 2-8, Depreciation Forecast Details.

³⁰ See Exhibit (PG&E-10), Ch. 11, "Depreciation Reserve and Expense"; and Ch. 12, "Depreciation Study."

³¹ Exhibit (PG&E-7), WP 2-9, Fuel Forecast Details.

and 3.4 percent on the price of unleaded gasoline applied in 2019 and 2020 compounded annually. These escalation rates are based on average prices between 2001 to 2020 from the Energy Information Administration.³² Unleaded and Diesel forecasted consumption includes a 1.55 percent escalation to account for average increase in miles driven per employee for the last 3 years (2016-2019) and a 5-year average with 3 percent escalation was used for mobile fueling.

4) Rentals

The rentals component is \$18.3 million and accounts for approximately 16 percent of the 2023 MWC AB Net Forecast.³³ Rentals are used to supplement the existing company owned fleet for short-term business needs, projects, headcount changes or to replace units that are out of service. The forecast is based on historical information that was used to identify a correlation between rental spend and LOBs forecasts.

b. Aviation Services Expenses (MWC AB)

1) Heavy-Lift

The 2023 MWC AB forecast includes operations and maintenance expenses for the four heavy lift helicopters supporting utility construction, restoration, and the Community Wildfire Safety Program (CWSP) and account for 2 percent of MWC BP spend. One helicopter will be available to PG&E year-round and three helicopters will be available to CAL FIRE to support emergency wildfire response during the fire season approximately 214 days. Outside of fire season, the three helicopters will be available by PG&E for heavy lift, utility construction and service restoration work. This cycle also supports the PM Program.

The operations and maintenance expense forecast included as part of MWC BP was determined by forecasting total operations and

³² Exhibit (PG&E-7), WP 2-90, Energy Information Administration: 18-Year Fuel Price Fluctuation.

³³ Exhibit (PG&E-7), WP 2-10, Rentals Forecast Details.

1 maintenance expenses, less forecast chargebacks to other PG&E
 2 LOBs and forecast reimbursements from CAL FIRE for utilizing the
 3 helicopters.³⁴

4 **c. Aviation Services Expenses (MWC BP)**

5 PG&E's 2023 forecast for Aviation Services expenses in MWC BP is
 6 \$1.3 million.³⁵ PG&E's 2023 forecast is \$1.3 million less than 2020
 7 recorded expenditures of \$2.6 million. The decrease is a result of the
 8 corporate jet sale, resulting in a decrease in corporate jet pilot
 9 headcount, removed expenses, and elimination of operations and
 10 maintenance expenses for the corporate jet.

11 MWC BP supports Aviation Operations; it includes ongoing
 12 expenses comprised mainly of labor associated with management,
 13 schedulers, and dispatchers. Non-labor components include navigation
 14 software subscription fees, hangar lease costs, and offsetting costs
 15 associated with cash discount credits for paying contract invoices early.

16 The Fixed-Wing Operations forecast includes maintenance and
 17 support costs required for 1,560 flight hours per year, which was
 18 projected using historical trends. PG&E has a maintenance contract for
 19 parts and engines; year-over-year escalation rates are applied to the
 20 2020 base year rates through 2023. The fuel forecast is based on fuel
 21 consumption (total consumption = 50 gallons per flight hour multiplied by
 22 flight hours) and the fuel price per gallon (5 percent escalation factor
 23 applied to 2020 base year price per gallon).

24 The Aviation Services Operation labor and other non-labor forecasts
 25 were developed using 2020 as a base line escalated by Company
 26 escalation guidelines factors through 2023.

27 **d. Maintain IT Applications & Infrastructure (MWC JV)**

28 **1) FIMS Replacement**

29 PG&E's 2023 Transportation Services forecast for IT project
 30 expenses in MWC JV is \$0.77 million, which is an increase from

34 Exhibit (PG&E-7), WP 2-20, Annual Blackhawk Operating Cost Forecast: Heavy Lift Helicopters.

35 Exhibit (PG&E-7), WP 2-05, line 10, MWC BP – Aviation Operations.

2020 recorded expenses of \$0.23 million. The increase reflects the request for application replacements (FIMS).

As described in Section B.3.a, “Transportation Services,” formed a project team to research current applications that are available on the market in order to find potential applications capable of handling PG&E’s fleet management requirements in a consolidated configuration, as well as gaining an understanding of new technology that may be available and currently being used by other fleet organizations.

The initial concept estimate was completed with a plus-or-minus 40 percent confidence level due to the complexity and the absence of an awarded contract.³⁶ Upon reaching an award and agreement with a selected vendor, Transportation Services and IT will be able to finalize the full scope of work and refine the concept estimate to a higher confidence level. The capital and expense funding for FIMS is based on the results of this competitive bid process.

2. Capital MWCs

a. Fleet/Automotive Equipment (MWC 04)

PG&E’s Transportation Services forecast for fleet vehicles and equipment replacement in MWC 04 is \$104.8 million in 2023, \$105.9 million in 2024, \$143.9 million in 2025, and \$244.1 million in 2026.³⁷ PG&E’s 2023 forecast is \$6 million less than 2020 recorded expenditures of \$110 million.

The decrease in 2023 and the increase in 2026 are both a result of planned vehicle replacements that are based on the useful lives of different asset types. Transportation Services’ vehicle replacement plan aligns with its overall goals to provide safe, reliable, compliant, and cost-effective vehicles and equipment to provide gas and electric services.

The Company’s asset replacement schedules are based on the age of each vehicle, or equipment asset, compared to the lifecycle

³⁶ Exhibit (PG&E-7), WP 2-93, FIMS Project Summary.

³⁷ Exhibit (PG&E-7), WP 2-17, Capital Summary.

established for the asset class. The lifecycle for each asset class is developed by Transportation Services engineers based on the estimated depreciation life of the asset.³⁸

MWC 04 include several categories of programs, which consist of the following activities, costs, and forecast drivers.³⁹

1) Lifecycle Replacements

Lifecycle replacements accounts for approximately 98 percent of the 2023 MWC 04 Gross Forecast. Transportation Services vehicle and equipment replacement plan, included in MWC 04 funding request includes capital replacement funding for the following:

- Lifecycle Replacement;
- Compliance Replacements; and
- Accident Replacements.

As part of Lifecycle Replacements, PG&E is committed to increasing the share of plug-in electric vehicles in the Company fleet. Electrifying vehicles at the time of lifecycle replacement allows PG&E to leverage existing planned funding for base vehicles and lower the overall costs of achieving EV goals. Starting in 2022, for the first time, there will be electric pickup trucks available from major manufacturers on the market in mass production quantities. Initial pilots will focus on sport utility vehicle and half-ton pickup truck categories with plans to start large scale purchases in 2023.

To meet the 5 percent EEI commitment for heavy-duty assets, certain aerial bucket trucks are planned to be equipped with plug-in Jobsite Energy Management Systems, which enables aerial booms to operate on full electric power and will help eliminate engine idling at the jobsite. EV purchases will increase lifecycle forecast by \$2.2 million in 2023, \$2.5 million in 2024, \$2.9 million in 2025, and \$4.8 million in 2026, which is aligned to the vehicle replacement plan described above.

³⁸ Exhibit (PG&E-7), WP 2-91, Fleet Replacement Guidelines.

³⁹ Exhibit (PG&E-7), WP 2-18, MWC 04 – Fleet/Automotive Equipment Forecast Details.

To manage and reduce vehicles costs, Transportation Services Fleet Engineering Team partners with LOB operators as part of the Specification Review Committee (SRC) to create asset designs and specifications for each vehicle and equipment type.⁴⁰ The SRC helps reduce overall spend by benchmarking other California utilities and prioritizing the features critical to work performance. Once a design and a specification are created, a competitive bid process is completed where the vendors are scored on commercial, technical, and responsibility to ensure the most qualified vendor is chosen for each build. Standardizing vehicle specifications improves Transportation Services' ability to manage safety and compliance in a uniform, consistent manner while reducing overall purchasing costs.

2) Stationary Crane Program

Currently PG&E maintains a fleet of 158 large stationary cranes with over 6,000-pound capacity and over 50 smaller cranes with less than 6,000 pounds capacity across various service centers and hydroelectric facilities. Starting in 2023, Transportation Services plans to begin a 10-year process of restoring these cranes.

Currently, many of these cranes were built prior to the year 1970, and before 1940 in some cases. This program will include quarterly, annual, and quadrennial inspections, repairs, and structural evaluations. Although PG&E has remained in compliance for these assets, the age of this equipment means that standard modern safety features like inching control, wireless controls, and updated wiring systems that provide safer, and more consistent, control response are not in place.

Transportation Services is partnering with the appropriate hydroelectric groups to plan the assessments based on priority and incorporate into Fleet Engineering lifecycle program. Stationary cranes differ slightly from normal fleet lifecycles since operating conditions will determine replacement. For example, severe duty or

⁴⁰ Exhibit (PG&E-7), WP 2-97, PG&E Automotive Specifications.

heavy corrosion would trigger a 10-year lifecycle for full rebuild or replacement, while light to limited duty would extend lifecycles up to 40 years. Stationary crane programs increase Transportation Services' forecast by approximately \$2.4 million per year. The forecast was determined using an analysis of historical information and average costs across common crane types, in addition to vendor provided estimates which are contingent on adequate planning, and design standardization.

b. Tools & Equipment (MWC 05)

Capital expenditures associated with replacing tools and equipment to support PG&E's fleet are included in MWC 05. PG&E's Transportation Services forecast for tools and equipment is based on historical information, the age and condition of our current tools and equipment, and the cost of additional tool and equipment needed at our facilities. This forecast is based on the estimated quantity and operations and maintenance requirement to support and service the Company's fleet.

PG&E's Transportation Services forecast for tools and equipment replacement in MWC 05 is \$1.35 million in 2023, \$1.38 million in 2024, \$1.41 million in 2025, and \$1.44 million in 2026.⁴¹ The recorded expenditures in 2020 is \$0.2 million less than the 2023 forecast and is primarily attributed to impacts of COVID-19 that delayed timelines and deliveries for replacements from our suppliers.

The primary driver of capital expenditures in MWC 05 continues to be replacements or additions of new automotive lifts that enable safe and timely repairs, the ability to adapt to changes in the fleet, and a reduced the risk of injury. The tools and garage equipment are critical for Transportation Services to maintain a safe, reliable, compliant, cost-effective fleet for the company to provide gas and electric services 24 hours a day, 365 days a year to our customers.

⁴¹ Exhibit (PG&E-7), WP 2-19, MWC 05 – Tools & Equipment Forecast Details.

c. Build IT Applications & Infrastructure (MWC 2F)

The capital request for IT applications (FIMS) was determined using the same estimating method as described above for MWC JV expenses.

MWC 2F includes capital forecasts for Transportation Services' IT projects. PG&E's forecast for IT capital costs in MWC JV is \$1.4 million in 2023 and 2024, and \$0.5 million in 2025 and 2026. This reflects the capital funding needed for application replacements as described in Section B.3.a.

D. Estimating Methods

The estimating methods for TAS' expense and capital forecasts vary by MWC and are described in detail in their respective sections above.

E. Cost Tables

**TABLE 2-5
EXPENSES BY MWC
(THOUSANDS OF NOMINAL DOLLARS)**

Line No.	MWC	Description	Recorded Adjusted				Forecast				Workpaper Reference
			2016	2017	2018	2019	2020	2021	2022	2023	
1	AB	Misc Expense	\$234,892	\$225,398	\$243,021	\$256,370	\$258,903	\$252,805	\$259,891	\$265,767	WP 2-5, WP 2-6
2	BP	Manage DCCP Business	3,170	4,171	2,755	4,794	2,615	1,608	1,384	1,311	WP 2-5, WP 2-6
3	JV	Maintain IT Apps & Infra	259	196	56	37	226	16	766	766	WP 2-5, WP 2-6
4		Total	\$238,322	\$229,765	\$245,832	\$261,201	\$261,744	\$254,429	\$262,040	\$267,844	
5	ZC	Fleet Services Overhead Credit									
			<u>\$(151,292)</u>	<u>\$(134,206)</u>	<u>\$(141,962)</u>	<u>\$(143,393)</u>	<u>\$(156,577)</u>	<u>\$(147,352)</u>	<u>\$(152,744)</u>	<u>\$(149,762)</u>	
6		Net Expense	\$87,030	\$95,559	\$103,870	\$117,808	\$105,167	\$107,077	\$109,296	\$118,082	WP 2-5, WP 2-6

**TABLE 2-6
CAPITAL EXPENDITURES BY MWC
(THOUSANDS OF NOMINAL DOLLARS)**

Line No.	MWC	MWC Description	Recorded Adjusted							Forecast				Workpaper Reference
			2016	2017	2018	2019	2020d	2021	2022	2023	2024	2025	2026	
1	4	Fleet/ Auto Equip	\$217,817	\$89,068	\$54,643	\$41,381	\$110,061	\$97,313	\$61,947	\$104,811	\$105,972	\$143,951	\$244,138	WP 2-18
2	5	Tools & Equipment	1,562	1,083	996	1,475	1,136	1,305	1,331	1,357	1,384	1,412	1,440	WP 2-19
3	21	Misc Capital	200	(164)	30,599	4,024	2,275	-	-	-	-	-	-	
4	2F	Build IT Apps & Infra	1,698	-	-	-	-	60	1,400	1,400	1,400	500	500	
5		Grand Total	\$221,276	\$89,987	\$86,238	\$46,880	\$113,472	\$98,678	\$64,677	\$107,569	\$108,756	\$145,863	\$246,079	

(PG&E-7)

**PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE**

Testimony: ☒ **Workpapers:** ☐ **SOQ:** ☐
Exhibit Number: 7 **Chapter Number:** 2
Chapter Title: Transportation and Aviation Services
Witness Name: Michael Glover and Christopher Steeb

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of November 5, 2021				
2-2	line 27 through 28	Acronym in testimony was incorrectly spelled out	“(Supplier Relationship Management)”	“(SRM)”

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of February 28, 2022				
2-36	5	2018 and 2019 Fleet Services Overhead Credit (MWC ZC)	2018 Recorded Adjusted: (146,129) 2019 Recorded Adjusted: (151,131)	2018 Recorded Adjusted: (141,962) 2019 Recorded Adjusted: (143,393)
2-36	6	Net Expense	2018 Recorded Adjusted: 99,702 2019 Recorded Adjusted: 110,070	2018 Recorded Adjusted: 103,870 2019 Recorded Adjusted: 117,808

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 3
MATERIALS
[INCLUDES NOVEMBER 5, 2021 ERRATA]

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 3
MATERIALS

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PACIFIC GAS AND ELECTRIC COMPANY
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MATERIALS

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 3
MATERIALS

A. Introduction

1. Scope and Purpose

The purpose of this chapter is to demonstrate that Pacific Gas and Electric Company's (PG&E or the Company) expense and capital forecasts for the Material & Distribution Operations Department (Materials), as well as PG&E's Materials and Supplies (M&S) inventory forecast, are reasonable and should be adopted by the California Public Utilities Commission (Commission).

Materials manages a materials distribution network throughout PG&E's 70,000-square-mile service territory in support of PG&E's Maintenance and Construction (M&C) activities. The management and delivery of M&S inventory is a critical component of the safe, reliable, and affordable service PG&E provides its customers.

Materials uses chargebacks to allocate operating expenditures to all PG&E Lines of Business (LOB), primarily Gas Operations, Electric Operations, Customer Care, and Energy Supply. Chargeback costs for Materials services are included in each LOB forecast and are not requested in this chapter. Information about Materials' chargeback costs are referenced in this chapter's cost tables for the Commission's information only.

2. Summary of Request

PG&E requests that the Commission adopt its 2023 Materials expense forecast of \$1.7 million for labor to operate PG&E's Internal Mail Services. Recorded adjusted expense in 2020 was negative \$12.6 million. PG&E's 2023 expense forecast shows a significant increase from Base Year (BY) recorded costs, due to a large non-recurring chargeback standard cost variance in 2020 under Major Work Category (MWC) JL, which is discussed further in Sections B and C below.

PG&E also requests that the Commission adopt its annual forecasted capital expenditures of \$1.2 million for each year 2021-2026 in tools and

1 equipment upgrades and investment recovery labor, as compared to the
2 \$1.0 million recorded in 2020. The annual capital forecast represents a
3 20 percent increase in capital from the BY 2020 recorded costs due to
4 investment recovery labor escalation and increases in warehouse tool and
5 equipment purchases to support safe, efficient operations at PG&E's
6 materials distribution facilities.

7 In addition to the capital expenditure described above, Materials has
8 also prepared a forecast of M&S inventory to support the core operational
9 LOBs. Portions of this forecast of M&S inventory are included in the capital
10 forecasts of PG&E's Electric Operations, Gas Operations, and Energy
11 Supply LOBs to support the M&C activities of these organizations.

12 Details about the activities, costs, and drivers for these forecasts are
13 provided in Section C below.

14 **3. Deferred Work Review**

15 Section 5.2 of the 2020 General Rate Case (GRC) Settlement
16 Agreement requires PG&E to make an additional showing in its 2023 GRC
17 testimony for work that was previously requested and authorized based on
18 representations that the work was needed to provide safe and reliable
19 service.

20 In the 2020 GRC, Materials did not request or receive authorized
21 funding for any work: (1) identified as safety, reliability, or maintenance
22 (SRM)-related in the 2020 Risk Spending Accountability Report; or
23 (2) based on representations in testimony and workpapers that the work was
24 needed to provide safe and reliable service.

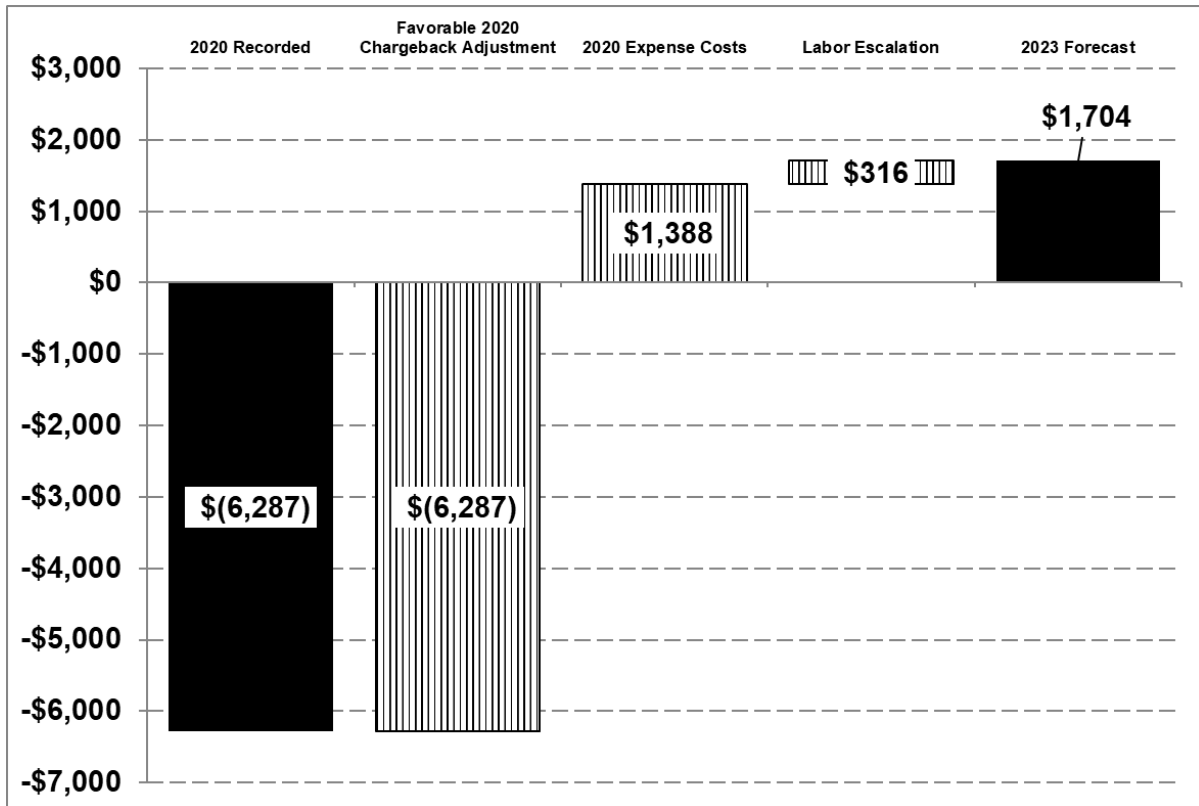
25 **4. Overview of Recorded and Forecast Costs**

26 **a. Expense**

27 Figure 3-1 below illustrates 2020 recorded expense for Materials,
28 which shows an increase in 2023 due to adjustments for a non-recurring
29 chargeback variance recorded in 2020. The 2020 chargeback variance
30 was due to journal entry postings at year-end that resulted in a
31 significant increase in the December 2020 allocation base used to
32 recover materials chargeback costs. After adjusting for the
33 non-recurring chargeback standard cost variance, Materials forecasts an

increase in expense for Internal Mail Services based on labor cost escalations in PG&E's Internal Mail Services Department.

FIGURE 3-1
EXPENSE WALK (2020-2023)
(THOUSANDS OF NOMINAL DOLLARS)

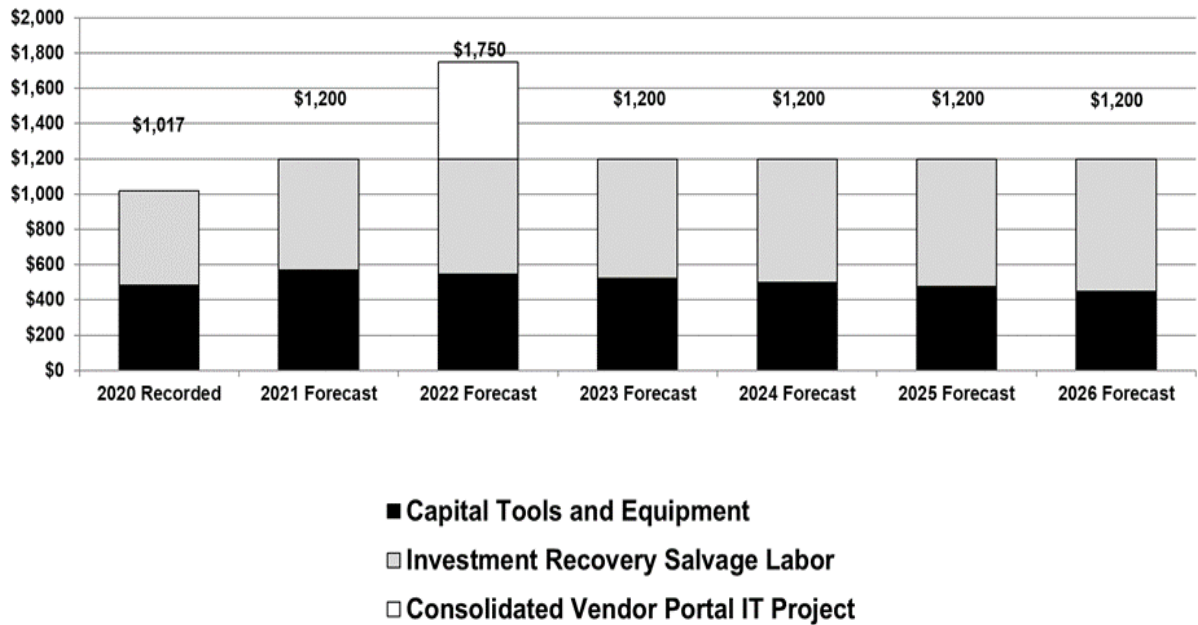


Note: Figure 3-1: 2020 Recorded values vary from the values listed in the Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

b. Capital

Figure 3-2 below shows 2020 recorded capital and the 2021-2026 forecasts for Materials. The forecast reflects an increase in capital tools and equipment costs and an increase in investment recovery labor costs due to escalation. The forecast also includes non-recurring Information Technology (IT) capital costs in 2022 to build a consolidated vendor portal.

FIGURE 3-2
CAPITAL EXPENDITURES (2020-2025)
(THOUSANDS OF NOMINAL DOLLARS)



5. Support for Request

PG&E's expense and capital forecasts for Materials are reasonable because they ensure the continued execution of material logistics and planning processes while achieving operating efficiencies to support PG&E's broader goals. The ongoing support of PG&E's materials and inventory is critical to the safe and reliable maintenance, construction, and restoration work by the LOBs.

6. Organization of the Remainder of This Chapter

The remainder of this chapter is organized as follows:

- Section B – Program and Risk Overview;
- Section C – Activities, Costs, and Forecast Drivers by MWC;
- Section D – Chargeback Forecast; and
- Section E – Cost Tables.

B. Program and Risk Overview

1. Program Description

a. Program Overview

Materials is responsible for the day-to-day operation and execution of PG&E's materials distribution network throughout its 70,000-square-mile service territory. Materials supports the management and delivery of PG&E's multi-million dollar M&S inventory and is critical to the LOBs' ability to provide safe, reliable, and affordable gas and electric service.

b. Management Structure

Materials reports to the Vice President, Supply Chain, and Chief Procurement Officer, and ultimately to the Executive Vice President, People, Shared Services, & Supply Chain. Materials is composed of five core areas: (1) Materials Operations; (2) Field Inventory Management and Internal Mail Services; (3) Supply Chain Planning; (4) Materials Transportation; (5) and Supplier Quality Assurance (SQA). Materials will manage more than \$500 million in M&S inventory across the Company in 2023.

1) Materials Operations

Material Operations consists of five major distribution centers, 20 specialty stores, and over 120 remote material locations located throughout PG&E's service territory. The distribution centers are located in Fremont, Fresno, Marysville, and Stockton, and each acts as an internal transportation hub that provides deliveries throughout PG&E's service territory.

Each distribution center is responsible for: (1) managing inventory storage; (2) security and accuracy related to materials inventory; (3) performing inventory receipt (data entry of receipt into system and physical put-away of inventory) of materials from suppliers; (4) filling and delivering M&S orders to PG&E's field locations and crew jobsites; and (5) processing materials returns.

Materials Operations personnel, headquartered at various PG&E specialty stores and field locations, act as the operational link

1 between the Materials distribution centers and the operating
2 departments to ensure that material needs are satisfied. Materials
3 Operations services in the field and specialty stores include:
4 maintaining and providing immediate access to materials needed to
5 perform planned and un-planned maintenance; new construction;
6 new service requests; urgent restoration work and other
7 construction; and maintenance-related activities.

8 Materials Operations has the following responsibilities in
9 specialty stores and remote material locations: (1) replenishing and
10 managing appropriate inventory levels; (2) receiving shipments from
11 distribution centers and third-party suppliers; (3) staging material for
12 the crews; (4) providing urgent materials response for work already
13 in process in the field; and (5) providing urgent material deliveries to
14 crews responding to PG&E customer outages.

15 Materials Operations is also responsible for managing PG&E's
16 Materials and Transportation Coordination Center (MTCC) located
17 at the Fremont distribution center. The MTCC provides support for
18 and responds to major emergencies and catastrophic events by:
19 (1) coordinating the delivery of materials, supplies and equipment to
20 service centers and crew jobsites; (2) providing other logistical
21 support as needed; (3) expediting receipt of critical material from
22 suppliers; and (4) assessing demand based on issues identified in
23 the field. Materials Operations provides ongoing emergency training
24 to its employees and participates in Companywide emergency drills
25 and practice exercises. In addition to delivering materials directly to
26 jobsites, Materials Operations field employees also support
27 customer power restoration efforts during major outage events in
28 coordination with the MTCC.

29 **2) Field Inventory Management and Internal Mail Services**

30 Field Inventory Management and Internal Mail Services is
31 responsible for all inventory analytics and inventory governance for
32 the specialty stores and remote material locations. The Field
33 Inventory Management team uses data on material usage and other
34 inputs to determine appropriate inventory targets at each field

location and monitors system processes and controls used to track and reconcile the field inventory. The Field Inventory Management and Internal Mail Services team is also responsible for company mail services employees that handle the sorting and delivery of Company mail to the various mail rooms located throughout PG&E's service territory.

3) Supply Chain Planning

Supply Chain Planning provides end-to-end lifecycle management of material data and material inventory including master data governance, material demand planning, and investment recovery. Key functional areas are listed below.

- Material Master Data Team

The Material Master Data team is responsible for maintaining detailed information used to describe, procure, and manage materials in SAP (PG&E's enterprise resource planning tool).

- Materials Demand Planning Team

The Materials Demand Planning team is responsible for forecasting inventory requirements and collaborating with internal clients and PG&E's suppliers to minimize inventory levels while maintaining required service levels in support of safe and reliable service to PG&E's customers. In addition, Materials Demand Planning adjusts inventory levels of critical materials in anticipation of increased demand for items commonly used in PG&E customer service restoration.

- Investment Recovery

The Investment Recovery group determines the best options for the disposal of surplus, obsolete, damaged, and scrapped materials and equipment. Re-deployment, sales, and recycling are used to maximize the return on PG&E's investment. These investment recovery efforts demonstrate PG&E's commitment to environmental stewardship by reducing the Company's use of landfills. In 2020, the Investment

Recovery group's efforts resulted in revenue of \$11.5 million with over 55 million pounds of material processed.

4) Materials Transportation

The Materials Transportation team provides other branches of Materials with support in two primary areas: (1) inbound transportation management, and (2) Safety Program management.

The inbound transportation management team is responsible for all inbound freight and third-party fleet asset transportation. PG&E spent \$41 million in 2020 on inbound freight. This team ensures the Company is transporting goods and equipment in the optimal and most affordable manner while still meeting delivery deadlines.

The Materials Transportation team also oversees all safety programs in Materials, including reporting on key metrics, grassroots team oversight, and the department's annual safety improvement plan.

5) Supplier Quality Assurance

The SQA group is responsible for assuring that the quality of high-risk products meet PG&E's engineering standards to ensure public safety, employee safety, and system reliability. This process is accomplished through various efforts including, but not limited to, product qualification processes, Quality Management System auditing, materials inspection, and field material problem reporting. SQA also introduced a new Quality Performance Rating tool in 2020 that combines these efforts (i.e., audit activities, corrective actions, whether purges have occurred, and other relevant quality data) to derive a quantifiable score which provides a better holistic approach to measuring the performance of our supply chain.

c. Key Metrics and Other Performance Measures

To ensure safe, reliable, and cost-effective service, Materials manages its performance through metrics, some of which have benchmarks. These metrics include: (1) surplus inventory; (2) total annual lines handled per materials handler; (3) Bundled Fill Rate (BFR) (i.e., perfect order rate); and (4) Defective Parts Per million (DPPM).

1) Surplus Inventory

Materials measures the level of surplus inventory in distribution centers to determine where opportunities for inventory reduction exist. Surplus inventory is defined as material inventory that exceeds levels justified by critical spare requirements or forecasted usage. As of year-end 2020, PG&E had identified \$102 million of surplus inventory, with a goal to reduce that amount by 30 percent by the end of 2021 with continued reduction in subsequent years. There is currently no benchmark data available for surplus inventory, but PG&E will be engaging other utilities to understand if they have similar measures to compare performance.

2) Total Annual Lines Handled Per Material Handler

Total annual lines handled per materials handler measures the efficiency of how well Materials manages labor resources in support of the distribution of materials. During 2020, PG&E's performance was 15,387 lines per handler, which is first quartile of the performance benchmark as determined by the Utility Purchasing Management Group's 2018 survey. Increased performance for this metric equates to Materials absorbing additional work while at the same time minimizing increases in headcount.

3) Bundled Fill Rate

BFR measures the rate of collective on-time and complete fulfillment of stock reservations (i.e., bundles) for PG&E M&C departments. The higher the percentage, the more successful Materials is at providing all material requested. BFR directly impacts services to PG&E customers as PG&E crews require timely and complete delivery of materials to perform scheduled work. PG&E's BFR 2020 year-end performance at the three distribution centers was 94 percent with a goal to improve to 96 percent in 2021.

4) Defective Parts Per million

DPPM is a metric that provides PG&E with a measure of the quality of products received from the manufacturer to the point of

inspection derived from compliance to engineering specifications and requirements. It is calculated as follows:

$$\text{DPPM} = (\text{Total Rejects} \div \text{Total Receipts}) \times 1,000,000$$

DPPM measurement began in 2012 and was measured at 19,507 DPPM, or 1.95 percent rejection rate at that time. DPPM has subsequently dropped to an average of 325 by the end of 2020, or .033 percent rejections.

2. Risk Controls and Mitigations

a. Risk Controls and Mitigations in Materials

Materials does not have any safety risk events identified in the 2020 Risk Assessment and Mitigation Phase Report.

C. Activities, Costs, and Forecast Drivers by MWC

1. Expense MWCs

a. MWC JL – Standard Cost Variance

1) Estimating Method

Standard cost variances are not forecasted, and the favorable 2020 variance is due to journal entry postings in Electric Operations at year-end that resulted in a significant increase in the December 2020 allocation base used to recover materials chargeback costs.

2) Costs

The 2020 recorded standard cost variance for Materials in MWC JL was \$7.68 million.

3) Forecast Drivers

Standard cost variances are not forecasted. Materials is only forecasting expense costs in MWC AB and JV as discussed directly below.

b. MWC AB – A&G Labor Expense

1) Estimating Method

To forecast Administrative and General (A&G) labor expense costs for internal mail services, the recorded and forecasted costs

were adjusted for labor escalation, consistent with rates described in Exhibit (PG&E 12), Chapter 4.

2) Costs

The 2020 recorded expense for Internal Company Mail in MWC AB was \$1.39 million. This includes current headcount of 15 employees responsible for pickup, transportation, and delivery of internal Company mail.

3) Forecast Drivers

Materials forecasts \$1.70 million in 2023 for MWC AB, which represents a 22 percent increase from recorded 2020 costs due to forecasted escalations in labor costs.

c. MWC JV – Maintain IT Apps & Infra

1) Estimating Method

PG&E discusses its standard estimating methods for technology project investments in Exhibit (PG&E-7), Chapter 8. Historical spend patterns, subject matter expertise, and standard cost factors serve as primary inputs to the IT estimating tools used in this chapter to calculate labor and non-labor costs and document associated assumptions. Forecasts are sequenced to fit within high-level annual planning targets set by IT and Company leadership to align with strategic priorities. Refer to Project and Program Summary workpapers supporting this chapter for more information on the specific estimating methods used in this chapter.

2) Costs

Materials does not have any recorded costs in MWC JV for 2020. Materials is only forecasting costs in 2022 for the Consolidated Vendor Portal technology project. The Consolidated Vendor Portal technology project will create a single entry point for material suppliers to collaborate and communicate with PG&E's SQA team. This interactive, two-way portal will provide PG&E's material manufacturers and distributors centralized access to current tools and reports such as: Electronic Supplier Change Requests (eSCR), material traceability document submission,

Supplier Corrective Action Requests (SCAR), DPPM reporting, product waiver submission, and PG&E's Qualified Supplier List (QSL).

3) Forecast Drivers

Materials forecasts \$150,000 in MWC JV in 2022 to support the implementation of a consolidated vendor portal.

2. Capital MWCs

a. MWC 05 – Tools and Equipment, Capital

1) Estimating Method

Tools and equipment costs for 2023 were determined by reviewing new and replacement needs for tools, equipment, and materials shelving. The process for determining the replacement of tools and equipment considers criteria including age (e.g., date of manufacture, hours or miles on equipment) condition, and cost to maintain.

2) Costs

The 2020 recorded capital for tools and equipment for Materials under MWC 05 was \$481,000. This cost includes all capital tools and equipment acquired by Materials in 2020 for materials management operations in support of M&C activities.

3) Forecast Drivers

Materials forecasts \$607,000 in 2023 for MWC 05, which represents a 26 percent increase from recorded 2020 costs based on the forecasted need for replacement of tools and equipment used in Materials Operations.

b. MWC 21 – Miscellaneous Capital

1) Estimating Method

In forecasting the capital expenditures needed for miscellaneous capital labor costs for Investment Recovery, Materials evaluated the quantity of equipment that is expected to be salvaged, based on historical trends and the related resources needed to sell and dispose of such equipment.

2) Costs

The 2020 recorded miscellaneous capital labor cost for Materials under MWC 21 was \$536,000. This cost represents three full-time employees, including overheads to support Materials' investment recovery function.

3) Forecast Drivers

Materials forecasts \$593,000 in 2023 for MWC 21, which represents an 11 percent increase from recorded 2020 costs based on labor escalation and is consistent with escalation rates described in Exhibit (PG&E 12), Chapter 4.

c. MWC 2F – Build IT Apps and Infra**1) Estimating Method**

PG&E discusses its standard estimating methods for technology project investments in Exhibit (PG&E-7), Chapter 8. Historical spend patterns, subject matter expertise, and standard cost factors serve as primary inputs to the IT estimating tools used in this chapter to calculate labor and non-labor costs and document associated assumptions. Forecasts are sequenced to fit within high-level annual planning targets set by IT and Company leadership to align with strategic priorities. Refer to Project and Program Summary workpapers supporting this chapter for more information on the specific estimating methods used in this chapter.

2) Costs

Materials does not have any recorded costs in MWC 2F for 2020. Materials is only forecasting costs in 2022 for the Consolidated Vendor Portal technology project. The Consolidated Vendor Portal technology project will create a single entry point for material suppliers to collaborate and communicate with PG&E's SQA team. This interactive, two-way portal will provide PG&E's material manufacturers and distributors centralized access to current tools and reports, such as: eSCR, material traceability document submission, SCAR, DPPM reporting, product waiver submission, and PG&E's QSL.

3) Forecast Drivers

Materials forecasts \$600,000 in MWC 2F to support the implementation of a consolidated vendor portal.

3. M&S Inventory

For M&S inventory, the 2021 through 2026 forecasts are based on forecasted M&C activities and anticipated changes in commodity costs.

Beginning in 2018, Materials implemented a more precise method for allocating M&S inventory to the responsible LOB. The new method assigns inventory balances based on the weighted average recorded consumption to each LOB. This method significantly improves M&S inventory allocation precision for materials that are shared across LOBs.

As part of this forecast, Materials provides a listing of all inactive M&S for reference purposes. M&S are considered inactive if they have been in inventory for more than three years without any demand and are not identified as critical spares. Materials is providing the M&S inventory forecast in this chapter, but the associated costs are included in the various LOB chapters and Exhibit (PG&E 10), Chapter 14, "Gas and Electric Distribution and Generation Rate Base," as Inventory is a rate base item.

D. Chargeback Forecast

Materials' chargeback costs are charged to other departments through PG&E's SAP accounting system; they are included in each LOB's forecast and not requested in this chapter.

E. Cost Tables

The capital expenditure forecast for Materials is summarized in the following tables. Table 3-3 summarizes total capital expenditures for MWCs 05, 21, and 2F for recorded years 2016-2020 and forecast years 2021-2026. Table 3-4 shows total expense costs for MWCs AB, JL, and JV for recorded years 2016-2020 and forecast years 2021-2023.

**TABLE 3-3
CAPITAL
(THOUSANDS OF NOMINAL DOLLARS)**

Line No.	MWC	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Workpaper Reference
1	05	Tools and Equip	\$761	\$821	\$287	\$1,181	\$481	\$646	\$626	\$607	\$586	\$565	\$543	WP 3-8
2	21	Misc. Capital	510	530	793	418	536	554	574	593	614	635	657	WP 3-8
3	2F	Build IT Apps & Infra							600					WP 3-8
4		Total	\$1,272	\$1,351	\$1,080	\$1,599	\$1,017	\$1,200	\$1,800	\$1,200	\$1,200	\$1,200	\$1,200	

**TABLE 3-4
EXPENSE
(THOUSANDS OF NOMINAL DOLLARS)**

Line No.	MWC	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Workpaper Reference
1	AB	Misc. Expense	\$1,775	\$1,664	\$1,509	\$1,516	\$1,388	\$1,606	\$1,654	\$1,704	WP 3-1
2	JL	Procure Materials & Services	2,939	(1,438)	(2,957)	537	(7,675)				WP 3-1
3	JV	Maintain IT Apps & Infra							150		WP 3-1
4		Total	\$4,714	\$226	(\$1,448)	\$2,053	(\$6,287)	\$1,606	\$1,804	\$1,704	

Note: Line no 2: 2020 Recorded Adjusted values vary from the values listed in the RO Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 4
SOURCING
[INCLUDES NOVEMBER 5, 2021 ERRATA]

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 4
SOURCING

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PACIFIC GAS AND ELECTRIC COMPANY

CHAPTER 4

SOURCING

A. Introduction

1. Scope and Purpose

The purpose of this chapter is to demonstrate that Pacific Gas and Electric Company's (PG&E or the Company) expense and capital forecasts for procurement and other services¹ provided and managed by Supply Chain Management (Sourcing) are reasonable and should be adopted by the California Public Utilities Commission (Commission).

Sourcing is responsible for the procurement of goods and services required by the Company's Lines of Business (LOB) to provide safe, reliable, affordable, and clean natural gas and electric service.² In 2020, Sourcing procured in excess of \$10 billion of goods and services, including but not limited to: (1) construction and maintenance services; (2) distribution equipment such as transformers, pipe, cable and fabricated and structural steel; (3) Information Technology (IT) software and equipment; (4) chemicals, lubricants and other oil products; (5) construction equipment (both purchase and rental); (6) vehicles and automotive parts; (7) tools, office supplies and furniture; and (8) engineering, environmental and other professional and technical services.

2. Summary of Request

PG&E requests that the Commission adopt its 2023 Sourcing expense forecast of \$26.4 million. Recorded expense in 2020 was \$24.8 million.³

-
- ¹ The Supply Chain Management organization is also responsible for managing PG&E's materials and supplies inventory. These services are addressed in a separate chapter, Exhibit (PG&E-7), Ch. 3, Materials.
 - ² Sourcing is not responsible for procuring gas and electricity for PG&E's bundled distribution customers. These procurement activities are the responsibility of the Energy Supply organization and are discussed in Exhibit (PG&E-5), Ch. 6.
 - ³ 2020 adjusted recorded values vary from the values listed in the Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

PG&E's 2023 expense forecast represents only a six percent increase from base year recorded costs largely due to operational efficiencies.

PG&E also requests that the Commission adopt its forecast of capital expenditures of \$0.4 million in 2021. Recorded capital expenditures in 2020 were \$2.4 million. The forecast decrease over 2020 recorded spend is primarily due to the completion of significant upgrades to Sourcing's primary procurement system.

Details about the activities, costs, and drivers for Sourcing's expense and capital forecasts are provided in Section C below.

3. Deferred Work Review

Section 5.2 of the 2020 GRC Settlement Agreement requires PG&E to make an additional showing in its 2023 GRC testimony for work that was previously requested and authorized based on representations that the work was needed to provide safe and reliable service.

In the 2020 GRC, Sourcing did not request or receive authorized funding for any work (1) identified as safety, reliability, or maintenance (SRM)-related in the 2020 Risk Spending Accountability Report or (2) based on representations in testimony and work papers that the work was needed to provide safe and reliable service.

4. Overview of Recorded and Forecasted Costs

a. Expense

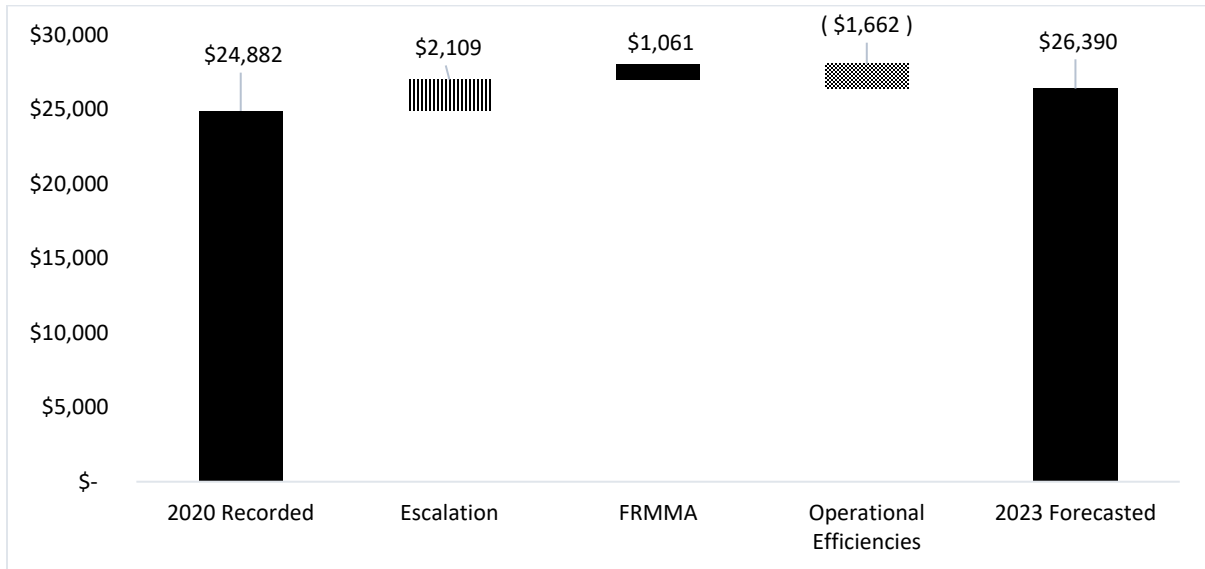
Figure 4-1 below shows 2020 recorded expense for Sourcing, which is forecast to increase slightly in 2023. The primary driver for Sourcing's costs is labor escalation, as discussed in Section D (Estimating Methods),⁴ as well as Fire Risk Mitigation Memorandum Account (FRMMA) specific costs associated with Sourcing.⁵ This increase is limited thanks to the efficiency gains that operational improvements and

⁴ The forecast labor escalation rates can be found in Exhibit (PG&E-8) Human Resources, Ch. 4, Total Rewards, Short-Term Incentive Plan, Non-Qualified Retirement and Labor Escalation.

⁵ PG&E's Sourcing department is conducting a large, one off strategic sourcing effort in support of the overall corporate priority to harden the electrical infrastructure against the growing threat of wildfires. This effort required external, specialized resources and is establishing new supply agreements and contracts with qualified electrical contractors to perform the asset upgrades and installations.

1 new software deployments have delivered over the last several years,
 2 as discussed in prior rate case.

**FIGURE 4-1
 EXPENSE WALK (2020-2023)
 (THOUSAND OF NOMINAL DOLLARS)**



Note: 2020 recorded values vary from the values listed in the RO Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

3 Table 4-1 below provides a detailed view from 2020-2023 of
 4 Sourcing expense dollars (in thousands). These are all workforce costs,
 5 listed by department or group within Sourcing, with the exception of
 6 \$1 million in dedicated to FRMMA.

TABLE 4-1
EXPENSE DETAILED WALK (2020-2023)
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	Expense	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast
1	Generation Supply Chain Department	\$2,207	\$2,591	\$2,669	\$2,749
2	Sourcing – Corporate and Shared Services	1,427	1,437	1,480	1,525
3	Sourcing – Corporate Services (Sourcing Ops)	6,951	8,025	8,266	8,514
4	Supplier Diversity (Including TAP)	2,809	2,590	2,668	2,748
5	VP-Supply Chain Management	2,740	1	1,251	1,479
6	IT Business Technology – Corp Svc – SS	209	216	36	36
7	Sourcing – Electric T&D	4,261	2,232	2,299	2,367
8	Sourcing – Gas	2,084	3,065	3,157	3,252
9	Sourcing – IT	2,194	2,508	2,583	2,661
10	Sourcing – FRMMA	–	1,000	1,030	1,061
11	Total	\$24,882	\$23,665	\$25,438	\$26,390

Note: Line 3 and Line 11 in 2020 Recorded values vary from the values listed in the RO Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

1 **b. Capital**

2 Table 4-2 below provides a detailed view from 2020-2026 of
3 Sourcing capital expense dollars (in thousands). These costs are
4 investments in technology necessary to continue development and
5 deployment of our core procurement software, a critical component for
6 sustained operational efficiencies.

TABLE 4-2
CAPITAL EXPENSE DETAILED WALK (2020-2021)
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	MWC Description	2020 Recorded	2020 Adjusted	2021 Forecast
1	2F	Build Applications and Infrastructure	\$2,404		\$470
2		Grand Total	\$2,404		\$470

5. Support for Request

PG&E's expense forecast for Sourcing is reasonable because the goods and services procured by the department are necessary to provide safe, reliable, affordable, and clean natural gas and electric service. Sourcing has been working closely with its LOB partners to ensure continued value creation and financial savings. Sourcing has implemented several internal initiatives to continue delivering quality service at lower cost, largely thanks to technological and process improvements.

Sourcing also contributes significantly to economic development and job creation in the communities that PG&E serves:

- **Local Economy:** In 2020, PG&E paid more than \$3.9 billion to suppliers with addresses in the Company's service territory.
- **Supplier Diversity:** In 2020, PG&E procured nearly \$4 billion of goods and services from Diverse Business Enterprises (DBE),⁶ which represents 38.9 percent of PG&E's spend in 2020, substantially exceeding the Commission-recommended goal of 21.5 percent.
- **Environmental Sustainability:** Sourcing also supports environmental sustainability through its product strategies and work with its suppliers. PG&E continues to drive more product choices and strategies that measurably reduce the Company's environmental footprint. This includes working directly with suppliers to improve their performance in key sustainability areas (e.g., energy, water, waste, and greenhouse gas (GHG) emissions).

6. Organization of the Remainder of This Chapter

The remainder of this chapter is organized as follows:

- Section B – Program and Risk Overview;
- Section C – Activities and Costs by Major Work Category (MWC);
- Section D – Estimating Methods;
- Section E – Chargeback Forecast; and
- Section F – Cost Tables.

⁶ DBEs includes small business enterprises owned by women, minority, service-disabled veteran, or lesbian, gay, bisexual, and transgender (LGBT) individuals.

B. Program and Risk Overview

1. Program Description

a. Program Overview

Sourcing is responsible for procuring goods and services necessary for the Company's LOBs to provide safe, reliable, affordable, and clean natural gas and electric service. Sourcing provides oversight for day-to-day supply chain activities and functional guidance to all PG&E departments regarding all procurement policies and procedures. Sourcing also supports the Company's Supplier Diversity and Sustainability efforts.

b. Organizational Structure

Sourcing reports to the Vice President of Supply Chain Management, and ultimately to the Executive Vice President, People, Shared Services, and Supply Chain. Sourcing provides procurement support for the Company's primary LOBs—Corporate Services, Electric, Gas, and IT—and implements key programs such as Supplier Diversity and Environmental Sustainability.

1) Supply Chain-Sourcing

In 2020, Sourcing facilitated procurement of over \$10.9 billion in materials and services from over 4,000 active suppliers, involving more than 300 master service agreements and 170,000 purchase orders. These purchase orders and contracts support all Company operations, directly sustaining public and employee safety and gas and electric reliability.

Sourcing provides the following suite of services for the Company:

- Companywide Strategic Sourcing and Procurement – Provides systematic assessment of supply market economics and internal requirements to achieve the greatest total value of procured goods and services. Sourcing employs proven sourcing strategies to achieve cost-effective pricing and that our vendors provide the highest quality products and services. PG&E's Sourcing professionals follow a defined seven-step

sourcing process to guarantee that PG&E receives cost-effective pricing, quality and safety with the goods and services it procures. The procurement of goods and services involves negotiating contract terms and conditions and creating purchase orders which define scopes of work and protect the Company from risk.

- Benchmarking – Benchmarks supply chain performance with peer utilities and third-party organizations such as the Center for Advanced Procurement and Supply (CAPS), a not for profit research group started by the Institute for Supply Management and the W. P. Carey School of Business at Arizona State University, to identify “best-in-class” processes and performance, and strategically implements improvements to reduce costs and improve the efficiency and effectiveness of Sourcing.
- Emergency Preparedness – Serves as a key participant in the Company’s Emergency Operations Center (EOC) in the case of a major emergency, including storms and natural disasters, which can affect electric or gas service in a significant part of PG&E’s service territory, a significant percentage of PG&E’s customers, or otherwise requires systemwide coordination. Sourcing serves a critical role in the EOC by staffing key Logistics section positions, supporting base camps, as well as procuring materials and services required to safely and promptly restore electric or gas service for PG&E’s customers.
- Supplier Performance Management – Conducts performance and compliance management reviews with suppliers to drive lower costs; improve safety, quality, and service levels; supplier diversity; and sustainability, and leads PG&E’s Supplier Performance Management Program. This program establishes a structured and integrated communication process with suppliers to jointly review performance via fact-based key performance indicators and a goal for continuous improvement.

- 1 • Supplier and Supply Risk Mitigations – Sourcing supports and is

2 a key component of the Third-Party Risk Management initiative,

3 discussed in Exhibit (PG&E-9), Chapter 3. Understanding and

4 mitigating third-party risk while ensuring business continuity is

5 mission critical for Sourcing. Any failure to do so might result in

6 essential functions being unable to perform as key sources of

7 supply may not be able to provide materials or services for

8 PG&E.
- 9 • Supplier Relationship Management (SRM) and Performance –

10 SRM manages a structured and integrated communication

11 process with PG&E's top 100+ suppliers to jointly review

12 performance via formal scorecard reviews of fact-based key

13 performance indicators with a goal of continuous improvement.

14 The program is designed to enable PG&E to:

 - 15 – Set performance targets, develop focused action plans and

16 provide its suppliers with opportunities for improvement via

17 regular review meetings, performance tracking and timely

18 feedback;
 - 19 – Develop its suppliers' capabilities to meet its business

20 needs;
 - 21 – Support ongoing category management and strategic

22 sourcing initiatives to improve visibility into future demand;

23 and
 - 24 – Guide suppliers towards better supporting PG&E's goals,

25 vision, mission, and business priorities.
- 26 • Management of the Procure-to-Pay Process – This effort is

27 aimed at developing, implementing, and enhancing PG&E's

28 policies and procedures that govern the procurement process.

29 The team performs quality reviews and audits of contracts

30 based on Company procurement policies and any training

31 based on identified deficiencies. Additionally, it provides

32 training, workshops, and audits throughout the Company to

33 drive the quality of contracts developed in the field and

34 conducts instructor-led training, coordinates technical

enhancements, communicates and assists with troubleshooting technical issues.

- Alignment of Priorities and Goal Setting – Sourcing establishes annual department goals which align with the Company's priorities of providing safe, affordable, and reliable service to our customers.

2) Supply Chain Responsibility

PG&E's Supply Chain Responsibility Program aims to foster an ethical supply chain that is clean, efficient, diverse, and inclusive. The components of the program include supplier diversity, supply chain environmental sustainability and supplier code of conduct.

a) Supplier Diversity

PG&E's partnerships with small and diverse businesses has increased economic opportunities in our local communities while helping to enhance the quality of service that PG&E provides to its customers. Women (WBE), minorities (MBE), service-disabled veterans (DVBE) and LGBT individuals (LGBTBE), collectively WMDVLGBTBEs, play an important role in helping PG&E provide gas and electric services to our customers throughout Northern and Central California.

On the 40-year anniversary of PG&E's Supplier Diversity Program, we spent \$3.88 billion or 38.9 percent with diverse suppliers in 2020 – our highest spend ever. For 15 consecutive years, PG&E has exceeded the 21.5 percent CPUC goal with WMDVLGBTBEs established in General Order (GO) 156. The Company's overall aspirational supplier diversity goal is 40 percent including 25 percent with minority-owned business through 2023.

The Supplier Diversity Initiative includes the following elements:

- Supplier Diversity Champion Program – Promotes collaboration between Sourcing, Supplier Diversity,

Business Finance, and the LOB to achieve supplier diversity goals.

- Prime Supplier Program – Helps prime suppliers develop robust supplier diversity plans, engage WMDVLGBTBEs in contract opportunities, and accurately report diverse subcontracting.
- Technical Assistance Program (TAP) – Offers training and education to WMDVLGBTBEs of all sizes. TAP adheres to the Joint Utilities' Multi-Tiered Technical Assistance and Capacity Building Program adopted by the CPUC in 2011 (Decision (D.) 11-05-019). TAP is further discussed in Section B.2.c.

**TABLE 4-3
SOURCING
TECHNICAL ASSISTANCE PROGRAM (TAP)
(THOUSANDS OF NOMINAL DOLLARS)**

Line No.	Description	2020 Recorded Adjusted	% of Total Spend
1	Staffing	\$184	21.40%
2	TAP Travel Expenses	2	0.29%
3	CBO TAP Partnerships	149	17.33%
4	DBE Scholarships	48	5.63%
5	Trade Show Trade Mission	15	1.74%
6	TAP Program Initiatives	122	14.17%
7	TAP Enablement	345	40.09%
8	Dept Expenses	(5)	-0.65%
9	Total	\$861	

- Supplier Development Program – Supports the development of WMDVLGBTBEs through mentorship, opportunity identification and value chain analysis.
- Small Business Outreach – Supports the growth and development of small businesses through dedicated resources and training. PG&E hosts an annual Small Business Consultation and Feedback Forum with community-based organization and small business owners. Topics include barriers that prevent small businesses from

competing effectively. PG&E continues to fund one full-time employee focused on supply chain responsibility topics.

- Supplier Diversity Outreach – Participates in local, state, and national outreach events to meet with qualified prospective WMDVLGBTBEs. The Supply Chain Responsibility team and its ambassadors share best practices, connect prime suppliers to WMDVLGBTBEs and educate prospective suppliers on how to compete for business.

b) Supply Chain Environmental Sustainability Program

Supply Chain Environmental Sustainability, founded in 2007, aims to improve environmental performance by ensuring that sustainability is embedded in our sourcing processes. We performance improvements for our suppliers through training and assessments. The initiative has three primary goals:

i) Driving Supplier Sustainability Engagement and Performance

Sourcing focuses on advancing the performance of the Company's suppliers and expect them to follow a set of [Supplier Environmental Performance Standards](#). These standards encourage performance improvement and promote greater transparency and accountability by setting the expectation that suppliers:

- 1) Implement an Environmental Management System and track GHG emissions (Scope 1, emissions generated by assets owned or directly controlled by the supplier and Scope 2, emissions resulting from the generation of electricity, heat or steam purchased by the Supplier from a utility provider), energy use, water use, waste and compliance with environmental requirements;
- 2) Set voluntary reduction goals in three of the following areas: GHG emissions (Scope 1 and 2), energy, water and waste; and

3) Publicly report their performance against these goals.

Sourcing works with suppliers to drive continuous improvement and provide training on PG&E's expectations and systems for improving sustainability management. Reducing PG&E's Environmental Footprint Through Product Strategies

PG&E works to identify product choices and procurement strategies that measurably improve the Company's environmental profile. PG&E uses the "reduce-reuse-recycle" framework to guide strategies and plans:

- Reduce resource consumption through the Company's product choices. Where there is no feasible option to reduce consumption, Sourcing tries to buy products and equipment with a lower environmental footprint.
- Reuse products and equipment when they can be repaired or refurbished to meet required performance standards.
- Recycle products and equipment with licensed vendors if they cannot be refurbished for reuse.

When recycling options are not available, PG&E disposes of products in compliance with environmental requirements.

ii) Partnering With Industry Peers

PG&E continues to partner with industry peers through the [Electric Utility Industry Sustainable Supply Chain Alliance](#) (EUISSCA), a consortium of utilities that PG&E cofounded in 2008 to advance sustainable business practices. EUISSCA provides a forum to benchmark our performance and the performance of our suppliers, and to share best practices.

c) Supply Chain Responsibility Key Initiatives

Supply Chain Responsibility continues to lead two key initiatives in pursuit of delivering best-in-class supply chain services: the Supplier Code of Conduct (Code) and the TAP.

- Supplier Code of Conduct– PG&E’s Code sets forth the principles and standards of conduct that suppliers, employees, subcontractors, and sub-suppliers are expected to adhere to as they provide goods and services to PG&E.

The Code is communicated to suppliers and contractors via the following mechanisms:

- i) Online: The Code is posted publicly on PG&E’s Purchasing Program page at <http://www.pge.com/b2b/purchasing/>.
- ii) Contractual Requirement: A link to the Code is included in the General Conditions of PG&E contracts, within a clause which requires that the supplier comply with PG&E’s Code.
- iii) Webinar Training: PG&E has conducted webinar Code trainings for its suppliers since 2015. We leverage opportunities to communicate the Code and the importance of suppliers speaking up about misconduct issues and concerns. During training sessions, we remind suppliers of how to raise misconduct issues and concerns.
- iv) Code Acknowledgement: As we update the Code, like was done in 2020, we send an email notice to suppliers and ask that they electronically acknowledge receiving the updated Code and will abide by the content in the Code.

- Supply Chain Responsibility Program Enhancements – TAP – As discussed in Section B.2.a. (Supplier Diversity) above, TAP offers training and education to DBEs of all sizes in accordance with the Joint Utilities’ Multi-Tiered Technical Assistance and Capacity Building Program

adopted by the Commission in D.11-05-019. The TAP budget for related expenses and labor is \$800 thousand or 3.2 million for the 4-year 2023 GRC period. The program includes university scholarships, trade show trade missions, and signature initiatives that educate small and diverse businesses on how to develop competitive advantage. TAP initiatives and workshops are typically conducted in collaboration with community-based organizations. In addition to in-person and webinar trainings, materials and resources for the small and diverse business community (e.g., Green Business Toolkit) are available on PG&E's Supply Chain Responsibility website at www.pge.com/supplychainresponsibility.

c. Key Measures and Metrics

Sourcing's vision is to be recognized as a best-in-class utility supply chain organization by delivering the highest value while at the same time maintaining efficient and productive operations. Sourcing uses established metrics to determine where it stands in relationship to other utility supply chain operations. These metrics help identify gaps and opportunities for continuous improvement initiatives. Two key metrics used are:

- Realized Savings/Total Spend and Cost as a percent of Spend – In 2020, Sourcing, in collaboration with internal clients and working through its strategic sourcing process, achieved annual cost savings and cost avoidance that placed PG&E in the first quartile for cost savings results using the CAPS benchmarking methodology. Sourcing's goal is to continue to achieve top quartile ranking. Sourcing also measures Sourcing Cost as a percent of Spend using the Like-Sized Utility Benchmark administered by CAPS Research. PG&E currently benchmarks in the high third quartile for this metric compared to utilities of similar size.
- Percentage of Diversity Spend – As previously discussed, PG&E has substantially exceeded the Commission goal of 21.5 percent in diverse spending for the twelfth year in a row. In 2019, 28 utilities

1 filed supplier diversity annual reports pursuant to GO 156. PG&E
 2 placed in the first quartile within this cohort, with a DBE spend result
 3 of \$3.4 billion, or 41.2 percent of total procurement. Table 4-4 below
 4 compares PG&E's 2018 performance with the other gas and electric
 5 utilities in California. Using this comparison, PG&E ranked
 6 Number 1 in dollars spent with DBEs. PG&E will continue to strive
 7 to maintain its top quartile performance in supplier diversity.

TABLE 4-4
SUPPLIER DIVERSITY PERFORMANCE COMPARISON WITH PEER UTILITIES

Line No.	Utility	Total 2020 DBE	Total 2020 Purchases	Percentage
1	San Diego Gas and Electric (Sempra)	\$872,284,372	\$2,098,149,510	41.5%
2	Southern California Gas Company (Sempra)	884,181,102	2,139,674,225	41.3%
3	PG&E	3,879,415,235	9,974,059,425	38.9%
4	Southern California Edison	\$2,405,531,616	\$6,386,837,449	37.6%

Note: Data source obtained from diversity reports filed with the CPUC by peer utilities:
<http://www.cpuc.ca.gov/supplierdiversity/>.

d. Operational Efficiencies

Sourcing supports PG&E's affordability goal and occupies a key role in the effort. An overview of Sourcing's key affordability and process improvement initiative is provided below:

Procure to Pay Redesign (Contract Management Cross-cutting Risk): In 2020, PG&E management identified contract management as a work process that cut across many other work processes and thereby impacted enterprise risks. It was determined that controls needed to be strengthened to support risk mitigation. Supply Chain and Finance have therefore embarked on a multi-year project to redesign the procure-to-pay process. The result of the initiative will be a fully documented, end-to-end Procure-to-Pay process, along with technology, procedures, and tools, that will increase efficiency throughout the process, improve contract quality and provide real time visibility into third-party costs, thereby enabling better third-party cost and work management. Key components of the initiative include:

(1) purchase order and contract "ownership," (2) financial management

accountability, (3) an end-to-end process redesign that addresses identified issues with the process, shorter contracting cycle time, and (4) enablement of features in PG&E's procurement technology system that will improve requisitioning and acceptances of services when they are performed. Expected outcomes include reductions in value leakage, missed accruals, overall cycle time, and contract compliance audit findings.

2. Risk Assessment and Mitigation Phase (RAMP) Risks

There are no RAMP risks associated with Sourcing; however, Sourcing supports the Contractor Safety effort managed by Enterprise Risk and Safety (see Chapter 1 of this Exhibit).

C. Activities and Costs by MWC

1. Expense

The primary MWCs for Sourcing's forecast expense work are as follows:

- MWC OS – (Operational Support) includes costs for service organizations supporting major drivers of the business;
- MWC JL – (Sourcing Operations Support) includes procurement specific costs to support PG&E business operations; and
- MWC JV – (Maintain Applications and Infrastructure) includes costs for ongoing maintenance, operations and repair for PG&E's applications, systems, and infrastructure.

2. Capital

The primary MWC for Sourcing's recorded capital work is MWC 2F, which is defined as follows:

- MWC 2F (Build Applications and Infrastructure) includes costs to design, develop and enhance applications, systems, and infrastructure technology solutions.

D. Estimating Methods

1. Procure Materials and Services (MWC JL & MWC OS)

Sourcing used 2020 as the base year and escalated labor and non-labor costs based on Company escalation guidelines. Historical labor and related

costs were used to estimate the average cost per employee to adjust for additional headcount costs.

2. Project Estimating Tool (PET) (MWC JV & MWC 2F)

The PET is the primary method used in determining initial capital and expense forecasts for technology projects covered in this chapter.⁷

E. Chargeback Forecast

As stated in Section A.1. (Scope and Purpose) above, operating expenses for Sourcing had previously been allocated to all PG&E LOBs using chargebacks, but with the cost model allocation change in 2016,⁸ Sourcing's operating expenses are now directly recorded and forecast in this chapter.

F. Cost Tables

The recorded and forecasted expense and capital expenditures for Sourcing are summarized in the following tables. Table 4-5 shows expense costs for MWCs JL, JV, and OS, and Table 4-6 shows capital costs for MWC 2F, for recorded year 2016 through forecast year 2023.

⁷ See Exhibit (PG&E-7), Ch. 8 for further discussion on the PET.

⁸ See Exhibit (PG&E-12), Ch. 3, Cost Model.

TABLE 4-5
HISTORICAL AND FORECASTED EXPENSE
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast
1	JL – Expense	Generation Supply Chain Department	\$4,712	\$2,134	\$3,711	\$2,813	\$2,207	\$2,591	\$2,669	\$2,749
2	JL – Expense	Sourcing – Corporate and Shared Services	2,240	1,920	2,397	1,124	1,427	1,437	1,480	1,525
3	JL – Expense	Sourcing – Corporate Services	3,188	3,979	5,744	7,654	6,790	8,025	8,266	8,514
4	JL – Expense	(Sourcing Ops) Sourcing – Electric T&D	1,937	386	88	826	1,440	–	–	–
5	JL – Expense	Sourcing – Gas	–	–	94	–	–	–	–	–
6	JL – Expense	Sourcing – IT	–	–	298	1	323	508	523	539
7	JL – Expense	Supplier Diversity (Includes TAP)	2,852	2,701	2,834	2,043	2,809	2,590	2,668	2,748
8	JL – Expense	Supplier Sustainability	239	-1	–	–	–	–	–	–
9	JL – Expense	VP-Supply Chain Management	1,897	1028	2,979	617	2,903	1	1,251	1,479
10	JV – Expense	IT Business Technology – Corp Svc -SS	253	36	31	13	63	–	–	–
11	JV – Expense	IT BusTech Projects – Corp Svc	2,613	3,557	1,020	–	145	216	36	36

TABLE 4-5
HISTORICAL AND FORECASTED EXPENSE
(THOUSANDS OF NOMINAL DOLLARS)
(CONTINUED)

Line No.	MWC	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast
12	JV – Expense	IT BusTech	–	–	–	–	–	–	–	–
		Projects – Shared								
		Services								
13	JV – Expense	Sourcing – Corporate	–	–	–	–	–	–	–	–
		Services								
14	OS – Expense	Generation	2,731	2,553	–	–	–	–	–	–
		Supply Chain Department								
15	OS – Expense	Sourcing – Electric T&D	4,957	4,295	5,095	3,517	2,820	3,232	3,329	3,428
16	OS – Expense	Sourcing – Gas	3,959	3,655	3,018	3,156	2,084	3,065	3,157	3,252
17	OS – Expense	Sourcing – IT	1,791	1,727	1,401	1,700	1,871	2,000	2,060	2,122
18		Grand Total	\$33,369	\$27,971	\$28,710	\$23,374	\$24,882	\$23,665	\$25,438	\$26,390

Note: Line 3 and line 18 on Table 4-5 for 2020 Recorded Adjusted values vary from the values listed in the RO Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

TABLE 4-6
HISTORICAL AND FORECASTED CAPITAL
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Workpaper Reference
1	2F – Capital	ASvcs: Development	\$4,533	\$3,873	–	–	\$2,404	\$470	–	–	
2		Grand Total	\$4,533	\$3,873	–	–	\$2,404	\$470	–	–	

PACIFIC GAS AND ELECTRIC COMPANY

CHAPTER 5

REAL ESTATE

**[INCLUDES AUGUST 27, 2021 REVISED TESTIMONY AND
NOVEMBER 5, 2021 ERRATA]**

PACIFIC GAS AND ELECTRIC COMPANY
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REAL ESTATE

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 5
REAL ESTATE

A. Introduction

1. Scope and Purpose

The purpose of this chapter is to demonstrate that Pacific Gas and Electric Company's (PG&E or Company) expense and capital forecasts for common utility plant buildings and yards (referred to as "facilities") are reasonable and should be adopted by the California Public Utilities Commission (CPUC or Commission).

PG&E's Real Estate organization, known internally as Corporate Real Estate Strategy and Services (CRESS), is responsible for governing, planning, acquiring, designing, constructing, operating, and maintaining 7.7 million square feet (sq. ft.) of facilities throughout PG&E's 72,000 square mile service territory. These facilities include but are not limited to service centers (SC), data centers, contact centers, office buildings, shops, warehouses, construction and equipment yards, vehicle maintenance garages, Customer Service Offices (CSO), and meeting and training facilities. This cross-section of facilities will be referred to as "workspaces."

In the original 2020 General Rate Case (GRC), PG&E outlined a long-term real estate strategy that adapted to changing business needs and provided for safe, compliant, reliable, and affordable facilities while reducing the company's overall real estate footprint through the Regional Office Optimization Plan and SC Optimization Plan.

This 2023 GRC request reflects PG&E's continuing evolution of its CRESS strategy including the planned sale of its San Francisco General Office (SFGO) headquarters and move to a new headquarters location in Oakland along with continued investment in its operations portfolio to support ongoing wildfire mitigation and response and customer support.

Costs for acquiring or improving buildings and yards that are planned by a Line of Business (LOB) other than CRESS, but where project planning and delivery will be part of the CRESS book of work, are included in the

respective LOB testimony and forecast and not included herein. Table 5-1 identifies the LOB scope of work and exhibits and chapters that contain additional forecasts for workspace expenditures. Further discussion of the LOB specific requests is contained in Section B.f.5 below.

**TABLE 5-1
OTHER REAL ESTATE FORECASTS**

Line No.	Line of Business/Chapter Title	Exhibit/Chapter Number
1	Aviation Services: "Aviation Operations Center"	Exhibit (PG&E-7), Chapter 2

2. Summary of Request

a. Expense¹

PG&E requests that the Commission adopt CRESS's gross expense forecast of \$122.0 million for 2021, \$131.1 million for 2022, and \$124.3 million for 2023. PG&E's 2023 expense request for CRESS represents a 1.7 percent decrease from the base year 2020 recorded costs of \$126.5 million. The decrease is primarily driven by the reduction of operating cost from the SFGO move to Oakland Lakeside.

PG&E derives a net expense forecast for CRESS by allocating a portion of CRESS's expense costs² to non-expense orders such as Capital, Balancing Account and Other Balance Sheet orders.³ CRESS's 2023 net expense forecast⁴ of \$57.8 million is \$5.2 million less than 2020 recorded adjusted net expense of \$63.0 million.

¹ See Exhibit (PG&E-7), WP 5-1, Table 5-1, Expenses by Major Work Category.

² Allocated costs are described in the tables and workpapers as Building Services Overhead Credit (MWC AB).

³ See Exhibit (PG&E-12), Ch. 3 for additional information on the cost model.

⁴ Net expense forecast has been updated to reflect the recalculation of the Building Services Overhead Credit due to the SFGO Sale.

1 **b. Capital⁵**

2 PG&E also requests the Commission adopt its capital forecasts of
3 \$182.0 million for 2021, \$176.0 million for 2022, \$1,044.7 million for
4 2023, \$183.0 million for 2024, \$181.0 million for 2025, and
5 \$160.0 million for 2026. Recorded adjusted capital expenditures were
6 \$197.5 million for 2020. PG&E's 2023 capital request for CRESS
7 represents a 429 percent increase from the base year 2020 recorded
8 costs. This increase is primarily driven by the Oakland Lakeside
9 purchase and SC investment.

10 Details about the activities, costs, and drivers for these forecasts are
11 provided in Sections B and C below.

12 **3. Deferred Work Review**

13 Section 5.2 of the 2020 GRC Settlement Agreement requires PG&E to
14 make an additional showing in its 2023 GRC testimony for work that was
15 previously requested and authorized based on representations that the work
16 was needed to provide safe and reliable service.

17 In the 2020 GRC, CRESS did not request or receive authorized funding
18 for any work: (1) identified as safety, reliability, or maintenance
19 (SRM)-related in the 2020 Risk Spending Accountability Report (RSAR)
20 or (2) based on representations in testimony and work papers that the work
21 was needed to provide safe and reliable service.

22 **4. Overview of Recorded and Forecast Costs**

23 **a. Expense**

24 CRESS forecasts a gross expense forecast of \$124.3 million in
25 2023, which represents a \$2.2 million decrease, compared to 2020
26 recorded adjusted costs of \$126.5 million. The key drivers of this
27 decrease are described below.

5 See Exhibit (PG&E-7), WP 5-9, Table 5-9, Capital Expenditures by Major Work Category.

1) Escalation

CRESS forecasts a \$3.5 million increase due to escalation.^{6,7} Process improvements, efficiency programs and improved contract management have offset a portion of escalation.

2) Facilities and Portfolio Management

Facilities Management (FM) and Portfolio Management costs account for a \$3.2 million increase in expense, as compared to the 2020-2021 period, due to escalation and returning to pre-COVID-19 levels of service. The period from March 2020 and continuing through writing of this testimony showed facilities costs related to the office portfolio lower than previous trend. When PG&E personnel return to work, we expect similar operating expenses but an increase in janitorial and other cleanness activities due to PG&E's "Work from Home" pandemic mitigation (less office operating expenses). Increases are primarily due to enhanced cleaning and other pandemic mitigations in its operations portfolio that supported PG&E's essential operations. Facilities management includes janitorial service, repairs and maintenance, landscape, water, sewer, gas, electricity, waste disposal and recycling services, rent (for leased facilities), mail delivery, and conference center services. Portfolio Management includes strategic portfolio planning and governance, real asset development, planning, design, and delivery services, compliance, and expense projects.

3) RAMP – Seismic

RAMP expense is \$1.9 million in 2023, a \$1.5 million increase from 2020 to address seismic study results.

4) Fire Risk Mitigation Memorandum Account

Fire Risk Mitigation Memorandum Account (FRMMA) expense is \$1.1 million in 2023, a \$0.6 million increase from 2020. Detailed

⁶ See Exhibit (PG&E-12), Ch. 3 for the forecast non-labor escalation rates.

⁷ See Exhibit (PG&E-8), Ch. 4 for the forecast labor escalation rates.

information on the work and costs recorded to the FRMMA can be found in Exhibit (PG&E-7), Chapter 5, Appendix 1.

5) SFGO/Oakland Lakeside Transition⁸

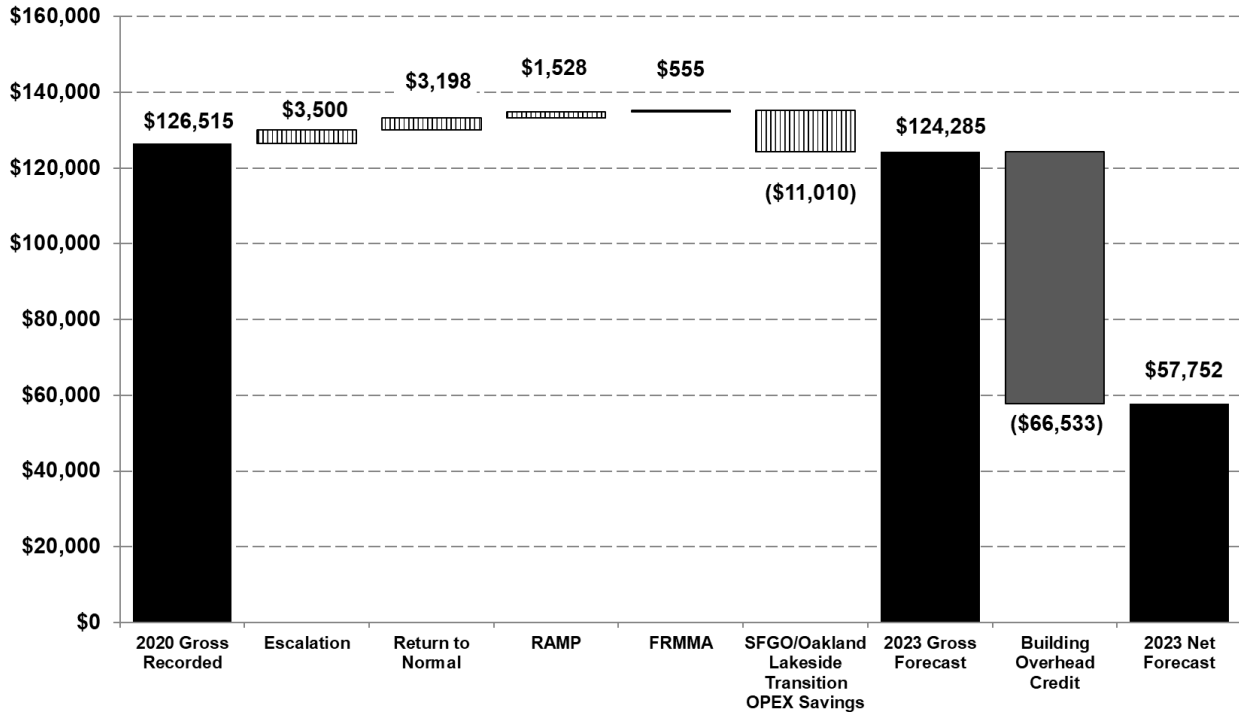
SFGO/Oakland Lakeside Transition expense is forecast to decrease \$11.0 million in 2023. This decrease is driven by the reduction of operating costs attributable to moving from SFGO and the San Ramon Office Sunset Building at 3401 Crow Canyon Road to Oakland Lakeside. Specifically, the reduction is attributable to the sale of the SFGO and termination of the San Ramon Office lease in July 2022 and the Bishop Ranch BR1Y lease in June 2023.⁹

Figure 5-1 below shows the change from CRESS's 2020 recorded adjusted expense to its 2023 forecast expense.

⁸ Expense forecast updates, including savings, for 2021, 2022 and Q1 2023 will be accounted for in the General Office Sale Memorandum Account (electric) and General Office Sale Memorandum Account (gas), net of cost to exit, as follows: (\$3.3) million in 2021, \$10.5 million in 2022, and \$10.9 million in 2023. These values are not reflected in the expense walks and values referenced throughout this chapter.

⁹ PG&E will also be terminating the Concord Resource Management Center facility lease in February 2024. This termination does not result in any further reductions.

**FIGURE 5-1
EXPENSE WALK (2020-2023)
(THOUSANDS OF NOMINAL DOLLARS)**



b. Capital

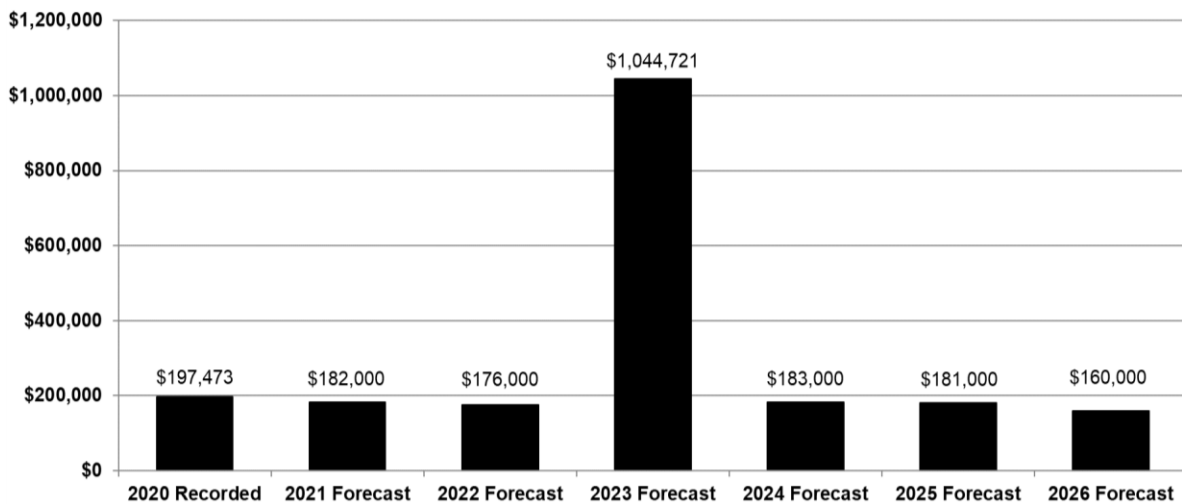
CRESS forecasts total capital expenditures of \$1,044.7 million in 2023, which represents a \$847.2 million increase, compared to 2020 recorded adjusted expenditures of \$197.5 million. CRESS's capital expenditures forecast for the 2023-2026 period is driven by the following eight initiatives:

- Oakland Lakeside Transition;¹⁰
- Service Center (SC) Investment Plan;
- Regional Office Investment Plan;
- CSO Investment Plan;
- LOB Operational Initiatives;
- Regionalization;
- Facility Asset Upkeep (FAU) Program;

¹⁰ PG&E's capital forecast changes for 2021 thru 2026 will be addressed in the petition for modification application, which will be filed within 90 days following the closing date of the Lakeside purchase and will reflect the final purchase price. See Exhibit (PG&E-10), Chapter 10, page 10-10, lines 11 through 14.

- Safety, Security, and Compliance; and
 - Fire Risk Mitigation Memorandum Account (FRMMA) – Wildfire.
- Each of these initiatives is described in Section B.1.f. of this chapter.
- Figure 5-2 below shows CRESS's 2020 recorded adjusted expenditures and forecasted expenditures for 2021-2026.

FIGURE 5-2
CAPITAL EXPENDITURES (2020-2026)
(THOUSANDS OF NOMINAL DOLLARS)



5. Support for Request

PG&E's expense and capital forecasts for CRESS are reasonable and will allow the Company to:

- Comply with applicable laws and regulations;
- Invest in workspaces to enable critical operations, support PG&E's system hardening and wildfire efforts, and provide essential customer service and support for all field crews, equipment, vehicles, and materials staging;
- Reduce operational, safety, and compliance risks and maintain safe, reliable, and efficient facilities to better serve PG&E's customers.

6. Organization of the Remainder of This Chapter

The remainder of this chapter is organized as follows:

- Section B – Program and Risk Overview;

- Section C – Activities, Costs, and Forecast Drivers by Major Work Category (MWC);
- Section D – Estimating Methods;
- Section E – Revenue Forecast; and
- Section F – Cost Tables.

B. Program and Risk Overview

1. Program Description

a. Department Overview

CRESS is responsible for planning, acquiring, designing, constructing, operating, and maintaining PG&E's facility or workspace portfolio. Specific activities include assessing long-term business needs, developing, and executing real estate plans, and regularly monitoring and maintaining facility conditions. CRESS also provides support for surplus properties,¹¹ and is responsible for providing business support services, such as maintaining conference centers and training facilities.

b. Organizational Structure

CRESS employees report to a Senior Director, who in turn reports to the Vice President of Shared Services. CRESS has 40 management employees, two administrative employees, 103 International Brotherhood of Electrical Workers (IBEW)¹²-represented employees, and 5 Engineers and Scientists of California¹³-represented employees. CRESS is also supported by outside professionals for facilities management, program management, and project services.

c. Activities Overview

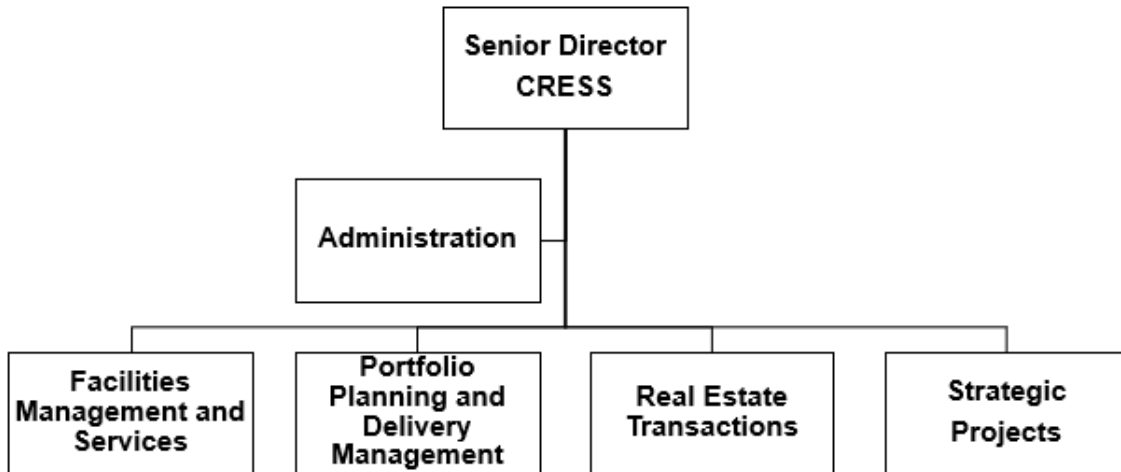
The CRESS organization, shown in Figure 5-3, is comprised of four functional areas: Facilities Management and Services; Portfolio Planning and Delivery Management; Real Estate Transactions; and Strategic Projects.

¹¹ Exhibit (PG&E-7), Ch. 6.

¹² <http://www.ibew.org/> (as of June 16, 2021).

¹³ <https://www.ifpte20.org/pge/> (as of June 16, 2021).

**FIGURE 5-3
CRESS ORGANIZATION**



1) Facilities Management and Services

Facilities Management and Services operates and maintains the Company's facilities managed by CRESS. Included in Facilities Management and Services are: (1) Facilities Services Operations Center (FSOC); (2) Facilities Operations; (3) Critical Operations; (4) Facilities Planning; and (5) Facilities Program groups.

- FSOC Group – Interfaces with PG&E employees for call intake on facilities issues (e.g., broken facility equipment, such as heating, plumbing, etc.) and handles general building office requests (e.g., workstation re-configuration). This group maintains the integrated work management process, administrative services, and records.
- Facilities Operations – Provides services such as janitorial, landscaping, plumbing, lighting, furniture, pest control, and repairs and maintenance to CRESS's diverse portfolio of offices, SCs, CSOs, and critical facilities.
- Critical Operations Group – Manages critical facilities that house crucial core computer or customer support operations, such as data centers, grid and gas control centers, and customer call centers.

- Facilities Planning Group – Supports the Risk-Based Facility Condition Assessment (RB-FCA) Program, described more fully in Section B.1.e. of this chapter.
- Facilities Program Group – Manages PG&E's conference centers, training facilities, food services and lodging.

2) Portfolio Planning and Delivery Management

Portfolio Planning and Delivery Management provides strategic portfolio and financial planning and governance, real asset development, planning, design, and delivery services, compliance, and execution support for the CRESS organization. The team utilizes a vendor-leveraged model utilizing best in class designers, general contractors, and key subcontractors to help plan, design, manage, and deliver workspaces. Unlike other PG&E LOBs, no work is self-performed other than planning, management, and governance oversight.

3) Real Estate Transactions

Real Estate Transactions provides lease management and land acquisition support for the CRESS organization.

4) Strategic Projects

Strategic Projects develops overall portfolio strategy and manages strategic repositioning projects such as planning to monetize real estate, relocating critical infrastructure in support of the San Francisco headquarter relocation to Oakland, and developing workplace needs in support of regionalization.

d. Overview of Corporate Real Estate and PG&E's Facility Portfolio

The CRESS portfolio consists of 726 buildings at 215 different locations. PG&E owns 88 percent of the buildings and leases 12 percent. The facilities in PG&E's real estate portfolio are shown in Table 5-2.

**TABLE 5-2
FACILITIES MAINTAINED BY CRESS**

Line No.	Facility Type	No. of Sites	No. of Buildings	Gross Square Feet (K)
1	Headquarters and Regional Offices	38	51	3,507
2	SCs	94	502	2,933
3	Stand-Alone CSOs	29	29	85
4	Special Purpose Sites	7	43	540
5	Critical Facilities	7	10	330
6	Material Warehouses	10	19	266
7	Other	30	72	595
8	Total	215	726	8,256

1) Office Buildings

CRESS manages Class A¹⁴ and Class B¹⁵ office space in a multitude of locations. In addition to the GO complex in San Francisco, PG&E has office facilities in Sacramento, Concord, Fresno, San Jose, San Ramon, and other areas. In 2022, PG&E will begin its move from the San Francisco GO to 300 Lakeside Drive in Oakland.

2) Service Centers (SC)

PG&E manages 94 SCs that include more than 500 buildings totaling 2.9 million square feet. SCs provide the necessary light-industrial facilities for all local energy transmission and distribution, system maintenance and construction, service planning, customer service, and support team activities including material storage, equipment parking, vehicle repair and maintenance, and office space for local management and staff personnel. SCs located in metropolitan areas generally house a staff ranging from 150 to

¹⁴ Class A office space is defined as: Most prestigious buildings competing for premier office users with rents above average for the area. Buildings have high quality standard finishes, state of the art systems, exceptional accessibility, and a definite market presence. www.boma.org (as of June 16, 2021).

¹⁵ Class B office space is defined as: Buildings competing for a wide range of users with rents in the average range for the area. Building finishes are fair to good for the area and systems are adequate, but the building does not compete with Class A at the same price. www.boma.org (as of June 16, 2021).

300 employees, while those in remote or less populated regions typically house 25-50 employees.

3) Customer Service Offices (CSO)

PG&E currently has 65 CSO sites located in owned SCs and office buildings, and in standalone leased sites. CSOs have between 1 to 12 Customer Service Representatives who provide face-to-face service to customers processing bill payments and certain non-payment transactions. The Customer Care organization oversees CSO operations with CRESS support to manage the facilities.¹⁶

4) Special Purpose Sites and Warehouses

CRESS supports seven special purpose sites containing 43 buildings with over 540,000 square feet of space. These facilities house dedicated operations such as the Corporate Records Center in Brisbane, Billing Center in West Sacramento, Electric Safety Academy in Livermore, Gas Safety Academy in Winters, Applied Technology Services in Danville, and the San Ramon Valley Conference Center in San Ramon. CRESS also maintains PG&E's material distribution centers located in Fremont, Wheatland, Emeryville, Pismo Beach, and Fresno totaling 266,000 square feet of space.

5) Critical and or Significant Facilities

CRESS supports maintenance and facilities operations for Critical Facilities which house crucial core computer or customer support operations such as: data center in Fairfield; grid and gas control centers in San Ramon, Rocklin, and Vacaville; electric distribution control centers in Rocklin, Concord and Fresno; and customer call centers in Sacramento and Fresno. These facilities are essential to providing reliable and responsive service to electric and gas customers.

¹⁶ See Exhibit (PG&E-6), Ch. 4 for further details on CSOs.

e. Maintenance of Facility Assets

CRESS manages janitorial, landscaping, building maintenance, and repair work and oversees life cycle repairs and replacements (e.g., heating, ventilation, and air conditioning (HVAC)), plumbing and sewage systems, roofing, infrastructure, and grounds for all locations within its portfolio.

CRESS utilizes the Facility Condition Index (FCI) and Risk-based Facilities Condition Assessment (RB-FCA) methodologies developed in 2016 and detailed in the 2017 GRC. The methodologies provide a systematic approach to assess facilities and develop maintenance and lifecycle strategies using data from the FCI and RB-FCA. Both the FCI and the RB-FCA methodologies are described in more detail below.

1) Facilities Condition Index¹⁷

FCI is a standard facility management industry benchmark used to objectively assess the current and projected condition of a building asset.

2) Risk-Based Facility Condition Assessment¹⁸

The RB-FCA Program is an industry-proven, proactive asset management process to systematically review the age and condition of major building systems and components. The RB-FCA allows the Company to monitor, assess, plan, and make repairs on building systems and components on a risk rank basis before they fail.

3) Benefits of RB-FCA

PG&E prioritizes work in its Facilities Condition Assessment investment plans to:

- Confirm that the highest priority work gets done;

¹⁷ The FCI is a tool that was first published in 1991 by the National Association of College and University Business Officers in *Managing the Facilities Portfolio*. The principal author of the book was Applied Management Engineering, Inc., located in Virginia Beach, Virginia.

¹⁸ Exhibit (PG&E-7), WP 5-19, Risk-Based Facility Condition Index.

- Prioritize and direct funds to the areas of greatest risk: namely, safety, compliance, building systems loss, and/or business interruptions;
- Validate the need for replacement of sizable portions/elements (systems) of property;
- Identify funding commitments necessary to keep facilities operational and recognize the associated risk of these projects are deferred;
- Group similar projects (e.g., roofing, paving, etc.) to generate economies of scale and minimize business interruptions; and
- Improve sustainability with new systems and office upgrades.

f. Key CRESS Initiatives

1) Transition from SFGO to Oakland Lakeside

In the 2020 GRC, PG&E identified emergent safety and compliance related work for the GO that was to be performed for employee and public safety should PG&E decide to maintain its SFGO campus. This included: (1) GO Façade Restoration; and (2) GO Electrical and Mechanical Safety Upgrades, and (3) Additional building system replacement work for GO consisting of building controls and alarms, heating and ventilation, and air handling unit upgrades. Since that time, PG&E has decided to sell the SFGO complex. Accordingly, all work forecast in the 2020 GRC other than required repairs to maintain operations has been deferred or cancelled.

As part of its Chapter 11 reorganization plan, PG&E worked collaboratively with the CPUC and the Bankruptcy Court to develop and approve a plan to sell the SFGO complex and enter into a lease with an option to purchase 300 Lakeside in Oakland. PG&E successfully negotiated an intent to lease agreement with TMG Partners in June 2020 for 300 Lakeside pending TMG's purchase of the 300 Lakeside asset. That transaction between TMG and the seller closed in October 2020, followed by PG&E executing the lease with purchase option transaction.

1 Under the terms of the agreement, PG&E has the option to
 2 purchase the 300 Lakeside asset in 2023 per terms of the
 3 lease/purchase option agreement for a forecasted and allocated
 4 amount of \$892 million based on a preliminary cost buildup including
 5 cost to purchase and redevelop the site to PG&E specifications.

6 PG&E filed an application with the Commission under Section
 7 (§) 851 of the Public Utilities Code to sell SFGO.¹⁹ On May 26,
 8 2021, PG&E filed a Joint Motion for Adoption of Amended
 9 Settlement Agreement in its §851 proceeding. Among other things,
 10 the Settlement Agreement proposes that the Commission should
 11 find that: (1) the proposed SFGO sale satisfies all Section 851
 12 requirements and should be authorized; (2) PG&E's proposed
 13 ratemaking treatment (as modified per the Settlement Agreement)
 14 should be found reasonable; (3) PG&E's headquarters real estate
 15 strategy should be found reasonable; (4) the terms of the Lakeside
 16 Building and Purchase Option Agreement should be found
 17 reasonable; and (5) the estimated Lakeside Building moving costs,
 18 lease costs, and operations and maintenance costs should be found
 19 reasonable. PG&E served supplemental testimony as well as
 20 updated workpapers on June 11, and three additional exhibits on
 21 July 7. The matter was deemed submitted on July 16, and the
 22 Commission approved the amended settlement agreement on
 23 August 19, 2021.²⁰

24 PG&E's 2023 capital forecast contains the forecasted purchase
 25 option amount pending exercising the option. Consistent with the
 26 decision approving the sale, PG&E will file a petition for modification
 27 within 90 days of exercising its purchase option, wherein PG&E will

¹⁹ See A.20-09-018. Terms of the proposed sale, outline of the 851 process, timing for transaction close, and other areas of the transaction have been provided to the CPUC within the 851 process testimony and data responses which can be found by entering the application number into PG&E's regulatory website: <https://pgera.azurewebsites.net/Regulation/search> (as of June 16, 2021).

²⁰ See Decision Authorizing Pacific Gas and Electric Company's Sale of its San Francisco General Office Complex and Related Matters, D.21-08-027, issued August 19, 2021 in A.20-09-018.

request a reasonableness review and cost recovery of actual costs incurred in connection with the move to the Lakeside Building.

2) 2023 GRC Service Center Investment Plan

PG&E's Service Centers (SC) are core to maintaining customer service and support for all field crews, equipment, vehicles, and materials staging. Approximately 75 percent of the Company's SCs are over 45 years old and are at the end of their design lifespan. Although all were compliant to the codes in place at the time of development, many do not fulfill current requirements related to fire and life safety, seismic performance, and environmental compliance. The locations and sizes of many current centers were based on customer profiles dating back more than 40 years. In many cases, local customer support needs have grown tremendously due to urban sprawl and suburban development without the center expanding in proportion to demand. Many SCs were originally located in industrial or light-industrial areas on the outskirts of communities, but now are immediately adjacent to residential and/or commercial developments which causes safety and community engagement issues. Lastly, trucks and equipment have grown over time, and when coupled with the materials storage at a site, severely constrain site logistics.

The 2023 GRC request focuses on continuing the investment in PG&E's SCs to support its diverse customer needs, supporting system hardening and enhanced emergency response, and resolving individual safety and/or compliance items at the respective sites.

a) Service Center Investment Plan – Background

PG&E plans to continue to invest in its SC portfolio as these assets are critical to providing and maintaining customer energy service and support

Since early 2019, CRESS has focused its strategic investments at selected PG&E-owned SC sites while continuing to monitor opportunities to fulfill the highest priority consolidation

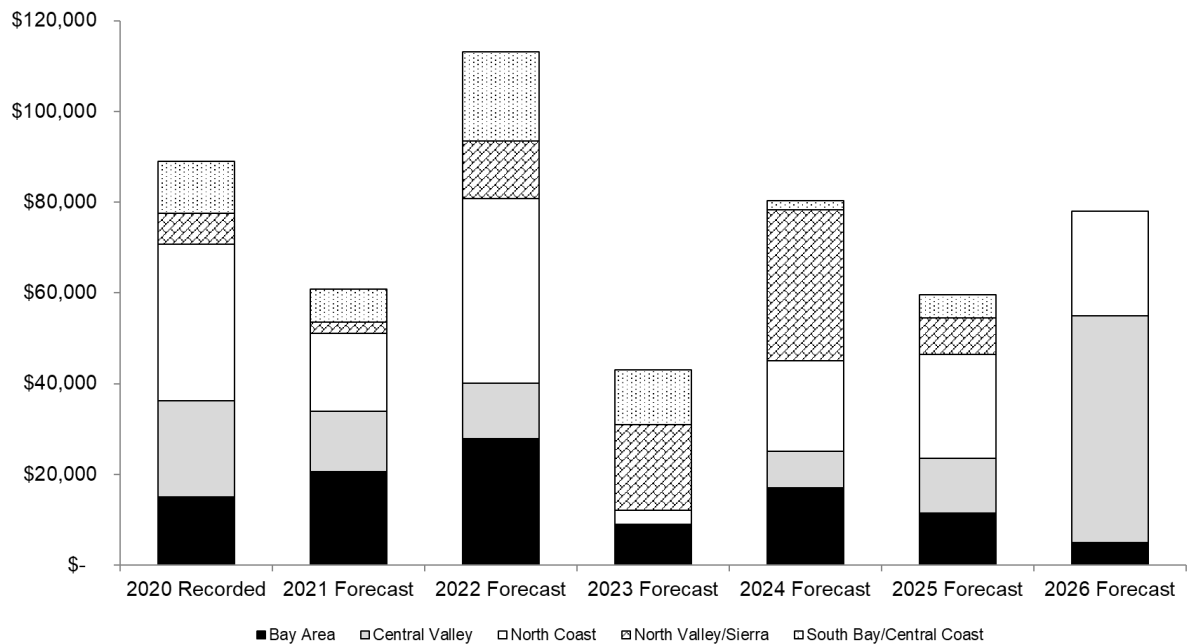
1 efforts should an opportunity come available. The focus has
 2 continued to be on enhancing safety, reducing risk, and
 3 maintaining compliance as well as maintaining customer
 4 support and supplementing wildfire risk reduction and response.

5 **b) 2023 GRC Service Center Investment Plan – Investments**

6 PG&E plans to invest approximately \$260.8 million²¹
 7 in capital over the 2023-2026 timeframe for the Service Center
 8 Investment Plan, as shown in Figure 5-4. This capital
 9 investment will target opportunities at several existing centers to
 10 reduce operational costs, enhance safety and logistics by
 11 creating efficient layouts, resolve site environmental concerns to
 12 maintain compliance, reduce threat of physical attack by
 13 enhancing perimeter security and fencings, and enable key
 14 Electric and Gas system hardening as well as emergency
 15 response efforts.

²¹ Exhibit (PG&E-7), WP 5-116, Project Summary: North Coast Region Service Center Investment. Exhibit (PG&E-7), WP 5-121, Project Summary: North Valley and Sierra Region Service Center Investment. Exhibit (PG&E-7), WP 5-127, Project Summary: Bay Area Region Service Center Investment. Exhibit (PG&E-7), WP 5-134, Project Summary: Central Coast Region Service Center Investment. Exhibit (PG&E-7), WP 5-138, Project Summary: Central Valley Region Service Center Investment.

**FIGURE 5-4
SC INVESTMENTS BY REGION – CAPITAL
(THOUSANDS OF NOMINAL DOLLARS)**



c) Service Center Investment Plan – Benefits

The Service Center Investment Plan will continue to provide several operational and risk-related benefits to PG&E's customers and employees, including:

- Immediate removal of safety hazards related to congested yards, poor traffic circulation, poor visibility and less than optimal SC layouts;
- Reduction of risks related to fire, flood, seismic, and physical attack; and
- Maintaining compliance with all applicable codes and standards such as the use of mobile trailers at various centers, storm water runoff, and the storage of hazardous materials.

Table 5-3 shows the associated cost of the Service Center Investment Plan.

TABLE 5-3
SERVICE CENTER INVESTMENT PLAN
2021-2026 FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	Service Center Investment Plan	Forecast						Total	Workpaper Reference
		2021	2022	2023	2024	2025	2026		
1	Capital (MWC 23)	\$60,778	\$113,122	\$43,021	\$80,300	\$59,500	\$78,000	\$434,721	WP Table 5-13
2	Expense (MWC JH)	—	—	—	—	—	—	—	WP Table 5-3
3	Total	\$60,778	\$113,122	\$43,021	\$80,300	\$59,500	\$78,000	\$434,721	

d) 2023 GRC Service Center Investment Plan – Details

i) Prior SC Investment Progress

PG&E identified in the 2020 GRC SCs that required investment in terms of enhancing safety, reducing risk, and maintaining compliance. PG&E completed projects at the Chico and Redding SCs in 2020 and is in process for others in 2021 and 2022.

ii) Service Center Investment Plans for Current Focus of Operations

PG&E's plan to invest in SCs prioritizes locations that directly support its focus on wildfire mitigation including distribution system inspection and repairs, vegetation management, and grid hardening. The investment will target risk reduction and resolution of safety and compliance items at priority sites which may include the following aspects:

- Incorporating FAU items to resolve facility features that have exceeded useful life;
- Reviewing and resolving planned maintenance (e.g., roofing, heating, and cooling, power, paving, domestic water, sewer, etc.) to ensure the site has adequate remaining useful life to accommodate planned operations;

- Ensuring perimeter security and access control systems and features are compliant with PG&E's Corporate Security standards;²²
- Resolving any seismic stability concerns, particularly with racking and other vertical storage features;
- Resolving compliance issues that may include use permits for temporary facilities, use of trailers for office spaces, use of cargo vans for local storage, etc.;
- Resolving environmental concerns, particularly those related to storm water runoff from treated wood poles; and
- Ensuring each center has appropriate and adequate emergency response capabilities such as an event response or storm room, adequate laydown for additional materials and crew staging, and backup power to maintain operations during an outage.

The approach will be to assess the respective site against planned operations, list proposed investments, risk/rank them for implementation, and deliver as much target value as possible based on available funds. Estimates for each site are presumptive at this point based on available information at this time. To ensure an equitable distribution of funds to each priority site, PG&E plans to update each facility to the extent possible within the budgeted amounts per site. This is consistent with the investment approach outlined in the 2020 GRC.

e) North Regions^{23,24}

Locations within PG&E's northern region (includes both proposed regionalization regions: North Coast, and

²² Exhibit (PG&E-7), WP 5-146, PG&E's Enterprise Perimeter Barrier/Fencing Standard.

²³ Exhibit (PG&E-7), WP 5-116, Project Summary North Coast Service Center Investment.

²⁴ Exhibit (PG&E-7), WP 5-121, Project Summary North Valley and Sierra Region Service Center Investment.

Northern Valley and Sierra²⁵), which has significant wildfire risk mitigation Tier 2 and Tier 3 areas,²⁶ include the following sites:

- Auburn, Burney, Chico, Davis, Eureka, Napa, Redding, Sacramento, San Rafael, Santa Rosa, and Ukiah
- Typical work to be performed at each site includes:
 - Resolving scheduled or deferred maintenance;
 - Installing site paving, storm, and domestic water systems;
 - Installing fixed emergency generation or connection points for portable generators to help maintain operations during a power outage;
 - Installing perimeter fence updates to current Corporate Security Standards; and
 - Updating pole and/or soils storage areas to accommodate planned volume and maintain environmental compliance.

f) Bay Area Region²⁷

The Bay Area Region will have critical deferred maintenance supported by the FAU Program and will include the following locations: Antioch, Cupertino, Fremont, Livermore, San Carlos, Oakland, and San Francisco. One site within this region will be renovated to support planned operations.

g) Central Coast Region²⁸

The Central Coast Region, also home to significant Tier 2 and Tier 3 wildfire mitigation areas, will include the following locations: Salinas, San Luis Obispo, and Santa Cruz.

²⁵ Exhibit (PG&E-7), WP 5-218, Proposed Five Regions for Regionalization Map.

²⁶ Exhibit (PG&E-7), WP 5-217, Wildfire Safety Operations Center (WSOC) Map. Tier 2 elevated and Tier 3 extreme are fire zones defined by PG&E's WSOC.

²⁷ Exhibit (PG&E-7), WP 5-127, Project Summary Bay Area Region Service Center Investment.

²⁸ Exhibit (PG&E-7), WP 5-134, Project Summary: Central Coast Region Service Center Investment.

1 **h) Central Valley Region²⁹**

2 The Central Valley, which benefited from recent
3 development at Lemoore, Fresno, and Merced will see
4 investment at the following sites: Lemoore, Modesto,
5 and Stockton.

6 **3) Regional Office Investment Plan**

7 To continue to drive affordability with the CRESS office portfolio,
8 PG&E plans to implement a regional office consolidation program
9 within one of its regional office portfolios. The modeled portfolio is
10 comprised of five leased sites. PG&E's intent is to develop a site to
11 PG&E's workplace standards to consolidate all operations at the
12 current leased facilities to one new owned center.³⁰

13 Based on historical costs and utilizing CRESS's cost estimating
14 models, PG&E estimates \$117 million for development of the new
15 center. Program validation and site search activities will commence
16 in 2023 with site development and delivery to be completed by
17 2027. PG&E estimates annual operating expense savings to be
18 \$5.5 million.

19 Table 5-4 compares the associated operating expenses
20 between keeping the existing buildings and building the new
21 regional office.

²⁹ Exhibit (PG&E-7), WP 5-138, Project Summary: Central Valley Region Service Center Investment.

³⁰ Exhibit (PG&E-7), WP 5-157, Project Summary: Regional Office.

**TABLE 5-4
REGIONAL OFFICE PLAN
(THOUSANDS OF NOMINAL DOLLARS)**

Line No.	Building (Existing)	RSF	Seats	HC	Owned/Leased	OPEX
1	Site A	49,334	310	256	Leased	\$1,933
2	Site B	20,301	106	92	Leased	417
3	Site C	26,523	169	144	Leased	670
4	Site D	3,038	11	10	Leased	73
5	Site E	94,560	501	446	Leased	3,248
6	Existing Totals	193,757	1,097	948		\$6,341

Line No.	Building (New)	Estimated RSF	Estimated Seats	Estimated HC	Owned/Lease	Estimated OPEX/Year
7	Regional Office A – Site TBD	89,640	498	570	Owned	\$418
8	Regional Office B – Site TBD	59,130	405	405	Owned	275
9	Potential CSO – Site TBD	4,145	11	11	Leased	116
10	New Totals	152,915	914	986	–	\$809
11	New vs. Existing TOTAL	(40,842)	(183)	38	–	\$(5,532)

4) Customer Service Office Investment Plan – Overview

a) CSO³¹

PG&E currently has 65 CSOs in owned and leased sites. A portion of the leased sites do not meet PG&E's seismic requirements and were in process of determining appropriate relocation opportunities when the CSOs were closed in early 2020 as a pandemic mitigation. Once the CSOs are approved to reopen, CRESS will reinitiate its plan to relocate sites that do not meet PG&E operating criteria.

5) LOB Operational Initiatives

PG&E's CRESS team works closely with all lines of business to provide the necessary workspace to accomplish respective business goals CRESS worked with the Aviation Services Department to develop a concept and estimate for a centralized aviation operations center adjacent to one of Northern California's regional public airports, and to develop a drone operations and maintenance facility

³¹ See Exhibit (PG&E-6), Ch. 4 for further details on CSOs.

at an existing PG&E owned site. The business case for this effort is contained in Exhibit (PG&E-7), Chapter 2. CRESS has provided an initial estimate of \$25 million to support the Aviation plan.³²

6) Regionalization

CRESS has supported Regionalization discussions related to how potential regional teams may be accommodated with adequate workspace within each region. PG&E filed an application for approval of its Regionalization Proposal on June 30, 2020 and the general premise for this GRC period is PG&E will utilize its existing portfolio as-is to accommodate the proposed regional management teams. No cost forecast is expected to expand existing or develop new centers. Detailed information can be found in the Application for Approval of Regionalization Proposal.³³

7) Facility Asset Upkeep Program

CRESS uses proactive maintenance practices to optimize life cycle costs and limit unplanned business interruptions due to system or equipment failure. This process helps minimize costly reactive maintenance and unplanned business interruptions. Regular maintenance is essential for enhancing safety, reducing risk, and maintaining compliance at PG&E's facilities.

To assist in developing investment priorities within existing facilities and systems, PG&E relies on its RB-FCA Program which develops a relative score for each facility known as the FCI. PG&E uses this model and score to determine planned investment referred to as FAU.

This approach is particularly appropriate for PG&E based on the aging of the CRESS managed portfolio (shown in Table 5-5).³⁴

³² Exhibit (PG&E-7), WP 5-153, Project Summary: Aviation Operations Center.

³³ See A.20-06-011. The Application for Approval of Regionalization Proposal can be found by entering the application number into PG&E's regulatory website: <https://pgera.azurewebsites.net/Regulation/search> (as of June 16, 2021).

³⁴ The average age of PG&E's buildings is 40 years. More than 60 percent of PG&E's facilities are more than 30 years old. For example, PG&E's Davis Service Center is 94 years old.

CRESS utilizes predictive maintenance items coupled with annual visual inspections to qualify and quantify remaining useful life for building systems and components to identify and prioritize investments required to maintain operations.

**TABLE 5-5
AGE OF PG&E FACILITY PORTFOLIO**

Line No.	Building Age	No. of Buildings	Percent of Total
1	0-10 Years	98	16%
2	11-20 Years	66	10%
3	21-30 Years	78	12%
4	31-40 Years	137	22%
5	40+ Years	248	40%
6	Unspecified	99	—

a) FAU Maintenance Plan Investments

FAU spend is driven by facility age and remaining useful life of systems and components and is needed to:

- Replace or upgrade the electrical, lighting, mechanical, and plumbing systems;
- Replace or renovate building infrastructure systems and subsystems such as asphalt, roofing, fire detection/prevention, fencing, and painting; and
- Replace or remediate interior building components, such as doors, ceilings, and floor coverings.

The National Research Council recommends annual maintenance expenditures ranging between 2-4 percent of replacement value.³⁵ The replacement value of PG&E's owned portfolio is approximately \$8.7 billion,³⁶ excluding land.

Therefore, the annual maintenance expenditure for PG&E should range between \$174 and \$348 million in expense and

³⁵ Exhibit (PG&E-7), WP 5-24, for "Committing to the Cost of Ownership: Maintenance and Repair of Public Buildings," National Research Council, National Academy Press, 1990.

³⁶ Exhibit (PG&E-7), WP 5-92, Replacement Value of CRESS-Managed Buildings.

capital. PG&E's requested funding is below this range and appropriate for its portfolio.

The expense forecast for FAU activities is \$4.0 million in 2023. Capital expenditures for 2023-2026 are \$37.2, \$41.7, \$42.0, and \$30.0 million, respectively. Costs are associated with investment that will occur in the 2023-2026 GRC timeframe as part of Service Center Investment Plans and will be a portion of the overall projects which are primarily capital and will only occur if capital funding is available for those projects.

8) Safety, Security, and Compliance

To address structural and non-structural safety and environmental compliance risks associated with occupied and critical facilities, CRESS will implement projects that focus on safety and regulatory compliance. The projects address seismic study results with seismic renovations and repairs, racking and vertical storage³⁷ issues along with sediment and rainwater runoff from mismanaged spoils and materials storage.³⁸

For physical security concerns, CRESS will continue to ensure perimeter security and access control systems and features are compliant with PG&E's Corporate Security Department's Standard.³⁹

Capital expenditures for 2023-2026 are \$47.5, \$44.0, \$44.0, and \$34.0 million, respectively. This is a 20 percent increase from the 2020 baseline year of \$39.5 million.

9) Fire Risk Mitigation Memorandum Account (FRMMA)

Capital expenditures for 2023-2026 are \$0 million since the program will complete in 2022. This is a 100-percent decrease from the 2020 baseline year of \$38.4 million. The capital expenditures forecast for 2021 and 2022 are \$41.0 million and \$21.0 million

³⁷ Exhibit (PG&E-7), WP 5-163, Project Summary: RAMP Seismic Improvements.

³⁸ Exhibit (PG&E-7), WP 5-149, Project Summary: Environmental Compliance Program.

³⁹ Exhibit (PG&E-7), WP 5-144, Project Summary: System Service Center Security Program.

respectively. ~~Detailed information on the work and costs recorded to the FRMMA can be found in Exhibit (PG&E-7), Chapter 5, Attachment A.~~

2. Risk Assessment and Mitigation Phase (RAMP) Risks

a. Real Estate Facilities Failure Risk

1) Risk Overview

The Real Estate Facilities Failure Risk is the risk of an event which causes a building, facility, or property within PG&E service area to be deemed unsafe, or inaccessible for operation or occupancy, such that PG&E is unable to use the building or property to support operational needs. Key risk drivers include a seismic, flood, landslide, building fire, or physical security event. The scope of this risk includes all PG&E owned or leased buildings and facilities. All other non-facility-related PG&E assets, such as electric and gas transmission and distribution systems, dams, and substations are covered under other risks.

2) Updates to PG&E's RAMP Report

Announced in June 2020, PG&E will relocate the San Francisco General Office to Oakland. Therefore, PG&E determined that an analysis of the Oakland 300 Lakeside Building should be performed to determine the risk score for the building as a separate tranche. The Oakland Lakeside Building was added to the overall risk model replacing the tranches for the San Francisco 77 Beale and 245 Market buildings. Based on the updated model, PG&E could then reconfirm the risk score baseline from which PG&E can develop a risk mitigation strategy which would include proposed actions and costs resulting in Risk Spend Efficiency (RSE) and Risk Reduction. Information from the updated analysis is described below.

3) Feedback from Safety Policy Division

On November 25, 2020, the Safety Policy Division (SPD) issued its Staff Evaluation Report on PG&E's 2020 Risk Assessment and Mitigation Phase (RAMP) Application (A.) 20-06-012. SPD

1 recommended that PG&E provide a full analysis of such a move,
2 including any risks associated with the transition, and how it might
3 affect the risks analyzed throughout the 2020 RAMP. This analysis
4 of Oakland to replace the SFGO within PG&E's model was also a
5 recommendation of the Safety Policy Division.

6 In response to SPD's feedback, PG&E added the
7 Oakland Lakeside Building as a tranche to our model and calculated
8 a baseline risk score for Oakland. The baseline risk score for
9 Oakland represents the building as-is which is a contemporaneous
10 code-compliant high-rise multi-tenant commercial office building.
11 The risk score model algorithm has several variables such as:
12 (a) location to determine local ground characteristics and proximity
13 to a known fault; (b) building type and structure (i.e., high-rise and
14 steel moment frame); and (c) planned headcount resident at the
15 time of a seismic event or other risk. PG&E's prior model showed a
16 baseline risk score for 77 Beale of 67.50, 245 Market of 5.82, and
17 45 Beale of 0.35 as separate tranches. The range in risk scores
18 between 77 Beale, 245 Market, and 45 Beale is primarily attributed
19 to: (a) difference in building height (16 vs. 32 vs. 3 above-ground
20 occupied floors); (b) seismic performance characteristics (77 Beale
21 is built to contemporaneous 1970s code and 245 Market was
22 seismically-upgraded in the 1990s); and (c) density of personnel
23 (77 Beale has approximately 2,000 employees assigned
24 vs. 245 Market has approximately 1,000 employees assigned
25 vs. 45 Beale with less than 50). Using the same algorithm for
26 300 Lakeside, the baseline risk score is 101.51. The increase in risk
27 score for Oakland, as compared to the SFGO complex, is primarily
28 driven by Oakland being roughly the same height and performance
29 level as 77 Beale, but with 33 percent more employees potentially
30 present in one building versus the three modeled SFGO buildings
31 during a risk event.

32 To further provide the comparison of 77 Beale to 300 Lakeside,
33 PG&E once contemplated consolidating all SFGO employees to
34 77 Beale and offering 245 Market for surplus. Placing all employees

1 in 77 Beale (as compared to having them split between 77 Beale
2 and 245 Market) results in a risk score of 113 vs. a score of 102 for
3 the Oakland building.

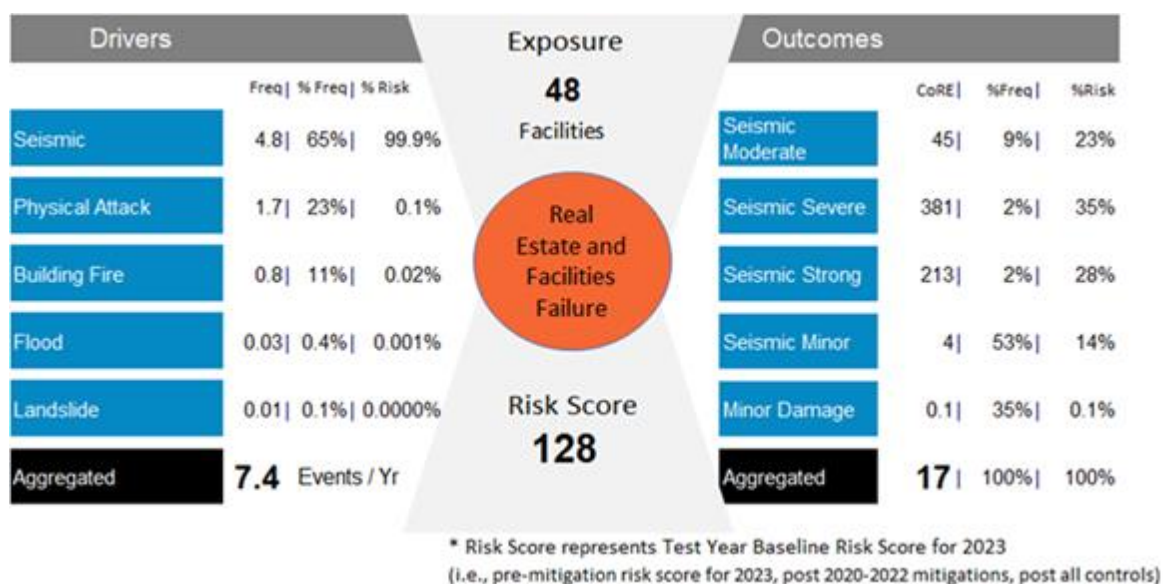
4 **4) Real Estate Facilities Risk Overview**

5 As previously stated, the Real Estate Facilities Failure Risk is
6 the risk of an event which causes a PG&E building, facility, or
7 property to be deemed unsafe or inaccessible for operations.
8 As filed in the PG&E's 2020 RAMP report, exposure to this risk was
9 based on a tranche-level analysis of 50 representative buildings
10 from the subset of facilities managed by CRESS that included high-,
11 mid-, and low-rise office buildings, SCs, conference centers, and
12 critical facilities in predominately high seismic areas of the state.
13 The risk model analysis indicates that the expected number of
14 events per year is approximately 8 for this risk. 62 percent of the
15 risk events are seismic events while physical security, flood,
16 landslide, and building fire account for 38 percent of the risk events.
17 Seismic risk also makes up more than 99 percent of the total risk
18 impact score and physical security, flood, landslide, and building fire
19 events comprise 26 the remaining portion of the risk score. Based
20 on this analysis, PG&E's planned mitigations primarily address
21 seismic risk events.

22 PG&E's prior model that included 77 Beale, 245 Market and
23 45 Beale showed 71.8 percent of the tranche-level risk was related
24 to these two high-rise, highly populated buildings located in a
25 relatively high-seismic zone coupled with a low-rise relatively lightly
26 populated building. 12.3 percent of the tranche-level risk is related
27 to five mid-rise buildings, and the remaining 15.9 percent is based
28 on the sample of single story or low-rise buildings found in SCs,
29 office complexes, and other facilities. Since the RAMP filing,
30 PG&E's updated model removed 77 Beale, 245 Market and
31 45 Beale and now includes Oakland 300 Lakeside.
32 Oakland Lakeside is now the highest risk tranche with 77.6 percent
33 of the overall modeled risk. The remaining 22.4 percent risk
34 remains the same as the remaining tranches were not changed.

The updated 48 tranche model has slightly changed certain values in the bowtie for this risk⁴⁰ (shown in Table 5-6 below):

**TABLE 5-6
REAL ESTATE FACILITIES FAILURE**



The prior bowtie representing the 50-tranche model showed a total risk score of 97, as compared to the updated score of 128. Driving events reduced from 8.2 to 7.4 per year, and aggregated outcomes increased from 12 to 17.

Although the increase in total risk score appears material (from 97 to 128) to the overall risk reduction effort, it underscores that the Real Estate Failure Risk is solely grounded in the fact that PG&E, like many other greater San Francisco Bay Area companies, house centralized employee workforces in metropolitan high-rise commercial office buildings. This is primarily a business decision based on the pool of qualified professional, technical, and support personnel in large metropolitan areas served by robust urban and suburban transit to allow employees to travel to the office.

⁴⁰ This bowtie reflects an updated 48 building model that removed SFGO buildings and included 300 Lakeside Oakland. This information has not been filed with RAMP testimony at this writing but will be included in the next RAMP update.

To reduce seismic risk within the CRESS portfolio, CRESS plans to incrementally invest in structural and non-structural seismic enhancements to its owned buildings. The Oakland Lakeside transaction contains investment to perform a voluntary upgrade (not required by code or statute but prudent for an owner/occupier of a high-rise office building) to increase seismic performance of the building from its current code-compliant condition and seismic mitigation capabilities.

5) Continuation of Foundational Activities

Between 2020 and 2022, PG&E will conduct foundational activities such as surveying buildings that meet criteria related to potential seismic performance (i.e., location, building type, age). The buildings or structures will be reviewed to determine if the structures should be renovated or replaced either by redevelopment or relocation (relocation is particularly related to leased facilities). PG&E will begin renovation or replacing targeted facilities identified during the foundational survey starting in 2023 or sooner depending on the implementation of CRESS SC Investment Program as outlined in the 2020 GRC.

Detailed information on this risk as modeled in the RAMP can be found in Chapter 14 of the 2020 RAMP Filing.

6) Controls

PG&E has not changed the Real Estate and Facilities Failure risk controls since it submitted its RAMP Report. See Table 5-7 for an overview of the controls. Detailed information about our risk controls can be found in our RAMP Filing and Workpaper Table 5-21.⁴¹

⁴¹ Exhibit (PG&E-7), WP 5-165, Table 5-21: Real Estate and Facilities Failure Risk: Forecast Control Costs.

**TABLE 5-7
REAL ESTATE FACILITIES FAILURE
CONTROLS AND MITIGATIONS**

Controls		
1	C1 – Regional Optimization	Develop regional office optimization strategy that prioritizes renovations of or relocations from buildings/workplaces that present risks of seismic, flood, landslide, fire, and physical attack events.
2	C2 – SC Optimization	Harden SC facilities by updating perimeter security and fencing to current PG&E standards, upgrading site drainage capabilities and storm water runoff infrastructure, and replacing non permitted temporary or legacy structures with current code compliant structures to control for seismic, flood, landslide, fire, and physical attack drivers.
3	C3 – CSO Optimization	When determining which CSOs to close or relocate, factor in potential seismic, flood, landslide, fire, and physical security risks.
4	C4 – Facilities Management Preventive Maintenance Program	Preventive Maintenance programs include inspections of fire alarms, protection and detection systems, and validating all required maintenance and updates. This control primarily impacts fire and physical attack drivers.
5	C5 – Site Design Structural and Engineering Reviews	All new and retrofitted PG&E facilities must be built to current local codes and ordinances. This control impacts seismic, flood, landslide, and fire drivers.
6	C6 – Segregation of Assets	Place PG&E's critical assets in different areas or regions ensuring a local disaster does not affect all facets of critical operations. This control primarily impacts the seismic or flood driver.
7	C7 – Facility Inspection Program	Inspections include reviews of safety housekeeping items including potential fire hazards, and non-structural seismic issues. This control impacts seismic, fire and physical attack drivers.
8	C8 – Security System Hardening	Identify areas for security system hardening, such as installing higher fencing, automatic gates and/or enhanced perimeter surveillance devices. This control impacts the physical attack driver.
Mitigation		
9	M6 – Renovate or Relocate Facilities Other than SFGO	<u>Effort 1: Renovate or Relocate Low Rise Facilities</u> PG&E will systematically evaluate and retrofit or relocate all low-rise facilities such as SCs and office buildings that do not meet a minimum seismic performance level to reduce seismic risk. <u>Effort 2: Renovate or Relocate Mid Rise and High-Rise Structures (Other Than SFGO)</u> PG&E will review midrise and high-rise structures against the minimum seismic performance criteria and renovate or relocate facilities accordingly.

7) Mitigations

PG&E has not changed the Real Estate and Facilities Failure risk mitigations since it submitted its RAMP Report. For this GRC cycle, the report proposes one mitigation that consists of two concurrent efforts. Table 5-7 provides an overview of that mitigation plan and Tables 5-8 and 5-9 below lists its recorded and

1 forecast costs. Detailed information about our risk mitigations can
2 be found in our RAMP Filing and workpapers. Workpaper
3 Table 5-22 and 5-23⁴² shows the estimated costs for mitigations in
4 RAMP, compared to the estimated costs in the GRC.

5 PG&E calculated two RSEs for the Real Estate and Facilities
6 Failure mitigation:

- 7 a) Renovate or Relocate Facilities Other than SFGO [Materials
8 Racking]: 0.05
9 b) Renovate or Relocate Facilities Other than SFGO [Structural
10 and Non-Structural Building]: 0.52

⁴² Exhibit (PG&E-7), WP 5-166, Table 5-22: Real Estate and Facilities Failure Risk: Comparing Estimated Risk Costs in RAMP to Forecast Costs in the GRC – RAMP Costs. Exhibit (PG&E-7), WP 5-167, Table 5-23: Real Estate and Facilities Failure Risk: Comparing Estimated Risk Costs in RAMP to Forecast Costs in the GRC.

**TABLE 5-8
REAL ESTATE AND FACILITIES FAILURE
RECORDED AND FORECAST MITIGATION COSTS 2020-2026 – CAPITAL
(THOUSANDS OF NOMINAL DOLLARS)**

Line No.	Mitigation No. (2023 GRC)	Mitigation Name (2023 GRC)	2020 Rec. Adj.	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total
1	REFFL-M006	Renovate or Relocate Facilities Other than SFGO	\$2,955	\$8,788	–	\$30,000	\$30,000	\$30,000	\$20,000	\$121,743
2		Total	\$2,955	\$8,788	–	\$30,000	\$30,000	\$30,000	\$20,000	\$121,743

**TABLE 5-9
REAL ESTATE AND FACILITIES FAILURE
RECORDED AND FORECAST MITIGATION COSTS 2020-2023 – EXPENSE
(THOUSANDS OF NOMINAL DOLLARS)**

Line No.	Mitigation No. (2023 GRC)	Mitigation Name (2023 GRC)	2020 Rec. Adj.	2021 Forecast	2022 Forecast	2023 Forecast	Total
1	REFFL-M006	Renovate or Relocate Facilities Other Than SFGO (Retrofit/Rebuild Facilities)	\$329	\$360	\$1,860	\$1,856	\$4,405
2		Total	\$329	\$360	\$1,860	\$1,856	\$4,405

Not listed in the above table of forecast investments is the effort proposed by TMG (The Lakeside Building project developer) and approved by PG&E to enhance the seismic performance of the building. The enhancements allow for increased performance to maintain life safety or collapse prevention following a seismic event. The cost for this work will be contained in the capital investment update following purchase of the building by PG&E in 2023.

C. Activities and Costs by MWC

1. Expense MWCs

Table 5-10 lists the expense MWCs utilized by CRESS.

**TABLE 5-10
REAL ESTATE MWCS
EXPENSE**

Line No.	MWC	Key Initiatives
1	BI	Maintain Buildings
2	EP	Manage Properties and Buildings
3	IG	Fire Risk Mitigation Memorandum Account
4	JH	Real Estate Portfolio and Transaction Management; Project Expenses Related to Optimization Plans
5	JV	Maintain and Operate Applications and Infrastructure

a. MWC BI – Maintain Buildings

PG&E forecasts Maintain Building costs of \$5.9 million in 2023, which is an increase from the 2020 Recorded Adjusted costs of \$0.8 million due primarily to RAMP and investment in facilities where proposed repair or replacement projects are contained within the Facility Asset Upkeep program. CRESS investment in its portfolio is not limited to large projects, but also focused on incremental repair or replacement of building systems. This incremental effort ensures ongoing performance to support operations. Not performing this incremental investment is akin to running building systems to failure, which is not a prudent operating paradigm for PG&E, particularly in its operations portfolio which directly provide customer support.

b. MWC EP – Manage Properties and Buildings

PG&E forecasts Manage Properties and Building costs of \$109.5 million in 2023, which is a decrease from the 2020 Recorded Adjusted costs of \$117.1 million due primarily to SFGO/Oakland Lakeside Transition.

c. MWC IG – Fire Risk Mitigation Memorandum Account (FRMMA)

PG&E forecasts Fire Risk Mitigation costs of \$1.1 million in 2023, which is an increase from the 2020 Recorded Adjusted costs of \$0.5 million due primarily to wildfire support.

d. MWC JH – Real Estate Portfolio and Transaction Management; Project Expenses Related to Optimization Plans

PG&E forecasts Portfolio Management costs of \$7.8 million in 2023, which is a decrease from the 2020 Recorded Adjusted costs of \$8.2 million primarily due to the SFGO/Oakland Lakeside Transition.

e. MWC JV – Maintain and Operate Applications and Infrastructure

PG&E forecasts Application and Infrastructure costs of \$16 thousand in 2023, compared to the 2020 Recorded Adjusted cost of \$0, due primarily to software applications.

2. Capital MWCs

Table 5-11 lists the capital MWCs utilized by CRESS.

**TABLE 5-11
REAL ESTATE MWCS
CAPITAL**

Line No.	MWC	Key Initiatives
1	22	Maintain Buildings
2	23	Oakland Lakeside Transition
3	23	SC Investment
4	23	Customer Service Office (CSO) Investment Plan
5	23	Line of Business (LOB) Operational Initiatives
6	2F	Develop and Enhance Applications and Infrastructure

1 **a. MWC 22 – Maintain Buildings**

2 PG&E forecasts Maintain Buildings capital expenditures of
3 \$37.2 million in 2023, which is an increase from the 2020 Recorded
4 Adjusted costs of \$19.6 due primarily to Facility Asset Upkeep Program.

5 **b. MWC 23 – Oakland Lakeside**

6 PG&E forecasts Oakland Lakeside capital expenditures of
7 \$892.0 million in 2023, which is an increase from the 2020 Recorded
8 Adjusted cost of \$0 due to the purchase of Oakland Lakeside.⁴³

9 **c. MWC 23 – SC Investment**

10 PG&E forecast SC Investment capital expenditures of \$43.0 million
11 in 2023, which is a decrease from the 2020 Recorded Adjusted costs of
12 \$88.9 due to renovating, replacing, or and in some cases consolidating,
13 its SCs.

14 **d. MWC 23 – Safety, Security and Compliance**

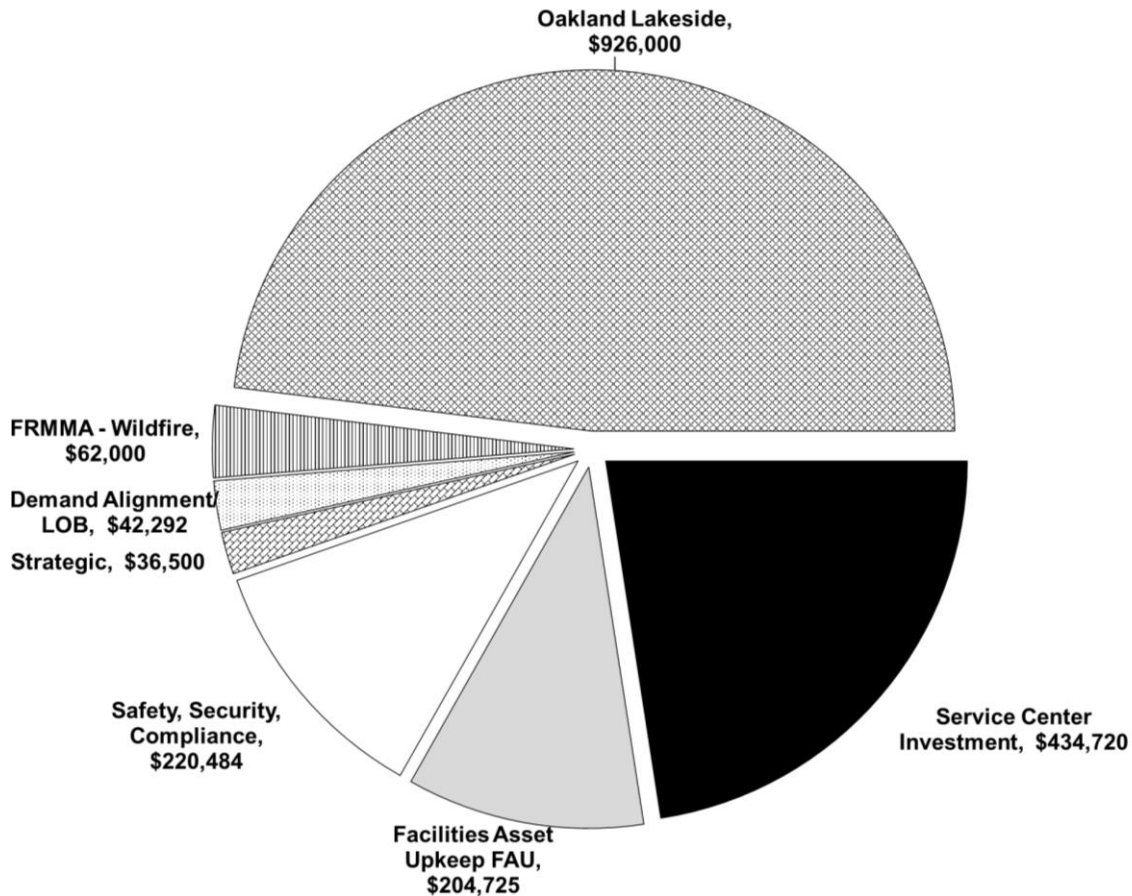
15 PG&E forecast Safety, Security and Compliance capital
16 expenditures of \$47.5 million in 2023, which is an increase from the
17 2020 Recorded Adjusted costs of \$39.5 due primarily to perimeter
18 fencing, material racking, and environmental compliance.

19 **e. MWC 23 – LOB Operational Initiatives**

20 PG&E forecast LOB Operational Initiatives capital expenditures of
21 \$25.0 million in 2023, which is an increase from the 2020 Recorded
22 Adjusted costs of \$10.2 due to the Aviation Operations Center.

⁴³ As described in footnote 9 and Section B.f.1 of this testimony, PG&E's 2023 capital forecast contains the forecasted purchase option amount pending exercising the option. PG&E's capital forecast changes for 2021 thru 2026 will be addressed in the petition for modification, which will be filed within 90 days following the closing date of the Lakeside purchase to reflect the final purchase price. See Exhibit (PG&E-10), Chapter 10, p. 10-10, lines 11 through 14.

**FIGURE 5-5
CAPITAL EXPENDITURES – INITIATIVES (2021-2026)
(THOUSANDS OF NOMINAL DOLLARS)**



D. Estimating Methods

1. New Development, Renovations, and Improvements

In 2017, PG&E commissioned Leland Saylor Associates (LSA)⁴⁴ an industry leader in cost estimation to develop a cost estimating tool for CRESS.⁴⁵ The estimating tool uses inputs, such as forecasted number of personnel, location, seismic performance level, and numbers of floors to provide total project costs. The tool uses actual cost information from over

⁴⁴ LSA is a certified Disabled Veteran Business Enterprise based in San Francisco and Los Angeles with over 30 years' experience in cost analysis and construction management focusing on education, civic and transit projects, as well as other publicly-funded projects. <https://lelandsaylor.com/> (as of June 16, 2021).

⁴⁵ Exhibit (PG&E-7), WP 5-168, Leland Saylor Associates Estimation.

1 5,000 real estate office projects constructed in California and was updated in
2 April 2018 to reflect current market costs.

3 LSA has developed five models covering common office projects,
4 including two types of office construction, and three types of tenant
5 improvements. Additionally, LSA has developed a model for CSO tenant
6 improvements. Consistent with industry best practices, the cost models use
7 parameter-based cost estimating techniques in which costs are correlated to
8 observed (i.e., historical) data from actual construction projects. The models
9 were developed using industry standard platforms common to the
10 construction industry to facilitate ease of use by the end user and use
11 benchmarked construction cost data sourced from CRESS's project
12 experience, as well as costs provided by the LSA database.

13 For SCs and light industrial sites, PG&E also uses an estimating model
14 that is applied during the early stages of the planning process. The model
15 utilizes cost experience from previous and ongoing PG&E capital projects
16 along with LSA's database to develop a standardized cost estimating model
17 based on common structures (e.g., operations building, warehouse, fleet
18 maintenance, etc.).

19 The model utilizes inputs based on proposed occupancy or use such as:
20 Seated Head Count, Assigned Head Count, Fleet Vehicles, and Employee
21 Vehicles. These numbers are used as programming elements to establish
22 the size of each building type, including: Operations, Fleet Garage,
23 Warehouse/Shop, Wash Bays, Hazmat, and Telecom Buildings.
24 The Programming elements are multiplied by a grossing factor to establish
25 size and overall cost based on each type of building. For rough order of
26 magnitude estimates, PG&E uses an estimated size of respective building
27 and applies a unit rate based on recent contracting experience.

28 The estimates used in the supporting workpapers utilized this method.

29 The model also calculates soft costs (for projects based on historical
30 project data) and allows for an override based on deviation from the typical
31 project delivery model. These factors can be modified to reflect the actual
32 project being contemplated (e.g., a greenfield or development project would
33 require additional design, as compared to a renovation project for the same
34 relative footprint to be added or renovated).

2. Facility Renovations and Repairs

CRESS follows industry standards and best practices in developing cost estimates for maintenance projects. The two primary methods of estimating project costs are planning estimates and competitively bid contract pricing.

a. Planning Estimates

Planning estimates include a description of the project scope, along with cost adjustments based on geographic location, complexity, and intended facility use. These estimates are prepared to develop project budgets, including project management costs, and are based on historical data, current market rates, internal support organization data, and third-party construction experts.

Estimates for project management costs are developed by taking the sum of the construction costs and multiplying them by an industry standard percentage. The industry standard percentage is based upon project scope and complexity, historical data, internal support organization data, third-party construction experts, and widely-accepted industry data sources, such as RS Means,⁴⁶ LSA, Comps Inc.,⁴⁷ and Real Quest.⁴⁸

E. Revenue Forecast

PG&E receives external revenues from certain locations that provide for third-party tenants or outside incremental uses. PG&E expects to exercise its option to purchase the Oakland Lakeside building in 2023 which currently has commercial tenants on the 1st floor. PG&E provided an estimate of potential income from these leases based on current rent roll information shared with

⁴⁶ RS Means is a division of Reed Business Information that provides cost information to the construction industry, so that contractors in the industry can provide accurate estimates and projections for their project costs. It has become a data standard for government work in terms of pricing and is widely used by the industry.

⁴⁷ Comps, Inc., is provider of commercial real estate research and information services for property investors and professionals to analyze, interpret, and gain information on and insights into commercial property values, market conditions and supply.

⁴⁸ Real Quest is the largest provider in the United States of real estate, property, ownership, mortgage, and mortgage securities data—and the advanced analytics that use such data.

1 PG&E as part of the purchase due diligence process as part of the SFGO 851
2 sale approval process.

3 PG&E also expects incremental revenue from third-party use of the
4 San Ramon Valley Conference Center. These revenues are not factored into
5 the CRESS forecast, but are addressed in Exhibit (PG&E-10), Chapter 16.

6 **F. Cost Tables**

TABLE 5-12
EXPENSE
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference (A)
1	BI	Maint Buildings	4,601	7,147	2,687	3,575	767	3,875	5,855	5,855	
2	EP	Manage Property & Bldgs	125,140	114,513	109,531	113,448	117,051	111,900	117,642	109,527	
3	IG	Manage Var Bal Acct Processes				402	545	1,000	1,100	1,100	
4	JH	Implement RealEstate Strategy	11,085	6,093	4,945	1,276	8,153	5,225	6,507	7,787	
5	JV	Maintain IT Apps & Infra	1,294	974	1,255	7		16	16	16	
6	LL	Charges from Affiliates									
7		Total	142,120	128,730	118,418	118,708	126,515	122,016	131,120	124,285	
8	ZC	Building Services Overhead Credit	(76,829)	(69,738)	(70,739)	(73,859)	(63,557)	(68,579)	(76,309)	(66,533)	
9		Net Expense	65,291	58,992	47,680	44,848	62,958	53,438	54,811	57,752	

TABLE 5-13
CAPITAL
(THOUSANDS OF NOMINAL DOLLARS)

		Capital Expenditures												
No.	MWC	MWC Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1	22	Maintain Buildings	48,137	45,103	92,220	55,751	19,593	30,267	23,558	37,200	41,700	42,000	30,000	
2	23	Implement RealEstate Strategy	90,189	164,456	158,553	106,806	177,880	151,733	152,442	1,007,521	141,300	139,000	130,000	
3	2F	Build IT Apps & Infra	0	2	-	-	-	-	-	-	-	-	-	
4		Grand Total	138,326	209,560	250,774	162,558	197,473	182,000	176,000	1,044,721	183,000	181,000	160,000	

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 6
LAND AND ENVIRONMENTAL MANAGEMENT
[INCLUDES NOVEMBER 5, 2021 ERRATA]

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 6
LAND AND ENVIRONMENTAL MANAGEMENT

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 6
LAND AND ENVIRONMENTAL MANAGEMENT

A. Introduction

1. Scope and Purpose

The purpose of this chapter is to demonstrate Pacific Gas and Electric Company's (PG&E or the Company) forecasts for expense and capital expenditures for managing and implementing the Company's Land and Environmental Management (LEM) organization are reasonable and should be adopted by the California Public Utilities Commission (Commission).

LEM is an integral part of PG&E and contributes to providing safe, reliable, affordable, and clean gas and electric service to its customers. As PG&E has increased investment in infrastructure upgrades to improve public safety, customer satisfaction, and system reliability, the workload associated with environmental permitting and compliance has also increased. This is especially true for permitting associated with PG&E's wildfire risk reduction efforts. The LEM organization is also critical to PG&E achieving its goal of environmental leadership, as it establishes policies and programs aimed at reducing the Company's operational footprint and improving its environmental sustainability.

LEM uses chargebacks to allocate operating expenditures to the Lines of Businesses (LOB), primarily Gas Operations, Electric Operations, and Power Generation. Chargeback costs for LEM services are included in each LOB forecast and are not requested in this chapter. Information about LEM's chargeback costs are referenced in Section D (Chargeback Forecast) for the Commission's information only.

2. Summary of Request

PG&E requests the Commission adopt its 2023 LEM expense forecast of \$29.09 million. Recorded expense was \$28.30 million in 2020.¹ PG&E's 2023 expense request represents a 2.79 percent increase from Base Year (BY) 2020 recorded expenses, driven primarily by increases in base

¹ Exhibit (PG&E-7), WP 6-1 and 6-2.

escalation, and costs in Land Management and Environmental Management initiatives.

PG&E also requests the Commission adopt LEM's capital expenditure forecasts of \$12.02 million in 2021, and \$7.62 million for 2022-2026.

Recorded adjusted capital expenditures were \$13.08 million for 2020.²

PG&E's 2023 capital request for LEM represents a 41.75 percent decrease from BY 2020 recorded costs, largely driven by the full implementation of LEM's Habitat Conservation Plan in 2020.

Details about the activities, costs, and drivers for these forecasts are provided in Section C below.

3. Deferred Work

Section 5.2 of the 2020 General Rate Case (GRC) Settlement Agreement requires PG&E to make an additional showing in its 2023 GRC testimony for work that was previously requested and authorized based on representations that the work was needed to provide safe and reliable service.

In the 2020 GRC, LEM did not request or receive authorized funding for any work (1) identified as safety, reliability, or maintenance (S R M)-related in the 2020 Risk Spending Accountability Report or (2) based on representations in testimony and work papers that the work was needed to provide safe and reliable service.

4. Overview of Recorded and Forecast Costs

a. Expense

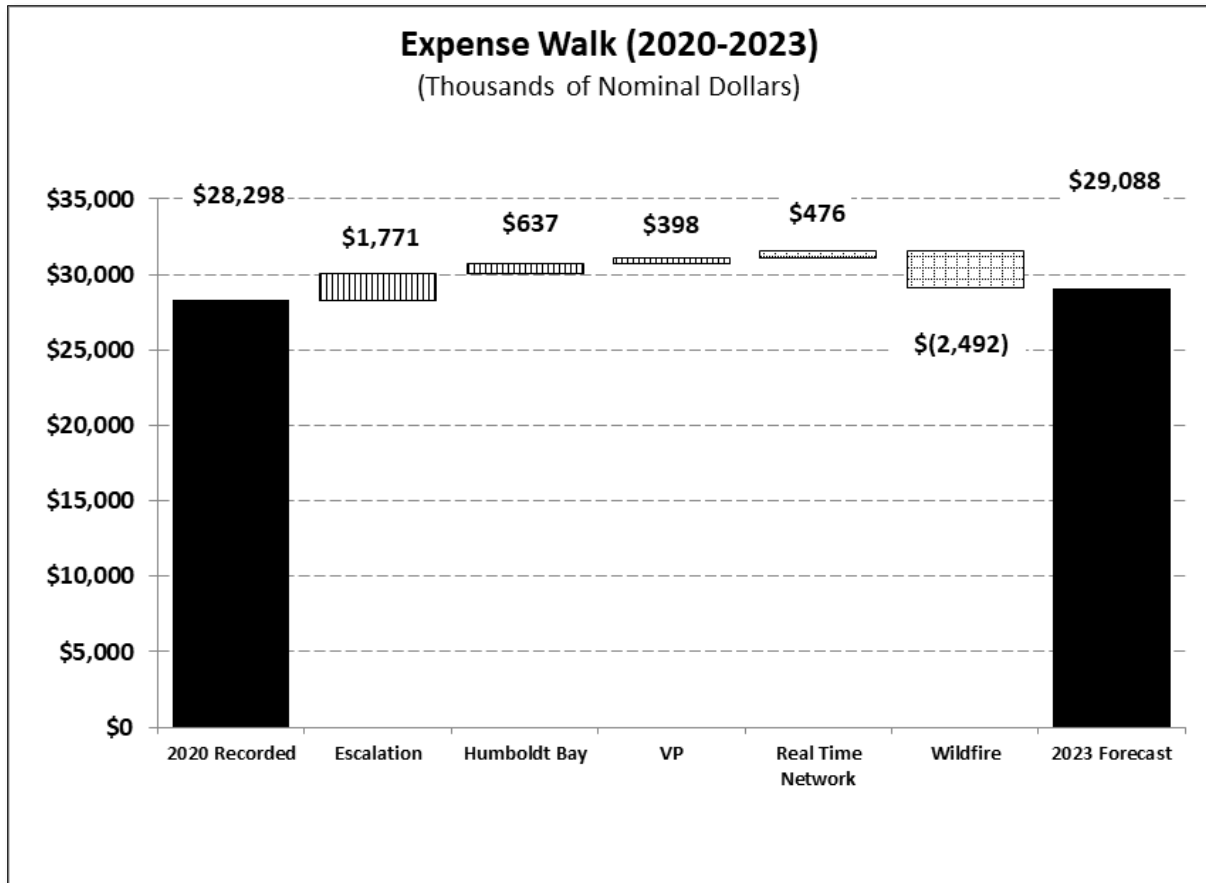
Figure 6-1 below shows 2020 recorded expenses and 2023 forecast expense for LEM. PG&E forecasted increase of approximately \$2.5 million is attributable primarily to Real-Time Network³ followed by long-term Operations and Maintenance (O&M) for remediated fossil plants and escalation⁴.

² Exhibit (PG&E-7), WP 6-40.

³ See Section C.1.b of this section for a description of the MWC JE forecast drivers..

⁴ See Section C.1.c of this section for a description of the MWC JK forecast drivers.

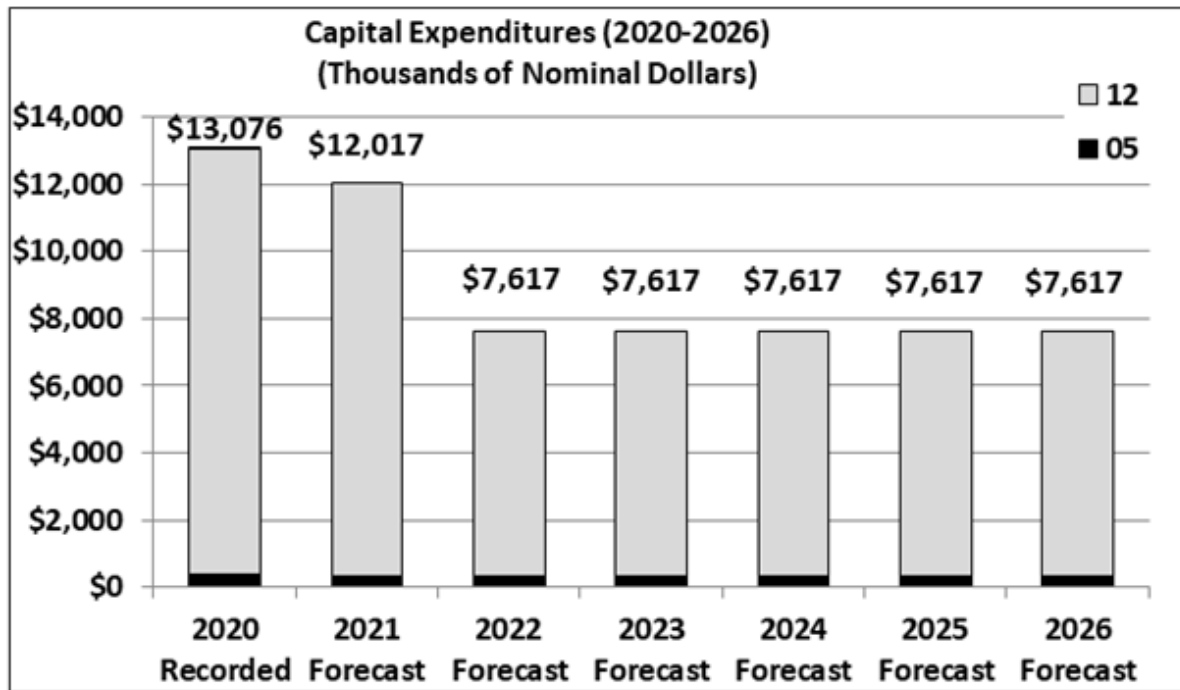
FIGURE 6-1
EXPENSE WALK (2020-2023)
(THOUSANDS OF NOMINAL DOLLARS)



b. Capital

Figure 6-2 below shows the total LEM 2021-2026 capital forecasts by project. The 2021-2026 forecasts are primarily driven by Implementing Environmental Projects. Environmental project work is composed of spill control and berm installation, containment/drainage mitigation, pond wall and coating installation, underground storage tanks, treated wood poles disposal, installation of hazardous waste accumulation sheds, and finally, installation of drinking water treatment units.

FIGURE 6-2
CAPITAL EXPENDITURES (2021 - 2026)
(THOUSANDS OF NOMINAL DOLLARS)



5. Support for Request

PG&E's expense and capital forecasts for LEM are reasonable and should be approved because they are required to:

- Comply with environmental laws and regulations;
- Manage PG&E's expansive land holdings;
- Protect sensitive species and natural and cultural resources;
- Remediate environmental contamination from historic operations;
- Identify and prepare for emerging environmental regulatory trends; and
- Implement Shared Services' risk and compliance programs.

6. Organization of the Remainder of This Chapter

The remainder of this chapter is organized as follows:

- Section B – Program and Risk Overview;
- Section C – Activities, Costs, and Forecast Drivers by Major Work Category (MWC);
- Section D – Chargeback Forecasts; and
- Section E – Cost Tables.

B. Program and Risk Overview

1. Program Description

a. Department Overview

LEM provides integrated, Companywide environmental leadership, project support, and compliance management services. LEM also promotes environmental stewardship of PG&E's properties and associated natural resources.

b. Organizational Structure

LEM reports to the Vice President, Shared Services, who in turn reports to the Executive Vice President, People, Shared Services, & Supply Chain, and is comprised of approximately 690 employees from the following core departments:

- Shared Services Business Operations;
- Environmental Management and Permitting;
- Enterprise Public Works;
- Land Management; and
- Environmental Remediation.

1) Shared Services Business Operations

Shared Services Business Operations provides support to all of the Shared Services departments (in addition to LEM). The Shared Services departments and their corresponding Exhibit 7 chapter are shown below in Table 6-1.

**TABLE 6-1
SHARED SERVICES DEPARTMENTS**

Line No.	Shared Services Organization	Exhibit 7 Chapter
1	Aviation Services	Chapter 2
2	Transportation Services	Chapter 2
3	Corporate Real Estate Strategy and Services (CRESS)	Chapter 5
4	Land & Environmental Management	Chapter 6

Shared Services and Business Operations is organized into the following discrete teams.

a) Risk and Compliance

The Risk and Compliance team is responsible for implementing and maintaining the Shared Services' compliance and risk management programs, coordinating with the corporate Compliance and Ethics and Enterprise Operational Risk Management departments, and leading Shared Services' Speak-Up efforts to encourage a culture where all PG&E employees are empowered to identify and raise issues of concern.

Shared Services Risk and Compliance's primary responsibilities include:

- Tracking, analyzing, and mitigating operational and enterprise risks;
- Establishing an inventory of regulatory requirements;
- Providing guidance on documentation of work processes;
- Control testing of work processes associated with regulatory requirements;
- Ensuring Shared Services' employees are appropriately trained in a timely manner;
- Investigating potential violations, as well as causal evaluations of regulatory requirements;
- Developing, implementing, and managing Speak-Up efforts through the Enterprise Corrective Action Program; and
- Reporting compliance and risk issues and metrics to Shared Services' leadership, allowing them to make informed operational and resource decisions.

Consistent with the Companywide focus on compliance maturity, Shared Services Risk and Compliance focuses on compliance requirements set by state and federal regulators overseeing PG&E such as the Environmental Protection Agency; U.S. Fish and Wildlife Services; and state and regional Air and Water Resource Control Boards (for LEM), the Federal Aviation Authority (for Aviation Services), the Department of Motor Vehicles, US Department of Transportation, and

Occupational Safety and Health Administration (for Transportation Services), and the California Building Codes and National Fire Protection Agency (for CRESS).

Shared Services' strategy for managing risks within its business are aligned with the Enterprise framework for risk management outlined in Exhibit (PG&E-2), Chapter 2 - Enterprise Risk Management and Risk Assessment and Mitigation Phase (RAMP) Integration.⁵ Within Shared Services, there are three risks that are listed on the Corporate Risk Registry.⁶ Table 6-2, shown below, briefly describes these three risks and also provides a reference to the section of the Exhibit (PG&E-7) testimony where more information can be found.

**TABLE 6-2
SHARED SERVICES RISKS**

Line No.	Risk Name	Risk Description	Exhibit 7 Chapter
1	Aviation Incident	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.	Exhibit 7, Chapter 2
2	Hazardous Material Release	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, nonhazardous waste, and 3rd party facilities are out of scope.	Exhibit 7, Chapter 6
3	Real Estate and Facilities Failure	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.	Exhibit 7, Chapter 5

⁵ See Exhibit (PG&E-2), Ch. 2, Section B. Enterprise and Operational Risk Management Program, Section C. Risk Management Long-Term Vision.

⁶ See Exhibit (PG&E-2), Ch. 1, Attachment A, Table 1-1: PG&E's Corporate Risk Register.

1 **b) Programs and Systems**

2 The Programs and Systems team is responsible for:

- 3 • Shared Services' safety program; accordingly, it works to
4 identify safety trends within the organization, provides safety
5 resources, and profiles employees for appropriate safety
6 trainings to ensure compliance with Enterprise Health and
7 Safety (EHS) Programs;⁷
- 8 • Shared Services' contract management; accordingly, it
9 works to improve and streamline vendor contracting
10 processes throughout the organization and ensures
11 compliance with Enterprise level programs described in the
12 Sourcing chapter;⁸ and
- 13 • Shared Services' technology and data strategy; accordingly,
14 it works to improve the use of data to better inform decision
15 making and to create more transparency within and
16 between the different Shared Services' teams.

17 **2. Environmental Management and Permitting**

18 Environmental Management and Permitting is comprised of six teams
19 with the descriptions provided below.

20 **a. Environmental Management, Facility Compliance**

21 The Facility Compliance team supports all LOBs and manages
22 environmental compliance at PG&E's operating facilities (including fossil
23 power plants, hydroelectric powerhouses, solar facilities, substations,
24 gas compressor stations, and service centers).

25 **b. Environmental Management, Gas and Electric Projects**

26 The Gas and Electric Projects team supports the gas and electric
27 LOBs (both distribution and transmission). This team obtains
28 environmental permits and ensures environmental compliance for
29 projects and routine O&M.

7 Exhibit (PG&E-7), Ch. 1, for more detail on the specific EHS programs.

8 Exhibit (PG&E-7), Ch. 4, for more detail on the specific Sourcing programs.

c. Environmental Management, Power Generation

The Power Generation team supports the Power Generation line of business. This team obtains environmental permits and ensures environmental compliance for projects and routine O&M.

d. Environmental Resources and Mitigation⁹

The Environmental Resources and Mitigation team provides: guidance; strategic direction; management of the Company's environmental mitigation program; training and procedures to ensure consistent regulatory permitting for biological, cultural, and natural resources; and works with federal and state agencies to streamline permitting processes for PG&E projects. The scope of the environmental mitigation program includes the following regulations:

- Federal Endangered Species Act;
- California Endangered Species Act;
- Clean Water Act Section 404 (Wetlands);
- Clean Water Act Section 401 (for discharges of fill materials into waters of the United States. Does not include 401 Certifications for Federal Energy Regulatory Commission licenses);
- California Fish and Game Code Section 1600 (Lake and Streambed Alteration Program);
- Migratory Bird Treaty Act;
- California Nesting Bird Protection;
- California Environmental Quality Act (CEQA) – CEQA historical and tribal resources;
- California Public Resources Code, Health and Safety Code, and Penal Code – Human remains discoveries;
- National Historic Preservation Act – federal land and permitting;
- Native American Graves Protection and Repatriation Act – federal lands; and
- Archaeological Resources Protection Act – federal lands.

⁹ Formerly under the Environmental Programs and Systems group.

e. Water Quality and Hazardous Materials Programs

The Water Quality and Hazardous Materials Programs team oversees compliance obligations related to water quality and hazardous materials and waste. Its responsibilities include:

- Assessing environmental risks from water quality and hazardous waste;
- Advising the LOBs on water quality, hazardous material and waste compliance trends and strategies;
- Developing strategies to promote environmental compliance and facilitate LOB operations;
- Partnering with federal, state, and local regulatory agencies to develop effective permitting strategies; and
- Developing partnerships with other utilities within California to benchmark and develop best management practices.

f. Air Quality Program

The Air Quality Program team oversees compliance obligations related to air quality. Its responsibilities include:

- Managing all mandatory regulatory filings for Greenhouse Gas reporting;
- Monitoring new and modified air regulations and determining their potential impact to the LOBs;
- Assessing environmental risks from an air quality perspective, as a result of self-inspection processes;
- Assisting in developing procedures, guidance, and training modules to improve compliance;
- Advising the LOBs on air quality compliance trends and strategies; and
- Disseminating relevant technical and regulatory information to other environmental professionals in PG&E; and managing air permit filings.

3. Enterprise Public Works

The Enterprise Public Works team obtains encroachment permits from Cities and Counties for PG&E projects within public streets and provides

support to all of PG&E's LOBs. This is an essential function that ensures that PG&E projects in these public rights-of-way are performed in a manner that protects the traveling public in accordance with all street and highway regulations.

4. Land Management

The Land Management team is responsible for managing over 150,000 acres of Company-owned land and hundreds of thousands of easements and other land rights. These lands and land rights support PG&E's operations encompassing over 107,000 miles of electric distribution, 42,000 miles of gas distribution, 18,500 miles of electric transmission, 63 hydroelectric powerhouses and associated water delivery facilities, and 6,500 miles of gas transmission facilities. This work includes maintaining and protecting PG&E-owned property and easements, as well as implementing a wide range of land stewardship activities, and sustainable forest management practices that improve forest health, reduce fuel loads, and mitigate the spread of wildfires.¹⁰

Land Management also supports PG&E's core operations by performing land and topographic surveys, providing mapping and routing services, acquiring new land rights and property, and dispositioning properties that are either no longer needed or have been identified for donation, either through the Company's Land Conservation Commitment or through its Surplus Property Program. When the Surplus Property group sells a property, the benefits are returned to PG&E's customers. Additionally, Land Management performs essential document and record retention work, including the conversion of thousands of paper land rights records, which are vulnerable to destruction, to digital format and making them more accessible through integration with the Land Spatial Tool.

¹⁰ The Natural Resource Management (NRM) team provides vegetation management support and forest management activities on PG&E's fee properties as well as creating defensible space around PG&E's substations and gas valve lots. The NRM team also works to reduce vegetation load on PG&E fee properties where the Wildland Urban interface is prevalent. This team's efforts are aligned with PGE's overall efforts to reduce system wide wildfire risk through vegetation management around electric distribution assets as described in Exhibit (PG&E-4), Ch. 9.

PG&E's Land Rights' records are a critical asset that give the Company legal rights to install its facilities on property owned by 3rd Parties (private or agency ownership). The Land Management organization is solely responsible for the management of these assets and has more than 500,000 of these records in its database. Land Management is working to digitize its historic paper records and to populate them into Land Management's Land Spatial Tool (a Geographic Information System (GIS) database) to make them more efficiently and reliably retrieved. This work will enable Land Management staff to provide critical Land Rights' information more quickly to Line of Business partners, by minimizing labor intensive Land Rights research efforts, and also aligns the Land Management organization with records management and GIS systems improvement efforts occurring throughout the Enterprise.

5. Environmental Remediation

The Environmental Remediation expense forecast in the General Rate Case is primarily PG&E labor. Most of Environmental Remediation contract costs are recovered through the Hazardous Substance Mechanism (HSM), Gas Transmission and Storage (GT&S), and Transmission Owner Rate Case, although some portion of these costs are borne by the Company's shareholders.

Due to a constraint of HSM recovery method,¹¹ some remediation sites recover long term operations and maintenance (O&M) costs through this rate case.

The Decommissioning and Remediation forecast accounts for environmental remediation and decommissioning activities at the four facilities, including (1) Hunters Point Power Plant (HPPP), (2) Humboldt Bay Power Plant (HBPP), (3) Kern Power Plant (KPP) and (4) Pleasant Creek Underground Gas Storage Facility.

¹¹ According to the "1993 Hazardous Substance Cleanup Recovery Collaborative Report Submitted in Response to Decision No. 92-11-030", utilities cannot use HSM as a rate recovery mechanism to recover remediated sites' long term ongoing and monitoring (O&M) costs 10 years after the utilities have notified the Commissioner—this constraint is generally described as "HSM 10-Year Ruling Restriction".

c. Key Metrics and Other Performance Measures

LEM's goal is to ensure PG&E's compliance with all environmental requirements. Integrated, effective environmental and sustainability strategies have been developed to support PG&E's core business, while protecting the environment. Below are four examples of PG&E's internal LEM performance metrics.

1) Short Cycle Work Review

In this efficiency metric, PG&E identifies short cycle electric distribution work where LEM-supported activities are required before the start of construction. For these projects, LEM aims to complete all reviews within 45 days, which is a committed timeframe for all required environmental activities. The metric is a percentage that represents the on-time completion and is shown below in Table 6-3.

**TABLE 6-3
SHORT CYCLE WORK REVIEW COMPLETION PERCENTAGE (2019-2023)**

Line No.	Description	2019	2020	2021	2022	2023
1	Goal	98%	98%	98%	98%	98%
2	Achieved	97%	94%	–	–	–

2) Land and Environmental Costs as a percent of all MWCs

This metric measures cost effectiveness of LEM spend as compared to overall project costs across all of PG&E's LOBs¹² and is shown below in Table 6-4.

¹² In the 2020 GRC, this metric captured the Top 20 MWCs (measured by overall project costs). It was changed to all MWCs due to the variability in large projects from year to year (i.e., the Top 20 MWCs might change year-to-year), and to provide more insight into LEM's spend efficiency across the entire Enterprise.

TABLE 6-4
LAND AND ENVIRONMENTAL COSTS AS A
PERCENTAGE OF TOTAL PROJECT COSTS (2020 – 2023)¹³

Line No.	Description	2020	2021	2022	2023
1	Env – Goal	1.28%	–	1.25%	–
2	Env – Recorded	1.25%	–	–	–
3	Land – Goal	0.98%	–	1.17%	–
4	Land – Recorded	1.17%	–	–	–

3) Inspections Without Citation

PG&E's facilities are regularly inspected by both regulatory agency representatives and by internal PG&E personnel. This metric measures the percentage of those inspections that are fully compliant and receive no citation, as shown below in Table 6-5.

A citation is defined as written notification of non-compliance by a regulatory agency or an internal finding of non-compliance that has an impact on the environment (including permit exceedance) and/or has a negative impact on health and safety or the Company's financial position, reputation, or regulatory status.

TABLE 6-5
INSPECTIONS WITHOUT CITATION (2020-2023)

Line No.	Description	2019	2020	2021	2022	2023
1	Goal	91%	–	93%	–	95%
2	Achieved	91%	–	96%	–	–

The goal is to reduce or eliminate all issues of non-compliance for all facilities through continuous improvement efforts. When an inspection reveals an issue of non-compliance the issue is tracked, and the necessary actions are taken to resolve the compliance issue.

¹³ LOBs refer to Electric Transmission and Distribution, Gas Distribution, Transmission, and Storage, and Power Generation.

6. Risk Assessment and Mitigation Phase Risks

a. Non-RAMP Risk: Hazardous Materials Release - Risk Overview

The Hazardous Materials Release risk is on PG&E Corporate Risk Register but was not a 2020 RAMP risk.

Hazardous Materials Release is defined as the release of hazardous materials (excluding natural gas) by PG&E or by an agent acting on behalf of PG&E or under PG&E's authority. This risk excludes transport events, asset failure outcomes, and employee safety events addressed in other event-based risk assessments. It includes spills and air release as well as events that occurred in the past and for which PG&E is now responsible for remediating.

PG&E uses hundreds of different potentially hazardous materials throughout its operations, ranging from fuel for vehicles and aircrafts, fire retardant materials for poles, anodes for cathodic protection, and caustics used to reduce NOx emissions. PG&E has discontinued the use of some hazardous materials, such as PCBs, while introducing new materials where they offer benefits to our operations. PG&E models its exposure as a normalized risk where the exposure equals one. The challenges associated with knowing the types and amounts of materials used in the past and how these materials will persist in the environment, and projecting the types and amounts of materials used in the future and how these materials will persist in the environment inhibit a more conventional approach to exposure. PG&E models hazardous materials through seven different tranches; Corrosive, Biological, Toxic, Flammable, Combustible, metals, and Mercury. The cross-cutting factor that impact the Hazardous Materials Release risk is Physical Threat.¹⁴

The drivers of Hazardous Materials Release risk are: Storage, Transportation and In Use. The sub-drivers are: Human Error, Common Practice, Equipment Failure, External Factor and Vandalism.

The 2023 TY baseline risk score for Hazardous Materials Release risk is 33.82 and the 2026 post mitigation risk score is 20.36. PG&E's risk models and accompanying source data are available upon request.

¹⁴ See Cross-Cutting Factor mapping table in Exhibit (PG&E-2), Ch. 1, Attachment B.

b. Risk Management Strategy – Mitigations and Controls

PG&E's strategy for managing this risk is to:

- Comply with all Federal, State, and local regulations;
- Ensure employees have appropriate training necessary for work expectations;
- Assure proper storage, maintenance and inspections of hazardous materials and hazardous waste storage facilities at PG&E sites and work locations;
- Maintain detection systems and emergency response equipment at PG&E sites; and
- Employ continual improvement processes and practices across all environmental operations.

In this GRC, PG&E is proposing several mitigations and controls to manage this risk. Tables 6-6 and 6-7 below summarize the forecasts for the mitigations and controls for the Hazardous Materials Release risk.

As shown in the tables below, PG&E is forecasting 2 mitigations and 10 controls over the 2023 GRC period. These programs were determined to reduce the frequency or consequence of risk of a hazardous materials release. Additional information about these programs is included in other sections of this chapter.

**TABLE 6-6
HAZARDOUS MATERIALS RELEASE RISK
FORECAST MITIGATIONS**

Line no.	Mitigation Number	Mitigation Name	Description	Risk Drivers Addressed	Additional Information
1	HZMAT-M002	Treated poles storage and waste management	Complete pilot studies and implement recommended remedy of treated pole storage and pole waste management approaches and implement recommendation.	Storage, All Sub-drivers	
2	HZMAT-M001	Chemical Purchase Program	Review and approval program for the purchase, storage, transportation and use of new chemicals.	All, All Sub-drivers	This mitigation has no costs associated with it.

**TABLE 6-7
HAZARDOUS MATERIALS RELEASE RISK
FORECAST CONTROLS**

Line No.	Control Name	Description	Risk Drivers Addressed
1	Chemical and Hazardous Waste Storage Training	Employee training on proper storage of hazardous materials and wastes; compatibility, container requirements, labeling, etc.	Storage, Sub-driver Human Error
2	Hazardous Materials and Waste Handling Procedures	Employee training on use of PPE and proper spill prevention measures when working with hazardous materials and hazardous waste	Use, Sub-driver Human Error
3	Hazardous Materials and Hazardous Waste Transportation Procedures	Standards, procedures, and training for employees transporting hazardous materials; Standards, procedures and training for employees transporting hazardous waste	Transportation, Sub-driver Human Error
4	Chemical Storage Facilities and Hazardous Waste Accumulation Areas	Design and installation of proper chemical storage facilities; Design and installation of proper hazardous waste accumulation areas	Storage, All Sub-drivers

**TABLE 6-7
HAZARDOUS MATERIALS RELEASE RISK
FORECAST CONTROLS
(CONTINUED)**

Line No.	Control Name	Description	Risk Drivers Addressed
5	Hazardous Waste Accumulation Inspection and Hazardous Materials Storage Area Inspection	Inspections of hazardous waste accumulation areas to ensure the facility is in good condition, wastes are stored properly, and systems are functioning properly; Inspections of hazardous materials storage areas to ensure the facility is in good condition, materials are stored properly, and systems are functioning properly	Storage, All Sub-drivers
6	Chemical Release Detection Systems	Sensors, alarms, and other equipment that detect a release of chemicals from containment i.e., UST leak detection and gas detection systems.	Storage, All Sub-drivers
7	Equipment Testing and Calibration programs	Testing and calibration of equipment relied upon to detect a release of hazardous materials.	Storage, All Sub-drivers
8	Spill Response programs	Spill equipment, training, processes used to respond in the event of a hazardous materials release.	All Drivers and Sub-drivers
9	Storm Water Management	Systems, procedures, and maintenance programs in place to prevent hazardous materials from leaving facilities.	All Drivers and Sub-drivers
10	Spill risk assessment and planning	Conduct risk assessments and mitigations, such as those conducted by CalARP, to prevent accidental releases of substances that can cause serious harm to the public and the environment, and to minimize the damage if releases do occur.	All Drivers and Sub-drivers

c. Safety Model Assessment Proceeding (S-MAP) Settlement Agreement, Step 3 Supplemental Analysis

The S-MAP Settlement Agreement¹⁵ requires PG&E to conduct a “Step-3 Supplemental Analysis” (Step-3 Analysis) in the GRC for any program that was not addressed in the RAMP, that PG&E justifies primarily on the basis of reducing a safety or reliability risk and that the program is associated with the Electric Distribution or Gas Distribution,

¹⁵ D.18-12-014, Phase Two Decision Adopting S-MAP Settlement Agreement with Modifications, (Issued Dec. 20, 2018).

1 Transmission or Storage Facilities.¹⁶ The Hazardous Materials Release
 2 risk is not subject to the Step-3 Analysis. Therefore, PG&E is not
 3 required to provide RSEs for Hazardous Materials Release controls.
 4 Risk Mitigation Costs.

5 **d. Safety Model Assessment Proceeding (S-MAP) Settlement**
 6 **Agreement, Step 3 Supplemental Analysis**

7 The S-MAP Settlement Agreement¹⁷ requires PG&E to conduct a
 8 “Step-3 Supplemental Analysis” (Step-3 Analysis) in the GRC for any
 9 program that was not addressed in the RAMP, that PG&E justifies
 10 primarily on the basis of reducing a safety or reliability risk and that the
 11 program is associated with the Electric Distribution or Gas Distribution,
 12 Transmission or Storage Facilities.¹⁸ The Hazardous Materials Release
 13 risk is not subject to the Step-3 Analysis. Therefore, PG&E is not
 14 required to provide RSEs for Hazardous Materials Release controls.
 15 Risk Mitigation Costs.

¹⁶ D.18-12-014, Appendix A, p. A-14 to p. A-15, Row 28.

¹⁷ D.18-12-014, Phase Two Decision Adopting S-MAP Settlement Agreement with Modifications, (Issued Dec. 20, 2018).

¹⁸ D.18-12-014, Appendix A, p. A-14 to p. A-15, Row 28.

**TABLE 6-8
HAZARDOUS MATERIALS RELEASE
RECORDED AND FORECAST MITIGATION COSTS 2020-2026 – CAPITAL**

Line No.	Mitigation No. (2023 GRC)	Mitigation Name (2023 GRC)	2020 Rec. Adj.	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total	RSE
1	HZMAT-M002	Treated Poles Storage Waste Management	\$670	\$1,200	\$1,205	\$1,211	\$1,216	\$1,221	\$1,228	\$7,951	0.02
2	HZMAT-M001	Chemical Purchase Program ^(a)	–	–	–	–	–	–	–	–	239.99 ^(b)
3		Total	\$670	\$1,200	\$1,205	\$1,211	\$1,216	\$1,221	\$1,228	\$7,951	–

(a) Costs for this mitigation are not tracked separately.

(b) This RSE was calculated using costs for an existing product license. The Chemical Purchase Program is a new use of this existing product license and does not incur additional costs.

C. Activities, Costs, and Forecast Drivers by MWC

1. Expense MWC

Table 6-9, below, lists LEM's expense MWCs. This section describes Estimating Method, Costs, and the forecast drivers for each MWC. The estimating methods vary by MWC. Total costs for LEM include: labor, contracts, materials, permit fees, and other costs associated with electric distribution, gas operations, and customer service. There are also costs associated with projects, activities, and initiatives required to comply with environmental regulations, including Information Technology (IT) expenditures necessary to support LEM. The 2023 expense forecasts are based on recorded 2020 expenses adjusted for applicable forecast drivers from 2021-2023.

**TABLE 6-9
LIST OF MWCS EXPENSE**

Line No.	MWC	MWC Description
1	AK	Environmental Operations
2	AY	Habitat and Species Protection
3	CR	Waste Disposal and Transportation
4	ES	Implement Environmental Projects
5	JE	Land Services
6	JK	Environmental Remediation

The following estimating methods were used for the various MWCs.

a. Environmental Management (MWC AK, AY, CR, and ES)

1) Estimating Method

Forecasts were made by evaluating recorded costs from 2020 and prior years and adjusting for anticipated forecast drivers occurring between 2021-2026. Anticipated drivers include: reviewing forecasts for managing environmental compliance at PG&E facilities; ensuring compliance for PG&E construction projects; and reviewing program compliance for: Air Quality, Water

Quality, Habitat and Species Protection, and Hazardous and Material Waste. The primary costs are vendor contracts and labor.

2) Costs

The 2020 recorded expense for MWC AK was ~\$8.5 million¹⁹. This includes contract and labor costs to ensure Air Quality, Water Quality, Habitat and Species Protection, and Hazardous Materials at PG&E's operating facilities²⁰.

The 2020 recorded expense for MWC AY was ~\$.13 million²¹ and includes contract and labor costs associated with the implementation of Habitat Conservation Plans and Valley Elderberry Longhorn Beetle protection plans.

The 2020 recorded expense for MWC CR was ~\$2.12 million²² and includes contract and labor costs associated with the system wide disposal and transportation of hazardous wastes.

The 2020 recorded expense for MWC ES was ~\$.80 million²³ and includes contract and labor costs associated with the storage and disposal of treated wood poles and other environmental projects and initiatives.

3) Forecast Drivers

MWC AK – HBPP

There are long term permitting costs related to on-going Environmental compliance obligations at PG&E's Humboldt Bay Generating Station. Full environmental remediation of the HBPP is expected to be completed by the end of 2022, however the compliance obligations for biological monitoring and vegetation management will still be required. As such, the costs for this

¹⁹ Exhibit (PG&E-7), WP 6-14.

²⁰ See Section B.b.2.a of this section for the types of facilities where this type of compliance work is performed.

²¹ Exhibit (PG&E-7), WP 6-16.

²² Exhibit (PG&E-7), WP 6-18.

²³ Exhibit (PG&E-7), WP 6-20.

compliance obligation will be transitioning from MWC 55 to MWC AK at the beginning of 2023, resulting in an increase for expense.

b. Land Management (MWC JE)

1) Estimating Method

Expenses in MWC JE are influenced by programs and key initiatives PG&E is implementing, such as the Land Conservation Commitment Program,²⁴ and Land Stewardship initiatives which are developed by Land's NRM team to ensure the responsible and sustainable management of PG&E's fee properties²⁵. The Land Stewardship efforts ensure facility and forest protection, wildfire resilience and resistance, and incorporate both habitat and recreation enhancement. Land Stewardship expenses are estimated by prioritizing different Land Stewardship projects throughout the service territory that provide the greatest benefit on an annual basis.

The Surplus Property expenses are associated with costs for staff and contractors to prepare properties for sale, to market them, and to sell the properties. The budget includes forecasts to address properties that may be determined as surplus through strategic real estate initiative²⁶.

2) Costs

The 2020 recorded expense for MWC JE was ~\$3.05 million²⁷ and includes costs associated with PG&E's Land Stewardship work, ensuring compliance with PG&E's Land Conservation Commitment, and Surplus Properties program²⁸.

²⁴ See Exhibit (PG&E-5), Ch. 4 for details on the establishment of Land Conservation Commitment Program.

²⁵ This includes lands associated with hydro facilities, substations, gas facilities, offices, and Diablo PP lands.

²⁶ See Exhibit (PG&E-7), Ch. 5.

²⁷ Exhibit (PG&E-7), WP 6-22.

²⁸ See Section B.b.4 for a description of each of these workstreams.

3) Forecast Drivers

On-going Land Management costs related to improving management of Land records and taking over the Real Time Network²⁹ from LOBs have contributed to more costs for Land.

c. Environmental Remediation (MWC JK)

1) Estimating Method

Forecast methodology is based upon historical information and anticipated contract renewal frequency; these include labor and programmatic costs. Due to the constraint of HSM cost recovery, O&M costs are included in this MWC; these costs include cap maintenance, regular cadences of compliance inspections, groundwater monitoring, operation and maintenance of groundwater treatment systems, and adherence to soil management plans. The O&M program is growing as more sites become fully remediated and enter a long-term O&M phase.

2) Costs

The 2020 recorded expense for MWC JK was \$6.23 million³⁰ and includes long term contract and labor costs for long-term O&M of remediation sites.

3) Forecast Drivers

Throughout this rate case period, Remediation labor and program costs will remain constant below \$6 million. O&M costs will remain around \$500,000 a year for the next four years until 2025, when Topock Compressor Station remediation is expected to enter its 30 years of long term O&M with an anticipated spend of \$4.2 million, primarily attributed to groundwater monitoring, compliance and engineering support to be conducted at the In Situ

²⁹ Land Surveying and Engineering Support utilizes real-time Global Positioning System (GPS) corrections in the normal course of daily work activities. This technology replaces the need for an employee to occupy a temporary GPS base station and achieves absolute positional accuracies of approximately 5cm.

³⁰ Exhibit (PG&E-7), WP 6-28.

Reactive Zone, a subsurface groundwater treatment zone designed to prevent chromium from reaching the Colorado River.³¹

2. Capital MWCs

Table 6-10 lists the Capital MWCs, and the key initiatives for those MWCs. Detailed description of those project initiatives contributing to the 2021-2026 forecasts are described below.

TABLE 6-10
ENVIRONMENTAL FORECAST DRIVERS MWCS CAPITAL

Line No.	MWC	Forecast Drivers
1	05	Tools and Equipment
2	12	Implement Environmental Projects

a. Tools and Equipment (MWC 05)

1) Estimating Method

Cost for tools and equipment under MWC 05 are forecast based on PG&E's historical spend for updating to new technologies.

2) Costs

The 2020 recorded capital costs for MWC 05 were ~\$.38 million³² and included costs related to upgrading Land Survey equipment.

3) Forecast Drivers

Driven solely by the need to update land survey equipment.

b. Implement Environmental Projects (MWC 12)

The Implement Environmental Projects request has decreased from the 2020 budget as a result of the full execution and implementation of

³¹ Exhibit (PG&E-7), WP 6-56.

³² Exhibit (PG&E-7), WP 6-47.

the regional Habitat Conservation Plans (HCP)³³. Ongoing Implement Environmental Projects capital work is required each year for: spill control and berm installation, containment/drainage mitigation, pond wall and coating installation, underground storage tanks, treated wood pole disposal, installation of hazardous waste accumulation sheds, and installation of treatment units for drinking water systems.

1) Estimating Methods

Based on historical costs related to the items described above.

2) Costs

The 2020 recorded capital costs for MWC 12 were ~\$12.70 million³⁴ and included various costs related to capital improvements made at PG&E's facilities to ensure sustained environmental compliance.

3) Forecast Drivers

The forecast reduction is being driven by the full execution and implementation of the HCP.

3. Power Plant and Gas Storage Decommissioning and Remediation (MWC 55)

Decommissioning and remediation have been occurring at three power plants including (1) HPPP, (2) HBPP, (3) KPP, and an underground gas storage facility (4) Pleasant Creek Gas Storage Facility.³⁵ This chapter includes remediation costs and some portions of decommissioning and demolition costs being managed by various groups within LEM.

³³ PG&E's regional HCPs streamline the process for obtaining environmental permits for construction projects by addressing issues on a regional scale in collaboration with applicable resource agencies. The HCPs provide greater certainty for planning and scheduling for major and minor O&M activities by eliminating the need for ad hoc, project-by-project permitting activities. The HCPs allow for better environmental mitigation planning and also makes the process more affordable for customers by avoiding and reducing expensive delays. Although the regional HCPs have been fully executed and implemented the previous costs are reflected as deferred debits and are referenced in Exhibit (PG&E-10), Ch. 14, section C.4.

³⁴ Exhibit (PG&E-7), WP 6-49.

³⁵ Exhibit (PG&E-7), WP 6-52.

Hunters Point PP remediation is complete and has entered its 30 years of long-term O&M and is being supported by LEM Surplus Property for redevelopment and sale.

Humboldt Bay PP remediation is at project closure and expected to end remediation by 2021 with five years of ground water monitoring requirements; thereafter, decommissioning activities at Humboldt Bay PP are managed by LEM Environmental Management Generation.

KPP remediation is complete; the remainder of work is property disposition managed by LEM Surplus Property.

In 2021, Pleasant Creek Underground Gas Storage Remediation has been added to the Remediation portfolio per the 2019 GT&S Rate Case Decision (D.) 19-09-025.

a. Hunter's Point Power Plant³⁶

1) Current State – O&M

HPPP was retired from service in 2006. The above-ground demolition of the plant began in 2006 and was completed by 2010, when remediation began. Below ground demolition was completed in 2014, and remediation was completed in 2017. Through 2020, PG&E spent \$89.5 million on remediation and \$78.5 million on decommissioning activities, including costs for demolition and asset retirement obligations, such as sealing the underground cooling water tunnels and related structures, removing/retiring unneeded off-site pipelines and closing unneeded land rights related to the power plant. Post-remediation operation and maintenance will continue throughout this GRC cycle and beyond for 30 years. PG&E will manage and redevelop the vacant site until property disposition is completed in approximately 7-10 years. The current costs have been trued up to actual cost. Estimates to complete the work are provided to commensurate with the final approved long-term ground water monitoring, soil management plan and land use covenant.

³⁶ Exhibit (PG&E-7), WP 6-53.

2) Future State

The remaining costs to complete remediation at HPPP are forecasted to be \$3.1 million and retirement costs including disposition of property are forecasted to be \$2.8 million, which brings the total to \$173.9 million in nominal dollars. Site fill soils contain naturally occurring asbestos and other constituents not related to HPPP operations. Once a redevelopment plan is established, additional site mitigation may be necessary. These costs are not subject to estimation at this time; it is anticipated the HPPP decommissioning estimate will be trued up to the actual costs in subsequent rate recovery filings and/or when the mitigation costs associated with redevelopment are known.

b. Humboldt Bay Power Plant

1) Current State

PG&E has completed several interim soil removal actions to remediate selected areas to support the decommissioning activities at the HBPP and construction of the Humboldt Bay Generating Station which began operation in September 2010. In 2009, the DTSC was designated as the Lead Agency overseeing remediation at the HBPP and PG&E entered into a Voluntary Cleanup Agreement with the DTSC as HBPP decommissioning activities were being initiated. Since decommissioning and demolition activities would be occurring in areas where environmental contamination may exist, PG&E developed an Interim Measures Removal Action Work (IMRAW) Plan, which was approved by the DTSC in 2009. The IMRAW established procedures for managing soil excavated during decommissioning activities to maintain consistency with the final site remedial action and restoration. As per the IMRAW, all excavated soils were sampled and compared to interim onsite soil reuse screening levels to determine whether excavated soil could be stockpiled for future use as backfill during site restoration efforts or shipped for offsite disposal. Between 2009 and 2019, numerous interim soil removal actions were completed to

1 remediate environmental contamination associated with structures
2 removed as part of HBPP decommissioning project and final site
3 restoration activities.

4 In 2020, DTSC indicated that since site remediation was
5 completed in 2019 and with DTSC's approval of the site
6 characterization and risk assessments, a Feasibility Study/Remedial
7 Action Plan was not required. But instead, a Statement of Basis as
8 the final remedy document for the site was appropriate.

9 Remediation costs to date through 2020 for HBPP are
10 \$30.1 million.³⁷ These include the cost of implementing interim
11 remediation measures associated with decommissioning activities
12 and other removal actions addressing localized soil contamination,
13 soil management activities during decommissioning including the
14 disposal of excavated soil, site characterization activities, and
15 preparation of site characterization and risk assessments which
16 were approved by the DTSC in 2020.

17 **2) Future State**

18 Forecast costs include actual costs to 2020 and revised future
19 estimates that include finalizing DTSC's final remedy document,
20 public participation efforts required by DTSC on the final remedy,
21 completion of Soil Management Plan and land use covenant, five
22 years of groundwater monitoring (expected costs considered a
23 20 percent risk factor), and abandonment of existing groundwater
24 monitoring wells. Future estimated costs are based on
25 environmental industrial cleanup standards since continued
26 industrial land use is planned for the HBPP property. The
27 forecasted cost to complete remediation at the HBPP is \$0.5 million
28 in nominal dollars. Additionally, there will be labor and contract
29 costs related to on-going environmental permit obligations for
30 biological monitoring and vegetation management under the Final
31 Site Restoration Plan being managed by Environmental

³⁷ HBPP Exhibit (PG&E-7), WP 6-54.

Management Generation.³⁸ These costs are forecasted to be at \$2.3 million in nominal dollars, bringing the total costs at completion to \$32.9M. Future costs thereafter at HBPP will be transitioned from MWC 55 to MWC AK beginning 2023.

c. Kern Power Plant

1) Current State

The KPP, a 140-acre former Power Plant property, has received a “No Further Action” (NFA) letter on May 24th, 2019 from the Central Valley Regional Water Quality Control Board Fresno office for the completion of remediation. This closure letter was received following multiple site investigations, remedial excavations, Human Health and Ecological Risk assessments. All remedial activity costs have been recovered in prior GRC filings. KPP did not incur any remediation cost in the current year. Management of the site has transitioned to LEM Surplus Property for site disposition.

2) Future State

The original plant property has been sub-divided, and the 46-acre northern parcel, along Stockdale Highway, has been re-zoned from industrial to retail mixed-use, and is now on the market for re-development. The southern area is encumbered with multiple overhead high voltage transmission lines and will likely remain as PG&E owned surplus property around the expanded substation. Remaining cost at \$102 thousand in nominal dollars is being managed by LEM Surplus Property; disposition of the site is expected by the end of 2021.

d. Pleasant Creek Underground Gas Storage Facility

The 2019 GT&S D.19-09-025 adopted PG&E’s request to sell or decommission the Pleasant Creek storage field and authorized \$1.724 million in spend for Environmental Remediation. The decision indicated a sale is preferred before decommissioning, which will be anticipated to begin by the end of 2021. Given the sale of this site will

³⁸ See Section B.1.b.2.c of this section for a brief description of the Environmental Management Generation team.

1 not be concluded prior to filing, this rate case assumes
2 an unsuccessful sale. Furthermore, based on PG&E's Environmental
3 Legal guidance, the Company should perform investigations to
4 determine the level of remedial actions necessary to ensure elimination
5 of environmental contamination as Legal representatives anticipate any
6 potential buyer is unlikely to perform adequate level of remediation, if left
7 to own "as-is", long term liabilities for the Company may result.

8 In 2019 and 2020, pre-sale preparation activities at Pleasant Creek
9 have been underway, with bids from buyers expected in the first quarter
10 of 2021. According to the existing schedule, a sale will not have been
11 fully executed before this rate case is filed. With this
12 constraint, the assumption that the Company will not successfully sell
13 the site has been made. The environmental remediation efforts are
14 anticipated to be implemented following investigation activities as
15 warranted by the results in 2021, subject to the Commission's approval
16 of any sale.

17 To prepare Pleasant Creek for decommissioning, Environmental
18 Remediation has performed various due diligence efforts in parallel with
19 the ongoing pre-sale preparation activities. In 2020, two feasibilities
20 studies were arranged as part of the overall remediation strategy. The
21 scope of work included a Phase 1 literature search as well as land rights
22 evaluation. A Phase 2 site investigation, which includes scoping and
23 planning a detailed site investigation including groundwater, soil vapor
24 and soil sampling and analysis is funded and planned for early
25 2021. Results of this investigation will inform, if warranted, development
26 of work plans for excavation, disposal, and backfill of impacted soils
27 along with groundwater management and treatment as required. These
28 efforts will be completed at the compressor-dehydrator station as well as
29 at the five well sites located on the property if impacts are discovered for
30 remediation. Cost estimates are within an order of magnitude and will
31 be further refined with ongoing investigative efforts. Below table
32 summarizes environmental remediation cost activities from 2021 to
33 2025:

TABLE 6-11
PLEASANT CREEK GAS STORAGE FACILITIES³⁹
(THOUSANDS OF DOLLARS)

Line No.	Program	2021	2022	2023	2024	2025
1	Remediation	\$247	\$383	\$483	\$383	\$204

D. Charge Back Forecasts

As stated above, certain LEM activities are charged to other PG&E LOBs. Chargeback costs for LEM services are included in each LOB forecast and are not requested in this chapter. Information about LEM's chargeback costs are referenced in this chapter for the Commission's information only.

Chargeback allocations are done through PG&E's SAP accounting system. To estimate LEM's total Company chargeback costs for 2023-2026, PG&E applied standard escalation, per Company escalation guidelines.⁴⁰

E. Cost Tables

³⁹ Pleasant Creek Exhibit (PG&E-7), WP 6-55.

⁴⁰ Exhibit (PG&E-7), WP 6-51, for chargeback detail.

TABLE 6-12
LAND AND ENVIRONMENTAL MANAGEMENT
EXPENSES BY MWC
(THOUSANDS OF DOLLARS)

Line No.	MWC	Description	Recorded Adjusted					Forecast			Workpaper Reference
			2016	2017	2018	2019	2020	2021	2022	2023	
1	AB	Misc. Expense	\$2,840	\$1,443	\$1,239	\$913	\$630	\$831	\$955	\$1,403	WP 6-3, WP 6-12, WP 6-13
2	AK	Environmental Operations	6,775	8,011	8,729	8,911	8,496	8,092	8,604	9,456	WP 6-4, WP 6-14, WP 6-15
3	AY	Habitat and Species Protection	442	315	321	263	128	298	305	313	WP 6-5, WP 6-16, WP 6-17
4	CR	Waste Disposal and Transportation	1,976	2,493	2,649	1,905	2,124	2,112	2,115	2,118	WP 6-5, WP 6-18, WP 6-19
5	ES	Implement Environmental Projects	551	466	697	718	797	423	623	639	WP 6-5, WP 6-20, WP 6-21
6	FA	Spc A&G/Oth Csts-Bud Dept	1,144	342	—	—	—	—	—	—	
7	IG	Manage Var Bal Account Processes	—	—	—	1,523	2,493	—	—	—	
8	JE	Land Services	4,194	4,330	4,250	3,823	3,053	3,191	4,156	4,248	WP 6-6, WP 6-22, WP 6-23
9	JK	Environmental Remediation	6,039	5,346	5,447	5,647	6,233	5,534	5,470	5,931	WP 6-7, WP 6-28, WP 6-29
10	JV	Maintain IT Apps and Infra	—	78	60	48	105	66	66	66	WP 6-8, WP 6-30, WP 6-31
11	KX	Employee Engagement	5	7	25	3	2	5	5	5	WP 6-32, 6-33
12	KY	Risk and Compliance	1,282	1,403	1,260	1,358	1,198	1,380	1,426	1,461	WP 6-9, WP 6-34, WP 6-35
3	OM	Operational Management	1,792	368	436	402	478	406	519	532	WP 6-10, WP 6-36, WP 6-37
14	OS	Operational Support	1,821	2,305	1,667	2,091	2,563	2,390	2,846	2,917	WP 6-10, WP 6-38, WP 6-39
15		Total	\$28,861	\$26,907	\$26,782	\$27,606	\$28,298	\$24,726	\$27,089	\$29,088	

TABLE 6-13
LAND AND ENVIRONMENTAL MANAGEMENT
CAPITAL COST BY MWC
(THOUSANDS OF DOLLARS)

Line No.	MWC	Description	Recorded				Adjusted				Forecast				Workpaper Reference
			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026		
1	05	Tools and Equipment	\$429	\$584	\$1,117	\$561	\$380	\$300	\$300	\$300	\$300	\$300	\$300	WP 6-47, WP 6-48	
2	12	Implement Env. Projects	4,531	10,850	5,238	9,384	12,696	11,717	7,317	7,317	7,317	7,317	7,317	WP 6-49, WP 6-50	
3	2F	Build IT Apps and Infra	35	—	—	—	—	—	—	—	—	—	—	WP 6-45, WP 6-46	
4	Total		\$4,995	\$11,434	\$6,355	\$9,945	\$13,076	\$12,017	\$7,617	\$7,617	\$7,617	\$7,617	\$7,617		

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 7
ENTERPRISE RECORDS AND INFORMATION MANAGEMENT
AND ENTERPRISE DATA MANAGEMENT
[INCLUDES NOVEMBER 5, 2021 ERRATA]

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 7
ENTERPRISE RECORDS AND INFORMATION MANAGEMENT AND
ENTERPRISE DATA MANAGEMENT

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 7
ENTERPRISE RECORDS AND INFORMATION MANAGEMENT AND
ENTERPRISE DATA MANAGEMENT

A. Introduction

1. Scope and Purpose

The purpose of this chapter is to demonstrate that Pacific Gas and Electric Company's (PG&E or the Company or the Utility) expense and capital forecasts for the Enterprise Records and Information Management (ERIM) and the Enterprise Data Management (EDM) Programs are reasonable and should be adopted by the California Public Utilities Commission (Commission).

PG&E's ERIM Program has become an integral part of PG&E's effort to further strengthen its safety culture and contributes to providing safe, reliable, and affordable gas and electric service to its customers. The ERIM Program's focus is to reduce risk and increase trust in the Company's records and information by providing clear governance, change management and process improvement, and effective technology and tools.

The primary goal of PG&E's EDM Program is to ensure the health and usefulness of PG&E's data assets, enabling data-driven decision making in support of PG&E's mission. To deliver on this goal, the EDM Program's approach is to treat data as an asset. Fundamentally, this approach translates to defining, implementing, and monitoring requirements to explicitly identify and catalog critical data assets, measure the health of those assets, and as needed, mitigate risks to those assets so that they are fit for purpose. The EDM Program strategy is to reduce data asset risks by promoting more consistent Data Management (DM) across the lines of business (LOB), promoting consistent LOB data standard compliance and improving operational efficiency.

2. Summary of Request

PG&E requests that the Commission adopt its 2023 ERIM/EDM expense forecast of \$20.3 million, which represents a 61 percent increase from base year 2020 recorded expenses. This increase is primarily driven

1 by EDM Program expenses, as EDM is a new program at PG&E, as well as
2 an increase in ERIM Program and related Information Technology (IT)
3 Project costs.

4 PG&E also requests that the Commission adopt its capital expenditure
5 forecasts of \$2.720 million in the year 2021 and \$2.0 million in the years
6 2022-2026, all of which are in support of the ERIM Program.

7 Details about the activities, costs, and drivers for these forecasts are
8 provided in Section C below.

9 **3. Deferred Work Review**

10 Section 5.2 of the 2020 General Rate Case (GRC) Settlement
11 Agreement requires PG&E to make an additional showing in its 2023 GRC
12 testimony for work that was previously requested and authorized based on
13 representations that the work was needed to provide safe and reliable
14 service.

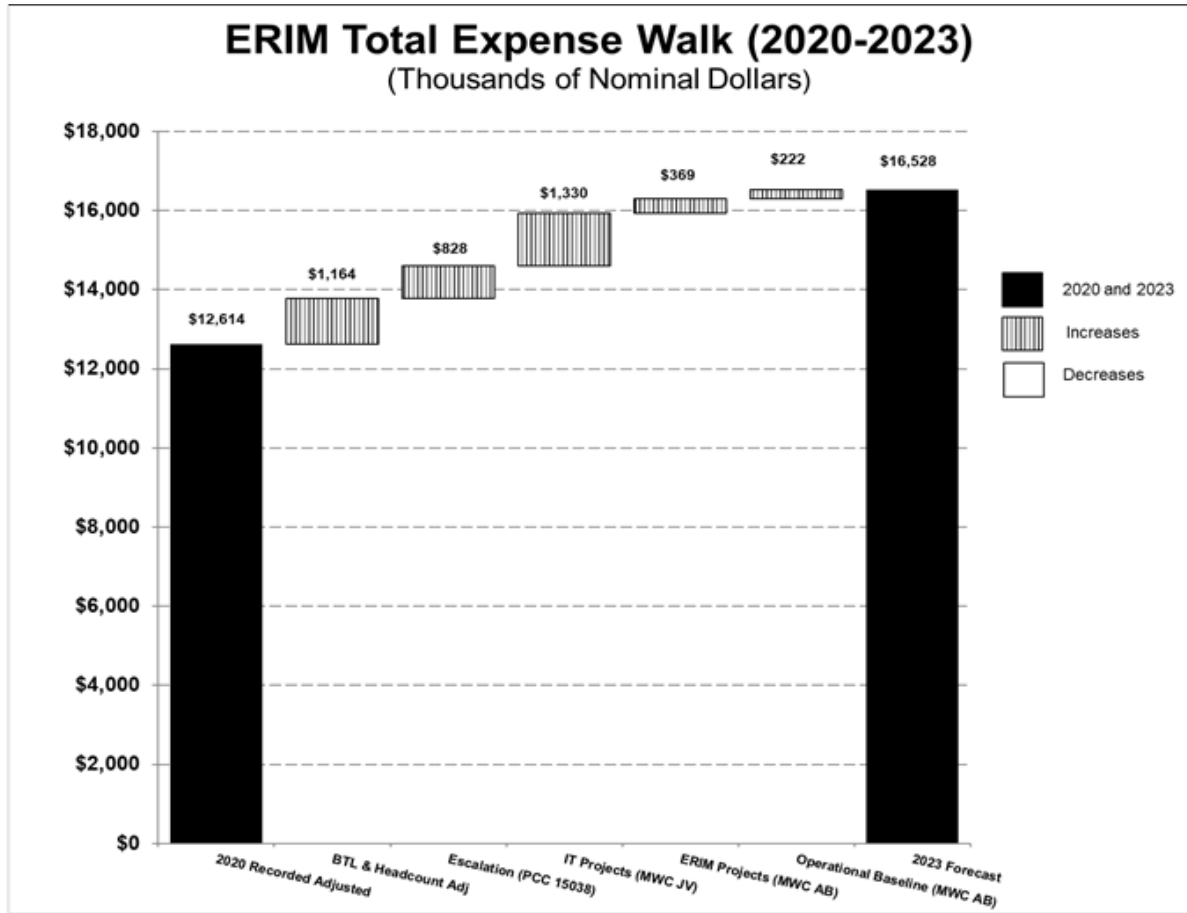
15 In the 2020 GRC, ERIM/EDM did not request or receive authorized
16 funding for any work (1) identified as safety, reliability, or
17 maintenance(SRM)-related in the 2020 Risk Spending Accountability Report
18 or (2) based on representations in testimony and work papers that the work
19 was needed to provide safe and reliable service.

20 **4. Overview of Recorded and Forecast Costs**

21 **a. ERIM Expense**

22 PG&E requests that the Commission adopt its 2023 ERIM expense
23 forecast of \$16.5 million. Recorded expense was \$12.6 million in 2020.
24 PG&E's 2023 expense request represents a 24 percent increase from
25 base year 2020 recorded expenses and is primarily driven by an
26 increase in ERIM Program and related IT Project Costs in the test year.
27 The increase in ERIM Program costs is primarily due to wage
28 escalation, transitioning from shareholder-funded projects, and
29 backfilling vacant positions.

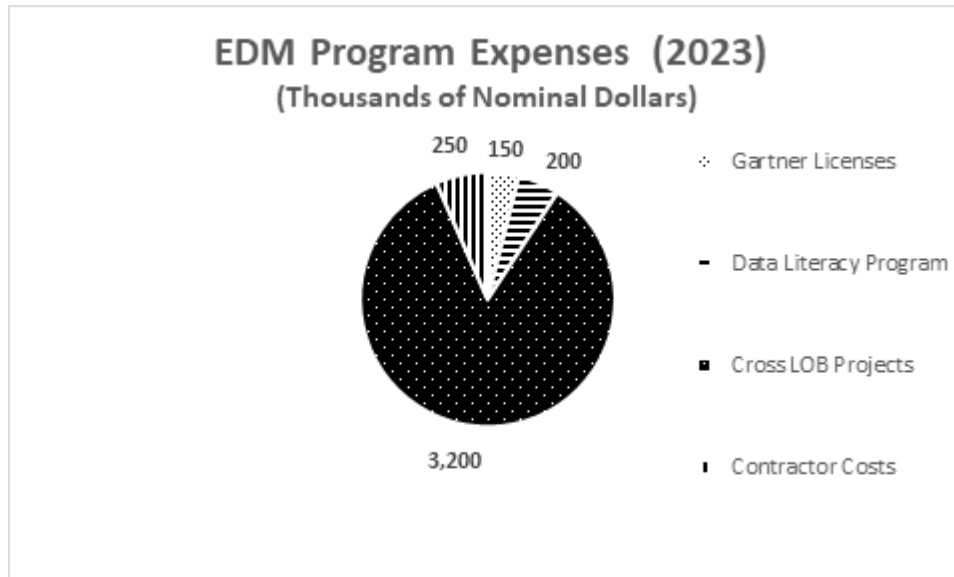
FIGURE 7-1
ERIM TOTAL EXPENSE WALK (2020–2023)



b. EDM Expense

PG&E requests that the Commission adopt its 2023 EDM expense forecast of \$3.8 million. EDM is a new data governance program at PG&E and, therefore, there are no prior recorded EDM expenses. PG&E's 2023 expense request represents the costs to operationalize a centralized team to provide governance and oversight to the standards required by the EDM Program. The activities needed to operationalize EDM practices are based on an assessment of the current state of EDM maturity within the Company as benchmarked against best practices identified by other organizations. It should be noted that the LOBs will own and manage the data. The funding requested is for setting up a centralized office to support the consistent implementation of best practices in DM across the LOBs. This will facilitate alignment focused on safety, quality, and reliability across the enterprise.

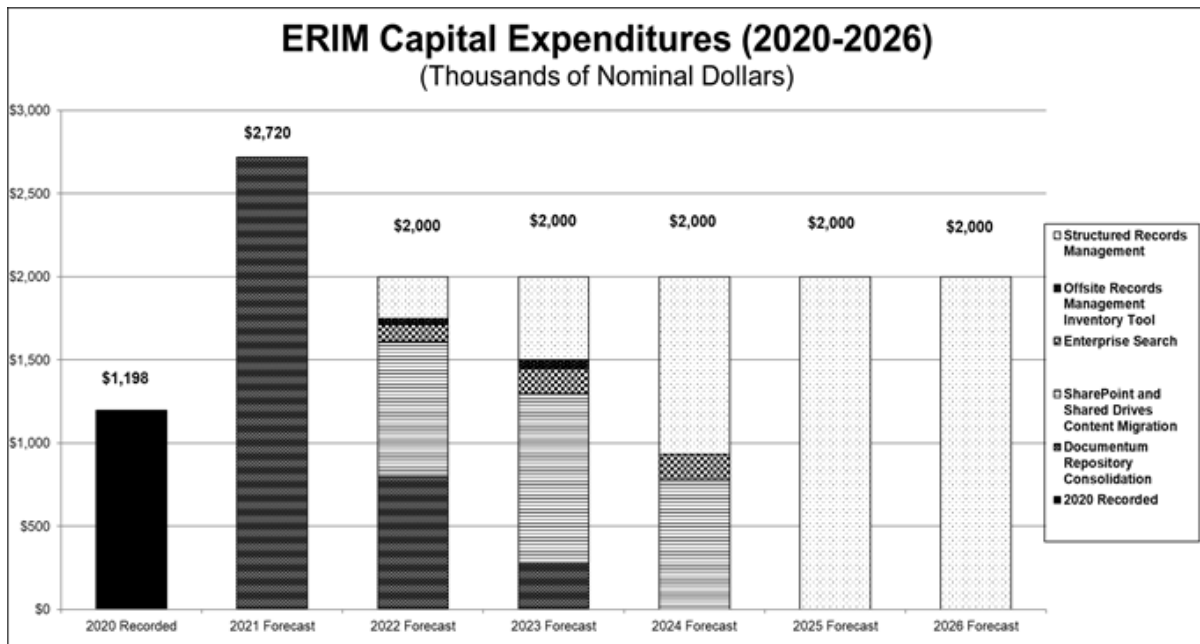
FIGURE 7-2
EDM PROGRAM EXPENSES (2023)



c. ERIM Capital

PG&E also requests that the Commission adopt its ERIM capital expenditure forecasts of \$2.72 million in the year 2021 and \$2.0 million in the years 2022-2026, which represent a 67 percent increase over 2020 recorded adjusted capital expenditures of \$1.2 million. The increase in forecast spend relative to 2020 is driven primarily by IT projects related to managing structured electronic content. These projects implement records and information management (RIM) governance for content in structured data repositories (i.e., SAP (SAP AG Software), Customer Care and Billing, Geographic Information System, etc.).

FIGURE 7-3
ERIM CAPITAL EXPENDITURES (2020–2026)



5. Support for ERIM Request

PG&E recognizes the critical role that effective RIM strategies, policies, standards, and procedures play in further mitigating different risks, supporting consistent LOB RIM compliance, and further improving operational efficiency. Implementing and maintaining a mature RIM program is also a critical component of PG&E's commitment to safety. A mature program is more effective in mitigating risk because it is characterized by defined policies and procedures and the implementation of processes specifically intended to improve information governance and records management.

Inconsistent management of records and information resulting in insufficient record availability and integrity may lead to an operational incident and/or an adverse business result, including the potential for post-event negative impacts resulting from an inability to locate records necessary to support an investigation or understanding the incident's root cause. For that reason, the ERIM Program has a six-year road map that outlines the steps it will take to mature RIM practices at PG&E, and as a result, mitigate the related safety and operational risks. This six-year ERIM

1 Program road map (2021-2026) is the basis for the requested amounts in
2 this chapter.

3 **6. EDM Program Justification**

4 The wildfire events of 2017-2019 and our work to minimize wildfire
5 through Public Safety Power Shutoffs, combined with our development and
6 maturation of our data analytics and data science practices, are driving us to
7 build more analytics on integrated data from across the enterprise. At the
8 end of 2019, PG&E Corporation's Chief Executive Officer declared data
9 governance to be among the top eight issues for the enterprise. In support
10 of this, a new Data Governance Chief position was created in March 2020 to
11 develop and implement an EDM Program that enables data-driven decisions
12 to improve safety outcomes, reduce risk, and build customer trust. The
13 responsibilities of this position included:

- 14 • Creation of the EDM Program;
- 15 • Development of the DM Policy, Strategy, and Standards; and
- 16 • A coordinated approach to the changes in people, processes, and
17 technology that will result in improvements to PG&E's DM maturity and
18 capabilities within each LOB.

19 The Data Governance Chief and Directors from several of the largest
20 business areas were brought together to launch a new EDM Program at
21 PG&E. The program is designed to address DM challenges across the
22 business and help the organization make timely, risk-informed, data-driven
23 decisions through better data quality that will ultimately improve analytics
24 and insights. Working with data sets across lines of business, departments,
25 and work teams requires a deeper understanding of the data and better
26 controls over all aspects of fidelity and quality. The new requirements of our
27 more demanding integrated data analytics environment now require a level
28 of effort beyond what has been satisfactory in the past. We recognize the
29 need to expand and build on our departmental solutions by developing a
30 comprehensive enterprise DM capability. The establishment of the EDM
31 organization solidly establishes business oversight, control, and
32 accountability for this program.

33 PG&E recognizes the critical role that effective DM strategies, policies,
34 standards and procedures play in meeting stakeholder commitments,

supporting consistent LOB DM compliance, further improving operational efficiency and realizing the expected return on the investment in the Palantir Foundry DM platform¹. Furthermore, an effective DM program will support PG&E's new framework to run the business, the Operating Rhythm². An enterprise wide DM program will align with this integrated enterprise wide structure and accurate data elements will underpin the sharing of key business and operational updates including Key Performance Indicators that will promote making timely decisions.

Implementing and achieving a mature EDM program is also a critical component of PG&E's commitment to safety. A mature program is more effective in mitigating data risks because it is characterized by defined policies and procedures and the implementation of processes specifically intended to improve DM and governance. The Program has a road map that outlines the steps it will take to mature DM practices at PG&E, and as a result, mitigate the related safety and operational risks. This road map is the basis for the requested amounts in this chapter.

7. Organization of the Remainder of This Chapter

The remainder of this chapter is organized as follows:

- Section B – ERIM Program and Risk Overview;
- Section C – ERIM Activities, Costs, and Forecast Drivers by Major Work Category (MWC);
- Section D – ERIM Cost Tables;
- Section E – EDM Program Overview and Risk Overview;
- Section F – EDM Activities, Costs, and Forecast Drivers by MWC; and
- Section G – EDM Cost Tables.

B. ERIM Program and Risk Overview

1. Program Description

a. Program Overview

PG&E established the ERIM Department in May 2014 to continue and expand the work of PG&E's former Information Management

¹ Exhibit (PG&E-7), Ch. 8, IT.

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

Compliance organization. The ERIM Department was established as a centralized function providing enterprise level strategy and support for maturing RIM.

In 2015, PG&E's senior leadership identified records management as one of the Company's top Enterprise Risks. In response, the ERIM Department assessed the existing Program and created an enterprise wide ERIM Program and roadmap designed to mitigate the RIM Risk, support PG&E's safety culture, promote compliance with the law, and improve operational efficiencies. The complete scope and mission of the ERIM Program is described in the sections that follow.

b. Management Structure

The ERIM Department is part of the Compliance & Ethics organization. It is comprised of 79.5³ full-time equivalents organized in the following internal groups:

- Compliance;
- Operations;
- Project Execution; and
- LOB Support.

The design of the ERIM Department structure is aligned with key functions needed to mature records management at PG&E and execute its supporting Program roadmap. The following outlines the functions of these different teams within the ERIM Department.

1) Compliance

The Compliance team within the ERIM Department is responsible for documenting compliance obligations and gaps, performing risk assessments, supporting internal and external strategic planning, and reporting out on Program metrics. The team's roles and responsibilities include developing program governance, maintaining program policy and standards, managing the Enterprise Records Retention Schedule (ERRS), monitoring the protection of vital records, supporting internal and external audits, implementing a vendor Quality Assurance (QA)/Quality Control (QC)

³ Headcount as of March 31, 2021.

1 audit process, supporting regulatory filings and requests for
2 information, documenting compliance testing, performing
3 benchmarking, identifying records quality challenges, modeling data
4 quality impact to enterprise risks, and updating required training.

5 **2) Operations**

6 The ERIM Operations team is dedicated to overseeing the
7 management of physical records and supporting PG&E field
8 operations by providing RIM related support and training. This
9 includes: overseeing the PG&E Corporate Archives, coordinating
10 enterprise Shred Services, supporting legal holds, discovery and
11 responding to data requests related to physical records, managing
12 the centralized storage of PG&E's physical records (both storage
13 and retrieval), and the remediation of inactive physical records.
14 Within ERIM Operations, the RIM Coordinators provide Program
15 awareness and training support in each PG&E division as well as
16 support remediation efforts of RIM related non-conformances in the
17 field.

18 **3) Project Execution**

19 The Project Execution team is responsible for supporting the
20 execution of the ERIM Program roadmap, which includes project
21 management (including change management and communications),
22 financials, communications, and training. Some of the team's roles
23 and responsibilities involve reporting on financials and program
24 metrics, developing business requirements for and executing on
25 projects, providing support for electronic records assessments,
26 implementing technology and tools to enable the management of
27 the records lifecycle, and supporting governance for e-Discovery,
28 and legal holds applicable to electronic records.

29 **4) LOB Support**

30 The LOB Support teams consult, educate and partner with the
31 LOBs to support and implement ERIM Program requirements and
32 mature the LOB's records management practices. Ultimately, every
33 leader at PG&E is responsible for promoting consistent records

management and the goal of the LOB Support teams is to provide RIM guidance, assessment, training, and education to help leaders understand and meet their responsibilities. Their roles and responsibilities include: implementing ERIM initiatives into the LOBs, project execution support, consulting on business process improvements to ensure necessary RIM components, implement and support disposition, providing subject matter expertise to support adoption and change management specific to an individual LOB, managing the Enterprise records inventory including the facilitation of LOB inputs, program monitoring, and LOB support and use of the ERRS.

c. Key Metrics and Other Performance Measures

The ERIM Department developed metrics, a monthly Program scorecard and a dashboard. The key metrics are discussed below.

1) Number of RIM Related Notices of Violation (NOV)

In this metric, PG&E tracks the number of RIM related. The objective of this metric is to identify the RIM Risk drivers identified in NOV, use the data to support RIM Risk modelling efforts and ultimately take appropriate actions to mitigate these risks.

2) Percent of Resolved or Remediation Plans Developed for Corrective Action Plan (CAP) Related Findings Within 30 Days of Assignment

In this metric, PG&E tracks the percentage of CAP items that have been resolved or for which remediation plans have been developed within 30 days of assignment. The objective of this metric is to define and execute timely remediation of issues identified in submitted CAP reports.

3) Percent of Personnel Who Have Completed ERIM Training (CORP-9045 Web-Based Training (WBT))

In this metric, PG&E tracks the percentage of personnel, both employee and non-employee, who have completed the annual ERIM Program training. The objective of this metric is to educate employees and non-employees on ERIM Program requirements.

This will help address the gap of a lack of knowledge of ERIM Program compliance elements, which is a cross-cutting risk for all LOBs.

4) Number of RIM Related Findings by IA, CAP and QA/QC

In this metric, PG&E tracks the number of RIM related findings by Internal Audit (IA), CAP, and QA/QC. The objective of this metric is to define and execute timely remediation of issues identified in IA, CAP, and QA reports.

2. Risk Controls and Mitigations

a. Risk Overview

As PG&E evaluated all the risks on its Corporate Risk Register (CRR), it identified items that were not risk events themselves, but rather impacted either the likelihood or consequence of other items on the CRR. Those items were identified as the cross-cutting factors in the 2020 Risk Assessment and Mitigation Phase (RAMP) report.

PG&E identified RIM as a cross-cutting factor because the risk of not having an effective RIM program may result in the failure to construct, operate and maintain a safe system and may lead to property damage and/or loss of life. Managing records and information inconsistently can lead to an operational incident or adverse business result if records that are needed cannot be located in a timely fashion. RIM influences the baseline risk for all but two of the risk events on the Corporate Risk Register. Risk has been quantified such that the contribution of RIM to the risk can be distinguished. Exhibit (PG&E-2), Chapter 1, Attachment B includes a table mapping the cross-cutting factors to the risk events.

In the 2020 RAMP period, the ERIM team will continue to implement existing mitigations and begin new mitigations in the areas of records and information compliance, retention, availability, governance, disposition, and integrity.

b. Response to Safety and Policy Division's General Comments

The Commission directed Safety and Policy Division Staff to evaluate PG&E's RAMP report and issue its own report. The report

issued by the Staff contained the following minimal comments regarding the RIM cross cutting factor:

Staff finds the incorporation of the RIM cross-cutting factor is appropriate.⁴

RIM was a separate risk in the 2017 RAMP but is now treated as a cross-cutting factor in the 2020 RAMP.

...Staff agrees that these risk factors are appropriate cross-cutting topics.⁵

The ERIM Department has not significantly changed the scope of the mitigations and controls proposed by PG&E in the RAMP. Any forecast changes to cost forecasts for the mitigations are the result of further refining those costs and are described below.

c. Risk Mitigations and Controls Overview

This chapter includes mitigations and controls that address the RIM cross cutting factor, as described in Exhibit (PG&E-2), Chapter 1.

The forecast for the associated controls for the RIM Risk is \$8.3 million in 2023 for expense. The forecast for the associated mitigations is \$8.3 million in 2023 for expense and \$2.0 million for capital in 2023, 2024, 2025, and 2026, respectively.

Prior to and during 2020, the ERIM Department implemented various controls to mitigate the RIM Risk. For ease of understanding and to align to the framework of the Information Governance Maturity Model (IGMM), the control activities have been bundled according to the Association of Records Managers and Administrators (ARMA) principles⁶ used to measure program maturity and are listed below:

- Accountability Related Controls;
- Transparency Related Controls;
- Compliance Related Controls;
- Retention Related Controls;

⁴ See A.20-06-012 Safety Policy Division Staff Evaluation Report (November 25, 2020) on 2020 RAMP Risk (Ch. 17): Contractor Safety Incident, p. 122, and RAMP Risk (Ch.18): Motor Vehicle Safety Incident, p. 127.

⁵ See *id.*, Cross Cutting Factors (Ch. 20), p. 136.

⁶ For education and resources on the Generally Accepted Recordkeeping Principles, visit www.arma.org/principles (as of June 16, 2021).

- Protection Related Controls; and
- Availability Related Controls.

To further reduce the RIM Risk, various mitigations are being implemented during the years 2021-2026. As in the case of the controls mentioned above, some of these have been bundled according to the ARMA IGMM principles used to measure program maturity. These are:

- Retention Related Mitigations;
- Availability Related Mitigations;
- Implement RIM Governance for Content in Unstructured Data Repositories;
- Integrity Related Mitigations; and
- Implement RIM Governance for Content in Structured Data Repositories.

d. Details of RIM Risk Mitigations and Controls

1) Mitigations

PG&E has identified six risk mitigations to be implemented during the years 2023-2026 to address the RIM cross cutting factor. The forecasts associated with the mitigations have been modified since the 2020 RAMP report due to scope overlap, an alternate funding source, or a refined forecast. Details regarding these forecast changes are discussed below.⁷

- **Records Retention Related Mitigations⁸** – The total forecasted expense cost is \$0.4 million and \$0.7 million in 2022-2023, respectively. The forecast expenses decreased from the 2020 RAMP Report by \$0.9 million and \$0.7 million in 2021 and 2022 but increased by \$0.3 million in 2023. Additionally, there are forecast capital expenditures of \$38,000 and \$53,000 in the years 2022-2023, which were not in the 2020 RAMP report. The forecast changes were due to refinements in the forecast and adjustments to the timing of the

⁷ See Exhibit (PG&E-7), WP 7-22 to WP 7-24.

⁸ For more information on the Records Retention Related Mitigations see Exhibit (PG&E-7), WP 7-25 to WP 7-26.

projects. These mitigations are effective at modifying the RIM cross cutting factor because they support maintaining records and non-records for an appropriate time, taking into account legal, regulatory, fiscal, and operational requirements. Activities include: building a connector to manage retention schedule changes in systems, and implementing software that manages offsite records.

- **Records Availability Related Mitigations⁹** – The total forecasted expense cost is \$0.9 million, \$0.2 million, and \$0.2 million in the years 2021-2023. The forecast expenses decreased from the 2020 RAMP Report by \$0.5 million in 2022 but increased by \$0.3 million in 2021 and \$0.2 million in 2023. Additionally, the capital related expenditures for these projects are \$100,000; \$150,000; and \$150,000 for the years 2022-2024. This is an increase from the 2020 RAMP report which forecast no capital expenditures for those years. The forecast changes were due to refinements in the forecast and adjustments to the timing of the projects. These mitigations are effective at modifying the RIM cross cutting factor because they facilitate timely, efficient, and accurate retrieval of records. Activities include: evaluating, selecting and deploying mobile content management tools to access Documentum records and content; and identifying key systems and understanding where we need to find records and information and how (metadata and search capabilities) in those systems.
- **Implement RIM Governance for Content in Unstructured Data Repositories¹⁰** – The total forecasted expense cost is \$3.7 million, \$3.4 million, and \$3.5 million in 2021-2023. The expense forecast decreased from the 2017 RAMP Report by \$2.0 million, \$2.2 million, and \$2.1 million in 2021-2023,

⁹ For more information on the Records Availability Related Mitigations see Exhibit (PG&E-7), WP 7-27 to WP 7-29.

¹⁰ For more information on the Implement RIM Governance for Content in Unstructured Data Repositories mitigation see Exhibit (PG&E-7), WP 7-30 to WP 7-33.

respectively. The total capital forecasted cost is \$2.7 million, \$1.6 million, \$1.3 million, and \$0.8 million in 2021-2024. The capital forecast increased from the 2021 RAMP Report which did not forecast any capital expenditures for the years 2021-2026. The changes in the forecast were due to a portion of the work being completed by other IT projects, a refinement in the forecasts, and removal of shareholder funded expenses. This mitigation is effective at modifying the RIM cross cutting factor because it implements metadata and retention controls in applications such as e-mail, SharePoint, and file shares to support efficient and accurate retrieval of needed information.

- **Records Integrity Related Mitigations¹¹** – The total forecasted expense cost is \$0.4 million, \$0.7 million, and \$1.3 million in the years 2021-2023, respectively. The forecast expenses decreased from the 2020 RAMP Report by \$0.5 million and \$0.2 million in 2021 and 2022, respectively but increased by \$0.2 million in 2023, due to refinements in the forecast and adjustments to the timing of the projects. These mitigations are effective at modifying the RIM cross cutting factor because they improve the integrity of records and information by supporting authenticity and reliability. Activities include: normalizing data from across legacy systems to ensure the required metadata is collected, standardized, and retained; enhancing the Engineering Workspace tool to fix issues like missed objects and the inability to find data efficiently and performing data cleanup.
- **Implement RIM Governance for Content in Structured Data Repositories¹²** – The total forecasted expense cost is \$0.5 million, \$2.4 million, and \$2.5 million in the years 2021-2023, respectively. The expense forecast decreased from

¹¹ For more information on the Records Integrity Related mitigations see Exhibit (PG&E-7), WP 7-34 to WP 7-35.

¹² For more information on the Implement RIM Governance for Content in Structured Data Repositories mitigation see Exhibit (PG&E-7), WP 7-36 to WP 7-37.

the 2020 RAMP Report by \$1.2 million and \$0.1 million in 2021-2022, respectively. The total capital forecasted cost is \$0.3 million, \$0.5 million, \$1.1 million, \$2.0 million, and \$2.0 million in the years 2022-2026, respectively. The capital forecast decreased from the 2020 RAMP Report by \$0.1 million, \$0.8 million, and \$0.5 million in the years 2021-2023, respectively and increased by \$0.1 million, \$1.0 million, and \$1.0 million in the years 2024-2026. The changes in the forecast were primarily due to a change in the schedule to accommodate other IT projects. This mitigation is effective at modifying the RIM cross cutting factor because it implements retention controls in structured database applications such as SAP and the customer billing system to dispose of content that is no longer needed to meet retention obligations.

2) Controls

In the years 2021-2023, the ERIM Department is implementing various controls to reduce the RIM cross cutting factor. Risk Spend Efficiency scores were calculated for any controls anticipated to be in place by the GRC forecast year of 2023. The total forecasted cost for these activities is \$9.3 million, \$8.9 million, and \$8.3 million of expense in the years 2021-2023, respectively.¹³

For ease of understanding and to align to the framework of the IGMM, the activities have been bundled according to the ARMA principles used to measure program maturity and are described below:

- **Accountability Related Controls** – These controls involve oversight of the ERIM Program including the management of its policy and standards. These activities include: ‘Metric Reporting’; ‘Enterprise Risk & Compliance (IGMM) Maturity’; ‘ERIM Employee Training & Development’; ‘ERIM Risk Activities’; ‘ERIM Strategy’; and, ‘ERIM Technology Strategy’. The total forecasted cost for these controls is \$1.6 million,

¹³ See Exhibit (PG&E-7), WP 7-22 – WP 7-24.

\$1.8 million, and \$1.3 million of expense in the years 2021-2023, respectively.

- **Transparency Related Controls** – These controls involve documenting business processes and activities. These activities include: ‘Reporting (Financial and performance)’; ‘Communications & Change Management’; ‘ERIM Training Module (WBT)’; ‘ERIM Guidance Documents’; ‘GRC Filings’; ‘LOB & Customer Support’; and, ‘ERIM Field Training’. The total forecasted cost for these controls is \$1.7 million, \$1.7 million, and \$1.6 million of expense in the years 2021-2023, respectively.
- **Compliance-Related Controls** – These controls involve verifying compliance with applicable laws and other regulations issued by binding authorities, as well as the ERIM Program’s policy and standards. These activities include: ‘Enterprise Program Compliance’; ‘Integrated Planning’; ‘Regulatory Requirements – Controls & Testing’; ‘Trend Analysis of Corrective Action Program, NOV, and IA’; ‘Certifications & Remedies’; ‘Third-Party Contract Audits’; and, ‘Data Requests’. The total forecasted cost for these controls is \$0.9 million, \$1.0 million, and \$1.1 million of expense in the years 2021-2023, respectively.
- **Retention-Related Controls** – These controls involve maintaining records and non-records for an appropriate time, taking into account legal, regulatory, fiscal, and operational requirements. These controls include: ‘ERRS Updates’; ‘Corporate Archives’; ‘Physical Records Storage (Offsite)’; and ‘Information & Data Governance’. The total forecasted cost for these controls is \$2.3 million, \$2.4 million, and \$2.6 million of expense in the years 2021-2023, respectively.
- **Protection-Related Controls** – These controls involve providing an appropriate level of security controls for records and non-records that are internally classified for security purposes as Public, Internal, Confidential, and Restricted.

1 These activities include: 'System Retirement/Decommissioning
2 Efforts'; 'Physical Records Assessments and Cleanups';
3 'Manage Shred Bins'; 'Bull Room Cleanup'; 'Headquarter Move';
4 and 'Emergency Response Documentation'. The total
5 forecasted cost for these controls is \$2.3 million, \$1.6 million,
6 and \$1.3 million of expense in the years 2021-2023,
7 respectively.

- 8 • **Availability-Related Controls** – These controls involve
9 maintaining records and information in a manner that allows for
10 timely, efficient, and accurate retrieval of records. These
11 activities include: 'Records Inventory'; 'Nitrate Negatives
12 Management'; and 'Paper Reduction'. The total forecasted cost
13 for these controls is \$0.4 million, \$0.4 million, and \$0.5 million of
14 expense in the years 2021-2023, respectively.

TABLE 7-1
RIM CROSS CUTTING FACTOR MITIGATION CAPITAL COSTS
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	Control/ Mitigation#	Name	MWC/Maintenance Activity Type (MAT)	2020 (\$000)	2021 (\$000)	2022 (\$000)	2023 (\$000)	2024 (\$000)	2025 (\$000)	2026 (\$000)
1	RECIM-M04C	Retention Related Mitigations	2F	–	–	\$38	\$53	–	–	–
2	RECIM-M06C	Availability Related Mitigations	2F	\$772	–	100	150	\$150	–	–
3	RECIM-M007	Implement RIM Governance for Content in Unstructured Data Repositories	2F	426	\$2,720	1,612	1,297	784	–	–
4	RECIM-M013	Implement RIM Governance for Content in Structured Data Repositories	2F	–	–	50	500	1,066	2,000	2,000
5	Mitigation Total			\$1,198	\$2,720	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000

(PG&E-7)

TABLE 7-2
RIM CROSS CUTTING FACTOR MITIGATION EXPENSE COSTS
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	Control/ Mitigation#	Name	MWC/ MAT	2020 (\$000)	2021 (\$000)	2022 (\$000)	2023 (\$000)	RSE ^(a)
1	RECIM-C001	Accountability Related Controls	AB	\$549	\$1,643	\$1,786	\$1,260	
2	RECIM-C002	Transparency Related Controls	AB	1,382	1,717	1,677	1,569	
3	RECIM-C003	Compliance Related Controls	AB	2,393	945	1,029	1,080	
4	RECIM-C004	Retention Related Controls	AB	1,726	2,345	2,445	2,581	
5	RECIM-C005	Protection Related Controls	AB	2,119	2,312	1,570	1,273	
6	RECIM-C006	Availability Related Controls	AB	346	387	432	513	
7	Control Total			\$8,514	\$9,350	\$8,938	\$8,277	
8	RECIM-M03C	Compliance Related Mitigations	AB	2	—	—	—	
9	RECIM-M04C	Records Retention Related Mitigations	AB JV	23	2	448	707	4.56
10	RECIM-M06C	Availability Related Mitigations	AB JV	1,165	931	156	247	16.40
11	MRECIM-M007	Implement RIM Governance for Content in Unstructured Data Repositories	AB JV	1,615	3,651	3,442	3,470	10.59
12	RECIM-M10C	Disposition Related Mitigations	AB	42				
13	RECIM-M011	Integrity Related Mitigations	AB JV	1,030	406	687	1,285	8.49
14	RECIM-M013	Implement RIM Governance for Content in Structured Data Repositories	AB JV	222	537	2,365	2,544	6.3
15	Mitigation Total			\$4,101	\$5,527	\$7,099	\$8,251	

(a) RSE calculations incorporate both expense and capital forecasts.

C. ERIM Activities, Costs, and Forecast Drivers by MWC

1. Expense MWCs

Forecasted expense costs are based on an evaluation of the resources required to implement the ERIM Program and include:

- Dedicated resources needed to manage the ERIM Program (i.e., ERIM Program operating costs);
- Additional resources required to comply with the ERIM Program requirements and implement ERIM initiatives (i.e., ERIM MWCs and Order Costs); and,
- Implementation of the ERIM Program's IT initiatives.

a. IT Projects (MWC JV)

1) Estimating Method

IT costs include the costs to implement the ERIM Technology roadmap activities. IT costs include both forecast expense and capital amounts. PG&E discusses its standard estimating methods for technology project investments in Exhibit (PG&E-7), Chapter 8. Historical spend patterns, subject matter expertise, and standard cost factors serve as primary inputs to the IT estimating tools used in this chapter to calculate labor and non-labor costs and document associated assumptions. Forecasts are sequenced to fit within high-level annual planning targets set by IT and Company leadership to align with strategic priorities. Refer to Project and Program Summary workpapers supporting this chapter for more information on the specific estimating methods used in this chapter.

2) Costs

IT is the primary enabler for managing electronic records (both structured and unstructured) by enabling efficient storage, management and location of records and information assets. It furthers program maturity by automating controls such as limiting access to records containing protected or sensitive information and automatically disposing of records as appropriate. The ERIM Program roadmap has identified projects designed to drive consistency in how the Company implements governance for

1 electronic records, including how it stores and manages content.
 2 These projects further PG&E's efforts to mature records
 3 management. There is a forecasted increase of \$1.0 million in
 4 ERIM project costs from 2020.

5 **3) Forecast Drivers**

6 The increase in project costs is driven by the continuation and
 7 increase of work in structured records management, availability,
 8 retention, and integrity related mitigations being offset by the
 9 completion of unstructured records management projects. In 2023,
 10 the IT Projects include:

11 **Retention Related Mitigations¹⁴** – IT will be working on two
 12 projects which will improve PG&E's ability to maintain records and
 13 non-records for an appropriate time, taking into account legal,
 14 regulatory, fiscal, and operational requirements. These projects are
 15 entitled 'Connect ERRS to Systems' and 'Offsite Records
 16 Management Inventory Tool'. The first involves building a connector
 17 between Versatile (Zasio) to manage ERRS changes in systems
 18 (RecordPoint, Documentum, ATLAS, and others to be identified).
 19 The second involves implementing software that manages offsite
 20 records.

21 **Availability Related Mitigations¹⁵** – IT will be continuing work
 22 on a project entitled 'Enterprise Search' which implements a tool to
 23 search across File Shares, SharePoint and Documentum
 24 repositories to increase the timely, efficient, and accurate retrieval of
 25 needed information. The ability to search across multiple
 26 repositories can also help with reducing convenience copies and the
 27 space required to store duplicates. The project involves the
 28 evaluation, selection, and implementation of the tool. It will improve
 29 the ability to locate, retrieve, and dispose of records and information.

14 Exhibit (PG&E-7), WP 7-25 to WP 7-26.

15 Exhibit (PG&E-7), WP 7-27 to WP 7-29.

Implement Records and Information Management

Governance for Content in Unstructured Data Repositories¹⁶ –

This work consists of implementing metadata and retention controls in applications such as Outlook, SharePoint, and file shares. This effort will establish governance on where unstructured electronic records can be stored, and drive consistency in applying retention and disposition of both electronic records and non-records.

Integrity Related Mitigations¹⁷ – IT will be working on a

project entitled 'Enhance Engineering Workspace' which involves enhancing an engineering tool to fix issues like missed categorized object and inability to find data efficiently to improve integrity of records and information by supporting authenticity and reliability.

Implement Records and Information Management

Governance for Content in Structured Data Repositories¹⁸ –

This project consists of implementing retention controls in structured database applications such as SAP and the customer billing system to dispose of content that is no longer needed to meet retention obligations. This involves developing the strategy for establishing the records lifecycle management capabilities of these systems and determine how to apply retention and disposition to eligible information.

b. ERIM Projects (MWC AB)

1) Estimating Method

The ERIM Projects forecasts are based on contract resources required to deliver and manage the projects. The calculations supporting PG&E's forecast amounts for its ERIM Projects are included in supporting workpapers.

¹⁶ Exhibit (PG&E-7), WP 7-30 to WP 7-33.

¹⁷ Exhibit (PG&E-7), WP 7-34 to WP 7-35.

¹⁸ Exhibit (PG&E-7), WP 7-36 to WP 7-37.

2) Costs

ERIM projects support the implementation of items on its roadmap. There is a forecasted increase of \$0.4 million or 41 percent in ERIM project costs from 2020. This is primarily due to continuing work on physical records clean-ups, metadata standardization, as well as nitrate negatives management.

3) Forecast Drivers

In 2023, the forecasted ERIM Projects include:

ERIM Employee Training & Development – Support ERIM employee development by providing employees with opportunities to attend conferences, training, speaking engagements, certifications, professional memberships, etc. and includes ERIM to ERIM training.

Communications & Change Management – Increase level of knowledge and awareness at PG&E of records management with communications, events, and outreach.

Nitrates Negatives Management – Digitize and dispose of Nitrate Negatives located in NFPA-40 compliant storage in accordance to industry and Haz-Mat standards.

ERRS Updates – Maintain a Functional ERRS organized by high level business function; Manage all modifications to the retention schedule each year (law, regulations, or business changes) and publish approved updated schedule

Metadata Standardization & Legacy Technology Consolidation – Normalize legacy system data to ensure the required disposition boxes' metadata are collected, standardized, and retained. This will help to generate the eligibility reports for disposition of boxes in the near future.

Physical Records Cleanup – Identifying, indexing and relocating inactive physical records to Iron Mountain for consolidation in a more centralized manner and to ensure a consistent and secure environment for ongoing storage for the remainder of the record's retention period. This effort includes restoring damaged records to ensure the records remain available and protected.

1 **c. Operational Baseline Costs (MWC AB)**

2 **1) Estimating Method**

3 The ERIM Baseline Operational forecasts are based on contract
4 resources required to deliver and manage the baseline operational
5 activities. The calculations supporting PG&E's forecast amounts for
6 its Baseline Operations are included in supporting workpapers.

7 **2) Costs**

8 Various activities performed by the ERIM Program involving
9 third party vendor spending are categorized as baseline costs
10 necessary for Program operations. There is a forecasted increase
11 of \$0.2 million or 15.5 percent in operational baseline project costs
12 from 2020. This is primarily driven by increases in shred operations
13 and offsite storage costs.

14 **3) Forecast Drivers**

15 For 2023, the forecast drivers for these projects are as follows:

16 **Enterprise Shred Services** – This work includes maintaining
17 an all shred strategy across PG&E, where all paper non-records that
18 are not on legal hold are shredded. This involves using industry
19 best practices to provide confidential document destruction services
20 on a regularly scheduled time and as-needed basis, thereby
21 allowing for a reasonable level of protection for the destruction of
22 records and information internally classified for security as
23 Confidential or Restricted.

24 **Centralized Physical Records Management (Off-Site**
25 **Storage)** – This work includes maintaining centralized off-site
26 storage for inactive physical records to promote more consistent
27 management and protection of physical records.

28 **Companywide Training** – Companywide training includes
29 annually updating the RIM Training (CORP-9045WBT) required of
30 all employees and non-employees and developing any additional
31 training specific to implementing the ERIM Program for LOBs.

d. ERIM Provider Cost Center (PCC) Costs (PCC 15038)

1) Estimating Method

The ERIM Program management forecast is based on the dedicated resources required to deliver and manage the ERIM Program as outlined in the ERIM roadmap. All ERIM Program management forecasts are expense amounts. The calculations supporting PG&E's forecast amounts for its ERIM Program are included in supporting workpapers.

2) Costs

ERIM's PCC expense forecast is based on ERIM labor and associated changes and adjustments. There is a forecasted increase of \$2.0 million or 19 percent in ERIM PCC costs from 2020. This was primarily driven by wage escalation, transitioning from shareholder funded projects, and backfilling vacant positions.

3) Forecast Drivers

ERIM's PCC expense forecast is driven by the following:

a) Labor Escalation

PG&E forecasts \$0.8 million incremental cost attributed to labor escalation for the Program based on the rates (and escalation factors) described in Exhibit (PG&E-8), Chapter 4.

b) Shareholder Funded work and Vacancies

In 2020, PG&E shareholders funded \$1.0 million in work associated with meeting remedies for the Gas Transmission (GT) OII. This included work on many of our unstructured content repositories such as SharePoint and Shared Drives. It is anticipated that the work associated with these remedies for GT will be completed in the years 2021 and 2022. By 2023, the associated personnel will be continuing to support these enterprise-wide efforts which, since the GT remedy work would be completed, will be considered rate payer funded work. This effectively represents an incremental increase in costs even though it is not an increase in work. In addition to this, PG&E forecasts further adjustments to backfill vacant positions.

2. Capital MWCs

The capital projects described here are components of the six-year Program roadmap described above. Each project is an element of the roadmap steps necessary to mature RIM practices at PG&E, and as a result, mitigate related safety and operational risks.

a. Build IT Apps and Infrastructure (MWC 2F)

1) Estimating Method

IT costs include the costs to implement the ERIM Technology roadmap activities. IT costs include both forecast expense and capital amounts. PG&E discusses its standard estimating methods for technology project investments in Exhibit (PG&E-7), Chapter 8. Historical spend patterns, subject matter expertise, and standard cost factors serve as primary inputs to the IT estimating tools used in this chapter to calculate labor and non-labor costs and document associated assumptions. Forecasts are sequenced to fit within high-level annual planning targets set by IT and Company leadership to align with strategic priorities. Refer to Project and Program Summary workpapers supporting this chapter for more information on the specific estimating methods used in this chapter.

2) Costs

The ERIM Program has policies and strategies that address the storage, management, and protection of electronic records and other information assets. This involves systems with the ability to collect and store accurate complete records, enable keyword search to locate these records, limit access to records containing protected or sensitive information, and dispose of records as appropriate.

Numerous legacy systems serving multiple purposes currently exist across the Company. These systems vary in sophistication and maturity, the type of content they maintain, the level of vendor support available, and the governance requirements employed. The different records management systems contain data, information, and records in both structured and unstructured repositories and are used by employees in every LOB.

1 In the year 2021, it is anticipated that ERIM will spend
2 \$2.7 million on IT projects and \$2.0 million per year in the years
3 2022 - 2026. This is an increase of \$0.7 million or 57 percent over
4 2020 costs. This increase is primarily driven by increases in
5 structured records management efforts being offset by completion of
6 work on unstructured records management.

7 **3) Forecast Drivers**

8 The ERIM Department, in partnership with IT, is developing and
9 implementing technology solutions to address issues associated
10 with both structured and unstructured content management. In
11 2023, these efforts are focused on further improving records
12 availability by addressing controls related to availability and
13 retention as well as content in unstructured data and structured
14 repositories. This involves the following projects:

15 **Retention Related Controls** – IT will be working on two
16 projects to improve PG&E's ability to maintain records and
17 non-records for an appropriate time, taking into account legal,
18 regulatory, fiscal, and operational requirements. These projects are
19 called Connect ERRS to Systems and Offsite Records Management
20 Inventory Tool. The first involves building a connector between
21 Versatile (Zasio) to manage ERRS changes in systems
22 (RecordPoint, Documentum, Active Directory, ATLAS, and others to
23 be identified). The second involves implementing software that
24 manages offsite records.

25 **Availability-Related Controls** – These IT Projects involve
26 maintaining records and information in a manner that allows for
27 timely, efficient, and accurate retrieval of records. IT will be
28 continuing work on a project called Enterprise Search, which
29 implements a tool to search across File Shares, SharePoint and
30 Documentum repositories to increase the timely, efficient, and
31 accurate retrieval of needed information. The ability to search
32 across multiple repositories can also help with reducing
33 convenience copies and the space required to store duplicates. The
34 project involves the evaluation, selection, and implementation of the

1 tool. It will improve the ability to locate, retrieve, and dispose of
2 records and information.

3 **Unstructured Records Management** – This project includes
4 implementing metadata, retention controls and retention trigger
5 events in applications such as e-mail, SharePoint, and file shares to
6 support efficient and accurate retrieval of needed information and
7 the application of automated retention and disposition of
8 non-records. In 2023, this involves continuing work related to
9 improving document availability in Documentum, enhancements to
10 integration services with Documentum, and migrating LOB content
11 (records and non-records) from shared drives to Documentum or
12 SharePoint including any associated storage.

13 **Structured Records Management** – This project includes
14 implementing retention controls in database applications such as
15 SAP and the customer billing system to dispose of content that has
16 met retention and is no longer needed. This involves developing the
17 strategy for establishing the records lifecycle management
18 capabilities including determining how the retention and disposition
19 of information in these structured systems will be handled.

20 **b. Miscellaneous Capital (MWC 21)**

21 In 2020, capital expenditures were incurred in the amount of \$7,000
22 for the completion of a project implemented in prior years to implement a
23 storage solution to safely manage nitrate negatives to ensure long-term
24 access to valuable PG&E records and historical assets.

25 **D. ERIM Cost Tables**

26 The tables below show the total ERIM Program costs. Table 7-3
27 summarizes total ERIM expenses for MWC AB and JV for recorded year 2020
28 and forecast years 2021 through 2023. Table 7-4 shows total ERIM capital
29 expenditure for MWC 2F for recorded year 2020 and forecast years 2021-2026.

**TABLE 7-3
ERIM PROGRAM EXPENSE BY EXPENSE TYPE**

Line No.	Cost Type	2020 Recorded (\$000)	2021 Forecast (\$000)	2022 Forecast (\$000)	2023 Forecast (\$000)
1	MWC AB	\$10,394	\$12,307	\$12,837	\$12,978
2	MWC JV	2,220	2,570	3,200	3,550
3	Total	\$12,614	\$14,877	\$16,037	\$16,528

**TABLE 7-4
ERIM PROGRAM CAPITAL BY MWC**

Line No.	MWC	2020 Recorded (\$000)	2021 Forecast (\$000)	2022 Forecast (\$000)	2023 Forecast (\$000)	2024 Forecast (\$000)	2025 Forecast (\$000)	2026 Forecast (\$000)
1	2F	\$1,192	\$2,720	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
2	21	7	—	—	—	—	—	—
3	Total	\$1,198	\$2,720	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000

E. EDM Program Overview

1. Program Description

a. Program Overview

PG&E established the EDM Data Governance Chief role in March 2020 to oversee the ways the Company views and manages data, including working with the Company's LOBs to develop and implement the EDM vision and strategy, develop data governance and key governance documentation, and define data quality standards. Subsequently in 2021, the EDM Department is being operationalized as a centralized function providing enterprise level strategy and support for maturing DM. Over the years, PG&E has collected data through various processes, but without a unified vision or strategy. This has resulted in inefficiencies and a compartmentalized approach to DM. The Company is rethinking the way data is managed by treating it as an asset.

The sections below define PG&E's strategic approach to establishing a DM program as well as the organizational structures, assessment tools and related processes that drive DM activities and

business outcomes to reduce risk, improve the customer experience, and increase operational efficiency.

The complete scope and mission of the EDM Program is described in the sections that follow.

b. Management Structure

The EDM Department is planned to be organized in the following internal groups:

- Data Governance and Oversight;
- Data Stewardship;
- Project Execution; and
- EDM Program Strategy and Delivery.

The design of the EDM Department structure is aligned with key functions needed to support PG&E's goal of advancing DM maturity and executing its supporting Program roadmap. The following outlines the functions of these different teams within the EDM Department.

1) Data Governance and Oversight

The Data Governance and Oversight team within the EDM Department is responsible for developing, implementing, maintaining, and monitoring adherence to EDM policy and standards. Data governance focuses on establishing organization roles and responsibilities, policies, processes, procedures, and standards to ensure that appropriate data quality and accessibility is maintained throughout the complete lifecycle of the data.

2) Data Stewardship

Ultimately, every leader at PG&E is responsible for promoting consistent DM and the goal of the Data Stewardship team is to provide assessment, training, and education to help leaders understand and meet their responsibilities.

The Data Stewardship team activities include identifying, prioritizing, and resolving cross-LOB DM related issues and developing, implementing, and maintaining the Data Literacy and the Data Stewardship programs.

3) Project Execution

The Project Execution team is responsible for executing high level cross functional data quality improvement projects. This involves prioritizing and investing in DM projects and initiatives

4) Program Strategy and Delivery

The Program Strategy and Delivery team is responsible for developing the long-term EDM roadmap, implementation plan and oversight to further DM maturity. In addition, this team is responsible for change management and communication strategies, and other administrative functions to drive program success.

c. Key Metrics and Other Performance Measures

EDM will measure and report on key metrics to demonstrate that EDM activities are progressing to plan and delivering anticipated results. These will allow the EDM team to identify risks and issues and to implement mitigation measures promptly.

EDM Program reporting requirements will be developed by the EDM team in 2021 and 2022. The reporting requirements will include a requirement to measure and report on the progress the Data Stewardship Community of Practice is making in helping each LOB to implement EDM.

The types of metrics EDM will track and measure may include: progress against EDM project milestones; actual costs against EDM budget; the status of data quality projects; and measurements related to the data, people, process, and technology that drive DM activities and business outcomes, such as:

Data – number of datasets that meet standards, and datasets inventoried in outside data marts.

People – number of datasets without an owner and number of people working in the selected EDM platform.

Process – number of data standard issues by business area; number of policies, standards and processes designed; number of published definitions of critical business terms and data elements; and number of datasets with defined data standards.

Technology – the number of datasets ingested in the platform versus the number of datasets identified, and percentage of datasets validated by the platform.

F. EDM Activities, Costs, and Forecast Drivers by MWC

1. Expense MWCs

Forecasted expense costs are based on an evaluation of the resources required to implement the EDM Program, comply with the EDM Program requirements, and implement EDM initiatives.

a. MWC AB

1) Estimating Method

The EDM forecasts are based on the contract resources required to deliver and manage the various EDM activities. The calculations supporting PG&E's forecast amounts for its EDM activities are included in supporting workpapers.

2) Costs

EDM projects support the implementation of items on its roadmap. The forecast spend for 2023 is \$3.8 million. The various forecast activities are discussed in the following section on Forecast Drivers. The combined impact of these activities will improve data quality and accessibility to drive improvements in safety, reliability, compliance, affordability, and customer experience.

3) Forecast Drivers

In 2023, the forecasted EDM activities include:

Gartner Licenses – As the foundation is built, the Program is expected to advance DM maturity by moving processes along a continuum from ad hoc to repeatable to controlled to managed and then to optimized through the enablement of a continuous improvement mindset. The utilization of the Gartner process maturity curve and related materials will necessitate the purchase of licenses. Gartner, Inc. is a research and advisory company providing business leaders with insights, advice and tools to achieve their mission-critical priorities and build successful DM programs.

1 The forecast for these license costs is \$150,000 annually for the
2 years 2021-2023.

3 **Data Literacy** – Gartner defines data literacy as the ability to
4 read, write and communicate data in context, including an
5 understanding of data sources and constructs, analytical methods
6 and techniques applied—and the ability to describe the use case,
7 application and resulting value. The ability to understand and
8 communicate in a common data language is a core skill for a core
9 technology. Data literacy is an underlying component of digital
10 dexterity, which is an employee’s ability and desire to use existing
11 and emerging technology to drive better business outcomes. The
12 forecast for the data literacy program is \$0.5 million, \$0.2 million,
13 and \$0.2 million in the years 2021-2023, respectively.

14 **Cross LOB Projects** – These projects will be those that relate
15 to more than one business area. Historically, DM projects have
16 been funded by a single business area in order to improve data
17 quality, metadata management and related processes specific to
18 that particular area. These cross-LOB projects will be those that
19 benefit two or more business areas and may ultimately result in
20 bigger overall benefits to the company. These projects are currently
21 kept from rising to the surface due to siloed processes. Depending
22 on the scope of the selected projects, funding will be allocated for
23 additional contract labor to solve targeted problems and/or to bring
24 in short-term unique skill-sets, purchasing 3rd party data to combine
25 with PG&E data to give a more complete view of physical assets, or
26 adding cross-functional foundational data into the enterprise
27 platform. The forecast for these activities is \$0.3 million,
28 \$3.2 million, and \$3.2 million in the years 2021-2023, respectively.

29 **Contractor Staffing** – In order to advance maturity in a timely
30 manner, staffing of resources will draw upon external sources to
31 leverage expertise, critical skillsets, and prior experience in DM
32 operations as well as internal sources for institutional knowledge of
33 PG&E data operations and culture. The total forecast for contractor

1 staffing is \$850,000; \$250,000; and \$250,000 in the years
 2 2021-2023, respectively.

3 **G. EDM Cost Tables**

4 The table below show the total EDM Program costs. Table 7-5 summarizes
 5 total EDM expenses for MWC AB for forecast years 2021 through 2023.

TABLE 7-5
ERIM PROGRAM EXPENSE BY EXPENSE TYPE

Line No.	Cost Type	2020 Recorded (\$000)	2021 Forecast (\$000)	2022 Forecast (\$000)	2023 Forecast (\$000)
1	MWC AB	N/A	\$2,000	\$4,000	\$3,800

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 8
INFORMATION TECHNOLOGY
[INCLUDES NOVEMBER 5, 2021 ERRATA]

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 8
INFORMATION TECHNOLOGY

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PACIFIC GAS AND ELECTRIC COMPANY

CHAPTER 8

INFORMATION TECHNOLOGY

A. Introduction

1. Scope and Purpose

The purpose of this chapter is to demonstrate that Pacific Gas and Electric Company's (PG&E or the Company or the Utility) expense and capital forecasts for administering its Information Technology (IT) initiatives and programs are reasonable and should be adopted by the California Public Utilities Commission (Commission).¹

IT is vital to PG&E operations. Across the Company, digital innovation strengthens safety, improves reliability, enhances the customer experience, supports compliance, and promotes efficiency. IT provides a critical foundation for everyday communication and worker productivity. It enables and supports PG&E's day-to-day activities, including work execution, grid control, customer support, emergency response, asset management, and much more. Without IT, PG&E would be unable to function effectively, as the coronavirus (COVID-19) pandemic has especially highlighted. The Company's growing reliance on data and digital technology necessitates effective and reliable IT assets and services, which the IT organization plans, delivers, and supports. This reliance also makes it essential that PG&E effectively manage the risks posed to Company operations by its expansive IT asset base, which is rapidly approaching an inflection point: many of PG&E's critical IT software systems and infrastructure assets have reached (or will soon reach) the end of their useful service life. To revitalize the Company's IT environment, minimize IT-driven disruption to critical operations, and enable the Company to respond effectively to the challenges it faces, PG&E must invest substantially in IT upgrades,

¹ The costs presented in this chapter represent a subset of PG&E's total IT costs. IT costs directly attributable to a single Line of Business (LOB) are presented in their respective Exhibit and Chapter. See Table 8-5 in Section C.3.a.3 for specific references. See Exhibit (PG&E-7), WP 8-103 and 8-104 for a breakdown of IT expense and capital costs by LOB.

replacements, and modern capabilities over the General Rate Case (GRC) period.

This chapter describes IT's programs, initiatives, and mitigations to support PG&E's provision of safe and reliable gas and electric services to its customers.

2. Summary of Request

PG&E requests that the Commission adopt its 2023 expense forecast of \$385.1 million for the IT initiatives and programs presented herein. This forecast is an increase of 35.4 percent over 2020 recorded adjusted expense of \$284.3 million.² The primary driver of this increase is PG&E's transition to commercial cloud services for many of the Company's IT solutions.

PG&E also requests the Commission adopt its forecast of capital expenditures of \$191.6 million in 2021, \$204.1 million in 2022, \$265.9 million in 2023, \$279.9 million in 2024, \$305.5 million in 2025, and \$293.4 million in 2026. Recorded adjusted capital was \$185.5 million in 2020. PG&E's capital request for its IT organization represents a 43.3 percent increase from Base Year (BY) recorded costs to 2023, a 50.9 percent increase from BY to 2024, a 64.7 percent increase from BY to 2025, and a 58.2 percent increase from BY to 2026, due primarily to increased investment in initiatives to replace or upgrade end-of-life and at-risk IT infrastructure and software.

Details about the activities, costs, and drivers for these forecasts are provided in Section C below.

3. Deferred Work Review

Section 5.2 of the 2020 GRC Settlement Agreement requires PG&E to make an additional showing in its 2023 GRC testimony for work that was previously requested and authorized based on representations that the work was needed to provide safe and reliable service.

² For illustrative purposes, PG&E has adjusted 2020 recorded costs and 2021 and 2022 forecast costs in testimony and financial walks to include officer compensation costs that PG&E voluntarily excluded from rates in the 2020 GRC. Because of this, 2020 costs shown here vary from the values listed in the Results of Operations (RO) Model. See Exhibit (PG&E-8), Ch. 4 for further discussion of officer compensation costs.

In the 2020 GRC, IT did not request or receive authorized funding for any work (1) identified as safety, reliability, or maintenance-related in the 2020 Risk Spending Accountability Report or (2) based on representations in testimony and work papers that the work was needed to provide safe and reliable service.

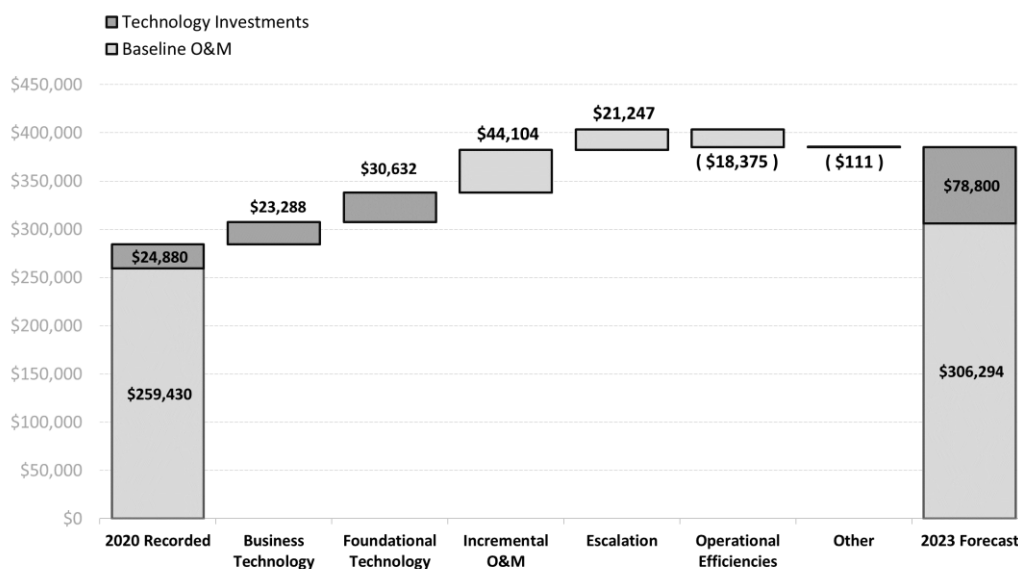
4. Overview of Recorded and Forecast Costs

PG&E organizes forecast and recorded costs for the IT organization into two main portfolios of work: (1) Technology Investments, which includes Business Technology and Foundational Technology investments, and (2) Baseline Operations and Maintenance (O&M). The forecasts and recorded costs are as follows:

- Figure 8-1 shows the expense walk from 2020 recorded to the 2023 forecast; and
- Figure 8-2 shows the capital walk from 2020 recorded to the 2026 forecast.

a. Expense

**FIGURE 8-1
EXPENSE – 2020-2023 WALK
(THOUSANDS OF NOMINAL DOLLARS)**



1) List of Expense Drivers

PG&E's IT expense forecast spans both the Technology Investments and Baseline O&M portfolios. Technology Investments have both expense and capital components and are discussed in each section respectively. Significant expense cost drivers within these categories are listed below:

a) Technology Investments

- Business Technology: Expense activities and costs associated with capital investments that are necessary to deliver and optimize cross-functional technology solutions and enterprise platforms that support business operations across the Company. These expense activities and costs include, for example, project planning, data migration, data conversion, process design, and certain types of third-party service agreements, which include commercial cloud service subscriptions.
- Foundational Technology: Expense activities and costs associated with capital investments that are necessary to improve the health of PG&E's IT assets and services, enable innovation through modern foundational technology capabilities, and optimize the management and operation of PG&E's IT footprint. These expense activities and costs include, for example, project planning, data migration, data conversion, process design, and certain types of third-party service agreements, which include commercial cloud service subscriptions.

b) Baseline O&M

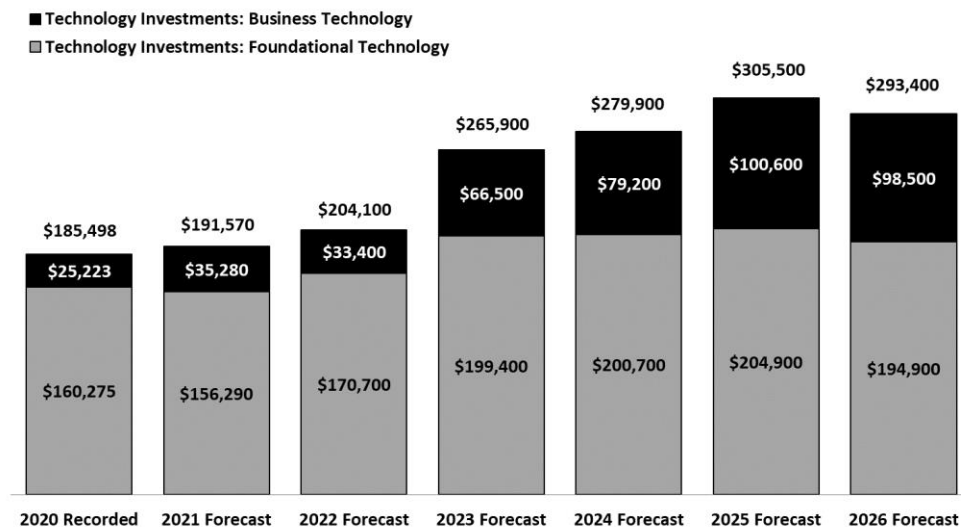
- Incremental O&M: Increases in ongoing labor and non-labor costs necessary to manage IT department functions, operate and maintain technology solutions, and meet contractual agreements for third-party software and IT services, such as commercial cloud services. These

increases are also required to support technology solutions deployed over the 2020 GRC period.

- Escalation: Standard Company escalation for labor and non-labor forecasts.
- Operational Efficiencies: Savings from a variety of sources that partially offset forecast increases in Baseline O&M.
- Other: Minor changes to capital overhead allocation amounts for IT end-user services.

b. Capital

FIGURE 8-2
CAPITAL – 2020-2026
(THOUSANDS OF NOMINAL DOLLARS)



1) List of Capital Drivers

PG&E's IT capital forecast falls entirely within the Technology Investments portfolio and includes two major types of investments: Business Technology and Foundational Technology. Significant capital cost drivers are listed below:

a) Technology Investments: Business Technology

- Asset Management and Risk Analysis: Investments necessary to modernize, standardize, and consolidate PG&E's end-of-life Geographic Information Systems (GIS)

and enable more efficient and effective asset investment planning across LOBs.

- Field Work Management: Ongoing investments in cross-functional software products that are necessary to increase the efficiency and quality of field activities (such as asset inspections) and enable alignment of work management processes and tools across LOBs.
- Data Enablement: Ongoing investments in PG&E's data management and analytics platforms necessary to support PG&E's data governance initiatives, improve data quality, and enable efficient delivery of analytics solutions that require data from a variety of different IT systems.
- Enterprise Resource Management: Ongoing investments to modernize PG&E's SAP platform and transition to a current supported version.

b) Technology Investments: Foundational Technology

- Core Network Infrastructure and Operations: Ongoing investments in PG&E's telecom network infrastructure necessary to maintain critical communication functions and mitigate IT Asset Failure risk across the network.
- Solution Delivery and Operations: Ongoing investments to modernize PG&E's data center infrastructure and reduce IT Asset Failure risk associated with PG&E's Data Center Technologies assets and the software applications that rely on them. This includes ongoing investments in cloud-hosting technologies and migration of applications to commercial cloud services.
- End-User Experience and Operations: Ongoing investments to replace end-of-life laptops, ruggedized tablets, other end-user devices, and the technologies necessary to manage, secure, and provision those devices.
- IT Asset and Service Management: Ongoing investments to modernize and deploy software tools that enable PG&E to effectively understand the health of IT hardware and

software assets, better inform risk mitigation planning for IT Asset Failure, and manage IT asset lifecycle from acquisition to retirement.

- System Operation and Control: Ongoing investments in PG&E's field networks to provide adequate capacity, coverage, and reliability for Gas Operations, Power Generation, and cross-LOB use cases, including support for increasing numbers of system automation devices in the field.³
- Meter Management and Operations: Ongoing investments in PG&E's Advanced Metering Infrastructure (AMI) network necessary to maintain adequate coverage and reliability.

5. Support for Request

PG&E's expense and capital forecasts for IT initiatives and programs are reasonable and should be adopted by the Commission. Together, the initiatives and programs discussed in this chapter help ensure PG&E's IT systems and services continue to function reliably. These initiatives and programs also deliver and support technology solutions that enable PG&E to improve public and employee safety, increase service reliability, reduce operational costs, and provide quality customer experiences.

6. Organization of the Remainder of This Chapter

The remainder of this chapter is organized as follows:

- Section B – Program and Risk Overview;
- Section C – Activities, Costs, and Forecast Drivers;
- Section D – Estimating Methods; and
- Section E – Cost Tables.

³ Investments of a similar nature that address specific Electric Distribution use cases are discussed in Exhibit (PG&E-4), Ch. 21.

1 **B. Program and Risk Overview**

2 **1. Program Description**

3 **a. Organization Overview**

4 PG&E's IT organization is responsible for planning, delivering, and
 5 supporting the Company's IT assets and services, which include the
 6 Company's telecommunications network, data center infrastructure, IT
 7 devices and equipment, software applications, and other IT solutions.
 8 The IT organization partners closely with the Company's LOBs to
 9 understand technology demand, define technology strategies, and
 10 deliver technology solutions through programs and projects. IT teams
 11 support these solutions through a variety of activities, including IT asset
 12 management, system operation and maintenance, service management
 13 and client support, and emergency response. IT teams also perform a
 14 variety of activities to manage and oversee IT business processes and
 15 continuously improve organizational effectiveness. See Section C.4.a
 16 below for further discussion of these activities.

17 **b. Management Structure**

18 The IT organization is led by the Senior Vice President (SVP) and
 19 Chief Information Officer (CIO) who reports directly to the Chief
 20 Executive Officer of PG&E Corporation. Reporting to the CIO are two
 21 Vice Presidents who are respectively responsible for the Application and
 22 Infrastructure Services department and the Products and Enterprise
 23 Platforms department. Also reporting to the CIO are several directors
 24 and senior directors responsible for smaller, specialized departments.⁴
 25 Across all departments, the IT organization performs activities
 26 necessary to plan, deliver, operate, and maintain the Company's IT
 27 solutions.

4 The IT organization includes the Cybersecurity department, which is addressed separately in Exhibit (PG&E-7), Ch. 9.

2. IT Risk Management

a. Organizational Structure and Governance

The IT organization operates a monthly Risk and Compliance Committee (RCC) chaired by the IT SVP and CIO and facilitated by the IT Security Compliance team within the Cybersecurity department. The IT RCC oversees risk management activities across the IT organization and reports on these activities to the Enterprise RCC, which is facilitated by PG&E's Enterprise Operational Risk Management (EORM) team and includes senior leaders from across the Company. PG&E periodically provides risk management updates to the Board of Directors' IT and Cybersecurity Committee. Within the IT organization, risk management activities are distributed across a variety of teams depending on their area of expertise, including a centralized IT asset management team.

b. IT Risk Management Processes and Tools

To develop the risk scores and other metrics discussed below, the IT organization leveraged the quantification models and tools managed by the EORM team and discussed in Exhibit (PG&E-2), Chapter 1. Inputs to these models and tools were informed by subject matter expertise as well as data PG&E currently captures in IT asset management systems and databases. PG&E performs Business Impact Analysis reviews of technology solutions prior to implementation, which identify risks associated with those solutions. IT asset owners periodically conduct health assessments for their respective asset classes and the different products within them, which informs long-term planning. These health assessments evaluate factors such as asset age, version, vendor support, availability/recoverability, performance/scalability, and more. The IT organization also partners with the Cybersecurity organization to identify and remediate vulnerabilities in the technology environment. The IT organization is still in the early stages of maturing its risk management processes and tools; some planned investments to improve these capabilities are discussed in Section C.3.b.8 below.

c. Risk Assessment and Mitigation Phase (RAMP) Risk – IT Asset Failure

1) Risk Overview

The IT Asset Failure risk is currently defined as “failure of IT hardware/infrastructure and/or software asset(s) resulting in IT service interruption(s) or system outage(s) that inhibit or disrupt Mission and Business Critical Processes.”⁵ Key drivers for this risk event include age-based asset deterioration, equipment malfunction, human error or change error, usage exceeding capacity, power failure, failure of third-party service(s), environmental factors, and facility or structure failure.

Exposure to this risk is based on the quantity of IT assets supporting PG&E operations. The total exposure for this risk event is 55,200 units, which consists of hardware assets (such as pieces of equipment or miles of cable) and software assets. As the IT Asset Failure risk model is still in early stages of maturity, PG&E elected to focus quantification efforts for this GRC on two tranches based on different types of IT assets. The two tranches for the risk event are Network Technologies and Data Center Technologies.⁶ These tranches represent the majority of IT assets likely to cause serious disruption to critical business processes in the event of failure. They are also the primary focus for risk mitigation spend forecast in this GRC.

The risk model estimates 778 total risk events in 2023, which include 568 for Network Technologies and 209 for Data Center Technologies. Approximately one half of events are driven by age-based asset deterioration or equipment malfunction. Human error or change error, failure of third-party service(s), power failure, and usage exceeding capacity each account for approximately one of every eight events.

⁵ See Exhibit (PG&E-7), WP 8-96 for a list of Mission Critical and Business Critical processes.

⁶ See Table 8-4 in Section C.3 below for a summary of key asset types within these tranches.

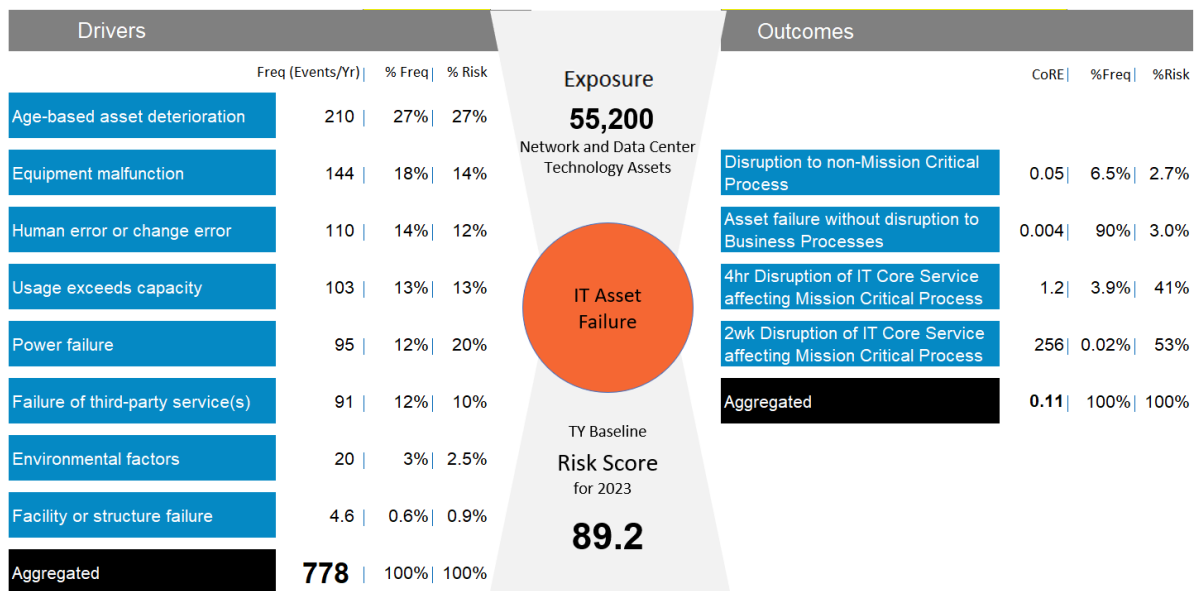
IT Asset Failure is comprised of four outcomes, listed here in order of decreasing severity:

- Two-week disruption of IT Core Service affecting Mission Critical Process;
- Four-hour disruption of IT Core Service affecting Mission Critical Process;
- Disruption to non-Mission Critical Process; and
- Asset failure without disruption to business process.

In the current model, the outcome of an IT Asset Failure includes only financial consequences. The two most severe outcomes, two-week or four-hour disruptions affecting Mission Critical Processes, comprise 94 percent of the risk and 4 percent of the risk events.

The Test Year (TY) baseline risk score for IT Asset Failure is 89.2. The estimated 2026 post-mitigation risk score is 56.9. See Figure 8-3 below for the current bowtie risk model for IT Asset Failure.

**FIGURE 8-3
IT ASSET FAILURE RISK BOWTIE**



2) Changes in Risk Management Strategy Since the 2020 RAMP Report

In PG&E's 2020 RAMP Report, IT Asset Failure was presented as a cross-cutting risk factor and defined as "failure of IT systems or infrastructure, resulting in outages, or system unavailability for mission critical assets impacting operations, or the ability to support public safety events." Since the 2020 RAMP, PG&E has transitioned IT Asset Failure from a cross-cutting factor to a standalone risk event. As part of that transition, PG&E has refined the risk definition and has developed an initial bowtie model, shown in Figure 8-3 above. While PG&E focused initial quantification efforts on the financial consequences of IT Asset Failure, future iterations may include other consequence types.

IT Asset Failure continues to impact other risk events as a cross-cutting factor and is included as a cross-cutting factor in several risk event bowties. The strategy for quantifying IT Asset Failure as a cross-cutting factor remains unchanged and is consistent with the quantification approach for other cross-cutting factors. PG&E provides a mapping of cross-cutting factors to risk events in Exhibit (PG&E-2), Chapter 1, Appendix B.

3) GRC Risk Mitigations and Controls

As shown in Table 8-1 below, PG&E has identified five mitigation programs for IT Asset Failure. These programs were determined to both reduce the likelihood of failure for high risk IT assets and reduce the severity of IT Asset Failures when they do occur. The names of the mitigations have changed slightly from the 2020 RAMP Report. A brief description of each mitigation is provided in the tables below. More detail is included in the 2020 RAMP Report.⁷

PG&E has not yet defined controls for the IT Asset Failure risk. PG&E plans to incorporate controls into the IT Asset Failure risk

⁷ See PG&E's 2020 RAMP Report, A.20-06-012 (June 30, 2020), Ch. 20.

- 1 model as IT matures its risk management program over the next
- 2 several years.

TABLE 8-1
IT ASSET FAILURE MITIGATION PROGRAMS

Line No.	Mitigation Number	Mitigation Name (2023 GRC)	Description	Drivers and Other Information
1	ITAFI-M001	Improve IT Asset Management and Monitoring	This program focuses on implementing and improving processes and technical capabilities to help the company better understand and manage the health of IT assets. This includes improving the quality and management of IT asset data to better understand risk exposure and asset dependencies. This program also includes the implementation and improvement of IT asset monitoring capabilities that enable IT to detect and respond quickly to IT asset failures (or warning signs of impending asset failures).	This mitigation program is foundational. Because of this, an associated Risk Spend Efficiency (RSE) score was not calculated.
2	ITAFI-M002	Improve Capacity, Coverage, and Scalability	This program focuses on deploying or modifying IT assets to ensure that IT systems can adequately meet the demands placed on them and remain accessible to users or autonomous systems at the times and locations they are needed. This includes remediation of coverage gaps in PG&E's telecommunications network, alignment of fixed IT infrastructure capacity (e.g., bandwidth, storage, compute) to real or projected demand, and implementation of scalable system architectures to efficiently satisfy variable demand	This mitigation program primarily addresses the following driver: usage exceeding capacity PG&E has not directly attributed any forecast spend to this program in this GRC and therefore has not calculated an associated RSE.
3	ITAFI-M003	Improve Resiliency	This program focuses on implementing technical and operational fail safes to maintain IT service continuity in the event of an IT asset failure. Elements of resilient system architectures include back up/recovery capabilities, alternative network paths, emergency power supplies, and more. A key objective is to minimize the impact a single component failure might have on a complex, integrated system.	This mitigation program primarily addresses the following drivers: - equipment malfunction - power failure - failure of third-party service(s). PG&E has not directly attributed any forecast spend to this program in this GRC and therefore has not calculated an associated RSE.

TABLE 8-1
IT ASSET FAILURE MITIGATION PROGRAMS
(CONTINUED)

Line No.	Mitigation Number	Mitigation Name (2023 GRC)	Description	Drivers and Other Information
4	ITAFI-M004	Lifecycle Obsolete and Low Health Assets	This program focuses on replacement of IT assets that have reached or exceeded their useful service life, are in poor health due to a variety of factors, or are otherwise at elevated risk of failure.	This mitigation program primarily addresses the following drivers: • age-based asset deterioration; • power failure; and • failure of third-party service(s).
5	ITAFI-M005	Multi-Faceted Mitigations ^(a)	This program encompasses mitigation initiatives that address IT asset failure risk from multiple angles. The work typically involves aspects of 2 or more of PG&E's other IT Asset Failure mitigation programs: improving IT asset management/monitoring, improving capacity/coverage/scalability, improving resiliency, and lifecycling obsolete/low health assets.	This mitigation program primarily addresses the following drivers: • age-based asset deterioration; • equipment malfunction; • usage exceeding capacity; • power failure; • failure of third-party service(s); and • facility or structure failure.
(a) Mitigation 5 was named "Multiple Risks Impact Mitigation" in the 2020 RAMP. It was renamed to improve clarity.				

4) Changes to Mitigations

As shown in the table above, PG&E modified its portfolio of mitigations since filing the 2020 RAMP Report. The work forecast in some of the mitigations proposed in the 2020 RAMP Report has also changed, as described below.

- M001: In the 2020 RAMP Report, PG&E estimated \$23 million in capital and \$2 million in expense for this program from 2020 to 2026. In this GRC, PG&E forecasts \$35 million in capital and \$8 million in expense for the same period. This change is primarily due to increased investment in asset management tools to better inform IT Asset Failure risk management.
- M002: In the 2020 RAMP Report, PG&E estimated \$83 million in capital and less than \$1 million for this program from 2020 to 2026. In this GRC, PG&E did not attribute any forecast spend to this program from 2021 to 2026 because the work was combined with other work and included in the Multi-Faceted Mitigations (M005) program.
- M003: In the 2020 RAMP Report, PG&E estimated \$27 million in capital and less than \$1 million in expense for this program from 2020 to 2026. In this GRC, PG&E did not attribute any forecast spend to this program from 2021 to 2026 because the work was combined with other work and included in the Multi-Faceted Mitigations (M005) program.
- M004: In the 2020 RAMP Report, PG&E estimated \$794 million in capital and \$159 million in expense for this program from 2020 to 2026. In this GRC, PG&E forecasts \$588 million in capital and \$54 million in expense for the same period. This change is primarily due to PG&E's decision to narrow the focus of IT Asset Failure quantification to the two tranches described above. As a result, the GRC forecast for the program no longer includes significant spend related to business application software or User Technologies assets (such as personal computers and mobile devices).

- M005: In the 2020 RAMP Report, PG&E estimated \$90 million in capital and \$7 million in expense for this program from 2020 to 2026. In this GRC, PG&E forecasts \$453 million in capital and \$107 million in expense for the same period.⁸ This change is primarily because PG&E was still in the early stages of defining the IT Asset Failure risk at the time of the 2020 RAMP Report, and mitigation plans were still being developed. PG&E's 2023 GRC forecast incorporates a more refined view of the Company's IT asset risks, which led to: (1) increased forecast spend necessary to improve capacity, resiliency, and management of PG&E's telecom network infrastructure; (2) increased forecast spend related to migration of software applications from PG&E data center assets to commercial cloud services; and (3) reallocation of forecast spend originally attributed to M002 and M003 to this program.

d. Cost Tables

Tables 8-2 and 8-3 below indicate PG&E's 2020-2023 expense costs, 2020-2026 capital costs, and RSE scores for IT Asset Failure mitigation programs in the 2023 GRC.⁹

⁸ This forecast includes costs presented in Exhibit (PG&E-4), Ch. 21, Integrated Grid Platform (IGP) and Grid Modernization Plan.

⁹ See Exhibit (PG&E-7), WP 8-95 for additional cost information, including mitigation program expense forecasts for 2024-2026.

TABLE 8-2
IT ASSET FAILURE
RECORDED AND FORECAST MITIGATION COSTS 2020-2023 – EXPENSE
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	Mitigation No. (2023 GRC)	Mitigation Name (2023 GRC)	2020 Rec. Adj.	2021 Forecast	2022 Forecast	2023 Forecast	Total	RSE	Testimony Reference
1	ITAFL-M001	Improve IT Asset Management and Monitoring	\$279	\$980	\$1,000	\$1,300	\$3,559	N/A	C.3.b.8
2	ITAFL-M002	Improve Capacity, Coverage, and Scalability	34	–	–	–	34	N/A	N/A
3	ITAFL-M003	Improve Resiliency	3	–	–	–	3	N/A	N/A
4	ITAFL-M004	Lifecycle Obsolete and Low Health Assets	3,313	5,080	5,150	12,020	25,563	0.11	C.3.b.1, C.3.b.2
5	ITAFL-M005	Multi-Faceted Mitigations	615	5,340	6,650	30,280	42,885	0.34	C.3.b.1, C.3.b.2, C.3.b.9
6		Total	\$4,243	\$11,400	\$12,800	\$43,600	\$72,044		

TABLE 8-3
IT ASSET FAILURE
RECORDED AND FORECAST MITIGATION COSTS 2020-2026 – CAPITAL
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	Mitigation No. (2023 GRC)	Mitigation Name (2023 GRC)	2020 Rec. Adj.	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total	RSE	Testimony Reference
1	ITAFL-M001	Improve IT Asset Management and Monitoring	\$3,435	\$5,870	\$5,400	\$5,000	\$5,000	\$5,000	\$5,000	34,705	N/A	C.3.b.8
2	ITAFL-M002	Improve Capacity, Coverage, and Scalability	3,155	–	–	–	–	–	–	3,155	N/A	N/A
3	ITAFL-M003	Improve Resiliency	236	–	–	–	–	–	–	236	N/A	N/A
4	ITAFL-M004	Lifecycle Obsolete and Low Health Assets	18,464	74,620	88,650	99,400	101,400	102,600	102,800	587,934	0.11	C.3.b.1, C.3.b.2
5	ITAFL-M005	Multi-Faceted Mitigations	3,529	58,260	63,040	82,890	82,700	86,200	76,400	453,109	0.34	C.3.b.1, C.3.b.2, C.3.b.9
6		Total	\$28,818	\$138,750	\$157,090	\$187,290	\$189,100	\$193,800	\$184,200	\$1,079,048		

C. Activities, Costs, and Forecast Drivers

1. Expense Major Work Categories (MWC)

The primary MWC for all IT forecast expense work is MWC JV. PG&E defines this MWC and other expense MWCs that contribute to the IT forecast as follows:

- MWC JV – (Maintain Applications and Infrastructure) includes costs for ongoing maintenance, operations, and repair for PG&E’s applications, systems, and infrastructure.
- MWC OM – (Operational Management) includes labor and employee-related costs to provide supervision and management support. MWC OM also includes costs incurred by the administrative staff supporting leadership.
- MWC ZC – (Miscellaneous Support) includes the overhead capital credit allocations for IT end-user services.

2. Capital MWCs

The primary MWC for all IT forecast capital work is MWC 2F. PG&E defines this MWC as follows:

- MWC 2F – (Build Applications and Infrastructure) includes costs to design, develop and enhance applications, systems, and infrastructure technology solutions.

3. Technology Investments

a. Portfolio Description

As PG&E increasingly looks to technology solutions as a means to reduce risk, improve compliance, and enhance safety, reliability, cost-effectiveness, and customer satisfaction, the Company relies on the IT organization to deliver and manage technology investments. In varying combinations, technology investments deploy new IT hardware assets and software capabilities, transition from legacy systems to new solutions, and change or introduce new business processes. Key cost drivers include the labor, materials, contracts, and associated overheads necessary to:

- Plan the work and manage activities once in progress;
- Assess end-user needs and technical requirements;

- Develop or update system architectures and process designs;
- Purchase, lease, license, or develop IT hardware/software assets;
- Install, configure, and test these assets;
- Operationalize the final solution;
- Manage impacts to end-users;
- Transition support to operations; and
- Retire legacy assets once no longer needed.

The IT organization delivers a wide range of services to PG&E's LOBs, customers, and external partners through investments in IT hardware and software assets. PG&E logically groups these assets into six Asset Families, which are described in Table 8-4 below.

**TABLE 8-4
IT ASSET FAMILIES**

Line No.	Asset Family	Description
1	Business Applications	The software assets within the Business Applications Asset Family include the specialized application features, interfaces, integrations, data models, databases, and underlying data used by PG&E's LOBs to perform LOB-specific business functions. These assets include a combination of PG&E-developed software code and software purchased or licensed from third-party vendors.
2	Network Technologies	The hardware and software assets in the Network Technology Asset Family include: • Data Transport Systems: Fiber optic connections, cables, and associated electronics (including software), multiplexor equipment used to aggregate traffic, and point-to-point microwave communication systems and associated licensed radio frequency (RF) spectrum. • Internet Protocol (IP) Network: Network routers that interconnect sites across PG&E's Wide Area Network (WAN), radios and nodes that comprise PG&E's Field Area Network (FAN) mesh network, FAN gateways that connect the FAN mesh to the WAN, switches that connect systems to systems, network load balancers that enable network traffic to be distributed across systems for redundancy, domain name servers, timing devices and their software operating systems, and software tools for managing the network. • Supervisory Control and Data Acquisition (SCADA) Network: Radio base stations, associated licensed RF spectrum, gateways, application servers, terminal servers, dedicated switches, and routers. • AMI Field Network Devices: Wireless access points (AP) to backhaul electric meter data, relays that repeat the signals, data collection units (DCU) that read gas meters, cellular carrier connections to bring data to PG&E data centers, and back-end software used to manage the devices and associated data. • Telephony Systems: Desktop telephones, Public Branch Exchange telephone system switches, Voice over IP telephone system switches, voice mail systems, voice recording systems, specialized operations centers systems, contact center telephony, and supporting software and management systems. • Mobile Radio Systems: Mountain-top base stations, radio signal repeaters, mobile radio devices for crew vehicles, handheld radio devices, centralized controllers and associated software to manage calls, and licensed RF spectrum. • Common Facilities: Generators; battery plant; power systems; heating, ventilation, and air conditioning (HVAC); high voltage protection; towers and antenna structures; and miscellaneous common communication room equipment.

**TABLE 8-4
IT ASSET FAMILIES
(CONTINUED)**

Line No.	Asset Family	Description
3	Data Center Technologies	The hardware and software assets in the Data Center Technology Asset Family include: • Compute Technologies: Server hardware, server software operating systems, and supporting management software. • Storage Technologies: Storage disk arrays, physical and virtual tape libraries, and supporting management software. • Data Center Facilities: Environmental infrastructure, including structural platforms and computer room HVAC that support the housing of computer, network, and storage infrastructure. • Private Cloud Hosting Technologies: Converged infrastructure units consisting of compute technologies, storage technologies, network technologies, and specialized automation and management software. • Commercial Cloud Hosting Technologies: Virtualized PG&E data center environments comprised of software services and infrastructure owned by a third-party Cloud Service Provider (CSP), but configured and managed by PG&E.
4	User Technologies	The hardware and software assets in the User Technologies Asset Family include: • End-User Devices: Desktop and laptop personal computers (PC) and monitors, ruggedized field devices, smartphones and tablets, printers, copiers, and scanners. • End-User Software: Client device operating systems (e.g., Microsoft Windows), internet browsers, and productivity tools (e.g., Microsoft Office). • Virtual Desktop Infrastructure: Specialized software and infrastructure enabling users to remotely access a virtualized PC that provides secure access to PG&E's IT systems. • Communication, Collaboration, and Social Media Platforms: Specialized software and infrastructure supporting e-mail communication, instant messaging and presence capabilities, shared virtual workspaces and document collaboration, internal social networking, web/voice/video conferencing, and applications that store and play video. • Endpoint Management Platforms: Specialized software and infrastructure enabling PG&E to manage, secure, and provision end-user devices and the software and content available on them. • Audio/Video Equipment: Room-based video conferencing systems, backend servers and software that manage video sessions, and control room video walls that enable situational awareness in PG&E Command Centers.

TABLE 8-4
IT ASSET FAMILIES
(CONTINUED)

Line No.	Asset Family	Description
5	Enterprise Platforms ^(a)	The hardware and software assets in the Enterprise Platforms Asset Family include: - Enterprise Resource Planning Platform: Specialized software and infrastructure related to PG&E's enterprise resource planning system (SAP). - Application Development Platform: Specialized software and infrastructure enabling PG&E to develop and deploy consistent, reliable, and secure business applications. - Enterprise Integration Platform: Specialized software and infrastructure enabling PG&E to share data between systems and applications. - Data & Analytics Platforms: Specialized software and infrastructure enabling PG&E to collect, organize, store, secure, and manage data for analysis and to analyze data and apply the results of analysis to business decisions. - Records and Content Management Platform: Specialized software and infrastructure, enabling PG&E to collect, organize, store, secure, and manage documents and corporate records.
6	IT Operational Tools	The hardware and software assets in the IT Operational Tools Asset Family include: - IT Asset Management Systems: Specialized software and infrastructure enabling PG&E to manage IT asset inventory, location, status, dependencies, and other asset data. - IT Service Management Systems: Specialized software and infrastructure enabling PG&E to intake and manage IT service requests, perform remote diagnostics and maintenance, configure and update software/operating systems, manage system changes, and track issue remediation. - Asset Monitoring Systems: Specialized software and infrastructure enabling PG&E to monitor IT asset health, performance, and system availability to identify issues and dispatch alerts to affected users and system owners.
(a) Since the 2020 GRC, PG&E consolidated the Information Management Asset Family under the Enterprise Platforms Asset Family as part of ongoing continuous improvement efforts.		

- 1 PG&E's investments in these Asset Families focus on two primary
- 2 types of technology solutions: Business Technology and Foundational
- 3 Technology.
- 4 **1) Business Technology**
- 5 "Business Technology" refers to specialized technology
- 6 capabilities that PG&E LOBs use to execute their business
- 7 processes. Business Technology solutions typically involve
- 8 software applications and enterprise technology platforms that LOB
- 9 users interact with directly to carry out an LOB-specific job function

1 or manage LOB operations. Business Technology solutions also
2 include PG&E's various customer facing software systems. Some
3 examples of Business Technology solutions include asset
4 management systems, scheduling systems, customer billing
5 systems, and financial management systems.

6 Investments in Business Technology enable PG&E to improve
7 the quality and efficiency of business operations, enhance the
8 customer experience, and effectively manage Company risks and
9 compliance obligations. As these solutions become essential to
10 PG&E's day-to-day business operations, continued investment
11 becomes necessary to retain vendor support for cybersecurity
12 patches and bug fixes, maintain compatibility with an evolving
13 technical landscape, adapt to changing business and customer
14 needs, and optimize PG&E's technology footprint. In this chapter,
15 PG&E discusses cross-functional Business Technology investments
16 that address enterprise capability needs shared by multiple LOBs.

17 **2) Foundational Technology**

18 "Foundational Technology" refers to the IT hardware and
19 software assets within the Network Technologies, Data Center
20 Technologies, User Technologies, Enterprise Platforms, and IT
21 Operational Tools Asset Families (described in Table 8-4) that are
22 necessary to deliver and operate Business Technology solutions
23 and enterprise IT services across the Company. Through
24 investment in Foundational Technology, IT directly supports PG&E
25 operations, facilitates business innovation, and enables new and
26 existing business technology solutions to function as designed. At
27 the same time, these investments increase the cost-effectiveness
28 and reliability of IT services. Failure to invest appropriately in
29 foundational technology would introduce cybersecurity, reliability,
30 and financial risk across PG&E's technology environment, and could
31 result in IT service degradation or system outages that, in turn,
32 could adversely affect core PG&E operations.

33 Through Foundational Technology investments, PG&E replaces
34 IT hardware and software assets as they reach or surpass the ends

of their service lives. This includes proactive replacements for high risk assets that meet certain asset health criteria (e.g., age, performance, stability, version, vendor support, etc.) and reactive replacements for assets that break. As technology evolves, replacement assets often offer additional benefits such as improved operational efficiency, reduced maintenance costs, and new features and functionality. Other Foundational Technology investments:

- Deliver new enterprise capabilities to support emerging technology innovations and business needs;
- Expand technical capabilities and capacity to support changing usage patterns and system demand growth;
- Address security, reliability, or financial concerns associated with obsolete technology and technology architectures;
- Establish new technical controls for managing IT risks; and
- Improve the efficiency or effectiveness of IT functions and services.

3) Organization of Technology Investment Forecasts

Since the 2020 GRC, PG&E's IT organization has begun to adopt an IT industry model for delivering technology investments using an agile methodology. This model is called the Scaled Agile Framework (SAFe), and it is designed to help expand the use of agile practices within large enterprises such as PG&E. In SAFe, a "value stream" is the primary construct for understanding, organizing, and delivering value. Because IT delivers value to PG&E and its customers through Business Technology and Foundational Technology solutions, IT has begun to organize its investments in these solutions into value streams. These value streams represent aspects of the Company where technology solutions are of long-term strategic importance and where ongoing investment will consistently deliver value.

For example, investments within the Field Work Management value stream focus on optimizing the technology solutions used to manage the flow of work from the back-office to field crews and

1 back again. PG&E has identified an ongoing need to invest in this
2 value stream not only to maintain the health of existing Field Work
3 Management solutions, but also to support evolving business needs
4 and continuously address opportunities to improve the quality and
5 efficiency of field-work-related activities across the Company. Other
6 value streams take a similar approach to technology solutions that
7 support other aspects of PG&E operations.

8 In this GRC, PG&E organizes its IT forecasts for Business
9 Technology and Foundational Technology investments by value
10 stream. Because these value streams provide a common
11 framework for organizing IT investments, some value streams
12 appear in multiple exhibits and chapters across the case and include
13 investments specific to each chapter.¹⁰ Technology investments
14 within the 10 value streams discussed in this chapter focus on
15 Business Technology and Foundational Technology solutions that
16 either benefit multiple LOBs, the Company as a whole, or the IT
17 organization and the enterprise services it provides. Other
18 technology investments delivered by the IT organization, such as
19 those that primarily benefit a single LOB, are discussed in
20 LOB-specific exhibits and chapters. Table 8-5 below shows the
21 exhibit and chapter numbers in PG&E's 2023 GRC testimony where
22 other LOBs present their forecast IT investments and costs.

¹⁰ Exhibit (PG&E-7), WP 8-98 for a list of value streams discussed in this case, their descriptions, and where associated forecasts are presented.

TABLE 8-5
TECHNOLOGY INVESTMENTS IN PG&E'S 2023 GRC

Line No.	Line of Business	Exhibit	Chapter(s)
1	Gas Operations	3	12
2	Electric Distribution ^(a)	4	4.5, 20, 21
3	Energy Supply	5	7
4	Customer Care	6	10
5	Shared Services and IT	7	1-9
6	Human Resources (HR)	8	2
7	Administrative and General	9	2-6

(a) IGP IT Infrastructure costs, which were presented in the IT chapter in the 2020 GRC, are now presented in Exhibit (PG&E-4), Chapter 21, IGP and Grid Modernization Plan.

b. Key Forecast Drivers

The expense and capital forecasts for technology investments presented in this chapter span 10 value streams and include both Business Technology and Foundational Technology solutions. Figures 8-4 and 8-5 indicate PG&E's forecast investments by primary technology type and value stream. Associated forecast drivers are discussed thereafter.

FIGURE 8-4¹¹
TECHNOLOGY INVESTMENTS
EXPENSE – 2020-2023
(THOUSANDS OF NOMINAL DOLLARS)

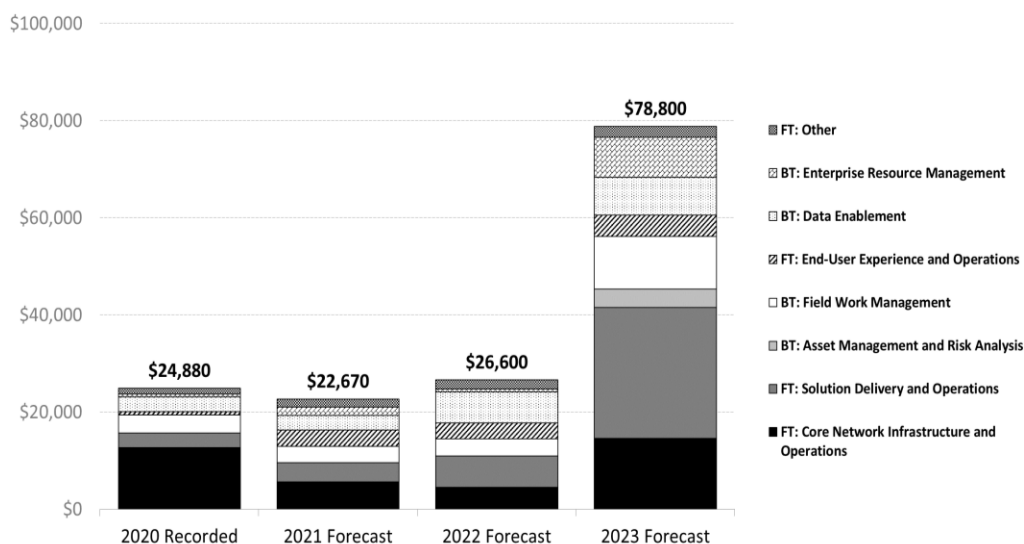
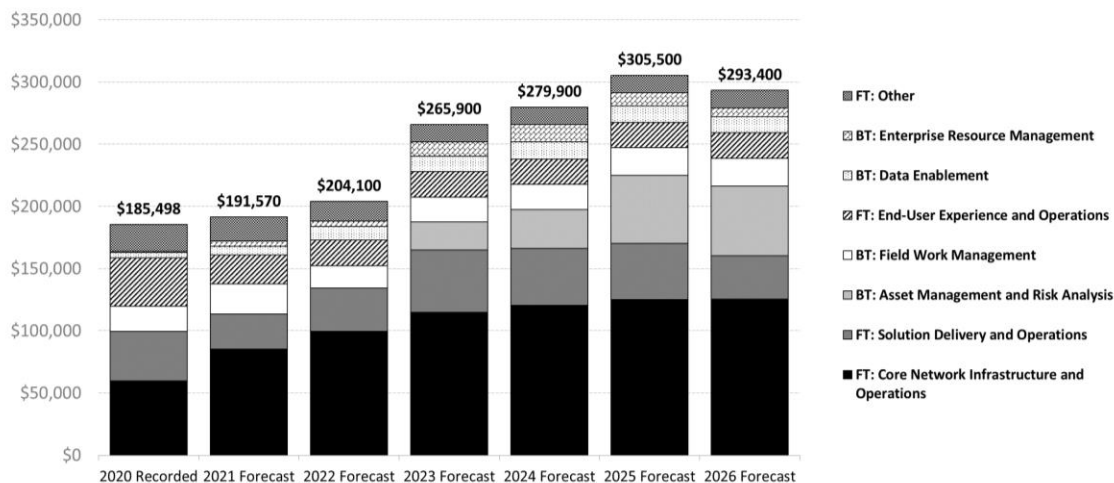


FIGURE 8-5
TECHNOLOGY INVESTMENTS
CAPITAL – 2020-2026
(THOUSANDS OF NOMINAL DOLLARS)



¹¹ In Figures 8-4 and 8-5, “FT: Other” includes the value streams IT Asset and Service Management, System Operation and Control, and Meter Management and Operations.

1) Foundational Technology: Core Network Infrastructure and Operations

PG&E's forecast for Foundational Technology investments in the Core Network Infrastructure and Operations value stream is shown below in Table 8-6 (expense) and Table 8-7 (capital).¹² Investments in this value stream are ongoing and will span multiple rate case periods.

TABLE 8-6
FOUNDATIONAL TECHNOLOGY: CORE NETWORK INFRASTRUCTURE AND OPERATIONS
2021-2023 EXPENSE FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast
1	JV	5,620	4,500	14,600

TABLE 8-7
FOUNDATIONAL TECHNOLOGY: CORE NETWORK INFRASTRUCTURE AND OPERATIONS
2021-2026 CAPITAL FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast
1	2F	85,170	99,500	114,900	120,600	125,200	125,400

The Core Network Infrastructure and Operations value stream focuses on the foundational technology solutions used to transport data across long distances, to direct data traffic from its origin to its destination, to deliver voice communications via radio and telephone, and to manage and monitor the telecommunication network services that enable PG&E users and technology systems to communicate. Planned technology investments in this value stream continue and accelerate efforts to mitigate IT Asset Failure risk associated with critical Network Technologies assets. This asset base is diverse and expansive, comprised of thousands of structures and facilities, thousands of miles of cable, and tens

¹² See Exhibit (PG&E-7), WP 8-38 for more information.

1 of thousands of devices and pieces of equipment across PG&E's
2 service area. Many of these assets are obsolete, deteriorating, and
3 have surpassed the ends of their service lives. Many more will
4 reach end-of-life over the 2023 GRC period. If no action is taken,
5 components of this critical infrastructure are increasingly likely to fail
6 with potentially severe consequences to PG&E operations.

7 PG&E's telecom network is the lifeline of the Utility. It is
8 responsible for carrying the data and communications essential to
9 daily operations under both routine and emergency conditions. It
10 connects workers to applications and data, field crews to
11 dispatchers, and operators to the devices that control and monitor
12 the gas and electric systems. It supports and enables all of the
13 Company's Mission Critical Processes to some degree. The
14 telecom network also plays an integral role in the electric protection
15 schemes that enable PG&E to safely operate the electric grid.
16 Table 8-8 below provides some key examples of potential
17 consequences of lost network connectivity resulting from an IT asset
18 failure.

**TABLE 8-8
POTENTIAL CONSEQUENCES OF LOST NETWORK CONNECTIVITY**

Line No.	Key PG&E System/Facility Reliant on Network Connectivity	Potential Consequences of Lost Network Connectivity
1	Electric Protection Relays	Failure to properly detect a fault or de-energize an electric line when a fault occurs, potentially resulting in serious injuries or fatalities, a fire ignition, or damage to equipment.
2	Remedial Action Schemes	Failure to properly stabilize electric flow after an electric line is de-energized, potentially resulting in power outages and grid instability.
3	SCADA	Inability to remotely operate or monitor gas, electric, and generation assets and systems, including loss of situational awareness and system control.
4	Energy Management System	Delayed or impaired response to changes in customer power demand, potentially resulting excessive or inadequate power generation.
5	Control and Operations Centers	Inhibited ability to dispatch or communicate with field crews, resulting in delayed gas or electric incident response and prolonged service outages.
6	Gas and Energy Trading	Inhibited ability to participate in the energy market, potentially resulting in mismatched supply and demand, increased costs, or energy shortages.
7	Customer Contact Centers	Inhibited ability to receive or manage customer phone calls, potentially resulting in delayed response to customer emergencies.
8	PG&E Data Centers, Offices, and Service Centers	Impaired communication between PG&E workers and external parties and/or loss of user access to applications or data necessary to perform Company functions.

To mitigate the risk of an IT asset failure in the Company's telecom network leading to these and other consequences, PG&E plans to focus its efforts on several key areas:

- Single points of failure: To minimize network service disruptions, PG&E's network is designed to be resilient, with alternate paths for traffic to take in the event of an isolated failure. PG&E has identified gaps in resiliency across the network and plans to remediate this by diversifying network connections at key locations.
- Fiber-optic cables and electronics: PG&E's initial investments in fiber-optic cables occurred from the late 1980s to the early

2000s. The lifespan of fiber-optic cables is 20 years.¹³ As of 2020, more than a thousand miles of cable are beyond end-of-life, and many cable segments are showing damage due to corrosion and material deterioration. Similarly, key electronic equipment that supports the fiber-optic network has surpassed its useful lifespan. For example, as of 2020, 95 percent of PG&E's ~370 Synchronous Optical Network multiplexor nodes are no longer sold or supported by the manufacturer, making it increasingly difficult to locate spare parts to perform repairs.

- Microwave terminals and channel banks: PG&E uses microwave technology to transmit data wirelessly across long distances. Channel banks are devices used to combine multiple lower-rate communication signals into a single higher-rate signal for transmission over long distances via fiber-optic or microwave systems. As of 2020, approximately 50 percent of PG&E's ~300 microwave link terminals and nearly 50 percent of PG&E's ~1200 channel banks are at end-of-life and are no longer sold or supported by the manufacturer. PG&E plans to replace these assets with modern equipment.
- Emergency generators: PG&E uses back-up power generators at many of its network facilities to minimize disruptions to network services due to power failures. As of 2020, PG&E must perform fuel level checks manually for more than 65 percent of the ~300 generators supporting the network, many of which are in remote, hard-to-access locations across California. PG&E plans to outfit many of these generators with remote fuel-level monitoring capabilities to manage refueling and emergency preparedness more effectively.
- Core network asset lifecycle: PG&E plans to address recurring demand to replace other core network assets as they reach the end of their lifespan or as they fail and cannot be repaired. This

¹³ The average service life for all asset classes that contain fiber-optic cables is 7-20 years. The asset class most closely related to the work described has an average life of 20 years.

work is necessary to restore services when assets fail and to limit increases in both risk exposure and vendor maintenance costs for out-of-support technologies. Over the 2023 GRC period, thousands of network assets will reach end-of-life and be due for replacement. Key asset types in scope include routers; switches; terminal servers; telephony and voice systems and endpoints; mobile radio base stations, controllers, and handsets; power systems, high voltage protection, and other communication room equipment; and other back-end systems and tools used to manage PG&E's network.

- Capacity and coverage: As technology becomes increasingly central to PG&E operations, demand for telecom network services across PG&E's service area evolves. This is particularly evident as the Company expands the use of automation devices in the gas and electric system. Reliable connectivity becomes required at locations where it previously wasn't. Carrying increasing amounts of data to and from increasing numbers of locations across California requires increasing amounts of bandwidth throughout the network. To this end, PG&E plans to continue ongoing efforts to appropriately scale network capacity and coverage to match demand, deploying the most cost-effective solutions available for the purposes and locations required. This includes leveraging or interconnecting with third-party carrier services where feasible.

2) Foundational Technology: Solution Delivery and Operations

PG&E's forecast for Foundational Technology investments in the Solution Delivery and Operations value stream is shown below in Table 8-9 (expense) and Table 8-10 (capital).¹⁴ Investments in this value stream are ongoing and will span multiple rate case periods.

¹⁴ See Exhibit (PG&E-7), WP 8-46 for more information.

TABLE 8-9
FOUNDATIONAL TECHNOLOGY: SOLUTION DELIVERY AND OPERATIONS
2021-2023 EXPENSE FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast
1	JV	3,930	6,500	26,900

TABLE 8-10
FOUNDATIONAL TECHNOLOGY: SOLUTION DELIVERY AND OPERATIONS
2021-2026 CAPITAL FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast
1	2F	28,400	35,000	50,200	45,600	45,200	35,000

The Solution Delivery and Operations value stream focuses on the foundational software and IT infrastructure used to develop, integrate, deploy, and operate IT solutions within PG&E-owned data centers, PG&E field sites, and third-party commercial cloud environments. Planned technology investments in this value stream continue efforts to mitigate IT Asset Failure risk associated with Data Center Technologies assets and the software applications that rely on them. This includes ongoing efforts to simplify and modernize PG&E's on-premise IT footprint, to enable faster issue resolution through remote system management, and to leverage commercial cloud services to improve scalability and IT operational efficiency.

To respond effectively and rapidly to customer needs, regulatory requirements, and emerging business demands, it has become increasingly clear that PG&E requires the agility, scalability, and technical innovations offered by commercial cloud services. While PG&E data centers are adequate for many use cases, it would be cost-prohibitive for PG&E to match the scale and pace of innovation offered by commercial cloud services. For example, Cloud Service Providers (CSP) such as Amazon Web Services (AWS) can provide the capabilities and on-demand capacity required to quickly scale up

1 website services to support traffic spikes surrounding an emergency
2 event then quickly scale back down when the event is over. To
3 accomplish this in Company data centers, PG&E would need to
4 purchase, install, and maintain hardware and software assets
5 sufficient to meet peak demand, even though that may only serve a
6 temporary need. CSPs enable companies like PG&E to take
7 advantage of pre-built infrastructure and services and pay only for
8 what they use when they use it.

9 This ability to rapidly scale enables commercial cloud customers
10 like PG&E to operate with greater agility and reduce the time to
11 value for new solutions. In addition, CSPs continuously add new
12 capabilities and services to their platforms, which the IT organization
13 can leverage with minimal investment risk to deliver new innovations
14 and solutions requested by PG&E customers, regulators, and
15 internal clients. CSPs are incentivized in today's highly-competitive
16 commercial cloud market to provide best-in-class services and new
17 innovations at competitive prices. For example, with their global
18 scale, CSPs can offer leading-edge cybersecurity, resiliency, and
19 other technological advancements that would not be economical for
20 companies like PG&E to build independently.

21 PG&E plans to leverage commercial cloud services wherever
22 feasible for new IT solutions, but not all solutions are suitable for
23 hosting in the cloud. PG&E is transitioning to a "hybrid cloud" model
24 that integrates PG&E-owned infrastructure with commercial cloud
25 services to enable consolidation and optimization of the Company's
26 on-premise footprint. To maintain a secure, reliable, and efficient
27 foundation for the systems that will reside on PG&E-owned
28 infrastructure for the foreseeable future, PG&E must continue to
29 invest in the IT infrastructure and foundational services that reside in
30 Company data centers, field sites, and remote locations. Without
31 adequate investment, PG&E could lose access to or be unable to
32 recover critical systems or data in the event of an IT asset failure,
33 resulting in potentially severe disruptions to critical Company
34 functions.

Technology investments within the Solution Delivery and Operations value stream address both commercial cloud services and on-premise IT infrastructure, software, and foundational services. Some key efforts include:

- Application health and cloud migration: PG&E's IT landscape includes more than 1,300 software applications. Multiple types of technology come together to enable these applications to function, including server and storage hardware, server operating systems, database software, middleware/integration software, and the application software itself. This aggregation of hardware and software is referred to as the application stack. As of 2020, nearly 30 percent of PG&E's applications rely on components of the application stack that are obsolete and no longer supported by the associated vendor, meaning cybersecurity vulnerability patches, bug fixes, feature updates, troubleshooting support, and spare hardware parts either come at a premium cost or are not available at all. With no action, PG&E estimates over 90 percent of the Company's applications would be out of support by the end of 2025. PG&E plans to address this by continuing efforts (a) to reduce the number of at-risk applications through rationalization and retirement, and (b) to upgrade or replace the unsupported hardware and software components of at-risk applications, leveraging or migrating to commercial cloud-based alternatives wherever feasible.¹⁵
- Other IT asset lifecycle: PG&E must continue to operate and maintain the data center infrastructure, applications, and services that will remain on-premise within PG&E data centers, control centers, remote offices, and substations. While PG&E continues to look for opportunities to consolidate and centralize these assets and services, it is not always feasible nor practical.

¹⁵ Efforts within this value stream will address a subset of PG&E's 1300+ applications. Separate but parallel efforts in alignment with this application health and cloud migration strategy are included in other value streams below and in LOB exhibits and chapters.

Where necessary, PG&E plans to address the recurring need to replace or upgrade these foundational Data Center Technology assets and supporting tools as they reach the end of their useful life or as they fail and cannot be repaired. Many of these assets are already beyond their typical service lifespan, are out of mainstream vendor support, and are therefore at elevated risk of failure or exposure to cybersecurity vulnerabilities. Many more will reach end-of-life over the 2023 GRC period. Timely replacement of these assets is necessary to maintain the reliability of PG&E's critical business applications and limit increases in both risk exposure and vendor maintenance costs for out-of-support technologies. These efforts will focus on foundational IT assets and services not currently planned for cloud migration, though commercial cloud alternatives will be considered where feasible. Key asset types in focus for these efforts include servers, storage hardware, and foundational software, such as relational database management systems and backup and recovery utilities.

- Commercial cloud enablement: PG&E plans to continue development and expansion of the Company's commercial cloud "landing zone", which provides the foundational services necessary to operate in the cloud and defines the guardrails for the commercial cloud products and services available for PG&E use. It provides a baseline environment for new workloads, which includes identity and access management,¹⁶ governance controls, data security, network design, service monitoring, and logging. The landing zone also automates the set-up of these environments and establishes initial cybersecurity guardrails through the creation of core accounts and resources. The landing zone centralizes and streamlines cloud administration and account-level tasks, allowing PG&E application development teams to focus their efforts on the application code

¹⁶ For additional discussion, see Exhibit (PG&E-7), Ch. 9, Cyber and Corporate Security.

and logic that more directly deliver value. To support increasing and evolving demand for commercial cloud products and services, PG&E plans to expand the capabilities of its landing zone with existing CSP partner AWS. PG&E also plans to evaluate additional CSPs (such as Microsoft Azure), and, when it makes economic sense, establish new landing zones to enable a broader range of cost-effective alternatives for IT solutions.

- Integration and application development platforms: PG&E plans to continue efforts to modernize the technologies it uses to develop, integrate, and deploy software applications. These efforts will transition PG&E from obsolete integration and development systems hosted in Company data centers to modern, commercial cloud-based and hybrid cloud-based platforms that support developer self-service and best practices for mobile and cloud-based application development. These efforts will help to reduce IT operational complexity and enable key capabilities necessary to support PG&E's hybrid cloud model. This includes abilities to (a) deploy applications that leverage a mix of commercial cloud services and private cloud infrastructure, to (b) efficiently develop and manage integrations between different cloud services and between cloud and on-premise systems, and to (c) deliver solutions using Agile methodologies, re-usable Application Programming Interfaces, and other industry best practices.

3) **Business Technology: Asset Management and Risk Analysis**

PG&E's forecast for Business Technology investments in the Asset Management and Risk Analysis value stream is shown below in Table 8-11 (expense) and Table 8-12 (capital).¹⁷ Investments in this value stream will span multiple rate case periods.

¹⁷ See Exhibit (PG&E-7), WP 8-53 for more information.

TABLE 8-11
BUSINESS TECHNOLOGY: ASSET MANAGEMENT AND RISK ANALYSIS
2021-2023 EXPENSE FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast
1	JV	–	–	3,800

TABLE 8-12
BUSINESS TECHNOLOGY: ASSET MANAGEMENT AND RISK ANALYSIS
2021-2026 CAPITAL FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast
1	2F	–	–	22,400	31,400	54,500	56,100

The Asset Management and Risk Analysis value stream focuses on technology solutions used to manage the lifecycle of utility assets; to track their location, condition, specifications, and relationships to other assets; and to understand and manage asset-related risks. Planned technology investments in this value stream build upon work executed for specific LOBs in prior rate case periods and begin to standardize and align the Company on cross-functional technology solutions that meet capability needs common to multiple LOBs. Key areas of investment include:

- Next Generation Geographic Information Systems: PG&E plans to modernize and standardize core components of the Company's multiple GIS that rely on obsolete third-party mapping and map editing technologies. PG&E's GIS support mission-critical operations through geographic representations of where the Company's gas, electric, generation, and certain IT assets are located and how they connect to one another. The mapping technologies behind these GIS were developed almost 20 years ago with industry-agnostic data models. Currently, assets are represented geometrically as points, lines, and polygons. PG&E's primary GIS software vendor, Esri, has since developed a standardized data model called the "Utility

1 Network” model that is purpose-built for utilities. This effort will
2 migrate PG&E’s existing GIS from the legacy “geometric” model
3 to the modern Utility Network model and upgrade associated
4 editing software to a compatible version.

5 In the legacy model, third-party add-on software is
6 necessary to provide utility-specific asset overlays, resulting in
7 siloed data models for PG&E’s different asset types. Utility
8 Network provides a built-in, standardized model for gas, electric,
9 and IT systems that allows for different asset types in the same
10 model. This enables a consolidated, end-to-end view of how
11 assets connect from generation or storage to transmission to
12 distribution, which is a challenge in the legacy model. In
13 addition, Utility Network enables increased granularity of data.
14 For example, the three power lines on a distribution pole (the
15 three phases of electricity) are represented as a single line in
16 the legacy GIS data model. In contrast, the Utility Network
17 model allows a user to zoom in and see the three different lines
18 or click on a pole to see information on individual asset
19 components such as fuses and transformer units.

20 Ultimately, the Utility Network model will enable PG&E to
21 visualize its systems as they are operated (by showing switches
22 and valves as open or closed, for example), rather than just as
23 they are built. It will also enable PG&E to access historical
24 views of the system and track changes over time as assets are
25 added, removed, or replaced. Furthermore, the Utility Network
26 model and modern map editor support three-dimensional asset
27 modeling, which lays the groundwork to build more accurate
28 representations of underground and overhead assets. None of
29 these capabilities are currently available with PG&E’s existing
30 systems.

31 In parallel to the deployment of Utility Network, which will
32 continue into the 2027 GRC period, the LOBs that currently use
33 the legacy systems will need to perform a variety of activities to
34 prepare their asset data and organization to accept the change.

For example, the LOBs must convert their existing, LOB-specific asset classification structures to the standardized model in Utility Network, map existing assets to the new model, and train their organizations on the changes. See Exhibit (PG&E-3), Chapter 12 and Exhibit (PG&E-4), Chapter 20 for discussion of these complementary efforts in Gas Operations and Electric Operations respectively.

- Enterprise Asset Investment Planning Management (AIPM):
PG&E plans to deploy an AIPM tool to enable more informed asset investment decisions across LOBs and improve the effectiveness of risk-based asset investment plans. Today, PG&E's LOBs assess asset risk using a variety of systems and risk models tailored to specific asset types. LOB teams leverage the output of these models to inform asset investment plans, but existing asset investment planning processes rely heavily on manual analysis and vary across LOB departments and asset types. This makes it challenging to effectively cross-prioritize investments across LOBs and asset types and to assess the risk impacts of different investment scenarios. In response to these challenges, PG&E is currently deploying components of an AIPM system called Copperleaf in Electric Operations.¹⁸ The effort discussed here will leverage learnings from Electric Operations' initial implementation to deploy additional Copperleaf modules to Electric Operations and the complete suite of modules to other LOBs, beginning with Gas Operations, Power Generation, and IT. Copperleaf will enable PG&E to consolidate investment scoping capabilities and relevant asset-related information (such as risk or benefit models) from across LOBs into a centralized system. PG&E can then use this information to measure asset condition, assess asset risk reduction options, or make investment decisions to enable other desired outcomes.

¹⁸ See Exhibit (PG&E-4), Ch. 22 for further discussion.

The consolidation of LOB asset investment planning capabilities will also enable PG&E to more effectively cross-prioritize asset investments. Copperleaf enables PG&E to develop risk and benefit models and incorporate different models (including models used by LOBs today) into a common scale, thereby allowing for more equivalent comparisons of risk reduction or investment value across different types of assets. The tool also provides scenario planning capabilities that enable continuous, automated optimization of investment plans over time based on different constraints or changing conditions. By implementing an AIPM solution, PG&E can improve visibility into the sustainment needs of the Company's asset base, better track the risk mitigation impacts of asset investment plans, and improve traceability of asset investment decisions and changes to plans. Importantly, consolidating investment planning processes into an enterprise AIPM solution enables PG&E to more effectively direct risk reduction efforts where they can provide the most value for customers.

4) Business Technology: Field Work Management

PG&E's forecast for Business Technology investments in the Field Work Management value stream is shown below in Table 8-13 (expense) and Table 8-14 (capital).¹⁹ Investments in this value stream are ongoing and will span multiple rate case periods.

TABLE 8-13
BUSINESS TECHNOLOGY: FIELD WORK MANAGEMENT
2021-2023 EXPENSE FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast
1	JV	3,380	3,500	10,900

¹⁹ See Exhibit (PG&E-7), WP 8-60 for more information.

TABLE 8-14
BUSINESS TECHNOLOGY: FIELD WORK MANAGEMENT
2021-2026 CAPITAL FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast
1	2F	24,200	18,000	20,100	20,100	22,300	22,300

The Field Work Management value stream focuses on technology solutions used to plan and execute field work safely and efficiently, to document performed work completely and accurately, and to manage the flow of information between field crews and the back-office. Planned technology investments in this value stream continue and build upon work begun in prior rate case periods to support capability needs shared across LOBs, particularly in the mobile technology space. Key areas of investment include:

- Inspect and Maintain product: PG&E's "Inspect and Maintain" product suite is a collection of integrated mobile and web-based software tools that enable workers to execute and manage asset inspection processes efficiently and with quality. PG&E currently uses the Inspect and Maintain product suite to support wildfire safety inspection processes, discussed in Exhibit (PG&E-4), Chapter 4.5, and a variety of other asset inspection and maintenance processes across the Company. PG&E plans to deploy the product suite to additional user groups and expand its capabilities to support additional inspection processes and asset types. This includes new support for the Pole Test and Treat program, and expansion of applications to fully support electric distribution patrols, gas leak survey, and corrosion inspection and equipment maintenance. The solution will enable inspectors and supervisors in these and other areas to:
 - View and search digital maps that show inspection areas, asset locations, local hazards, and other relevant data;
 - Use electronic forms to capture inspection results, including abnormal conditions or necessary corrective work;

- Transmit inspection results and documentation directly to core systems of record;
- Receive work assignments electronically in lieu of paper-based work packages; and
- Digitally review, reject, and approve work as it completes.

This will help to improve timeliness of inspections and preventive maintenance work; increase PG&E's ability to document work in a standard and consistent manner; and improve the completeness, accuracy, and retrievability of inspection and preventive maintenance records.

- Enterprise work management platform: PG&E plans to implement a cross-LOB technology solution comprised of integrated mobile and web-based software systems that will enable the digitization and standardization of utility work processes from initiation to completion. This effort will evaluate and begin to consolidate, replace, and/or retire dozens of outdated, LOB-specific work management solutions that are similar in nature or that require similar technology capabilities. These include solutions used for work planning and prioritization, engineering and design, dependency management, scheduling and dispatch, construction documentation, and updating systems of record. PG&E will initially focus on implementing the cross-LOB solution for external customer generated work and work related to high risk assets. These areas will then serve as a model to scale a repeatable process using common technology for short-, mid-, and long-cycle work across the Company. Overall, this effort will deliver a streamlined digital workflow for work assignment and routing, work validation, work closeout, and asset data capture, thereby enabling increased work progress visibility, improved records traceability, and more optimized resource management. By consolidating existing systems, the effort will also enable the IT organization to simplify O&M of the Company's work management solutions.

- Other technology capabilities and enhancements: Consistent with Agile practices, PG&E will continue to identify, prioritize, and address emergent opportunities to optimize field operations and work management activities. Planned work includes ongoing enhancements to applications used by field crews and field support teams to locate and mark underground assets, perform analysis and reporting on Underground Service Alert 811 tickets, and display utility system and PG&E customer information on mobile maps. PG&E also plans to implement technology capabilities to improve collaboration and coordination between field crews and control center operations by, for example, providing field workers with real-time visibility of system operations and providing dispatch and control center operations with real-time visibility of field resources and work progress. Lastly, PG&E plans to investigate opportunities to improve coordination of work clearances, planned outages, and unplanned event response activities—opportunities that include aligning and integrating these processes with the enterprise work management platform discussed above.

5) Foundational Technology: End-User Experience and Operations

PG&E's forecast for Foundational Technology investments in the End-User Experience and Operations value stream is shown below in Table 8-15 (expense) and Table 8-16 (capital).²⁰ Investments in this value stream are ongoing and will span multiple rate case periods.

²⁰ See Exhibit (PG&E-7), WP 8-66 for more information.

TABLE 8-15
FOUNDATIONAL TECHNOLOGY: END-USER EXPERIENCE AND OPERATIONS
2021-2023 EXPENSE FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast
1	JV	3,350	3,300	4,400

TABLE 8-16
FOUNDATIONAL TECHNOLOGY: END-USER EXPERIENCE AND OPERATIONS
2021-2026 CAPITAL FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast
1	2F	23,310	20,400	20,400	20,400	20,400	20,400

The End-User Experience and Operations value stream focuses on the foundational technology solutions that PG&E's ~26,000 employees and thousands of contractors and seasonal workers depend on to accomplish their daily activities—specifically, personal computing and mobile devices; the software used to provision, operate, and manage those devices; productivity and collaboration software; and the audio/visual (A/V) and imaging equipment used at PG&E facilities. Planned technology investments in this value stream continue ongoing efforts to maintain the health of these IT assets and provide PG&E end-users with modern tools that enable them to perform their jobs efficiently and effectively. Key areas of investment include:

- IT asset lifecycle: PG&E plans to address recurring demand to replace assets in the User Technologies Asset Family as they reach the end of their useful life or as they fail and cannot be repaired. The primary focus for these efforts will be the more than 40,000 laptops, desktop computers, and mobile devices due for replacement over the 2023 GRC period. As users' primary access point to PG&E systems and data, these devices are essential for the daily productivity of PG&E's workforce. A failed device often means a user is unable to perform their job

until the device is replaced. To minimize this, PG&E maintains the health of these devices and the core software that runs on them through cyclical replacements and upgrades based on the typical asset lifespan, taking into account vendor support for associated products, security vulnerabilities, software bugs and hardware defects, compatibility with other systems, evolving user needs, and other factors. Other key asset lifecycle efforts will focus on end-of-life and at-risk imaging devices (e.g., multi-function printer/scanner/copiers and large format printers) and A/V equipment (e.g., room-based conferencing equipment and video wall monitors).

- Collaboration and endpoint management tools: As technology has evolved, so too has the way people work. Wherever they are located, PG&E workers require secure access to the documents, data, productivity software, collaboration tools, and business applications that enable them to perform their work. PG&E plans to continue efforts to modernize and consolidate collaboration systems and endpoint management tools to enable a more mobile field workforce, an increasingly remote back-office/support workforce, and a more flexible workplace environment. These efforts will enable workers to access temporary office space on-demand; improve remote access to PG&E systems and resources for workers at home; and simplify the process and tools used to manage PG&E's device landscape, reducing the time and effort it takes to provision devices and get them in users' hands.

6) Business Technology: Data Enablement

PG&E's forecast for Business Technology investments in the Data Enablement value stream is shown below in Table 8-17 (expense) and Table 8-18 (capital).²¹ Investments in this value stream are ongoing and will span multiple rate case periods.

²¹ See Exhibit (PG&E-7), WP 8-71 for more information.

TABLE 8-17
BUSINESS TECHNOLOGY: DATA ENABLEMENT
2021-2023 EXPENSE FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast
1	JV	3,000	6,300	7,700

TABLE 8-18
BUSINESS TECHNOLOGY: DATA ENABLEMENT
2021-2026 CAPITAL FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast
1	2F	7,000	10,900	12,200	13,900	13,200	12,900

The Data Enablement value stream focuses on the technology solutions used to manage PG&E data, data relationships, and data quality; to make data accessible for analysis; to perform automated analysis; and to present data and analytic results in understandable formats from which users can derive insight for decision-making. Planned technology investments in this value stream directly support information management and data management initiatives discussed in Exhibit (PG&E-7), Chapter 7, and continue ongoing efforts to establish a foundational platform for data management and analytics use cases across the Company. Key areas of investment include:

- Enterprise data platform: As PG&E operations become increasingly digital, the Company creates, collects, and relies on data of increasing volume, variety, and complexity. The ability to extract insight from this data is vital to effective decision-making across the Company. In 2020, PG&E began implementation of a centralized data platform, Palantir Foundry, with an initial focus on data sets necessary to support wildfire risk mitigation efforts and Public Safety Power Shut-Off

1 decision-making.²² To realize the vision of an enterprise
 2 platform for data management and data governance, PG&E
 3 plans to expand its implementation of Foundry—as well as
 4 complementary data warehousing and metadata management
 5 technology—to encompass data sets and business processes
 6 from across the Company. Today, those data sets reside
 7 primarily in siloed databases supporting hundreds of software
 8 applications. Foundry and supporting tools provide a suite of
 9 capabilities to clean, curate, and publish those data sets in a
 10 centralized location where they can be mapped to a standard
 11 enterprise framework, or “formal ontology”, that defines the
 12 Company’s information landscape, the entities or concepts
 13 within that landscape, and the relationships between them. This
 14 enables PG&E to efficiently combine data for analysis across
 15 information domains, such as asset information and customer
 16 information, without having to build complex, single-purpose
 17 integrations between dozens of systems of record.

18 As PG&E adds data sets to Foundry, not only do PG&E’s
 19 opportunities for cross-domain analyses expand, but
 20 development of data and analytics solutions also becomes
 21 increasingly more efficient; once ingested into Foundry, a data
 22 set is available to any solution built on or integrated with the
 23 platform. Furthermore, Foundry provides tools for data quality
 24 management²³ and establishes a centralized control point for
 25 applying data governance policies to help ensure that data used
 26 for decision-making is trustworthy, complete, and traceable.

27 PG&E plans to steadily ingest new data sets into Foundry
 28 over time, prioritizing those necessary for high value analytics
 29 use cases that improve risk reduction, the customer experience,
 30 and cost efficiency.²⁴ For each data set, PG&E must establish

²² See Exhibit (PG&E-4), Ch. 4.5 for further discussion.

²³ PG&E continues to evaluate data quality management solutions for data not in Foundry.

²⁴ Analytics use cases and related costs that directly support PG&E’s wildfire risk mitigation programs are discussed in Exhibit (PG&E-4), Ch. 4.5.

its characteristics and relationships within the enterprise ontology; build a data pipeline between Foundry and the system(s) of record; implement data access, data governance, and data quality processes and controls; configure the data set to take advantage of Foundry's native capabilities, such as machine learning and artificial intelligence; and perform a variety of other activities to prepare the data for use in analytic solutions.

- Geospatial data management: As discussed in Section C.3.b.3 above, PG&E's GIS systems contain critical information about Company assets. To enable other PG&E applications to access and use that information, PG&E established a centralized geospatial data hub called "GeoMart" within Company data centers that consolidates data from PG&E's GIS and presents it in a format that is easily accessible to PG&E software developers through standard integration patterns. For example, GeoMart provides the data foundation for applications that support gas and electric control center operations, the Wildfire Safety Operations Center, field-crews that need access to maps on their mobile devices, and more. PG&E plans to continue efforts to modernize GeoMart using commercial cloud services, which will enable cloud-native elasticity and reliability, prepare the system for PG&E's next generation GIS (discussed above), and support growing demand from both PG&E and external users to access and manipulate PG&E's geospatial data. This cloud-based implementation of GeoMart will coexist alongside Foundry and serve as that platform's source for GIS data.
- Other data and analytics tools: PG&E's technical landscape includes a range of foundational data repositories, data management tools, analytics systems, and business intelligence solutions that support specialized use cases across the Company. Concurrent with the rollout of Foundry as the Company's primary data platform, many of PG&E's existing data and analytics solutions will reach end-of-support and be

due for upgrade or replacement. As that occurs, PG&E plans to evaluate opportunities to retire the legacy solutions and consolidate their functionality into Foundry and other enterprise toolsets. Where consolidation and retirement are not feasible, PG&E plans to upgrade these solutions to current versions to maintain compatibility with other systems and ensure ongoing access to security patches, bug fixes, feature updates, and troubleshooting support from the vendor. In some cases, these efforts will transition legacy solutions to a commercial cloud service in alignment with the Company's cloud strategy. While these solutions continue to provide value, PG&E plans to deliver additional enhancements as necessary to address emergent business needs, including integrations with new systems and enterprise platforms as they deploy.

7) Business Technology: Enterprise Resource Management

PG&E's forecast for Foundational Technology investments in the Enterprise Resource Management value stream is shown below in Table 8-19 (expense) and Table 8-20 (capital).²⁵ Investments in this value stream are ongoing and will span multiple rate case periods.

TABLE 8-19
BUSINESS TECHNOLOGY: ENTERPRISE RESOURCE MANAGEMENT
2021-2023 EXPENSE FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast
1	JV	1,790	600	8,300

²⁵ See Exhibit (PG&E-7), WP 8-77 for more information.

TABLE 8-20
BUSINESS TECHNOLOGY: ENTERPRISE RESOURCE MANAGEMENT
2021-2026 CAPITAL FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast
1	2F	4,080	4,500	11,800	13,800	10,600	7,200

The Enterprise Resource Management value stream focuses on the technology solutions used to plan, understand, and manage PG&E's human, financial, and physical resources. Planned technology investments in this value stream continue ongoing efforts to modernize SAP (the Company's central Enterprise Resource Planning platform) and its component modules.

SAP is integral to many of the Company's core processes, including financial planning and management, procurement and supply chain management, gas and electric asset management, project and portfolio management, HR and workforce management, and more. It consists of a wide variety of interconnected modules, databases, and peripheral systems linked and supported by a central foundation. The latest available versions of this software are cloud-based, and the SAP software provider has announced plans to end support for its legacy products in 2027.²⁶ PG&E currently uses many of these legacy products, some of which run on software versions that will be out of support prior to 2027. The Company must upgrade these products to current versions to retain access to bug fixes, cybersecurity patches, and SAP developer support. In addition to being outdated, PG&E's current implementation of SAP is extensively customized, with more than 30,000 custom objects. This added complexity makes software development and maintenance involving SAP more difficult, time consuming, and costly.

As a result, PG&E plans to gradually upgrade and migrate its legacy SAP components to the vendor's modern, cloud-based

²⁶ SAP extended the original 2025 deadline referenced in PG&E's 2020 GRC filing.

platform while at the same time consolidating and simplifying the Company's SAP code base. This work will complete in stages, with periodic releases to operations. Key SAP systems and modules in scope²⁷ over the forecast period include:

- Enterprise SAP foundation: SAP Enterprise Resource Planning Central Component (ECC) includes the core accounting and logistics modules that support many of the Company's financial and operational business processes. PG&E plans to re-platform these core SAP modules onto the latest version of the vendor's cloud-based Enterprise Management product suite. In addition to delivering the inherent benefits of a cloud service (e.g., simplified maintenance, a smaller data center footprint, and improved scalability, reliability, and performance), this effort will enable PG&E to reduce code customizations and leverage simplified business models to streamline Company operations. Reduced custom code and native platform capabilities will also enable PG&E to simplify integrations between SAP and other applications.
- Reporting and analytics modules: SAP Business Objects and Business Warehouse (BW) provide reporting, business intelligence, and analysis of SAP based data for all business processes managed using SAP. SAP Business Planning and Consolidation (BPC) provides planning, budgeting, forecasting, and financial consolidation capabilities. In addition to upgrading and migrating these systems to the SAP cloud, PG&E plans to consolidate BW and BPC into a single system to simplify related business processes. Among other features, this will enable PG&E to take advantage of the cloud platform's real-time reporting and built-in analytics and machine learning capabilities.

²⁷ In prior GRCs, SAP-related investments supporting PG&E's HR and Finance organizations were discussed in Exhibit (PG&E-8) and Exhibit (PG&E-9), respectively. In the 2023 GRC, SAP-related investments that support HR and Finance have been consolidated here to present an integrated execution strategy for SAP modernization.

- 1 • Spend management: PG&E currently uses the cloud-based
2 SAP products Fieldglass (for vendor management) and Ariba
3 (for procurement and sourcing). To take advantage of
4 synergies in the related process, PG&E plans to integrate these
5 systems, implement automated workflows, and enable new
6 analysis and reports using the cloud-based reporting and
7 analytics modules discussed above. PG&E also plans to align
8 these systems' capabilities and workflows to support the
9 standardization of procure-to-pay and spend management
10 processes²⁸ across the Company. These efforts will enable the
11 Company to better leverage buying power, spend analysis, and
12 supplier ratings to improve purchasing efficiency.
- 13 • Employee portal: The SAP Portal is the self-service hub
14 through which PG&E employees access time reporting, training
15 profiles, organizational charts, and other employee resources
16 such as pay and benefits information. PG&E plans to replace
17 this functionality with the cloud-based Employee Central module
18 within the SAP SuccessFactors suite. SuccessFactors is an
19 integrated HR management solution that PG&E currently uses
20 for recruiting, employee onboarding, and employee performance
21 management. By transitioning Portal functionality to Employee
22 Central, PG&E can consolidate HR-related functions onto a
23 common system and leverage built-in automation to streamline
24 HR processes.
- 25 • Other SAP module upgrades: SAP Extended Warehouse
26 Management (EWM) supports the Supply Chain Management
27 business process, including material receipt, inventory
28 management, and provisioning. SAP Project and Portfolio
29 Management (PPM) provides long term planning, portfolio
30 management, and project accounting capabilities for PG&E.
31 Extended, non-standard vendor support for PG&E's existing

²⁸ See Exhibit (PG&E-7), Ch. 4 for discussion of PG&E's procurement processes.

versions of these modules expires in 2022. PG&E plans to upgrade and migrate them to current, cloud-based versions.²⁹ Ultimately, these efforts will enable PG&E to keep current with product updates, take advantage of new capabilities, and streamline SAP development, operations, and maintenance, while at the same time retaining cost-effective vendor support for one of PG&E's most critical systems.

8) Foundational Technology: IT Asset and Service Management

PG&E's forecast for Foundational Technology investments in the IT Asset and Service Management value stream is shown below in Table 8-21 (expense) and Table 8-22 (capital).³⁰ Investments in this value stream are ongoing and will span multiple rate case periods.

TABLE 8-21
FOUNDATIONAL TECHNOLOGY: IT ASSET AND SERVICE MANAGEMENT
2021-2023 EXPENSE FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast
1	JV	980	1,000	1,300

TABLE 8-22
FOUNDATIONAL TECHNOLOGY: IT ASSET AND SERVICE MANAGEMENT
2021-2026 CAPITAL FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast
1	2F	5,870	5,400	5,000	5,000	5,000	5,000

The IT Asset and Service Management value stream focuses on the foundational technology solutions used by the IT organization to track and manage IT hardware and software assets throughout their

²⁹ PG&E re-sequenced the originally planned upgrades of EWM and PPM to better align with the cloud implementation strategy.

³⁰ See Exhibit (PG&E-7), WP 8-82 for more information.

1 lifecycle; to understand their relationships to each other and to
2 business processes; to measure and monitor their condition, costs,
3 and risk of failure; and to manage incident response and
4 maintenance activities associated with them. Planned technology
5 investments in this value stream directly support IT Asset Failure
6 risk management and complement investments in the Asset
7 Management and Risk Analysis value stream discussed above.

8 PG&E tracks data about IT hardware and software assets
9 across multiple software systems depending on the type of asset
10 and the type of data. This data includes asset type, specifications,
11 configuration, location, condition, interconnections, business
12 impacts, and more. To better align its IT Asset Management (ITAM)
13 function with Company and industry best practices, PG&E plans to
14 expand the capabilities of these ITAM systems and improve the
15 quality and completeness of the data they contain. These efforts will
16 enable a more comprehensive, data-driven understanding of
17 PG&E's IT asset base and its associated risks. To accomplish this,
18 PG&E plans to continue to develop the models, system integrations,
19 processes, and automation workflows necessary to consistently and
20 efficiently onboard asset data into systems of record and maintain
21 that data throughout the assets' lifecycle. IT assets without an
22 automatically discoverable IP address—e.g., fiber optic cables,
23 telecom towers—will be a key focus for these efforts.

24 By simplifying, integrating, and automating system transactions
25 at each stage of an asset's lifecycle, PG&E can limit instances of
26 errors or incomplete data. For example, PG&E plans to integrate
27 ITAM systems with Company procurement systems to capture data
28 correctly as assets are purchased and delivered. PG&E also plans
29 to improve asset risk modeling by integrating ITAM systems and
30 data models with IT service management and ticketing systems.
31 This will enable IT to systematically associate technical change
32 management data, asset failure data, and other incident data with
33 the corresponding assets. These data relationships can then

1 directly inform asset health assessments, IT Asset Failure risk
2 quantification, and analysis of total cost of ownership.

3 In parallel to these efforts, PG&E plans to adopt and/or integrate
4 with enterprise asset management and work management toolsets
5 where feasible. For example, PG&E's plans for incorporating IT
6 assets into the Company's enterprise GIS and AIPM solutions,
7 discussed in Section C.3.b.3 above, require complementary
8 investment in ITAM systems. PG&E must (a) develop the
9 IT-asset-specific data and risk models within the ITAM systems of
10 record that will feed the GIS and AIPM solutions, and (b) establish
11 the processes and tools for IT teams to populate ITAM systems with
12 the data elements the GIS and AIPM solutions require. PG&E also
13 plans to evaluate the Company's existing toolsets for engineering,
14 estimating, and graphic work design and deploy them where
15 feasible to IT users for IT assets. Through integration with ITAM
16 systems and other data sources, these toolsets can enable PG&E to
17 more efficiently design IT solutions that involve diverse,
18 interconnected technologies and better understand the solutions'
19 operational impacts. Not only does this help PG&E to identify and
20 address technology risks prior to service introduction, it also helps
21 the IT organization manage the change process and reduce
22 unintended service disruptions during implementation.

23 PG&E's IT assets serve a critical role in the Company's delivery
24 of safe, reliable, and cost-effective gas and electric service to
25 customers. These enhancements to IT asset lifecycle management
26 enable PG&E to reduce risk, improve operational efficiency, and
27 focus IT investments where they can provide the most value.

28 **9) Foundational Technology: System Operation and Control**

29 PG&E's forecast for Foundational Technology investments in
30 the System Operation and Control value stream is shown below in
31 Table 8-23 (expense) and Table 8-24 (capital).³¹ Investments in

³¹ See Exhibit (PG&E-7), WP 8-87 for more information.

1 this value stream are ongoing and will span multiple rate case
2 periods.

TABLE 8-23
FOUNDATIONAL TECHNOLOGY: SYSTEM OPERATION AND CONTROL
2021-2023 EXPENSE FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

<u>Line No.</u>	<u>MWC</u>	<u>2021 Forecast</u>	<u>2022 Forecast</u>	<u>2023 Forecast</u>
1	JV	–	100	100

TABLE 8-24
FOUNDATIONAL TECHNOLOGY: SYSTEM OPERATION AND CONTROL
2021-2026 CAPITAL FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

<u>Line No.</u>	<u>MWC</u>	<u>2021 Forecast</u>	<u>2022 Forecast</u>	<u>2023 Forecast</u>	<u>2024 Forecast</u>	<u>2025 Forecast</u>	<u>2026 Forecast</u>
1	2F	3,820	5,600	5,600	5,800	5,800	5,800

3 The System Operation and Control value stream focuses on the
4 technology solutions that directly enable the monitoring, operation,
5 and control of PG&E's gas, electric, and generation systems,
6 including the edge networks that connect monitoring, automation,
7 and other field devices to PG&E's core data networks. Planned
8 technology investments in this value stream continue ongoing efforts
9 to improve SCADA network reliability and deploy a wireless,
10 multi-purpose Field Area Network (FAN). Efforts here support Gas
11 Operations, Power Generation, and other enterprise use cases for
12 this technology, while parallel efforts supporting Electric Distribution
13 are discussed in Exhibit (PG&E-4), Chapter 21 as part of PG&E's
14 IGP and Grid Modernization Plan. These investments also support
15 IT Asset Failure risk mitigation for Network Technologies assets.

16 PG&E's operational LOBs continue to take advantage of
17 emergent monitoring, control, and automation technologies to
18 improve system reliability and safety and manage the daily flow of
19 energy. These technologies include SCADA devices, automated
20 gas valves, gas pressure monitors, and other sensors. These

1 devices require a connection to PG&E's data networks with the
 2 performance to handle real-time data transmission without delay.
 3 As PG&E deploys more of these devices across its service area,
 4 PG&E's existing communication infrastructure must evolve to
 5 provide adequate capacity, reliability, and speed in the areas where
 6 the devices are being deployed. To this end, PG&E plans to
 7 continue efforts to optimize field network capacity, coverage, and
 8 reliability. This includes efforts to modernize legacy SCADA
 9 networks and expand deployment of PG&E's FAN to additional
 10 locations. In addition to support for monitoring and automation
 11 initiatives in Gas and Power Generation, the multi-purpose nature of
 12 the FAN enables a variety of other use cases, including
 13 condition-based monitoring of assets, greenhouse gas monitoring,
 14 SmartMeter™ data backhaul in areas with inadequate cellular
 15 coverage, Wi-Fi enablement for mobile device users in the field,
 16 video feeds from security cameras, and connectivity for ID-card
 17 readers at remote PG&E facilities. As a modular mesh network, the
 18 FAN provides the flexibility and scalability to address other use
 19 cases as they emerge, and to grow over time at pace with demand
 20 for connectivity in the field.

21 **10) Foundational Technology: Meter Management and Operations**

22 PG&E's forecast for Foundational Technology investments in
 23 the Meter Management and Operations value stream is shown
 24 below in Table 8-25 (expense) and Table 8-26 (capital).³²
 25 Investments in this value stream are ongoing and will span multiple
 26 rate case periods.

³² See Exhibit (PG&E-7), WP 8-92 for more information.

TABLE 8-25
FOUNDATIONAL TECHNOLOGY: METER MANAGEMENT AND OPERATIONS
2021-2023 EXPENSE FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast
1	JV	620	800	800

TABLE 8-26
FOUNDATIONAL TECHNOLOGY: METER MANAGEMENT AND OPERATIONS
2021-2026 CAPITAL FORECAST
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast
1	2F	9,720	4,800	3,300	3,300	3,300	3,300

The Meter Management and Operations value stream focuses on the technology solutions used to manage and monitor PG&E's Advanced Metering Infrastructure (AMI), including the technologies that connect PG&E's electric and gas SmartMeters to the Company's data network. Planned technology investments in this value stream continue efforts to maintain the health of the IT hardware and software assets used for these purposes.

Access Points (AP), relays, and Data Collection Units (DCU) on PG&E's telecommunications network collect and transmit data from electric and gas SmartMeters back to Company operations. PG&E plans to conclude a multi-year effort to replace approximately 1,500 APs and 5,000 DCUs that function using obsolete second generation (2G) and third generation (3G) cellular technology. By deploying APs and DCUs that support more modern protocols, PG&E can continue to collect and transmit SmartMeter data when third-party cellular carriers complete the shut-down of their 2G and 3G networks.

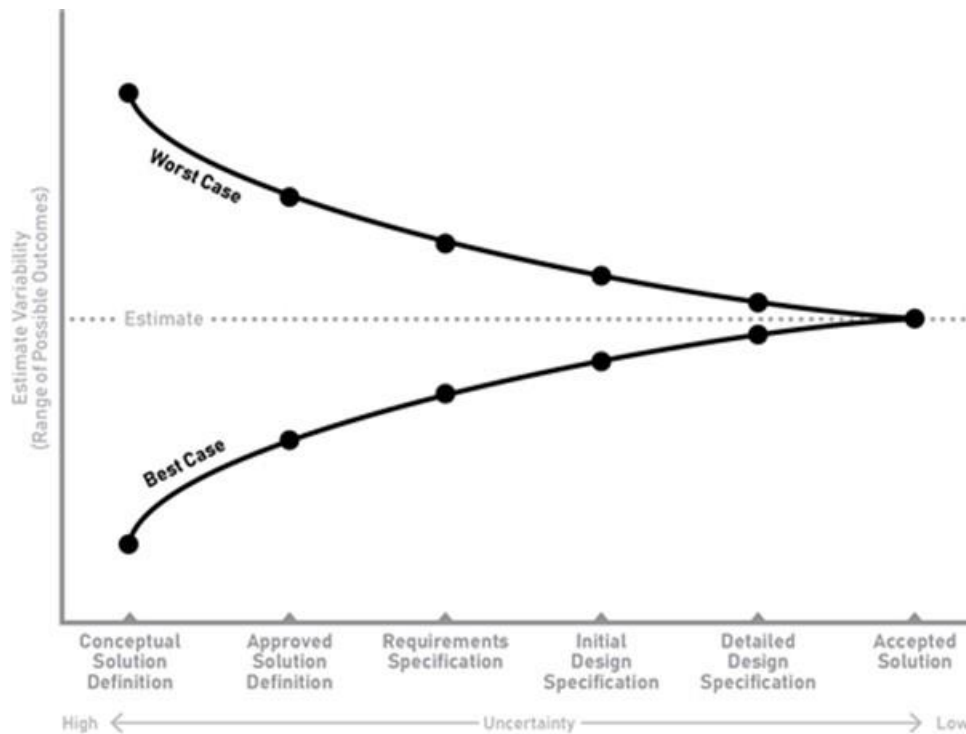
In addition, PG&E plans to continue recurring investments to maintain and optimize AMI network performance. This includes (1) periodic needs to replace APs, relays, DCUs, and associated battery equipment as they break or malfunction; (2) deployment of

1 additional APs, relays, and DCUs to provide optimal coverage and
2 capacity for new real estate developments across PG&E's service
3 territory; and (3) periodic upgrades of back-end AMI network
4 management and monitoring software to current, vendor-supported
5 versions.

6 **c. Estimating Methods**

7 Technology investments take a wide range of different forms. They
8 include efforts to upgrade software or hardware assets, develop new
9 applications, deploy new infrastructure, re-architect or integrate IT
10 systems, re-engineer processes, consolidate or retire assets, migrate
11 data, and more, all in varying combinations. This variability—coupled
12 with rapid industry innovation, the inherent complexity of technology,
13 and complicated accounting rules—makes precise estimation
14 challenging, particularly when estimating IT work far in advance of
15 execution. IT cost estimating methods are therefore heavily
16 assumption-driven and must consider a degree of uncertainty at the time
17 of estimation. As a result, an estimate's level of precision can vary
18 considerably from program to program or project to project. Moreover,
19 actual results can differ materially from initial forecasts if assumptions
20 change significantly as work progresses through the various stages of
21 planning and execution. The ongoing process of estimate refinement is
22 referred to in the IT industry as the "Cone of Uncertainty," which is
23 illustrated in Figure 8-6 below.

FIGURE 8-6
THE CONE OF UNCERTAINTY



To help account for estimate variability, PG&E presents its IT forecasts at a value stream level in this GRC, which provides a more strategic view of where and how PG&E plans to invest in technology over time. Consistent with the Cone of Uncertainty, more precise scoping and estimating for individual projects and sub-programs within each value stream will occur as the work moves through execution. As this occurs, PG&E can offset estimate deviations to some degree by adjusting the sequencing of projects and sub-programs within a value stream. To develop the value stream forecasts reflected here and in other exhibits and chapters where IT costs are presented, PG&E reviewed historical spend patterns, in-flight work, and typical team capacity, then made adjustments to account for strategic initiatives, anticipated changes in demand, and other factors, such as changes in cost accounting as PG&E increases its use of commercial cloud services. PG&E uses a variety of methods and tools to document

estimate assumptions and provide support for its IT forecasts.³³ The estimating methods leveraged across the 2023 GRC are described below:

1) The Program/Project Estimating Tool (PET)

The PET is the primary tool PG&E planners use to document forecast assumptions and develop labor and non-labor cost estimates for IT programs and projects. The PET combines common industry estimating practices with subject matter expert assumptions and PG&E-specific input factors. This helps planners create a high-level, early-stage cost estimate that can be tailored based on information available at the time of estimation. As forecasts for different investments come together, PG&E leadership recommends adjustments based on overall investment sequencing, resource capacity, annual budget constraints, and other factors. IT planners then, if necessary, update assumptions within the PET to reflect these recommendations and other adjustments made during the forecast refinement period. The PET itself is a Microsoft Excel workbook that consists of multiple worksheets, or tabs.³⁴ These include a summary tab, four user input tabs, and several supporting tabs.

1) Estimate Summary: This tab summarizes estimate information generated by all subsequent tabs and represents the final, high-level output of the tool. The dollar values shown represent the expected cost of the project or program based on the estimator's assumptions at the time of estimation, adjusted for portfolio-level sequencing and overall forecast objectives set by leadership. Unknowns at the time of estimation are reflected as an "uncertainty range" that suggests potential upper and lower

³³ The Program Summary workpapers supporting this testimony provide additional information about the cost estimating methods used for each of this chapter's initiatives. For IT initiatives discussed in other exhibits and chapters across the case, Project Summary or Program Summary workpapers supporting those exhibits and chapters provide similar information. Refer to Table 8-5 for a list of other exhibits and chapters where PG&E presents forecast IT initiatives and costs.

³⁴ See Exhibit (PG&E-7), WP 8-107 for a sample PET output.

limits of the cone of uncertainty described above. In execution, PG&E delays, accelerates, or re-sequences investments as needed to offset the impacts of unknowns and remain within overall annual budget constraints.

2) General Assumptions: This tab is the first of four user input tabs. Here, the user provides standard responses to a common set of questions determined by subject matter experts in technology, finance, and project management. The user also documents any specific assumptions made at the time of estimation. The responses to these questions determine a suggested labor effort sizing, provide an initial evaluation of the effort's complexity and execution risk, and assess the user's level of uncertainty surrounding program or project details. The responses to some questions also affect the default values and factors used in calculations on subsequent tabs.

3) Labor Cost Assumptions: This tab is the second of four user input tabs. Here, the PET leverages standard assumptions based on historical data, industry studies, and the inputs provided in the General Assumptions tab to suggest initial values for labor effort units (in 8-hour "person days") and distribute that effort across typical activities and resource types. The user then reviews these suggested values and makes adjustments or enters manual estimates as necessary to account for prior experience, subject matter expertise, project/program-specific assumptions, or additional information they may possess (such as a vendor estimate or benchmarking data). The tool then applies standard accounting assumptions and labor and overhead rates to calculate estimated labor costs for the effort.

4) Non-Labor Cost Assumptions: This tab is the third of four user input tabs. Two main sections comprise the majority of the tab. The first main section captures user estimates for contract-related costs such as fixed-fee labor agreements, software licenses, vendor maintenance contracts, telecom

leases, and commercial cloud services. Due to variability in contract types and sourcing strategies, estimates here rely primarily on estimator expertise, benchmarking, standard vendor pricing, and vendor quotes, if available. The second main section captures user estimates for materials. Estimates here are based on material quantities entered by the user multiplied by an estimated per-unit price. For IT materials commonly used at PG&E, the tool suggests standard per-unit prices based on typical price ranges experienced with past work. Users can enter manual estimates for uncommon materials or refine per-unit prices based on their expertise or other information they may have available.

- 5) Cost Allocation: This tab is the final of four user input tabs. It provides a detailed summary of the output from the previous two tabs and asks the user to allocate capital and expense costs by year based on expected sequencing. This tab also calculates escalation costs and Allowance for Funds Used During Construction.
- 6) Supporting Tabs: The remaining tabs include an instructions tab and several reference tabs that contain factors used in calculations on other tabs. These factors include drop-down response options to standardize user input, as well as base values and variables (e.g., labor, overhead, and escalation rates) used in calculations.

2) Other Estimating Methods

PG&E uses a variety of other methods in addition to the PET to generate or support technology investment forecasts. When these other methods are used, an initiative's associated Project Summary or Program Summary workpaper will indicate the specific methodology. Used on their own or in conjunction with the PET, some of the more common methodologies include: vendor quotes or estimates, requests for information, requests for proposal, industry studies, historical cost trends, prior experience with

similar types of programs or projects, resource capacity estimates, standard job estimating templates, and best professional judgment.

4. Baseline Operations & Maintenance

a. Portfolio Description

Within the Baseline O&M portfolio, PG&E performs activities and incurs costs necessary to operate the IT organization and plan, manage, support, and maintain the technology solutions IT delivers. These activities and costs fall into two primary categories: Labor O&M and Non-Labor O&M.

1) Labor O&M

On a daily basis, leaders and individual contributors within the IT organization carryout a variety of functions necessary to provide reliable and efficient IT services. These functions include:

a) IT Planning and Governance

The IT organization works with LOB partners across PG&E to define and continuously refine the technology vision and strategy for the Company. Through this process, IT and LOB teams identify opportunities to deliver business value through technology solutions. IT then helps to evaluate and select the products and services that best deliver this value. Those products and services are then incorporated into the Company's technology roadmaps and target-state architectures. From there, IT teams scope and estimate investments, evaluate dependencies and alternatives, assess the operational impact of proposed solutions, prioritize investment demand, and develop near-term and long-term investment plans. In parallel, the IT organization determines and allocates the people, technical, and financial resources necessary to maintain existing solutions and execute new work.

As plans come to fruition, the IT organization operates processes to oversee the in-flight investment portfolio, address emergent demand, apply technical and architectural standards, and adjust sequencing and budget allocations based on

1 execution performance. IT performs activities at multiple levels
 2 within the organization to monitor program and project
 3 performance and drive consistent and effective delivery. This
 4 includes periodic status review meetings with key stakeholders
 5 as well as the development and application of project
 6 management toolsets, process controls, and governance
 7 frameworks.

8 **b) IT Infrastructure and Application Operations**

9 PG&E performs a variety of activities to operate and
 10 maintain technology solutions and provide ongoing support to
 11 consumers of PG&E's IT services. Some key examples include:

- 12 • IT asset management: IT teams carry-out a range of
 13 activities to maintain a current understanding of IT's
 14 hardware and software asset base as solutions are
 15 deployed or retired, as changes are applied, and as PG&E's
 16 technical and operating environments evolve. This includes
 17 performing asset inspections, entering and maintaining
 18 asset data in systems of record, mapping dependencies
 19 between IT assets and business processes, assessing
 20 asset health, and performing other activities necessary to
 21 effectively quantify and manage IT Asset Failure risk. For
 22 software assets, PG&E also operates processes to assign
 23 and manage user licenses, which helps to both ensure
 24 compliance with vendor agreements and optimize license
 25 costs as users are added and removed over time.
- 26 • System operation and maintenance: PG&E's IT asset base
 27 is distributed across PG&E territory, with infrastructure
 28 extending to remote regions of the state and more than
 29 1,000 software applications hosted across multiple data
 30 centers and field locations. IT teams perform a variety of
 31 activities to keep those systems functioning properly. Some
 32 key activities include maintaining or repairing physical
 33 assets; deploying software patches and bug fixes; updating
 34 firmware, operating systems, and configurations; and

1 coordinating system changes. PG&E also operates a
2 24/7 network operations center responsible for monitoring IT
3 systems and infrastructure, identifying outages, and
4 directing and tracking incident response. When unplanned
5 outages or events occur, IT teams work to isolate the
6 problem, communicate with affected stakeholders,
7 determine the cause, and conduct remediation efforts. In
8 some cases, this may involve executing data center failover
9 and service restoration procedures to maintain business
10 continuity.

- 11 • Service management and client support: IT teams provide
12 direct support to PG&E LOBs and internal clients in a
13 number of ways. For example, IT operates a help desk for
14 PG&E clients to report system issues, submit service
15 requests, and receive remote technical support. System
16 specialist teams work with directly with business users to
17 understand and address their specific needs, which can
18 include activities like running data extracts and reports,
19 making minor system or workflow changes, or helping to
20 resolve business process challenges. IT teams also
21 support worker onboarding and offboarding procedures by
22 provisioning devices and system access for new users,
23 reclaiming and reassigning devices as users leave the
24 Company, and setting up user workstations at PG&E offices
25 as needed.
- 26 • Emergency response: The IT organization directly
27 participates in PG&E's planning and response to emergency
28 events, playing an increasingly important role as PG&E
29 operations become more dependent on technology. IT
30 helps to define business continuity plans in preparation for
31 emergencies and periodically tests failover controls to verify
32 that critical IT systems can be restored quickly should a
33 major event occur. When an emergency event does occur,
34 IT teams set-up and operate communications equipment at

PG&E base camps, coordinate with first responders, reestablish access to critical IT systems as needed, provide staff and technology to support PG&E Emergency Operations Centers, and participate in service restoration efforts when IT assets are impacted.

c) IT Business Management

IT teams perform a variety of activities to manage and oversee IT business processes and continuously improve organizational effectiveness. The IT organization partners closely with PG&E's Corporate and Shared Services departments—including Enterprise Health and Safety, HR, Business Finance, and Supply Chain—to support enterprise programs, such as the Enterprise Corrective Action Program (CAP),³⁵ and carry out common organizational functions such as safety management, recruiting, talent development, employee performance management, organizational change management, spend management, contract governance, and more. At the same time, IT leaders track operational performance, manage day-to-day challenges, and drive process improvement initiatives. They regularly review work progress, report on status to stakeholders, and monitor key performance indicators such as budget variance or system availability. In addition, PG&E's IT organization engages in benchmarking activities with other companies and organizations to identify opportunities for improvement. IT also consults with third-party research and advisory firms to understand and adopt industry best practices for IT functions. This work then informs continuous improvement activities that help the IT organization perform its primary functions more efficiently and effectively.

³⁵ Exhibit (PG&E-7), Ch. 1 for discussion of the Enterprise CAP.

2) Non-Labor O&M

Non-Labor O&M primarily refers to recurring, contractual costs related to third-party IT products, services, and support. Major costs include:

- Fixed-fee O&M labor contracts: PG&E engages with several third-parties under fixed term contracts to provide development, testing, and maintenance services for non-critical software applications. This managed services model follows industry standard practices for engaging an on-demand pool of on-site and off-shore resources to provide IT support at consistent and economical rates.
- Vendor maintenance and service agreements: When PG&E purchases hardware and software products from third-parties, these vendors often require a service agreement as a condition of the purchase. These agreements entitle PG&E to services that include onsite and remote support; routine maintenance; software patches, bug fixes, and minor feature updates; and potential discounts on future product and service purchases. These agreements typically cover a pre-defined time period, after which PG&E negotiates renewal, retirement, or non-standard support terms with the vendor.
- Software licenses: Consistent with common IT industry business models, PG&E must pay vendors for the right to use their software products. Licensing agreements are distinct from maintenance and service agreements in that they focus on the terms of PG&E's use of the product rather than the support the vendor provides for that product. Licensing terms are typically defined based on the volume of usage (e.g., database or operating system instances) or the number and type of users. These agreements require periodic renewal (depending on the terms) and occasional true-ups to account for changes in usage or users over set periods of time.
- Commercial cloud service subscriptions: Commercial cloud providers, such as AWS, charge recurring fees to use their

services. Typically, these fees are based on PG&E's actual usage of their services within a given month or year, with variable pricing based on the types of services consumed. These agreements generally address both licensing and ongoing support, including access to regular product updates and feature releases.

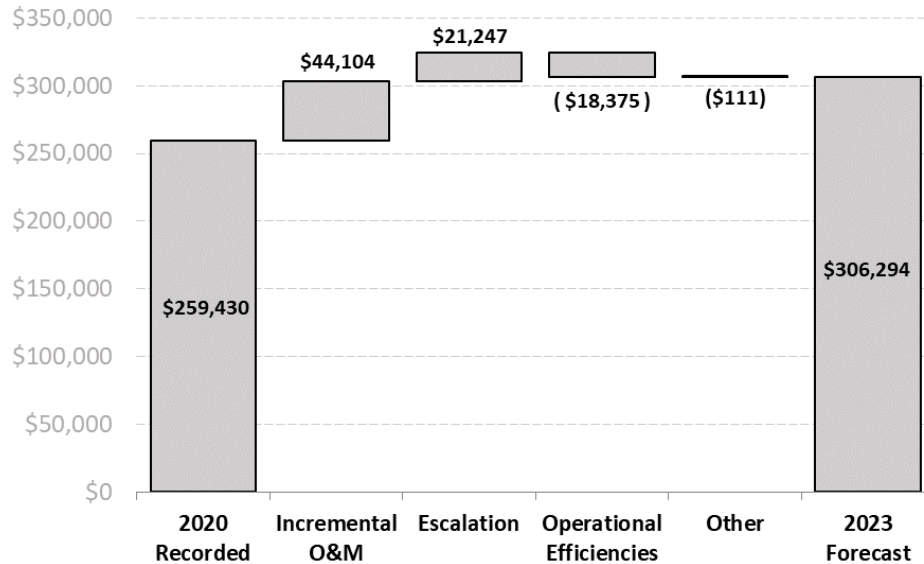
- Telecom leases and usage costs: PG&E's telecom network is comprised of both Company-owned infrastructure and third-party services provided by vendors such as Comcast, AT&T, and Verizon. PG&E pays recurring fees to these vendors and others for use of leased wireline circuits and wireless cellular and satellite networks. This includes data plans for PG&E-owned cell phones and mobile devices.

b. Key Forecast Drivers

As PG&E's technology landscape evolves through the delivery of technology investments, so to do the activities and costs necessary to operate and maintain that landscape. PG&E must appropriately scale its IT organization to meet demand for its services and continuously seek offsetting efficiencies. New solutions typically require ongoing vendor support, recurring license or subscription payments, or specialized IT skillsets not currently present in PG&E's IT organization. New IT processes and functions are also occasionally required as the Company and the IT organization evolve. These types of changes drive increased labor and non-labor costs, which IT offsets as much as possible through increased efficiency.

Figure 8-7 below shows PG&E's forecast for the Baseline O&M portfolio, walking from 2020 recorded expense to the 2023 forecast. The net increase in Baseline O&M expense from 2020 recorded to 2023 forecast is \$46.9 million, or approximately 18.0 percent. The Baseline O&M portfolio has no capital component.

FIGURE 8-7
2020-2023 BASELINE O&M EXPENSE WALK
(THOUSANDS OF NOMINAL DOLLARS)



1) Incremental O&M

As PG&E deploys new technology solutions and IT assets, the IT organization must incur incremental O&M costs commensurate to support these solutions and assets once they are operational. This support is necessary to sustain the safety, reliability, financial, risk-reduction, and customer benefits these solutions enable. PG&E's 2023 forecast reflects a net increase of \$44.1 million, or approximately 17.0 percent over 2020 recorded, for labor and non-labor spend attributable to incremental O&M.

Key labor drivers—which represent approximately 19.5 percent of the increase—include software application support; minor system upgrades that do not result in new functionality; and patching, issue remediation, and repairs for both application and infrastructure. In addition, PG&E plans to expand the scope of its IT asset inspection program to better support IT Asset Failure risk management. PG&E also plans to onboard additional resources to support data management and data governance processes and tools discussed in Exhibit (PG&E-7), Chapter 7 and Section C.3.b.6 above.

Key non-labor drivers, which represent approximately 80.5 percent of the increase, include commercial cloud subscriptions and other vendor service agreements, application and infrastructure license fees, network telecommunication leases, managed services support contracts, and hardware maintenance contracts.

See Section C.4.a.2 for further discussion of these types of costs.

As the Company migrates existing systems to commercial cloud services, PG&E will often require parallel service agreements for both the current system and the future-state cloud solution. While this will temporarily increase expense costs during the transition, it enables PG&E to retain support for existing systems and provide ongoing reliability and security until the transition is complete. Longer-term, commercial cloud service subscriptions will completely replace existing, asset-based maintenance agreements for those systems moving to the cloud.

2) Escalation

PG&E used standard escalation factors, which were generated to account for inflation, to calculate the approximately \$21 million escalation-related increase over 2020 recorded expense. PG&E applied labor escalation factors of 3.02 percent for 2021, 3.52 percent for 2022, and 3.52 percent for 2023. PG&E applied non-labor escalation factors of 1.40 percent for 2021, 1.90 percent for 2022, and 2.30 for 2023. These escalation factors are consistent with Company guidelines.³⁶ PG&E aims to offset escalation-related increases through operational efficiencies, discussed below.

3) Operational Efficiencies

The IT organization continues to identify and act on opportunities to reduce existing costs and offset future cost increases. For example, PG&E expects to improve operational efficiency through rationalization and consolidation of the IT asset base. By retiring systems with low usage, reducing the number of

³⁶ See Exhibit (PG&E-8), Ch. 4 and Exhibit (PG&E-12), Ch. 3 for standard escalation rate assumptions.

1 systems with overlapping capabilities, and consolidating IT solutions
 2 onto standardized enterprise systems and strategic vendor
 3 platforms, PG&E is able to both reduce maintenance costs
 4 associated with smaller, narrow-purposed systems and increase
 5 contract negotiation leverage with the IT organization's major
 6 vendors. Regular contract reviews and renegotiations
 7 (in partnership with PG&E's Sourcing department)³⁷ are another
 8 key way in which PG&E drives IT operational efficiency. PG&E also
 9 leverages its contracts with managed services partners to optimize
 10 support costs for low-criticality systems. Over the GRC forecast
 11 period, PG&E aims to deliver IT costs savings sufficient to offset
 12 escalation-driven cost increases and partially offset new costs
 13 driven by deployment of technology solutions.

14 **4) Other**

15 PG&E's Baseline O&M forecast includes a \$0.2 million forecast
 16 decrease in end-user services expense costs due to an increase in
 17 PG&E's allocation of these costs to capital overheads, consistent
 18 with PG&E's overhead cost allocation methodology.³⁸ These costs
 19 are partially offset by a \$0.1 million increase in IT officer
 20 compensation costs.

21 **c. Estimating Methods**

22 To determine Baseline O&M forecasts for a given year, PG&E
 23 begins with prior year recorded or forecast costs for the Baseline O&M
 24 portfolio, applies standard labor and non-labor escalation factors to
 25 those costs, then adjusts for cost increases or decreases due to
 26 changes in technology, processes, and demand for IT services. PG&E
 27 assesses demand for IT services based on factors that include:
 28 anticipated changes to the current business environment, planned
 29 deployments of new technology capabilities, planned changes to IT
 30 systems and infrastructure, anticipated growth in technology usage, and
 31 expected impacts of technology investments and continuous

³⁷ Exhibit (PG&E-7), Ch. 4.

³⁸ See Exhibit (PG&E-10), Ch. 1a for discussion of PG&E's allocation methodology.

improvement initiatives. Through analysis of these factors, PG&E forecasts year-over-year incremental changes to historical levels of O&M expenditures. IT's method for forecasting O&M costs is consistent with the estimating methods used throughout the Company.

5. Proposed Internal Accounting Policy Changes

In Exhibit (PG&E-10), Chapter 10, PG&E has proposed three internal accounting policy changes that impact IT costs, all of which would be effective in 2023. The first concerns commercial cloud services used for development of software application solutions, the second concerns prepaid software licenses and hardware maintenance agreements, and the third concerns implementation costs for leased fiber-optic circuits.

- Commercial cloud services used for software development: Commercial cloud services have become PG&E's preferred strategy for new technology solutions due to their high scalability and reliability, continual innovation, and cost-effectiveness. PG&E typically engages with commercial cloud services through short term hosting contracts that allow for regular renegotiation or renewal of terms, which enables PG&E to benefit from new innovations, price reductions, and other changes in the rapidly evolving commercial cloud market. To better support this strategy, PG&E proposes in Exhibit (PG&E-10), Chapter 10 to clarify internal accounting policy regarding the implementation costs for a cloud computing contract if it is used to develop a software application solution and meets other criteria. Not adopting the proposed policy would result in expense cost increases and inhibit PG&E's ability to implement commercial cloud-based solutions.
- Prepaid software licenses and hardware maintenance agreements: When PG&E purchases IT hardware from third-parties, these vendors often require the inclusion of a service agreement as a condition of the purchase. Essential updates, patches, and bug fixes for firmware and operating systems are rarely available without a service agreement. Vendors also require PG&E to pay for the right to use their software products, typically through a licensing agreement. These agreements are integral to the successful operation of new hardware or software. Discussed in Exhibit (PG&E-10), Chapter 10, PG&E's proposed update

1 to the Company's internal accounting policy regarding these agreements
 2 would result in a more accurate representation of total IT asset costs
 3 over time.

- 4 • Implementation costs for leased fiber-optic circuits: PG&E's
 5 telecommunications network uses fiber-optic systems to provide high
 6 capacity data transport capabilities between critical PG&E facilities and
 7 core network locations. Fiber-optic systems are comprised of electronic
 8 equipment and fiber-optic cabling, which are dependent on each other to
 9 function. PG&E plans to continue expansion of the Company's
 10 fiber-optic network to provide necessary capacity and resiliency at
 11 critical locations, as discussed in Section C.3.b.1 above. As a more
 12 cost-effective alternative to installing a PG&E-owned fiber-optic cable,
 13 PG&E will, where feasible, lease individual fiber-optic strands from a
 14 third-party cable owner under a long-term indefeasible right of use (IRU)
 15 agreement. These IRU agreements reserve these strands of cable for
 16 exclusive use by PG&E for a typical period of 20 years, which would
 17 provide the same operational functionality as a PG&E-owned fiber-optic
 18 cable. In Exhibit (PG&E-10), Chapter 10, PG&E proposes to clarify
 19 internal accounting policy regarding upfront payments and
 20 implementation costs for these leased IRU agreements. Implementation
 21 costs include, for example, costs to design and engineer the network
 22 circuit to meet PG&E requirements, costs to build interfaces with
 23 PG&E's network and PG&E-owned fiber-optic electronics, costs to
 24 splice cables to establish the network path that PG&E requires, and
 25 costs to install new fiber cable³⁹ if needed. Not adopting the proposed
 26 policy would result in expense cost increases that could delay key
 27 investments and inhibit PG&E's ability to effectively mitigate IT Asset
 28 Failure risk and maintain the health of the Company's telecom network,
 29 as discussed in Section C.3.b.1 above.

³⁹ In these cases, PG&E typically pays only a fraction of the installation cost, with the amount commensurate to the portion of the cable that will be reserved for PG&E use.

1 **D. Cost Tables**

2 The capital expenditure and expense forecasts for IT are summarized in the
3 following tables:

- 4 • Table 8-27 lists the expense MWCs, showing 2016 through 2020 recorded
5 expense and 2021 through 2023 forecast expenditures, stated in thousands
6 of nominal dollars.
- 7 • Table 8-28 lists the capital MWCs, showing 2016 through 2020 recorded
8 expenditures, and 2021 through 2026 forecast expenditures, stated
9 in thousands of nominal dollars.

TABLE 8-27
INFORMATION TECHNOLOGY
EXPENSE
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	Description	Recorded Adjusted				Forecast			Workpaper Reference	
			2016	2017	2018	2019	2020	2021	2022		2023
1	AB	Misc. Expense	\$(171)	\$(242)	\$(201)	\$(191)	\$106	—	—	—	
2	JV	Maintain IT Apps and Infra	291,755	280,463	286,235	285,386	311,365	\$311,545	\$342,775	\$420,375	
3	LL	Charges from Affiliates	377	337	323	342	327	—	—	—	
4	OM	Operational Management ^(a)	3,832	77	1,727	362	2,592	1,320	1,362	1,406	
5	OS	Operational Support	(2,159)	493	1,004	7,324	6,549	—	—	—	
6	ZC	Misc. Support	—	—	—	(443)	(182)	—	—	—	
7		Total	\$293,633	\$281,127	\$289,088	\$292,781	\$320,758	\$312,865	\$344,137	\$421,781	
8		End User Services Overhead Credit									
9	ZC	Misc. Support	\$(43,510)	\$(36,686)	\$(42,239)	\$(39,470)	\$(36,448)	\$(37,898)	\$(37,981)	\$(36,686)	
10		Net Expense	\$250,123	\$244,441	\$246,849	\$253,311	\$284,309	\$274,967	\$306,157	\$385,094	WP 8-1, line 8

(a) For illustrative purposes, PG&E has adjusted 2020 recorded costs and 2021 and 2022 forecast costs in testimony and financial walks to include officer compensation costs that PG&E voluntarily excluded from rates in the 2020 GRC. Because of this, 2020, 2021, and 2022 costs shown here vary from the values listed in the RO Model. See Exhibit (PG&E-8), Ch. 4 for further discussion of officer compensation costs.

TABLE 8-28
INFORMATION TECHNOLOGY
CAPITAL
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	Description	Recorded Adjusted					Forecast					Worksheet Reference	
			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025		2026
1	2F	Build IT Apps and Infra	\$151,222	\$198,572	\$157,560	\$103,160	\$185,498	\$191,570	\$204,100	\$265,900	\$279,900	\$305,500	\$293,400	WP 8-21, line 2
2		Total	\$151,222	\$198,572	\$157,560	\$103,160	\$185,498	\$191,570	\$204,100	\$265,900	\$279,900	\$305,500	\$293,400	

(PG&E-7)

PACIFIC GAS AND ELECTRIC COMPANY

CHAPTER 9

CYBER AND CORPORATE SECURITY

[INCLUDES NOVEMBER 5, 2021 ERRATA]

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 9
CYBER AND CORPORATE SECURITY

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 9
CYBER AND CORPORATE SECURITY

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 9
CYBER AND CORPORATE SECURITY

A. Introduction

1. Scope and Purpose

The purpose of this chapter is to demonstrate that Pacific Gas and Electric Company's (PG&E or the Company) expense and capital forecasts for Cybersecurity and Corporate Security are reasonable and should be adopted by the California Public Utilities Commission (CPUC or Commission).

Like other utilities and many other entities, PG&E faces the increasing risk of cybersecurity and physical security threats. These threats are further magnified by factors such as the sophistication of active adversaries, the growing dependence on technology in the utility industry, and an evolving threat of domestic terrorism. PG&E must work diligently to anticipate and effectively combat these threats.

It is critical for PG&E to maintain the security of all its assets, both physical and cyber. The Cybersecurity and Corporate Security organizations collectively referred to as "Security" work together to address overlapping cybersecurity and physical risks. With new threats emerging, the collaboration and shared information approach provides a comprehensive strategy that addresses evolving security matters.

The controls, mitigations, and strategies presented in this chapter demonstrate how PG&E's Cybersecurity and Corporate Security organizations will continue to address the constant and evolving cybersecurity and physical security risks to PG&E's workforce, critical infrastructure, information assets, customers, and business operations.

2. Summary of Request

PG&E requests that the Commission adopt its 2023 expense forecast of \$56.2 million for Corporate Security and Cybersecurity baseline services and projects, as shown in Table 9-1 below. Recorded expense was \$50.4 million in 2020. PG&E's 2023 expense request represents a 11 percent increase from base year (BY) 2020 recorded expenses and is

1 primarily driven by lower-than-planned spending in the BY, as well as
 2 security mitigations to enable automation to support control programs.

**TABLE 9-1
 CYBERSECURITY AND CORPORATE SECURITY
 2023 EXPENSE FORECAST
 (MILLIONS OF DOLLARS)**

Line No.	Expense	2020 Expense Recorded	2023 Expense Forecast	Expense 2023 vs Recorded 2020
1	Corporate Security	\$21.3	\$23.9	12%
2	Cybersecurity	\$29.1	\$32.3	11%

3 PG&E also requests that the Commission adopt its capital expenditure
 4 forecast shown in Table 9-2 below for the years 2021-2026. Recorded
 5 adjusted capital expenditures were \$37.6 million for 2020. PG&E's
 6 \$43.1 million capital request for the Security Program in 2023 represents
 7 approximately a 15 percent increase from the BY 2020 recorded costs. The
 8 increase in forecast spend, relative to 2020, is driven primarily by new or
 9 increased security mitigations.

**TABLE 9-2
 CYBERSECURITY AND CORPORATE SECURITY
 CAPITAL FORECAST
 (MILLIONS OF DOLLARS)**

Line No.	Capital	2020	2021	2022	2023	2024	2025	2026	Capital 2023 vs Recorded 2020
1	Corporate Security	\$9.5	\$12.6	\$12.6	\$13.3	\$14.0	\$14.0	\$14.5	40%
2	Cybersecurity	\$28.1	\$29.3	\$29.3	\$29.8	\$30.5	\$31.4	\$32.6	6%

10 Details about the activities, costs, and drivers for these forecasts are
 11 provided in Section C below.

12 **3. Deferred Work Review**

13 Section 5.2 of the 2020 General Rate Case (GRC) Settlement
 14 Agreement requires PG&E to make an additional showing in its 2023 GRC
 15 testimony for work that was previously requested and authorized based on
 16 representations that the work was needed to provide safe and reliable
 17 service.

In the 2020 GRC, Cybersecurity and Corporate Security did not request or receive authorized funding for any work: (1) identified as safety, reliability, and/or maintenance-related in the 2020 Risk Spending Accountability Report or (2) based on representations in testimony and work papers that the work was needed to provide safe and reliable service.

4. Overview of Recorded and Forecast Costs

a. Expense

Recorded expense costs for 2020 as compared to the 2023 forecast are indicated in Figure 9-1 for Cybersecurity and Figure 9-2 for Corporate Security:

**FIGURE 9-1
CYBERSECURITY EXPENSES
(MILLIONS OF DOLLARS)
(2020-2023)**

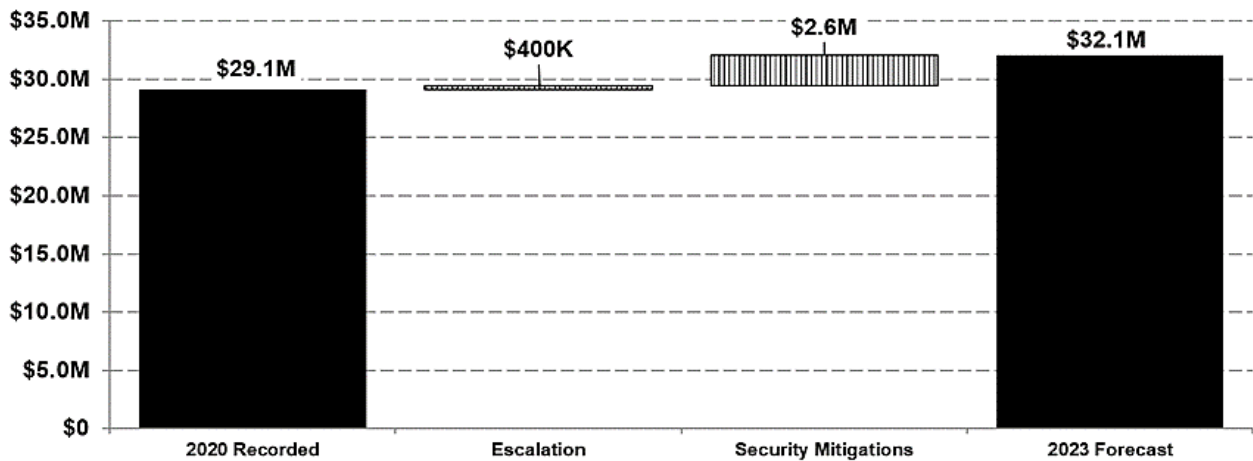
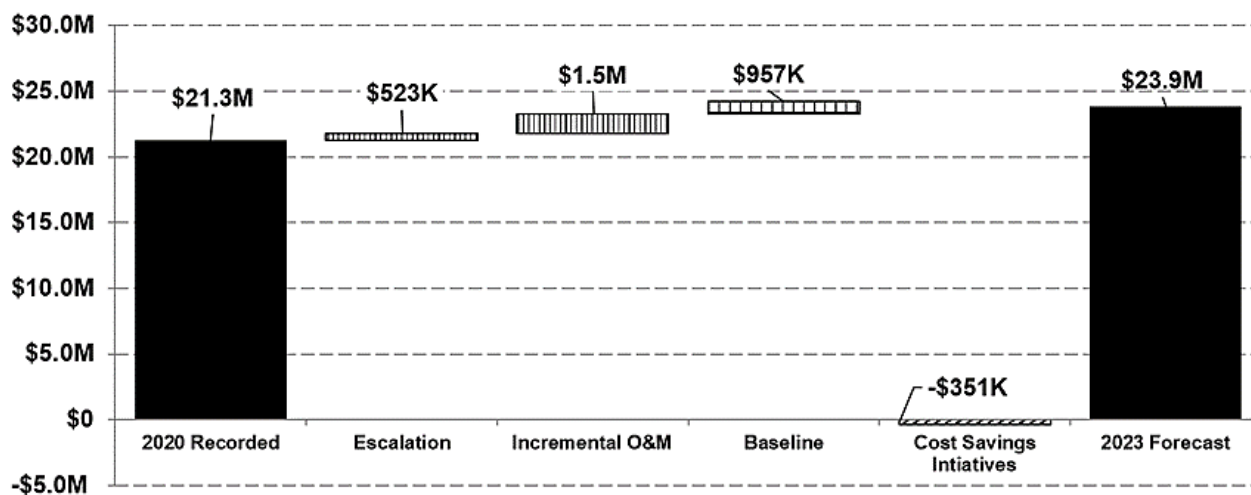


FIGURE 9-2
CORPORATE SECURITY BASELINE AND PROJECT EXPENSES
(MILLIONS OF DOLLARS)
(2020-2023)

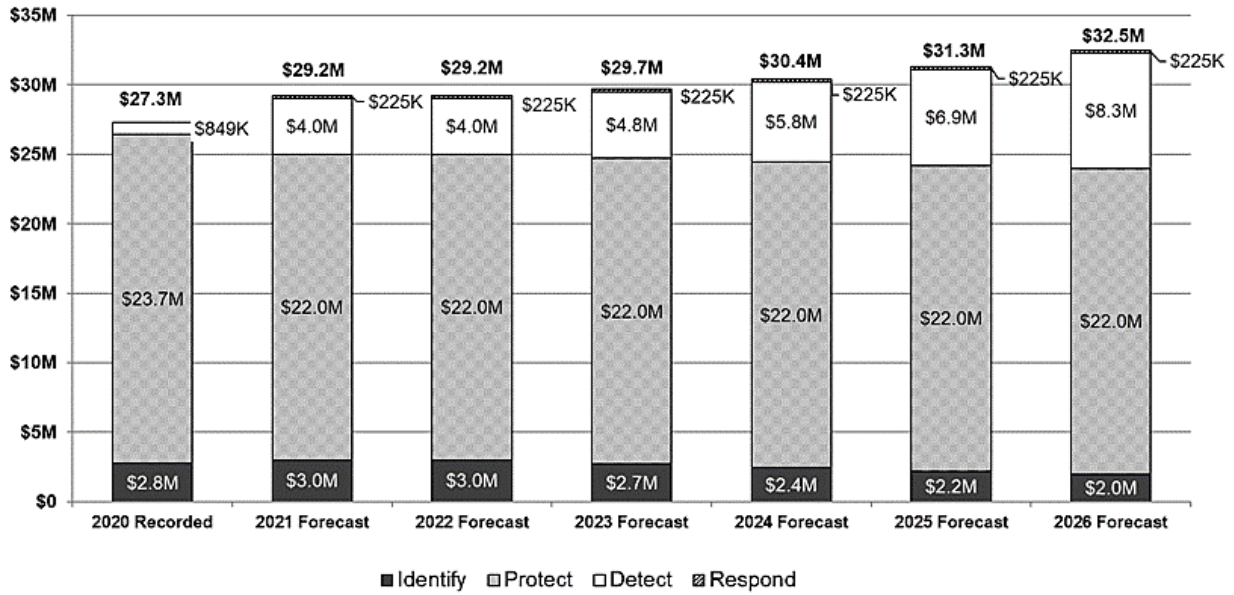


Cost drivers reflected in PG&E's Security expense forecast include escalation (including end-user labor services with a slight increase in headcount, as well as end-user non-labor services and contracts); incremental operations and maintenance (O&M) costs; increased baseline operating expense due to a slight headcount increase. These increases are offset by cost savings associated with increased use of technology, where possible.

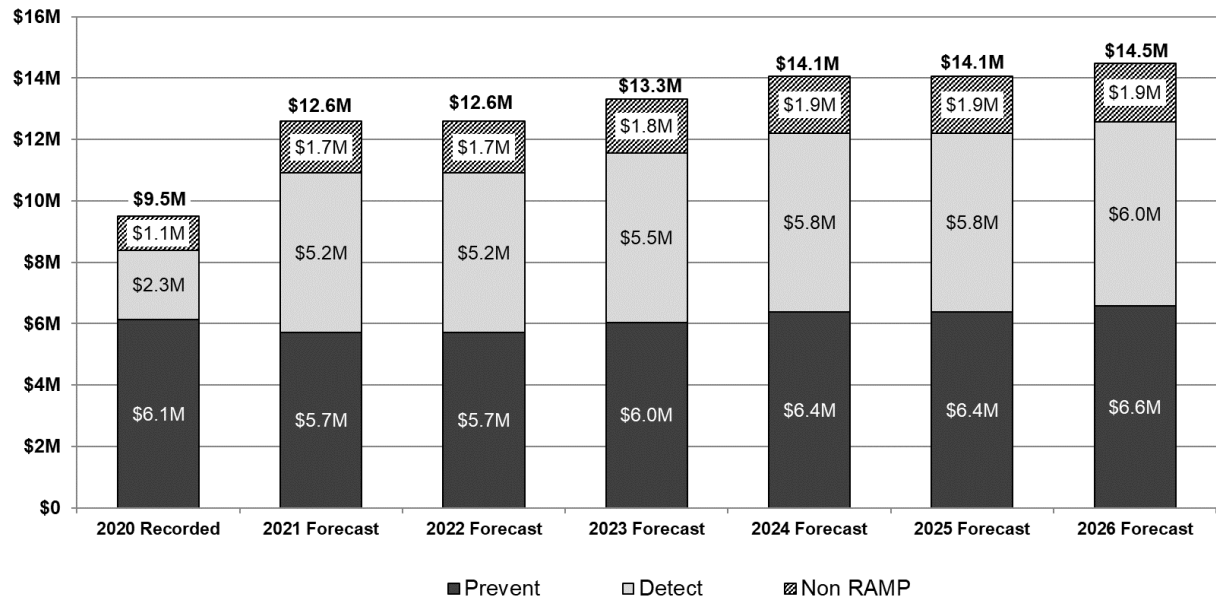
b. Capital

Figures 9-3 and 9-4 display Cybersecurity and Corporate Security capital costs for 2020-2026, respectively. Recorded 2020 capital costs are provided with forecast capital costs for years 2021-2026.

**FIGURE 9-3
CYBERSECURITY CAPITAL MITIGATIONS
(MILLIONS OF DOLLARS)
(2020-2026)**



**FIGURE 9-4
CORPORATE SECURITY CAPITAL MITIGATIONS
(MILLIONS OF DOLLARS)
(2020-2026)**



Cost drivers reflected in PG&E's Security capital forecast include mitigation investments for Cybersecurity and Corporate Security to address Security risks.

5. Support for Request

Sufficient funding is essential for a strong security program that protects critical infrastructure, information assets, and PG&E's workforce. Active adversaries, including nation states, criminals, and potential insiders, are constantly innovating, with threats evolving in complexity and sophistication.

The energy sector is among the top three most attacked critical infrastructure sectors in the United States (U.S.).¹ In 2021, Colonial Pipeline reported a cyber-attack to a pipeline that halted its systems for 5,500 miles due to a ransomware attack. Technology innovations in critical infrastructure have become an important element in achieving PG&E's business objectives. Consequently, security programs must evolve to defend against challenges presented by modern technologies and new, complex threats. To maintain effective Cybersecurity and Corporate Security programs, PG&E must continue to invest resources that keep us ahead of threats. PG&E Security organization's expense and capital forecasts are needed to support this strategy, allowing continued investments to address evolving types of attacks and new operational technologies to support changing business needs.

6. Organization of the Remainder of This Chapter

The remainder of this chapter is organized as follows:

- Section B – Program and Risk Overview;
- Section C – Activities, Cost, and Forecast Drivers by Major Work Category (MWC);
- Section D – Estimating Methods; and
- Section E – Cost Tables.

¹ Power Engineering International, "Cybersecurity: How Utilities Can Prepare the Next Generation of Smart Grid," February 12, 2018, by Scott Foster, Chief Executive of Delta Energy and Communications.

B. Program and Risk Overview

1. Program Description

a. Cybersecurity Program Overview

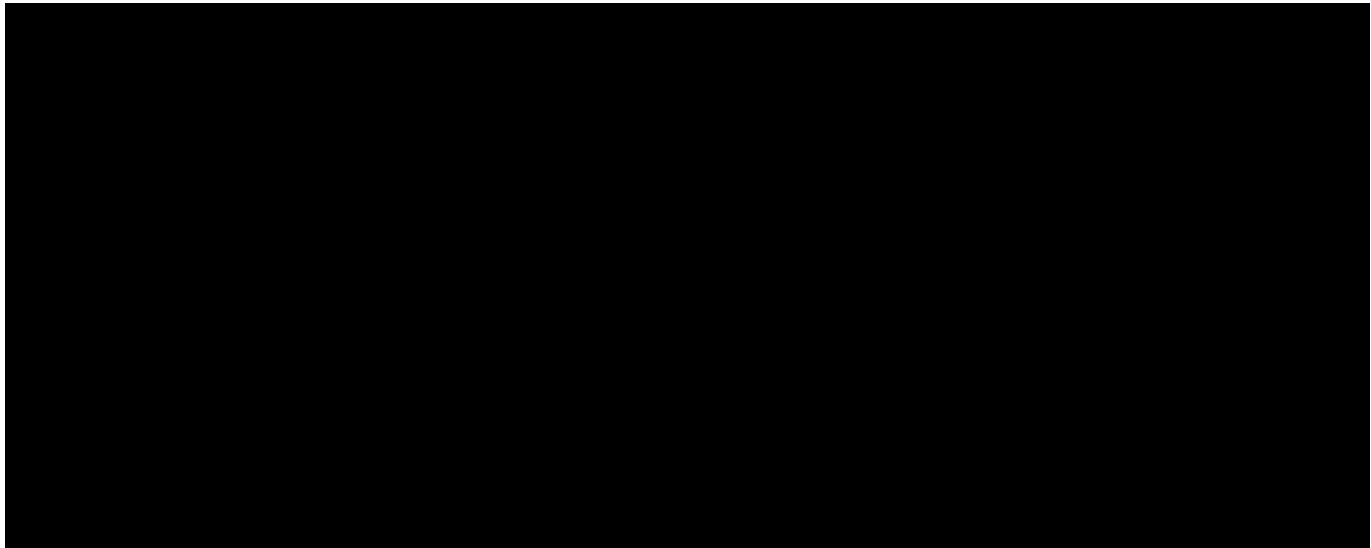
As the utility sector evolves becoming more digitized, cyber-attacks are increasing in sophistication and frequency. PG&E's Cybersecurity Team must stay one step ahead of its challenging landscape in order to provide safe and reliable utility service to its customers. PG&E must defend against global attack campaigns by active adversaries that probe, seeking to exploit, and disrupt the Industrial Control System. In recent years, nation state adversaries have carried out attacks on Supervisory Control and Data Acquisition (SCADA) control systems within the utility sector under names like Stuxnet Black Energy2, and Crash Override. These attacks have resulted in operational shutdowns that have crippled power grids and caused severe financial loss.

The security needs of the energy sector continue to rapidly change as utilities transform and become more digitized. Operational Technology devices have become more accessible to cyber- attacks, making them more vulnerable. According to leading cybersecurity provider Armis-Utilities, in 2018, there were 204 public vulnerability advisories, an increase of 25 percent from 2017. The DHS US-CERT reported 17,477 vulnerabilities in 2020. According to Claroty Security, over 70 percent of the industrial control system (ICS) vulnerabilities disclosed in the second half of 2020 were remotely exploitable through a network attack vector. There was a 25 percent increase in ICS vulnerabilities disclosed in 2020 compared to 2019, as well as a 33 percent increase from Q1 and Q2 of 2020. Vulnerabilities are prevalent in many devices such as voltage regulators in Remote Terminal Units, Human Machine Interface, and SCADA software. In 2018, over half of the vulnerabilities reported by manufacturers were rated as high in terms of severity level.²

² <https://info.armis.com/rs/645-PDC-047/images/Armis-Utilities-WP.pdf> (as of Jun. 15, 2021).

As technology becomes more complex, cybersecurity becomes more important to the overall safety of PG&E's operating environment. PG&E's Cybersecurity organization has devised a program that effectively addresses evolving security threats, vulnerabilities, and challenges presented by innovative technology.

b. Cybersecurity Organizational Structure



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- [Redacted]

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c. Corporate Security Program Overview

Corporate Security's mission is to protect PG&E's people, assets, and facilities. Corporate Security manages programs that are designed to keep our employees and customers safe. In 2020, Corporate Security re-structured our department to better identify the current and

1 future risks and develop a long-term strategic plan to align with our
2 objectives.

3 As part of the restructuring, the Project Management and Delivery
4 function was formed to help streamline security projects and manage
5 our portfolio. Other existing Corporate Security services and functions
6 are discussed below.

7 Physical security threats are increasing and changing. PG&E
8 continues to experience more incidents related to break-ins, vandalism,
9 theft, fraud, assault, and threats against the Company's workforce and
10 assets, which has resulted in a rising need for investigations. Additional
11 mitigations are required to improve our physical protection levels. Some
12 physical security mitigations require pivoting to technology for more
13 efficient solutions that enhance the protection of workforce, assets, and
14 facilities.

15 PG&E must also proactively mitigate emerging physical attack risks.
16 A prime example is the increase in active shooter incidents in the U.S.
17 PG&E continues to update its workplace violence program to remain
18 current with incident learnings. The Insider Threat program's evolution
19 also assists in proactively identifying and monitoring risks of this nature
20 and preventing large scale negative consequences.

21 **d. Corporate Security Organizational Structure**

22 Corporate Security reports to the Senior Director of Corporate
23 Security, who reports to the Senior Vice President of Customer Care
24 and ultimately the Executive Vice President and Chief Customer Officer.

**FIGURE 9-6
CORPORATE SECURITY ORGANIZATION CHART**



The baseline services and functions that support Corporate Security programs include:

- Physical Security – Assesses physical security risks related to employees, contractors, customers, physical assets, facilities, and the Company's infrastructure. Responsibilities include emergency response, incident management, and collaborating with local management on physical security vulnerabilities and mitigations;
- Security Asset and Technology – Designs and implements technology solutions to mitigate physical security risks. This includes managing ongoing operations and inspections to ensure Corporate Security system operability and replacing inadequate defense technologies with next generation tools;
- Corporate Security Control Center – Monitors and responds to physical security system alarms. Responsibilities also include incident response and communication activities during physical security events, security officer deployment, technology break-fix repair ticketing, and physical access control management. It also serves as an emergency center for our employees to call seeking help; and
- Investigations and Insider Threat – Conducts internal and external investigations of criminal activities and employee misconduct.

Responsibilities include maintaining law enforcement and industry security liaison relationships to build in-house intelligence, and identifying, evaluating, and mitigating threats and vulnerabilities. Other services include, enterprise-wide training (e.g., active shooter, workplace violence awareness), and Insider Threat program management. Insider Threat monitors for internal and external threats that can cause potential risk to PG&E facilities and/or people, with a particular emphasis on workplace violence, sabotage, and fraud. Insider Threat partners extensively with the Cybersecurity team to mitigate these threats.

e. Key Metrics and Other Performance Measures

Cybersecurity and Corporate Security have further defined key performance and risk indicator metrics reports to make them actionable and specific to line of business (LOB) stakeholders. PG&E benchmarks with other utilities to identify key risk indicators within the industry and enlists the services of third-party agencies for assessments to align with industry best practices. These metric reports are aimed at gauging the vulnerability of our risks and compliance with applicable government regulations. They also demonstrate how effective Cybersecurity and Corporate Security mitigations have been at reducing risk and maturing the program over time. Cybersecurity and Corporate Security also tracks and provides metric reports for compliance and mandated security training that apply to the enterprise.

2. Risk Overview Analysis

a. Risk Assessment and Mitigation Phase (RAMP) Risk Cyber Attack

The Cyber Attack risk is defined as a coordinated malicious attack purposefully targeting PG&E's core business functions, resulting in loss of control of Company information or systems used for gas, electric or business operations. The consequences of a cyber-attack are potentially catastrophic and could impact the safety and reliability of PG&E's operational systems. The Cyber Attack factor includes attacks on IT to obtain unauthorized access to PG&E's data, and attacks on operational technology to impact PG&E's ability to control the delivery of

1 natural gas and/or electricity. In 2018, the energy sector was among the
2 top three most attacked critical infrastructure sectors in the U.S.

3 Cybersecurity continues to be increasingly important to the overall
4 safety of PG&E's operating environment as technology becomes more
5 complex and PG&E becomes more dependent on technology enabled
6 assets to meet business objectives. Security risks must be mitigated to
7 prevent an attack and secure technology to guard against safety,
8 reliability, financial and customer trust impacts.

9 PG&E's Cybersecurity organization is solely focused on managing
10 security risk to PG&E's workforce, critical infrastructure, information
11 assets, customers, and business operations. Efforts to manage risk
12 include: new security mitigation investments; monitoring and reporting
13 cyber-attacks, securing operational technology environments; mitigating
14 critical asset risks; Identify and Access Management; educating PG&E's
15 employees on common and emerging security threats; remediating
16 vulnerabilities across the enterprise; managing enterprise security
17 technology; and collaborating with Corporate Security to investigate and
18 mitigate insider threats, which are functions managed by Corporate
19 Security. (For more information on the Cybersecurity Attack risk, please
20 see the 2020 RAMP Report.)³

21 PG&E described the Cybersecurity programs and strategies to
22 address Cyber Attack in its 2020 RAMP Report. PG&E has not
23 changed this program or strategy since the 2020 RAMP Report was
24 filed. For details on Cybersecurity programs and strategies, refer to the
25 2020 RAMP Report, Chapter 20, Table 20.

26 **b. Cyber Attack RAMP Risks Controls, Mitigation Costs and Changes**

27 The time between PG&E's 2020 RAMP submission and the GRC
28 request has allowed Cybersecurity to reevaluate how Cybersecurity is
29 presented across the enterprise. In PG&E's 2020 RAMP Report, Cyber
30 Attack was presented as a cross cutting factor. PG&E later determined
31 that, given the complex nature of cybersecurity events, cybersecurity is

³ Cyber Attack is discussed in more detail in PG&E's 2020 RAMP Report, A.20-06-012, (June 30, 2020) Ch. 20 Attachment A, Section B.

more accurately characterized as an individual risk event rather than an enterprise cross cutting factor. PG&E recognizes that a cybersecurity event can influence other risk events so in this GRC Cyber Attack is considered both an individual risk event and a cross- cutting factor.⁴

5

-
- | Category | Value 1 | Value 2 | Value 3 |
|------------|---------|---------|---------|
| Category 1 | 95 | 100 | 85 |
| Category 2 | 88 | 100 | 85 |
| Category 3 | 88 | 95 | 15 |
| Category 4 | 100 | 98 | 18 |
| Category 5 | 100 | 100 | 25 |
| Category 6 | 100 | 100 | 100 |

4 Cyber Attack influences six risk events on PG&E's Corporate Risk Register. PG&E maps the cross-cutting factors to the risk events in Exhibit (PG&E-2), Ch. 1, Attachment B.

5 Exhibit (PG&E-7), WP 9-57 for more information on the Cybersecurity Risk Bowtie.

1	
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10	6

c. Cybersecurity Framework

The controls and mitigations in this section are aligned to the four pillars of the NIST CSF (Identify, Protect, Detect, and Respond). The NIST CSF establishes the basic guidelines of an effective cybersecurity program. The table below provides a definition for each of the four NIST sections.

6 Exhibit (PG&E-7), WP 9-57, For more information on the Cybersecurity Risk Bowtie.

**TABLE 9-3
NIST CSF DOMAIN**

Line No.	NIST CSF Domain	Definition
1	Identify	Activities that develop organizational understanding in managing Security risks to systems, assets, and data. Resources supporting critical functions must have a clear understanding of the business context and related risks to enable the organization to focus and prioritize its mitigation efforts. This ensures resources are applied where the greatest risk reduction will be achieved.
2	Protect	Activities that develop and implement appropriate safeguards ensuring delivery of critical infrastructure services. These activities limit or contain the impact of Security risk-based events, reducing both frequency and consequence.
3	Detect	Activities that identify the occurrence of a potential Security risk, enabling timely discovery and reducing potential consequences.
4	Respond	Activities that enable effective evaluation of a potential Security risk-based event, and impact containment reducing potential consequences.
5	Recover	Activities that support maintaining plans for resilience and restoration of capabilities and services that are impaired due to a cybersecurity event.
(a) The NIST CSF, Recover Domain, is not a function of Cybersecurity. This effort is led by IT Disaster Recovery. Cybersecurity partners with Emergency Preparedness and Response and the IT Disaster Recovery to support business recovery due to a cybersecurity event.		

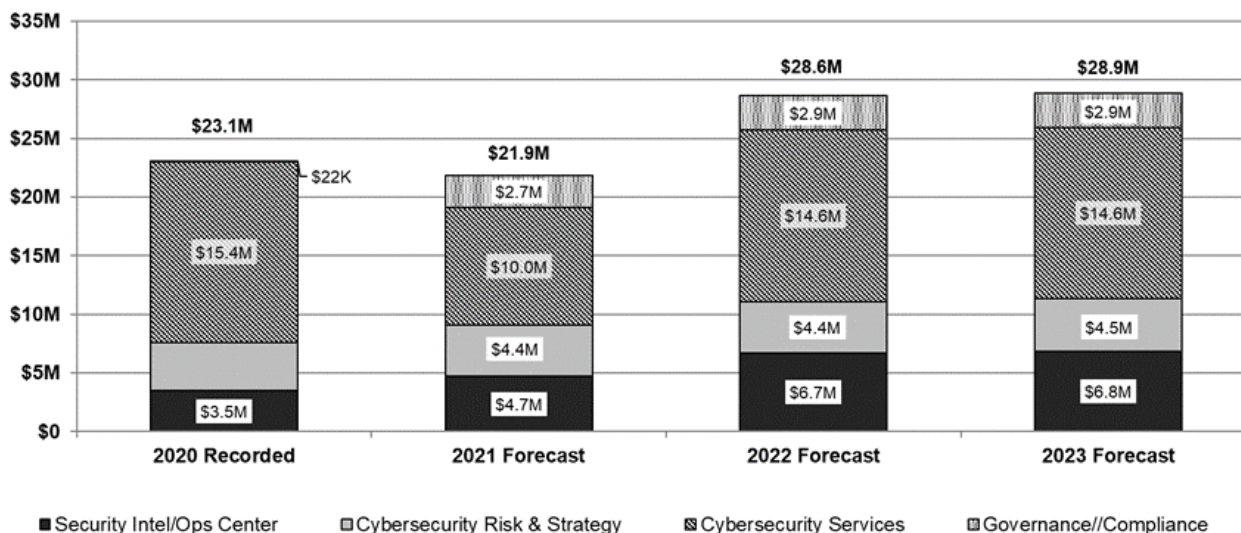
d. Cyber Attack Controls and Mitigations

1) Controls

The Cybersecurity organization established controls addressing the Cyber Attack risk conducted through key Cybersecurity Services noted in Section B, “Cybersecurity Program Overview.” These are same controls PG&E included in the 2020 RAMP Report. These controls span all NIST CSF domains. PG&E’s forecast costs for controls are provided in workpapers.⁷

⁷ See Exhibit (PG&E-7) WP 9-54.

FIGURE 9-7
CYBERSECURITY CONTROLS EXPENSES
(MILLIONS OF DOLLARS)
(2020-2023)



Note: 2021 Forecast values vary from the values listed in the Standard Workpapers and Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

2) Mitigations

The Cyber Attack risk is addressed by four NIST domains that are described in Table 9-3 above. These are same mitigations PG&E included in the 2020 RAMP Report.⁸ Recorded and forecast costs for mitigations are provided in workpapers.⁹

⁸ Exhibit (PG&E-7), WP 9-33, WP 9-35, WP 9-38, WP 9-41 for a list of projects aligned to each mitigation.

⁹ See Exhibit (PG&E-7), WP 9-53.

FIGURE 9-8
CYBERSECURITY MITIGATIONS EXPENSE FORECAST
(MILLIONS OF DOLLARS)
(2020-2026)

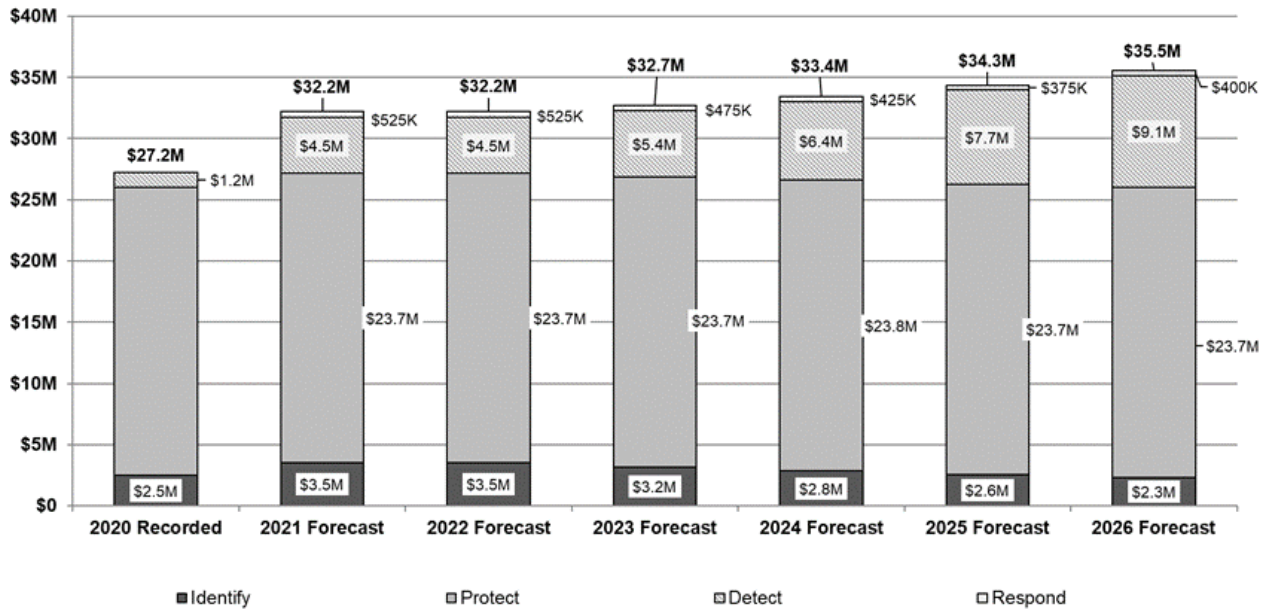


TABLE 9-4
CYBER ATTACK
RECORDED AND FORECAST MITIGATION COSTS 2020-2023 – EXPENSE
(THOUSANDS OF DOLLARS)

Line No.	Mitigation No. (2023 GRC)	Mitigation Name (2023 GRC)	2020 Rec. Adj.	2021 Forecast	2022 Forecast	2023 Forecast	Total	RSE
1	CYBER-M001	Identify	\$701	\$500	\$500	\$450	\$2,151	0.60
2	CYBER-M002	Protect	846	1,700	1,700	1,700	5,946	0.13
3	CYBER-M003	Detect	356	500	500	600	1,956	0.23
4	CYBER-M004	Respond	–	300	300	250	850	1.77
5		Total	\$1,904	\$3,000	\$3,000	\$3,000	\$10,904	

TABLE 9-5
CYBER ATTACK
RECORDED AND FORECAST MITIGATION COSTS 2020-2026 – CAPITAL
(THOUSANDS OF DOLLARS)

Line No.	Mitigation No. (2023 GRC)	Mitigation Name (2023 GRC)	2020 Rec. Adj.	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total	RSE
1	CYBER-M001	Identify	\$2,759	\$3,000	\$3,000	\$2,700	\$2,430	\$2,187	\$1,968	\$18,044	0.60
2	CYBER-M002	Protect	23,670	22,000	22,000	22,000	22,000	22,000	22,000	155,670	0.13
3	CYBER-M003	Detect	849	4,000	4,000	4,800	5,760	6,912	8,294	34,615	0.23
4	CYBER-M004	Respond	–	225	225	225	225	225	225	1,350	1.77
5		Total	\$27,278	\$29,225	\$29,225	\$29,725	\$30,415	\$31,324	\$32,488	\$209,680	

3. Non-RAMP Risk: Data Loss Event

a. Risk Overview

Data Loss Event (DLE) is defined as a confirmed incident in which sensitive, confidential, or otherwise protected data has been accessed and/or disclosed in an unauthorized fashion.

10

-
- | Government | Percentage |
|---------------------|------------|
| Current government | 100% |
| Previous government | 0% |

- [REDACTED]
- [REDACTED] 11

10 Confidential information is defined as information intended for use within PG&E on a “business need to know basis.” Restricted information is defined as information that is the most sensitive due to its significant value to the Company and requires the maximum level of handling and protection from unauthorized disclosure that could result in severe damage such as a loss of intellectual property, safety, financial or reputational damage to PG&E.

¹¹ See Exhibit (PG&E-6), Ch. 10.

- 1 • [REDACTED]
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- 4 [REDACTED] ¹²

b. Risk Modeling

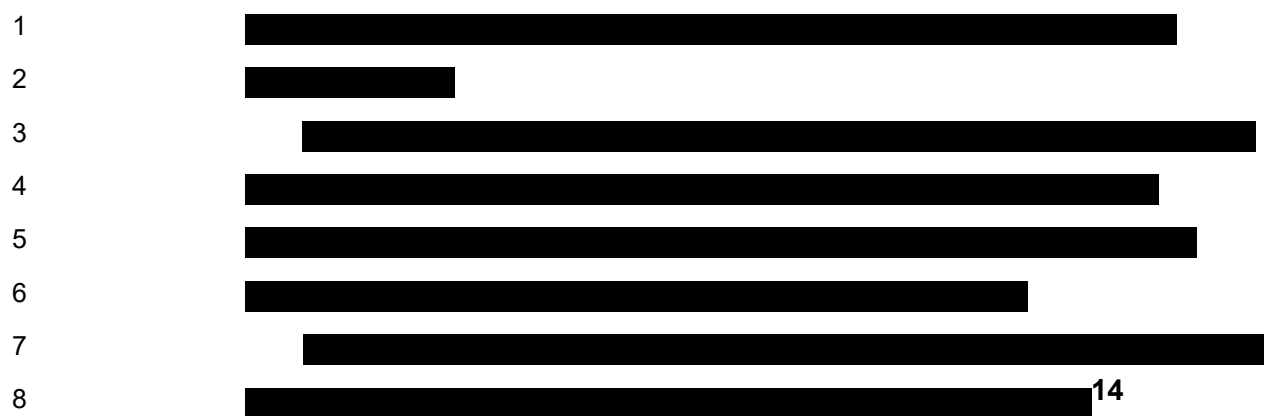
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- 15 [REDACTED]
- 16 [REDACTED] ¹³

c. Managing Data Loss Risk

- 18 [REDACTED]
- 19 [REDACTED]
- 20 [REDACTED]
- 21 [REDACTED]
- 22 [REDACTED]
- 23 [REDACTED]
- 24 [REDACTED]
- 25 [REDACTED]
- 26 [REDACTED]
- 27 [REDACTED]
- 28 [REDACTED]
- 29 [REDACTED]
- 30 [REDACTED]

¹² Exhibit (PG&E-8), Ch. 5.

¹³ Exhibit (PG&E-7), WP 9-57, For more information on the Cybersecurity Risk Bowtie.



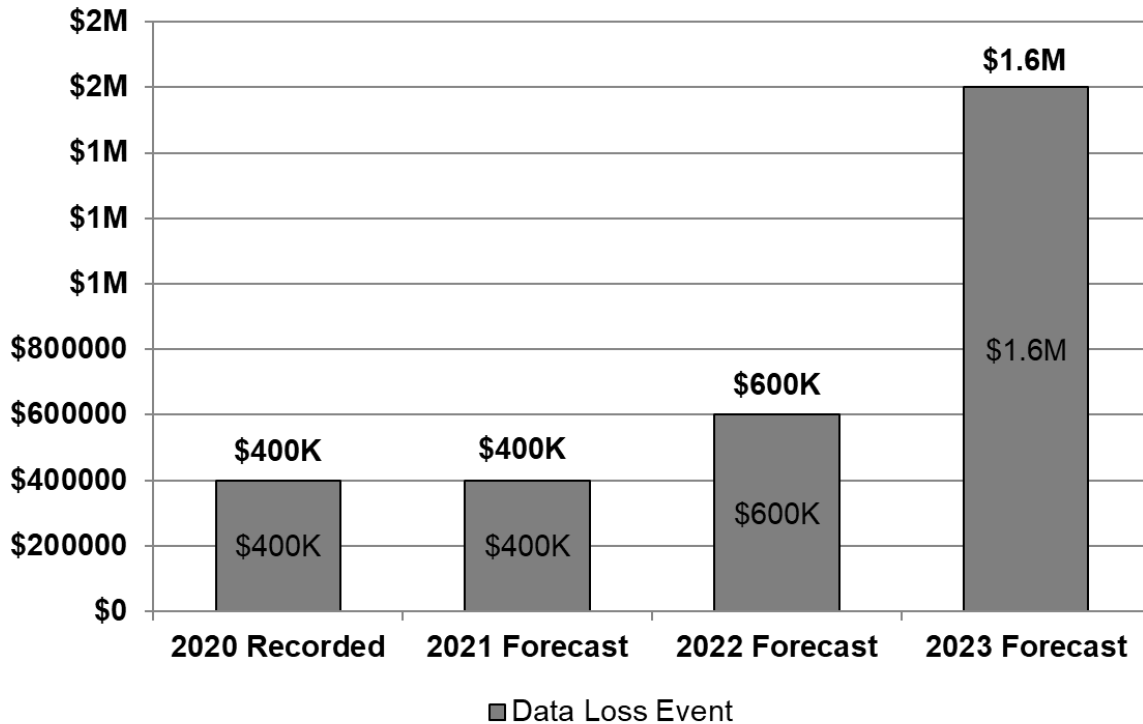
**TABLE 9-6
DATA LOSS EVENT
RECORDED AND FORECAST MITIGATION COSTS 2020-2023 – EXPENSE
(THOUSANDS OF DOLLARS)**

Line No.	Mitigation No. (2023 GRC)	Mitigation Name (2023 GRC)	MWC	2020 Rec. Adj.	2021 Forecast	2022 Forecast	2023 Forecast	Total
1	DTALS-M001	Data Security – Data Placement	KZ	\$400	\$400	\$400	\$ 600	\$1,800
2	DTALS-M002	Data Security – Assessment/Harden	KZ	–	–	\$200	\$1,000	\$1,200
3		Total		\$400	\$400	\$ 600	\$1,600	\$4,000

9 The following chart below displays the expense forecast for the Data
10 Loss program.

14 See Exhibit (PG&E-7), WP 9-33, WP 9-35, WP 9-38, WP 9-41.

FIGURE 9-9
CYBERSECURITY DATA LOSS EXPENSE FORECAST
(MILLIONS OF DOLLARS)
(2020-2023)



4. RAMP Risk: Physical Attack

a. Introduction

The Physical Attack¹⁵ risk is defined as incidents related to break-ins, vandalism, theft, fraud, assault, and threats against PG&E's workforce and assets. Physical attacks are increasing as evidenced by the increase in active shooter and civil unrest incidents in the U.S. There were seven times more counter-protests reported across two times more states in 2020 from 2019. In addition, seven times as many of these counter-protests turned violent.¹⁶

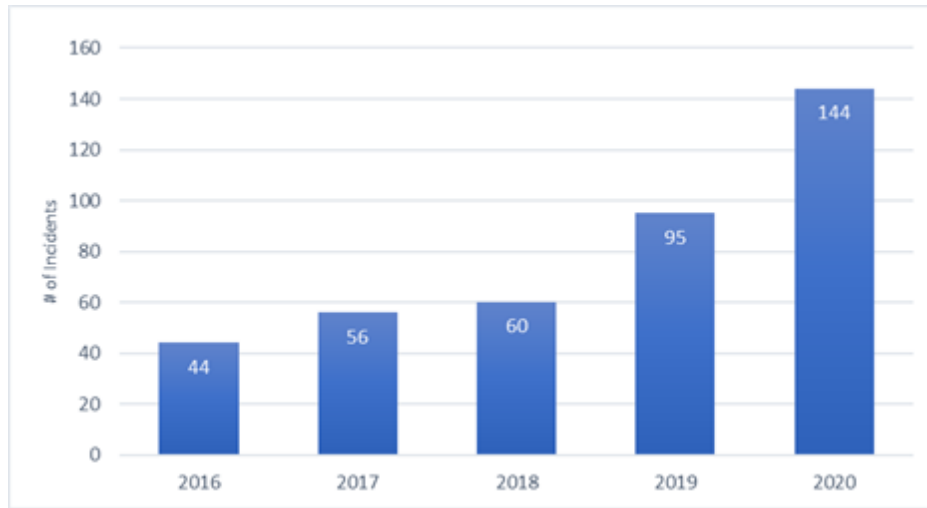
¹⁵ Physical Attack is discussed in more detail in PG&E's 2020 RAMP Report, A.20-06-012 (June 30, 2020), Ch. 20, Attachment A, Section E.

¹⁶ ["Demonstration Trends in the U.S." – Armed Conflict Location & Event Data Project \(ACLED\) \(as of Jun. 15, 2021\).](#)

1 There has been an increase of crime, civil unrest and homelessness
2 leading to incidents at PG&E. In many of the cases, we are
3 experiencing longer response time by local law enforcements when we
4 contact them on various incidents. This has caused additional
5 self-reliant efforts from Corporate Security to keep our people safe and
6 our assets and facilities secured from any potential physical attacks.

7 Like the rest of society, PG&E has contended with the steeply
8 increased emergence of homeless encampments on or immediately
9 affecting PG&E property and facilities. PG&E properties, facilities and
10 infrastructure are spread throughout the Company's service territory and
11 include many areas which are attractive to homeless encampment
12 establishment. Such encampments often directly affect PG&E's ability
13 to deliver gas and electric power. Corporate Security related responses
14 to homeless encampment issues affecting PG&E operations increased
15 by 50 percent from 2019 to 2020 and that trajectory shows no sign of
16 change. See figure 9-10 below for homeless encampment incidents
17 2016-2020. At PG&E, homeless encampment issues have led to
18 additional investigations, use of additional guard services, hazmat
19 cleanups and efforts to harden Company facilities, to the point that costs
20 of mitigating the effects of encampments are becoming a notable part of
21 the Company's security and land management costs.

**FIGURE 9-10
HOMELESS ENCAMPMENT INCIDENTS
(2016-2020)**



PG&E manages the Physical Attack risk in its Corporate Security organization. Activities include assessing and mitigating physical security risks related to employees, contractors, physical assets, facilities, and infrastructure. The Corporate Security organization is responsible for emergency response, incident management and collaborating with local management on physical security vulnerability and mitigations. Physical Attack is included in several risk event bowties.

b. Controls and Mitigations

Physical Attack is a cross-cutting factor. A cross-cutting factor is an item from PG&E's Corporate Risk Register (CRR) that is not a risk event, but impacts other risk events. Physical Attack impacts eighteen risk events.¹⁷ There are eight cross-cutting factors on the CRR.

PG&E has developed its detailed Corporate Security project plan in response to the increased threat landscape. These Corporate Security projects, which are aligned to prevent and detect categories, are designed to mitigate the Physical Attack risk as referenced in the 2020

¹⁷ Exhibit (PG&E-2), Ch. 1, Attachment B, Cross-cutting factor mapping to risk events table.

1 RAMP Report. Prevent mitigation programs¹⁸ are to provide
2 appropriate safeguards to prevent or contain the impact of a physical
3 attack at a PG&E site and/or asset. Detect mitigation programs¹⁹ are
4 activities that identify the occurrence of a potential physical attack risk,
5 enabling timely discovery and reducing potential consequences.

6 One of the mitigation programs PG&E implemented is the Security
7 Defined Protection Levels (SDPL),²⁰ an internally-developed process.
8 Using the SDPL risk framework, Corporate Security has assigned a risk
9 level to approximately 2,000 PG&E facilities. Each risk level
10 corresponds to a standard security package to counter the risk level at
11 each location. Starting with the risk level “elevated” sites, the Corporate
12 Security team will work towards closing any gaps in the security
13 package at that facility.

14 **1) Controls**

15 The Corporate Security organization’s established controls
16 addressing the Physical Attack risk are conducted through key
17 Corporate Security services noted in Section B, Corporate Security
18 Overview. These are the same controls included in the 2020 RAMP
19 Report. These controls span the Prevent and Detect categories.

20 Figure 9-11 shows the forecast costs for controls addressing the
21 Physical Attack risk. Recorded and forecast costs for controls are
22 provided in workpapers.²¹

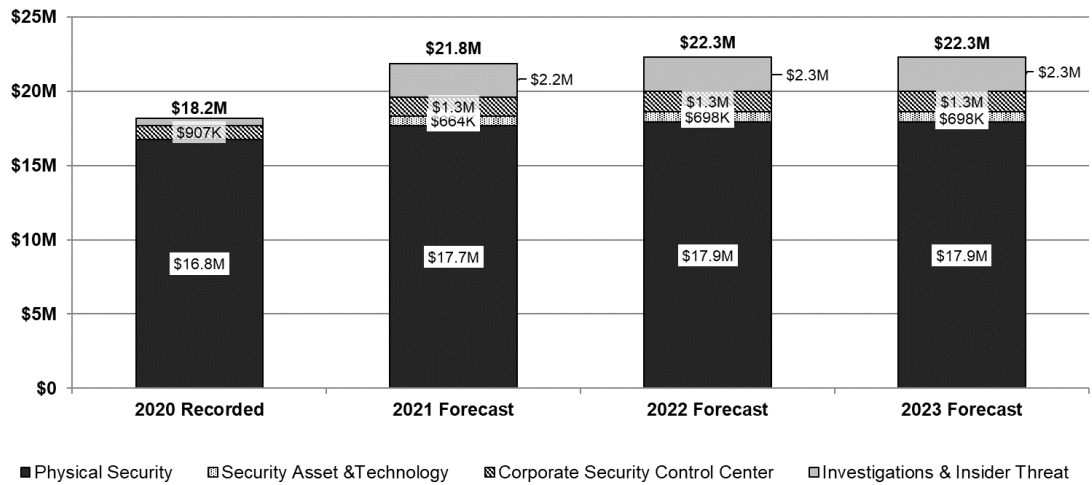
¹⁸ Exhibit (PG&E-7), WP 9-43 for more information on Prevent mitigation programs.

¹⁹ Exhibit (PG&E-7), WP 9-48 for more information on Detect mitigation programs.

²⁰ Exhibit (PG&E-7), WP 9-51 for details on the SDPL risk framework.

²¹ Exhibit (PG&E-7), WP 9-56 for recorded and forecast costs for controls.

FIGURE 9-11
CORPORATE SECURITY CONTROLS EXPENSES
(MILLIONS OF DOLLARS)
(2020-2023)



Note: 2021 Forecast values vary from the values listed in the Standard Workpapers and Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

2) Mitigations

The Physical Attack risk is addressed with the following Corporate Security mitigation programs under the Prevent and Detect domains:

- Physical Security Program (Prevent Domain) – Addresses Physical Attack risk by deploying state of the art proven technologies to prevent attacks at critical and high-risk PG&E facilities. Program objectives are met by implementing technology that address risks of physical attacks. The program will deploy advanced technologies such as ground based radar, anti-drone and gun detection devices, which are some examples on how we are leveraging pivot to technology to be efficient and effective in mitigating risks. In addition, the program will replace antiquated and obsolete technologies throughout PG&E facilities to improve physical security. To improve reliability and reduce availability risks, the program

1 standardizes technologies replacing inconsistent technologies
2 throughout PG&E.

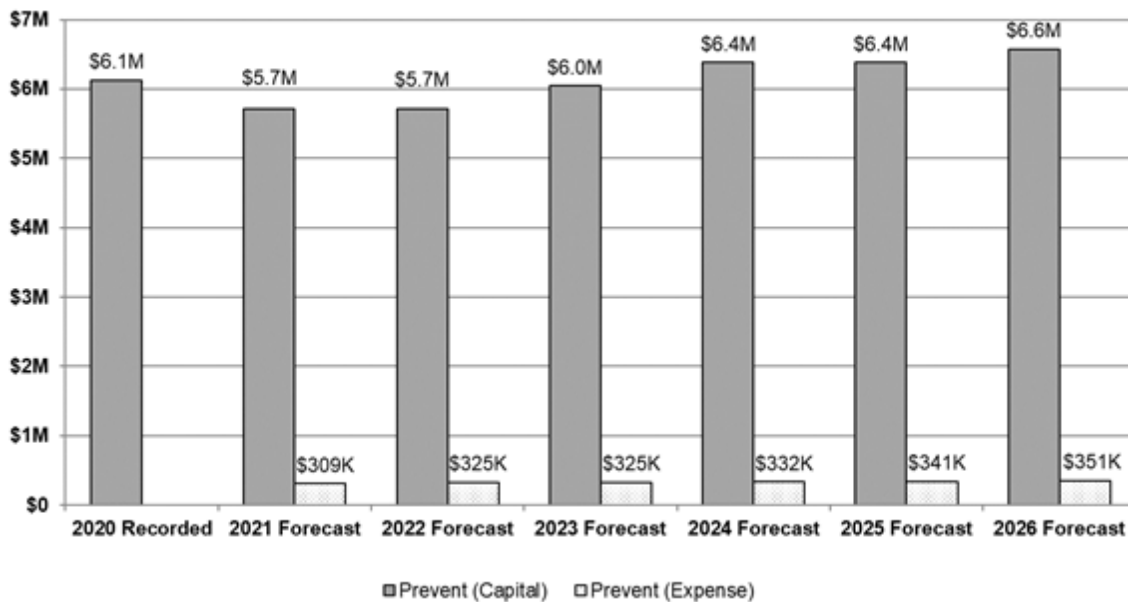
- 3 • Access Program (Prevent Domain) – Addresses Physical Attack
4 risk by preventing unauthorized access to critical or high-risk
5 PG&E facilities. Access controls to high-risk areas is critical to
6 PG&E safety and security. Program objectives are met through
7 technology upgrades and replacement of Corporate Security
8 systems that allow only authorized access to PG&E facilities by
9 replacement of older security systems. Access will be managed
10 by implementing systems that allow authorized access in an
11 efficient manner and preventing unauthorized access.

12 Technologies will be deployed to provide auditable access logs
13 that validate only authorized access is granted.

- 14 • Technology Solution Program (Prevent Domain) – Addresses
15 Physical Attack risk by maintaining security . Benefits include
16 reduced security system downtime and improved PG&E
17 workforce safety and asset security. Program objectives are
18 met by replacing and or upgrading unreliable security equipment
19 in a prudent and timely manner that will increase availability of
20 PG&E security systems. This program ensures critical PG&E
21 facilities are protected.

22 See summary Figure 9-12 for forecast costs addressing the
23 Physical Attack risk in the Prevent Domain.

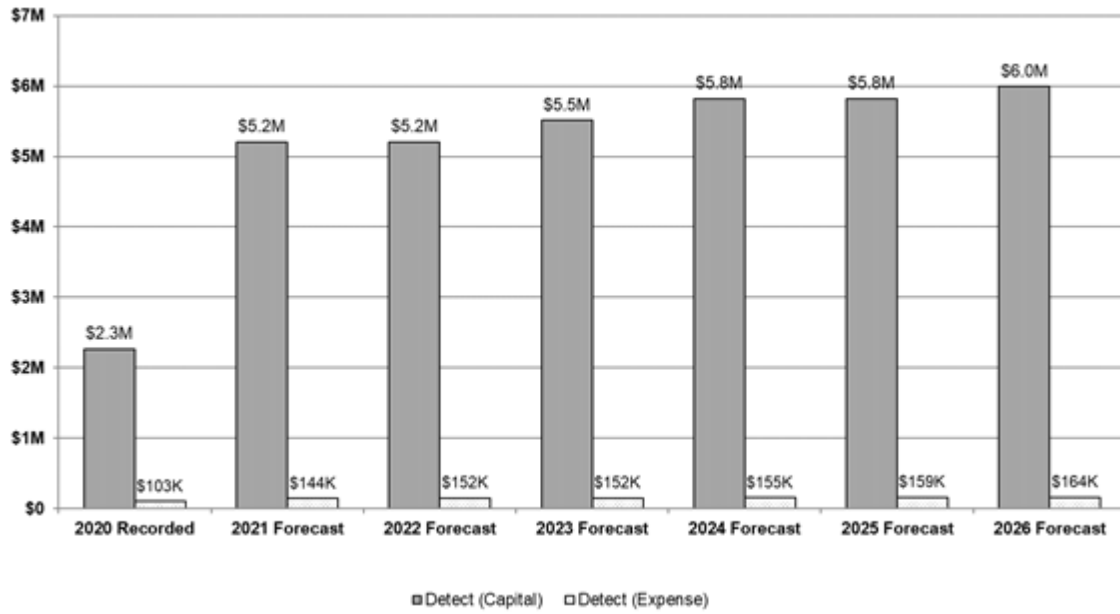
FIGURE 9-12
CORPORATE SECURITY PREVENT CAPITAL AND EXPENSE
(2020-2026)



- Analytics & Mobility Program (Detect Domain)** – Addresses Physical Attack risk by utilizing data and information to detect security threats. The program objective is to provide field security teams with mobile capabilities to evaluate security risks in an effective and efficient manner. Data and information will be analyzed using the latest tools and techniques to assess risks and detect threats to critical and high-risk PG&E facilities.

See summary Figure 9-13 for forecast costs addressing the Physical Attack risk in the Detect Domain.

FIGURE 9-13
CORPORATE SECURITY DETECT CAPITAL AND EXPENSE
(2020-2026)



3) Mitigation and Control Costs

The forecast costs for the Physical Attack mitigations are shown in the tables below.²²

²² Exhibit (PG&E-7), WP 9-55 for the costs for mitigations.

TABLE 9-7
PHYSICAL ATTACK
RECORDED AND FORECAST MITIGATION COSTS 2020-2026 – CAPITAL
(THOUSANDS OF DOLLARS)

Line No.	Mitigation No. (2023 GRC)	Mitigation Name (2023 GRC)	2020 Rec. Adj.	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total
1	PHYSA-M001	Prevent	\$6,125	\$5,709	\$5,709	\$6,045	\$6,380	\$6,380	\$6,572	\$42,920
2	PHYSA-M002	Detect	2,262	5,206	5,206	5,512	5,819	5,819	5,993	35,817
3		Total	\$8,387	\$10,915	\$10,915	\$11,557	\$12,199	\$12,199	\$12,565	\$78,737

TABLE 9-8
PHYSICAL ATTACK
RECORDED AND FORECAST MITIGATION COSTS 2020-2023 – EXPENSE
(THOUSANDS OF DOLLARS)

Line No.	Mitigation No. (2023 GRC)	Mitigation Name (2023 GRC)	2020 Rec. Adj.	2021 Forecast	2022 Forecast	2023 Forecast	Total
1	PHYSA-M001	Prevent	–	\$309	\$325	\$325	\$959
2	PHYSA-M002	Detect	\$103	144	152	152	551
3		Total	\$103	\$453	\$477	\$477	\$1,510

c. Risk Spend Efficiency

As mentioned above in the Cybersecurity (Section B2.b) section, RSE analysis was conducted at high level to determine the efficiency of the programs being deployed and implemented. The use of the RSE enables PG&E to understand how effective each program is at reducing risks, over what part of the system, and for how long. Corporate Security used two mitigations, Prevent and Detect, to understand the frequency reduction and the impact reduction of associated effectiveness.

**TABLE 9-9
PHYSICAL ATTACK
COMPARING MITIGATIONS RSEs IN THE 2020 RAMP AND 2023 GRC**

Line No.	Mitigation No.	Mitigation Name (2023 GRC)	2020 RAMP RSE	2023-2026 GRC RSE
1	PHYSA-M001	Prevent		0.008
2	PHYSA-M002	Detect		0.002
3		Aggregated	<0.01	0.005

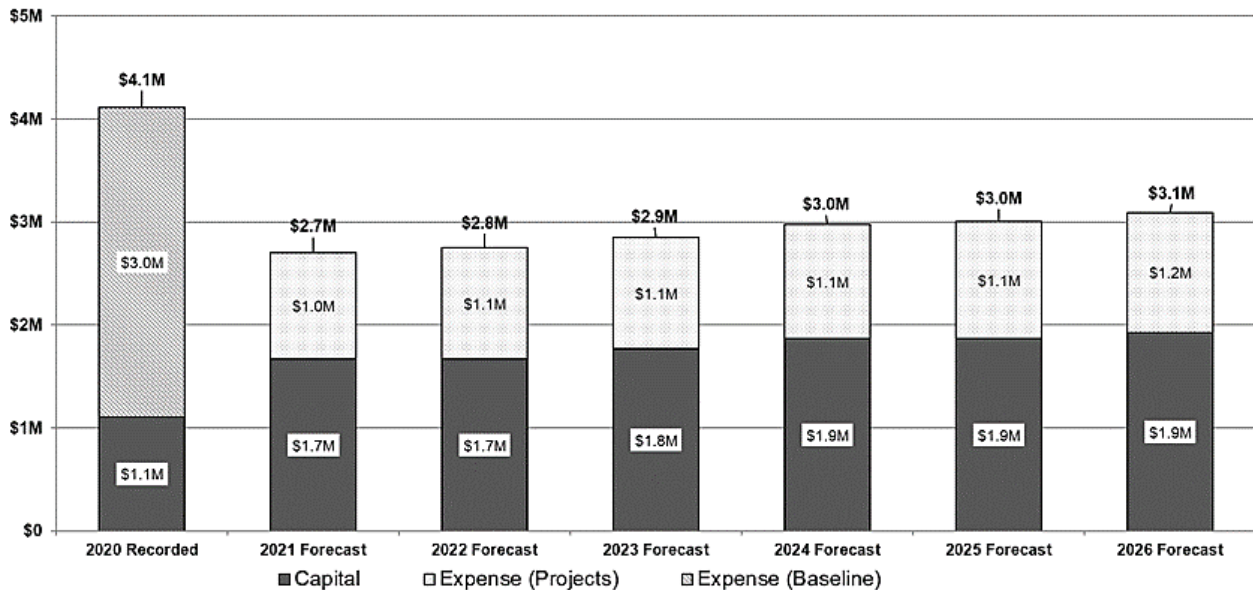
Response to Safety Policy Division's (SPD) General Comments

PG&E described Corporate Security and Cybersecurity programs and strategy in its RAMP Report. PG&E has not made any changes to the programs or strategies due to the SPD Report comments and or request.

5. Other Corporate Security Risks

Corporate Security also has programs and projects to address risks are not on the CRR. These include managing ongoing operations and inspections to ensure Corporate Security system operability and replacing inadequate defense technologies with next generation tools. Technology break-fix repair and replacements are an example of the continuous maintenance required for the security technology to be functional. There was a decrease from recorded 2020 cost and 2021-2026 forecast costs, which was due to cost allocations to more RAMP related programs and projects. Figure 9-14 displays Corporate Security non-RAMP capital and expense costs for 2020-2026.

FIGURE 9-14
CORPORATE SECURITY NON-RAMP CAPITAL AND EXPENSE
(2020-2026)



a. Insider Threat Risk

The Insider Threat risk, which was first introduced in the 2017 RAMP and positioned as a control of Cyber Attack in the 2020 RAMP, is addressed with the following Corporate Security mitigations and controls:

1) Controls

The Corporate Security organization's established controls addressing the Insider Threat risk are conducted through key Corporate Security services noted in Section B, Corporate Security Overview. These controls are within the Detect Domain.

2) Mitigations

The Insider Threat risk is addressed by the following Corporate Security mitigations:

- Insider Threat (Detect Domain) – Addresses Insider Threat risk with benefits of advanced detection, heightened awareness, and more effective response to internal threats (such as workplace violence, sabotage, and fraud). Program objectives are met by establishing processes and technical capabilities allowing detection of anomalous, or non-typical, PG&E workforce

behavior, enabling advanced identification and mitigation of insider threat risk to PG&E's workforce and assets (all done under the guidance of a strict governance model). The program will proactively identify insider threat risks and assist Corporate Security and Cybersecurity threat specialists in prioritizing investigative and response activities.

C. Activities, Costs, and Forecast Drivers by MWC

1. Expense MWCs

The MWCs below are used for all Security forecast expense work and are defined as follows:

- MWC JV – Maintain IT Applications and Infrastructure includes costs for ongoing maintenance, operations and repair for PG&Es IT applications, systems, and infrastructure.
- MWC OM – Operational Management includes labor and employee related costs to provide supervision and management support. MWC OM also includes costs incurred by the administration staff working for the Supervisors/Managers.
- MWC KZ – Provision for Risk and Security Services includes support for Corporate Security, risk management, internal audit, and insurance functions. Work is primarily Corporate Security expense costs. Corporate Security includes guard services, investigations and investigators, executive protection, access control, physical security testing, video monitoring our security facilities, and fixing broken security equipment.

Forecast drivers for these expense MWCs are as follows:

- Escalation – Costs for labor and non-labor are calculated using the standard methodology for escalation. Security's labor costs include end-user labor services with a slight increase in headcount forecasted. Security's non-labor costs include end-user non-labor services and contracts;
- Incremental O&M – 2020 and 2023 O&M increases are due to existing project implementation costs (e.g., contracts, vendor support);

- Security Mitigations – Forecast Security mitigation expense costs for 2023 remain consistent in comparison to 2020 recorded costs. Security control and mitigation expenses are detailed in Section C, Risk Overview Analysis, Mitigations and Controls, and Section B, Cost Tables;
- Baseline – Operating expense cost remain relatively consistent between 2020 and 2023 with a slight headcount increase. Talent constraints continue in the highly competitive Security industry, which increases PG&E's costs to employ quality security professionals; and
- Cost Savings Initiatives – Corporate Security is leveraging pivot to technology where possible in order to reduce cost such as reduction of guard services.

2. Capital MWCs

The MWCs below are used for all Security forecast capital work and is defined as follows:

- MWC 2F – Build IT Applications and Infrastructure- includes the costs to design, develop and enhance applications, systems, and infrastructure technology solutions.
- MWC 3N – Security Install/Replace- includes the costs to design, build, install and replace Corporate Security assets.

Forecast drivers for these capital MWCs are as follows:

- 2020 – In 2020, as an optimization effort, Corporate Security reprioritized equipment that was previously capitalized to better align with long-term investment strategy.
- 2021-2026 – For the 2021-2026 period, Corporate Security forecasts Security mitigations including tools to enhance capabilities in support of Cybersecurity and Corporate Security programs. Security mitigation are detailed above.

D. Estimating Method

Cybersecurity and Corporate Security used an estimating methodology to document assumptions and generate labor and non-labor cost forecasts for mitigations. Cybersecurity and Corporate Security's expense and capital

1 estimating methods are based upon several factors, such as examining
2 historical information, subject matter expertise, new strategic initiatives, and
3 resource planning. Cybersecurity and Corporate Security's forecast within this
4 chapter for 2021 through 2026 is based on 2020 historical spend patterns
5 associated with the following:

- 6 • Cybersecurity – Identify, Protect, Detect, and Respond domains
- 7 • Corporate Security – Prevent, Detect and Non-RAMP Mitigations

8 Both Cybersecurity and Corporate Security project job estimates are
9 prepared by internal resources. For smaller projects external vendors may
10 provide cost estimate quotes as supporting documentation. We continue to
11 invest in Cybersecurity and Corporate Security technology resources, which are
12 based upon current market quotes and conditions. This forecast addresses
13 operations and maintenance costs, lifecycle of existing end of life technology,
14 and new technological enhancements that are in alignment to Cybersecurity and
15 Corporate Security long term investment strategies.

16 **E. Cost Tables**

17 The capital expenditure and expense forecasts for Cybersecurity and
18 Corporate Security are summarized in the tables below.

**TABLE 9-10
CYBERSECURITY
EXPENSES BY MWC
(THOUSANDS OF NOMINAL DOLLARS)**

Line No.	MWC	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference (A)
1	JV	Maintain IT Apps & Infra	20,501	25,079	28,492	29,902	29,085	28,678	30,284	32,284	
2	LJ	Prov Corp Affairs Svcs	12								
3	OM	Operational Management	644	1,306	1,398	246					
4	Total		21,157	26,385	29,890	30,148	29,085	28,678	30,284	32,284	

Note: Line 1 2021 Forecast values vary from the values listed in the Standard Workpapers and Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

**TABLE 9-11
CORPORATE SECURITY
EXPENSES BY MWC
(THOUSANDS OF NOMINAL DOLLARS)**

Line No.	MWC	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference (A)
1	KZ	Prov Risk/Security Svcs	12,767	18,522	21,618	22,099	21,289	23,322	23,858	23,869	
2	Total		12,767	18,522	21,618	22,099	21,289	23,322	23,858	23,869	

Note: Line 1 2021 Forecast values vary from the values listed in the Standard Workpapers and Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

**TABLE 9-12
CYBERSECURITY
CAPITAL EXPENDITURES BY MWC
(THOUSANDS OF NOMINAL DOLLARS)**

No.	MWC	MWC Description	2016 Recorded		2017 Recorded		2018 Recorded		2019 Recorded		2020 Recorded		2021 Forecast		2022 Forecast		2023 Forecast		2024 Forecast		2025 Forecast		2026 Forecast	
			Adjusted		Adjusted		Adjusted		Adjusted		Adjusted													
1	2F	Build IT Apps & Infra	17,008		25,855		21,269		20,230		27,278		29,285		29,285		29,285		29,785		30,475		31,384	
2		Grand Total	17,008		25,855		21,269		20,230		27,278		29,285		29,285		29,785		30,475		31,384		32,548	

**TABLE 9-13
CORPORATE SECURITY
CAPITAL EXPENDITURES BY MWC
(THOUSANDS OF NOMINAL DOLLARS)**

No.	MWC	MWC Description	2016 Recorded		2017 Recorded		2018 Recorded		2019 Recorded		2020 Recorded		2021 Forecast		2022 Forecast		2023 Forecast		2024 Forecast		2025 Forecast		2026 Forecast	
			Adjusted		Adjusted		Adjusted		Adjusted		Adjusted													
1	3N	Security/Install/Replace	8,797		8,596		11,299		4,541		9,494		12,585		12,585		13,326		14,066		14,066		14,488	
2		Grand Total	8,797		8,596		11,299		4,541		9,494		12,585		12,585		13,326		14,066		14,066		14,488	

(PG&E-7)

PACIFIC GAS AND ELECTRIC COMPANY 2023 GENERAL RATE CASE

Testimony X Workpapers SOQ

Exhibit Number: PGE 07 Chapter Number: 9

Chapter Title: Cyber and Corporate Security

Witness Name: Martin Strasburger and James Murphy

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of November 5, 2021				
9-14	Footnote 5	Corrected footnote reference.	Exhibit (PG&E7), WP 44, for more information on the Cybersecurity Risk Bowtie.	Exhibit (PG&E-7), WP 9-57, for more information on the Cybersecurity Risk Bowtie.
9-15	Footnote 6	Corrected footnote reference.	Exhibit (PG&E-7), WP 44, for more information on the Cybersecurity Risk Bowtie.	Exhibit (PG&E-7), WP 9-57, for more information on the Cybersecurity Risk Bowtie.
9-16	Footnote 7	Corrected footnote reference.	See Exhibit (PG&E-7) WP 9-41.	See Exhibit (PG&E-7) WP 9-54.
9-17	Footnote 8	Corrected footnote reference.	Exhibit (PG&E-7), WP 9-33, WP 9-34, WP 9-35, WP 9-36 for a list of projects aligned to each mitigation.	Exhibit (PG&E-7), WP 9-33, WP 9-35, WP 9-38, WP 9-41 for a list of projects aligned to each mitigation.
9-17	Footnote 9	Corrected footnote reference.	See Exhibit (PG&E-7), WP 9-40.	See Exhibit (PG&E-7), WP 9-53.
9-21	Footnote 13	Corrected footnote reference.	Exhibit (PG&E7), WP 44, for more information on the Cybersecurity Risk Bowtie.	Exhibit (PG&E-7), WP 9-57, for more information on the Cybersecurity Risk Bowtie.
9-22	Footnote 14	Corrected footnote reference.	See Exhibit (PG&E-7), WP 9-33, WP 9-34, WP 9-35, WP 9-36.	See Exhibit (PG&E-7), WP 9-33, WP 9-35, WP 9-38, WP 9-41.
9-26	Footnote 18	Corrected footnote reference.	Exhibit (PG&E-7), WP 9-37 for more information on Prevent mitigation programs.	Exhibit (PG&E-7), WP 9-43 for more information on Prevent mitigation programs.

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of November 5, 2021				
9-26	Footnote 19	Corrected footnote reference.	Exhibit (PG&E-7), WP 9-38 for more information on Detect mitigation programs.	Exhibit (PG&E-7), WP 9-48 for more information on Detect mitigation programs.
9-26	Footnote 20	Corrected footnote reference.	Exhibit (PG&E-7), WP 9-39 for more information on SDPL risk framework.	Exhibit (PG&E-7), WP 9-51 for more information on SDPL risk framework.
9-26	Footnote 21	Corrected footnote reference.	Exhibit (PG&E-7), WP 9-43 for recorded and forecast costs for controls.	Exhibit (PG&E-7), WP 9-56 for recorded and forecast costs for controls.
9-30	Footnote 22	Corrected footnote reference.	Exhibit (PG&E-7), WP 9-42 for the costs for mitigations.	Exhibit (PG&E-7), WP 9-55 for the costs for mitigations.
9-32, Table 9-9	1	RSE scores for mitigation PHYSA M001	0.104	0.008
9-32, Table 9-9	2	RSE scores for mitigation PHYSA-M002	0.005	0.002
9-32, Table 9-9	3	RSE scores for mitigation Aggregated	0.061	0.005

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 10
GEOSCIENCES
[INCLUDES ERRATA THROUGH
FEBRUARY 28, 2022]

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 10
GEOSCIENCES

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 10
GEOSCIENCES

A. Introduction

1. Scope and Purpose

The purpose of this chapter is to demonstrate that Pacific Gas and Electric Company's (PG&E or the Company) expense forecast for the Geosciences Department is reasonable and should be adopted by the California Public Utilities Commission (Commission).

Geosciences is responsible for managing PG&E's Seismic Program, which is comprised of the Diablo Canyon Power Plant (DCPP) Long-Term Seismic Program (LTSP) and the Integrated Seismic Risk Management Program (ISRMP).

Consistent with the 2020 General Rate Case (GRC), Geosciences continues to use a chargeback method to allocate operating expenditures to all PG&E Lines of Business (LOBs). Chargeback costs for Geosciences are included in each LOB forecast and are not requested in this chapter. Information about Geosciences chargeback costs are referenced in this chapter's cost tables, where applicable, for the Commission's information only. Presenting Geosciences as a separate chapter in this GRC reflects the broadening of the department's scope of responsibility from one focused primarily on DCPP Long-Term Seismic issues to an Enterprise-wide seismic safety program.

2. Summary of Request

PG&E requests that the Commission adopt its 2023 expense forecast of \$5.3 million for Geosciences. Recorded expenses in 2020 for Geosciences were \$5.5 million. While PG&E's 2023 expense forecast represents a 5.0 percent decrease from 2020 recorded costs, future budgets will increase due to escalation.

Details about the activities, costs, and drivers for these forecasts are provided in Section C below.

3. Deferred Work Review

Section 5.2 of the 2020 GRC Settlement Agreement requires PG&E to make an additional showing in its 2023 GRC testimony for work that was previously requested and authorized based on representations that the work was needed to provide safe and reliable service.

In the 2020 GRC, Geosciences did not request or receive authorized funding for any work (1) identified as safety, reliability, or maintenance (Supplier Relationship Management)-related in the 2020 Risk Spending Accountability Report or (2) based on representations in testimony and work papers that the work was needed to provide safe and reliable service.

4. Overview of Recorded and Forecast Costs

a. Expense

Table 10-1 summarizes 2020 recorded Geosciences Operations & Maintenance (O&M) expenses and PG&E's forecast for 2021-2023.

TABLE 10-1
OPERATIONS AND MAINTENANCE EXPENSE
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	Description	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast
1	Expense	\$5,554	\$5,010	\$5,135	\$5,274
2	Total O&M Expense	\$5,554	\$5,010	\$5,135	\$5,274

The Geosciences expense forecast is based on:

- 1) Historic spend for the LTSP, which has been primarily funded to-date through the Energy Supply (DCPP) function (2020 base year is \$3.9 million); and
- 2) Additional line of business (LOB) funding for the ISRMP (2020 base year is \$1.7 million).

5. Support for Request

Geosciences' expense request is reasonable and should be adopted by the Commission. The work conducted by Geosciences to evaluate seismic hazard and risk across the Company is critical to public and worker safety.

6. Organization of the Remainder of This Chapter

The remainder of this chapter is organized as follows:

- Section B – Program and Risk Overview;
- Section C – Activities, Costs, and Forecast Drivers by Major Work Category (MWC);
- Section D – Estimating Method; and
- Section E – Cost Tables.

B. Program and Risk Overview

1. Program Description

The 2020 Risk Assessment Mitigation Phase (RAMP) Report constitutes the initial phase of PG&E's 2023 GRC.¹ In the RAMP Report PG&E identifies and describes its top safety risks including the understanding, analysis, quantification, and mitigation of risk. Geosciences' activities are recognized in PG&E's 2020 RAMP proceeding as a cross-cutting factor. A cross-cutting factor is a risk driver, control or mitigation that impacts multiple risk events but is not itself a risk event. These factors contribute to risk model inputs related to consequences and frequencies. The Geosciences Department does not "own" the resulting risk calculated by the models, but rather provides the basic hazard information that supports risk assessment and identification of mitigation activities through the RAMP, GRC and other LOB-focused programs.² The Geosciences cross-cutting factors can be considered "foundational" which defines activities or programs that do not have a stand-alone risk mitigation effect but enable multiple mitigations. These elements can be thought of as initial work needed to implement future mitigations. Because foundational activities generally do not directly reduce risk they do not have associated risk spend efficiency scores. The following sections summarize these activities.

¹ Application 20-06-012.

² See PG&E 2020 RAMP Report, A.20-06-012 (June 30, 2020) Ch. 20, Attachment A, Section G for a detailed discussion of these programs.

1 **a. Program Overview**

2 **1) LTSP**

3 The LTSP was established in 1984 to support licensing and
4 operation of DCP, in response to United States Nuclear Regulatory
5 Commission (USNRC) Facility License Condition DPR-80 that
6 required PG&E to develop and implement a program to update the
7 evaluation of the seismic design bases of the DCP.

8 Following the success of the LTSP in satisfying the USNRC's
9 licensing requirements for DCP in 1991, PG&E made a
10 commitment to continue LTSP activities for the life of the plant.³
11 These activities included: (1) maintaining a LTSP staff of
12 geoscience and engineering experts to keep abreast of new
13 geological, geophysical, seismological, and seismic engineering
14 information that might apply to Diablo Canyon; and (2) operation of
15 a strong-motion accelerometer array and coastal seismic network
16 (Central Coastal Seismic Network). These commitments are
17 documented in the DCP Final Safety Analysis Report Section 2.5,
18 Geology and Seismology.⁴

19 A comprehensive reevaluation of seismic and tsunami hazards
20 at DCP was conducted during the 2010 to 2015 period in response
21 to recommendations from the California Energy Commission (CEC)
22 related to Assembly Bill (AB) 1632⁵ and data requests from the
23 USNRC⁶ following the 2011 Fukushima, Japan accident. Both the
24 CEC AB 1632 and USNRC Senior Seismic Hazard Analysis
25 Committee (SSHAC) studies have reinforced the value of the LTSP
26 as part of the current and future operations of DCP. The AB 1632
27 studies were submitted to the Commission's Independent Peer
28 Review Panel (IPRP) and the USNRC in September 2014.⁷ The

3 PG&E Letter DCL-91-091.

4 DCP FSAR, Rev 19, Section 2.5.1.2.5.

5 CEC 100-2008-009-CMF.

6 USNRC, Letter 50.54(f).

7 PG&E, Central Coastal California Seismic Imaging Project Report.

SSHAC studies were submitted to the USNRC in March 2015 and have been recognized by the USNRC as being suitable for use in other seismic assessments specified in their data request.⁸

Although initially focused on seismic hazard at DCP, LTSP activities are recognized as being applicable across the entire PG&E service territory. Improvements in earthquake source and ground motion models are relevant across all LOB and support informed decision making.

2) ISRMP

The Geosciences ISRMP was initiated in 2019 to integrate seismic risk activities and implement consistent risk quantification across the company LOB. Initial progress made in the ISRMP supported the 2020 RAMP process through a more consistent assessment of seismic hazard and risk across all LOB. Key aspects of the ISRMP include standardization of hazard characterization, development and integration of system fragility models, and integration of hazard and fragility with system models to estimate seismic performance/risk. PG&E did not receive feedback from outside parties or Summary Plan Description on the seismic elements of the RAMP report.

Going forward, the ISRMP will continue to develop, analyze, and refine PG&E-specific seismic hazard and risk data. This supports the transition from the use of Subject Matter Experts and industry data to the use of both historic and model-driven analysis based on PG&E-specific data.

Key elements of the ISRMP include:

- Seismic source characterization and regional geology;
- Site specific and distributed system ground motion models;
- Ground failures such as landslide, liquefaction, and fault crossings;
- Asset health as an input to more accurately quantify seismic risk;

⁸ USNRC, 2016.

- Development of asset earthquake fragilities and damage models; and
- Integration of hazard and fragility information into seismic risk models.

As its first priority, Geosciences focused its seismic risk evaluation efforts in the San Francisco Bay Area (SFBA) for electric, gas and real estate (facilities) assets during the 2020 RAMP and 2023 GRC periods. ISRMP used various tools to analyze the network seismic risk of geographically distributed electric and gas assets. Seismic risk analyses for gas and electric assets were based on three scenarios including the M 7 HayWired scenario for the Hayward Fault in the East Bay;⁹ a M 7.2 San Andreas Fault scenario that extends through the San Francisco Peninsula; and a M 7 Rogers Creek Fault scenario that extends from the Bay through Santa Rosa.

b. Management Structure

Geosciences has a staff of 18 employees and is led by a Director who reports to a Vice President in the Business and Technical Services Division of Generation. Geosciences provides risk-based seismic engineering, geologic, geophysical, and geotechnical services that support the safe and reliable operation of PG&E assets across all LOB. Geoscience costs are typically recovered through chargebacks to the LOB. In other words, when Geosciences performs work for the electric distribution function, its costs are charged directly to that function. In addition to internal staff, Geosciences uses contractors to execute planned work.

Geosciences has successfully developed “user-driven” partnerships or collaborations with the United States Geological Survey (USGS), as well as national laboratories, industry working groups, and leading academic institutions such as the Southern California Earthquake Center and the Pacific Earthquake Engineering Research Center at the

⁹ United States Geological Survey (USGS) Scientific Investigations Report 2017-5013-A-H.

University of California, Berkeley to keep abreast of current geological, geophysical and engineering research of direct interest and impact to PG&E. These collaborations allow PG&E to update Enterprise hazard damage & risk models by continually integrating new information, technologies, and interpretations.

Geosciences programs support risk-informed decision making throughout PG&E. Examples include the Gas Transmission Geohazards Control Program,¹⁰ the Hydro Geoscience Engineering and Risk Research Program,¹¹ the CRESS Seismic Risk Ranking and Reduction Programs,¹² as well as cross cutting activities in Emergency Preparedness and Response (EP&R) to improve situational awareness and response.¹³

c. Risk Modeling Update

Seismic hazards are identified as a significant cross cutting risk driver for both RAMP and non-RAMP events and are included in several risk bowties.¹⁴ The 2020 RAMP evaluations illustrated how seismic events can impact the likelihood or consequences of 7 out of the top 12 risks listed on the Corporate Risk Register and contribute 10 percent to 99 percent of the overall risk for various LOB scores in the RAMP.

These earthquake-related risks include:

- Real Estate and Facilities Failures;
- Large Uncontrolled Water Release (Dam Failure);
- Loss of Containment on Gas Distribution Main or Service Line;
- Loss of Containment on Gas Transmission Pipeline;
- Failure of Electric Distribution Overhead Assets;

¹⁰ See PG&E 2020 RAMP Report, A.20-06-012 (June 30, 2020), Ch. 7 for a discussion of this program.

¹¹ See PG&E 2020 RAMP Report, A.20-06-012 (June 30, 2020), Ch. 13 for a discussion of this program.

¹² See PG&E 2020 RAMP Report, A.20-06-012 (June 30, 2020), Ch. 14 for a discussion of these programs.

¹³ See PG&E 2020 RAMP Report, A.20-06-012 (June 30, 2020), Ch. 20, Attachment A, Section C for a discussion of these programs.

¹⁴ See Exhibit (PGE-2) Ch. 1, Attachment B, Table 1-2 for a mapping of the cross-cutting factors to risk events.

- Failure of Electric Distribution Network Assets; and
- Wildfire.

The 2020 RAMP focused on seismic risk in the greater SFBA, a region within the PG&E service territory that has the highest seismic risk based on seismic exposure and high density of infrastructure within a highly populated region. A large earthquake in the SFBA represents a cross-cutting risk event as damages from a single event can extend over a large geographic region and impact facilities in all company LOBs. PG&E's 2020 RAMP testimony describes the seismic cross cutting risk and Geosciences foundational seismic program to evaluate this risk and develop input for evaluation of LOB risk drivers and consequences.¹⁵ Descriptions of the seismic element specific to each RAMP risk, and proposed mitigations, are discussed in the respective chapters of the testimony.

In addition to directly supporting the Company's RAMP, the Geosciences Seismic Program supports evaluation of seismic hazard and risk across the Enterprise. PG&E seismic instruments monitor earthquake activity and collect seismic engineering data useful to the development of seismic risk models that inform the following programs and efforts:

- LTSP – DCCP program which is an operating license commitment for monitoring seismicity and keeping abreast of the science as due diligence;
- ISRMP – Enterprise-wide program to standardize and support seismic risk evaluations including RAMP and non-RAMP Enterprise Risk, and LOB risk assessment outside of RAMP; and
- Power Generation Dam Safety Seismic Program –Seismic hazard characterization for PG&E's dam portfolio.

Geosciences programs also support EP&R activities included in RAMP by providing situational awareness and initial emergency response/inspection tools before and after an earthquake.

¹⁵ See PG&E 2020 RAMP Report, A.20-06-012 (June 30, 2020), Ch. 20, Attachment A, Section G for a detailed discussion of these programs.

- Earthquake Early Warning (EEW) – The real-time warning of earthquakes and initial alarms is a life-safety control technology listed for the EP&R cross-cutting RAMP risk.¹⁶

Post-earthquake inspection and response activities are informed by:

- Dynamic Automated Seismic Hazard (DASH) – Earthquake messaging and initial emergency response and restoration prioritization system which is a technology control listed for the EP&R crosscutting RAMP risk.¹⁷

For the RAMP and Enterprise non-RAMP seismic risk models, Geosciences works closely with the Enterprise and Operational Risk Management group which facilitates interactions with LOB risk managers and integration into the multi-hazard risk calculations. Previous seismic evaluations across the Company were independently performed by both Geosciences and the LOBs using different approaches.

The Geosciences Seismic Program integrates seismic activities with the goal to standardize approaches and progressively improve quantification of seismic risk across all LOBs. The Geosciences ISRMP was developed in 2019 specifically to achieve LOB seismic analyses integration and risk quantification, applying and leveraging the seismic expertise and advances from the LTSP and other Geosciences activities. Centralization of these various seismic programs under the GRC permits better control and planning of activities, and will establish a reliable funding source for the program which currently is dependent on LOB contributions which have not been coordinated or specifically identified for supporting these seismic activities.

¹⁶ See PG&E 2020 RAMP Report, A.20-06-012 (June 30, 2020), Ch. 20, Attachment A, Section C and G; and Exhibit (PGE-4) Ch. 5 for a detailed discussion of these programs.

¹⁷ See PG&E 2020 RAMP Report, A.20-06-012 (June 30, 2020), Ch. 20, Attachment A, Section C and G; and Exhibit (PGE-4) Ch. 5 for a detailed discussion of these programs.

d. Key Metrics and Other Performance Measures

Geosciences is responsible for the development of metrics to monitor the cross-cutting seismic risks proposed in the 2020 RAMP.

One of these metrics is the Seismic Cross Cutter Score which integrates the seismic mitigation component of the RAMP with an analytical Risk Maturity Score (RMS) for each LOB. The RMS tracks the maturity or level of detail for each LOB risk assessment in terms of their characterization of the

- Source (seismicity);
- Hazard (calculation of seismic demands);
- Asset Performance (asset fragility and response to seismic demand);
- Risk Evaluation (methodology, e.g., site specific, network-based); and
- Asset Coverage (number and type of PG&E assets considered in the risk evaluation).

2. Risk Controls and Mitigations

PG&E considers Geoscience-informed risk platforms such as DASH and EEW to be foundational because they support other controls and mitigations rather than directly mitigating risk themselves. These programs improve earthquake preparedness, resiliency, and response capability by using early warning technology.¹⁸

The following describes Geosciences activities during the period 2020-2023 that focus on the continued Geoscience-informed foundational risk controls and mitigations development of basic seismic hazard and risk information to inform enterprise risk assessment and mitigation activities through the RAMP and other LOB-focused programs.

As DCPD approaches decommissioning during this period, Geosciences' focus will shift from DCPD to the SFBA and the wider PG&E service territory in support of the RAMP. For the 2023 GRC, PG&E proposes that LTSP and ISRMP be integrated into a single program that

¹⁸ Exhibit (PG&E-4), Ch. 5.

1 supports enterprise risk assessment and mitigation activities through the
2 RAMP and LOB-focused programs.

3 **a. Planned Work**

4 **1) ISRMP**

5 During the 2020 RAMP period, Geosciences focused its seismic
6 risk evaluation efforts in the SFBA for electric, gas, and real estate
7 (facilities) assets. Geosciences worked with LOB asset owners and
8 risk managers to develop the means to consistently quantify seismic
9 risk and to inform risk mitigations tailored to those LOB assets. The
10 ISRMP developed and maintained seismic risk quantifications by
11 focusing on the following key elements in the RAMP Risk Maturity
12 Score:

- 13 • **Source** (seismic source characterization, including regional
14 geology and ground failures such as landslides, liquefaction,
15 and surface fault rupture) – Develop a unified SFBA earthquake
16 source model to provide consistent hazard estimates.
- 17 • **Hazard** (site specific and distributed system ground motion
18 models) – Improve ground motion and fault displacement
19 models to incorporate site- or location-specific information.
- 20 • **Asset Performance** (input to more accurately quantify seismic
21 risk) – For the 2020 RAMP, the ISRMP integrated all Electric
22 and Gas transmission and distribution networks into a common
23 network-based loss estimation/risk evaluation model – System
24 Earthquake Risk Assessment (SERA). SERA is a commercial
25 platform that has been modified for PG&E's applications to
26 evaluate the geographically distributed electric and gas linear
27 assets. SERA is used by utilities across the western United
28 States and Canada, helping to standardize seismic risk
29 analyses. The SERA model includes fragilities for individual
30 system components and allows evaluation of predicted damage
31 from scenario earthquake events that are simulated and
32 calibrated by historical performance data. Geosciences will
33 continue to update and refine the information used in SERA to

address uncertainties in modeling results based on actual earthquake experience, research, and collaborations with leading academic and government agencies, including the CEC through their Natural Gas Infrastructure Seismic Risk Program. This continual improvement process will lead to more granular system performance modeling to better estimate damages from future earthquakes.

- **Risk Evaluation** – In addition to system risk damage tools such as SERA, Geosciences has also developed a proprietary earthquake response tool – DASH. The DASH tool analyzes seismic data and ground shaking maps from the USGS (Shake Map) to evaluate and notify potential system impacts within a 15-to 30-minute timeframe after an earthquake. The DASH tool compares ground shaking maps against simplified damage models specific to each LOB and produces reports of potential damage that the LOB and EOC can use to prioritize inspection and response activities.¹⁹
- **Asset Coverage** – Continue to refine the inventory of PG&E-specific assets along with fragility and other location-specific information.

2) LTSP

LTSP related activities in 2020-2023 are focused on continued earthquake and geodetic monitoring of the DCPD area (Source Characterization), additional ground motion studies (Ground Motion Characterization), and technical management. Additional geologic/geophysical field studies will be conducted as needed. PG&E will continue to publish key study results as well as support the development of community databases to archive earthquake and geodetic data (e.g., Global Positioning System velocities, earthquake waveforms and other parametric data) for use by the seismological and earthquake engineering communities.

¹⁹ Exhibit (PG&E-4) Ch. 5 and Exhibit (PG&E-7) WP 10-1.

b. Interface with LOB Risk Management Teams

Seismic risk assessment is a collaborative process between Geosciences and the LOB risk and asset management teams. Hazard models are developed by the Geosciences team that integrate geologic, seismological and earthquake engineering information, and integrated with damage (fragility) models for LOB assets. The models are run using various earthquake scenarios and the results are discussed with LOB risk teams which then identify potential mitigations and RSE scores.

Including the Geosciences Department as a separate chapter in the Shared Services exhibit reflects the broadening of the Geosciences' seismic work from a DCPD-focused program towards an Enterprise-wide seismic safety program. Seismic influences the baseline risk for sixteen of the risk events on the Corporate Risk Register. In certain risk models, risk has been quantified such that the contribution of Seismic to the risk can be distinguished while in others, Seismic influences the baseline risk, but risk from it has not been explicitly quantified. Exhibit (PG&E-2), Chapter 1, Attachment B includes a table mapping the cross-cutting factors to the risk events. Specific funding identified for the Geosciences seismic programs in the GRC permits this work to continue.

C. Activities, Costs, and Forecast Drivers by MWC

Table 10-02 lists the planning orders and dollar amounts that are included in the GRC forecast. The associated MWCs for each of the planning orders are detailed in each of the LOB. In all cases, the explanation for the cost changes of the Geosciences related planning orders is the same.

The Geosciences GRC forecast is primarily expense-related funding. Expense activities include:

- Maintaining Geosciences group for internal seismic expertise and program management;
- Development and implementation of seismic hazard and risk models (internal and commercial applications) including external contractors; and

- Grants to various public agencies, laboratories, and academic institutions to conduct user-defined geologic, geophysical, and engineering research of direct interest and impact to PG&E.

The primary driver for increasing Geosciences expense during this period is escalation—the expected general inflation for contracts, materials, and other services or fees, and includes the higher employee labor rates attributed to market labor rate increases.

D. Estimating Method

PG&E's expense and capital estimating method is based on trends from recent historical information. Specifically, Geosciences' expense forecast is based on: (1) historic spend for the LTSP, which has been primarily funded to-date through the Energy Supply (DCPP) function (2020 base year is \$3.9 million), and (2) additional LOB funding for the ISRMP (2020 base year is \$1.7 million).

E. Cost Tables

Table 10-2 shows recorded and forecasted costs by MWC for expense and references these costs to the corresponding GRC Exhibit and Chapter.

TABLE 10-2
OPERATIONS AND MAINTENANCE EXPENSE BY MWC
(NOMINAL DOLLARS)

Line of Business	Program	MWC	2020	2021	2022	2023	GRC Chapter
Nuclear	LTSP	BV	\$ 3,885,091	\$ 1,202,400	\$ 1,232,460	\$ 1,265,736	Exhibit 5, Chapter 3
Nuclear	ISRMP	BV	\$ -	\$ 2,605,200	\$ 2,670,330	\$ 2,742,429	Exhibit 5, Chapter 3
Power Gen	ISRMP	KG	\$ 135,985	\$ 150,300	\$ 154,058	\$ 158,217	Exhibit 5, Chapter 4
Elec Transmission	ISRMP	AM	\$ 1,396,849	\$ 150,300	\$ 154,058	\$ 158,217	Not in GRC
Elec Distribution	ISRMP	GC	\$ 135,780	\$ 300,600	\$ 308,115	\$ 316,434	Exhibit 4, Chapter 1
Gas Distribution	ISRMP	HP	\$ -	\$ 150,300	\$ 154,058	\$ 158,217	Exhibit 3, Chapter 4
Gas Transmission	ISRMP	JQ	\$ -	\$ 150,300	\$ 154,058	\$ 158,217	Exhibit 3, Chapter 5
Gas Distribution	ISRMP	JT	\$ -	\$ 150,300	\$ 154,058	\$ 158,217	Exhibit 3, Chapter 6
CRESS	ISRMP	BI	\$ -	\$ 140,280	\$ 143,787	\$ 147,669	Exhibit 7, Chapter 5
Information Tech	ISRMP	JV	\$ -	\$ 10,020	\$ 10,271	\$ 10,548	Exhibit 7, Chapter 8
			\$ 5,553,705	\$ 5,010,000	\$ 5,135,250	\$ 5,273,902	

PACIFIC GAS AND ELECTRIC COMPANY 2023 GENERAL RATE CASE

Testimony: ☒ **Workpapers:** ☐ **SOQ:** ☐
Exhibit Number: 7 **Chapter Number:** 10
Chapter Title: Geosciences
Witness Name: Jeffrey Bachhuber

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of November 5, 2021				
10-2	8	Acronym in testimony was incorrectly spelled out	“(Supplier Relationship Management)”	“(SRM)”

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of February 28, 2022				
10-1	22	Spelling error	Enterprisewide	Enterprise-wide
10-1	27	Corrected amount	\$5.1 million	\$5.5 million
10-1	27-29	Corrected Text	PG&E's 2023 expense forecast represents a 3.6 increase from 2020 recorded costs due to escalation.	While PG&E's 2023 expense forecast represents a 5.0 percent decrease from 2020 recorded costs, future budgets will increase due to escalation.
10-2	Line No. 1 and 2	Table 10-1: 2020 Recorded Corrected amount	\$5,090	\$5,554
10-2	18	Corrected amount	\$3.8 million	\$3.9 million
10-2	20	Corrected amount	\$1.2 million	\$1.7 million
10-4	Footnote 7	Spelling error	Coast	Coastal
10-6	11	Correction	M 6.7	M 7
10-7	11-12	Corrected Text	Emergency Response and Preparedness	Emergency Preparedness and Response (EP&R)
10-8	24	Spelling error	Enterprisewide	Enterprise-wide
10-8	29	Corrected Text	Emergency Preparedness and Response (EP&R)	EP&R
10-12	10-11	Delete extra space	analyzes seismic	analyzes seismic
10-13	12-13	Spelling error	Enterprisewide	Enterprise-wide
10-14	13	Corrected amount	\$3.8 million	\$3.9 million
10-14	14	Corrected amount	\$1.2 million	\$1.7 million

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 11
ENTERPRISE AND OPERATIONAL RISK MANAGEMENT
[INCLUDES ERRATA THROUGH
FEBRUARY 28, 2022]

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 11
ENTERPRISE AND OPERATIONAL RISK MANAGEMENT

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 11
ENTERPRISE AND OPERATIONAL RISK MANAGEMENT

A. Introduction

1. Scope and Purpose

The purpose of this chapter is to demonstrate that Pacific Gas and Electric Company's (PG&E or the Company) expense forecast for the Enterprise Operational Risk Management (EORM) Program is reasonable and should be adopted by the California Public Utilities Commission (Commission).

The EORM organization was created in August of 2020, partially through consolidation of functions previously housed in other organizations and partially through identification of additional functions required to address risk-management commitments made in the Plan of Reorganization.¹

The EORM organization is responsible for implementation and governance for the EORM Program and, on a temporary basis, for governance and oversight of wildfire risk management.²

2. Summary of Request

PG&E requests that the Commission adopt its 2023 EORM expense forecast of \$8.0 million. The 2023 forecast represents a 129 percent increase over EORM's base spend of \$3.5 million in 2020, with the increase primarily due to headcount (increasing from 13 in 2020 to 44 in 2023) and contract spend (decreasing from \$2.1 million in 2020 to \$1 million in 2023), both of which reflect the additional resources needed to support programmatic improvements, including new functions added to EORM's responsibilities.

¹ PG&E's filing in the Bankruptcy Investigation (I.)19-09-016, *Debtors' and Shareholder Proponents' Joint Chapter 11 Plan of Reorganization Dated January 31, 2020*, section 5 concerning the Chief Risk Officer (CRO) and its responsibilities (see sections 5-1 to 5-3, 5-5 to 5-7 and 5-11 to 5-18) as confirmed in D.20-05-053.

² Costs associated with the management of wildfire risk are addressed in Exhibit (PG&E-4), Ch. 4. Costs associated with the administration of the Wildfire risk oversight program also included in this chapter.

1 Details about the activities, costs, and drivers for EORM's forecast are
2 provided in Section C below.

3 **3. Deferred Work Review**

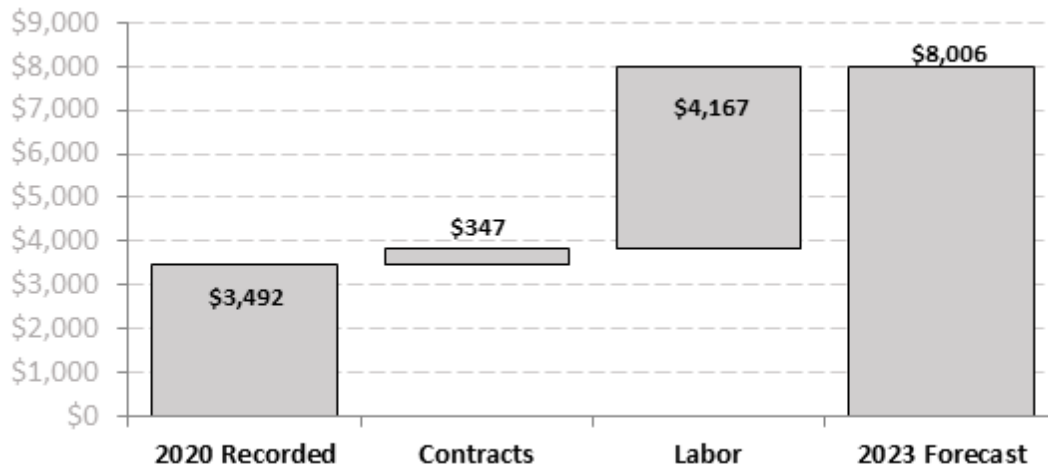
4 Section 5.2 of the 2020 GRC Settlement Agreement requires PG&E to
5 make an additional showing in its 2023 GRC testimony for work that was
6 previously requested and authorized based on representations that the work
7 was needed to provide safe and reliable service.

8 In the 2020 GRC, EORM did not request or receive authorized funding
9 for any work (1) identified as safety, reliability, or maintenance
10 (SRM)-related in the 2020 Risk Spending Accountability Report (RSAR) or
11 (2) based on representations in testimony and work papers that the work
12 was needed to provide safe and reliable service.

13 **4. Overview of Recorded and Forecast Expense**

14 As noted above, the EORM organization was formed in August 2020.
15 Historic costs, including those for 2020, represent costs for the EORM
16 function as it existed before August 2020 and were housed in multiple
17 organizations, primarily Finance and Risk. Figure 11-1 shows the recorded
18 2020 costs, and the forecast for these and additional responsibilities through
19 2023.

FIGURE 11-1
ENTERPRISE & OPERATIONAL RISK MANAGEMENT
EXPENSE WALK (2020-2023)
(THOUSANDS OF NOMINAL DOLLARS)



5. Support for Request

The forecast costs requested for EORM are reasonable because they are necessary to provide the lines of business with the tools, methods, and technical support to identify, evaluate, prioritize, mitigate, and monitor risk inherent in PG&E's operations.³

6. Organization of the Remainder of This Chapter

The remainder of this chapter is organized as follows:

- Section B – Program and Risk Overview;
- Section C – Activities, Costs and Forecast Drivers by Major Work Category (MWC);
- Section D – Estimating Method; and
- Section E – Cost Tables.

B. Program and Risk Overview

1. Program Description

The EORM Program supports data-driven risk assessments by providing a consistent framework, tools, and risk management program

³ In Exhibit (PG&E-2), Ch. 1, Enterprise Risk Management Program, PG&E describes, more broadly, the role EORM plays in supporting the LOBs.

oversight across the enterprise. The EORM organization provides support for the EORM Program by:

- Establishing and communicating risk-management guidance;
- Facilitating oversight responsibilities for the Boards of Directors, senior management, and across Lines of Business (LOB);
- Developing risk models;
- Supporting consistent adoption of risk models;
- Establishing risk management strategy;
- Supporting risk-related regulatory filings; and
- Validating risk management results.

2. EORM Programmatic Improvements

Continuous improvement is central to PG&E's EORM framework. This section describes key opportunities for programmatic improvement for the years leading up to and including this GRC period.

Advance Risk Analytics: PG&E will improve its risk analytics function to interrogate existing data, information and capabilities to harvest insights for key decisions. This function will include risk modeling for regulatory filings, integration of enterprise and operational risk models and developing and enforcing consistent modeling standards across PG&E.⁴

Standardize Policies and Procedures: EORM will continue standardizing and codifying enterprise risk management policy and procedures including standards, procedures and the necessary skills and capabilities to execute the EORM framework consistently across the organization. An important benefit of developing a consistent set of policies and procedures is the increased confidence in using data to make risk-driven business decisions. Additional standardization of policies and procedures will allow us to compare analyses and integrate decision-making across lines of business to increase confidence in risk-informed decisions.

Institute Risk Management Validation: PG&E is instituting a risk management validation function that will independently review and confirm recommendations and outcomes of the risk analysis processes performed by the operating units. The validation team will confirm compliance with

⁴ See Section 3.b.

relevant regulatory commitments, field verify risk-based asset management practices; review and verify risk modeling, analytics and calculations performed by the Line of Businesses (LOB); and ensure consistency in applying a risk-based approach in investment planning activities.

Ultimately, this risk validation function will help to integrate risk-based decision making at the operational level and significantly strengthen the Risk Analytics function to further develop data-driven models for risk quantification.

Test Findings and Validate Methodologies: PG&E has established a Public Safety Risk Council co-chaired by the CRO and Chief Safety Officer (CSO) comprising internal and external experts to stress test findings and to validate methodologies and risk management approaches.

3. Organizational Structure

The EORM organization consists of four departments: Risk Strategy and Governance, Risk Analytics, Operational Risk Validation, and Wildfire Risk Governance. Details about each of these four departments are provided below. In addition to the headcount described for each of these departments, there is one administrative headcount to support the team.

a. Risk Strategy and Governance

Risk Strategy and Governance consists of 12 employees reporting to a senior director and is composed of the following groups:

- Risk Strategy – Risk Strategy leads the development of risk management strategy with the benefit of internal and external stakeholder feedback, its consistent representation across regulatory forums and its use in the development of PG&E's operating plan. Deliverables for this department include risk-based filings in various regulatory cases such as Safety Model Assessment Proceeding, RAMP, the GRC, etc. and development and implementation of processes and tools that support strategy implementation.
- Risk Governance and Reporting – Risk Governance and Reporting oversees implementation of and visibility into the risk management

process, risk integration with the short-, medium-, and long-term planning processes and alignment of compliance activities with operational risk mitigation/control strategies. Deliverables for this team include the Corporate Risk Register, risk metric visibility, EORM program guidance documents and integration of risk with the planning processes and the Compliance program.⁵

- Risk Systems and Processes – Risk Systems and Processes establishes and provides oversight of risk information systems, data quality and the interoperability of tools, platforms, and systems.

b. Risk Analytics

Risk Analytics consists of 10 employees reporting to a director and is responsible for developing and deploying risk assessment methodologies and tools that form the data-based foundation for the risk-based decision-making framework. Deliverables for this team include risk models and scores to support the Corporate Risk Register, LOB risk model review and validation, analysis of control and mitigation effectiveness, risk-reduction quantification and risk model and tool training for internal stakeholders.

c. Operational Risk Validation

Operational Risk Validation consists of 11 employees reporting to a senior director and is responsible for assessing the application and impact of the risk-based decision-making framework for risk mitigations and controls. Deliverables for this team include validation assessments in support of risk-related regulatory proceedings (GRC, WMP, TO, etc.), of risk-based asset management practices in Gas Operations, Electric Operations, Generation, and Information technology, and of risk modeling, analytics and score calculations performed by LOBs.

4. Wildfire Risk Governance

Wildfire Risk Governance consists of 6 employees reporting to a senior director and is responsible for the administration of the CRO's governance responsibilities.

⁵ The compliance program is described in Exhibit (PG&E-9), Ch. 4 Compliance and Ethics.

Wildfire Risk Governance ensures alignment of wildfire risk mitigation activities with strategic objectives and keeps internal and external stakeholders informed of progress and issues. Deliverables for this team include ensuring mitigation implementation aligns to overall organization risk management objectives, program management for wildfire mitigations across the Company, and standardization of processes required for internal and external communication.

5. Metrics and Performance Measures

Key metrics and performance measures for EORM department collectively include development and continuous improvement of:

- EORM Program Metrics – The extent to which risk reduction objectives are met across the Company.⁶ The Key Risk Indicator dashboard⁷ provides visibility to areas requiring additional support to meet their goals.
- Process Performance Measures – The extent to which regulatory filings and governance processes are timely, and process development and improvement initiatives are implemented successfully.
- Quality Performance Measures – The extent to which models and operational risk validation show achievement of risk-reduction objectives and improvement in data quality. These performance measures inform priorities for process improvement.

C. Activities, Costs, and Forecast Drivers by MWC

1. Expense MWC KZ – Prov Risk/Security Services

All of EORM's expense costs are included in MWC KZ. EORM's forecast spending for 2023 is \$8 million.

The primary driver of the EORM forecast is the expanded scope of the EORM program in terms of risk quantification, operational risk validation and

⁶ Risk mitigations and controls are described in specific chapters related to the risk. For example, metrics related to the Gas Transmission Loss of Containment risk are described in Exhibit (PG&E-3), Ch. 5 Asset Family – Transmission Pipe.

⁷ See Exhibit (PGE-7), Ch11, Workpaper 11-4 for an example of the Key Risk Indicator Dashboard.

wildfire governance and the specialized skill sets required for many of these positions.

Increased headcount in support of quantitative risk modeling reflects the increased complexity and sophistication of the risk models used for PG&E's RAMP and GRC filings.

Increased headcount in support of risk validation reflects the need to have accurate information about the effectiveness of risk controls and mitigations to increase confidence in risk analysis used in decision-making and forecasts of risk reduction.

Recruiting external to PG&E has been necessary to acquire the skills needed for these positions.

D. Estimating Method

The forecast for EORM is based on estimates of headcount requirement and consulting support. These estimates reflect adjustments to headcount in support of additional responsibilities and costs of consulting support based on recent experiences.

E. Cost Tables

TABLE 11-1
EXPENSES BY MAJOR WORK CATEGORY
(THOUSANDS OF NOMINAL DOLLARS)

Line No.	MWC	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference (A)
1	KZ	Prov Risk/Security Svcs	1,786	2,784	2,102	1,170	3,492	11,500	7,500	8,006	
2	Total		1,786	2,784	2,102	1,170	3,492	11,500	7,500	8,006	

PACIFIC GAS AND ELECTRIC COMPANY 2023 GENERAL RATE CASE

Testimony: ☒ **Workpapers:** ☐ **SOQ:** ☐
Exhibit Number: 7 **Chapter Number:** 11
Chapter Title: Enterprise and Operational Risk Management
Witness Name: Rick Ito

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of February 28, 2022				
11-1	22	Correct headcount value	increasing from 15 in 2020 to 44 in 2023	increasing from 13 in 2020 to 44 in 2023
11-1	23	Correct 2020 costs	increasing from \$0.7 million in 2020 to \$1 million in 2023	decreasing from \$2.1 million in 2020 to \$1 million in 2023
11-3	Footnote 3	Correct footnote reference	In Exhibit (PG&E-2), Ch. 2	In Exhibit (PG&E-2), Ch. 1
11-5	18-19	Add explanation for adjusted 2020 headcount value	N/A	In addition to the headcount described for each of these departments, there is one administrative headcount to support the team.