



FILSINGER ENERGY
P A R T N E R S

**PG&E
INDEPENDENT SAFETY MONITOR STATUS UPDATE
REPORT**

April 3, 2023

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BACKGROUND

In conjunction with California Public Utilities Commission (CPUC) Decision 20-05-053, the Bankruptcy Plan of Reorganization for Pacific Gas and Electric Company (PG&E)¹ and the findings included in the Kirkland & Ellis LLP Federal Monitorship Final Report dated November 19, 2021 (Federal Monitorship Report)², through Resolution M-4855³ the CPUC approved implementation of an Independent Safety Monitor (ISM) of PG&E to fulfill a role that supports the CPUC's ongoing safety oversight of PG&E's activities.

Filsinger Energy Partners, Inc. (FEP) has been engaged to serve as the ISM of PG&E. The ISM contract executed between FEP and PG&E dated January 27, 2022 (the ISM Contract) outlines a scope of work that includes FEP monitoring certain safety and risk aspects of PG&E's electric and natural gas operations and infrastructure. In consultation with the CPUC, the ISM identifies and performs certain monitoring activities associated with areas outlined within the scope of the ISM Contract. The initial areas of focus were designed to take into consideration the findings from the Federal Monitorship Report and provide complementary oversight and monitoring activities that are not unnecessarily duplicative, consistent with CPUC Resolution M-4855.

The six initial focus areas for PG&E's electric operations and infrastructure include aspects of 1) System Inspections and Repair; 2) Vegetation Management (VM); 3) System Hardening; 4) Situational Awareness; 5) Public Safety Power Shutoff (PSPS) and Enhanced Powerline Safety Settings (EPSS); and 6) Implementation of Corrective Action Plans initiated as a result of the Enhanced Oversight and Enforcement Process (EOEP).

For PG&E's gas operations and infrastructure, the six initial focus areas include aspects of 1) Transmission Integrity Management Program (TIMP) and Distribution Integrity Management Program (DIMP); 2) Leak Survey Program; 3) Pipeline Replacement Program; 4) Locate and Mark Program; 5) Pipeline Patrols; and 6) In-line Inspection (ILI) program.

The ISM's Initial Report, hereafter referred to as "ISM Initial Report", covered the period January 27, 2022, through September 30, 2022, and was published October 4, 2022. The ISM Initial Report identified work performed in the above referenced areas during the reporting period and the related areas to be monitored going forward. The following topics were included:

- Critical Spares and Inventories
- Substation Asset Age
- Underground Transformer Asset Age

¹ <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M338/K816/338816365.PDF>.

² https://s1.q4cdn.com/880135780/files/doc_downloads/wildfire_updates/2021/11/1524-1.Exhibit-Monitor-Report.pdf.

³ <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M397/K322/397322603.PDF>.



- Training
- Core Leadership Changes
- EPSS Criteria Change
- Infrastructure – Distribution Inspections
- Infrastructure – Field Review of Inspections
- Variability of Distribution Risk Ranking in Model Updates
- Gas Storage Operations
- Pipeline Integrity Management
- Data Management and Recordkeeping

This PG&E Independent Safety Monitor Status Update Report, hereafter referred to as “Q1 2023 ISM Report”, covered the period October 1, 2022, through March 31, 2023. It was developed based on the stipulations of the ISM Contract and the reporting directive included within CPUC Resolution M-4855. The Q1 2023 ISM Report is designed to summarize the oversight activities performed by the ISM during the period described and the related observations.

This Q1 2023 ISM Report also includes a summary of potential emerging risks identified during the oversight activities performed during the current reporting period. With respect to potential emerging risks, consistent with the ISM Contract scope, the ISM has documented the initial observations and performed certain initial monitoring activities. Depending upon the observations, in consultation with the CPUC, it may be determined that the ISM will perform additional monitoring activities.

The ISM’s role is not to provide suggestions for addressing the issues identified or rank the order of priority or risk. Relatedly, the ISM has only monitored to the extent agreed upon within the confines of the ISM Contract or as otherwise agreed to between the ISM and the CPUC.

The information included in this Q1 2023 ISM Report should be considered a “snapshot” of observations during the current reporting period. The ISM may continue to perform monitoring activities related to certain observations noted herein. Observations may change for various reasons (e.g., additional information becomes available, operational changes are implemented by PG&E, etc.). General facts and information contained within this report have been derived from internal PG&E meetings, presentations, data, and external reports which may not always be footnoted.



ISM REPORT STRUCTURE

As stated previously, the period of the Q1 2023 ISM Report encompasses October 1, 2022, through March 31, 2023. This is consistent with the ISM schedule of report submittals at the end of calendar quarters one and three, with each report covering activities in the previous six months. The compilation of reports summarizes the totality of work performed during the ISM's engagement and should be read as such in order to obtain an accurate depiction of how observations made by the ISM may have changed from period to period.

The following four types of observations are documented within the report:

- Observations from the previous report that are finalized during the current reporting period, where the ISM does not intend to continue monitoring activities unless an issue is brought to the ISM's attention in the future.
- Observations from the previous report that are not finalized during the current reporting period, where the ISM intends to continue monitoring activities.
- Observations from the current reporting period that are finalized during the reporting period, where the ISM does not intend to continue monitoring activities unless an issue is brought to the ISM's attention in the future.
- Observations from the current reporting period that are not finalized during the reporting period, where the ISM intends to continue monitoring activities in the future.

Consistent with the previous ISM report, the Q1 2023 ISM Report is structured as follows:

- General Observations – ISM observations that may have been identified during an analysis or review of information associated with a specific division or function of PG&E (e.g., Electric, Gas, etc.) but may potentially have broader impacts (e.g., corporate wide).
- Electric Operations Observations – ISM observations that stem from specific activities performed by the ISM in specific areas within Electric Operations and which primarily impact Electric Operations.
- Gas Operations Observations – ISM observations that stem from specific activities performed by the ISM in specific areas within Gas Operations and which primarily impact Gas Operations.
- Emerging Observations – ISM observations that have been recently initiated or are planned for initiation in the near future.



GENERAL OBSERVATIONS

CORE LEADERSHIP CHANGES

The Federal Monitorship Report identified “retaining a core leadership team, in the wake of near constant turnover in recent years” as one of the “most salient challenges PG&E faces going forward.”

In the previous ISM report, the ISM observed three changes in PG&E’s senior leadership (including a new Senior Vice President of Electric Operations, Senior Vice President of Gas Engineering, and Vice President of Electric Engineering, Asset and Regulatory). The ISM interviewed each new leader; each indicated that they did not intend to significantly change the overall priorities established by the previous leadership for their respective areas of responsibility.

These leaders were only in their new roles for approximately one month at the time of their previous interview. The ISM followed up with each during the current reporting period regarding progress toward achieving their operational and safety related priorities.

During the follow up discussions with these leaders, the ISM noted they each: 1) identified what they considered to be the most pressing issues of the respective departments, 2) determined and/or confirmed their areas of focus, 3) had developed initial plans to achieve these goals/objectives, and 4) were in the process of implementing processes to achieve these objectives. A goal for each department was creating processes that were flexible enough to manage potential unplanned work without creating unnecessary impacts to internal/external resources, customers, and the related budgets (including unnecessary cost increases).

During the current ISM reporting period, the ISM observed the following additional senior leadership changes:

- In November 2022, David McCulloch was appointed as Vice President and Chief Marketing and Communications Officer. This position was vacant during the ISM’s previous reporting period.
- In January 2023, PG&E created two new senior leadership positions that reported to the Executive Vice President, Chief Risk Officer (CRO) and Chief Safety Officer (CSO).
 - Matt Hayes – Vice President of Enterprise Health and Safety
 - Russ Prentice – Vice President of Wildfire and Enterprise Risk Management
- In February 2023, PG&E announced that Adam Wright, Executive Vice President, Operations and Chief Operating Officer (COO) was moving to a different company.
- As a result of the move noted immediately above, also in February 2023 PG&E announced that, effective March 1, 2023, Sumeet Singh, Executive Vice President, CRO and CSO would transition to the role of Executive Vice President, Operations and COO.



- As part of the transition plan, the CRO and CSO roles were separated.
- Matt Hayes, Vice President of Enterprise Health and Safety, assumed the role of CSO.
- Stephen Cairns, Vice President, Chief Audit Officer, assumed the additional role of Interim CRO.
- A new position, Senior Vice President, Wildfire & Emergency Operations (SVP, WEO) was created and reports directly to the COO. This role is responsible for overseeing the Emergency Preparedness & Response organization residing in Operations, and the team responsible for Wildfire Preparedness & Operations previously in Safety & Risk. In March 2023, the position was filled internally by Mark Quinlan, who was previously Vice President, Electric System Operations.
- The prior Enterprise Risk Management organization within Safety & Risk was split into two organizations as follows:
 - Wildfire Preparedness & Operations will be part of the organization led by the new SVP, WEO.
 - Enterprise & Operational Risk will remain under the Vice President, Enterprise & Operational Risk, reporting to the CRO.
- In March 2023, it was announced that PG&E's Chief Financial Officer (CFO), Christopher Foster, will be leaving to assume a similar position at a different company, effective May 5, 2023. PG&E has named Carolyn Burke as its new CFO, also effective in May 2023.

Additionally, during the current ISM reporting period, PG&E implemented an organizational structure change involving the 10,000-Mile Undergrounding Program. The program was moved from "Engineering, Planning and Strategy" to Operations in order to increase the focus on the operational implementation and scaling of the program. The new organization of "Undergrounding, Vegetation Management and System Inspection" is called "Major Infrastructure Delivery".

During the previous ISM reporting period, the ISM observed that PG&E had initiated a Voluntary Separation Program (VSP) to facilitate staffing adjustments related to system changes and/or business efficiency improvements. During the current ISM reporting period, per discussions with PG&E leadership, the VSP did not significantly impact senior leadership positions nor PG&E's operational safety capabilities.

The ISM will continue to monitor the leadership changes and related potential impacts relative to the areas within the scope of ISM responsibilities.



SUPPLY CHAIN

Critical Spares and Inventories

As discussed in the previous ISM report, the outbreak of the Novel Coronavirus-2019 (COVID-19) pandemic has impacted the global supply chain of goods and services across numerous industries. Impacts on the U.S. electric and gas utility sectors continue to be experienced into 2023, with lengthened lead-times associated with ordering and receiving various goods, limited availability for unscheduled manufacturing production, and limited quantity of goods available for purchase, which in turn has impacted inventory levels of goods on hand.

In the previous ISM report, several observations related to PG&E specific supply chain issues were identified by the ISM following participation in meetings, document reviews, and follow-up interviews. These observations included: 1) an inability to source quantities of certain supplies that, according to PG&E, “could create risks for [their] Wildfire Mitigation Plan (WMP) commitments”⁴; 2) a shortfall of critical spares within certain electric departments; 3) a lack of equipment required to perform select monitoring activities; and 4) a general lengthening of time required to source supplies.

As part of the ISM’s initial review into PG&E’s efforts at addressing supply chain issues, PG&E indicated that several mitigation strategies were being deployed across all impacted areas as needed to drive recoveries associated with global supply chain challenges. PG&E stated⁵ that their mitigation plans include:

- Partnering with line of business to determine highest priority work and allocating available supply accordingly.
- Referring jobs to available substitute materials where possible to consume surplus inventory and reduce backlog on short materials.
- Requesting additional capacity allocation and prioritization of PG&E orders with suppliers.
- Enhanced communications with suppliers.
- Greater visibility with senior leadership regarding potential manufacturing and/or order delivery performance delays.
- Placing advanced orders ahead of standard lead time to lock in production capacity and expediting critical materials to minimize transit time.
- Partnering with engineering to prioritize and expedite the qualification/onboarding of new sources of materials where PG&E is currently at or exceeding sourced capacity.

⁴ Data request response received from PG&E.

⁵ Internal PG&E report.



Since the ISM's engagement, it has tracked and observed the effectiveness of these enhanced supply chain management programs in several areas of PG&E's electric and gas operations.

On June 30, 2022, PG&E informed the ISM that it was experiencing material limitations with nine types of electrical equipment, and that there was the possibility that six of its WMP commitments for 2022 were at risk of not being completed by their target dates⁶. Throughout the balance of the year, the ISM observed PG&E's efforts at managing its equipment requirements through focused catch back plans with its suppliers, and through reprioritizing limited equipment supplies within the company. PG&E has represented that by year end all six of these at-risk wildfire mitigation work streams were completed, with the last of these equipment dependent commitments achieved in the final week of the year⁷.

Another means by which the ISM has been able to track PG&E's supply chain impacts was through its review of reports on PG&E's emergency and critical spares inventory readiness. These reports include a readiness percentage which takes into account current usage rates and inventory levels, and the ability to replace these materials in a timely manner as used, in order to maintain a minimum safety supply quantity/level.

While supply chain management indicated during an interview with the ISM in July 2022 that PG&E's average readiness percentage for all inventory items has historically been in the 97-98% range, the ISM observed that this percentage had dropped to 95.8% in August 2022, at which time 5.5% of the inventory items were shown with a score of less than 100%. During the current ISM reporting period, the percentage has remained consistent, with the January 2023 report⁸ showing an average readiness percentage of 95.6%, and 6.0% of the inventory items having a score of less than 100%. One item to note, during the current ISM reporting period the average planned delivery times have continued to lengthen slightly, from an average across the roughly 3,200 inventory items of 48 days in August 2022 to 52 days in January 2023. While the planned delivery timelines reported for two of the longest lead time items (out of approximately 3,400 inventory items being tracked) increased from 392 days to 532 days during the same period, both of these items were still calculated at 100% emergency readiness when factoring in the quantity of supplies on hand, and their anticipated usage rates, resupply times, and safety stock requirements.

During the previous ISM reporting period, the ISM also started receiving and reviewing a weekly dashboard related to material planning. In August 2022 eight categories of electric materials were being tracked as items of potential supply chain concerns with work impact/delays recorded for seven of these eight categories ranging from two to six weeks, and with two of the categories reported to have sourced capacity for 2022 being below its 2022 demand.

During the current ISM reporting period, the ISM has tracked the progress of PG&E's supply chain management on these electrical items, with each week providing a trend analysis against

⁶ Data request response received from PG&E.

⁷ Internal PG&E report.

⁸ Data request response received from PG&E.



the prior week, a description of the root cause behind the original constraint, the recovery enablers that were being pursued, the owner of the recovery actions, and the estimated recovery date. As noted in PG&E's weekly reports, many of the causes were cited as labor/component and raw material constraints, increase in product demand and corresponding long lead time to ramp up production, and in one instance a quality issue which led to a new design by the manufacturer.

During the current ISM reporting period, PG&E reported progress in addressing and managing its electrical supply constraints. Whereas the trends in August 2022 were primarily for no change or worsening conditions each week, by January 2023 three of the eight categories were removed from the weekly dashboard citing improved conditions for those items, with the remaining five categories showing steady or improving trends. While current work impacts and delays are still forecast at two to six weeks, two of the remaining five categories have estimated full recovery dates in the first quarter of 2023, with the other three estimated to have full recovery dates prior to the end of the second quarter of 2023. The primary recovery enablers that have led to a stabilization of supply chain conditions over this period include the onboarding of new domestic and international suppliers, reallocation of supplies within PG&E, resolution of component delays, and short-term engineering and design variances to allow for modified raw material usage.

Supply chain issues were not having the same impact on PG&E's gas operations as compared to electric operations. During the previous ISM reporting period, the August 2022 Materials Planning Dashboard was tracking eight categories of equipment that were experiencing supply constraints. All eight, however, were still projected to have sourced capacity in excess of their 2022 demand. During the current ISM reporting period, the number of equipment categories exhibiting supply constraints was reduced to only three which demanded extra attention. The focus resided on creating recovery work plans to secure additional suppliers aimed primarily at reducing current work impact/delays that are still reported between two and ten weeks for these remaining three categories.

During the previous ISM reporting period, in addition to the above reports, the ISM also started to receive a supplemental weekly report which tracks the progress on sourcing materials specifically for PG&E's 10,000-mile electric distribution undergrounding program. Since this is a long-term program which requires increasing quantities of materials as the annual mileage of this program increases, this report focuses on ensuring that suppliers will be able to meet PG&E's growing demands. During the current reporting period, the ISM observed that PG&E has taken the following steps to ensure that sufficient quantities of materials are available: 1) conducting requests for proposals for new suppliers, 2) having planning and check-in calls with leadership of its vendors to ensure that ramp up plans are achievable, and 3) in certain instances, touring the factories of key suppliers. For 2023, PG&E has established materials readiness targets for rolling 1-, 3- and 6-month future periods of 98%, 94% and 90% respectively. As of early March 2023, PG&E was exceeding its targets for the upcoming months with readiness scores of 99.3%, 98.0% and 95.3% respectively.⁹

⁹ Internal PG&E report.



In the previous ISM report, it was noted that the electric transmission engineering, substation equipment, and asset management group were managing inventory and supply chain activities separately from PG&E's main supply chain group and its Computer Managed Maintenance System inventory tracking systems. The report further noted that several long lead time items were at inadequate critical supply levels. During the current reporting period, the ISM observed that the underground transmission group has put in place a plan to enhance its supply levels over the next three-year period, and that the timing of underground cable inventory replenishments is based on an assessment where areas of higher operational risk are to receive additional critical spare supplies earlier in the 2023-2025 period.

ASSET AGE AND USEFUL LIFE

Asset age commonly refers to how long an asset/piece of equipment has been in operational service, while useful life commonly refers to the estimated length of time equipment can be expected to effectively contribute to operations. Asset age is often one of many factors considered when determining when an asset is targeted for replacement. Other factors may include utilization (e.g., number of times equipment operates), performance (e.g., no, or minimal degradation in operating as expected), asset wear (e.g., amount of corrosion), etc.

The previous ISM report referenced the Federal Monitorship Report, including PG&E's Conditions of Probation, Condition 7, "Asset Age Condition" for "certain critical transmission tower components in High Fire Threat Districts". This was highlighted as a condition for which PG&E needed to provide a reasonable record of age and installation data for those components. PG&E notified the ISM that completion of asset age data collection on all High Fire Threat District¹⁰ (HFTD) transmission circuits by the end of 2022 was off track but was believed to be recoverable through increased resources and a one-month cushion which had been included in the plan.

During the current ISM reporting period, PG&E reported that all requirements of Probation Condition 7 had been met, which included conducting a reasonable data search and recording the age and date of installations of critical components in HFTD. PG&E also developed a Transmission Composite Model and an associated Wildfire Transmission Risk Model V1 which is a component used in the determination of asset useful life. PG&E has stated that it will continue to improve asset data and risk models; however, V1.5 of the model is now expected to be completed and approved by Q3 2023.

As stated in the previous ISM report: 1) the ISM has observed numerous PG&E asset ages that are older than the related industry average useful life and the related PG&E average age of asset failure, and 2) the emerging risk relates to the volume of assets that have the potential to fail within close time proximity to one another.

As also discussed in the previous ISM report, PG&E has stated that asset age is one of many

¹⁰ HFTD includes areas of the State designated by the Office of Energy Infrastructure Safety and CAL FIRE to have elevated wildfire risk, indicating where each utility must take additional action (per GO 95, GO 165, and GO 166) to mitigate wildfire risk. (Source: PG&E's 2022 Wildfire Mitigation Plan Update).



factors considered when determining asset replacement. PG&E uses asset age and other factors (e.g., component type, threats, hazards, environment, etc.) to determine condition and failure risk of assets. Failure risk information is used in conjunction with the consequence of failure data to implement various mitigation activities such as, but not limited to, monitoring, repair, life extension, and replacement.

Substation Asset Age

In the previous ISM report, the ISM observed certain equipment up to 20 years older than the industry average and up to 56% of this equipment exceeding PG&E's average age of failure.¹¹ The ISM will continue to monitor PG&E's average age of substation equipment and the associated allocation of resources associated with mitigating/remediating the identified gaps.

As noted above, PG&E states that asset age is one of many variables it analyzes to determine potential failure and replacement.

Underground Transmission Asset Age

In the previous ISM report, the ISM reported that underground cable failures can result in long duration outages, especially if conduits are damaged. Further, the ISM observed that 60% of certain PG&E underground transmission assets exceed their useful life.¹² PG&E stated that it intends to purchase certain quantities of assets to serve as spares, including full length cables to avoid unnecessary splicing. During the current ISM reporting period, PG&E reported cross functional processes to prioritize the purchase of additional underground asset spares, and that PG&E does have additional spares of certain transmission cable available that would be utilized in emergencies to address outages. Further, PG&E stated that in addition to asset spares, there are proactive equipment replacement efforts in progress, including but not limited to, replacement programs under Major Work Category¹³ (MWC) 72Z¹⁴, and various underground capital replacement projects.

The ISM will continue to monitor PG&E's efforts to increase like-kind inventories as well as determine PG&E's efforts directed toward modernizing their underground transmission cable system.

The ISM will also continue to monitor and analyze the effects that asset age, useful life, and spare equipment – coupled with longer lead times and reduced availability of certain equipment due to the global supply chain issues, have on outages and the related safety concerns.

¹¹ Internal PG&E report.

¹² Internal PG&E report.

¹³ PG&E organizes operational activity and cost forecast by Major Work Category (MWC), for its operational planning, budgeting, and managing purposes.

¹⁴ Replacement programs under MWC 72Z include such things as cable replacement, corroded cable racks, and cathodic protection improvements.



Overhead Distribution Asset Age and Asset Replacement¹⁵

PG&E’s overhead distribution electric system covers an area of approximately 70,000 square miles and is comprised of approximately 161,500 miles of overhead lines, 2.25 million wood poles, and over 669,000 transformers. In order to manage the asset failure risk of these assets, PG&E is heavily dependent on regular condition monitoring. During the current ISM reporting period, the ISM participated in meetings where several PG&E managers reported that a shift in strategy is required as the PG&E distribution asset base ages more towards its end of life, and that elevated investment levels will be required to adequately control and mitigate the associated risks.

Parts of the overhead distribution system are currently stressed or are forecast to become stressed. Examples of this include:

- Over one-third of overhead distribution conductor lines qualify for asset health replacement in the next 10 years.
- While half of the distribution circuits have good reliability, approximately 20% of the circuits are responsible for 50% of the average customer outage duration across the distribution system.
- There is a considerable backlog of distribution asset maintenance and/or upgrade items needing to be addressed, including approximately 120,000 poles tagged for replacement.

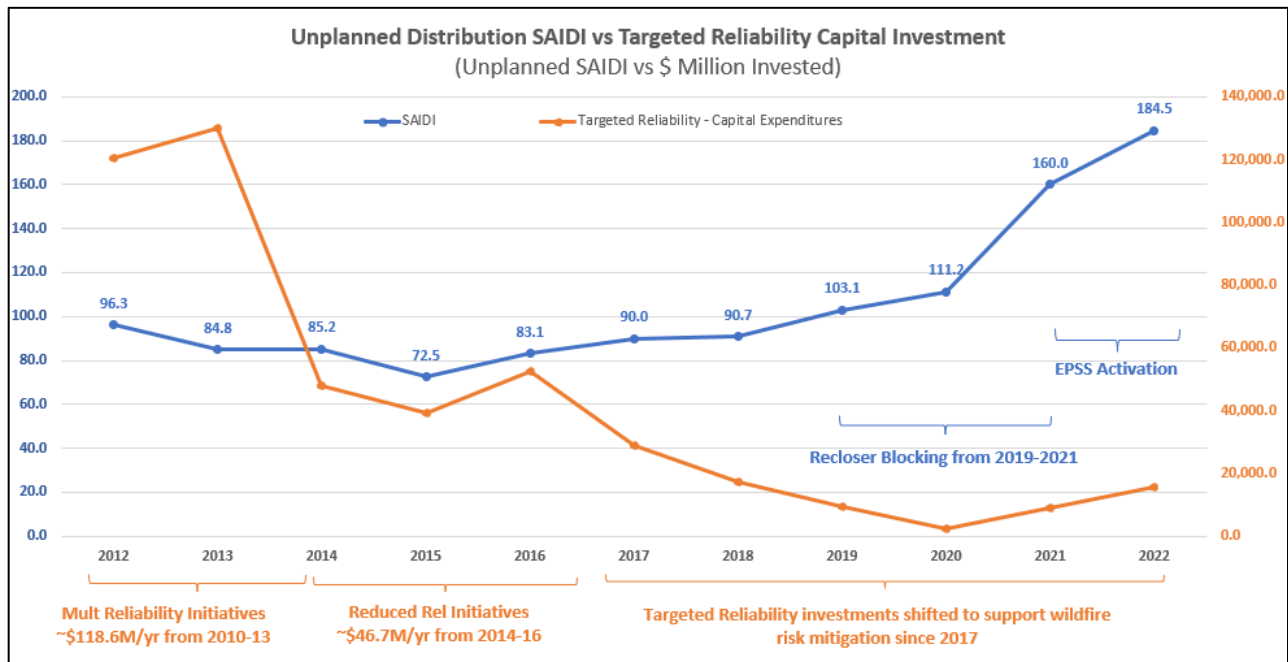


Figure 1. Unplanned Distribution SAIDI vs Reliability Capital Investment

¹⁵ Unless otherwise noted, all references in this section are sourced from internal PG&E reports.



As seen in Figure 1, and as has been expressed by several PG&E managers during meetings attended by the ISM and interviews held by the ISM, capital expenditures on reliability-oriented projects have seen a drop over the past ten years, with targeted reliability investments shifted to support wildfire risk mitigation since 2017. During the five-year period from 2015 to 2020, unplanned distribution System Average Interruption Duration Index (SAIDI), an outage duration measure, increased by 53% during the period when reliability capital was in decline. The introduction of the PSPS and the EPSS programs in 2018 and 2021, respectively, have also contributed to these rising SAIDI figures. During the current ISM reporting period, the ISM observed that PG&E's unplanned distribution SAIDI increased by an additional 66% since 2020, and PG&E sits in the fourth quartile for SAIDI as compared to all other U.S. based electric utilities. PG&E has stated it is working on improving the SAIDI metric through their Integrated Grid Plan, a multi-year plan and strategy to provide stability, achieve balance, and engage external and internal stakeholders throughout the process from planning to construction. The ISM will continue to monitor the development and implementation of the Integrated Grid Plan.

The ISM also notes that since 2017 the number of reportable ignitions in HFTD attributed to PG&E equipment failure has been in steady decline; from 59 in 2017 to 14 in 2022, for a 76% decrease. As detailed later in this report, the largest contributing factor for this decrease in the last two years has been the introduction of EPSS enablement across all of PG&E's HTFD distribution circuits in 2022.

While reducing wildfire risk is a high priority for PG&E, the increase in the overall number and duration on unplanned outages could have financial and safety impacts on PG&E's customers (see the EPSS section further detailing the number of outages that have been impacting sensitive customers such as Medical Baseline, Life Support and Critical Customers, as well as hospitals and schools).

Overhead conductors have been responsible for 101 (55%) of the 183 equipment failure ignitions reported in the High Fire Risk Area¹⁶ (HFRA) between 2017 and 2022. PG&E has indicated that it believes "Wire down rate is a key indicator of public safety. Wire downs per year has stayed steady over the past five years. However, we expect the number of wire downs to increase as conductors are aging faster than the replacement rate." Determining the age of PG&E's conductors has been difficult, and PG&E has reported that age data is missing for 53% of its primary conductors, while secondary conductors have 88% of their ages missing. While age is only one factor in determining conductor failure, this missing data limits the predictive power of PG&E's risk models. (Note: other factors can include, but are not limited to, corrosion, geographical location, high fault currents, number of fault currents, and number of splices).

PG&E has proposed using the guardrail approach to asset lifecycle management for primary overhead conductors. This is a flexible approach that establishes a targeted asset age-base to maintain. Therefore, when the age-base of the assets is above or below the guardrail, PG&E reduces or increases the number of assets replaced in order to maintain the targeted asset age-

¹⁶ HFRA is mapping terminology that aligns with other California utilities' use of maps supplemental to the High Fire Threat District (HFTD) Map. (Source: PG&E's 2022 Wildfire Mitigation Plan Update).



base. For primary overhead conductors, PG&E has established the targeted age-base to maintain as 100 years. At this age, the sustainable rate of replacement would be approximately 800 miles per year (80k miles/100 years). In comparison to this guardrail rate, over the past seven years (as seen in Figure 2) the miles of proactive replacement of deteriorated conductor have averaged approximately 40 miles per year.

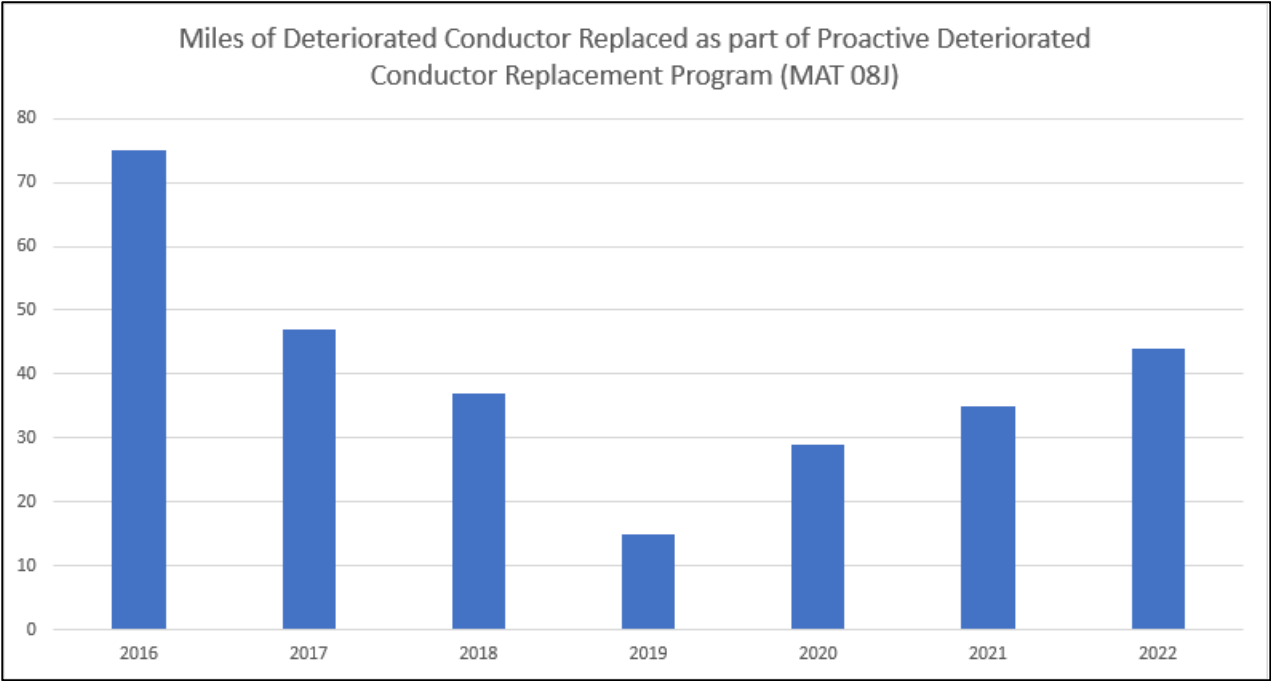


Figure 2. Deteriorated Conductor Miles Replaced

A similar situation exists with poles, where pole failure rates jump approximately ten-fold as the pole population reaches approximately 80 years in age. PG&E has noted that the guardrail approach to asset lifecycle management for primary overhead poles would be to maintain the age of the pole asset base at 80 years. At this age, the sustainable rate of replacement would be approximately 28,000 poles per year (2.25M/80 years). In comparison to this guardrail rate, over the past seven years, as seen in Figure 3, PG&E has been increasing the number of deteriorated structures replaced with open tags per year from a low of approximately 6,000 in 2016 to approximately 19,600 in 2022, with the average over this seven-year period of approximately 12,000 per year.

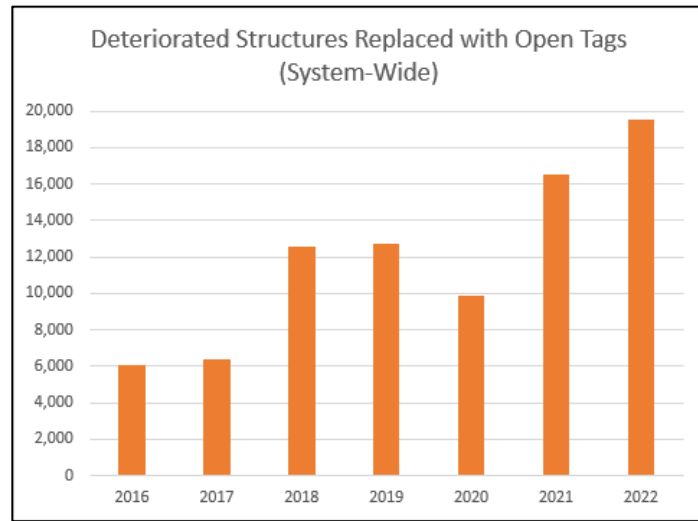


Figure 3. Number of Deteriorated Structures Replaced with Open Tags

For both the conductors and poles, PG&E has noted that the proposed guardrail levels may be inadequate, and that “given the aging population and need to also prioritize locations with other key risks, significantly higher ramp up would be required.”

In meetings attended by the ISM, concern was expressed by PG&E leadership that the magnitude of capital needed for asset replacement programs was far in excess of the amount of capital believed to be available.¹⁷

According to PG&E leadership, asset replacement programs have been continuously reprioritized for other higher risk programs (e.g., wildfire risk management), and given the aging asset base, there is a need to prioritize proactive replacement of assets. As examples, personnel cited that there are approximately 150,000 open pole corrective maintenance tags and approximately 327,000 open non-pole corrective maintenance tags in the system (of which approximately 90,000 and 80,000, respectively, are in HFTD).

In response to a requirement by the Office of Energy Infrastructure Safety (Energy Safety) in a Revision Notice, PG&E has refocused its efforts on addressing its asset backlog, including developing strategies for managing wear-out failures. These strategies include:

- Continuation of regular condition-based monitoring (e.g., ground inspections, pole treatment testing, infrared).
- Ramped up replacement of aging assets (Integrated Grid Planning).
- Deployment of the following reactive asset management strategies:
 - Fail safe (e.g., Downed Conductor Detection (DCD))
 - Precision inspection tools (which minimizes human judgement)

¹⁷ Internal PG&E meeting discussion.



- Real time monitoring and analysis.

Several of these work streams have recently been introduced, such as the Integrated Grid Plan (an emerging item planned for future monitoring) and DCD (described in the EPSS section of this report). The ISM will continue to monitor PG&E's overhead distribution asset management strategies as they continue to evolve.

CONTRACTOR MANAGEMENT

In the previous ISM report, the ISM observed that PG&E substantially relies on its contract workforce to perform wildfire mitigation efforts with approximately two-thirds of PG&E distribution inspectors being contractors in 2022. In 2023, PG&E is changing its system inspection work plan (see section on Distribution Inspections) which will both reduce the number of HFTD structures receiving ground inspection and spread out the time over which its HFTD inspections will be conducted. PG&E has stated it believes this will result in a reduced dependence on a contractor workforce and an increase to risk mitigation as inspection schedules are shifted to address assets based on risk.

Training

In the previous ISM report, the ISM performed certain activities to monitor contractor training and stated that the ISM would continue to monitor these training activities and the related results.

During the current reporting period (and into the next reporting period), the ISM is continuing to observe certain contractor management activities (e.g., reviewing field inspections, analyzing errors/corrections, monitoring enhancements and commitments, conducting interviews, observing the 2023 trainings, etc.). The ISM will continue to monitor these training initiatives and the related results.

Vegetation Management

During the current ISM reporting period, the ISM held interviews with various vegetation management (VM) contractors who perform tree-work, pre-inspection work and work verification for PG&E. During the interviews, contractors reported that they were instructed to halt routine work due to budgetary constraints well before the end of 2022 (as early as November 1). The contractors indicated that in most years they are required to halt VM work prior to the end of the year. However, in 2022, the contractors stated the work stoppage was earlier than usual and occurred with minimal notice. Additionally, some of the VM contractors noted that PG&E halted "wood management"¹⁸ in the later part of the year. Each of the contractors said that, as a result, it either laid-off employees or had to find other work for them to perform to avoid losing qualified resources. PG&E has stated that it was able to secure all necessary contract resources for their 2023 work plan.

¹⁸ Wood management" allows the contractor to haul off large tree trunks when the customer allows the removal of hazard, dead, and/or dying trees.



Additionally, the VM contractors described a lack of communication between the PG&E VM Construction group, the PG&E VM field organization, and the VM contractors. While the contractors indicated they have very good relationships and communications with the PG&E field organization, they said there seemed to be little or no communication between the other VM groups charged with making all VM decisions.

The ISM held interviews with PG&E leadership regarding these issues. PG&E described that budget is one of many factors which goes into its decision-making process. PG&E stated that all 2022 vegetation management compliance and Wildfire Mitigation Plan work met or exceeded original commitments, and these programs were not stopped due to budgetary constraints. It instead stated that the halting of work at the end of 2022 was due to the early completion of compliance work for 2022. Additionally, PG&E explained its intent is to build more stable and predictable workplans. PG&E stated its goal is to work collaboratively to reduce risk and reiterated that contract resources are flexible and can be adjusted based on business need. PG&E further stated that it welcomes the contractors' feedback about how to improve its communications, including the transparency of its decision making, and will take those concerns into account in 2023 and future work years.

During the current ISM reporting period, the ISM observed that in 2022 and past years, the VM contractors were under a "defined scope" contract with PG&E, which allowed a contracting company to manage an area at a given annual fee (with some allowance for "add-in" tree work). While the defined scope contract was set for a five-year contract term, PG&E is terminating the contract early to move to a "unit price" contract. "Unit pricing" sets a specific price for the various types of tree pruning, removals, wood management, etc.

Finally, during the current ISM reporting period, PG&E notified the ISM that it was ending its Enhanced Vegetation Management (EVM) program at the end of 2022. Additionally, it was noted that the 2023 VM budget has been reduced to \$1.4 billion from \$1.8 billion in 2022. However, the overall wildfire budget is expected to remain constant at approximately \$6 billion¹⁹, although it will be allocated differently to reflect PG&E's risk-informed shift to operational mitigations like EPSS, Downed Conductor Detection (DCD), and System Hardening. One of the results of this shift is that fewer VM contract resources will be needed in 2023. PG&E has stated it has identified operational efficiencies that will be addressed using additional internal staff rather than contractors. PG&E has provided the ISM an update of these operational programs and the ISM requested that PG&E provide its VM guidelines that address any new VM wildfire mitigation strategies in light of the ending of the EVM program.

¹⁹ PG&E's 2023-2025 Wildfire Mitigation Plan submitted March 27, 2023; Table 4-1, "Summary of WMP Expenditures".



ELECTRIC OPERATIONS OBSERVATIONS

ENHANCED POWERLINE SAFETY SETTINGS (EPSS) PROGRAM

2022 EPSS Program Overview

EPSS is a program that increases the fault detection sensitivity on enabled powerline circuits such that when a change in current on the EPSS enabled powerline is identified, the EPSS equipment will quickly deenergize the powerline. In the previous ISM report, the ISM observed that following the implementation of a pilot EPSS program in 2021, PG&E made the decision to expand its EPSS program in 2022 to encompass all HFRA distribution circuits in its service territory. EPSS enablement is designed to reduce the risk of wildfires (which PG&E has indicated is one of its highest priorities). While PG&E's EPSS and its PSPS programs both provide the benefit of ignition and wildfire reduction, their use also correlates with increasing average customer duration of unscheduled and planned outages (in the event of EPSS and PSPS events, respectively) for its customers that can also result in other types of public safety concerns.

Due to the combination of reduced spending on reliability related capital programs in order to shift spending more towards wildfire mitigation programs (as was noted earlier in this report) and the introduction of EPSS, PG&E's average unplanned distribution SAIDI has more than doubled over the last five years, placing PG&E in the fourth quartile for reliability in comparison to other U.S. based electric utilities.²⁰

In the previous ISM report, the ISM observed that Energy Safety requested that PG&E take the following actions in Revision Notice #22-32 and Revision Notice #22-12: 1) explain how it will analyze EPSS deployment and modify settings; 2) reassess customer impacts associated with more widespread use of EPSS; 3) explain its EPSS customer impact mitigation plan; 4) detail its customer outreach plan; 5) present an EPSS staffing and resourcing plan; 6) detail an EPSS benchmarking plan; and 7) submit monthly EPSS data reports through the end of 2022. The ISM did not review PG&E submissions associated with these seven requests from Energy Safety as doing so would be unnecessarily duplicative in nature. The ISM has, however, tracked the data provided in the monthly EPSS data reports, conducted follow-up interviews with senior management, and requested and reviewed supplemental data to better understand root causes of certain types of EPSS related outages, restoration policies, and other actions that PG&E has been conducting through 2022 aimed at reducing the impact of these EPSS related outages on its customers.

From a wildfire mitigation point of view, the EPSS pilot program in 2021, which covered approximately 45% of the circuits in HFTD, saw a 74% reduction in CPUC reportable ignitions on EPSS enabled circuits as compared to the prior 2018-2020 three-year average. The 2022 program, which expanded coverage to all of the HFTD circuits, in comparison experienced 31 CPUC reportable ignitions on EPSS enabled lines in HFTD, which was a 68% reduction in CPUC reportable ignitions in HFTD where EPSS settings were enabled. Note that this 68% reduction

²⁰ EIA Annual Electric Power Industry Report, Form EIA-861 for 2021.



calculation for 2022 versus the 2018-2020 three-year average incorporates weather normalization such that PG&E did not include ignitions in the denominator (2018-2020 average) where, based on historical meteorology data, it estimated that it would not have had EPSS enabled given criteria in place at the same time of year in 2022.

Of these 31 reportable fire ignitions on EPSS enabled circuits in HFTD in 2022, all of the fire sizes were reported at less than 100 acres in extent, and PG&E's average response time for these 31 fire ignitions was 49 minutes.²¹ Across all of HFTD, including times when EPSS was both enabled and disabled, total CPUC reportable ignitions in 2022 were 89 versus the three-year average prior to the start of any EPSS enablement of 143.

For 2022, 574 PG&E circuits experienced a total of 2,375 EPSS outages, with approximately 2.1 million customer outages. The ISM observed that during the year, 58% of the customers (approximately 1.1 million) serviced by these EPSS enabled circuits experienced no outages, while 42% (approximately 770,000 customers) experienced one or more EPSS outage. Of these 770,000 customers, approximately 283,000 experienced only one outage, 365,000 experienced two to four outages, 131,000 customers experienced five to nine outages, and approximately 8,100 customers experienced ten or more outages, with one of the EPSS enabled circuits experiencing 20 EPSS outages in the year.

PG&E has been tracking EPSS outages experienced by customers with special sensitivity to outages. The ISM observed that of the approximate 2.1 million customer EPSS outages during 2022, approximately 135,000 of these customer outages were classified as Medical Baseline, 94,000 as Life Support, and 35,000 as Critical Customers. PG&E has also identified that there were 185 hospital EPSS outage events and 4,573 school EPSS outages during the year.

During the peak in September 2022, approximately 37,000 distribution miles were EPSS enabled on approximately 760 circuits, covering a peak of just under 1.3 million customers at any one time. In addition to covering circuits in the HFTD and HFRA areas, in September 2022, PG&E also approved enabling EPSS in an EPSS buffer zone under minimum fire potential conditions, where a fire, up to one mile distance outside the HFRA boundary that traverses burnable fuels, has the potential to spread into a high fire threat district.

Additionally, during 2022, to enhance its EPSS program, PG&E also began implementing two new technology operational mitigations: 1) Partial Voltage Detection (PVD) — a Smart Meter alarm notification automatic service to distribution control centers, and 2) Downed Conductor Detection (DCD) — a protective relay enhancement.

PVD detects low voltage service to customers using PG&E's SmartMeter network, which covers approximately 90% of HFRA miles. The use of PVD was initiated in June 2022, and a total of 36 partial voltage outages were experienced with an average response time of 11 minutes through the end of 2022.

DCD uses electrical sensor information and software to identify the presence of specific

²¹ Internal PG&E report.



electrical characteristics (or patterns) produced by arcing conductors with the earth’s surface, thus initiating trips on circuit interrupting devices. A total of 16 DCD outages occurred in 2022. At the end of 2022, PG&E had DCD capability on 411 devices covering 5,372 miles (of which approximately 3,700 miles are in the HFRA), with plans to add 507 additional devices in 2023 and an additional 595 devices in 2024. This would increase the HFRA coverage to approximately 20,500 HFRA miles where DCD enablement is feasible. Prioritization of the DCD implementation is being based on the WDRM V3 risk model.

Table 1 provides an overview of the 2,375 EPSS outages broken down by identified cause, and Figure 4 provides a breakdown of the cause type as a percentage each month for the more active May to November period. As seen in Table 1 and Figure 4, nearly half of the outages occurred without an identified cause, with all cause types generally seeing a consistent percentage throughout the year.

Table 1. EPSS Outages by Cause–2022²²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD	Percent
3rd Party			1	1	9	42	38	40	43	39	12		225	9.5%
Animal			1	4	16	67	76	86	61	71	9		391	16.5%
Company Initiated					8	15	15	25	19	18	6		106	4.5%
Environmental/External						4	1		3	1	3		12	0.5%
Equipment				2	28	60	28	58	75	24	18		293	12.3%
Unknown	1		1	12	63	170	180	208	226	139	77	6	1083	45.6%
Vegetation				4	15	59	43	39	61	28	14	2	265	11.2%
	1		3	23	139	417	381	456	488	320	139	8	2375	

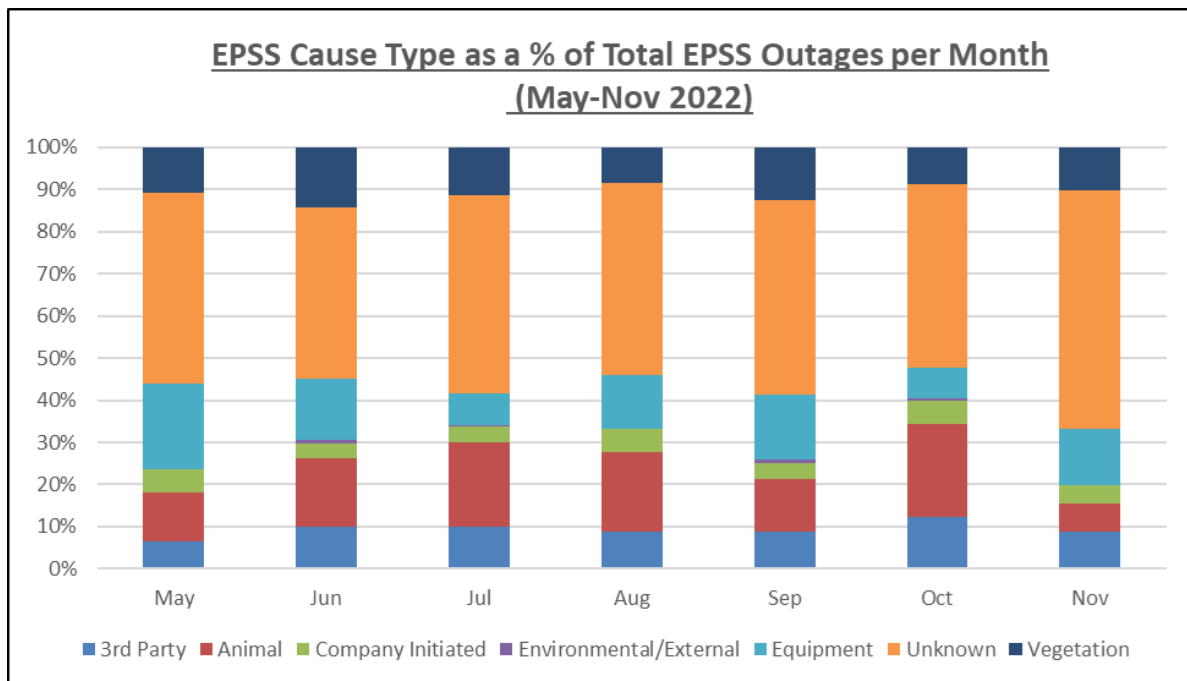


Figure 4. EPSS Outages by Cause – May through November 2022²³ (calculated as %)

²² PG&E report to CPUC.

²³ Ibid.



In an interview with the ISM, PG&E personnel described that the 45.6% “Unknown” cause for EPSS outages in 2022 was approximately 10% higher than what normally is experienced for outages with no cause attribution on these same lines without EPSS enablement. PG&E personnel indicated that the likely causes for most of the “Unknown” EPSS outages are bird, animal, or tree branch contacts where the patrols are unable to find any evidence of such contacts.

Non-EPSS enabled circuits normally have auto-reclosing enabled. This assists in reducing the number of “Unknown” outages in two ways. While momentary contacts from bird, animals, or tree branches might cause an EPSS circuit to trip and lead to an “Unknown” cause determination, if the same brief contact occurs on a non-EPSS enabled line, these lines would auto-reclose and quickly restore service, with no evidence of the contact. With auto-reclosing, blown fuses also allow for sectionalizing of the faulted area. Such sectionalization, along with the use of fault indicator sensors, can narrow down the area that needs to be patrolled and searched for a cause, increasing the opportunity for PG&E to identify the source of the power interruption.

PG&E personnel also indicated that additional targeted vegetation management (as described later in this report) on EPSS enabled circuits should help reduce both vegetation contact (11.2% of 2022 EPSS outages) and “Unknown” cause EPSS outages in the future, as will their efforts at focusing future tree work on species that are more prone to shed branches in higher winds. Finally, PG&E personnel indicated that the EPSS group has been allocated an additional \$50 million in funding. This additional funding will be directed to targeted vegetation management and other activities aimed at reducing “Unknown” outages (e.g., avian guards, critter animal protection) as well as other customer resilience activities such as battery purchases.

Further information regarding PG&E’s new Vegetation Management for Operational Mitigation program aimed at reducing vegetation caused outages on EPSS enabled circuits, as well as the ISM’s investigation into the root causes behind EPSS outages attributed to company initiation (4.5%), are presented later in this report.

As was noted in the prior ISM report, given the increase in EPSS-enabled miles, the change in EPSS enablement criteria, and the projected increase in customer impact as a result of increased usage of EPSS in 2022, the ISM requested information on the cost/benefit analysis behind the decision-making process. PG&E noted that while it had originally calculated a Risk Spend Efficiency²⁴ (RSE) for EPSS settings of approximately 103-105 (based on the 2021 EPSS pilot data of ignition reduction), PG&E had not conducted any updated RSE calculations prior to implementing its EPSS enablement criteria changes in June 2022. PG&E noted that it was awaiting the conclusion of the 2022 full expansion year before recalculating a new RSE for the

²⁴ Risk Spend Efficiency (RSE) is a calculation of the net present value of ((Risk Reduction X Lifetime of Benefit) / Total Cost); similar to a cost/benefit analysis. Additional information on PG&E’s approach for computing RSE for wildfire mitigations measures can be found in section 7.1.4 of its 2023 WMP. PG&E’s 2023 General Rate Case Prepared Testimony Exhibit 4 Table 3-3 includes RSE scores for its distribution wildfire mitigation initiatives. As a point of reference, Table 3-3 lists an RSE of ~6 and ~5 for overhead hardening and undergrounding, respectively.



expanded and modified program.

During the current ISM reporting period, PG&E completed the updated RSE analysis and has indicated that its updated RSE for EPSS is now calculated at approximately 171, based on 2022 EPSS data and forecasted end-of-year program financials. PG&E has attributed this change in RSE primarily due to lower outage reliability impacts than originally forecast, and projected 2022 program costs coming in lower than forecasted in the 2023 General Rate Case Supplemental Filing and 2022 Wildfire Mitigation Plan (WMP).

EPSS Response and Restoration Times

During the current ISM reporting period, PG&E reported²⁵ that on average 877 customers were impacted by each of the 2,375 EPSS outage events in 2022. With each EPSS outage, PG&E has been able to restore many of its customers earlier in the restoration process based on the event location being narrowed and isolated, with the remaining customers having to remain without power for the full duration of the restoration process. PG&E has reported that for 2022 its overall EPSS Customer Average Interruption Duration Index (CAIDI) was 173 minutes, meaning that for the 2.1 million EPSS customer outage experiences, the average restoration time was just under three hours.

As seen in Table 2 and in Figure 5, over the course of 2022, PG&E was able to reduce both the average time to restore 100% of the customers who experienced an EPSS outage (“Full Restoration Time”) and the average EPSS outage time experienced by a customer (“EPSS CAIDI”).

Table 2. 2022 EPSS Outages²⁶

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD
EPSS Outages	1		3	23	139	417	381	456	488	320	139	8	2375
Avg. Full Restoration Time/EPSS outage (min)	284		521	409	407	431	327	326	343	291	368	96	
EPSS CAIDI (min)	187		209	199	212	193	182	177	164	151	166	87	
CESO/EPSS Outage	129		405	509	715	928	906	970	968	701	692	467	
Count of Full Restoration Times > 12 hours			1	3	24	70	50	43	65	38	23	1	318
As a % of EPSS outages					17.3%	16.8%	13.1%	9.4%	13.3%	11.9%	16.5%	12.5%	13.4%
Count of Full Restoration Times <=60 min			1	2	9	20	30	25	40	25	21	5	178
As a % of EPSS outages			33.3%	8.7%	6.5%	4.8%	7.9%	5.5%	8.2%	7.8%	15.1%	62.5%	7.5%

²⁵ PG&E report to CPUC.

²⁶ Ibid.

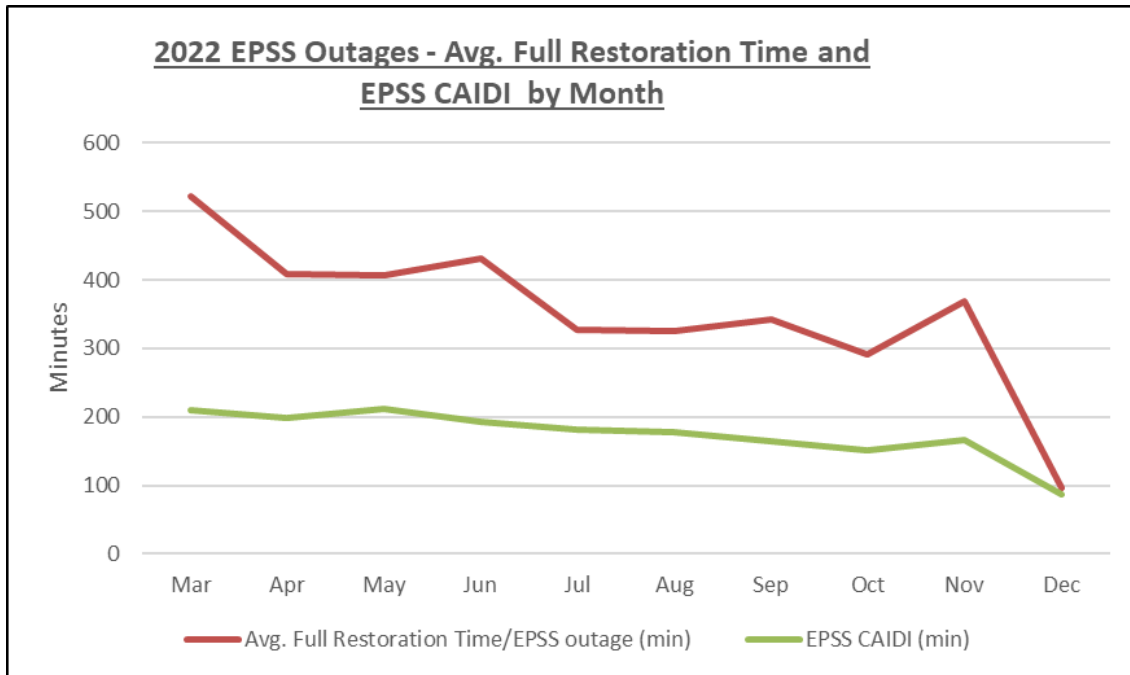


Figure 5. 2022 EPSS Outages – Average Full Restoration Time and Average CAIDI²⁷

One of the contributors in achieving more rapid restorations was the expanded installation of fault indicators, which allows the patrolling personnel to more quickly identify the section of the line which was the location of the EPSS outage.

Another contributing element to this trend was PG&E’s efforts over the course of the year to reduce the time it took for its staff to respond to the outages and have personnel on site to investigate the cause of the outage, and if required, to patrol the impacted distribution lines. PG&E set a target at the beginning of 2022 to have its personnel on site within 60 minutes of the EPSS outage in excess of 80% of the time. PG&E was able to meet its target, with a 2022 average of 88% of responses meeting this 60 minute or less target.

During the early months of the year, several divisions were unable to consistently meet this target, with reasons for failing to meet the target cited as extended travel times (employees not being in the vicinity of the location or stationed near remote areas), difficult terrain, resource constraints and crew availability, or staff not responding until morning for outages that occurred during the night, which as previously noted was experienced in the early months of the year and has been mitigated. In order to improve average response time, PG&E undertook root cause analysis with each of the underperforming divisions and came up with specific plans to improve performance. Prior to the introduction of the root cause analyses (RCA), the average restoration time was 188 minutes; post-RCA, the average restoration time was reduced to 157 minutes with more uniform consistency across all operating divisions in achieving the targeted response time.

As part of its review, the ISM performed monitoring activities to determine whether there were

²⁷ Ibid.



any trends in longer restoration times in excess of 12 hours duration. As seen in Table 2, the monthly figures fluctuated evenly around the annual 13.4% level. As part of its monitoring, the ISM also reviewed the circumstances behind several of the longest duration outages. In September 2022 the ISM selected 15 longer duration outages (the ten longest plus the next five longest animal and third party caused outages), ranging from 20 hours to 10 days, for review and requested from PG&E a description of the circumstances behind each of the restorations. The information provided by PG&E from the related data request²⁸ indicated many of the long duration outages involved unique circumstances of weather, access, rugged terrain, and fire activity.

The ISM also noted that, on average, 7.5% of the outages on EPSS enabled circuits were fully restored within 60 minutes. In order to understand PG&E's restoration procedures, the ISM requested and reviewed PG&E's EPSS outage patrol and restoration procedures. The ISM observed that effective in November 2022 PG&E amended its EPSS restoration procedure. A change which was included in this new policy is, *"IF picking up or dropping load during planned switching is determined to be the cause of the EPSS outage, THEN the DO [Distribution Operation] may restore the outage without conducting a patrol."*²⁹ Under the original policy, all EPSS outages required patrolling. This change allows PG&E the ability to restore these specific outage instances faster.

To monitor the rapid EPSS outage restorations and to observe whether PG&E followed its EPSS restoration procedures, in September 2022 the ISM also requested that PG&E provide a description of the circumstances behind 20 short duration EPSS outages (the 15 shortest plus the next four shortest of "unknown" cause plus the shortest vegetation caused outages), ranging from 7 to 37 minutes.

The information provided by PG&E from this data request indicated that EPSS restoration procedures were not followed in one of the selected restorations for an "Unknown" cause outage. PG&E indicated that this incident occurred early in the 2022 EPSS season, and that the operators inadvertently followed the normal restoration procedure, which did not require a physical patrol of the line in that circumstance.

After PG&E's further investigation of the selected EPSS related outages, PG&E removed three "Unknown" cause outages from the EPSS outage list, citing two instances as incorrect flagging of the outage in its system, and noting that one outage occurred after EPSS-disable instructions were issued, but before the circuit was actually EPSS disabled.

As a follow-up, the ISM also requested information on how PG&E records incidents where EPSS restoration procedures were not followed. PG&E provided copies of its logs for such events, and an example of a Corrective Action Plan (CAP). One other incident was noted in the logs where the EPSS restoration procedure was not followed in October 2022. In this instance, the ground patrol only took place within HFTD, whereas the procedure required patrolling the protection zone both within and outside HFTD. The CAP for this incident involved the issuance

²⁸ Data request response received from PG&E.

²⁹ Ibid.



of supplemental documentation to the inspection group, and discussions with the specific operator and supervisor.

Company Initiated EPSS Outages

During the current ISM reporting period, the ISM also requested a description of the circumstances behind 65 EPSS outages that were identified as “Company Initiated”. These outages were further subdivided into the eight categories included in Table 3.

Table 3: Company Initiated EPSS Outages through 9/5/2023³⁰

CI	65
Construction Activity/equip, company	12
Contact with High Voltage, company	1
Coordination failure	18
Dig in, company	1
Improper Construction	1
Operating error	5
Personnel, company	25
Return Circuit Normal	2

The information provided by PG&E from the related data request³¹ indicated that PG&E was aware that its staff and operations were the cause of the outages. Restoration times in these instances were much quicker (average CAIDI of 103 minutes) since in many instances staff were already on site. In three instances, after further review, PG&E indicated that it was changing the cause from “Company Initiated” to “Unknown”. These company-initiated outages were cited as the cause for 4.5% of the EPSS outages during the year and the number of these types of outages remained between 4% and 6% each month throughout the year.

During interviews with the ISM, PG&E staff noted that they do not expect the number of company-initiated outages to decrease in the future. This is because most of the outages occur during tap line work where planned clearances which require dropping or picking up customer load as work progresses (or is completed) causes the EPSS protective device to trip due to the sensitivity of the setting. When doing normal switching operations, however, PG&E indicated that it disables EPSS in advance in order not to cause an outage.

The ISM will continue to monitor response/restoration times and resource allocations, as well as their combined impacts on customer outage durations as the EPSS program continues.

INFRASTRUCTURE OBSERVATIONS

Distribution Inspections

In the previous ISM report, the ISM stated that for the past three years, as part of its annual WMP commitments, PG&E has been inspecting 100% of all HFTD Tier 3 distribution structures

³⁰ Ibid.

³¹ Ibid.



annually, and one-third of its HFTD Tier 2 structures, as part of a three-year inspection cycle that began in 2020. For each of these past three years, PG&E's WMP commitment was to complete its HFTD inspections by July 31 of the respective year. In the previous ISM report, the ISM reported that in 2022, due to inspections not beginning until March, delays in transitioning to a single party contractor, and contractor related delays, PG&E was required to increase its inspection volume from approximately 15,000 inspections/week in April 2022 to a peak of 40,000 inspections/week by July 2022 in order to meet its July 31 WMP target. This push to meet its WMP target date also required PG&E to rapidly expand and train its contractor workforce active in the HFTD areas from 188 inspectors in April to 374 in July. With these additional contractors, and with many contractors working several weeks without interruption during June and July, PG&E reported that it achieved its WMP distribution inspection target in the final week of July.

Both PG&E and the ISM are conducting further analysis on the effectiveness of the inspection program in being able to reduce wildfire risks, and on the rates with which both PG&E's employees and its contractors have been able to identify conditions that could lead to equipment failure and/or ignition risk. This ongoing work by the ISM includes the impact that rapid escalations in inspection rates, such as what occurred in 2022, may have had on deficiency identification rates. The ISM anticipates being able to present the results of both PG&E's internal analysis, as well as its own independent observations, in its next ISM report.

For 2023, PG&E is implementing several distribution inspection program modifications that are expected to help reduce increases to short term staffing like those experienced in 2022. These include shifting to a more risk-informed approach to its inspection planning and spreading out inspections of its HFTD inspections throughout the entire calendar year period.

PG&E's latest plan presented to the ISM is to conduct ground inspections on a total of over 230,600 higher-risk HFTD distribution structures in 2023, which is a reduction from the roughly 398,000 HFTD structures which received ground inspections in 2022. Aerial drone inspections, which covered approximately 7,000 HFTD structures in a 2022 pilot program, are currently planned to increase to 37,000 higher risk HFTD structures in 2023.

In addition to reducing the number of structures planned for inspection in 2023 (while increasing the 'eyes on risk'³² level from 55% in 2022 to 60% in 2023), PG&E is also intending to expand the time frame over which its HFTD inspections will be conducted. In 2023, PG&E intends to inspect those HFTD structures with wildfire consequence risk scores³³ classified as extreme, severe, and high (collectively, approximately 42,400 structures) by July 31, those classified as having a medium risk (approximately 30,000 structures) by September 30, and those classified as having a low risk (approximately 162,000 structures) by December 31. PG&E informed the ISM that changes to the 2023 workplan were driven by observations,

³² "Eyes on risk" refers to the percent of the cumulative risk score of the Distribution assets in HFTD which were inspected by ground or aerial drone.

³³ Wildfire consequence risk scores are generated by the Wildfire Consequence Model, which is a historically calibrated model that estimates the impact and consequences of an ignition and fire spread at relevant PG&E infrastructure locations. The model relies on historical fire damage, simulations of fire propagation, and the Fire Potential Index Model, which incorporates weather and fuel conditions.



feedback, and cross-functional deep-dives with internal and external stakeholders. The ISM will provide observations on the 2023 inspection program as it progresses throughout 2023. The Wildfire Consequence Model (a component of PG&E's Wildfire Distribution Risk Model) calculates the estimated impact and consequences of an ignition at relevant PG&E infrastructure locations. The model relies on historical fire damage, simulations of fire propagation and the Fire Potential Index (FPI) Model.

The risk-classified structures will also be placed into their own cycles, regardless of which HFTD Tier they are located in. Those classified as having extreme or severe wildfire consequence scores will be inspected by ground every year, those classified as high risk will receive ground inspections every other year, and those classified as low risk will receive ground inspections every three years. As PG&E continues to expand its aerial drone program, its intention is to have the extreme and severe risk areas aerially inspected every year, the high-risk areas inspected every other year (in the off-year of the 2-year ground inspection cycle) and every three years for low-risk areas (also in-between ground inspection years).

The previously referenced aerial drone inspection program was piloted in 2022. The implementation of the expanded program in 2023 will continue to be a point of observation for the ISM in the coming months.

Through a combination of PG&E's eyes on risk levels, reduced number of HFTD structures being inspected in 2023, and by spreading out the inspections over the course of the year, PG&E anticipates being able to rely on more of its own employees to conduct the majority of its HFTD ground inspections. Since PG&E's employees are also able to immediately make many types of repairs in the field as they inspect (contractors can only make limited repairs), PG&E anticipates this current schedule will allow for a more rapid correction of certain conditions.

EVOLUTION OF THE VEGETATION MANAGEMENT PROGRAM

EVM Program History

EVM was initiated by PG&E in 2019 as an additional vegetation management program to reduce the risk of vegetation caused fire ignitions from energized distribution power lines.

Prior to 2019, PG&E had three core VM resiliency programs: Routine Vegetation Management (compliance driven), Mid-Cycle Patrols (Tree Mortality), and Pole Clearing. In 2019, EVM was introduced targeting greater radial clearances, substantially greater overhang clearances, and enhanced strike tree removal in HFTD areas.

As seen in Table 4, the EVM program has worked on over 1.1 million trees over the past four years, with an annual minimum target of approximately 1,800 miles per year. As a result of PG&E being placed into Step 1 of the CPUC's Enhanced Oversight, PG&E shifted to a more systematic approach by having its annual plans executed in a more risk-informed manner. Table 4 reflects how, as PG&E's wildfire risk models evolved over time, and the company began to introduce tree weighting into its risk ranking determination, the number of trees worked and the average trees per mile have increased in recent years.



Table 4: PG&E EVM Inspections³⁴

YEAR	HFTD MILES COMPLETED	INSPECTED STRIKE POTENTIAL TREES	TREES WORKED	AVG. TREES PER MILE	% OF MILES IN TOP 20% OF RISK	ACTUAL SPEND	AVG. UNIT COST (TREES)
2019	2,498	836,949	200,390	80	55%	\$470.4 (M)	\$2,348
2020	1,878	1,092,800	167,765	89	43%	\$451.4 (M)	\$2,691
2021	1,983	1,149,581	335,543	169	97.8%	\$770.4 (M)	\$2,296
2022	1,924	1,519,099	396,502	206	99.5%	\$816.9 (M)	\$2,060
TOTAL	8,283 <small>32% of total HFTD miles</small>	4,598,429	1,100,200				

EVM work during 2021 and 2022 was guided by risk ranking from PG&E’s tree-weighted prioritization to Version 2 of its Wildfire Distribution Risk Model (WDRM V2). Version 3 of the WDRM model (WDRM V3), which contained numerous enhancements, and which resulted in shifting of the risk rankings of the company’s circuit segments from Version 2 (both of which were described in the previous ISM report) was not approved for use until April 2022³⁵. According to PG&E, the decision to use the Version 2 tree-weighted prioritization for 2022 was for consistency and planning purposes.

The 2021 EVM plan required PG&E to focus its EVM work on distribution circuit segments ranked from 1 to 100 by the tree weighted WDRM V2 model. In addition, the company also included nine lower ranked circuit segments selected due to prior community commitments or ignition potential. PG&E’s 2022 EVM plan continued its progression through the risk ranking, focusing on circuit segments ranked from 101 to 253 using the same model. In addition, PG&E’s 2022 EVM plan included 12 lower ranked circuit segments selected due to recommendations from PG&E’s local public safety specialists due to ignition risk potential. The ISM reviewed the actual EVM miles performed in both 2021 and 2022 and confirmed that PG&E’s work was performed in accordance with these plans.

In performing its EVM, and with the increase in tree removal volume, PG&E informed the ISM that it had experienced an increase in negative customer interactions. PG&E also reported that the higher volume of customer refusals from its increased tree work was impeding its ability to reduce risk associated with removing identified hazard trees. To address the issue, PG&E stated that it implemented a centralized constraints resolution team to oversee identification and ultimate resolution of constraints. In the first year of this effort in 2021, PG&E reported that it had successful resolution of approximately 390 miles that had previously been constrained. Using lessons learned from program implementation, PG&E reported that it was able to increase its constraint resolution to approximately 703 miles in 2022.

³⁴ Internal PG&E presentation.

³⁵ See “E3 Review of PG&E’s Wildfire Risk Model Version 3” for additional information on PG&E’s WDRM. Access document via: <https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=53553&shareable=true>



In order to address these customer interactions, and as a result of the effectiveness of newly introduced wildfire mitigation programs such as the EPSS program which was implemented across all of its HFTD service territory in 2022, PG&E elected to end its EVM program at the end of 2022. As described in the following sections, PG&E has indicated that its preferred approach is to: 1) continue to rely on new programs such as EPSS, which it believes is more effective at reducing wildfire risk, 2) continue to evolve its existing routine vegetation management programs, and 3) replace EVM with more targeted vegetation management programs.

Effectiveness of EVM Compared to EPSS

PG&E provided the ISM with an internal analysis comparing the historical effectiveness of its EVM and EPSS programs which are both aimed at reducing ignitions. The ISM's initial observations generated questions regarding the analysis and the methodology utilized to evaluate the effectiveness of vegetation caused ignition reduction across both programs. As a follow-up, the ISM has requested a review of a third-party assessment of this analysis which was commissioned by PG&E as well as a more in-depth review of the analysis with PG&E personnel.

Replacement Vegetation Management Programs

With the evolution away from EVM, PG&E proposed to modify its existing routine vegetation management program and identify targeted areas in a risk-informed manner; however, as of the date of this report, the existing routine VM program remains in effect within the HFTD.

The ISM will be monitoring how PG&E intends to adjust its routine vegetation management programs in areas that have recently been covered as part of the EVM program and have received enhanced clearing beyond that which is required under the current routine program. In addition, PG&E is also proposing three new vegetation management programs for 2023: 1) Vegetation Management for Operational Mitigation (VMOM), 2) Focused Tree Inspections (FTI), and 3) Tree Removal Inventory (TRI). PG&E reports that these programs are intended to assist in the reduction of outages and potential ignitions using a risk-informed, targeted plan to mitigate potential vegetation contacts based on historic vegetation outages on PG&E circuits.

The objective of VMOM program is to reduce customer impacts due to vegetation outages on EPSS enabled devices in the following prioritizations:

- Tranche 1: Work in Progress (approximately 4,500 trees).
- Tranche 2: Based on 2023 EPSS outages (tree numbers TBD based on 2023 activity).
- Tranche 3: Customer impact with EPSS Customer Experiencing Multiple Interruptions (CEMI) of eight or more outages (approximately 9,000 trees).

The FTI program prioritizes miles based on areas of concern – specifically miles associated with increased vegetation related outages and/or including particular tree species. PG&E



approved an initial 300-mile, risk-ranked pilot program for 2023. Depending on the results of the pilot, it could authorize additional miles of FTI through the balance of 2023.

The TRI focuses on an inventory of approximately 385,000 trees at the end of 2022 that have been identified and previously assessed using PG&E’s Tree Assessment Tool (TAT) or during an EVM inspection prior to the use of the TAT. Of these trees, approximately 176,000 trees would be removed based on the prior TAT “ABATE” result, and approximately 209,000 non-ABATE trees are in the process of being re-inspected by a Tree Risk Assessment Qualified (TRAQ) inspector. Additionally, PG&E indicated that the trees will be worked based on priority using their WDRM V3 model, with a target of removing 15,000 of these trees in 2023 and increasing incrementally in subsequent years.

FIELD REVIEW OF INSPECTIONS

In the previous ISM report, the ISM documented observations regarding in-field reviews of approximately 500 electric distribution structures and over 200 miles of PG&E’s EVM inspected circuits in HFTD areas which had been inspected by PG&E in 2022.

The ISM continued to observe PG&E’s vegetation management and system inspections through the end of the 2022 year. Observations from this reporting period are included in the following section.

Observations of PG&E’s Distribution Inspections

As represented in Figure 6, the ISM conducted field observations on over 1,100 structures in 2022. Of the structures observed, approximately 20% had at least one observation that was not identified by PG&E’s inspection team which, according to PG&E, is consistent with what their own quality verification team found. The top four types of observations identified by the ISM team, but not identified by PG&E (i.e., inconsistencies) were: 1) pole broken, damaged, burnt, deformed, corroded, gunshot, or showing signs of cracking, rotting or decay; 2) conductor with splices tied in proximity to insulator preventing free movement of splice with conductor; 3) down guy above insulator overgrown with vegetation and in need of trimming; and 4) tree causing strain or abrasion to single-service drop (open wire/triples/quad)³⁶.

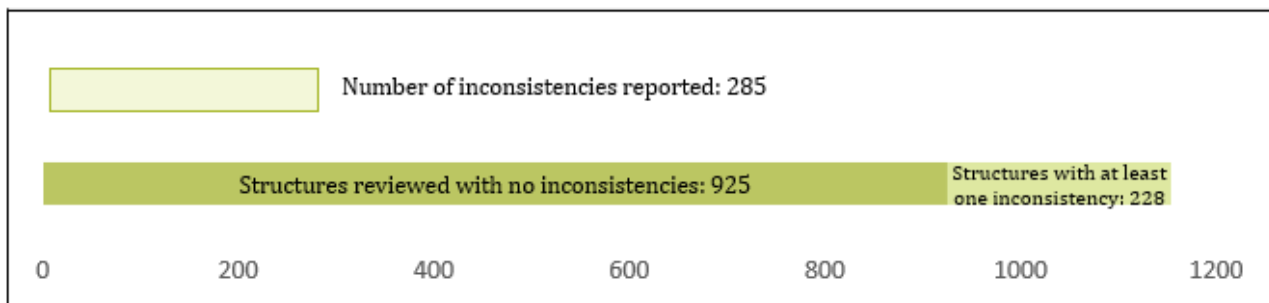


Figure 6. 2022 ISM Identified Observations of PG&E’s Distribution Inspections

³⁶ The types of observations identified come from a PG&E specific form the inspectors use in the field.



As noted in the previous report, observations #1 and #2 identified above align with PG&E's most commonly occurring identification failures during their own quality verification process. These top four types of observations that were not identified by PG&E make up one-third of all such observations identified by the ISM. PG&E informed the ISM that it is revising its Job Aid and training to reduce the subjectivity associated with observation #1 and amending the inspection question related to observation #2 to identify splices tied into the insulator or splices in contact with the tie wire, preventing free movement of splice with the conductor.

PG&E believes the above actions will provide inspectors with more specific questions and reduce the potential subjectivity resulting in failed identification. PG&E indicated it will be holding additional reviews to align on ISM observations, which may lead to further clarifications and updates to observations based on PG&E standards and procedures.

Observations of PG&E's EVM Program

The ISM conducted field observations on a relatively small sampling (approximately 350 miles) of PG&E 2022 EVM worked miles. Of the miles observed, there were 61 trees observed as potentially requiring trimming or removal that were not identified by PG&E's inspections. According to PG&E calculations based on historical data, this would have resulted in an estimated find rate of 0.04% when comparing ISM observations to mileage reviewed. Of the identified inconsistencies, 11 were radial clearance trees (i.e., branches breaching the specified clearance distance around the equipment) and three were overhang trees (i.e., branches overhanging equipment which could result in contact with the equipment if the branches fell). The remaining 47 were identified as hazard trees (i.e., trees that pose a risk to equipment due to location, disease, or dying); Ponderosa Pine and Blue Oak species were identified 75% of the time.

Observations of PG&E's Routine VM Program

With the ending of the EVM Program, going forward the ISM plans to place additional focus on routine VM inspection, including both the changes in the routine program and the quality of PG&E routine inspections.

RISK MODEL UPDATING

In the previous ISM report, the ISM discussed the considerable refinement of PG&E's wildfire risk models over the past five years, (e.g., incorporating such things as advanced machine learning, the introduction of increasing sources of historical ignitions, greater geographic granularity and environmental inputs, updated ground fuels, and the use of more advanced wildfire spread and consequence formulation over time).

While the wildfire model enhancements are allowing PG&E to better target its wildfire mitigation efforts to areas deemed higher in risk for wildfire, as was detailed in the previous ISM report, the company has been seeing considerable variability in the risk ranking of its distribution circuits between Version 1 (2019), Version 2 (2021) and Version 3 (2022) of its



Wildfire Distribution Risk Model (WDRM). With these historical large changes in circuit risk ranking, some of the earlier wildfire mitigation work that was prioritized based on earlier versions of the risk models was later seen to have been done on circuits and circuit segments that later versions of the model were showing as having lower risk.

This historical shifting of risk rankings had impacts related to system hardening planning, where it may take several years to scope, estimate, and permit the work. With this approach, by the time a project is ready for construction, the latest version of the risk model may have confirmed, or substantially increased or decreased the risk rank of these circuit segments from when they were originally selected for system hardening. In the past, when updated models generated what PG&E considered to be significantly lower risk rankings for system hardening work that was already in the planning and permitting phase, PG&E elected to abandon and expense certain pre-construction system hardening projects. During this ISM reporting period, PG&E adjusted this policy and now continues with an approved system hardening project to completion, regardless of any subsequent risk recalculation, and does not abandon and expense any in-process preparatory work.

As PG&E prepares to release its WDRM V4 model (projected for presentation/approval in April 2023), the ISM has been monitoring the further enhancements that are being introduced to the model, and their potential impact on future risk rank volatility.

Two of the more substantive changes to the risk model, requested by Energy Safety for inclusion in the 2023 WMP, are the introduction of an egress and a wildfire suppression modifier to the wildfire consequences portion of the model. These elements are being introduced into the wildfire risk models of two other large California utilities, and these initial modifiers are to be used as a starting point for collaboration with Energy Safety and the other utilities as a unified approach to egress and fire suppression modeling is developed.

Egress is the evacuation of people who must evacuate a fire, and the egress calculation includes fire burn area relative to populated areas. PG&E's egress modifier is based upon resident mobility impacts rather than road egress as PG&E's analysis of historical data determined that age and disability were stronger correlating factors than road egress. After analyzing several population variables, PG&E elected to use the fraction of population over 80 as a proxy for mobility issues.

Wildfire suppression is the difference in area burned and structures destroyed between an unsuppressed wildfire and a wildfire with human intervention. It is a measure of the likelihood, feasibility, and effectiveness of firefighting after an ignition event, and includes ingress considerations (i.e., the ability for fire resources to access an area). PG&E has stated that the challenge to modeling wildfire suppression is that it is impossible to acquire real world data for model development, and that consequence adjustment development relies on "what if" modeling of non-suppressed fires initiated at locations of historical fires with highly variable interventions. After reviewing several options, PG&E has elected to incorporate a feature called the Terrain Difficulty Index, which is a composite index that integrates data on topography, terrain, and road networks.



PG&E's preliminary modeling results shared with the ISM have shown that the egress and wildfire suppression modifiers both exhibit higher consequence scores in areas already being modeled as having high consequence scores in the prior version of the model. PG&E is projecting that the adjustments to risk rankings are expected to be relatively small after introducing these two new modeling elements.

In addition to the two new wildfire consequence modeling elements noted above (plus the introduction of climate forecasting and community vulnerability which the ISM has not yet had an opportunity to review), WDRM V4 is also introducing several new features in calculating the probability of ignition. These include more granularity on equipment failures (e.g., capacitors, switches, and voltage regulators) as well as additional contact from object drivers.

While the ISM has not yet seen how these new features may change the probability of ignition risk ranking, the ISM is not expecting the overall risk score (which multiplies the probability of ignition score with the consequences of ignition score) to show the same degree of volatility in circuit segment risk rank changes as has been seen between prior versions of the models. This is due to consequence scores having been scaled, such that they have a much larger influence on the combined risk scores. The lower projected volatility of the consequence scores, after taking the new egress and fire suppression modifiers into consideration, should therefore result in a lower volatility of the combined risk scores in WDRM V4.

PG&E has also shared with the ISM certain modeling limitations that continue to exist, and the list of improvements that are in progress. Modeling limitations include missing data attributes (e.g., missing asset age, secondary conductor type, conductor splice count, transformer electrical loading for prior year), missing outage information (e.g., exact location, cause unknown, equipment type failed) and missing ignition information (e.g., sub-cause, equipment type).

Other upcoming model improvements that have been noted by PG&E include:

- Asset Failure Data Collection – improvement of asset failure location and cause/sub-cause information.
- Foundry Asset Failure Investigation Tools – automatic correlation and trending information of failed assets from multiple sources and creates an asset failure database.
- Import of previously collected inspection data to their GIS mapping system – incorporation of asset attributes such as non-exempt equipment locations (e.g., surge arresters) and splices into GIS so that it can be leveraged for modeling purposes.
- LiDAR Conflation – improvement of asset information for secondary voltage conductor network that operates at less than 600 volts, and includes open wire, triplex, and quadruplex type of conductors.

GAS OPERATIONS OBSERVATIONS



PG&E is the owner and operator of one of the largest natural gas transmission and distribution systems in the United States. PG&E operates an integrated transmission, storage and distribution system comprised of over 6,000 miles of backbone and local transmission pipeline, three gas storage facilities and over 40,000 miles of distribution pipeline. PG&E's gas operations have been under external oversight and scrutiny since the San Bruno pipeline explosion in 2010. During the period of heightened regulatory oversight, PG&E was required to change and/or implement several policies, programs, and processes to enhance gas operation integrity and increase public safety. The ISM has and continues to perform various monitoring activities supporting regulatory oversight of these policies, programs, and processes.

GAS STORAGE OPERATIONS

In the previous ISM report, the ISM provided observations associated with: 1) interviews with PG&E leadership and personnel within gas storage operations; 2) meetings regarding various gas storage operations; 3) ISM site visits to each of PG&E's three gas storage facilities (McDonald Island, Los Medanos, and Pleasant Creek); 4) review of PG&E gas storage risk models, procedures, policies, and programs; and 5) review and analysis of gas storage well conversion and direct casing inspection operations.

During the current ISM reporting period, the ISM interviewed members of the PG&E gas storage group. During this interview, the ISM was informed that the PG&E Pleasant Creek gas storage facility is in the process of asset transfer to a third party. PG&E anticipates that the asset transfer will require at least six months of regulatory approval to complete.

During the current ISM reporting period, the ISM continued: 1) interviews with PG&E leadership and personnel within gas storage operations; 2) attending meetings regarding various gas storage and/or operations; 3) performing ISM site visits to three of PG&E's gas transmission facilities (including Delevan and Bethany compressor stations and Brentwood terminal); 4) performing reviews of PG&E gas operation's program, policy, and risk assessment documents; 5) review and analysis of gas storage well conversion and direct casing inspection operations; and 6) review of certain components of PG&E's Tee Cap Replacement Program.

Gas Operational Changes

In the previous ISM report, the ISM reported PG&E's installation of a new SVP of Gas Engineering, and that PG&E was reviewing the gas operation's organizational structure, budget, and headcount. During the current ISM reporting period, the ISM held follow up discussions with the SVP of Gas Engineering, who indicated that the gas storage asset group was adjusting to operational changes in group leadership and improving internal and third-party vendor wellbore conversion and inspection resource availability. Further, the SVP of Gas Engineering reported completion of implementing organizational structure changes and obtaining approval to hire additional required gas operation staff.

As reported in the previous ISM report, PG&E's gas storage operation's minimal staffing



allowed continued coverage of required daily gas storage operations; however, it delayed performing gas storage employee training. During the current ISM reporting period, members of the PG&E gas storage group informed the ISM of effort to hire four additional professional team members and efforts to add web based professional training courses leveraging PG&E SME training advisory support. The professional training is expected to include both operational and regulatory compliance instruction. The ISM will continue to monitor PG&E's gas storage operational requirements and review delays performing the gas operations training.

Gas Storage Wellbore Conversions

During the previous ISM report, the ISM observed that PG&E's most recent wellbore conversion schedule included conversion of all remaining gas storage wellbores to a tubing and packer configuration with gas flow through tubing with 21 conversions scheduled for 2023 and 19 scheduled for 2024. During the current ISM reporting period, PG&E reported that three well service rigs have been contracted to perform the 2023 wellbore conversions to be completed by November 2023. The ISM also confirmed the "California Geologic Energy Management Division" (CalGEM) requirement for PG&E to perform wellbore direct casing inspections on a 24-month interval. During the current ISM reporting period, the ISM performed additional interviews with gas storage management. PG&E indicated that all CalGEM required gas storage wellbore initial direct casing baseline inspections with the magnetic flux leakage (MFL) direct contact tool will be completed by the end of 2023.

CalGEM has previously required at least two wellbore direct casing baseline inspections prior to considering extending the 24-month per well direct casing inspection schedule. In the previous ISM report, PG&E asserted that as a result of increased competition for well service rigs and crews choosing to provide service to conventional oil and gas operations in other states there was a scarcity of well service rigs with the United States Department of Transportation "Pipeline and Hazardous Materials Safety Administration" (PHMSA)/CalGEM qualified crews within California to perform the regulated wellbore conversion and inspection operations. During the current ISM reporting period, PG&E reported that it has located well service rigs and crews to support the current CalGEM approved pace of its baseline wellbore conversion and inspection schedule. PG&E reported that it has contracted two well service rigs and will add a third rig in the near future to complete required 2023 wellbore conversion with associated direct casing inspections by November 2023.

Additionally, during the current ISM reporting period, PG&E's gas storage management informed the ISM that a report summarizing gas storage wellbore direct casing inspection evaluation results was provided to CalGEM on January 20, 2023. This is part of PG&E's request for an extension of the 24-month per well casing inspection schedule due to PG&E's concern with potential mechanical damage which might occur during direct casing inspections.

The ISM will continue to monitor PG&E's above ground gas storage safety, integrity, and surface operations and the related completion of wellbore conversions.



Gas Storage Inspections

In the previous ISM report, the ISM observed that CalGEM performed an inspection of PG&E's three gas storage facilities (McDonald Island, Los Medanos, and Pleasant Creek) and that the inspection results had not been officially issued by PHMSA for the 2022 inspection period. During the current ISM reporting period, PG&E management indicated that the official inspection results are still pending.

The ISM will continue to monitor the status of the official inspection results and PG&E's associated actions.

PIPELINE INTEGRITY MANAGEMENT

PG&E's Pipeline Integrity Program includes the Transmission Integrity Management Program (TIMP), Distribution Integrity Management Program (DIMP), and Gas Safety Plans.

Gas Transmission Integrity Management

During the current ISM reporting period, the ISM performed a site visit to three gas transmission facilities including two compression facilities and one transmission terminal facility and completed several interviews with key PG&E facility operation personnel at each facility (i.e., Delevan and Bethany compressor stations and Brentwood terminal). During those facility management personnel interviews the ISM engaged in a brief discussion with a PG&E manager who described a PG&E initiative to review transmission compression facility inventory and operating equipment obsolescence. In response to the ISM's inquiry regarding the PG&E obsolescence review PG&E responded that reports or documents identifying observations or findings are still pending.

Can't Get In (CGI) Tickets

In the previous ISM report, the ISM observed a high risk of potentially large volumes of overdue "Can't Get In"³⁷ (CGI) tickets in the near future. The anticipated increase in volume was the result of the expiration of the M-4845 waiver. The waiver allowed for exclusion of CGIs that were not completed ahead of their original compliance dates due to reasons associated with the COVID-19 Pandemic. The waiver had been extended through the end of 2021 and gave until the end of 2022 to complete any backlog existing at the end of 2021. While the total number of overdue CGIs avoided through the waiver did increase as a result of the COVID-19 Pandemic (24,935 in 2020; 24,196 in 2021; 10,374 in 2022), PG&E has indicated that it has been able to address the majority of these, and as of January 1, 2023, the CGI backlog consisted of 1,963 Leak Survey CGIs and 1,180 Atmospheric Corrosion CGIs, for a total backlog of 3,143 CGIs. These numbers include any outstanding CGIs that had previously been avoided through the waiver.

³⁷ "Can't Get In" is a ticket status for work orders where PG&E is not able to gain immediate access to perform emergency or scheduled maintenance work.



The COVID-19 pandemic and other health related concerns caused increases in the number of customer refusals and therefore the number of CGIs. Beginning in 2020, PG&E worked to counteract this through enhanced technology and processes³⁸, and by increasing customer awareness and understanding of the importance of its gas meter safety work. These mitigating actions decreased the backlog of CGIs from approximately 39,450 in January 2021 to approximately 3,143 in January 2023.

Tee Cap Replacement Program

On October 8th, 2022, there was an explosion at 2793 River Plaza Dr., a residential area in Sacramento, California, with no injuries or fatalities reported. A root cause analysis (RCA) is being performed, and PG&E is awaiting the results of this analysis. The ISM will review the results of the RCA once completed and made available.

Since 2013, PG&E has replaced an average of 1,000 Tee Caps per year through the end of 2022 under the most recent rate case. PG&E has submitted Tee Cap replacement within the current 2023-2026 General Rate Case seeking approval for the proactive replacement of 4,660 Tee Cap units (1,165 per year).

In addition to PG&E's current rate base replacement request, PG&E has polled the American Gas Association (AGA) SOS program which allows AGA members to inquire of its peers to better understand how other utilities are addressing similar Tee Cap replacement issues. PG&E's poll requested peers' failure experience with similarly constructed Tee Caps, characterization of those failures, mitigating actions taken, and best-practice repair methods. PG&E has reviewed the results provided by AGA peers and discussed them with the ISM. PG&E has stated that it is one of the few operators in North America that has a proactive Tee Cap replacement program.

The ISM interviewed PG&E regarding the current frequency of the DIMP risk-based Tee Cap replacement program, other than replacement of Tee Caps associated with existing plastic main replacement programs. Based on PG&E's described annual risk assessment of Tee Cap failure considering location-based consequence of failure, gas service volume, and region Tee Cap failure history, PG&E characterizes the current rate case Tee Cap replacement frequency as appropriate to minimize risk of Tee Cap failure.

The ISM will continue to monitor certain activities associated with PG&E's gas operations and observe additional pipeline integrity testing.

GAS TRANSMISSION AND DISTRIBUTION GEOHAZARD MONITORING

During the recent California 'atmospheric river' heavy rains event across the state, there was ISM interest regarding PG&E's preparation to identify and monitor adverse weather related

³⁸ PG&E employed new strategies to address the large number of new CGIs, including enhanced customer interaction such as an online portal for communication and scheduling of service, and eventually disconnecting customers' electric service after multiple refusals to schedule gas service. In addition, PG&E stated it has taken steps to enhance internal communication and CGI tracking methods.



geohazard impacts on pipeline reliability and safety. The geohazards affected by the recent heavy rains and adverse weather include susceptibility to landslides, heavy erosion, and excessive flooding that may impact PG&E's reliable and safe gas operations. The ISM's recent access to PG&E's ArcGIS system enabled the ISM to review PG&E's proactive measures to prepare for these unique weather events. Included in this data was a gallery of unique ArcGIS web applications created by PG&E asset teams to display specialized views of GIS and gas operation information.

PG&E's identification of various geohazard susceptibility locations mapped into accessible ArcGIS web portals provides the opportunity for PG&E personnel to efficiently focus pipeline operation geohazard event monitoring and response along specific pipeline segments.

The ISM will continue to monitor activities associated with PG&E's gas transmission and distribution geohazard monitoring initiatives.

GAS OPERATIONS DATA MANAGEMENT AND RECORDKEEPING

The ISM has initiated a review of PG&E's data management and recordkeeping practices. The ISM is in the process of regularly interviewing key PG&E personnel across its Gas Asset Knowledge group, as well as gaining access to several data repositories within PG&E's information system to better understand data access and organization of essential gas operation data and recordkeeping and their associated data acquisition and management processes.

EMERGING OBSERVATIONS

In addition to the areas covered in this current period ISM report, the ISM will continue to perform activities consistent with the ISM Contract (e.g., tracking, inspections, validations, analyzing, etc.) to monitor developments in other areas including but not limited to Integrated Grid Plan, Gas Distribution Integrity Management, and Gas Leak Management.