



May 26, 2022

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Subject: Office of Energy Infrastructure Safety Issuance of Revision Notice for Pacific Gas and Electric Company’s 2022 Wildfire Mitigation Plan Update and Notice of Extension of Office of Energy Infrastructure Safety’s Determination Per Public Utilities Code 8389.3(a)

Mr. Singh:

Pursuant to Public Utilities Code (Pub. Util. Code) Section 8386.3(a), before approval of an electrical corporation’s (hereafter “utility”) Wildfire Mitigation Plan (WMP), the Office of Energy Infrastructure Safety (Energy Safety) may require modification of the WMP. Energy Safety effectuates this by issuing a Revision Notice.

Enclosed is a Revision Notice Energy Safety is issuing in conjunction with its review of Pacific Gas and Electric Company’s (PG&E) 2022 WMP Update (2022 Update). This Revision Notice confirms that Energy Safety has identified critical issues associated with PG&E’s 2022 Update. Critical issues are defined as areas of significant concern that may lead to denial of a WMP if associated remedies are not satisfactorily addressed by the utility. For each identified critical issue, Energy Safety sets forth the remedy that PG&E must address along with a timetable for PG&E’s responses.

Revision Notice Responses must be submitted by PG&E within 30 days, 45 days, and 60 days of issuance of this Revision Notice. The timing is as follows:

- 30 days after issuance of this Revision Notice, no later than June 27, 2022, PG&E must provide a response to critical issues RN-PG&E-22-01, RN-PG&E-22-03, RN-PG&E-22-06, RN-PG&E-22-07, RN-PG&E-22-08, RN-PG&E-22-10, RN-PG&E-22-11, and RN-PG&E-22-13.

- 45 days after issuance of this Revision Notice, no later than July 11, 2022, PG&E must provide a response to critical issues RN-PG&E-22-02, RN-PG&E-22-05, and RN-PG&E-22-12.
- 60 days after issuance of this Revision Notice, no later than July 26, 2022, PG&E must provide:
 - A response to critical issue RN-PG&E-22-04 and RN-PG&E-22-09;
 - A revised version of its 2022 Update to the 2022 Wildfire Mitigation Plan Updates docket (#2022-WMPs) that includes any changes to the 2022 Update resulting from Revision Notice Responses, in both a redlined and a clean version of the document; and
 - A single updated WMP and auxiliary Excel file updating tables required in the WMP submissions that incorporates all required changes across all critical issues.

Public comments

Stakeholders may submit one set of comments on all of PG&E’s Revision Notice Responses within 15 calendar days after PG&E’s 60-day Revision Notice Response submittal. Reply comments are due 10 calendar days thereafter and shall be limited to issues raised and representations made in opening comments of other stakeholders. As such, opening comments must be submitted no later than August 10, 2022. Reply comments must be submitted no later than August 20, 2022.¹

Revision Notice Responses and public comments must be submitted to Energy Safety’s e-filing system in the 2022 Wildfire Mitigation Plans docket (#2022-WMPs).² Submission files must use the naming conventions provide in the 2022 Guidelines.³ For example, “2022-07-25_PGE_22_RNR_R1,” refers to the PG&E Revision Notice Response submitted on July 25, 2022, revision 1. The redlined version must be named “2022-07-25_PGE_22_RNR_R1_redlined” and the auxiliary excel file “2022-07-25_PGE_22_RNR_R1_Tables 1-12.”

¹ Dates falling on a Saturday or holiday as defined in Government Code Section 6700 have been adjusted to the next business day in accordance with Government Code Section 6707.

² Submit comments to the 2022-WMPs docket via the Energy Safety e-filing system here: <https://efiling.energysafety.ca.gov/EFiling/DocketInformation.aspx?docketnumber=2022-WMPs> (accessed May 19, 2022)

³ Guidelines for Submission and Review of 2022 Wildfire Mitigation Plan Updates, Office of Energy Infrastructure Safety, Attachment 5, Electronic File Naming Convention with Examples, p.8.

Extension of statutory deadline

Pursuant to Pub. Util. Code Section 8386.3(a), Energy Safety must issue a written determination on a utility's WMP or WMP Update within three months of submission, unless Energy Safety makes a written determination, including reasons supporting the determination, that the three-month deadline cannot be met. This Revision Notice serves as Energy Safety's notice of an extension of the three-month deadline to issue its determination on PG&E's 2022 Update.

Energy Safety finds the critical issues to be of enough importance that an extension of the three-month statutory deadline is necessary for Energy Safety to adequately determine that PG&E's 2022 Update satisfies the information requirements as set out in Energy Safety's Final 2022 WMP Update Guidelines⁴ and, when implemented, will sufficiently reduce wildfire risk and impacts to public safety. Energy Safety will issue its Draft Decision on PG&E's 2022 Update by September 30, 2022.

Sincerely,



Melissa Semcer
Deputy Director | Electrical Infrastructure Directorate
Office of Energy Infrastructure Safety

⁴Final 2022 Wildfire Mitigation Plan Update Guidelines (accessed January 26, 2022):
<https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true>



OFFICE OF ENERGY INFRASTRUCTURE SAFETY
REVISION NOTICE FOR
PACIFIC GAS AND ELECTRIC COMPANY'S
2022 WILDFIRE MITIGATION PLAN UPDATE

May 26, 2022

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1. Introduction

Pursuant to Public Utilities Code (Pub. Util. Code) Section 8386.3(a), before approval of an electrical corporation's (hereafter "utility") Wildfire Mitigation Plan (WMP), the Office of Energy Infrastructure Safety (Energy Safety) may require modification of the WMP. Energy Safety effectuates this by issuing a Revision Notice.

This Revision Notice confirms that Energy Safety has identified critical issues associated with Pacific Gas and Electric Company's (PG&E's) 2022 Update to its WMP (2022 Update). Critical issues are defined as areas of significant concern that may lead to denial of a WMP if associated remedies are not satisfactorily addressed by the utility. PG&E must address the critical issues set forth in this Revision Notice according to the parameters set forth herein. Section 5 provides submission instructions and deadlines.

2. Extension of Statutory Deadline

Pursuant to Pub. Util. Code Section 8386.3(a), Energy Safety must issue a written determination on a utility's WMP or WMP Update within three months of submission, unless Energy Safety makes a written determination, including reasons supporting the determination, that the three-month deadline cannot be met. This Revision Notice serves as Energy Safety's notice of an extension of the three-month deadline to issue its determination on PG&E's 2022 Update.

Energy Safety finds the critical issues to be of enough importance that an extension of the three-month statutory deadline is necessary for Energy Safety to adequately determine that PG&E's 2022 Update satisfies the information requirements as set out in Energy Safety's Final 2022 WMP Update Guidelines⁵ and, when implemented, will sufficiently reduce wildfire risk and impacts to public safety. Energy Safety will issue its Draft Decision on PG&E's 2022 Update by September 30, 2022.

3. Summary of Critical Issues

Where a utility fails to sufficiently address a required element of the WMP as prescribed by Public Utilities Code Section 8386, a requirement detailed in the 2022 Wildfire Mitigation Plan Update Guidelines, or a specific area for continued improvement outlined in a previous plan approval, it can constitute a critical issue. This section outlines the 13 critical issues

⁵ Final 2022 Wildfire Mitigation Plan Update Guidelines (accessed January 26, 2022): <https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true>.

associated with PG&E's 2022 Update. The issues are categorized below by the relevant 2022 WMP Guideline mitigation initiative section.

Section 4 provides a more detailed explanation of each critical issue and sets out specific remedies. PG&E must demonstrate that it has fully addressed and responded to each remedy in its Revision Notice Responses, within the specified 30-day, 45-day, or 60-day timeframe. Failure to respond and fully address Revision Notice remedies within the specified timeframe may result in denial of PG&E's WMP Update.

For purposes of PG&E's responses and Energy Safety's continued evaluation, the issues are assigned tracking codes.

Risk Assessment and Mapping

- **RN-PG&E-22-01:** PG&E has not adequately documented the causes of, or direct lessons learned from, PG&E-ignited catastrophic wildfires

Grid Design and System Hardening

- **RN-PG&E-22-02:** PG&E did not report on the amount of work being completed in top-risk areas
- **RN-PG&E-22-03:** PG&E is not adequately focusing grid hardening work, particularly undergrounding, on highest-risk areas based on risk model output
- **RN-PG&E-22-04:** PG&E does not provide planned undergrounding locations beyond 2023, nor adequately demonstrate that it is currently prepared to meet its ambitious undergrounding goals

Asset Management and Inspections

- **RN-PG&E-22-05:** PG&E has a significant backlog of repairs and needs a more aggressive plan to address the poor health of its infrastructure
- **RN-PG&E-22-06:** PG&E does not sufficiently explain its increase in distribution-level ignitions from equipment failure, nor provide a remediation plan
- **RN-PG&E-22-07:** PG&E's ignition projections do not account for its ignition mitigation measures
- **RN-PG&E-22-08:** PG&E has high find and failure rates in its quality assurance and quality control of asset inspections

Vegetation Management and Inspections

- **RN-PG&E-22-09:** PG&E has failed to provide plans to mature in certain vegetation management capabilities
- **RN-PG&E-22-10:** PG&E does not report targets for its vegetation management quality assurance and quality verification program or for poles brushed

- **RN-PG&E-22-11:** PG&E has failed to implement the vegetation management refresher curriculum it committed to implement in its 2021 WMP Update

Grid Operations and Protocols, Including PSPS

- **RN-PG&E-22-12:** PG&E has failed to provide sufficient evidence to support its extensive use of Enhanced Powerline Safety Settings and instead relies on the findings of a time-limited pilot deployed in 2021

Resource Allocation Methodology

- **RN-PG&E-22-13:** PG&E does not provide sufficiently disaggregated data on its system hardening initiatives

4. Critical Issues and Required Remedies

4.1 Risk Assessment and Mapping

4.1.1 RN-PG&E-22-01: PG&E has not adequately documented the causes of, or direct lessons learned from, PG&E-ignited catastrophic wildfires

In its 2022 Update, PG&E has not adequately documented the causes of, or direct lessons learned from, PG&E-ignited catastrophic wildfires, including how such lessons have informed its WMP initiatives.⁶

⁶ Under Public Utilities Code § 8386(c)(14), the WMPs must include “A description of the actions the electrical corporation will take to ensure its system will achieve the highest level of safety, reliability, and resiliency, and to ensure that its system is prepared for a major event, including hardening and modernizing its infrastructure with improved engineering, system design, standards, equipment, and facilities, such as undergrounding, insulation of distribution wires, and pole replacement.” See generally 2022 WMP Guidelines, Attachment 2, 42-50; *id.*, Attachment 4, pp. 4, 16 (Capability 46, Protocols in place to learn from wildfire events), 20-23 (different sections of the 2022 WMP Guidelines requiring utilities to use lessons learned to combat risk of utility-related wildfires).

Several of the fires in PG&E's service territory had similar causes over a relatively short time interval, such as the failure to remove idle facilities, low cycle fatigue,⁷ and issues associated with line terminations. These fires include the 2017 Northern California Wildfires (Railroad Fire, Atlas Fire, Cascade Fire, Redwood Fire, and Nuns Fire) and the 2016 Sawmill Fire. PG&E does not include in its 2022 Update sufficient detail on the actions, including timeframes, it is taking to address the specific causes of PG&E-ignited catastrophic wildfires. In particular, it does not fully explain how it will address many of the specific causes of the 2019 Kincade Fire or the Camp Fire. PG&E provided some lessons learned from the Kincade Fire, including the need for removal of idle facilities, but many other targeted lessons were not applied. For example, PG&E did not explain what actions, including timelines, it is taking to address low cycle fatigue and issues associated with line terminations, both of which were factors in the cause of the Kincade Fire.⁸

Energy Safety requested further detail specifically on how PG&E is applying lessons learned from past fires.⁹ In response, PG&E provided a high-level description of how it ties its mitigation initiatives to the causes of recent fires.¹⁰ PG&E states that it is incorporating past fire lessons learned by introducing changes to its broader wildfire mitigation strategy, including by adopting more frequent use of Enhanced Powerline Safety Settings (EPSS) (discussed further in RN-PG&E-11 below), and ramping up undergrounding (discussed further in RN-PG&E-04 below). While both solutions may reduce ignition risk as a whole, neither solution is directly informed by the underlying cause of the Dixie Fire, which ignited from vegetation contact, or the Camp Fire, which was caused by a failed C-hook. For example, an expected application of lessons learned from the Camp Fire would be for the utility to aggressively target C-hook inspections and maintenance or show prioritization of C-hook maintenance within its existing programs.

⁷ High stress at low frequency with a long period between applications.

⁸ William B. Abrams Comments on 2022 WMPs, pp. 5 and 7.

⁹ Data Request OEIS-PG&E-22-004, Question 4.

¹⁰ Data Request OEIS-PG&E-22-004, Question 4.

Required Remedies

A response to RN-PG&E-22-01 is due in 30 days. For each PG&E-ignited catastrophic wildfire (greater than 500 acres) since 2017,¹¹ PG&E must:

- List the cause(s) of each catastrophic wildfire and any associated lessons learned, and
- Detail the specific measures PG&E is taking to i) directly mitigate the causes of past PG&E-ignited catastrophic wildfires, and ii) integrate lessons learned from past PG&E-ignited wildfires into its wildfire mitigation strategy.¹²

4.2 Grid Design and System Hardening

4.2.1 RN-PG&E-22-02: PG&E did not report on the amount of work being completed in top-risk areas

PG&E did not comply with the 2022 WMP Guideline requirement to report on the amount of work being completed in top-risk areas as determined by risk model output.¹³ Instead, PG&E redefined top-risk to be a combination of the highest risk areas as determined by risk model output and three additional criteria. Energy Safety finds that recent fire rebuild locations are not directly correlated to near-term wildfire risk, as discussed in RN-PG&E-22-03. Further, PG&E has not sufficiently demonstrated that PSPS-impacted locations correlate to highest wildfire risk.

The 2022 WMP Guidelines require utilities to provide a table of initiatives broken down by the percentage of work being completed in a given percentage of top-risk areas as identified by risk model output.¹⁴ PG&E provided the information shown in Table 1 below. However, PG&E

¹¹ Where CAL FIRE or local fire suppression agencies determined PG&E caused the fire or the CPUC's Safety and Enforcement Division found PG&E in violation.

¹² See 2022 WMP Guidelines, Attachment 2, pp. 42-44.

¹³ See 2022 WMP Guidelines, Attachment 2, pp. 54-55. In Table 5.3-1, utilities must populate the column "Target%/ Top-Risk%" for each 2022 performance target related to initiatives in the following categories: Grid design and system hardening; Asset management and inspections; and Vegetation management and inspections. This column allows utilities to identify the percentage of the target that will occur in the highest risk areas. For example, if a utility targets conducting 85% of its vegetation management program in the top 20% of its risk-areas, it should input "85/20" in this column. In the "Notes" column, utilities must provide definitions and sources for each of the "Top-Risk%" values provided. In the given example above, an acceptable response would be: "The top 20% of risk areas used for this target relate to the circuit segment risk rankings from [Utility Company's] Wildfire Risk Model outputs, as described in [hyperlink to Section XX] of the 2022 WMP Update."

¹⁴ 2022 WMP Guidelines, Attachment 2, p. 54.

did not provide a top-risk percentage. Instead, PG&E defined top risk as a combination of four criteria:¹⁵

- The top 20 percent of risk-ranked circuits,
- PSPS-impacted locations,
- “Locations where risk has materialized” (i.e., recent wildfire locations),¹⁶ and
- Public Safety Specialist (PSS)-identified locations.

This information submitted by PG&E does not satisfy the 2022 WMP Guidelines requirement. The current format prevents Energy Safety from fully understanding the work being completed in top-risk ranked circuits and comparing this with the work of other utilities.

*Table 1: PG&E's Grid Hardening Targets*¹⁷

Program	2021 Target	2021 Completed	2022 Target	2022 Risk %
Undergrounding (mi)	N/A	73	175	80% top risk
System Hardening - Dist (mi)	180	210	470	80% top risk
System Hardening - Trans (mi)	92	104	32	100% top risk
Expulsion Fuse Removals	1200	1429	3000	15% top risk
Sectionalization Devices - Dist	250	269	100	100% top PSPS risk
Sectionalization Devices - Trans	29	41	15	60% top PSPS risk
Remote Grid	1	1	2	100% top risk

Required Remedies

A response to RN-PG&E-22-03 is due in 30 days. PG&E must provide an update of Table 5.3-1(A) with top-risk percentages based solely on risk model output.

The revised table must specifically provide the percentage of each type of work being completed in the top-risk circuits defined by risk model outputs. This must be done without

¹⁵ PG&E's 2022 Update, pp. 285-286.

¹⁶ PG&E uses this term to describe the locations where recent fire rebuild projects are located.

¹⁷ PG&E's 2022 Update, Table PG&E-5.3-1(A), List and Description of Quantitative Program Targets, Last Five Years, pp. 255-284.

conflating the percentages of top-risk circuits with other criteria, including PSPS-impacted locations, fire rebuild projects, and PSS-identified locations.

Separate from Table 5.3-1(A), PG&E must provide information to demonstrate that PSPS-impacted locations are correlated with the top risk.

4.2.2 RN-PG&E-22-03: PG&E is not adequately focusing grid hardening work, particularly undergrounding, on highest-risk areas based on risk model output

PG&E is not adequately focusing grid hardening work, particularly undergrounding, on highest-risk areas based on risk model output.¹⁸

PG&E set a goal for 2021 that 80 percent of its distribution system hardening work would occur in its top risk categories, the highest-risk areas based on risk model output.¹⁹ PG&E did not reach its goal, with work on only 25 percent of hardened distribution miles (52.5 miles) occurring within the top 20 percent of PG&E's risk-ranked circuits in 2021.²⁰ While the 2021 scope was based largely on previous risk model output, in its 2022 Update, PG&E continues to fall short of addressing the areas with the highest risk based on its 2021 Wildfire Distribution Risk Model (WDRM) output. Only 66 percent of PG&E's 2021–2023 hardening work is planned to occur within the top 20 percent of risk-ranked circuits, as seen in Table 2 below. For undergrounding specifically, PG&E demonstrates even less focus on the riskiest circuits, with only 49.3 percent of work being completed in the top 20 percent of risk-ranked circuits and a comparable percentage (42.3 percent) being completed on fire rebuild projects, as seen in Table 3 below.

Table 2: PG&E's 2021-2023 System Hardening Plans ²¹

2021 - 2023 System Hardening Actuals / Forecast Mileage Summary	Top 20% Risk	Fire Rebuild	PSPS Mitigation	Other Miles (outside 2021-2023 high risk criteria)*	Total Overall Portfolio
Mileage (Actuals/Forecast)	893.1	222.6	52.7	178.6	1346.9
Percentage by category	66%	17%	4%	13%	100%

¹⁸ See 2022 WMP Guidelines, Attachment 2, pp. 74-75; *id.*, Attachment 4, pp. 10-11, 28 (A utility's risk model will be based on the extent to which it "uses more ignition prevention equipment with higher risk-spend efficiency." In the Maturity Model "higher scores are assigned to utilities that use more ignition prevention equipment with higher risk-spend efficiency.").

¹⁹ Data Request CalAdvocates-PGE-2022WMP-07, Question 1.

²⁰ Data Request OEIS-PG&E-22-008, Question 05.

²¹ Data Request OEIS-PG&E-22-008, Question 05.

Table 3: PG&E's 2022-2023 Undergrounding Plans²²

2022-2023 Undergrounding Forecast Summary	Top 20% Risk	Fire Rebuild	PSPS Mitigation	Other Miles	Total Overall Portfolio
Mileage	174.6	149.7	20.6	9.4	354.3
Percentage by Category	49.3%	42.3%	5.8%	2.6%	

PG&E is far behind targeting undergrounding in top risk circuits when compared to its peers. SCE is targeting 91.3 percent and 100 percent of its undergrounding scope in the top 20 percent in 2022 and 2023 respectively. SDG&E is targeting 91.7 percent and 93.2 percent of its undergrounding scope in the top 20 percent in 2022 and 2023 respectively.

Fire rebuild projects are conducted in areas where recent wildfires have occurred. Wildfire mitigation activities in these localities can allow for effective use of materials and time because rebuild is already occurring where facilities have burned, and expedited actions can be taken in response to the emergency.²³ However, PG&E should not count projects in this category towards mitigating highest-risk areas. Burn scars from areas recently affected by wildfires take years to recover vegetative growth and do not present the near-term risk that should be prioritized when determining high wildfire risk areas.

Required Remedies

A response to RN-PG&E-22-02 is due in 45 days. PG&E must revise its system hardening plan to adequately demonstrate prioritization based on highest-risk areas. PG&E must provide details of, and commit to, a more aggressive 2022–2024 goal of locating undergrounding in its top 20 percent risk-ranked circuits, on par with its peers. The undergrounding goal must not include any undergrounding associated with fire rebuild miles.

If PG&E takes any additional risks into account when developing this more aggressive undergrounding goal, aside from those already considered as part of the risk model output, PG&E must:

- Identify the percentage of undergrounding work that will be driven by these additional risk categories (i.e., PSPS, open work tags, Public Safety Specialist selected, etc.)
- Explain why PG&E's existing risk model output does not sufficiently cover these additional risks.

²² PG&E's 2022 Update, Section 4.6 Remedy 21-14, Attachment 1.

²³ PG&E's 2022 Update, p. 435.

4.2.3 RN-PG&E-22-04: PG&E does not provide planned undergrounding locations beyond 2023 and does not adequately demonstrate that it is currently prepared to meet its ambitious undergrounding goals

PG&E does not provide planned undergrounding locations beyond 2023, and it does not adequately demonstrate that it is currently prepared to meet its aggressive undergrounding goals.²⁴ Furthermore, PG&E has not demonstrated that undergrounding is risk-spend efficient at the project level when compared to other grid hardening efforts.²⁵

In 2021, PG&E announced its goal of undergrounding 10,000 miles in 10 years, with the plan of ramping up to a goal of undergrounding 1200 miles a year by 2026 to meet the 10,000-mile goal.²⁶ As of the submission of its 2022 Update, there are large discrepancies between PG&E's undergrounding plan and undergrounding goal. PG&E plans to complete 113 miles of undergrounding in 2023,²⁷ despite having a goal of undergrounding 400 miles in 2023.²⁸ PG&E, in its 2022 Update, commits to only 0.82 miles of undergrounding in 2024,^{29, 30} despite having an overall goal of undergrounding 800 miles in 2024.³¹ Undergrounding of the 0.82 miles was initially planned for completion in 2022 or 2023 but faced unexpected delays and is now scheduled for 2024.³² PG&E states that it has not yet selected its undergrounding locations for 2024 because it plans to use its latest Wildfire Distribution Risk Model (WDRM) output to inform locations for undergrounding. Version 3 (V3) of the WDRM is undergoing third-party review to check for validation. A WDRM V3 validation report was scheduled to be completed in April 2022; however, as of the date of this Revision Notice, the WDRM V3 validation report has not yet been completed.³³

²⁴ See 2022 WMP Guidelines, Attachment 2, p. 99; PG&E-21-14 from the 2021 WMP Final Action Statement (PG&E must provide additional details in its 2022 WMP Update on “the decision to underground and its plans for such undergrounding”); see also 2022 WMP Guidelines, Attachment 2, pp. 53, and Public Utilities Code Section 8386(b) (WMP is forward-looking and long-term).

²⁵ See 2022 WMP Guidelines, Attachment 4, p. 11 (Capability 14, Risk-based grid hardening and cost efficiency).

²⁶ PG&E's 2022 Update, Figure PG&E-7.3.3-2, p. 528.

²⁷ PG&E's 2022 Update, Section 4.6, Remedy PG&E-21-14, Attachment 1.

²⁸ PG&E's 2022 Update, Figure PG&E-7.3.3-2, p. 528.

²⁹ PG&E's 2022 Update, Section 4.6, Remedy 21-14, Attachment 1.

³⁰ PG&E's 2022 Update, p. 546.

³¹ PG&E's 2022 Update, Figure PG&E-7.3.3-2, p. 528.

³² PG&E's 2022 Update, Section 4.6, Attachment 1, pp. 82–83.

³³ Data Request OEIS-PG&E-22-07, Question 9. Data Request OEIS-PG&E-22-014, Question 1.

PG&E's estimated timeline for completing undergrounding projects is 31 months from scoping to completion of construction.³⁴ Given that PG&E will not achieve its 2023 goal and that the locations for undergrounding projects for 2024 have not yet been identified, meaning that these projects are not even in the scoping phase, PG&E has not demonstrated that its short-term and long-term undergrounding goals are realistic and feasible.

Furthermore, PG&E has not demonstrated that distinct undergrounding projects are more risk-spend efficient when compared to other grid hardening efforts.³⁵ PG&E calculates undergrounding to have a risk-spend efficiency (RSE) score of 4.4, compared to a score of 7.56 for overhead hardening.³⁶

Required Remedies

A response to RN-PG&E-22-04 is due in 60 days. PG&E must provide an update of its planned undergrounding projects in 2024, following a similar format as PG&E-21-14 from the 2021 WMP Final Action Statement. This should be in the form of a spreadsheet with the following information:

- Location³⁷
- Status of the project (scoping, design permitting, etc.)
- Relevant Circuit Protection Zones (CPZs)/Risk Score
- Circuit ranking based on 2021, 2022, and 2023 risk model output³⁸
- Measured effectiveness of ignition risk reduction projected to result from undergrounding at that circuit segment
- Planned length
- Risk-type identified for prioritization of the project (top 20 percent of risk buydown curve, fire rebuild, PSPS mitigation, public safety specialist identified, or non-risk related, or combination of the proceeding).

PG&E must include a timeline for the frequency with which it will determine undergrounding mileage and locations based on updated risk model output, factoring in RSE comparison with other initiatives. The timeline must continue past 2024.³⁹ If the above information for the targeted 400 miles in 2023 and 800 miles in 2024 is not available, PG&E must provide

³⁴ PG&E's 2022 Update, Table PG&E-7.3.3-5, p. 533.

³⁵ See 2022 WMP Guidelines, Attachment 4, p. 11 (Capability 14, Risk-based grid hardening and cost efficiency).

³⁶ PG&E's 2022 Update, Section 7.3.a, Attachment 4.

³⁷ As available, the revised undergrounding plan for 2024 must also include locations via geospatial data.

³⁸ Added in addition to the items requested in PG&E-21-14.

³⁹ See 2022 WMP Guidelines, Attachment 2, p. 99; PG&E-21-14 from the 2021 WMP Final Action Statement.

justification as to why it is unable to provide any of the missing information and provide a timeline for when the information will be available.⁴⁰

4.3 Asset Management and Inspections

4.3.1 RN-PG&E-22-05: PG&E has a significant backlog of repairs and needs a more aggressive plan to address the poor health of its infrastructure

PG&E has a significant backlog of repairs and needs a more aggressive plan to address the poor health of its infrastructure.⁴¹ Since 2020, PG&E has consistently had a growing backlog of work orders. Its 2022 Update does not provide a plan for timely addressing this issue.

Since completion of its Wildfire Safety Inspection Program (WSIP) in 2020, PG&E has had a continual backlog of work orders, as seen in Table 4 below. As part of its WSIP, PG&E created around 259,940 work tags, and it has added more since then. Instead of decreasing the number of open work tags over time through corrective action,⁴² PG&E has opened more work tags each year than it has resolved. In 2021, PG&E opened approximately 16,000 more tags than forecasted.⁴³ PG&E does not “anticipate a decrease in find rates with the continual work down of back logged corrective action tags, replacement of system hardening miles, and system undergrounding efforts” until 2023.⁴⁴

⁴⁰ See 2022 WMP Guidelines, Attachment 2, p. 99; PG&E-21-14 from the 2021 WMP Final Action Statement.

⁴¹ See 2022 WMP Guidelines, Attachment 4, pp. 32-37; see also *id.*, p. 35 (Capability 19, Asset maintenance and repair).

⁴² Wildfire Safety Inspections, CPUC SED Meeting, June 18, 2019, pp. 9–10.

⁴³ PG&E's 2021 WMP Change Orders, p. 15.

⁴⁴ PG&E's 2022 Update Section 4.6, Attachment 2, p. 17.

Table 4: PG&E Work Order Tags ⁴⁵

System	Tags Created¹ <i>(data as of 12/31/2021)</i>	Tags Open² <i>(data as of 12/31/2021)</i>
Electric Distribution	761,452	507,904
Electric Transmission	191,676	75,211
Electric Substation	36,662	3,881
Total	989,790	586,996

¹ Tags created on or after 1/1/2019

² Starting with 2021 Q1, includes tags created prior to 1/1/2019

As of February 1, 2022, PG&E had 111,502 open distribution work orders that were overdue.⁴⁶ While most of PG&E's open work orders are low priority,⁴⁷ delaying the completion of these work orders can have serious ramifications for wildfire safety. PG&E's Federal Monitor identified one incident in which a delay in remediating a finding led to an ignition.⁴⁸ PG&E has also stated that ten other ignitions are connected to assets that had existing work orders.⁴⁹ PG&E must ensure that outstanding tags in areas of high wildfire risk that could propagate into potential ignitions are timely addressed to minimize the ignition risk.

Although PG&E has described a plan to determine and address the highest-risk work tags using risk modeling, and it is reinspecting lower-priority tags to monitor risk changes,⁵⁰ PG&E's inability to allocate adequate resources to timely address work orders demonstrates a failure to properly maintain a healthy system. Additionally, PG&E's practice of conducting Field Safety Reassessments, a process by which asset structures with pending, unresolved tags are periodically reviewed, could be diverting PG&E's resources away from conducting other inspections and remediation work.⁵¹ Field Safety Reassessments should also not be

⁴⁵ Data Request OEIS-PG&E-22-002, Question 11, Atch01, Compliance Plan Quarterly Update – Q4 2021, p. 2.

⁴⁶ Data Request WMP-Discovery2022_DR_CalAdvocates_009, Question 1, Atch01.

⁴⁷ As in F or G Priority.

⁴⁸ Federal Monitor Report of November 19, 2021, Kirkland & Ellis LLP, p. 36.

⁴⁹ Data Request WMP-Discovery2022_DR_CalAdvocates_008, Question 5, Supp04.

⁵⁰ PG&E's Update, pp. 572-573.

⁵¹ Federal Monitor Report of November 19, 2021, Kirkland & Ellis LLP, p. 37.

considered a method to extend and reset due dates in perpetuity. To improve asset health, PG&E must resolve existing work orders instead of leaving repairs uncompleted. In 2019 to 2021, PG&E decreased the priority level of 5,701 work order tags for distribution poles, or about 5 percent of the total work orders.⁵² Given a utility must prioritize highest-risk work tags when it cannot address all work orders before their regulatorily-mandated due date,⁵³ PG&E's approach is not a viable long-term solution.

Required Remedies

A response to RN-PG&E-22-05 is due in 45 days. PG&E must create a plan that demonstrates consistent progress on reducing the number of open tags and improve the health of its infrastructure.⁵⁴ To ensure that PG&E is reducing its backlog of work orders, PG&E must have a plan to complete more remediations than findings found.

PG&E must provide a resource plan, including timeline and quantitative targets for either a number or percentage of tags PG&E plans to resolve per quarter for the remainder of 2022 as well as 2023. The plan must include a description of how PG&E prioritizes completion based on risk analysis and modeling and where resources are being diverted from other efforts, if applicable.

PG&E must also provide a spreadsheet of all open work orders as of the date of its response to this Revision Notice that were generated in HFTD as well as all remediations in HFTD that have been completed in 2021. This data must include:

- Date work order was generated
- Priority of Work Order
- HFTD Tier
- Remediation Due Date
- Date Remediation Completed (if applicable)
- Latitude
- Longitude

⁵² Data Request OEIS-PG&E-22-014, Question 6.

⁵³ PG&E's 2022 WMP Maturity Model Assessment Survey, response to D.IV.a, stating that lines are not consistently maintained.

⁵⁴ See 2022 WMP Guidelines, Attachment 4, pp. 32-37; see also *id.*, p. 35 (Capability 19, Asset maintenance and repair).

4.3.2 RN-PG&E-22-06: PG&E does not sufficiently explain its increase in distribution-level ignitions from equipment failure, nor provide a remediation plan

PG&E does not sufficiently explain its increase in distribution-level ignitions from equipment failure, nor does it provide a forward-looking plan to address this increase.⁵⁵

From 2020 to 2021, PG&E's ignitions from equipment failures increased at the distribution level across PG&E's system, as seen in Figure 1 below.⁵⁶ In particular, ignitions increased relating to damage or failure of the following equipment:

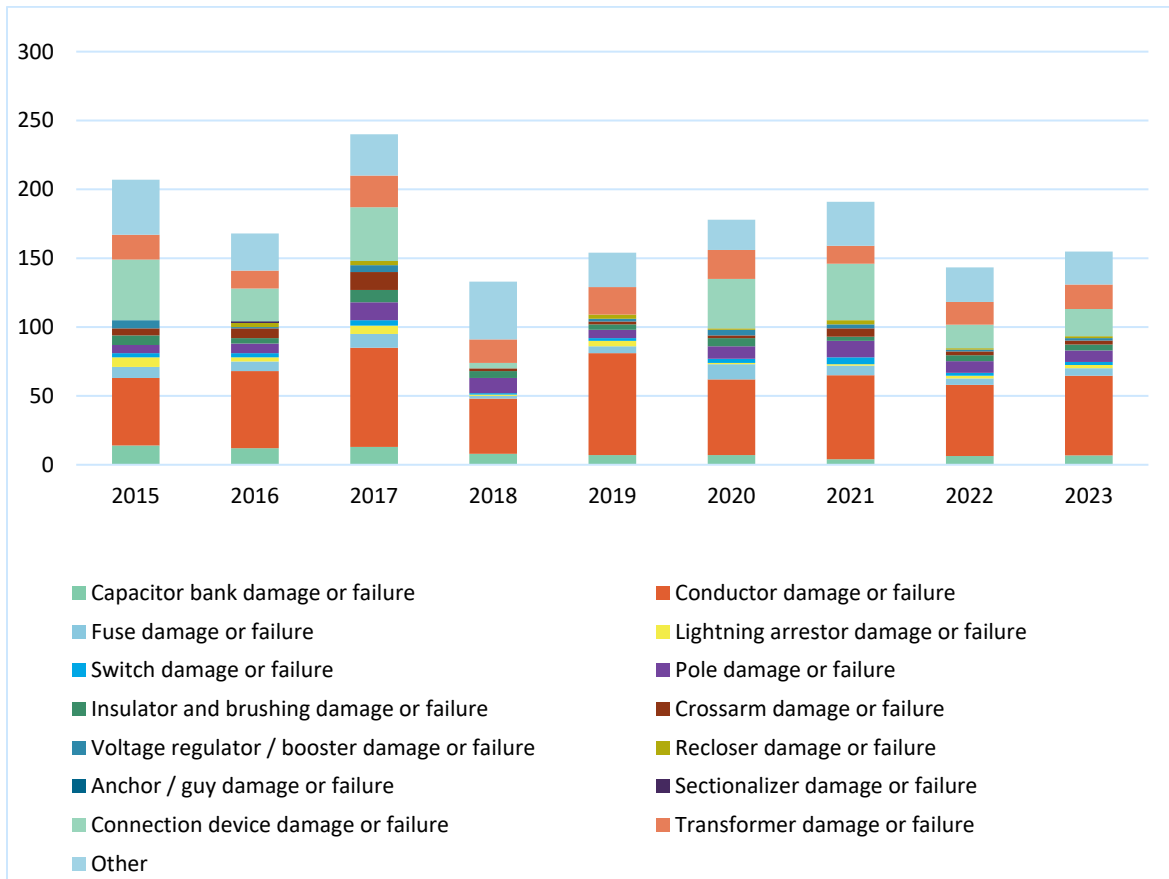
- Conductors
- Switches
- Poles
- Crossarms
- Reclosers
- Connection devices
- Other Equipment⁵⁷

⁵⁵ See 2022 WMP Guidelines, Attachment 2, pp. 86-89.

⁵⁶ See 2022 WMP Guidelines, Attachment 2, pp. 86-89.

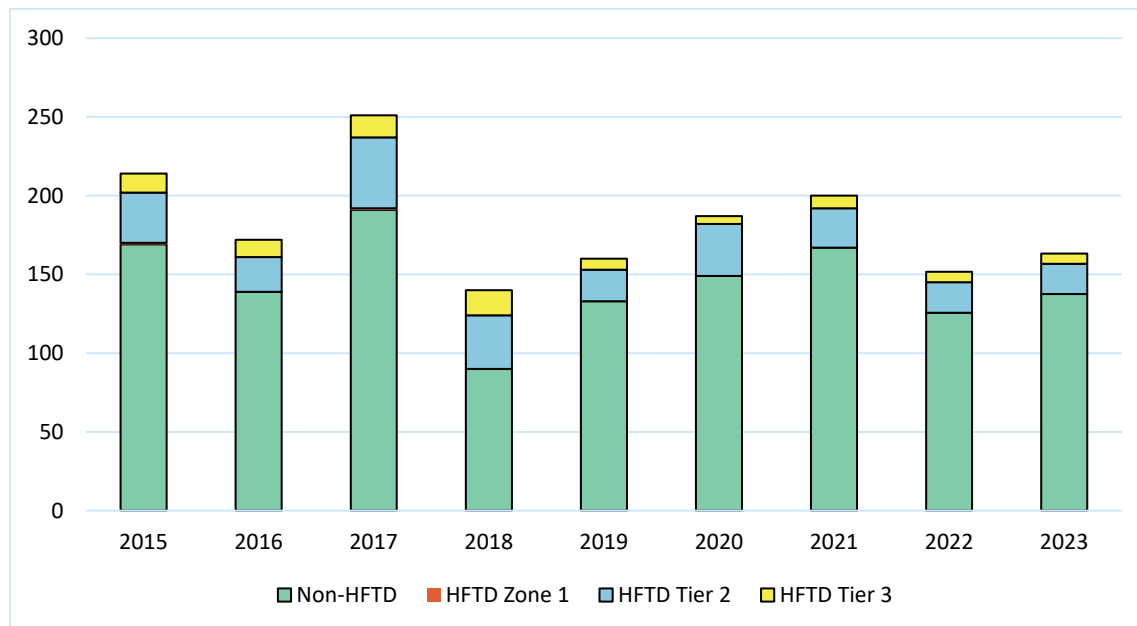
⁵⁷ "Further breakout of "Other" included in Data Request OEIS-PG&E-22-004, Question 5.

Figure 1: PG&E's Observed and Estimated Annual Systemwide Ignitions from Distribution Equipment Failures ⁵⁸



⁵⁸ PG&E's 2022 Update, Quarterly Data Report, Table 7.2.

Figure 2: PG&E's Observed and Estimated Annual Ignitions from Distribution Equipment Failures in the HFTD ⁵⁹



Required Remedies

A response to RN-PG&E-22-06 is due in 30 days. PG&E must provide a plan to address increases in ignitions from equipment failures categorized by equipment type, which must include the following:⁶⁰

- Conductors
- Switches
- Crossarms
- Reclosers
- Connection devices

The plan must include any additional efforts, if any, PG&E will undertake that are informed by a root cause analysis outside those efforts PG&E completes as part of its routine maintenance program or as part of program-level WMP initiatives. As applicable, PG&E must include

⁵⁹ PG&E's 2022 Update, Quarterly Data Report, Table 7.2.

⁶⁰ Some short descriptions of PG&E's changes were included in OEIS-PG&E-22-004. However, PG&E should provide further description of root cause analyses performed and direct changes made relating to trends and causes. See 2022 WMP Guidelines, Attachment 2, pp. 86-89; see also *id.*, Attachment 4, pp. 28-31.

descriptions of root analyses completed by equipment type and explain any trends that inform changes to its inspections and maintenance programs. If such root cause analyses have not already been performed, PG&E must explain why, as well as how it has otherwise identified trends and reoccurring issues.

PG&E must explain why it does not predict decreases in ignitions for equipment failures from 2022 to 2023, broken down by equipment type. PG&E must also explain how mitigations it is implementing for all equipment types affect predicted ignition rates.⁶¹

4.3.3 RN-PG&E-22-07: PG&E's ignition projections do not account for its ignition mitigation measures

PG&E's ignition projections do not factor in the utility's ignition mitigation measures and therefore may be artificially high. PG&E must explain how implementation of mitigation measures will impact ignition projections.⁶²

PG&E forecasts a continued increase in ignitions for 2023 outside of the HFTD. It forecasts ignitions in the HFTD to remain steady from 2022 to 2023.

While PG&E predicts a decrease in distribution-level ignitions from 2021 to 2022, it predicts a system-wide increase from 2022 to 2023, as seen in Figure 3 below. PG&E's projected averages for 2022 are greater than the 2018, 2019, and 2021 averages. Its projected ignitions for 2023 average higher than those in 2019, 2020, and 2022.⁶³ There were fewer ignitions in 2018, and PG&E did not include 2018 ignitions when calculating its 2023 average.⁶⁴ This accounts for the predicted increase in ignitions in 2023.

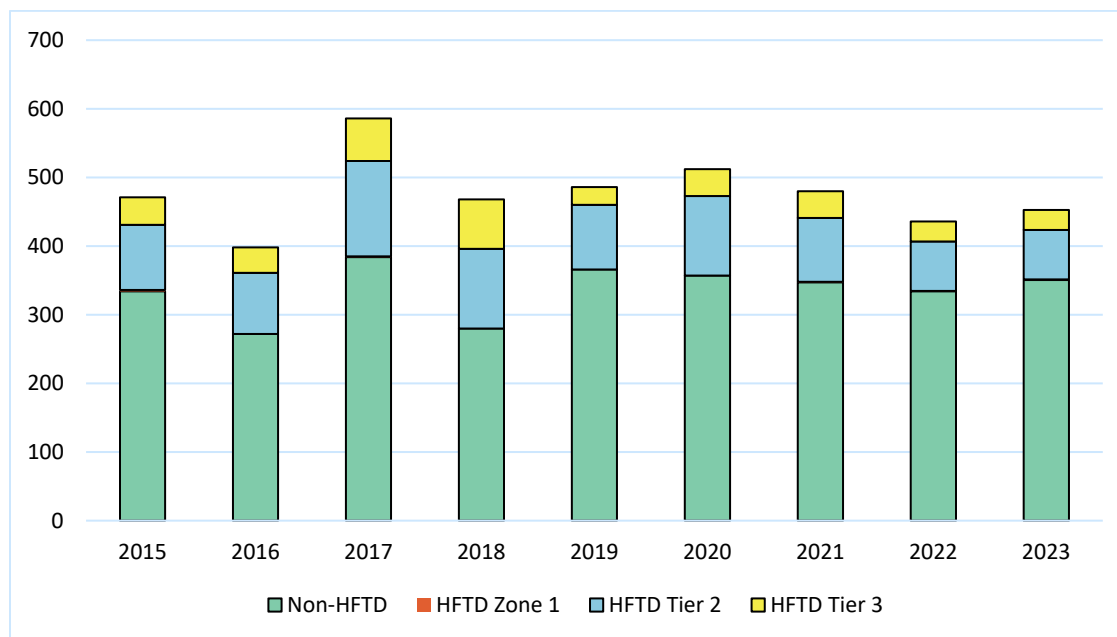
⁶¹ Data Request OEIS-PG&E-22-004, Question 5.

⁶² PG&E's 2022 Update, Quarterly Data Report, Table 7.2.

⁶³ Data Request OEIS-PG&E-22-012, Question 3.

⁶⁴ Data Request OEIS-PG&E-22-012, Question 3.

Figure 3: PG&E's Observed and Estimated Annual Ignitions from Distribution in the HFTD ⁶⁵



In the HFTD, even when accounting for Tier 2 and Tier 3 designations, PG&E predicts a relatively steady number of ignitions from 2022 to 2023, as seen in Figure 2 above. For example, for distribution-level connection devices, PG&E predicts Tier 2 ignition rates of 6.4 and 6.7 for 2022 and 2023, respectively.⁶⁶ However, these predictions do not include estimated effects of the implementation of measures to mitigate ignitions, including EPSS, since projections are only based on the historical average numbers of ignitions.⁶⁷ Without factoring in the impact of mitigation measures on ignition risk, PG&E's ignition projections may be artificially high.

Required Remedies

A response to RN-PG&E-22-07 is due in 30 days. PG&E must revise and resubmit Table 7.2 from PG&E's 2022 Update to project 2022 and 2023 ignitions factoring in risk reduction benefits of mitigation measures, including (but not limited to) EPSS, undergrounding, and covered conductor.

PG&E must also provide a narrative description for what factors are considered when calculating ignition projections, inclusive of WMP mitigation measure implementation, the weights of such factors and effects on projected ignitions.

⁶⁵ PG&E's 2022 Update, Quarterly Data Report, Table 7.2.

⁶⁶ PG&E's 2022 Update, Quarterly Data Report, Table 7.2, rows 180 and 181.

⁶⁷ Data Request OEIS-PG&E-22-012, Question 3.

4.3.4 RN-PG&E-22-08: PG&E has high find and failure rates in its quality assurance and quality control of asset inspections

PG&E has high find and failure rates⁶⁸ in its quality assurance and quality control (QA/QC) of asset inspections, demonstrating a low quality of asset inspections, and it has not provided adequate details on its plan to improve asset inspection quality moving forward.⁶⁹

PG&E has a very high find rate for quality control of its asset inspections, defined as at least one missed finding during the QA/QC process, as seen in Table 5 below. PG&E has not provided a plan to improve the quality of its inspections. Notably, contractors completed 84 percent of PG&E's transmission ground inspections and 87 percent of PG&E's distribution ground inspections.⁷⁰

Table 5: PG&E QA/QA Find Rates ⁷¹

Inspection Type	Inspected	2021 Find Rate
Transmission ground, desktop QC	30.17%	58%
Transmission ground, field QC	4.82%	5%
Distribution detailed, desktop QC	5.47%	38%
Distribution detailed, field QC	2.38%	58%

PG&E also has an alarmingly high failure rate of asset inspections,⁷² with PG&E's asset inspections having failed 8.5 percent to 33 percent of quality control reviews.⁷³ This raises a serious concern that even if PG&E increases the number of asset inspections, a large percentage of that work will be done incorrectly. If potentially hazardous issues are not

⁶⁸ "Find rate" is defined as the percentage of reviews in which discrepancies were identified (Data Request OEIS-PG&E-22-008, Question 3) whereas "failure rate" is defined as when QA/QC inspections led to a "failed review," meaning the inspection record review indicates a compelling abnormal condition was miss-identified by the inspector, resulting in an incorrectly updated EC/LC notification, or failure to create an EC/LC notification (Data Request CalAdvocates-PGE-2022WMP-08, Question 4).

⁶⁹ See 2020 WMP Guidelines, Attachment 4, p. 12 (Capability 20, QA/QC for asset management).

⁷⁰ Data Request OEIS-PG&E-22-008, Question 3.

⁷¹ Data Request OEIS-PG&E-22-008, Question 3.

⁷² Cal Advocates Comments on Large Utilities, pp. 21-22.

⁷³ Cal Advocates Comments on Large Utilities, pp. 21-22.

identified correctly, there is a heightened risk that those assets could cause ignitions before they can be remediated.

PG&E provided various actions being taken to increase the quality of asset inspections, which includes issuing a request for proposal (RFP) for a single contractor for asset inspections, focusing more on ignition risk within asset inspection training materials, and using internal metrics on ignition risk to inform asset inspection training.⁷⁴ However, these actions do not include timelines for implementation nor quantitative targets to track PG&E's progress and associated goals to improve the asset management QA/QC processes. Without this information, and given the high QA/QC failure rates, Energy Safety finds that the quality of PG&E's asset inspections is inadequate.

Required Remedies

A response to RN-PG&E-22-08 is due in 30 days. PG&E must explain actions taken to improve its quality control processes.⁷⁵ Specifically, PG&E must:

- For all listed actions⁷⁶ to increase the quality of its asset inspections, provide an update on progress and timeline for implementation.
- Provide quarterly quantitative asset management QA/QC goals for both findings and reducing failure rates for the remainder of 2022 and 2023.
- Explain whether there is a failure rate threshold at which PG&E will take remedial or disciplinary action on an inspector. If so, provide that threshold and describe the action that PG&E takes to address inspectors with high failure rates.
- Provide a detailed description of how PG&E escalates non-adherence to asset inspections processes and procedures.
- Provide actions to improve training for both internal inspectors and contractors in PG&E's asset inspection and management program based on repeat QA/QC findings.
- Provide an update on PG&E's QA/QC findings and failure rates for asset inspections completed since the 2022 WMP Update filing.

⁷⁴ PG&E's Reply Comments to the 2022 WMP, pp. 39-40.

⁷⁵ PG&E's Reply Comments to the 2022 WMP, pp. 39-40.

⁷⁶ See 2022 WMP Guidelines, Attachment 2, pp. 73, 75; *id.*, Attachment 4, p. 12.

4.4 Vegetation Management and Inspections

4.4.1 RN-PG&E-22-09: PG&E has failed to provide plans to mature in certain vegetation management capabilities

PG&E has failed to provide plans to mature in certain vegetation management capabilities. According to its 2020 Maturity Survey, PG&E had only planned on maturing one⁷⁷ of six capabilities by 2023. In its evaluation of PG&E's 2021 WMP Update, Energy Safety required PG&E to reach a maturity level of at least 1 for capabilities 24 "Vegetation grow-in mitigation" and 25 "Vegetation fall-in mitigation" by the end of 2023.⁷⁸ PG&E is on track to satisfy this requirement. Notwithstanding, between 2020 and 2022, PG&E has not increased its overall maturity level for vegetation management (VM).⁷⁹ According to its responses on the 2022 Maturity Survey, PG&E does not have plans to increase maturity in using predictive modeling to inform inspections or ignition and propagation risk modeling to guide clearances, measures that are in use by its peer utilities.

PG&E continues to have the lowest self-assessed maturity level among the large IOUs in vegetation management and inspections, with a level of 0.7 (Figure 4 and Figure 5). In evaluating PG&E's maturity survey, Energy Safety determined that as of January 1, 2023, PG&E will most likely remain at a low level of maturity in its use of predictive modeling in VM inspection scheduling, checklists, and procedures and the use of risk modeling to guide clearances.⁸⁰

⁷⁷ Capability 21, Vegetation inventory for condition assessment.

⁷⁸ PG&E-21-18 from the 2021 WMP Final Action Statement ("Minimally planned maturity for VM program")

⁷⁹ Data Request OEIS-PG&E-22-002, Question 1.

⁸⁰ See 2022 WMP Guidelines, Attachment 4, pp. 12-13.

Figure 4: Vegetation Management and Inspections Maturity Level Progress: Large IOUs

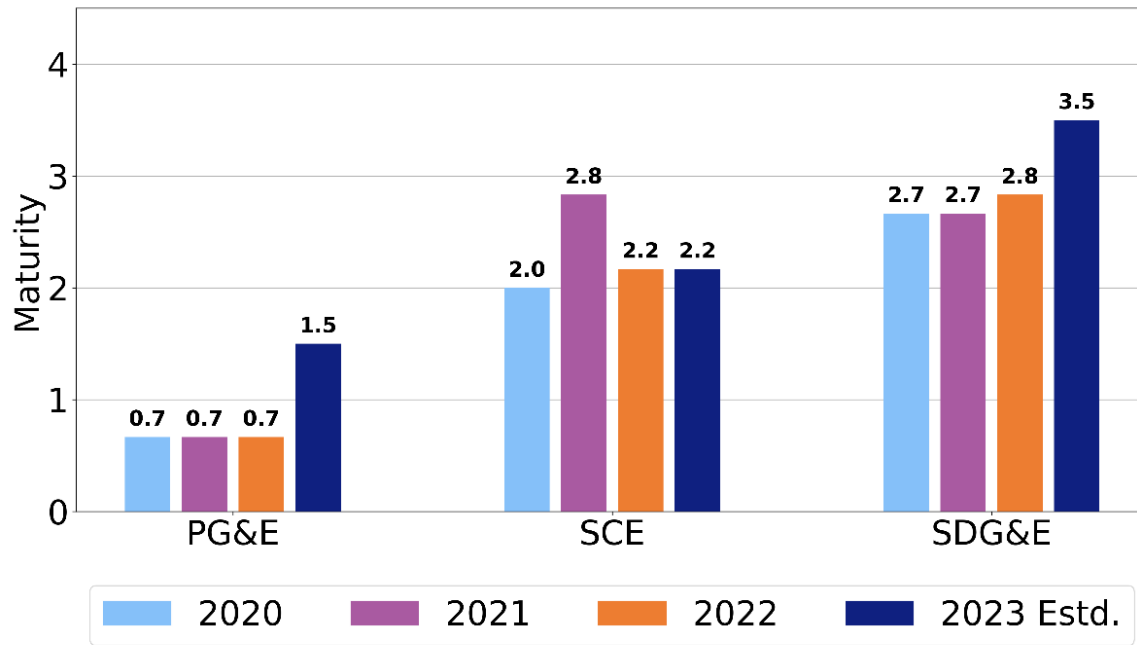
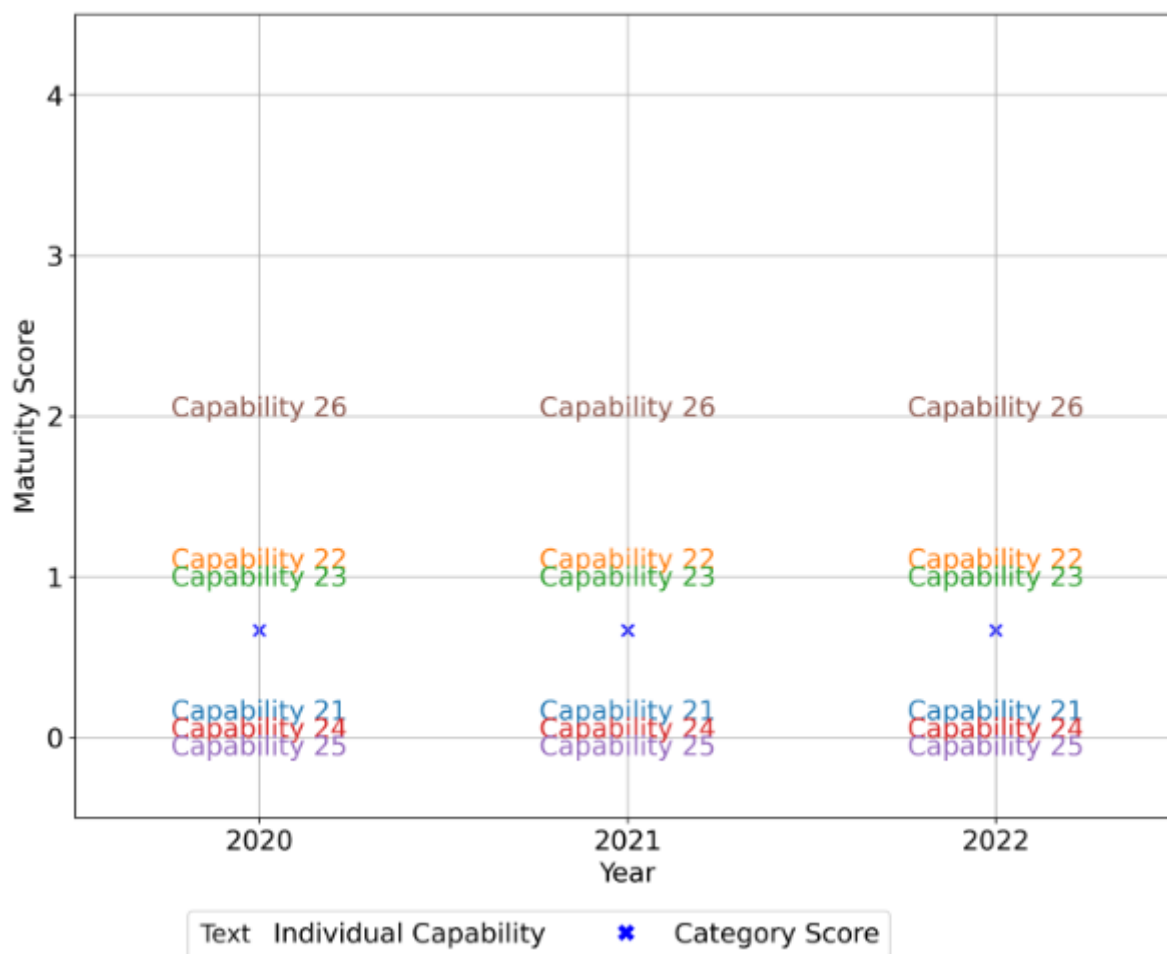


Figure 5: Vegetation Management and Inspections
Maturity Level Progress by Capability – PG&E



According to PG&E’s response to the Maturity Survey, as of January 1, 2023, it will use predictive modeling of vegetation growth as an input to scheduling VM inspections (E.II.c). Yet, contradictorily, PG&E does not project it will use predictive modeling in the context of two Maturity Survey questions shown in Table 6.

Table 6: Predictive Modeling Questions and Responses in
PG&E’s, SCE’s, and SDG&E’s Maturity Surveys

Capability	Question	PG&E’s 2022 & 2023 Projected Response	SCE’s 2022 Response	SDG&E’s 2022 Response
22: Vegetation inspection cycle	E.II.b. How are vegetation inspections scheduled?	i. Based on annual or periodic schedules	ii. Based on up-to date static maps of predominant vegetation	iii. Risk, as determined by predictive modeling of

			species and environment	vegetation growth and growing conditions
23: Vegetation inspection effectiveness	E.III.b. How are procedures and checklists determined?	i. Based on statute and regulatory guidelines only	ii. Based on predicative modeling based on vegetation and equipment type, age, and condition	iii. Based on predictive modeling based on vegetation and equipment type, age, and condition and validated by independent experts.

Energy Safety inquired why PG&E is developing predictive modeling capabilities for VM (E.II.c) but not using those models to schedule inspections (E.II.b) and determine procedures and establish checklists (E.III.b). PG&E responded that it “will pursue predictive modeling of its VM program to further support risk-informed decision making and planning for programs, such as Enhanced Vegetation Management (EVM), but annual inspections are expected to continue to define the inspection cycle frequency.”⁸¹ Additionally, Energy Safety asked when predictive modeling will be used to schedule inspections, determine procedures, and establish checklists, to which PG&E responded: “Predictive modeling may never fully replace annual scheduled inspections but should continue to further support risk-informed decision making.... We are hiring a data scientist to explore predictive modeling for tree growth and tree health. Our future use of this is dependent on the outcome of exploring this predictive modeling.”⁸²

Energy Safety acknowledges that discovering ways to perform predictive modeling and integrating it into VM schedules, checklists, and procedures takes time and resources. However, without developing its capabilities, PG&E's maturity level will remain at 1 for both capabilities 22 and 23 (Figure 5), below its peer utilities and below what Energy Safety considers reasonable for a robust vegetation management program.

Similarly, in capability 24, “grow-in mitigation,” based on its response to Energy Safety's question, PG&E does not intend to mature on the question highlighted in Table 7.

⁸¹ Data Request OEIS-PG&E-22-003, Question 3a.

⁸² Data Request OEIS-PG&E-22-003, Question 3b.

Table 7: Maturity Survey Question E.IV.c and Responses from PG&E, SCE, and SDG&E

Capability	Question	PG&E's 2023 Projected Response	SCE's 2023 Projected Response	SDG&E's 2023 Projected Response
24: Grow-in Mitigation	E.IV.c What modeling is used to guide clearances around lines and equipment?	iii. None of the above	ii. ignition and propagation risk modeling	ii. ignition and propagation risk modeling

Energy Safety inquired, "How does and will PG&E's ignition and propagation risk modeling guide clearances?" PG&E responded, "PG&E adheres to CPUC standards when determining clearances around line and equipment which has proven to be successful using in-person inspection. Currently, PG&E's ignition risk modeling do not guide clearances. PG&E believes ignition risk modeling is more appropriate for possible fall-in and blow-in scenarios and currently has no plans to utilize ignition risk modeling to guide clearances."⁸³

The fact that PG&E has no plan to use ignition and propagation risk modeling to guide clearances around lines and equipment stagnates PG&E's maturity level for capability 24 and does not follow best practice as set forth in the Maturity Model for mitigating grow-in risk.

Required Remedies

A response to RN-PG&E-22-09 is due in 60 days. PG&E must benchmark its use of predictive and risk modeling in VM with SCE and SDG&E.⁸⁴ PG&E should also consider benchmarking with at least one electric utility outside California.⁸⁵

PG&E must report on practices learned from benchmarking regarding the use of predictive and risk modeling in VM and discuss the initial steps that it will take to incorporate those practices into its VM programs.

⁸³ Data Request OEIS-PG&E-22-003, Question 4.

⁸⁴ See 2022 WMP Guidelines, Attachment 4, p. 12 (Capabilities 22-24, Vegetation inspection cycle, Vegetation inspection effectiveness, and Vegetation grow-in mitigation).

⁸⁵ Ideally, this other utility would have similar vegetation management challenges to PG&E, e.g., density of vegetation.

4.4.2 RN-PG&E-22-10: PG&E does not report targets for its vegetation management quality assurance and quality verification program or for poles brushed

PG&E did not report targets for its VM quality assurance and quality verification (QA/QV) program or for poles brushed.⁸⁶ These targets are required by 2022 WMP Guidelines and PG&E-21-24.⁸⁷ Through data requests, Energy Safety learned PG&E has internal targets for QA/QV and poles brushed per Pub. Util. Code Section 4292 but has not committed to targets in its 2022 Update.

In response to a key area for improvement identified in the 2021 Update (PG&E-21-24, “Need for quantified VM compliance targets”), PG&E, in its 2022 Update, provided eight targets in Table 5.3-1 per 2022 WMP Update Guidelines requirements. This is an increase over the two targets in PG&E’s 2021 WMP. However, PG&E does not provide the percentage of vegetation inspections audited in accordance with its QA/QV program, nor the number of poles brushed (cleared) in accordance with PRC 4292, as required by the Guidelines.⁸⁸

In response to a data request, Energy Safety learned that PG&E fell short of its internal targets for QA/QV auditing in 2021. Energy Safety inquired as to how many audits PG&E planned to perform in 2022, to which PG&E responded by providing the information in Table 8, below.⁸⁹ PG&E also informed Energy Safety it “intends to inspect and work (as necessary)” 100 percent of the approximately 83,000 poles in its territory subject to PRC 4292 requirements.⁹⁰ The same data request revealed PG&E’s compliance rate⁹¹ for pole clearing has decreased since 2019 (Table 9 below).⁹²

PG&E’s responses to Energy Safety’s data requests reveal that PG&E has internal targets for QA/QV and PRC 4292, but it has not committed to them in its WMP. PG&E must provide these targets in accordance with PG&E-21-24 and the 2022 WMP Guidelines. Additionally, given

⁸⁶ Pole brushing requirements are set forth in PRC 4292

(https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=4292&lawCode=PRC).

⁸⁷ Pole brushing requirements are set forth in PRC 4292; see also 2022 WMP Guidelines, Attachment 4, p. 13 (Capability 26, QA/QC for vegetation management); PG&E-21-24 from the 2021 WMP Final Action Statement.

⁸⁸ 2022 WMP Update Guidelines, Attachment 2, pp. 54–55.

⁸⁹ Data Request OEIS-PG&E-22-005, Question 6.

⁹⁰ Data Request OEIS-PG&E-22-005, Question 2.

⁹¹ Compliance rate is the percentage of work audited found to be consistent with a specified protocol, process, or regulation.

⁹² Data Request OEIS-PG&E-22-005, Question 4, Attachment 1 (WMP-Discovery2022_DR_OEIS_005-Q04Atch011.xlsx).

decreasing QA/QV compliance rates for pole brushing, PG&E must establish acceptable quality levels (AQL)⁹³ for performance for each QA/QV program listed in Table 8.

Table 8: Number of Audits/Reviews PG&E Plans to Perform under the Quality Management Department for 2022⁹⁴

Quality Assurance – Vegetation Management (QAVM)	
Distribution Audits	43 Audits
Vegetation Pole Clearing Audits	1 Audit
Transmission Audits	1 Audit
Procedure Audits	4 Audits
Quality Verification – Vegetation Management (QVVM)	
Distribution Reviews	1,522 Reviews
Vegetation Pole Clearing	3,421 Poles
Transmission Reviews	260 Reviews

Table 9: Compliance Rates for Select PG&E Activities as Audited by PG&E⁹⁵

Year	PI Compliance Rate %⁹⁶	Pole Clearing Compliance Rate %⁹⁷
2019	99.79%	96.37%
2020	99.61%	93.44%

⁹³ Acceptable quality level (AQL) is defined as follows: When a continuing series of lots is considered, a quality level which for purposes of sampling inspection is the limit of satisfactory process average. (Juran, Joseph, and A. Blanton Godfrey. "Quality handbook." Republished McGraw-Hill 173, no. 8 (1999): 34-51. Page 46.7). In other terms, AQL is the worst quality level that is still considered satisfactory. In this case, PG&E could set the AQL for Vegetation Pole Clearing as 95%, meaning if 95% of work audited is deemed compliant with pole clearing specifications and congruently 5% of that same work is considered non-compliant, PG&E would consider this "acceptable."

⁹⁴ Data Request OEIS-PG&E-22-005, Question 6.

⁹⁵ Data Request OEIS-PG&E-005, Question 4, Attachment 1 (WMP-Discovery2022_DR_OEIS_005-Q04Atch011.xlsx).

⁹⁶ In compliance with PG&E standards and protocols regarding pre-inspection of vegetation.

⁹⁷ In compliance with Public Resources Code 4292 standards.

2021	99.75%	91.83%
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Required Remedies

A response to RN-PG&E-22-10 is due in 30 days. PG&E must provide targets in accordance with PG&E-21-24 and the 2022 WMP Guidelines for its QA/QV program and number of poles brushed per PRC 4292. For the QA/QV targets, PG&E may provide either the percentage of vegetation inspections audited (as prescribed by the Guidelines) or the number of audits/reviews it plans to perform (as described in Data Request OEIS-PG&E-22-005, Answer 6, and reiterated in Table 8).

PG&E must establish an Acceptable Quality Level (AQL) for performance for each QA/QV program listed in Table 8. The AQL for each program may be no lower than 95 percent.⁹⁸

Targets and associated AQLs must be presented in a revised WMP Table 5.3-1.

4.4.3 RN-PG&E-22-11: PG&E has failed to implement the vegetation management refresher curriculum it committed to implement in its 2021 WMP Update

PG&E has failed to implement the vegetation management refresher curriculum it committed to implement in its 2021 WMP Update.⁹⁹

In the Final Action Statement on PG&E's 2021 Update, Energy Safety required PG&E to report on progress in developing and implementing its new VM refresher curriculum in its 2022 WMP Update.¹⁰⁰ PG&E stated in its 2022 WMP Update that the "refresher curriculum is still in the development process" and that "curriculum development and project scope will be established in 2022."¹⁰¹ Energy Safety acknowledges that curriculum development takes time; however, PG&E stated in its 2021 Update that it is "currently in the process of creating a refresher course that will be updated yearly" and expected to have this course "ready for use in 2022."¹⁰² Energy Safety is holding PG&E to this commitment. Accordingly, PG&E must implement its refresher course in 2022.

⁹⁸ An AQL of 95% or greater is in line with PG&E's peer utilities.

⁹⁹ Final Action Statement on 2021 Wildfire Mitigation Plan Update – Pacific Gas and Electric, p. 86.

¹⁰⁰ Final Action Statement on 2021 Wildfire Mitigation Plan Update – Pacific Gas and Electric, p. 86.

¹⁰¹ PG&E's 2022 Update, Table PG&E 4.6-2: Progress on Additional Issues, p. 239.

¹⁰² PG&E's 2021 Update Revision, p. 728.

Required Remedies

A response to RN-PG&E-22-11 is due in 30 days. PG&E must provide a progress update, a summary of the curriculum, and a timeline to complete the implementation of its VM refresher training in 2022.

4.5 Grid Operations and Protocols, Including PSPS

4.5.1 RN-PG&E-22-12: PG&E has failed to provide sufficient evidence to support its extensive use of Enhanced Powerline Safety Settings and instead relies on the findings of a time-limited pilot deployed in 2021

PG&E has failed to provide sufficient evidence to support its extensive use of Enhanced Powerline Safety Settings (EPSS).¹⁰³ PG&E relies on the findings of a time-limited EPSS pilot deployed in 2021 to support the widespread deployment of EPSS.¹⁰⁴ While PG&E reported ignition reductions over the period of the pilot, there is not clear evidence that all of these ignition reductions can be directly attributable to EPSS settings. Energy Safety is concerned that PG&E is hastily deploying this strategy across its system based on minimal data and without fully understanding the public safety impacts that may result from widespread application.

In June 2021, in response to the Dixie Fire, PG&E began to operate a limited number of grid miles in the HFTD under sensitive protective settings known as Hot Line Tag. Hot Line Tag is an extremely sensitive setting that causes the line to easily trip across all three phases. The setting is used to protect line workers when working directly on an energized line. Under Hot Line Tag, as deployed in 2021, the entire line was de-energized back to the substation, resulting in extensive outages. PG&E had to patrol the entire line prior to returning it to service. Outages were prolonged, some lasting upwards of days, and PG&E received significant customer complaints.¹⁰⁵

¹⁰³ See Public Utilities Code § 8386(a); 2022 WMP Guidelines, Attachment 4, pp. 13-14, 45-48.

¹⁰⁴ PG&E's 2022 Update, FIGURE PG&E-7.3.6-2: CPUC-REPORTABLE IGNITION REDUCTION ON EPSS ENABLED CIRCUITS AND OVERALL DECREASES IN HFTD AREA IGNITIONS AFTER EPSS ENABLED, p. 733.

¹⁰⁵ Data Request OEIS-PG&E-22-012, Question 2. PG&E received 249 customer complaints during deployment of Hot Line Tag and subsequent EPSS.

Following deployment of Hot Line Tag settings, PG&E initiated a pilot EPSS program¹⁰⁶ on approximately 11,500 miles of distribution circuits, or 45 percent of the circuits in HFTD areas.¹⁰⁷ PG&E modified its protective settings from Hot Line Tag to less sensitive settings, resulting in a higher threshold for a line trip. In addition, PG&E added line reclosers and fuse savers to further refine sensitivity settings and allow for the trip to occur on a single phase without resulting in an outage across all three phases. PG&E is continuing to refine the timing of protective devices such that the location of the fault can be more easily detected and the line only trips from the location of the fault to the next device. This reduces the amount of line that must be patrolled prior to re-energization.

In its WMP, PG&E states that deployment of Hot Line Tag and the EPSS pilot program resulted in an 80 percent decrease in CPUC-reportable ignitions. When accounting for all ignitions, including non-CPUC reportable ignitions, ignitions decreased by approximately 40 percent.¹⁰⁸ Relying upon estimated ignitions reductions that occurred during a short pilot inclusive of Hot Line Tag and EPSS deployment in the August-September timeframe of 2021, PG&E opted to deploy EPSS in 2022 across all lines in its HFTD and many surrounding the HFTD, resulting in approximately 43,431 miles subject to EPSS.¹⁰⁹ In its WMP, PG&E estimates that 80 percent of protective devices and associated settings will be installed by May of 2022, with the remaining 20 percent installed by August of 2022.

Although PG&E attributes ignition reductions to EPSS, PG&E did not present clear evidence in the 2022 Update to support this. Therefore, the ignition reduction rate and resulting benefit as a result of the modified EPSS settings is unclear. Further, since deployment of Hot Line Tag and EPSS, PG&E still experienced seven ignitions, as shown in Table 10 below.

Table 10: PG&E's 2021 EPSS Ignitions ¹¹⁰

Index Number	Create Date	Create Time	Suspected Initiating Event
1762	10/11/2021	13:48:00	Vegetation
1648	9/30/2021	09:12:00	Contamination
1309	8/27/2021	20:06:00	Vegetation
1258	8/10/2021	21:01:00	Contact - 3rd Party
1220	8/8/2021	05:12:00	Equipment - PG&E
1190	8/5/2021	07:36:00	Contamination
1154	7/31/2021	06:15:00	Equipment - PG&E

¹⁰⁶ PG&E's 2022 Update, p. 735.

¹⁰⁷ PG&E's 2022 Update, p. 731.

¹⁰⁸ PG&E's 2022 Update, FIGURE PG&E-7.3.6-2: CPUC-REPORTABLE IGNITION REDUCTION ON EPSS ENABLED CIRCUITS AND OVERALL DECREASES IN HFTD AREA IGNITIONS AFTER EPSS ENABLED, p. 733.

¹⁰⁹ PG&E's presentation to CPUC, ENHANCED POWERLINE SAFETY SETTINGS (EPSS) PROGRAM UPDATE, April 20, 2022.

¹¹⁰ Data Request MGRA-PGE-WMP22_DataRequest2, Question 2.

Of additional concern, PG&E has not provided sufficient evidence for how it will respond in a timely manner to the increased number of outages that may result from the widespread deployment of EPSS. In 2022, PG&E predicts 5.27 outages a day over a span of 183 days to occur in the areas impacted in 2021, and 3.58 outages a day for new circuits, as seen in Table 11 below.

Table 11: PG&E's EPSS – 2021 Impacts and Projected 2022 Impacts ¹¹¹

EPSS Circuit Group	Number of Circuits	Days With EPSS		Avg # EPSS Devices/Ckt	Ratio of Avg # of EPSS Devices/Ckt	Outages per Day	Estimated # of EPSS Outages in 2022
		2021	2022				
Circuits with EPSS in 2021	170	119	183	7.20	1.00	5.27	964
New Ckts (HFTD/HFRA & Tier 1 Devices)	657	0	183	4.90	0.68	3.58	2,534
Buffer Ckts (100% Devices in Tier 1)	191	0	30	1.61	0.22	1.18	40
Summary	1,018	-	-	-	-	-	3,538

To prepare for customer impacts, PG&E undertook a “EPSS Reliability Impact Analysis”¹¹² assessment of the number of customers that would have been impacted if EPSS were enabled from 2019-2021 (EPSS Reliability Impact Analysis). This showed a total of predicted “Customers Experiencing Sustained Outages (CESO)” at 5,602,299.¹¹³ However, this assessment was limited in its approach. For example, it did not include a predictive analysis for customer impacts (e.g., outage duration in minutes), nor types of customers being impacted (e.g., Access and Functional Needs customers). Further missing were factors such as asset health, risks present in the area that could lead to more frequent outages, and broader public safety impacts occurring under extended outages.

Based on the results from the above-mentioned assessment, PG&E is initiating "reliability mitigations" to mitigate outages on the 50 circuits that it predicts will be most impacted by EPSS. These mitigations include addressing critical operating equipment tags, completing reliability-specific corrective tags, replacing or installing assets that could impact reliability, and completing enhanced vegetation management and/or reducing vegetation clearance conditions.¹¹⁴ Given that the 50 circuits were selected based on a predicted CESO, it is not clear that mitigating these identified circuits will best address the most vulnerable customers. Additionally, it is unclear that mitigating just the top 50 circuits is all that is needed, given the above-mentioned shortcomings of PG&E's EPSS Reliability Impact Analysis. Finally, many of the corrective actions PG&E intends to complete are based on known conditions relating to open tags, as discussed in RN-PGE-22-05.

PG&E has already made significant progress in deploying EPSS throughout the HFTD; therefore, Energy Safety is limited in its ability to require PG&E to conduct more testing to evaluate the efficacy of chosen settings prior to widespread usage. However, given the high

¹¹¹ Data Request CalAdvocates-PGE-2022WMP-17, Question 2.

¹¹² PG&E's 2022 Update, p. 494

¹¹³ Data Request OEIS-PG&E-22-005, Question 1.

¹¹⁴ Data Request OEIS-PG&E-22-007, Question 17.

reliability and public safety impacts of EPSS and the yet unproven efficacy of the settings, Energy Safety sets forth remedies below to ensure that PG&E is adapting EPSS based upon real-time learning throughout 2022 to maximize ignition reductions while balancing that against customer impacts.

Required Remedies

A response to RN-PG&E-22-12 is due in 45 days. PG&E is required to take action in the following areas: 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.

1. PG&E must provide a plan explaining how it will collect and analyze data from EPSS deployment throughout 2022 and adjust settings to balance wildfire ignition reduction against public safety impacts of outages.¹¹⁵ This plan must include details on how PG&E determines the number and locations of protective devices throughout its system.
2. PG&E must submit a reassessment of the impacts associated with the widespread use of EPSS. This reassessment should include a consideration of additional factors, such as existing asset health (based on open repair tags, equipment risk, etc.) and public safety impacts to determine the circuits that will be most impacted by EPSS.
3. PG&E must explain how it will mitigate the circuits most impacted by EPSS, including a timeline for each mitigation measure and the projected impact of the mitigation measures on the likelihood of a trip on each circuit. PG&E must include how the circuits identified in this reassessment differ from the initial 50 circuits identified in its 2022 Update. Additionally, PG&E must explain if 50 circuits is the appropriate number on which to focus mitigations, and if so, why.
4. PG&E must provide details on its EPSS outreach plan, including preparation for Access and Functional Needs (AFN) and medical baseline customers, in areas that are subject to EPSS. This should include how PG&E is educating the public about EPSS and how PG&E will support customers, particularly AFN and medical baseline customers, to mitigate the impact of outages caused from EPSS.
5. PG&E must provide a restoration response and resource staffing plan that includes information on how PG&E plans to dedicate surge staff to support the projected increase in EPSS-related outages (and from what areas or purposes surge staff are being diverted).

¹¹⁵ See Public Utilities Code § 8386(a); 2022 WMP Guidelines, Attachment 4, pp. 13-14, 45-48.

6. PG&E must provide a plan for how often it will benchmark against other utilities that deploy protective sensitive settings and what topics it will seek to benchmark to apply learnings in as close to real time as possible to PG&E's system. PG&E must also include a description of any updates made to its program to date as a result of benchmarking that has already occurred.
7. Beginning with submission of its first Revision Notice Response to RN-PG&E-22-12 and monthly thereafter through 2022, PG&E must submit to Energy Safety the following information through the 2022 Wildfire Mitigation Plan Updates docket (#2022-WMPs):
 - a. Circuit Protection Zones (CPZ) where EPSS is deployed (with ID)
 - b. The number of times EPSS resulted in a trip on each CPZ
 - c. The number of customers that experienced an outage for each event
 - d. The restoration time for each outage
 - e. The cause of the fault for each outage
 - f. The number of ignitions that occurred on lines enabled with EPSS
 - g. The number of ignitions that resulted in a wildfire greater in size than 10 acres
 - h. The amount of time it took for PG&E to identify (and suppress if applicable) the ignition
 - i. Any changes made to EPSS over the month and explanation of why those changes were made
 - j. Estimated ignition reductions resulting from EPSS including methodology for arriving at this estimate

4.6 Resource Allocation Methodology

4.6.1 RN-PG&E-22-13: PG&E does not provide disaggregated data on its system hardening initiatives

PG&E does not provide disaggregated data on its system hardening initiatives.

PG&E continues to provide unacceptably aggregated data regarding its system hardening initiatives, including targets, costs and risk-spend efficiency data. This is not in accordance with the WMP Guidelines.¹¹⁶ Energy Safety also raised this issue in 2021 in RN-PGE-03.¹¹⁷

As in prior years, PG&E aggregates system hardening into one initiative titled "System Hardening Distribution." This continued aggregation impedes transparency, wherein

¹¹⁶ See 2022 WMP Guidelines, Attachment 4, pp. 14-15, 55-59.

¹¹⁷ PG&E-21-03 from the 2021 WMP Final Action Statement ("Unacceptable Aggregation of System Hardening Risk-Spend Efficiencies [RSEs]: PG&E does not provide individual RSE estimates for its system hardening initiatives and instead provides one RSE for distribution system hardening.").

individual mitigation strategy mile targets, RSE estimates, and costs are not readily identifiable. For instance, it is unclear what overhead hardening entails (e.g., what percentage is covered conductor vs. traditional hardening). As a result, it is difficult to measure achievement in specific areas (e.g., such as covered conductor) and make comparisons across utilities. In 2021 Energy Safety identified PG&E's aggregation of system hardening RSE estimates as a critical issue, which PG&E addressed by providing the costs, miles treated, and RSE estimates for covered conductor installation, undergrounding, and remote grid. PG&E did not provide this level of detail in its 2022 Update.

Required Remedies

A response to RN-PG&E-22-13 is due in 30 days. PG&E must separately provide detailed costs, miles previously treated, a range for miles planned to be treated, and RSE estimates for covered conductor installation, undergrounding, line removal, and any other system hardening initiatives currently presented together as one value in PG&E's 2022 Update.¹¹⁸

Table 12 must be revised to provide the required information for each initiative listed in Energy Safety's 2022 WMP Guidelines.

5. Conclusion and Next Steps

PG&E must submit its Revision Notice Responses via email to the Energy Safety Deputy Director. In addition, all Revision Notice Responses must be submitted to the 2022 Wildfire Mitigation Plan Updates docket (#2022-WMPs).¹¹⁹ PG&E must concurrently serve all Revision Notice Responses on the California Department of Forestry and Fire Protection at CALFIREUtilityFireMitigationUnit@fire.ca.gov (CAL FIRE).

Revision Notice Responses are due within 30 days, 45 days, and 60 days of this Revision Notice issuance, as explicitly noted in each of the Required Remedies subsections under Section 4. A summary is below:

- 30 days after issuance of this Revision Notice, PG&E must provide a response to critical issues RN-PG&E-22-01, RN-PG&E-22-03, RN-PG&E-22-06, RN-PG&E-22-07, RN-PG&E-22-08, RN-PG&E-22-10, RN-PG&E-22-11, and RN-PG&E-22-13.
- 45 days after issuance of this Revision Notice, PG&E must provide a response to critical issues RN-PG&E-22-02, RN-PG&E-22-05, and RN-PG&E-22-12.
- 60 days after issuance of this Revision Notice PG&E must provide:
 - A response to critical issues RN-PG&E-22-04 and RN-PG&E-22-09;

¹¹⁸ See 2022 WMP Guidelines, Attachment 4, pp. 14-15, 55-59.

¹¹⁹ <https://efiling.energy.ca.gov/EFiling/DocketInformation.aspx?docketnumber=2022-WMPs>.

- A revised version of its 2022 Update to the 2022 Wildfire Mitigation Plan Updates docket (#2022-WMPs) that includes any changes to the 2022 Update resulting from Revision Notice Responses, in both a redlined and a clean version of the document; and
- A single updated WMP and auxiliary Excel file updating tables required in the WMP submissions that incorporates all required changes across all critical issues.

For the updated auxiliary Excel file, PG&E must provide a clean version of the file and a change log that documents all adjustments to the file. Submission files must use the naming conventions provide in the 2022 Guidelines.¹²⁰ For example, “2022-07-25_PGE_22_RNR_R1,” refers to the PG&E Revision Notice Response submitted on July 25, 2022, revision 1. The redlined version must be named “2022-07-25_PGE_22_RNR_R1_redlined” and the auxiliary excel file “2022-07-25_PGE_22_RNR_R1_Tables 1-12.”

For each of the thirteen critical issues identified, Energy Safety sets forth specific remedies that PG&E must fully address and respond to within its Revision Notice Responses. Failure to fully address and respond to each remedy within the Revision Notice Response by the designated date may result in denial of PG&E's WMP. Energy Safety will not accept any updates or errata to Revision Notice Responses after the due date for each critical issue.

Stakeholders may submit comments on PG&E's Revision Notice Responses within 15 calendar days of PG&E's 60-day Revision Notice Response. Reply comments are due 10 calendar days thereafter and shall be limited to issues raised and representations made in opening comments of other stakeholders. Opening and reply comments must be submitted to the 2022 Wildfire Mitigation Plan Updates docket (#2022-WMPs).^{121, 122}

The dates for this Revision Notice are:

Revision Notice issued by Energy Safety:	May 26, 2022
PG&E's 30-day Revision Notice Response due:	June 27, 2022
PG&E's 45-day Revision Notice Response due:	July 11, 2022
PG&E's 60-day Revision Notice Response due:	July 26, 2022
Public Comments due:	August 10, 2022

¹²⁰ Guidelines for Submission and Review of 2022 Wildfire Mitigation Plan Updates, Office of Energy Infrastructure Safety, Attachment 5, Electronic File Naming Convention with Examples, p.8.

¹²¹ <https://efiling.energysafety.ca.gov/EFiling/DocketInformation.aspx?docketnumber=2022-WMPs>.

¹²² If any deadline falls on a weekend or holiday, the deadline will be moved to the following business day. Dates falling on a Saturday or holiday as defined in Government Code Section 6700 have been adjusted to the next business day in accordance with Government Code Section 6707.

Reply Comments due:

August 20, 2022

Draft Decision issued by Energy Safety:

September 30, 2022

Energy Safety will consider PG&E's Revision Notice Responses, revised 2022 Update, stakeholder comments, responses to data requests and the totality of the information before it to date in issuing a determination on PG&E's 2022 Update pursuant to Pub. Util. Code Sections 8386(b) and 8386.3(a).



Melissa Semcer

Deputy Director | Electrical Infrastructure Directorate

Office of Energy Infrastructure Safety

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