Pacific Gas and Electric Company

2022 Wildfire Mitigation Plan

Response to Revision Notice

RN-PG&E-22-02
RN-PG&E-22-03
RN-PG&E-22-05
RN-PG&E-22-12

July 11, 2022

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Critical Issue RN-PG&E-22-02

Critical Issue Title: PG&E did not report on the amount of work being completed in top-risk areas.

Required Remedies: *PG&E must provide an update of Table 5.3-1(A) with top-risk percentages based solely on risk model output.*

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

Response to Critical Issue RN-PG&E-22-02 Remedy #02(a)

In response to Critical Issue RN-PG&E-22-02(a), we have updated Table 5.3-1(A) by:

1. Providing the percentage of each type of work being completed in the top-risk circuits, as defined by wildfire risk model outputs alone. This information is included in the 2022 column marked Target% / Top-Risk%. For additional context:

    a. Target E.01 for Enhanced Vegetation Management (EVM) provides a good example of the information provided in response to the Office of Energy Infrastructure Safety's (Energy Safety's) request. As indicated in the Table, at least 80% of our EVM work in 2022 will take place on circuits in the top 20% of the highest risk areas using the circuit segment risk ranking from PG&E's Enhanced Vegetation Management Tree Weighted Prioritization model. Thus, the Target% / Top-Risk% column for EVM indicates: "80% / Top 20%"

    b. In certain situations, the percentage of work in the highest risk assets identified in Table PG&E-5.3-1(A) will appear low because we are performing work on a much larger population of assets than just the highest risk assets. For example, in Target D.02, Detailed Inspection Transmission – Ground, we are inspecting <u>all</u> transmission structures in the top 20% of highest wildfire risk circuits as well as a significant number of inspections outside of the top 20% of risk.

    c. The 2022 Target % / Top-Risk % values presented in Table 5.3-1 have been calculated based on our total work portfolio for each initiative target.

2. Based on guidance from Energy Safety, we are indicating "N/A" in the "Target % / Top Risk %" column in instances where the Initiative Targets do not utilize a <u>wildfire</u> risk model output to inform prioritization of the workplan. We are also indicating N/A for Initiative Targets that utilized a <u>reliability</u> risk model (*e.g.*, PSPS

lookback) for work planning purposes.[1] Initiative Targets that previously indicated using an "HFTD/HFRA Informed Prioritized" approach in the "Notes" column of Table PG&E-5.3-1(A) are also listed as N/A. These targets were prioritized based on work locations within (or traversing) an HFTD or HFRA rather than on the results of a wildfire risk model.

We note that the 2022 WMP Guidelines require Target% / Top Risk % for (1) grid design and system hardening (7.3.3); (2) asset management and inspections (7.3.4); and (3) vegetation management and inspection (7.3.5) targets. For Initiative Targets not included in these three categories, we have noted "N/A" in the "Target % / Top Risk %" column, similar to the approach taken with our initial 2022 WMP Update submission.

We also note that although many of our Initiative Targets were not determined by wildfire risk model outputs alone, the work has been carefully designed to address risk across our service territory. As we explain in more detail below in the response to Remedy #02(b), utilizing operational risk models— such as the PSPS lookback model— for work planning allows us to focus sectionalization work in areas frequently impacted by PSPS events. The PSPS lookback model is the most appropriate prioritization approach, and not the wildfire risk model, to identify potential areas most likely and susceptible to be impacted by potential PSPS events. In addition, work prioritized based on HFTD/HFRA location is often planned in this way because of general compliance obligations (e.g., inspection requirements) or in connection with long-term plans to remove certain types of equipment from use in the HFTD/HFRA (e.g., expulsion fuses, legacy 4C Controllers, motorized switch operators). In the latter scenario, all these items will be replaced over a designated period, so work is prioritized for operational execution efficiency.

[1] Please see our response to Remedy #02(b) below for a discussion of the relationship between PSPS lookback locations and high-risk locations based on wildfire risk.

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
Weather Stations - Installations and Optimizations (B.02) Section 7.3.2.1.3	400	426	400	378	300	308	Install or Optimize 100 weather stations. A unit is deemed "installed" when it is in service and verified as operating when initially installed. A unit is deemed "optimized" when a weather station is moved from an existing location to a new location for the purposes of improving our understanding of the weather conditions in the area. Target Date: 12/31/2022	N/A	# of Weather Stations	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target Notes: N/A
High-Definition Cameras - Installations (B.03) Section 7.3.2.1.4	71	124	200	216	135	153	Install 98 new cameras that are facing HFTD Tier 2 or Tier 3 viewsheds. In the case a site is destroyed, and a camera can be replaced / relocated nearby with a different visual coverage than the original, this will count as a new installation. Target Date: 12/31/2022	N/A	# of HD Cameras	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target Notes: N/A
Distribution Fault Anticipation (DFA) - Installations (B.04) Section 7.3.2.2.3	N/A	6	N/A	1	N/A	16	Install 40 Distribution Fault Anticipation (DFA) sensors on circuits feeding into HFTD areas or HFRA. One sensor per circuit at initiating substation. Target Date: 12/31/2022	N/A	# of DFA Sensors	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/Target Notes: N/A
Early Fault Detection (EFD) - Installations (B.05) Section 7.3.2.2.3	N/A	1.5	N/A	0	N/A	0	Install Early Fault Detection (EFD) sensors on 2 circuits feeding into HFTD areas or HFRA. Target Date: 12/31/2022	N/A	# of circuits	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/Target

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	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
											Notes: N/A
Line Sensor - Installations (B.06) Section 7.3.2.2.5	N/A	14	~20	46	N/A	67	Install Line Sensor devices on 40 circuits feeding into HFTD areas or HFRA to cover mainline and major tap lines in areas meeting minimum load requirements and within cellular coverage areas to provide visibility. Target Date: 12/31/2022	N/A	# of circuits	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/Target Notes: N/A
Expulsion Fuse - Removal (C.01) Section 7.3.3.7	625	708	~625	643	1,200	1429	Remove 3,000 non-exempt fuses/ cutouts identified on distribution poles in HFTD areas or HFRA. Target Date: 12/31/2022	16% / Top 20%	# of fuses	Y	Target % / Top Risk % Notes: Approach: The top 20% of risk areas used for this target relate to individual expulsion fuse risk rankings from PG&E's Wildfire Consequence Model outputs, as described in Section 4.5.1(d) of the 2022 WMP Update. Associated Risk Score: Wildfire Consequence Model Additional Notes: Engineering coordination studies are required for replacement of all fuses. To expeditiously progress on our plan to reduce risk by removing all known, non-exempt fuses on distribution poles in

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Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
											the HFTD or HFRA within the next five years, fuses requiring simpler engineering coordination studies were prioritized in 2022. Locations with more complex fuses in higher risk locations will be included in future years. 2019-2022 Performance/ Target Notes: N/A
Distribution Sectionalizing Devices - Install and SCADA commission (C.02) Section 7.3.3.8.1	N/A	241	592	604	250	269	Install and SCADA commission 100 new PSPS SCADA enabled Distribution Sectionalizing devices. Target Date: 9/1/2022	N/A	# of distribution sectionalizing devices	Y	Target % / Top Risk % Notes: N/A - Installation locations for 2022 were derived from a 10-year PSPS lookback. No wildfire risk model was used to prioritize this work as this mitigation is for PSPS/ reliability purposes. Additional Notes: Newly installed devices may not be located in the HFTD or HFRA but are on circuits that traverse HFTD areas or HFRA and may be impacted by PSPS. 2019-2022 Performance/Target Notes: N/A
Transmission Line	N/A	0 (For PSPS	23	54	29	41	Install and SCADA commission 15	N/A	# of switches	Y	Target % / Top Risk % Notes:

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Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
Sectionalizing - Install and SCADA commission (C.03) Section 7.3.3.8.2		Mitigation)					transmission line switches on lines that traverse the HFTD areas. The switches themselves may not be located in the HFTD areas but can be used to support customer impact reduction. Target Date: 9/1/2022				N/A - Installation locations for 2022 were derived from a 10-year PSPS lookback. No wildfire risk model was used to prioritize this work as this mitigation is for PSPS/ reliability purposes. 2019-2022 Performance/ Target Notes: N/A
Distribution Line Motorized Switch Operator (MSO) - Replacements (C.04) Section 7.3.3.8.3	N/A	N/A	N/A	2	48	50	Replace at least 50 of the 104 remaining Motorized Switch Operators that are located within or are energizing line sections that feed into HFTD areas or HFRA. Target Date: 12/31/2022	N/A	# of MSOs	Y	Target % / Top Risk % Notes: N/A Additional Notes: Newly installed devices may not be located in the HFTD or HFRA but are on circuits that traverse HFTD areas or HFRA 2019-2022 Performance/ Target Notes: The 2021 Target was updated from undefined/pilot to 48 via the Change Order approved by Energy Safety on 4/11/2022.
SCADA Recloser Equipment - Installations (C.05) Section 7.3.3.9.1	N/A	N/A	N/A	20	81	81	Install 17 substation SCADA enabled reclosers on circuits serving line sections that feed into HFTD areas or HFRA, barring any exceptions due to connectivity issues necessary to	N/A	# of reclosers	Y	Target % / Top Risk % Notes: N/A Additional Notes: Newly installed devices may not be located in the HFTD or HFRA but are on circuits that

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Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
							SCADA-enable the recloser. Footnote: There may be connectivity issues for some SCADA reclosers that will require manual setting updates, but there is still benefit in installing the recloser to get the sectionalization on the circuit. Target Date: 12/31/2022				traverse HFTD areas or HFRA. 2019-2022 Performance/ Target Notes: This initiative, related to system automation, was used to capture the replacement of all Legacy 4C controllers through the end of 2021. In the 2022 WMP, this initiative reflects a different system automation workstream, putting automated reclosers near older distribution substations.
Fuse Savers (Single Phase Reclosers) - Installations (C.06) Section 7.3.3.9.2	N/A	N/A	N/A	N/A	70	71	Install 80 single phase recloser sets in HFTD areas or HFRA. Target Date: 12/31/2022	N/A	# of fuse saver sets	Y	Target % / Top Risk % Notes: N/A Additional Notes: Newly installed devices may not be located in the HFTD or HFRA but are on circuits that traverse HFTD areas or HFRA. 2019-2022 Performance/ Target Notes: PG&E piloted these devices in 2018-2019 to determine if they work as designed. In 2020, the devices were used as part of the Distribution Line Sectionalizing program (Section 7.3.3.8.1).

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	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
Temporary Distribution Microgrids (C.07) Section 7.3.3.11.1	N/A	1 [+3 temporary configurations]	Mitigate the customer impacts of PSPS through permanent and temporary front-of the-meter microgrid solutions	3 (2 additional) [+3 temporary configurations]	8 (5 additional)	8 (5 additional) [+1 temporary configurations]	Make operationally ready at least four additional Distribution Microgrid Pre-installed Interconnection Hubs (PIHs). This target will include 1 PIH that completed construction in December 2021 and will be made ready to operate in 2022. Target Date: 12/31/2022	N/A	# of PIHs	Y	Target % / Top Risk % Notes: N/A - Installation locations for 2022 were derived from a 10-year PSPS lookback. No wildfire risk model was used to prioritize this work as this mitigation is for PSPS/ reliability purposes. 2019-2022 Performance/ Target Notes: 2019: 1 permanent complete plus 3 temporary configurations 2020: There was no specific unit target for this program in 2020, instead, 2020 Target was embedded as part of the broader commitment to "Mitigate the customer impacts of PSPS through permanent and temporary front-of-the-meter microgrid solutions". Two additional PIHs were completed in 2020, plus three temporary configurations were available for PSPS mitigation.
Rincon Transformer Fuse - Replacement	N/A	N/A	N/A	N/A	N/A	N/A	Replace the fuse with a circuit switcher on the Rincon Transformer Bank 1.	N/A	# of fuses	Y	Target % / Top Risk % Notes: N/A

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	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
(C.08) Section 7.3.3.11.2							Target Date: 6/1/2022				2019-2022 Performance/ Target Notes: N/A
Emergency Back-up Generation – Equip PG&E Service Centers & Materials Distribution Centers (C.09) Section 7.3.3.11.3	N/A	0	N/A	5	23	32	Equip 15 PG&E Service Centers or Materials Distribution Centers sites with emergency back-up generation to allow the sites to operate with the same amount of functionality as they would if they were being fed from their normal utility power source. Target Date: 12/31/2022	N/A	# of sites	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target Notes: Preliminary work began on the program in 2020 and successfully completed 5 sites.
10K Undergrounding (C.10) Section 7.3.3.16	N/A	N/A	N/A	N/A	N/A	73	Complete at least 175 circuit miles of undergrounding work. The 175 circuit mile target includes undergrounding taking place as part of both System Hardening (Section 7.3.3.17.1), Butte County Rebuild efforts (Section 7.3.3.17.6) including a small volume of previously hardened overhead lines that are being placed underground, and any other undergrounding work performed in HFTD or fire rebuild areas. Target Date: 12/31/2022	29% / Top 20%	# of circuit miles	Y	Target % / Top Risk % Notes: Approach: The top 20% of risk areas used for this target relate to the circuit segment risk rankings from PG&E's Wildfire Distribution Risk Model V2 outputs, as described in Section 4.5.1(b) of the 2022 WMP Update Associated Risk Score: Wildfire Distribution Risk Model V2 Additional Notes: See our response to Revision Notice 22-3 for additional details regarding our 2022 UG work plan. 2019-2022

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Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
											Performance/ Target Notes: These miles will count for the 10,000-mile undergrounding goal.
System Hardening - Distribution (C.11) Section 7.3.3.17.1	150	171	220	342	180	210	Complete at least 470 circuit miles of system hardening work which includes overhead system hardening, undergrounding and removal of overhead lines in HFTD or buffer zone areas with the exception of any mileage being undergrounded and tracked separately as part of our Butte County Rebuild efforts (Section 7.3.3.17.6). Target Date: 12/31/2022	73% / Top 20%	# of circuit miles	Y	Target % / Top Risk % Notes: Approach: The top 20% of risk areas used for this target relate to the circuit segment risk rankings from PG&E's Wildfire Distribution Risk Model V2 outputs, as described in Section 4.5.1(b) of the 2022 WMP Update Associated Risk Score: Wildfire Distribution Risk Model V2 Additional Notes: PG&E is targeting 80% of the SH mileage meet the highest risk criteria detailed in section 7.3.3.17.1 of PG&E's 2022 WMP over the 3-year period 2021-2023. 2019-2022 Performance/ Target Notes: The 2020 and 2021 performance figures do not include any undergrounding that took place as part of the Butte Rebuild.

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Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
System Hardening - Transmission (C.12) Section 7.3.3.17.2	N/A	40	N/A	103	92	104	Remove or replace 32 circuit miles of transmission conductor on lines traversing the HFTD areas or HFRA. Target Date: 12/31/2022	N/A	# of circuit miles	Y	Target % / Top Risk % Notes: N/A Additional Notes: Transmission system hardening requires long lead time projects, requiring emphasis on operational feasibility 2019-2022 Performance/ Target Notes: N/A
Surge Arrestor - Removals (C.13) Section 7.3.3.17.3	N/A	4,602	8,850	10,263	15,000	15,465	Remove all the remaining non-exempt surge arrestors in HFTD areas (based on the known population of 4,590 surge arrestors as of January 1, 2022) through replacement with exempt equipment. Target Date: 12/31/2022	N/A	# of surge arrestors	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target Notes: N/A
Remote Grid - Operate New SPS Units (C.14) Section 7.3.3.17.5	N/A	N/A	Deploy 4-8 initial sites to validate use cases, design standards, deployment processes and commercial arrangements and deliver recommendations for scale-up	0	1	1	Operate 2 new Remote Grid Standalone Power System (SPS) units Target Date: 12/31/2022	100% / Top 20%	# of Remote Grids	Y	Target % / Top Risk % Notes: Approach: The top 20% of risk areas used for this target relate to the circuit Protection Zone risk rankings from PG&E's Wildfire Distribution Risk Model V2 outputs, as described in Section 4.5.1(b) of the 2022 WMP Update Associated Risk Score: Wildfire Distribution Risk Model V2 Additional Notes: N/A

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Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
											2019-2022 Performance/ Target Notes: This was a new Technology initiative that started in 2020. In 2020, the primary objectives of learning through the deployment of actual projects were completed. In 2020, the 5 Remote Grid sites were delayed by challenging permitting constraints associated with sensitive species.
Butte County Rebuild - Under grounding (C.15) Section 7.3.3.17.6	N/A	N/A – part of the System Hardening metrics (7.3.3.17.1)	Trench Miles: 20**	Trench Miles: 29.3** Circuit Miles: 36.6	Trench Miles: 23	Trench Miles: 23.6 Circuit Miles: 31.5	Complete 55 circuit miles of undergrounding work as part of the Butte County Rebuild program. Target Date: 12/31/2022	N/A	# of primary circuit miles	Y	Target % / Top Risk % Notes: N/A Additional Notes: The Butte County Rebuild Program is focused on undergrounding the electric distribution within the Town of Paradise and lower Magalia following the Camp Fire. 2019-2022 Performance/ Target Notes: During the first year 2019 performance figures were incorporated in the System Hardening Program described in Section 7.3.3.17.1. Previously reported historical data for

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Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
											2020 - 2021 was provided in trench miles but the 2022 WMP now measures in circuit miles, consistent with system hardening in Section 7.3.3.17.1. The 2021 performance, as measured in circuit miles, does not include a small volume (approximately 1.4 circuit miles) of previously hardened overhead lines that were placed underground in 2021. **The 2020 WMP target of 20 miles reflected only the portions of the Butte Rebuild in HFTD areas, PG&E completed 22.2 miles in HFTD areas, plus 7.1 rebuild miles in non-HFTD areas to total 29.3 trench miles completed in 2020. The 2021 WMP target of 23 trench miles included both HFTD and non-HFTD rebuild areas.
Detailed Inspections - Distribution (D.01) Section 7.3.4.1	685,000	694,250	100% of HFTD Tier 3, and 33% of HFTD Tier 2 assets.	98% of Tier 3 (198,172) and 33% of Tier 2 (151,520)	Tier 3 and Zone 1 – annually; and Tier 2 and High Fire Risk	Tier 3 and Zone 1 – annually; and Tier 2 and High Fire Risk Areas (HFRA) within the non-High	Complete detailed inspections on a minimum of 396,000 distribution poles, which were identified in PG&E's asset registry as of January 1, 2022, in HFTD areas or HFRA, barring External Factors. Any poles discovered after January 1, 2022 with a field	N/A	# of poles	Y	Target % / Top Risk % Notes: Approach: N/A Associated Risk Score: N/A Additional Notes: N/A 2019-2022 Performance/ Target

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Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
					Areas (HFRA) within the non-High Fire Threat District (HFTD) – every three years (477,309)	Fire Threat District (HFTD) – every three years (480,749)	installation date on or before 2020 will be inspected within 90 days of when added to the asset registry. Any poles discovered after January 1, 2022 with a field installation date in 2021 or 2022 will not be in scope for inspection as part of this 2022 WMP target. Target Date: 7/31/2022				Notes: For WSIP in 2019, we counted the number of inspections. In 2020 and beyond, we began measuring units by the number of poles inspected. On November 1, 2021, PG&E submitted a Change Order to Energy Safety that was approved on 4/11/2022 to update the target number of distribution poles for this commitment to 477,309, however, as part of the ongoing record validation the target has since been increased to 480,749.
Detailed Inspection Transmission – Ground (D.02) Section 7.3.4.2	40,623 - Complete a WSIP enhanced inspection of all 50,000 structures by May 1, 2019. (Approx. 9,377 inspections were completed in December 2018)	49,715	Transmission – aerial and visual for ~22,000 structures	100% of Tier 3 (11,313) and 33% of Tier 2 (14,970)	100% of Tier 3 & Zone 1 and 33% of Tier 2 (26,810)	26,826	Complete detailed ground inspections on a minimum of 39,000 transmission structures in PG&E's asset registry as of January 1, 2022, in HFTD areas or HFRA, barring External Factors. Any assets discovered after January 1, 2022, with a field installation date on or before 2020 will be inspected within 90 days of when added to the asset registry. Any assets discovered after January 1, 2022, with a field installation date in 2021 or 2022 will not be in scope for inspection as part of this 2022 WMP target. Target Date: 7/31/2022	21% / Top 20% (100% of all structures in the Top 20% will be inspected)	# of structures	Y	Target % / Top Risk % Notes: Approach: Top 20% risk areas used for this target relates to the transmission line assets (at the structure level) risk ranking from PG&E's Transmission Operability Assessment Model and Wildfire Consequence outputs, as described in Section 4.5.1(h) and 4.5.1 (d) of the 2022 WMP update. Associated Risk Score: OA Model Additional Notes: PG&E is inspecting all Transmission structures that make up the top 20% of wildfire risk. PG&E is also performing

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Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
											work beyond the top 20% of risk, which brings the target % down to 21%. 2019-2022 Performance/Target Notes: For WSIP in 2019, we counted the number of inspections. In 2020 and beyond, we began measuring units by the number of structures inspected. On November 1, 2021, PG&E submitted a Change Order to update the target number of transmission structures requiring enhanced detailed inspections and some form of aerial assessment to 26,810, however, as part of the ongoing record validation the target has since been increased to 26,826. In 2022, we have separated the Detailed Inspections of transmission structures target into the three inspection methods: climbing, aerial, and ground.
Detailed Inspection Transmission–Climbing (D.03) Section 7.3.4.2	40,623 - Complete a WSIP enhanced inspection of all 50,000	49,715	Transmission–aerial and visual for ~22,000 structures	100% of Tier 3 (338) and 33% of Tier 2 (779)	100% of Tier 3 & Zone 1 and 33% of Tier 2 (26,810)	1,385	Complete detailed climbing inspections on a minimum of 1,800 transmission structures in PG&E's asset registry as of January 1, 2022, in HFTD areas or HFRA, barring External	N/A	# of structures	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target

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	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
	structures by May1, 2019. (Approx. 9,377 inspections were completed in December 2018)						Factors. Any assets discovered after January 1, 2022 with a field installation date on or before 2020 will be inspected within 90 days of when added to the asset registry. Any assets discovered after January 1, 2022 with a field installation date in 2021 or 2022 will not be in scope for inspection as part of this 2022 WMP target. Target Date: 7/31/2022				Notes: For WSIP in 2019, we counted the number of inspections. In 2020 and beyond, we began measuring units by the number of structures inspected. On November 1, 2021, PG&E submitted a Change Order to update the target number of transmission structures requiring enhanced detailed inspections and some form of aerial assessment to 26,810, however, as part of the ongoing record validation the target has since been increased to 26,826. In 2022, we have separated the Detailed Inspections of transmission structures target into the three inspection methods: climbing, aerial, and ground.
Detailed Inspection Transmission – Aerial (D.04) Section 7.3.4.2	40,623 - Complete a WSIP enhanced inspection of all 50,000 structures by May 1, 2019. (Approx. 9,377 inspections were	49,715	Transmission – aerial and visual for ~22,000 structures	100% of Tier 3 (11,036) and 33% of Tier 2 (14,376)	100% of Tier 3 & Zone 1 and 33% of Tier 2 (26,810)	26,826	Complete detailed aerial inspections on a minimum of 39,000 transmission structures in PG&E's asset registry as of January 1, 2022, in HFTD areas or HFRA, barring External Factors. Any assets discovered after January 1, 2022 with a field installation date on or before 2020 will be inspected within 90 days of when added to the asset registry. Any assets	21% / Top 20% (100% of all structures in the Top 20% will be inspected)	# of structures	Y	Target % / Top Risk % Notes: Approach: Top 20% used for this target relates to the transmission line assets (at the structure level) risk ranking from PG&E's Transmission Operability Assessment Model outputs, as described in Section 4.5.1(h) of the 2022 WMP update

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
	completed in December 2018)						discovered after January 1, 2022 with a field installation date in 2021 or 2022 will not be in scope for inspection as part of this 2022 WMP target. Target Date: 7/31/2022				<u>Associated Risk Score:</u> OA Model <u>Additional Notes:</u> PG&E is inspecting all Transmission structures that make up the top 20% of wildfire risk. PG&E is also performing work beyond the top 20% risk, which brings the target % down to 21%. 2019-2022 Performance/ Target Notes: For WSIP in 2019, we counted the number of inspections. In 2020 and beyond, we began measuring units by the number of structures inspected. On November 1, 2021, PG&E submitted a Change Order to update the target number of transmission structures requiring enhanced detailed inspections and some form of aerial assessment to 26,810, however, as part of the ongoing record validation the target has since been increased to 26,826. In 2022, we have separated the Detailed Inspections of transmission structures target into the three inspection methods: climbing, aerial, and

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
											ground.
Infrared Inspections - Distribution (D.05) Section 7.3.4.4	N/A	N/A	N/A	5,450	N/A	10,093	Complete infrared inspections on a minimum of 9,000 distribution circuit miles in PG&E's asset registry as of January 1, 2022, in HFTD areas or HFRA, barring External Factors. Any assets identified after January 1, 2022 with a field installation date on or before 2020 will be inspected within 90 days of when added to the asset registry. Any assets identified after January 1, 2022 with a field installation date in 2021 or 2022 will not be in scope for inspection as part of this 2022 WMP target. Target Date: 12/31/2022	N/A	# of circuit miles	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target Notes: This initiative did not have WMP targets for 2019-2021
Supplemental Inspections - Substation Distribution (D.06) Section 7.3.4.15	177	177	69	69	71	71	Complete supplemental inspections on 86 distribution substations in HFTD areas or HFRA, barring External Factors. Target Date: 7/31/2022	30% / Top 20% (100% of all structures in the Top 20% will be inspected)	# of Distribution Substations	Y	Target % / Top Risk % Notes: Approach: The top 20% of risk areas used for this target relate to the substation defensible space probability score and PG&E's Wildfire Consequence Model (WFC) outputs, as described in Section 4.5.1(d) of the 2022 WMP Update Associated Risk Score: WFC Model and defensible space probability score

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
											Additional Notes: PG&E is inspecting all Distribution substations that make up the top 20% of wildfire risk. PG&E is also performing work beyond the top 20% risk, which brings the target % down to 30%. 2019-2022 Performance/ Target Notes: N/A
Supplemental Inspections - Substation Transmission (D.07) Section 7.3.4.15	51	51	124	124	33	33	Complete supplemental inspections on 43 transmission substations within HFTD areas or HFRA, barring External Factors. Target Date: 7/31/2022	25% / Top 20% (100% of all structures in the Top 20% will be inspected)	# of Transmission Substations	Y	Target % / Top Risk % Notes: Approach: The top 20% of risk areas used for this target relate to the substation defensible space probability score and PG&E's Wildfire Consequence Model (WFC) outputs, as described in Section 4.5.1(d) of the 2022 WMP Update Associated Risk Score: WFC Model and defensible space probability score Additional Notes: PG&E is inspecting all Transmission substations that make up the top 20% of wildfire risk. PG&E is also performing work beyond the top 20% risk, which brings the target % down to 25%.

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
											2019-2022 Performance/ Target Notes: N/A
Supplemental Inspections - Hydroelectric Substations and Powerhouses (D.08) Section 7.3.4.16	60	61	38	38	38	38	Complete supplemental inspections on 52 Hydroelectric Generation Substations and Powerhouses within HFTD areas or HFRA, barring External Factors. Co-located Hydroelectric substations and Transmission & Distribution substations are counted separately as two distinct units. Target Date: 7/31/2022	23 % / Top 20% (100% of all structures in the Top 20% will be inspected)	# of Hydroelectric Substations and Powerhouses	Y	Target % / Top Risk % Notes: Approach: The top 20% of risk areas used for this target relate to the substation defensible space probability score and PG&E's Wildfire Consequence (WFC) Model outputs, as described in Section 4.5.1(d) of the 2022 WMP Update Associated Risk Score: WFC Model and defensible space probability score Additional Notes: PG&E is inspecting all P-Gen substations that make up the top 20% of wildfire risk. PG&E is also performing work beyond the top 20% risk, which brings the target % down to 23%. 2019-2022 Performance/ Target Notes: N/A
HFTD/HFRA Open Tag Reduction -	N/A	N/A	N/A	116,116	N/A	211,561	Close a minimum of 55,000 HFTD or HFRA distribution tags in PG&E's workplan	66% / Top 20%	# of Distribution EC Tags	Y	Target % / Top Risk % Notes:

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
Distribution (D.10) Section 7.3.4.17							as of June 30, 2022, barring External Factors. Target Date: 12/31/2022				Approach: The top 20% of tag risk scores as described in Section 7.1(B) of the 2022 WMP Update Associated Risk Score: Wildfire Consequence Model Additional Notes: Tags in the 2022 WMP workplan outside of the Top 20% have been bundled for efficiency purposes. 2019-2022 Performance/ Target Notes: Performance figures for each year represents cumulative closed tags since 1/1/2019 as reported in the Q4 Compliance Plan Quarterly Update for each respective year.
HFTD/HFRA Open Tag Reduction - Transmission (D.11) Section 7.3.4.17	N/A	N/A	N/A	52,826	N/A	74,158	Close a minimum of 18,000 HFTD or HFRA transmission tags in PG&E's workplan as of June 30, 2022, barring External Factors. Target Date: 12/31/2022	N/A	# of Transmission LC Tags	Y	Target % / Top Risk % Notes: N/A – Tags were categorized into fire ignition potential tags and non-fire ignition potential tags. The 2022 workplan includes all fire ignition potential tags thus a wildfire related risk model was not used to create the workplan. 2019-2022

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
											Performance/ Target Notes: Performance figures for each year represents cumulative closed tags since 1/1/2019 as reported in the Q4 Compliance Plan Quarterly Update for each respective year.
Enhanced Vegetation Management (E.01) Section 7.3.5.2	2,450	2,498	1,800	1,878	1,800	1,983	Complete EVM work on 1,800 risk ranked distribution circuit miles, barring External Factors. Target Date: 12/31/2022	80% / Top 20%	# of circuit miles	Y	Target % / Top Risk % Notes: Approach: The top 20% of risk areas used for this target relate to the circuit segment risk rankings from PG&E's Enhanced Vegetation Management Tree Weighted Prioritization Model outputs, as described in Section 4.5.1(e) of the 2022 WMP Update Associated Risk Score: EVM Tree Weighted Risk Model 2019-2022 Performance/ Target Notes: N/A
Pole Clearing Program (E.02) Section 7.3.5.2	N/A	3,932	N/A	7,253	N/A	9,869	Inspect and clear (where clearance is needed) all poles identified in PG&E's Vegetation Management Database as of October 1, 2021, in HFTD areas or HFRA, not required by PRC 4292 and barring External Factors. Any assets discovered between October 1, 2021 and August 31, 2022 will	N/A	# of distribution poles	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target Notes: This initiative did not have WMP targets for 2019-2021

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
							be inspected and cleared (where clearance is needed) by the target due date, barring External Factors. Any assets discovered after August 31, 2022 will be inspected and cleared (where clearance is needed) within 45 days of when added to the Vegetation Management Database, barring External Factors. Target Date: 10/1/2022				
LiDAR Ground Inspections - Distribution (E.03) Section 7.3.5.7	N/A	12,165.7	N/A	79.6	N/A	N/A	Complete at least 2,000 circuit miles of Mobile LiDAR capture on HFTD road-access electric distribution lines, barring External Factors. If at any point PG&E determines this technology does not effectively support efforts to reduce wildfire risk when compared to other viable approaches or technology, PG&E will pause or discontinue Ground Based LiDAR efforts. Target Date: 12/31/2022	N/A	# of circuit miles	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target Notes: This initiative did not have WMP targets for 2019-2021. In 2019, we scanned the entire accessible HFTD to define a baseline. In 2020, we piloted the integration of VM operations and data extraction. In 2021 - 2022, we integrated mobile LiDAR into the routine VM program. The 2021 performance miles are not yet available. We need additional data processing from outside vendor to get the total miles

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
											scanned for 2021. We hope to have this data by Q2 2022.
LiDAR Routine Inspections - Transmission (E.04) Section 7.3.5.8	N/A	12,165.7	N/A	79.6	N/A	N/A	Complete LiDAR inspection of a minimum of 18,000 circuit miles of transmission lines, barring External Factors. Target Date: 6/30/2022.	N/A	# of circuit miles	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/Target Notes: (a) In 2021, mileage was based on ETGIS, however LiDAR survey miles differ by 122. (b) In 2021, Midcycle completed miles includes circuits assessed for Unlisted Critical Detections (UCDs) where none were found and circuits where one or more UCDs were delivered. (c) In 2021, Midcycle routine mileage refers to routine deliverables processed via the LiDAR data collected in June 2021.
Vegetation Management – Quality Assurance and Quality Verification (E.05) Section 7.3.5.13	N/A	**Quality Assurance:** Distribution: 99.35% Vegetation Pole Clearing: 96.37% Transmission: 100% Procedure Audits: NA (No performance	N/A	**Quality Assurance:** Distribution: 99.45% Vegetation Pole Clearing: 93.44% Transmission: 100% Procedure Audits: NA (No performance	N/A	**Quality Assurance:** Distribution: 99.73% Vegetation Pole Clearing: 91.83% Transmission: 100% Procedure Audits: NA (No performance measure for	Achieve a 2022 performance rate of 95% for all Quality Assurance and Quality Verification Work Categories Target Date: 12/31/2022	N/A	**Quality Assurance:** Number of Compliant Trees Audited divided by Total Number of Tree Audited for each work category within QA **Quality Verification:**		Target % / Top Risk % Notes: N/A - This program does not leverage a risk model output to determine which locations or processes are reviewed and audited 2019-2022 Performance/ Target Notes:

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
		measure for this Audit Type) **Quality Verification:** Distribution: 16,222 Findings Vegetation Pole Clearing: 52 Findings Transmission: 2,698 Findings		measure for this Audit Type) **Quality Verification:** Distribution: 16,768 Findings Vegetation Pole Clearing: 153 Findings Transmission: 3,992 Findings		this Audit Type) **Quality Verification:** Distribution: 16,769 Findings Vegetation Pole Clearing: 3,506 Findings Transmission: 3,886 Findings			2019-2021: Total number of findings for each work category within QV 2022 (New Measure): Number of trees audited with zero findings divided by number of total trees audited		**Quality Assurance:** The 2022 QA performance calculation is identical to the calculation for 2019-2021 and are comparable measures representing the number of Compliant Trees audited divided by the total number of trees audited **Quality Verification:** The 2022 QV performance is a new measure beginning in 2022 that represents the number of trees audited with zero findings divided by the total number of trees audited. This measure was not in place or measurable for 2019-2021. From 2019-2021; the total number of findings was the measure reported. Reviews/audits were analyzed at a "location" level – a location is a collection of 1 or more individual trees. As analysis was conducted at the location level, the number of individual trees is not available for 2019-2021 and therefore an identical measure for comparison to the new 2022 performance measure is not available. The number of findings for QV from 2019-2021 has been provided.
Defensible	N/A	N/A	N/A	163	N/A	170	Complete defensible space	N/A	# of	Y	Target % / Top Risk %

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
Space Inspections - Distribution Substation (E.06) Section 7.3.5.17.1							inspections in alignment with the guidelines set forth in PRC 4291 at 132 distribution substations within HFTD areas or HFRA, barring External Factors. Target Date: 12/31/2022		Distribution Substations		Notes: N/A 2019-2022 Performance/ Target Notes: N/A
Defensible Space Inspections - Transmission Substation (E.07) Section 7.3.5.17.2	N/A	N/A	N/A	45	N/A	79	Complete defensible space inspections in alignment with the guidelines set forth in PRC 4291 at 55 transmission substations within HFTD areas or HFRA, barring External Factors. Target Date: 12/31/2022	N/A	# of Transmission Substations	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target Notes: N/A
Defensible Space Inspections - Hydroelectric Substations and Powerhouses (E.08) Section 7.3.5.17.3	N/A	N/A	N/A	N/A	N/A	63	Complete defensible space inspections at 61 Hydroelectric Generation Substations and Powerhouses within HFTD areas or HFRA, barring External Factors. Co-located hydroelectric substations and Transmission & Distribution substations are counted separately as two distinct units. Target Date: 12/31/2022	N/A	# of Hydroelectric Substations and Powerhouses	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target Notes: N/A
Utility Defensible Space - Distribution (E.09) Section 7.3.5.20	N/A	N/A	N/A	N/A	N/A	5,551	Complete utility defensible space work on a minimum of 7,000 poles in the HFTD, barring External Factors. Target Date: 12/31/2022	80% /Top 20%	# of distribution poles	Y	Target % / Top Risk % Notes: Approach: The top 20% of risk areas used for this target relate to the circuit segment risk rankings from PG&E's Wildfire Consequence Model outputs, as described in Section

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
											4.5.1(d) of the 2022 WMP Update Associated Risk Score: EVM Tree Weighted Risk Model Additional Notes: N/A 2019-2022 Performance/ Target Notes: The UDS program was paused in 2020 to evaluate program effectiveness and scope which resulted in modifications to the program. As a result, PG&E is unable to provide documentation for its UDS program in 2019-2020.
Pole Clearing in State Responsibility Areas (E.10) Section 7.3.5.2	N/A	97,753	N/A	96,775	N/A	88,163	PG&E will inspect and clear, where clearance is needed, 80,2582 distribution poles subject to PRC 4292 in State Responsibility Areas identified by PRC 4292, barring External Factors3 or poles that are exempt under Title 14 Cal. Code of	N/A	# of distribution poles	Y	Target % / Top Risk % Notes: N/A - WMP target is based on Public Resources Code section 4292 compliance and thus no risk model was used to inform the work. Therefore, we have responded N/A to the

[2] This number may change as poles are added, removed, or have a change in status during the pole clearing program cycle. Any assets discovered between October 1, 2021, and August 31, 2022, will be inspected and cleared (where clearance is needed) by the target due date, barring External Factors. Any assets discovered after August 31, 2022, will be inspected and cleared (where clearance is needed) within 45 days of when added to the Vegetation Management Database, barring External Factors.

[3] External Factors represent circumstances which may impact targets including, but are not limited to, physical conditions, landholder refusals, environmental delays, customer refusals or non-contacts, permitting delays/restrictions or operational holds, weather conditions, removed or destroyed assets, and active wildfire.

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
							Regulations 1255.4				Target% /Top 20% risk 2019-2022 Performance/ Target Notes: N/A
EPSS - Install Settings on Distribution Line devices (F.02) Section 7.3.6.8	N/A	N/A	N/A	N/A	N/A	This new program achieved its initial scope and goal for the 2021 wildfire season. Through Q4, the 170 target circuit devices had EPSS settings, ultimately disabled in concert with the onset of significant rain and reduced fire risk.	Load the engineered settings on protection line devices (line reclosers and fuse savers) on the identified 1,018 circuits (as of March 10, 2022) on the following schedule, barring External Factors: (1) 80% of line devices by 5/1/22 and, (2) on the remaining 20% of line devices by 8/1/22. Target Date: 8/1/2022	N/A	# of line reclosers and fuse savers	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target Notes: This initiative did not have WMP targets for 2019-2021. This new program started in July 2021 to mitigate wildfire risks for the 2021 wildfire season.
EPSS - Reliability Improvements (F.04) Section 7.3.6.8	N/A	N/A	N/A	N/A	N/A	N/A	Initiate reliability mitigations on 50 EPSS capable circuits in the HFTD areas, HFRA and non-HFTD buffer zones based on highest projected Customer Experiencing Sustained Outage (CESO).	N/A	# of circuits	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target Notes:

[4] Poles in fields that are plowed or cultivated, such as planted row crops, cultivated fields, vineyards, nonflammable summer fallow, irrigated pastureland, fruit, nut, citrus orchards, Christmas tree farms, swamp, marsh or bog land and where vegetation is maintained less than 30.48 cm in height, is fire resistant, and is planted and maintained for the specific purpose of preventing soil erosion and fire ignition.

TABLE PG&E-5.3-1(A):
LIST AND DESCRIPTION OF QUANTITATIVE PROGRAM TARGETS, LAST FIVE YEARS

Program Target	2019		2020		2021		2022		Units	Audited by Third Party? (Y/N)	Notes
	Target	Perf.	Target	Perf.	Target	Perf.	Target	Target% / Top-Risk%			
							Target Date: 8/1/2022				This initiative did not have WMP targets for 2019-2021. This new program started in July 2021 to mitigate wildfire risks for the 2021 wildfire season.
Community Engagement - Meetings (J.01) Section 7.3.10.1	N/A	Hosted 23 community open houses and three customer-specific webinars with approximately 3,200 attendees.	N/A	Hosted 15 regional and three systemwide virtual open houses and one safety town hall with over 5,000 attendees to provide a localized update on wildfire safety work happening in respective communities and answer customer questions.	N/A	Hosted 3 systemwide virtual open houses and 10 safety town halls to provide a localized update on wildfire safety work happening in respective communities and answer customer questions.	Host 22 customer and community focused virtual meetings (i.e., Safety Town Halls, CWSP Webinars) to further stakeholder and community awareness of PG&E's wildfire mitigation efforts. Target Date: 12/31/2022	N/A	# of meetings	Y	Target % / Top Risk % Notes: N/A 2019-2022 Performance/ Target Notes: N/A

Remedy #02(b)

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

Response to Critical Issue RN-PG&E-22-02 Remedy #02(b)

In general, circuit segments that are more frequently affected by PSPS interruptions tend to correlate with higher wildfire risk values. Specifically, a correlation exists between PSPS locations, as determined by our operational models, and the highest wildfire risk locations from the planning models. However, outputs from models identifying PSPS impact/scope and wildfire risks will not always align because the models are designed to consider different time horizons. As explained in more detail below, PSPS operational models determine where short-term wildfire risks are highest during events where Diablo wind events are likely to occur. Planning models determine where wildfire risk is highest during the long-term (e.g. an entire wildfire season). Using both types of models to create mitigations and workplans designed to address peak and annual wildfire risks is crucial to preventing wildfires.

Objectives of Operational Models

PG&E uses operational models to inform PSPS scope and locations. Operational models, such as the FPI and IPW models, help to determine PSPS scope in response to real-time wind-driven wildfire risks which rely on current weather forecasts as an input. As we explained in our 2022 WMP:

> The IPW Model requires the requisite input forecast data as described above to produce a forecast each hour. This high-resolution forecast data is currently available with about a 4-5 day ahead forecast horizon. The IPW Model is driven largely from weather forecasts and will have similar limitations as general weather forecasting.[5]

Operational models are heavily influenced by current and short-term weather forecasting. This allows PG&E to dynamically scope and target PSPS events in response to current and evolving weather patterns to address acute wildfire risks in specific locations.

Objectives of Planning Models

Planning models are used to focus mitigation workplans on locations where wildfire risk is the highest, in general, rather than on the effects of specific high-risk events in near real-time. Planning models are influenced by elements like vegetation growth and climate change. As we described in our 2022 WMP:

[5] *See* PG&E's 2022 WMP, p. 189.

> While there are temporal elements, like weather, within the 2022 WDRM v3, the predictions are defined as annual wildfire season-wide estimates of risk. The model does not determine when within the season (i.e., what month, day, or time) wildfires may occur in the future. The 2022 WDRM v3 is a "Planning" model whose outputs must be relevant over single to multi-year planning timeframes. To support planning work, the modeling time horizon is a single fire season. Other models, which are categorized as "Operational", such as PG&E's FPI and IPW Models, focus on informing day-to-day risk mitigation operations based on hourly weather forecasts, but only for a few days into the future.[6]

Planning models are focused on predicting wildfire risk over the course of an entire wildfire season, while operational models are focused on predicting these events during acute weather events. Thus, operational model results and the accompanying PSPS event locations are a small subset (~5 days a year) of the overall wildfire risk across the entire fire season that the planning models encompass and will not, therefore, always be perfectly correlated. It is also important to note that California wildfires do not always require strong winds to grow large and destructive. The Dixie, Caldor, Butte, Creek, Rough, and 2020 Lightning Complex fires are good examples of this fuel-driven phenomenon. Thus, long-term planning models must address areas where fuel states and topography can result in a destructive fire without strong winds.

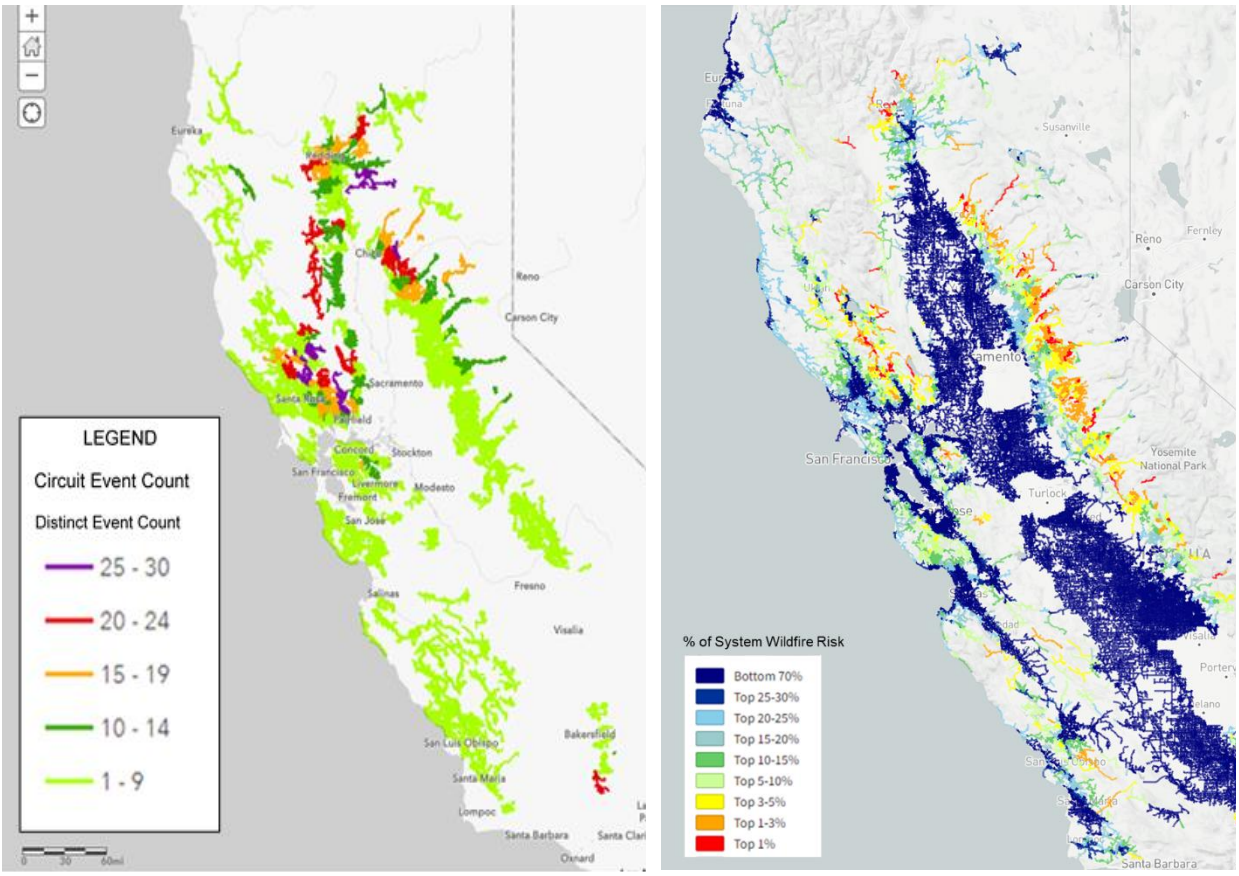
Correlation Between PSPS Locations and Wildfire Risk

To illustrate the correlation between PSPS locations and wildfire risk, Figure RN-PG&E-22-02-01 below includes a map of PSPS frequency for the PG&E service territory and a map with our system hardening circuit segment wildfire risk values. As shown, many regions such as the Northern Sierra, Napa, Tehachapi regions have both high PSPS frequency and wildfire risk. In these regions, Diablo or Santa Ana winds, which bring warm inland air across the region, can combine with the fuels to prompt PSPS conditions identified by the IPW and FPI operational models.

Conversely, regions such as the Southern Sierra, which have a high wildfire risk, experience the Mono wind pattern, which brings warm inland air across the region on a far less frequent basis. As a result, this region experiences PSPS conditions far less regularly while still posing a high risk for wildfire throughout the fire season. Similar regions are observed in the central coast where wildfire risk is high but PSPS frequency is low.

[6] *Id.* at p. 128.

Figure RN-PG&E-22-02-01: PSPS and Wildfire Risk Locations



PSPS Frequency by Circuit Segment

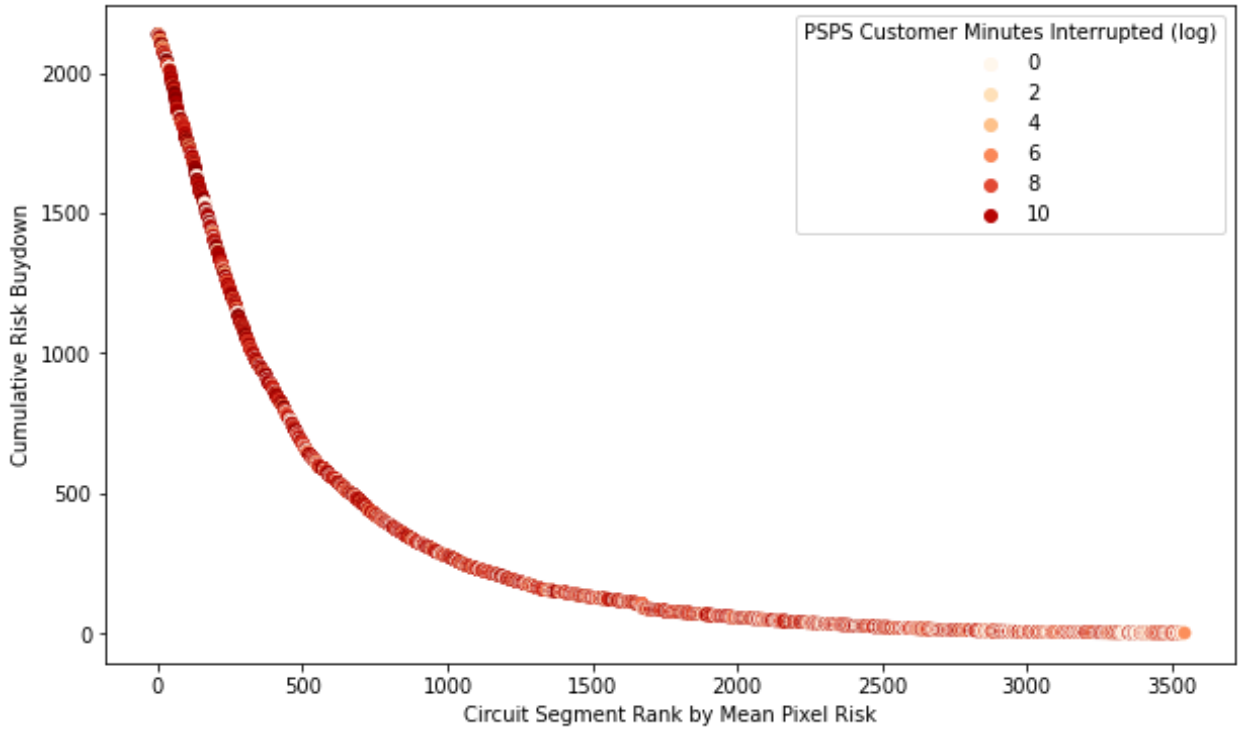
Wildfire Risk by Circuit Segment

Another example illustrating the correlation between PSPS locations and the highest wildfire risk locations is risk buy-down curve depicted in Figure RN-PG&E-22-02-02 below. The buy-down curve shows that circuit segments located in HFTD and HFRA areas with higher levels of customer interruptions due to PSPS (i.e., the darker red circles) tend to have higher wildfire risk values (i.e., shown as higher numbers on the y axis).[7]

However, there are also low ranked circuit segments that have experienced PSPS events and high ranked circuit segments that have not experienced PSPS events. Whether specific circuit segments experience a PSPS outage and/or represent a high wildfire risk location can be due to weather trends or the fact that PSPS conditions where high winds and dry fuels coincide do not always occur where wildfire risk is high during the entire fire season.

[7] The wildfire risk values are calculated based on PG&E's 2021 WDRM v3 risk model.

Figure RN-PG&E-22-02-02: Risk Buy-Down Curve for PSPS and Wildfire Risk



As demonstrated by Figures RN-PG&E-22-02-01 and RN-PG&E-22-02-02 above, circuit segments that are more frequently affected by PSPS events tend to correlate with higher wildfire risk values. However, outputs from the two types of models do not always align because they address different risks along different time horizons. PSPS operational models determine where short-term wildfire risks are highest during events like windy, summer heat waves. Planning models determine where wildfire risk is highest during the long-term (*e.g.*, an entire wildfire season). For these reasons, differences should be expected to continue, and PSPS and annual wildfire risk models will not always perfectly correlate.

Both types of models are necessary to create effective mitigations and workplans designed to address peak and annual wildfire risks. Accordingly, we will continue to use sectionalization devices, switches, and microgrids to help us target PSPS events to address high-risk weather events as a measure of last resort to keep our customers and communities safe. We will remove lines, install covered conductor, and place existing overhead lines underground to work down the overall, long-term wildfire risks within our service territory. And in locations where undergrounding is planned to target longer-term wildfire risks, we will review historical PSPS events to determine whether incrementally expanding the scope of the undergrounding project will allow us to address more efficiently both wildfire and PSPS risk as part of the same project.

Critical Issue RN-PG&E-22-03

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

Required Remedies:

1. *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.*

Response to Critical Issue RN-PG&E-22-03 Remedy #1

Since PG&E submitted the 2022 WMP in February, we have made substantial progress in identifying miles for our Undergrounding Program, including substantially increasing the percentage of miles in the top 20% of risk-ranked circuit segments for the years 2022 – 2026.

In this response, we describe the development of our 2022-2023 and 2024-2026 undergrounding plans, including revisions that we have made in response to this Critical Issue. We also explain why we believe it is prudent and appropriate to continue to include fire rebuild miles in our undergrounding plans and describe the risk-informed rationale for including PSPS and PSS identified miles in our plan. Finally, we include a table summarizing our undergrounding workplans from 2022 through 2026, which highlights that we have taken a substantially more aggressive approach toward the goal of focusing undergrounding in our top 20 percent risk-ranked circuits.

a) Development of the 2022-2023 Undergrounding Plan

We announced our 10,000-mile underground program in July 2021. Since that time, PG&E has performed extensive work to validate its existing 2022 and 2023 undergrounding work plans and identify opportunities to increase the amount of undergrounding work that will be done in the future. We have benchmarked with utilities across the country and engaged key stakeholders who provided feedback, input, and collaboration to shape the undergrounding program.

The 2022–2023 undergrounding portfolio that we developed reflects work that was in flight at the time of our 10,000-mile underground program announcement, including work in fire rebuild areas along with other underground work. We also considered what we believe are key factors directly affecting the risk profile of certain miles currently overhead: (1) PSPS risk, including frequency, critical customer and annual impacts; (2) ingress / egress informed by our Public Safety Specialists (PSS); and (3) tree strike potential, where fall-in trees are tall enough to potentially strike and sever a hardened span, regardless of wind direction. The selection was then informed by an economic analysis and risk spend efficiency (RSE) evaluation.

In addition, we considered the Final Action Statement issued by Energy Safety on September 22, 2021, approving our 2021 WMP. Specifically, with regard to the Final Action Statement, we noted that Energy Safety found:

> PG&E developed a new System Hardening Approval process by which it evaluates which circuit segments to target for mitigation and determines the optimal mitigation measure for each of the selected circuit segments. PG&E updated its system hardening plan to target: 1) the top 20 percent of its risk buydown curve, as determined by its 2021 Wildfire Distribution Risk Model (WDRM v2); 2) fire rebuild; 3) PSPS mitigation; and 4) miles identified by a [PSS].[8]

We understood this statement to be supportive of our approach to develop system hardening plans (e.g., undergrounding) that include the top 20% of the highest risk miles, as well as fire rebuild, PSPS mitigation, and PSS-identified miles.

Our 2022-2023 undergrounding workplan is part of a longer term, holistic strategy to ramp up our undergrounding program, developing a portfolio of projects early on that are executable and will result in enhancing our execution and construction expertise. We are addressing a substantial percentage of high-risk miles in our 2022-2023 workplan and that percentage of high-risk miles will continue to substantially increase over the entire 2022-2026 time period. The 2022-2023 workplans rapidly ramp up the amount of work performed on the top 20% of risk ranked circuits as indicated in Table RN-PG&E-22-03-01 below:

Table RN-PG&E-22-03-01: 2022-2023 Percentage of Workplan on Highest Risk Circuits

Year	Percentage Work on Top 20% Highest Risk Circuits	Percentage Increase Year-Over-Year
2022	29%	54% Increase
2023	63%	

We recognize the direction from Energy Safety regarding the need to revise our undergrounding program goals to prioritize risk more aggressively. To accomplish this, we have substantially revised our plans for 2024-2026, as described in section (b) below.

For our 2022-2023 workplans, which are already well underway, we will continue to execute on this work given the current stage of development.[9] Almost 100% of the miles planned for 2022 are either completed, in some phase of construction or in the

[8] *Final Action Statement on PG&E's 2021 Wildfire Mitigation Plan*, issued September 22, 2021 (Final Action Statement), p. 56.

[9] *See* 2022 WMP, p. 533, Table PG&E-7.3.3-5 (outlining the 19 month process for a project to go from scoping through permitting).

last steps of permitting. For 2023, nearly all miles have been scoped and are in design or permitting. PG&E believes we have the right miles in the 2022 and 2023 workplans and, as indicated above in Table RN-PG&E-22-03-01, there is a substantial increase in the risk on the top 20% of risk ranked circuits from 2022 to 2023. In addition, we believe that the current miles in our 2022-2023 undergrounding plans, especially the fire rebuild miles, are providing opportunities to pilot new design and construction standards and use a variety of different types of construction equipment, which will provide valuable learnings to scale mileage effectively and efficiently in 2024 and beyond. Below we explain our risk-based rationale for including fire rebuild miles.

b) Development of the 2024-2026 Undergrounding Plan

Based on Energy Safety's feedback in Critical Issue PG&E-22-03, we have worked to revise our 2024-2026 undergrounding workplans. As a result, between 2024 and 2026, more than 90% of our undergrounding work will be performed in the highest 20% or risk-ranked circuits, before additional PSPS, PSS-identified, and/or fire rebuild miles are added.

Between 2022-2026, the number of miles of undergrounding in the top 20% of risk-ranked circuit segments is estimated to be 88%, before additional PSPS, PSS identified and/or fire rebuild miles are added. Table RN-PG&E-22-03-02 below shows the breakdown of the undergrounding mileage between 2022 and 2026.

c) Fire Rebuild Miles Should Be Included in PG&E's Undergrounding Plan

We recognize that the Revision Notice directs us to remove fire rebuild miles from our undergrounding goal. However, PG&E respectfully proposes keeping our undergrounding program target at 175 miles, including as many as 129 miles of fire rebuild.[10] PG&E believes that the inclusion of fire rebuild miles in our undergrounding program target is appropriate. Since significant and catastrophic wildfires have already materialized in these locations, and wildfires have a tendency to be repeated in areas when certain types of vegetation regrows and is subjected to the growth/dry/regrow cycles (*e.g.*, the 2001 Poe Fire, the 2008 lightning siege fires, and the 2018 Camp Fire all occurred in Butte County in proximity to the North Fork and the West Branch of the Feather River Canyon), we can expect these locations to be candidates for potential wildfires in the future as vegetation regrows. Although wildfire risk will vary depending on the impact of a previous wildfire and subsequent vegetation growth, simply because an area previously experienced a wildfire in the past does not mean that the risk will not materialize again.[11]

In addition, since our undergrounding program is focused on both mitigating ignition risk and providing long term resilience into the future in these high wildfire risk areas, the

[10] Our undergrounding goal is reflected in Initiative Target C.10.

[11] *See* The Reburn Project (washington.edu) (study regarding fire reburn in areas burned in the Pacific Northwest).

most opportune and efficient time to perform the necessary excavation and trench setting activities are when the vegetation has already been cleared by recent fire activity.

Finally, because electrical facilities need to be rebuilt in a wildfire burn area, undergrounding those facilities now is a prudent approach as compared to installing overhead equipment which may create a higher wildfire ignition risk in subsequent years as vegetation (*i.e.*, fuel) grows.

d) Summary of 2022-2026 Undergrounding Workplan

Table RN-PG&E-22-03-02 below includes all miles in our work plan as of June 8, 2022. These miles purposely exceed the undergrounding program target for 2022 to ensure that there are sufficient miles in the queue to meet committed mileage targets.

Table RN-PG&E-22-03-02: Undergrounding Work Plans 2022-2026
(Numbers May Vary Due to Rounding)[12]

Portfolio Year		2022				2023				2024 – 2026				2022 - 2026			
# of Portfolio Miles		204				662				3,132				3,998			
Program Category		SH Miles	Butte Miles	Total Miles	% of Portfolio	SH Miles	Butte Miles	Total Miles	% of Portfolio	SH Miles	Butte Miles	Total Miles	% of Portfolio[13]	SH Miles	Butte Miles	Total Miles	% of Portfolio
Top 20% Risk Rank Circuit Segments[14]		59	-	59	29%	419	-	419	63%	3008	27	3035	97%	3486	27	3513	88%
Other	Fire Rebuild[15]	53	76	129	63%	57	100	156	24%	-	16	16	1%	110	192	302	8%
	PSPS	6	-	6	3%	62	-	62	9%	-	-	-	0%	68	-	68	2%
	PSS identified	6	-	6	3%	-	-	-	0%	-	-	-	0%	6	-	6	0%
Other UG System Hardening		4	-	4	2%	25	-	25	4%	80	-	80	3%	109	-	109	3%
Total		129	76	204	100%	562	100	662	100%	3089	43	3132	100%	3779	219	3998	100%

[12] The 2022-2023 risk rank for segments is based on the 2021 Wildfire Distribution Risk Model (WDRM) v2 because this is the model that was used to develop these plans. The 2024-2026 risk rank for segments is based on the 2022 WDRM v3 which will be used to develop these workplans.

[13] These percentages may change as we scope the work and finalize the execution plan for 2024 – 2026. Any updates will be included in the 2023 WMP.

[14] The Top 20% Risk Rank Circuit Segments include Fire Rebuild miles that are on circuits in the top 20%, specifically: 0.2 miles in 2022, 11 miles in 2023 and 27 miles in 2024-2026.

[15] Fire Rebuild miles are based on current, known rebuild needs. These miles may change as a result of future wildfire activity, which may result in changing other mileage goals in the 2022-2026 workplan.

Required Remedies

2. *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:*

    a. *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.)*

    b. *Explain why PG&E's existing risk model output does not sufficiently cover these additional risks.*

Response to Critical Issue RN-PG&E-22-03 Remedy #2

a. Please see Table RN-PG&E-22-03-01.

b. As explained in Sections 4.5.1(b) and 4.5.1(d) of the 2022 WMP:

> The 2022 WDRM v3 provides predictions of the where, why, and how much wildfire risk occurs during a typical wildfire season (defined as June 1st through November 30th).
>
> The model does not determine when within the season (i.e., what month, day, or time) wildfires may occur in the future. The 2022 WDRM v3 is a "Planning" model whose outputs must be relevant over single to multi-year planning timeframes. To support planning work, the modeling time horizon is a single fire season. Other models, which are categorized as "Operational", such as PG&E's FPI and IPW Models, focus on informing day-to-day risk mitigation operations based on hourly weather forecasts, but only for a few days into the future.[16]

In order to focus undergrounding projects in locations to both address wildfire risk over the entire year and locations where wind driven events pose high wildfire risk, both the WDRM and PSPS models are referenced in identifying candidate miles for undergrounding.[17]

In addition, the WDRM does not currently model a number of effects that are difficult to quantify in a model construct. PG&E's Public Safety Specialists have developed a qualitative assessment of locations that pose elevated wildfire risk based on five of these difficult to quantify factors currently. Namely,

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[16] 2022 WMP, p. 128.

[17] PSPS operational models determine where ignition risks are highest over short-term during events like windy, summer heat waves, where ground fuels are dry. Planning models determine where wildfire risk is highest over the long-term from influences like vegetation growth and climate change.

Ingress/Egress, Resistance to Control, Critical Infrastructure, Community Factors, and Fire History. While there is some overlap in that the WDRM uses fire history as a model input, Ingress/Egress and Resistance to Control are not currently modeled by the WDRM. This work is in scope for the WDRM v4 model and is 2022 WMP Initiative Targets A.04 and A.05. Even when these factors are accounted for in the WDRM, the qualitative experience of the PSS team from years fighting fires in these areas will continue to serve as a reference to identify and validate high-fire risk locations.

Other underground system hardening miles are included as these miles are opportune to underground either to most effectively address open corrective tags or identified through the detailed design process, i.e. - due to proximity to higher risk circuit segments already planned for undergrounding.

Correction to Critical Issue Narrative

Finally, we note that there was a factual error in the Revision Notice that PG&E would like to correct. The Revision Notice explained:

> 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. 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 based only on the WDRM.[18]

In our 2021 WMP, we have committed to a goal to complete 80% of work on the highest risk miles in the top 20% defined by the WDRM, fire rebuild miles, or PSPS mitigation miles over the period from 2021-2023.[19] PG&E is on track to meet this goal using the risk framework described in the Final Action Statement.[20]

[18] Revision Notice, p. 7.

[19] 2021 Revised WMP, p. 608.

[20] Final Action Statement, p. 56.

Critical Issue RN-PG&E-22-05

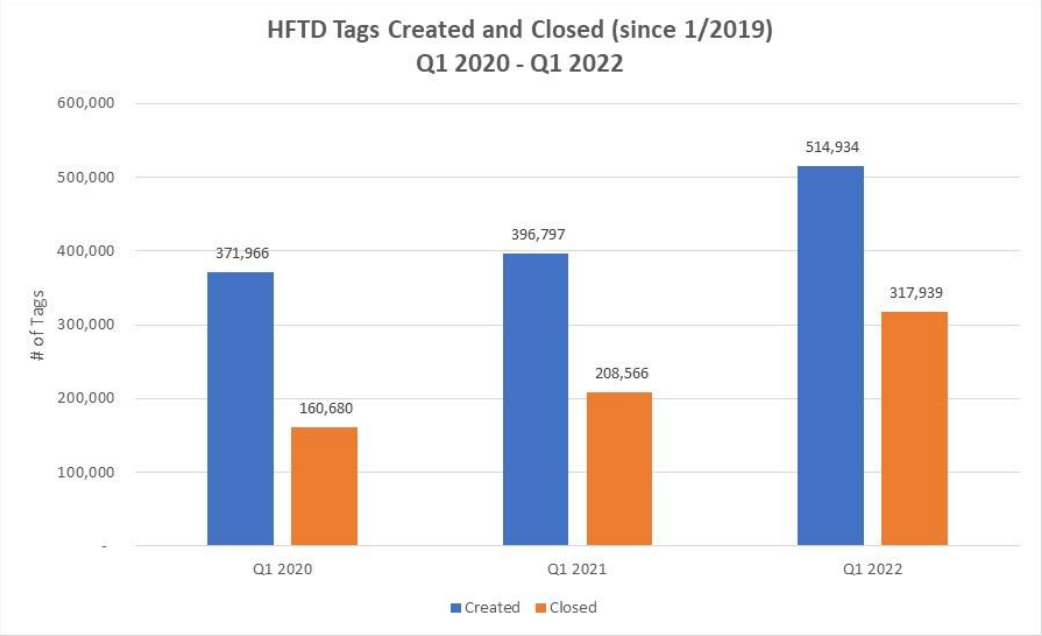
Critical Issue Title: PG&E has a significant backlog of repairs and needs a more aggressive plan to address the poor health of its infrastructure.

Overview of Plan and Summary of Response

In response to this Critical Issue, we are providing a detailed plan to address our current backlog of maintenance tags in High Fire Threat Districts (HFTD) and High Fire Risk Areas (HFRA).[21] Following the Wildfire Safety Inspection Programs (WSIP) that we launched in HFTD areas between 2018 and 2019, we have identified more non-conformances than we have been able to repair. In 2023, PG&E will begin repairing more tags than created to keep up with new tags as they are found and address the backlog of outstanding tags.

Figure RN-PG&E-22-05-01 below depicts the cumulative volume of tags created and closed since January 1, 2019, in HFTD areas from Q1 2020 to Q1 2022.

Figure RN-PG&E-22-05-01:
Created and Closed Tags
(HFTD, Distribution, Transmission, and Substation Cumulative Since January 1, 2019)



Because 99% of the wildfire risk occurs in HFTD and HFRA areas, our plan is focused on reducing the backlog of tags in these areas, specifically tags that create wildfire risks. In addition, we analyzed all of our outstanding tags and separated them into

[21] HFRAs represent areas outside the HFTD boundaries where risk factors for the potential of catastrophic fire from utility infrastructure ignition during offshore wind events is higher.

Ignition Risk and Non-Ignition Risk tags so that we can focus on tag remediations that will produce the greatest risk reduction.

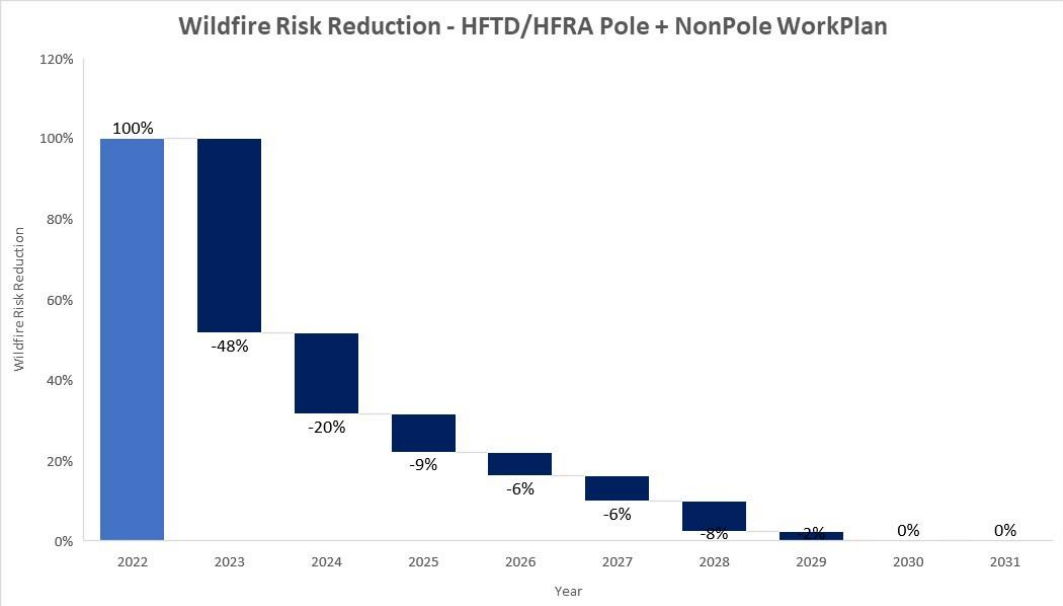
For HFTD and HFRA areas, our plan includes:

- Transmission and Substation Facilities: All current backlog of Ignition Risk tags (found prior to 2022) will be resolved by the end of 2022 and, going forward, all tags for these facilities will be addressed in the time required by the California Public Utilities Commission's (CPUC) General Orders (GO), barring external factors.

- Distribution Facilities:

    - Ignition Risk Backlog: The backlog of ignition risk tags is prioritized based on age of the tag and risk. This plan will reduce risk associated with the ignition risk backlog tags by 48% by the end of 2023 and reduce all risk associated with this backlog by the end of 2029, which is depicted in Figure RN-PG&E-22-05-02:

Figure RN-PG&E-22-05-02:
Wildfire Risk Reduction for HFTD/HFRA Ignition Risk Tags (Pole + Non-Pole)



    - Non-Pole Repairs and Replacements – Ignition Risk Tags: Because non-pole tags create greater ignition risk than pole tags, we are implementing a three-year plan to address all ignition risk related tags. This plan will reduce risk associated with non-pole tags by 63% by the end of 2023 and reduce all risk associated with this backlog by the end of 2025.

- Pole Replacements – Ignition Risk Tags: Because pole tags present a lower ignition risk and often require additional planning and permitting resulting in a longer execution timeline, we are implementing a seven-year plan to address all ignition risk related pole tags. This plan will reduce risk associated with pole tags by 23% by the end of 2023 and reduce all risk associated with this backlog by the end of 2029.

- Non-Ignition Risk Tags: We are implementing a ten-year plan to address all non-ignition risk tags in HFTD and HFRA areas. These tags do not create ignition risk and thus our plan is to reduce these tags over a ten-year period so that the backlog has ended by 2032.

- Ignition Risk New Findings: After January 1, 2023, all new HFTD and HFRA Ignition Risk distribution tags will be completed in compliance with GO timelines.

- Priority A and B-Tags: We will continue to work A and B-Tags, which have the highest risk, so that they are resolved immediately and within 90 days, respectively. These high-priority tags are not part of our tag backlog, and we will continue to prioritize resolving them.

In response to Remedy #1 below, we provide background information regarding the tag backlog and the status of outstanding tags, explain the data and analysis which supports focusing on HFTD and HFRA areas, and provide an overview of our plan, as well as expected risk reduction.

In response to Remedy #2, we provide a timeline and quantitative targets/goals for addressing the tag backlog in 2022 and 2023. We also provide a more detailed description of our workplans and identify the attachments that are included with this response that provide detailed resource plans to address the maintenance backlog.

Finally, in response to Remedy #3, we provide information regarding the status of current open and closed tags.

We take seriously the feedback from Energy Safety regarding our maintenance tag backlog and, in response, are providing a detailed and comprehensive plan to address this issue and ultimately eliminate the risk associated with these outstanding tags.

Required Remedies:

1. *PG&E must create a plan that demonstrates consistent progress on reducing the number of open tags and improve the health of its infrastructure.*

    a. *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.*

Response to Critical Issue RN-PG&E-22-05 Remedy #1

(a) Background

(1) Wildfire Safety Inspection Program

In response to the 2017 and 2018 wildfires, PG&E initiated WSIP. This program performed accelerated and enhanced inspections of PG&E's distribution, transmission, and substation facilities with the objective of identifying and repairing non-conformances on its facilities that posed a wildfire and/or reliability risk. The WSIP focused on PG&E's electric facilities located in HFTDs and also included inspections of adjacent areas with structures near the HFTD areas.

Prior to the WSIP, PG&E generally inspected our assets on a five-year schedule in accordance with the CPUC's GOs. However, given the significant changes in wildfire risk in our service territory in 2017 and 2018, the WSIP program accelerated that inspection cadence to inspect all assets in the HFTDs in the 2018 to 2019 timeframe. Through the WSIP program, we performed enhanced inspections on approximately 695,000 distribution structures, 50,000 transmission structures, and 200 substations in HFTD areas.

For the WSIP inspections, PG&E leveraged Failure Mode and Effects Analyses (FMEAs) to identify single points of failure on electric asset components and lead to fire ignition. As a result of the WSIP inspections, PG&E identified approximately 277,000 non-conformances, resulting in the creation of Electric Corrective (EC) or Line Corrective (LC) tags.[22] This volume amounted to approximately four times the average annual inspection find rate compared to the years preceding the WSIP. This sudden and rapid increase in the volume of EC and LC tags created a sizeable backlog of repair and replacement maintenance.

In reducing this backlog, we have prioritized reducing the greatest amount of risk first. Stated another way, we prioritized risk reduction before volume. As a further layer of control, we also conducted additional patrols and Field Safety Re-assessments (FSRs) on lower risk open tags to monitor tag conditions. Through the FSR process, we visited locations with open tags more frequently than we otherwise would through our inspections to determine whether the condition identified in the tag had degraded and required more immediate remediation.

(2) Ongoing Efforts to Address and Mitigate the Tag Backlog

Beginning in late 2021, PG&E launched an intensive effort to evaluate our inspection and maintenance practices for tags. The focus of this effort is threefold:

1. Evaluate the types of tags being created and determine if they were appropriately identified as a maintenance tag;

[22] EC is nomenclature used for distribution facilities, while LC is used for transmission and substation facilities.

2. Evaluate the timeframes for remediation for different tag types to ensure they are aligned with compliance requirements (GO 95, Rule 18) and with the risk posed by the non-conformance; and

3. Align tags, as appropriate, to our long-term capital investment strategy.

In addition, in late 2021 PG&E also started developing a long-term capital investment strategy referred to as Integrated Grid Planning that holistically looks at our electric system needs and builds a portfolio of solutions that address multiple needs. Integrated Grid Planning will allow us to identify all needs on a circuit and bundle projects to improve the effectiveness and efficiency of our capital investments, which will enable more work to be executed and will achieve more risk reduction than we could achieve with the existing portfolio. The tag backlog is one of the needs being considered as part of the Integrated Grid Planning initiative, which will be incorporated into our portfolio planning process beginning in 2024.

We expect the evaluation of our inspection and maintenance tag practices and Integrated Grid Planning to have impacts on the backlog of tags over the next ten years, both in HFTD/HFRA and non-HFTD areas.

Although the highest risk tags are being addressed through our existing risk-based maintenance program[23] and we have initiated efforts to evaluate and address the tag backlog, at the current find rates, the backlog of tags is projected to continue to grow in volume and thus additional actions are needed to change this trajectory.

We agree with Energy Safety's feedback that we develop a comprehensive plan that demonstrates consistent progress on reducing the number of open tags and improve the health of PG&E's infrastructure and have been working to put actions in place to address it. The remainder of Remedy #1 responds to this feedback and describes: (1) the current status of our outstanding tags; (2) our prioritization of tags in HFTD and HFRA; and (3) our risk-informed plan for reducing the number of open tags.

(b) Status of Outstanding Tags

When inspecting facilities or electrical equipment, we use five tag classifications, identified in Table RN-PG&E-22-05-01 below, based on the CPUC GO 95, Rule 18:

[23] In addition to addressing outstanding tags through our maintenance program, outstanding tags are also addressed through our System Hardening Program as existing facilities are replaced or removed.

Table PG&E-RN-22-05-01: PG&E Tag Classifications

Tag Priority	Description
A	An immediate risk of high potential impact to safety or reliability. Take corrective action immediately, either by fully repairing or by temporarily repairing and reclassifying to a lower priority.
B	Condition or risk of at least moderate potential impact to safety or reliability where corrective action within **3 months** from the date the condition is identified for electric equipment.
E	Condition or risk of at least moderate potential impact to safety or reliability where corrective action within: • **Six (6) months** for conditions that create a fire risk located in HFTD Tier 3; or • **Twelve (12) months** for conditions that create a fire risk located in HFTD Tier 2 or HFRA.
F	Condition or risk of low potential impact to safety or reliability: • Corrective actions for distribution assets to be addressed within **5 years** from the date the condition is identified; or • Corrective actions for transmission assets to be addressed within **2 years** from the date the condition is identified.
H	These are PG&E Priority "E" Tags that are planned to be addressed by a planned Distribution System Hardening Project.

As a result of WSIP, as well as our ongoing inspection programs, a substantial backlog of open tags has developed, as reflected in Table RN-PG&E-22-05-02 below:

Table RN-PG&E-22-05-02: Open Distribution Tags by Priority and HFTD Tier Type (as of Q1 2022 Compliance Plan Quarterly Report)

Tag Priority	HFTD/HFRA	Non-HFTD/Non-HFRA
A	29	83
B	2,221	2,338
E	150,635	205,741
F	102,169	105,163
H	7,828	810

It is important to note however, that while Table RN-PG&E-22-05-02 above indicates that there are open A and B-tags, we are complying with GO 95 by addressing all A and B-tags within the time frames required by GO 95 and our own procedures. Thus, we expect these A and B-tags will be closed within the required time period.

The tag backlog that has developed does not consist of A and B-tags, which are given the highest priority in terms of maintenance, but instead primarily consists of E and F-tags, and a population of H-tags that are awaiting permitting and construction of a Distribution System Hardening project.

In the next section, we describe why we are prioritizing the backlog of E and F-tags in HFTD and HFRA areas and then describe in detail our plan to address the HFTD and HFRA tags.

(c) Prioritization of Tags in HFTD and HFRA over Non-HFTD

The overwhelming majority (approximately 99%) of the wildfire risk in PG&E's service territory is located in the HFTD areas. Because tags in HFTD and HFRA areas can create the greatest risk of ignition, or fire propagation under elevated fire weather conditions, we focused on these areas first in addressing our current tag backlog.

The figures below represent our most current wildfire bowtie analyses. Figure RN-PG&E-22-05-03 represents the wildfire risk associated with distribution and transmission overhead electrical facilities in PG&E's entire service territory. Figure RN-PG&E-22-05-04 represents the risks associated with distribution facilities, but only for HFTD areas. The third bowtie, Figure RN-PG&E-22-05-05, represents the wildfire risks associated with transmission facilities in HFTD areas.

The bowties highlight that:

- Approximately 96% of our wildfire risk is associated with distribution facilities in HFTD areas; and
- An additional 3% of our wildfire risk is associated with HFTD transmission facilities.

Figure RN-PG&E-22-05-03:
Wildfire Risk Bow Tie Analysis
(PG&E Service Territory; Overhead Circuits All Voltage Classes)

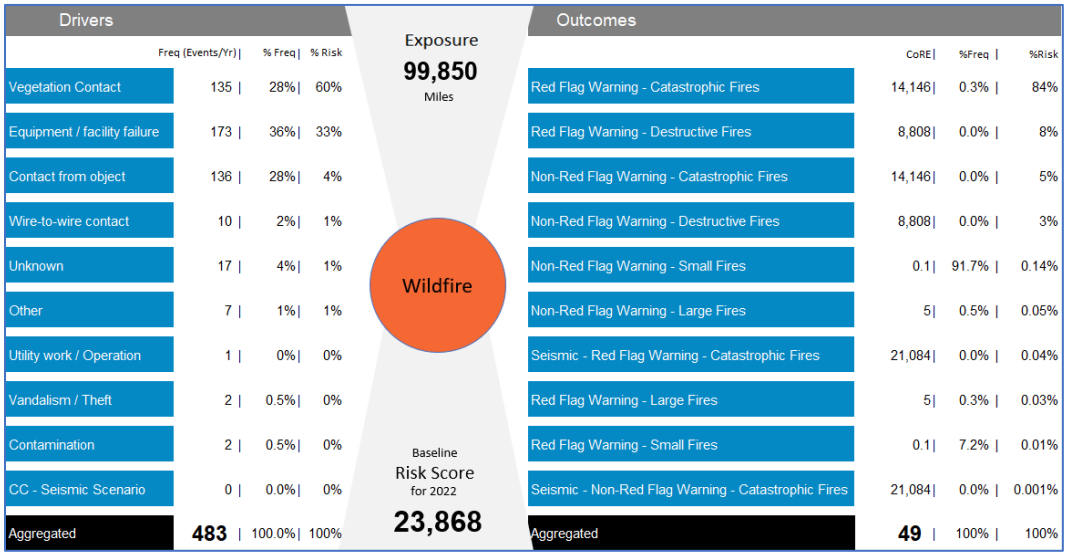


Figure RN-PG&E-22-05-04:
Wildfire Risk Bow Tie Analysis
(PG&E HFTD Only; Distribution Voltage Overhead Circuits)

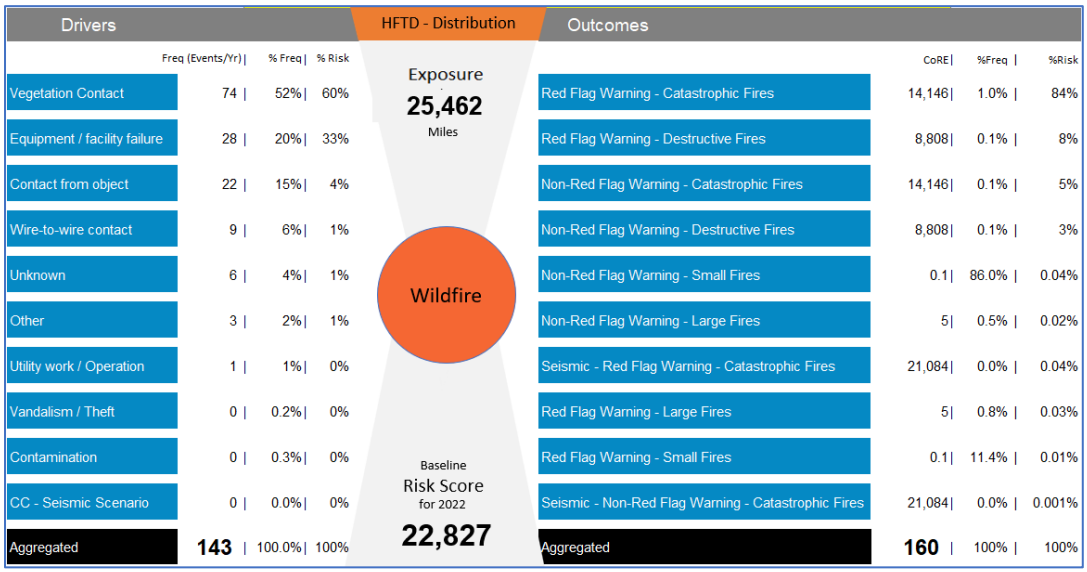
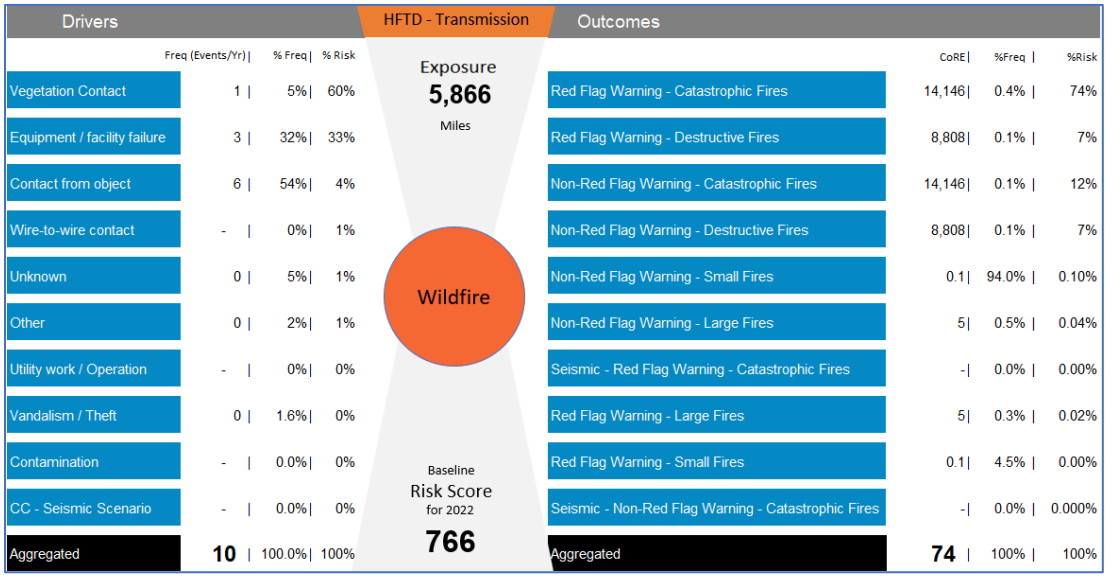


Figure RN-PG&E-05-05:
Wildfire Risk Bow Tie Analysis
(PG&E HFTD Only; Transmission Voltage Overhead Circuits)



(d) PG&E's Plan for Outstanding Tags in HFTD and HFRA Areas

To accelerate reducing the wildfire risk associated with open tags, while also addressing the projected increasing tag backlog volume, we are implementing a multi-year strategic plan to achieve "Steady-State" (see definition below) for all our maintenance tags in the HFTD and HFRA areas. As explained previously, because tags in HFTD and HFRA locations create substantially greater ignition risk exposure, our plan focuses on reducing the tag backlogs in these areas.

There are several terms which we have defined for purposes of our plan:

- "Steady-State" means that tags are addressed in accordance with their compliance timelines outlined in GO 95, Rule 18 for distribution and transmission facilities, and GO 174 for substation facilities.

- "Ignition Risk" tags are maintenance tags that have been determined to have some form of ignition risk as a result of the non-conformance identified on the tag (e.g., conductor or structural support deficiency).[24]

[24] PG&E leveraged a team of subject matter experts across our Electric Asset Strategy, Wildfire Risk, Standards and Work Methods teams to review each non-conformance type to determine which non-conformances present ignition risk versus those that do not present such a risk.

- "Non-Ignition Risk" tags are defined as maintenance tags where the non-conformance would not result in a failure that could produce an ignition (e.g., missing high sign or visibility strip).

Below, we provide an overview of our plan for reducing the number of Ignition Risk and Non-Ignition Risk tags associated with transmission, substation, and distribution facilities in HFTDs and HFRAs. The specific resource details for these plans are provided in response to Remedy #2.

(1) Transmission Ignition Risk and Non-Ignition Risk Tags

PG&E is forecast to complete the transmission tag backlog of HFTD and HFRA transmission Ignition Risk tags (found prior to 2022) by the end of year 2022. After January 1, 2023, all HFTD and HFRA new transmission Ignition Risk and Non-Ignition Risk tags will be completed in compliance with GO timelines, barring external factors.

(2) Substation Ignition Risk and Non-Ignition Risk Tags

All Substation HFTD and HFRA Ignition Risk and Non-Ignition Risk substation tags are currently in compliance with applicable GO requirements and are projected to continue to remain in compliance in 2023 and subsequent years.

(3) Distribution Ignition Risk and Non-Ignition Risk Tags

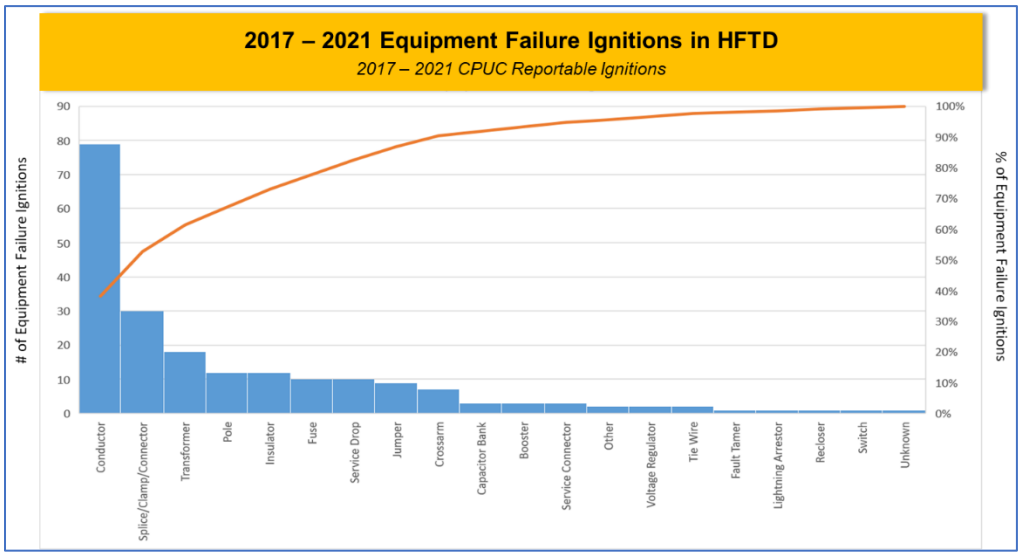
After January 1, 2023, all new HFTD and HFRA Ignition Risk distribution tags will be completed in compliance with GO timelines. This will require increasing maintenance work execution team resources to keep pace with projected Ignition Risk tag finds from ongoing systems inspections. The assumptions that were incorporated in developing the following distribution tag work plans, such as projected inspection tag find rates, future work resource tag completion rates, and tags cancelled as a result of PG&E's undergrounding plans, will be trued up as the actual work in these areas are completed.

All past due HFTD and HFRA Ignition Risk and Non-Ignition Risk tags, as of January 1, 2023, will be prioritized by considering tag risk score and tag age and will be completed based on the following criteria:

a. Three-Year Plan for HFTD/HFRA Ignition Risk Non-Pole Replacements and Repairs

Non-pole equipment replacements and repairs are considered to have a higher likelihood of causing an ignition. Figure RN-PG&E-22-05-06 below plots the historic equipment failure-related reportable ignitions that PG&E experienced in the HFTD (from 2017 to 2021) by type, which shows that non-pole equipment failures pose a higher likelihood of ignitions than pole failures.

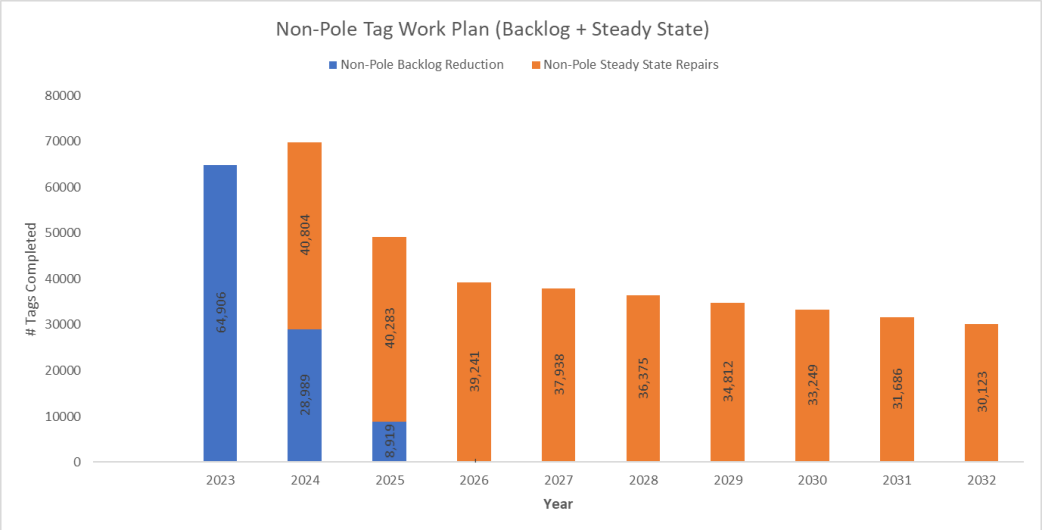
Figure RN-PG&E-22-05-06:
Equipment Failure Ignitions By Type



Based on these findings, we are prioritizing the backlog of non-pole replacement and repairs to be addressed in a three-year program. By end of year 2022, PG&E is projecting a backlog of approximately 103,000 Ignition Risk non-pole replacement and repair tags. We are increasing our work execution resources (e.g., volume of working crews) by approximately 5% per year to be able to focus on the remediation of the ignition risk tags backlog. The ramp up of 5% per year enables appropriate planning and onboarding of resources to ensure crews can work safely and productively to perform the work. This increase in working crews to remediate tags will need to be coordinated with other system hardening related programs to avoid creating resource constraints which could adversely impact those other programs. Furthermore, this three-year program factors in that some tags will be cancelled as a result of PG&E's undergrounding plan in the HFTD and HFRAs.

System hardening is focused on addressing the highest risk circuit segments in a wholistic manner by rebuilding entire sections of circuit to a wildfire hardened standard, thus replacing multiple pieces of equipment that may be potential ignition sources (i.e., conductor and splices/clamp/connector) while addressing tags typically addresses individual equipment components per tag. Since system hardening is more comprehensive, it requires a much longer timeline to complete versus a tag repair. Given that these two efforts address risk differently (e.g., holistically versus individual equipment repairs) it is important that resources are dedicated to make progress in both programs. In Figure RN-PG&E-22-05-07 below, we provide an overview of our plan to work down the backlog of Ignition Risk non-pole repair and replacement tags over three years to achieve Steady-State starting in 2026. Please note that tag numbers for future years are estimates and may vary based on actual conditions.

Figure RN-PG&E-22-05-07:
HFTD/HFRA Non-Pole Tag Work Plan**



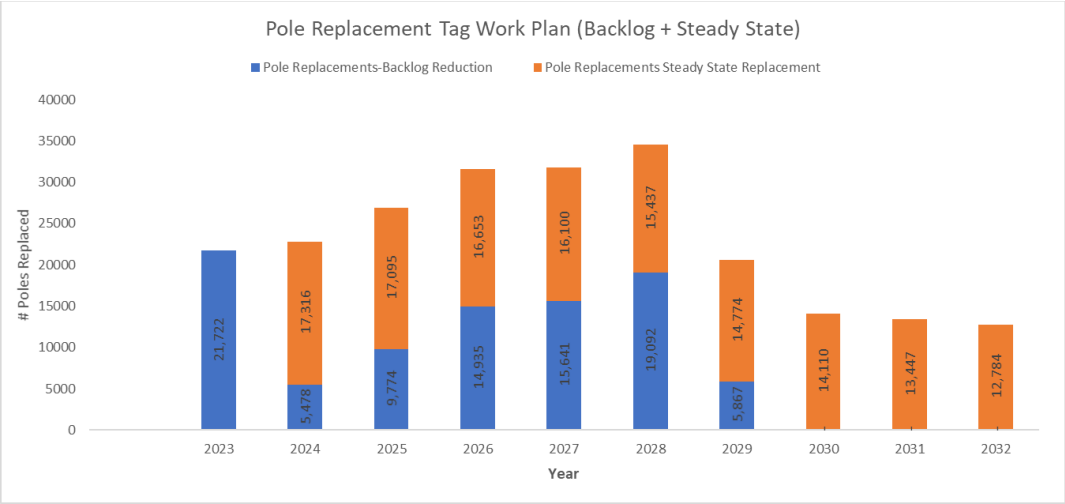
*** For year 2023, the tag backlog also assumes a small percentage of Tier 3 Steady State Repairs that are to be completed in 2023 (e.g. within 6 months after finding)*

b. Seven-Year Plan for HFTD/HFRA Ignition Risk Pole Replacements

Given the lower risk associated with, and more time-consuming requirements for pole replacements, we are implementing a seven-year plan to address the backlog of pole replacements in the HFTD and HFRA areas. Typically, pole replacements require a much longer timeline when compared to non-pole replacements and repairs, averaging approximately five months to replace a pole considering scoping, permitting, engineering, electric grid clearances, and construction activities.

By end of year 2022, PG&E is projecting a backlog of approximately 92,500 Ignition Risk pole replacement tags. As stated above, we are increasing our work execution resources to be able to focus on the remediation of the ignition risk tags backlog. In Figure RN-PG&E-22-05-08 below, we provide an overview of our plan to work down the backlog of pole repair and replacement Ignition Risk tags over seven years to achieve Steady-State starting in 2030. Furthermore, this seven-year program factors in that some tags will be cancelled as a result of PG&E's undergrounding plan in the HFTD and HFRAs. Please note that tag numbers for future years are estimates and may vary based on actual conditions.

Figure RN-PG&E-22-05-08:
HFTD/HFRA Pole Replacements Work Plan**

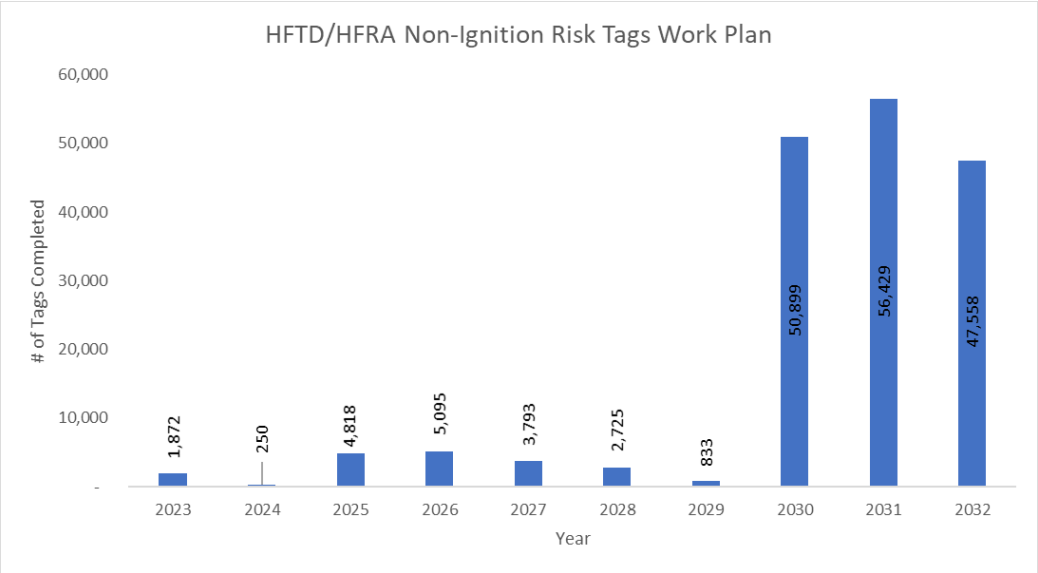


*** For year 2023, the tag backlog also assumes a small percentage of Tier 3 Steady State Repairs that are to be completed in 2023 (e.g. within 6 months after finding)*

c. Ten-Year Plan for Non-Ignition Risk Tags

We are implementing a 10-year plan to address the backlog of Non-Ignition Risk Tags in the HFTD and HFRA areas. As stated above, we are increasing our work execution resources to focus on the remediation of the Ignition Risk tags backlog. As we address our backlog of Ignition Risk tags, those resources will be transitioned to address the Non-Ignition Risk tags remaining in the backlog. In Figure RN-PG&E-22-05-09 below, we provide an overview of our plan to work down the backlog of Non-Ignition Risk tags to achieve Steady-State starting in 2033. Please note that tag numbers for future years are estimates and may vary based on actual conditions.

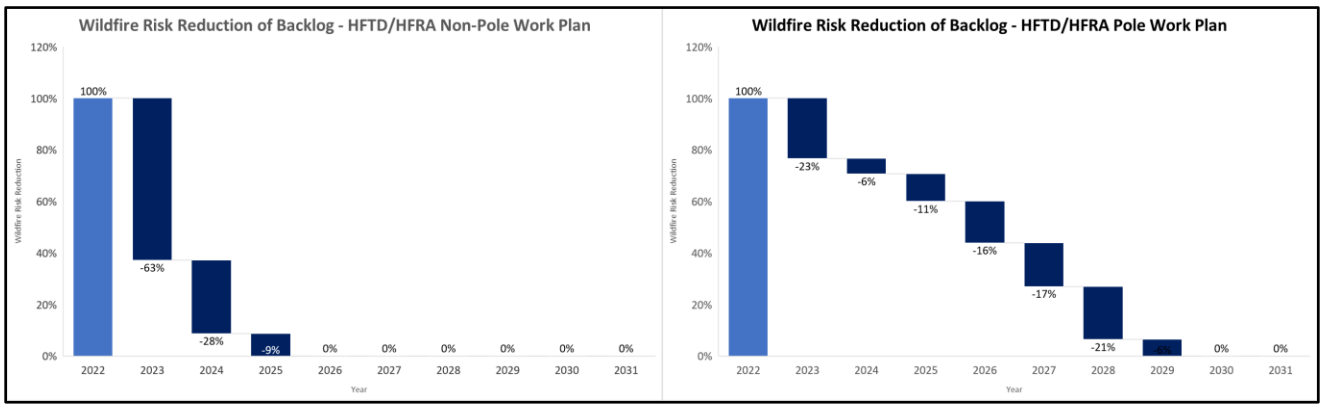
Figure RN-PG&E-22-05-09
HFTD/HFRA Non-Ignition Risk Work Plan



d. Expected Wildfire Risk Reduction Impact

By implementing the three-year non-pole replacement/repair and the seven-year pole replacement repair plans described above, we are projecting year-over-year risk reductions of our Ignition Risk tag backlog, which is depicted in Figure RN-PG&E-22-05-010 below. As Figure RN-PG&E-22-05-10 demonstrates, our plan to focus on the highest risk tags in the backlog will reduce relative wildfire risk by 63% and 23% in 2023 for non-pole and pole Ignition Risk tags, respectively. In subsequent years, the risk reduction decreases as lower priority Ignition Risk tags are addressed.

Figure RN-PG&E-22-05-10:
Risk Reduction Resulting from Three-Year Non-Pole and Seven-Year Pole Plans



e. Field Safety Reassessments

Following the 2019 WSIP, PG&E developed a process to monitor changing conditions for open tags by performing FSRs in HFTD and HFRA areas. Specifically, a trained and qualified inspector annually reassesses the field condition of open ignition risk tag to confirm that the ignition risk tag poses no immediate safety or reliability risk requiring emergency repair. Historically, FSRs were used to reprioritize tags either to accelerate or extend dates for completing the repair. Going forward, FSRs will be used primarily to elevate tag priority to an A-tag or a B-tag if the condition has degraded.

Required Remedies:

2. *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.*

    a. *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.*

Response to Critical Issue RN-PG&E-22-05 Remedy #2

In response to Remedy #2, we are providing a timeline and quantitative targets for reducing the backlog of Ignition Risk tags in HFTD and HFRA areas. Table RN-PG&E-22-05-03 provides specific quantitative goals for the number of outstanding Ignition Risk tags we plan to resolve per quarter. Beneath it, Table RN-PG&E-22-05-04 provides a new Initiative Target that will be added to Table PG&E-5.3-1(A) of our 2022 WMP and for which updates will be provided in our Quarterly Initiative Update submissions.

Table RN-PG&E-22-05-03: Timeline and Quantitative Targets/Goals

Quarter	Target for Outstanding Ignition Risk Tags to be Resolved in HFTD/HFRA Areas
Q3 2022	• Distribution: Close at least 12,700 HFTD or HFRA distribution tags, barring External Factors. • Transmission: Close at least 3,800 HFTD or HFRA transmission tags, barring External Factors
Q4 2022	• Distribution: Close at least 4,700 HFTD or HFRA distribution tags, barring External Factors. • Transmission: Close at least 3,500 HFTD or HFRA transmission tags, barring External Factors.

Q1 2023	• Distribution:
	  ○ Complete all new HFTD and HFRA distribution Ignition Risk tags in compliance with applicable General Order requirements.
	  ○ Close at least 8,300 HFTD or HFRA Ignition Risk tags.

Quarter	Target for Outstanding Ignition Risk Tags to be Resolved in HFTD/HFRA Areas
Q2 2023	• Distribution: ○ Continue to complete all new HFTD and HFRA distribution Ignition Risk tags in compliance with applicable General Order requirements. ○ Close at least 26,700 HFTD or HFRA Ignition Risk tags.
Q3 2023	• Distribution: ○ Continue to complete all new HFTD and HFRA distribution Ignition Risk tags in compliance with applicable General Order requirements. ○ Close at least 40,000 HFTD or HFRA Ignition Risk tags.
Q4 2023	• Distribution: ○ Continue to complete all new HFTD and HFRA distribution Ignition Risk tags in compliance with applicable General Order requirements. ○ Close at least 8,300 HFTD or HFRA Ignition Risk tags.

Table RN-PG&E-22-05-04: New Initiative Target to Be Included in Table PG&E-5.3-1(A)

ID	Initiative Target Name	Initiative Target Description	Activity Due Date	Qualitative or Quantitative Target
D.10	HFTD/HFRA Open Tag Reduction - Distribution	Close a minimum of 55,000 HFTD or HFRA distribution tags in PG&E's workplan as of June 30, 2022, barring External Factors.	12/31/2022	Quantitative
D.11	HFTD/HFRA Open Tag Reduction - Transmission	Close a minimum of 18,000 HFTD or HFRA transmission tags in PG&E's workplan as of June 30, 2022, barring External Factors.	12/31/2022	Quantitative

Our resource plans are based on the prioritization described above in Remedy #1(b) for HFTD/HFRA areas and the analysis of whether tags are Ignition Risk or Non-Ignition Risk as described in Remedy #1(c). A narrative description of our resource plans is included below. More detailed resource plans are provided in the attachments identified at the end of this Remedy response.

(a) Distribution EC Tag Resource Plan

2022 Resource Plan

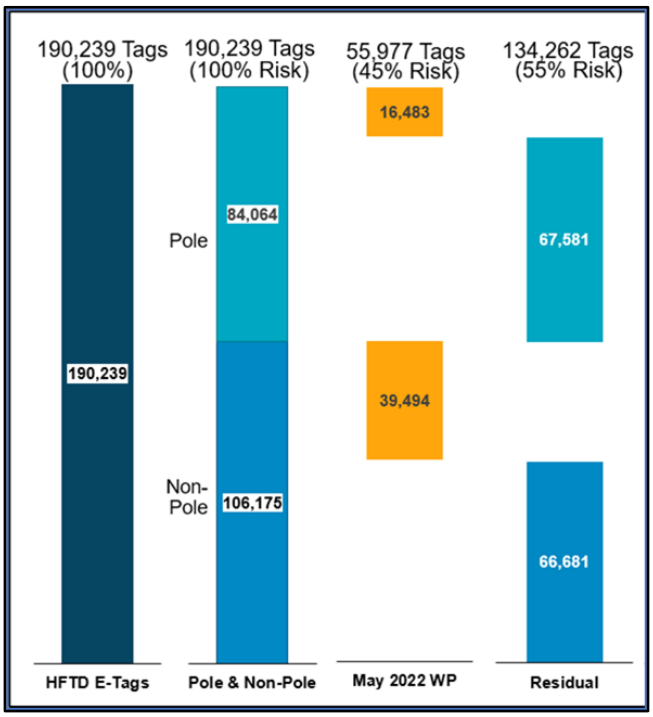
We developed our 2022 Distribution EC Tags Resource Plan (2022 Distribution Work Plan) for HFTD and HFRA areas using a risk-informed prioritization. To accomplish this, we first address A and B tags as they are identified in the field, in accordance with the timelines established under PG&E's Tag Priorities (see Table PG&E-RN-22-05-01 in

the response under Remedy #1 for additional information on PG&E's tag priority timelines).

For open E tags, we utilized our 2021 Wildfire Distribution Risk Model Version (WDRM) v2 to determine the wildfire risk score for each open HFTD tag. This approach allowed us to not only understand the individual risk score of each open tag, but also to understand the total amount of estimated wildfire risk associated with these populations of open E tags in comparison to the total population.

During the development of our 2022 Distribution Work Plan, we calculated our total wildfire risk score associated with all open E tags to be approximately 90% of the total tags HFTD risk. In coordination with our work execution operations, we developed a 2022 Distribution Work Plan that aims to reduce the open HFTD E-tags wildfire risk by 45% of the wildfire risk associated with all open HFTD E-tags. Figure RN-PG&E-22-05-11 illustrates the count of E-tags in HFTD and the relative risk percentages, as well as the count of tags included within the work plan as of June 27, 2022 which captured the revised 2022 Distribution Work Plan.

Figure RN-PG&E-22-05-11:
2022 HFTD/HFRA E-Tags with a Wildfire Risk Score (Count and Wildfire Risk Percentage)[25]



[25] Tag inventory as of December 15, 2021.

Our progress year to date against this work plan is that we have remediated approximately 19,000 tags, which has resulted in an overall HFTD open E-tag wildfire risk reduction of approximately 20.7%, as of June 27, 2022.

2023 Resource Plan

For the 2023 Resource Plan (2023 Distribution Work Plan), we are leveraging a similar approach used in developing our 2022 Distribution Work Plan but are using the 2022 WDRM v3. This plan will focus on further reducing the backlog of open E and F-tags using a wildfire risk informed approach. It will also provide an increased focus on geographical bundling of work to better take advantage of potential work efficiencies and mobilization in the field. However, we expect to find additional Ignition Risk tags as we continue to perform our scheduled system inspections in 2022. The workplan will be re-evaluated and adjusted in Q4 2022 to ensure that all Ignition Risk tags are included in the 2023 workplan and any changes to the plan included in this response will be included as part of the 2023 WMP.

(b) Transmission LC Tags Resource Plan

2022 Resource Plan

For the 2022 Transmission Tag Resource Plan, we are projecting that all backlog (found before 2022) Ignition Risk HFTD/HFRA transmission tags will be addressed by the end of 2022. In general, HFTD/HFRA tags are prioritized using factors such as whether the tag condition can degrade, the wildfire risk rank, and wildfire consequence. While performing work on prioritized tags, other tags with lower priority may be completed for efficiency reasons.

Non-Ignition Risk tags within HFTD/HFRA include items such as missing high voltage signs. These are considered less critical pursuant to GO 95 and will be addressed accordingly on an opportunistic basis.

2023 Resource Plan

For transmission, we will continue to plan and execute a risk-informed plan and expect to maintain Steady-State for ignition-related HFTD and HFRA tags in 2023.

(c) Substation LC Tags Resource Plan

2022 Resource Plan

For the 2022 Substation Resource Plan, we are currently managing substation LC tags in a Steady-State manner. Substation LC tags will continue to be addressed consistent with the timelines outlined in our Utility Standards.

2023 Resource Plan

The 2023 Substation Resource Plan is expected to continue to remain at Steady-State for 2023 and beyond. Substation LC tags will be addressed consistent with the timelines outlined in our Utility Standards.

(d) Resource Plan Attachments

Detailed resource plans by asset type, as well as by year, are provided in the attachments identified in Table RN-PG&E-22-05-05 below.

Table RN-PG&E-22-05-05: Resource Plans For 2022-2023 Tag Maintenance

Asset Category and Year	Attachment Name
Distribution EC Tags Resource Plan - 2022	2022-07-11_PGE_22-05_RNR_R2_Atch01
Distribution EC Tags Resource Plan - 2023	2022-07-11_PGE_22-05_RNR_R2_Atch02
Transmission LC Tags Resource Plan - 2022	2022-07-11_PGE_22-05_RNR_R2_Atch03
Transmission LC Tags Resource Plan - 2023	2022-07-11_PGE_22-05_RNR_R2_Atch04
Substation LC Tags Resource Plan - 2022	2022-07-11_PGE_22-05_RNR_R2_Atch05
Substation LC Tags Resource Plan - 2023	2022-07-11_PGE_22-05_RNR_R2_Atch06

Required Remedies

3. *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.*

    a. *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*

Response to Critical Issue RN-PG&E-22-05 Remedy #3

We are providing with this response the requested spreadsheets regarding all open HFTD tags as of June 7, 2022, as well as all tags that were completed and/or cancelled in the year 2021 in the following Attachment 2022-07-11_PGE_22-05_RNR_R2_Atch07. This attachment has separate workbook tabs for each of the following spreadsheets:

- DLine EC Tags Closed - 2021 Closed or Cancelled Distribution EC Tags;
- DLine EC Tags Open – Open Distribution EC Tags;
- TLine LC Tags Closed - 2021 Closed or Cancelled Transmission LC Tags;
- TLine LC Tags Open – Open Transmission LC Tags;
- Sub LC Tags Closed - Closed or Cancelled Substation LC Tags; and
- Sub LC Tags Open – Open Substation LC Tags.

We are providing the following additional information for context regarding the information included in the attachment.

- We understand all open work orders requested in this question to be for all open “EC” tags for distribution and “LC” tags for transmission and substation facilities that are within the HFTD and HFRA locations in our service territory, as of June 7, 2022.

- We are including all EC and LC tags that were closed in 2021, as well as EC and LC tags that were cancelled in 2021 due to reasons such as the tag was addressed as part of another project, tag was addressed under a fire rebuild project or under an emergency project, as well as tags determined to be duplicative with other tags.

- We are not including Vegetation Management tags, such as P1 (Priority 1) and P2 (Priority 2) tags in this response.

- We are interpreting the phrase “Date work order was generated” to mean the date when the tag was created in the field.

- We are interpreting the phrase “Priority of Work Order” to mean PG&E’s Tag Priorities (A, B, E, F and H).

- We are interpreting the phrase “Remediation Due Date” to be the date when the tag repair is forecasted to be remediated.

- We are interpreting the phrase “Date Remediation Completed (if applicable)” to be the date when the tag repair was remediated and marked as closed in our work management system.

Critical Issue RN-PG&E-22-12

Critical Issue Title: 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.

Required Remedies: *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.*

Remedy #1:

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.[26] This plan must include details on how PG&E determines the number and locations of protective devices throughout its system.*

Response to Critical Issue RN-PG&E-22-12 Remedy #1

In 2021, PG&E initiated Enhanced Powerline Safety Settings (EPSS) as a pilot effort to achieve immediate reduction of wildfire ignitions. The enablement of EPSS protection settings on 170 circuits resulted in an 80 percent reduction in CPUC-reportable ignitions compared with the prior three-year average for the enabled circuits. Given the significant ignition reduction and the criticality of reducing ignitions that could cause a catastrophic wildfire, we expanded the EPSS program in 2022 to all 25,500 distribution line miles in HFTD and HFRA areas, as well as select non-HFTD areas in our service area. Prior to implementing the expanded 2022 program, we collected and analyzed numerous data points and lessons learned across our 2021 EPSS program, including collecting data from industry peers, actual field device performance, and controlled laboratory testing relative to risk identification, situational awareness, field safety, operational practices, device engineering, and more.

As part of our 2022 EPSS program, we have established goals to drive improved reliability on the identified circuits to reduce the impact on customers that experience an outage on an EPSS-enabled circuit. So far in 2022, we have seen a reduction in the Customer Average Interruption Duration Index (CAIDI) and Customer Experiencing Sustained Outage (CESO) trend when compared to data from the 2021 pilot. We will continue to collect and analyze data from EPSS deployment throughout 2022 and will adjust settings to reduce wildfire ignition risk, while minimizing public safety impacts of outages. That work is described in detail below.

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

The 2022 EPSS program has leveraged existing protection devices for program implementation, selecting these devices based on the performance of an upstream electrical trace from any primary overhead conductor that intersects any of three risk-defined polygons: (1) HFTD; (2) HFRA; and (3) Non-HFTD Buffer Area.[27] The comprehensive electrical trace identifies devices that protect distribution conductor in one or more of HFTD, HFRA, or non-HFTD buffer area. The number of devices is determined by what protective devices currently exist on the system that can provide EPSS protection. As additional data is collected from our 2022 program, we will continue to evaluate and explore opportunities where increased sectionalization will enable us to further target wildfire risk while minimizing potential reliability impacts of outages across HFRA in our service area.

Items (a) through (e) below represent our plan to collect and analyze data from EPSS deployment throughout 2022 and adjust settings to reduce wildfire ignition risk, while minimizing public safety impacts of outages.

a) Performance of Controlled Laboratory Testing for Device Trip Settings

As discussed in our 2022 WMP[28], the goal of the EPSS protective device settings is to trip quickly enough to minimize ignition risk, while also allowing a very short time buffer – referred to as device coordination – for multiple protective devices along a circuit to act in coordination to minimize, to the extent possible, outages to customers outside the circuit protection zone where a fault occurred. This device coordination is helpful in that it can limit the scope of an EPSS caused outage, provide benefits in terms of situational awareness and response with a smaller geographic area to patrol, as well as reduce the scope and customer impact of an outage. Circuits enabled with EPSS are configured to clear bolted fault conditions at 100ms or less; however, increasing the clearing time can improve the coordination margin between devices, thus reducing the patrol zone.

In early 2022 PG&E conducted and completed controlled laboratory testing to refine the circuit device design parameters and provided empirical data describing ignition risk as a function of fault clearing times for distribution protection equipment if the 100ms fault duration time were to be extended. A total of 174 tests were performed at PG&E's Applied Technology Services (ATS) High Current Test Yard between January to February 2022.[29] Our test results indicated:

1) That as the fault current increases, the probability of sustained ignition similarly increases.

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[27] 2022 WMP, p. 1033 (A buffer area is an extension of the HFTD) Tier 2 or Tier 3 boundary into non-HFTD areas to allow for complete deployment of a mitigation program in the HFTD to account for any deviations in Geographic Information System layers or circuit diagrams).

[28] 2022 WMP, p. 735.

[29] *See* Attachment 2022-07-11_PGE_22-12_RNR_R2_Atch01_Redacted or Attachment 2022-07-11_PGE_22-12_RNR_R2_Atch01CONF.

2) As the clearing time increases, the probability of sustained ignition increases for all the fault types

3) The reduction in clearing time (fast relaying) for all faults will help reduce the ignition risk

4) Faster relaying will also help limit the movement of faults / traveling arcs on circuits and flashover / arcing to adjacent phases.

5) It was observed that for faster clearing times below 100ms, the risk of sustained ignition was minimal compared to conventional relay settings.

Circuits enabled with EPSS in 2021 were configured to clear bolted fault conditions at 100ms. Accordingly, increasing EPSS relay clearing times beyond 100ms was not recommended for 2022 implementation, as it may increase the ignition risk.

Our 2022 EPSS Program continues to develop and collect data from our enabled EPSS field devices as well as additional controlled testing to refine and improve device protection settings. Testing that is currently underway is focused on continued analysis of relevant failure modes, fault types, and the potential application of new or emerging technologies to improve our mitigations relative to:

- **High Current Faults** to continue to investigate and refine fast-trip protection settings and failure modes considering various operating, environmental, and failure conditions experienced throughout our service territory

- **High Impedance (e.g., low-current) Faults**, including investigation of the fault signatures from our devices or potential signals from other connected devices within our system for improved identification and situational awareness of these occurrences in the field as well as automated controls to mitigate these

- **Reliability Improvements & Mitigations** to test the efficacy or inform implementation of products and programs aimed at improving situational awareness or operational capabilities that enable us to respond and restore EPSS outages safely and efficiently considering both wildfire risk as well as the public safety impact of sustained, unplanned outages

b) Re-Engineering of 2021 Circuit Settings

Our 2021 EPSS program included approximately 11,500 distribution circuit miles across 170 circuits and 1,000+ protection devices. As a component of the planning and implementation of our 2022 EPSS program, protection engineers collected and reviewed performance data from each of the 2021 circuit devices and, leveraging revised design parameters that consider 2021 lessons learned, benchmarking, and controlled testing results, our teams confirmed or recalculated the protection settings for each device.

For EPSS enablement through June 30, 2022, across our 2021 EPSS circuits that have also been included in our 2022 program scope the revised settings have resulted in a 19% reduction in average outage size[30] and 44% reduction in average outage duration[31] for outages on this subset of circuits that are included in both the 2021 pilot and 2022 program scopes.

c) Continued Review of Device Settings

PG&E continues to collect and analyze system performance data on a real-time basis for our EPSS program. While EPSS is enabled, the EPSS Program Management Office, a matrixed organization that coordinates EPSS activities and real time operations performs the following analysis through Daily Operating Reviews:

- **For Ignitions on EPSS Protected Zones:** We collect the device data to analyze fault signatures and perform a causal analysis to understand the details of the fault through the collection and engineering review of cause (e.g., equipment, animal, vegetation, etc.), the nature of the fault (e.g., line-to-ground, line-to-line, etc.), environmental data (e.g., relative humidity, wind speed, dead / live fuel moisture, Fire Potential Index, etc.) and more. We will also examine the extent of condition for the specific fault type and ignition characteristics and take appropriate corrective action.

- **For Outages on EPSS Protected Zones:** Our Operational Standard requires the circuit segment of the protective device that operated during the outage to be patrolled from the beginning of the outage zone to the next protective device and/or end of each line[32] to identify and remediate damages or hazards associated with the outage prior to restoring power. Accordingly, when an outage with an identifiable cause is discovered, the issue is documented and remediated immediately so that service may be restored safely. We analyze outage trends along the circuit, with appropriate remediation work assigned and prioritized with an Electric Corrective Notification (EC Notification) or adjustment to settings, if warranted. PG&E uses our Lean Operating Model to track and trend issues and address both the specific issue and extent of condition for similar circumstances.

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[30] Measured by Customers Experiencing a Sustained Outage (CESO)

[31] Measured by reduction in Customer Average Interruption Duration Index (CAIDI)

[32] In select scenarios such as a readily apparent fault cause (e.g., third-party vehicle or vegetation contact with PG&E assets) and during conditions of reduced wildfire risk (e.g., high relative humidity or fuel moisture), PG&E will mobilize field response teams and test that the fault condition has been corrected to restore customers safely and efficiently without patrolling to end of line.

Through June 30, 2022, over 87% of EPSS Program circuits have not experienced an outage or experienced only one outage with EPSS enabled as shown in Table PG&E-22-12-01 below. For the approximately 13% of circuits that have experienced 2 or more outages, Table RN-PG&E-22-12-02 provides examples on 2022 EPSS Program circuits, through June 30, 2022, where PG&E has identified, reviewed, and remediated system performance abnormalities across our 2022 EPSS program.

Table RN-PG&E-22-12-01:
Year-to-Date EPSS Circuits by Number of Outages Experienced

NUMBER OF OUTAGES EXPERIENCED	COUNT OF CIRCUITS	% OF PROGRAM SCOPE
Zero to One	887	87%
Two to Four	117	12%
Five or More	14	1%
TOTALS	**1,018**	**100%**

Table RN-PG&E-22-12-02:
EPSS System Remediations & Correction Actions

CIRCUIT	YTD OUTAGES	CAUSAL ANALYSIS ACTIONS & FINDINGS	CORRECTIVE ACTIONS TAKEN
SAN LUIS OBISPO 1107	10	• Field patrol of impacted zones identified capacitor bank and transformer as potential causes • Hand-held infrared of underground cable identified potential damaged section of circuit (circuit zone had both UG and OH conductor) • Installed line sensors and continued to monitor and troubleshoot	• Majority of customers load transferred to a non-EPSS circuit • Capacitor bank was placed on manual and scheduled to be replaced • The UG conductor was removed from service • The protection device has been recommended for replacement • Vegetation patrol and clearing on impacted circuit zones • No additional EPSS outages have been observed since 6/20/22
PUTAH CREEK 1105	4	• During restoration patrol, a customer informed PG&E that their power has been interrupted when they start up large (customer owned) equipment in the morning • Consistent with our design parameters, the protection device had initially been set to trip below this in-rush current	• Engineers reviewed device data and re-adjusted protection settings considering this load to be above in-rush current and re-installed settings in field • No additional EPSS outages have been observed since 5/18/22
SHINGLE SPRINGS 2108	4	• Engineering reviewed data from protection devices and existing line sensors and identified abnormal pulses • Installed additional line sensors and continued to monitor and troubleshoot to identify pulses. • Field patrol of impacted zones to identify any abnormal conditions recommended installation of animal mitigations.	• Bird guarding implemented at normal open • Relay settings updated to increase coordination between devices • Additional protection devices have been recommended to further sectionalize line • No additional outages since 6/1/22

d) Remote (e.g., SCADA) Enablement based on Defined EPSS Criteria

As a compliment to PSPS, EPSS is critical during hot-dry summer days, when there are no high winds that may necessitate PSPS, but continued low relative humidity, low fuel moisture levels, and where the volume of dry vegetation increases the risk of an ignition becoming a large, fuel-driven wildfire. PG&E models these conditions locally at a 2km x 2km level of granularity across our service territory using our Utility Fire Potential Index models.

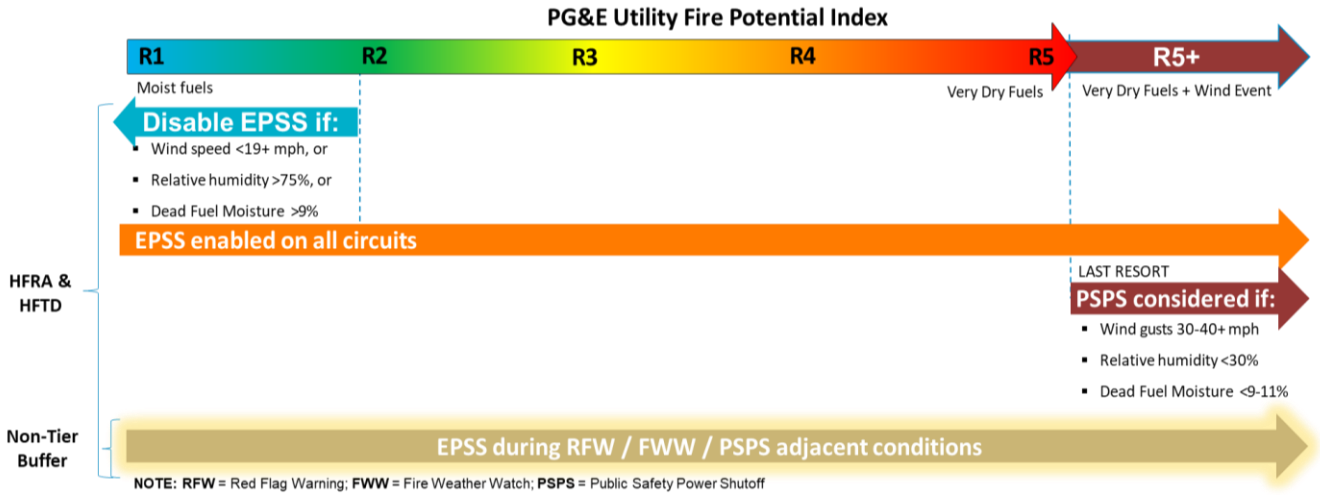
A targeted outcome of the engineering and initial installation of EPSS device settings for our 2022 EPSS program is the operational capability to remotely enable EPSS on most circuits throughout our service territory during periods of elevated wildfire risk and return to normal settings when it is safe to do so.

PG&E has developed and further refined EPSS enablement criteria that enables these protection settings during the conditions that historically account for 97% of acres burned and all of consequences.[33] Based on 2022 early season fire activity, PG&E updated our enablement criteria to reflect lessons learned and further mitigate wildfire risk, while allowing for return to normal settings when safe to do so.[34] In conditions that are below these risk-informed criteria, we return our system to its normal operating profile to maximize customer reliability and increase public safety from the perspective of both wildfire risk reduction and the safety consequences of outages.

[33] Consequences includes impacted fatalities, structures destroyed, acres burned based on historical fires > 100 acres from 2012-2020 of any cause and these results are for current criteria: Enable EPSS for all circuits unless disable criteria met of R1 and damp or calm.

[34] Previously approved criteria were to enable EPSS at R3 conditions and certain R1 and R2 conditions that included high sustained wind speed, low relatively humidity, and low 10-hour dead fuel moisture.

Figure RN-PG&E-22-12-01: EPSS Enablement Criteria as of June 6, 2022



e) EPSS Reliability Improvements through New Devices

As a new and emerging component of PG&E's capital planning process considering public safety, wildfire risk reduction, and customer affordability, beginning in 2022 EPSS system performance will be incorporated into our planning process to identify potential locations for new protective line equipment projects to further sectionalize highly impacted circuit protection zones. This process has already generated locations where installation of additional devices will help reduce the size and duration of future EPSS outages.

Remedy #2:

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.*

Response to Critical Issue RN-PG&E-22-12 Remedy #2

When assessing the impacts associated with the widespread use of EPSS, we begin with the positive public safety impact and objective to eliminate utility related catastrophic wildfires. The expansion of our EPSS program to all primary overhead distribution circuits in HFTD and HFRA areas of our service territory, as well as select non-HFTD areas, is driven by the observed reduction of CPUC-reportable ignitions in HFTDs by 80% on ~11,500 miles of EPSS-enabled circuits between June to October 2021.[35] These areas represent the portions of our service territory with an elevated risk (HFTD Tier 2) and extreme risk (HFTD Tier 3) of potential impacts on people and property from utility related wildfires.[36]

We recognize the impacts of outages associated with EPSS enablement on our customers and in response we continue our efforts to engineer the best technical solutions and operational capabilities to reduce outages and expand support offerings for our customers as well as proactive steps to improve reliability. Detailed planning of our EPSS Program began in late 2021, with purposeful attention placed toward minimizing customer impacts through developing new operational capabilities, executing proactive equipment repairs, and performing targeted vegetation management.

Year to date through June 30, 2022, we continue to observe comparable risk-reduction to our 2021 EPSS program, achieving a 72% reduction of CPUC Reportable Ignitions on EPSS protected zones in HFTDs as compared to the 2018-2020 3-year average. In addition, through June 30, 2022, across all program devices we have experienced and restored 590 outages on EPSS enabled zones and have achieved a 21% reduction in average number of customers impacted and a reduction of 51% in average outage duration compared to our 2021 EPSS Program. These numbers are reflected in Table RN-PG&E-22-12-03 below.

Table RN-PG&E-22-12-03:
Year-to-Date Ignition & Outage Performance on EPSS Enabled Zones

IGNITION PERFORMANCE	
PERIOD	**CPUC REPORTABLE IGNITIONS IN HFTD**
2018 – 2020 AVERAGE	43
2022 EPSS	12
% REDUCTION	**72%**

[35] See 2022 WMP, pp. 732-733 (value based on observed reduction of CPUC reportable ignitions in HFTD on primary overhead distribution circuits).

[36] Descriptions of HFTDs per Decision (D.) 17-01-009, as changed by D.17-06-024. PG&E also considers our HFRA map, the culmination of a fire threat assessment of our service territory focused on identifying areas where an ignition during an offshore wind event could lead to a catastrophic wildfire. See 2022 WMP, p. 75.

EPSS OUTAGE PERFRMANCE			
PERIOD	**OUTAGES**	**AVG. CESO**	**CAIDI**
2021 EPSS	627	1,102	404
2022 EPSS	590	868	196
	% REDUCTION	**21%**	**51%**

Throughout 2022, we continue to collect data and perform reassessments of the impacts associated with the widespread use of EPSS across a variety of perspectives:

a) EPSS Customer Reliability Studies

PG&E is required to annually assess and report on our worst performing circuits through our annual reliability report by D.16-01-008. In 2021, as PG&E scoped our expanded 2022 EPSS program, we determined that further analysis was required to identify circuits in scope that had historically experienced a higher number of unplanned outages given the differing grid response EPSS, by design, creates. With EPSS active, to achieve the ignition reduction benefits, outages that would normally be isolated to smaller zones within our system (e.g., such as fused tap outage) result in zone or circuit-level outages that impact a greater number of customers across a larger geographic area. Depending on fault location, this can result in additional time required for our field operations teams to ensure our system is clear of potential hazards before restoring power safely.

Accordingly, in January 2022, PG&E conducted a Preliminary Reliability Study which aggregated historical outage data on EPSS circuits, identified the upstream EPSS protection devices, and quantified the potential 2022 reliability impact had EPSS been enabled during that period. The Preliminary Reliability Study has informed work prioritization of our reliability mitigations for circuits with potential to be more highly impacted because of the expanded use of EPSS across all HFRA and HFTD areas in our service territory.

We continue to refine our Reliability Study with updates such as anticipated outage frequency, criteria for when EPSS circuits will be activated, and weighting for critical customers. While we continue to collect data from actual 2022 EPSS program performance, our Revised EPSS Reliability Study will continue to inform our reliability mitigations, customer and agency outreach, and customer support programs for EPSS circuits.

b) Vegetation Management on EPSS Circuits

In 2021, vegetation caused 33 percent of the known outages on EPSS enabled circuits.[37] Subsequent to PG&E's submission of the 2022 WMP, to evaluate potential additional actions to mitigate vegetation caused outages, PG&E conducted multiple, targeted reassessments between our Vegetation Management programs and EPSS Program scope to:

i) **Identify Work on EPSS Circuits in 2022 Routine and Enhanced Vegetation Management (EVM) Programs**. PG&E has identified work on EPSS circuits on the existing EVM 2022 Scope of Work or our Routine Vegetation Management program to maintain compliance, maximize efficiency, and mitigate reliability impacts across these programs

ii) **Target Proactive EPSS Circuit Vegetation Management** for circuits not included in the 2022 EVM program work plan. Our EPSS Program identified protection zones on 12 priority circuits based on a two-year lookback of three or more vegetation-caused outages for dedicated vegetation management crews to identify, inspect, and remove vegetation to achieve expanded clearances along these circuits that could otherwise potentially cause a fault along the overhead conductor.

c) Asset Health and Equipment Repairs

When scoping our 2022 EPSS program we did not exclude circuits or areas based on asset health under the conservative approach that all non-exempt overhead assets are potential sources of ignition. In 2021, equipment failure caused 25 percent of the known outages on EPSS enabled circuits.[38] Accordingly, we are proactively addressing asset health through targeted repair programs designed to reduce nuisance outages while EPSS settings are enabled.

PG&E initiated work to improve reliability on 50 EPSS capable circuits in the HFTD areas, HFRA and non-HFTD buffer zones based on highest projected Customer Experiencing Sustained Outage (CESO) to mitigate equipment caused outages.[39] These 50 circuits accounted for nearly 27% of the customer reliability impact - assuming no proactive reliability work - in our Preliminary Reliability Study, and the repairs targeted were intended to remediate conditions that could lead to a potential EPSS outage, including replacing crossarms and structures, repairing damaged conductor, replacing animal or bird protections, and more.

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[37] *See* PG&E's January Monthly Report – EPSS and attachments, accessible via the service lists for the Wildfire Mitigation Plan (R.18-10-007) and PG&E Safety Culture (I.15-08-019) proceedings.

[38] *Id*.

[39] 2022 WMP, p.738.

Our asset repairs and work focus has not been constrained to these top 50 circuits – rather, our intent has been to focus and prioritize efforts on these circuits where reliability improvements are needed most and continue to expand and perform repairs throughout our system. Table RN-PG&E-22-12-04 summarizes the repair work PG&E has completed as of June 30, 2022 across all our EPSS program circuits:

Table RN-PG&E-22-12-04:
EPSS System Asset Health and Equipment Repairs

GROUP	PROJECTED CUSTOMER RELIABILITY IMPACT	TAGS[40] COMPLETE
EPSS Top 50 Circuits	27%	3,388
EPSS Top 51 to 147 Circuits	23%	3,738
All Remaining Circuits	50%	9,975
TOTAL	**100%**	17,101

Remedy #3

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.*

Response to Critical Issue RN-PG&E-22-12 Remedy #3

In WMP Program Target F.04[41], PG&E identified 50 circuits to focus our proactive reliability mitigations on the areas where reliability improvements are most needed, and repairs would be anticipated to have the greatest impact. As shown in Table RN-PG&E 22-12-04 above, the Top 50 circuits account for 27% of the Projected Customer Reliability Impact[42] from our Preliminary Reliability Study, and when expanded to the top 147 circuits the relatively small population of circuits (147 of 1,018) accounts for approximately 50% of the overall Projected Reliability Impact.[43]

[40] Tag refers to identified maintenance or repair activities

[41] 2022 WMP, pp. 730 - 739

[42] Assuming no other proactive work performed

[43] *Id.*

However, our asset repair, vegetation management, and other reliability mitigation work is not limited to just these circuits. Rather, our intent is to prioritize and bring visibility to the efforts on this small population of circuits while continuing to expand and conduct repairs, perform additional vegetation management and other reliability mitigations throughout our system. Further, in instances such as our proactive EPSS Circuit Vegetation Management, PG&E has performed additional analysis above the results of our Preliminary Reliability Study to identify and better target mitigation work to the areas of our system where these specific mitigations are anticipated to be most effective.

Table RN-PG&E-22-12-05 below summarizes the current EPSS reliability mitigation measures, the applicable scoping methodology for each program, and an explanation of the anticipated impact the mitigation measure will have on circuit reliability.

Table RN-PG&E-22-12-05:
EPSS System Reliability Remediations & Correction Actions

#	RELIABILITY MEASURE	SCOPE	PROJECTED RELIABILITY IMPACT	TIMELINE
1	EPSS - Install Settings on Distribution Line devices (WMP Target F.02)	Load engineered settings on protection line devices (line reclosers and fuse savers) on the identified 1,018 circuits.	• Fully coordinated, engineered settings result in fewer customers on average that are impacted by an outage, reducing patrol zones, and decreasing outage time.	8/1/2022
2	Targeted Equipment Repairs on Top 50 EPSS Circuits (WMP Target F.04)	Initiate reliability mitigations on Top 50 EPSS capable circuits in the HFTD areas, HFRA and non-HFTD buffer zones based on highest projected Customer Experiencing Sustained Outage (CESO) for completion prior to the peak of wildfire season.	• Equipment repaired through this work has the potential to cause a fault along the overhead conductor. Likelihood of reliability improvement depends on specific equipment condition.	8/1/2022
3	Work on EPSS Circuits in 2022 Routine and EVM Programs	PG&E has identified EPSS circuits on the existing EVM 2022 Scope of Work or our Routine Vegetation Management program.	• Vegetation removed through this work has a high potential to make contact with PG&E conductor and cause a fault along the overhead conductor.	12/31/2022
4	Proactive EPSS Circuit Vegetation Management	Circuit protection zones on 12 priority circuits based on a two-year lookback of three or more vegetation-caused outages for dedicated vegetation management crews to identify, inspect, and remove vegetation along these circuits that could otherwise	• Vegetation removed through this work has a high potential to make contact with PG&E conductor and cause a fault along the overhead conductor.	10/1/2022

#	RELIABILITY MEASURE	SCOPE	PROJECTED RELIABILITY IMPACT	TIMELINE
		potentially cause a fault along the overhead conductor.		
5	Vegetation Strike Teams for Circuits Experiencing Multiple Vegetation-Caused Outages	During wildfire season, emergency vegetation management work will be performed based on analysis of outages. If vegetation is found during the patrol and restoration process or as part of a follow up to an unknown cause investigation, crews will be dispatched to perform vegetation clearing work both upstream and downstream of the fault location, reducing the potential risk of a future outage and impact to the customers served along the circuit.	• Vegetation removed through this work has a high potential to make contact with PG&E conductor and cause a fault along the overhead conductor.	12/31/2022
6	Targeted Equipment Repairs on EPSS Circuits	Continued performance of reliability mitigations on EPSS capable circuits in the HFTD areas, HFRA and non-HFTD buffer zones based on highest projected Customer Experiencing Sustained Outage (CESO).	• Equipment repaired through this work has the potential to cause a fault along the overhead conductor. Likelihood of reliability improvement depends on specific equipment condition.	12/31/2022

Remedy #4

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.*

Response to Critical Issue RN-PG&E-22-12 Remedy #4

PG&E has conducted and will continue to conduct comprehensive outreach to all customers living in areas protected by EPSS, with a special focus on individuals with Access and Functional Needs (AFN) and those enrolled in the Medical Baseline (MBL) Program. To date, approximately 266,000 PG&E customers have enrolled in the MBL Program. The intent of this outreach is to ensure individuals are educated about these enhanced power line safety settings, prepared for potential power outages, and informed about the resources that are available to support them.

- Since March 2022, PG&E has been hosting weekly regional webinars and safety town hall events in high fire-risk communities, which include information on EPSS and available customer resources. To date, there have been 19 webinars attended by more than 1,683 customers. These webinars will continue through early August 2022.

- In addition to regional webinars and safety town halls, PG&E hosted two wildfire safety webinars in May focused on Deaf/hard of hearing and Blind/low vision individuals, which were attended by 217 customers. PG&E has also hosted four wildfire safety webinars and training sessions with Community-Based Organizations (CBOs) serving AFN individuals. Six additional wildfire safety webinars are planned with CBO and AFN partners.

- PG&E is committed to continuing its robust outreach and engagement with Public Safety Partners and critical customers. This includes direct outreach through PG&E's dedicated representatives, trainings, information sharing and high-touch engagement with hospitals, telecommunications providers, and school districts.

- PG&E conducted an outage risk analysis for potential EPSS impacts to all hospitals and school districts in PG&E's service area. Additional outreach was conducted with those customers at the highest risk of outages related to EPSS. PG&E is currently working with one hospital and 25 school districts to improve resiliency and mitigate EPSS impacts at their locations.

- PG&E has conducted two critical facilities wildfire safety webinars specifically focused on Community Choice Aggregators and telecommunications providers and has three additional critical facilities wildfire safety webinars planned with water agencies and retail and wholesale transmission customers.

- On April 20, 2022, PG&E held an All-Customer Webinar that focused on EPSS, providing the opportunity for participants to ask PG&E subject matter experts questions. The invitations were emailed to all residential and small/medium business customers with an email address on file who are served by powerlines protected by EPSS; this webinar was also referenced in additional collateral materials sent to customers, as referenced below. The webinar was attended by more than 725 customers.

- In April 2022, PG&E contacted all customers by email or direct mail who are served by powerlines protected by EPSS, and therefore, subject to EPSS-related safety outages. This outreach included information about the upcoming All-Customer Webinar.

- On April 29, 2022, PG&E shared a Safety and Reliability Highlight with 2.9 million customers who receive electricity from PG&E. This included county-specific data on electric service dependability, recent safety improvements and enhanced wildfire prevention efforts that took place from January through March this year. The Highlight included EPSS information for counties with EPSS-capable circuits.

- On May 25, 2022, PG&E sent an email to EPSS-protected customers who may experience more frequent outages this year. These customers were identified through analysis of historical outages and meteorology lookback. The email included information about what to expect and highlighted the resources and preparedness tools available to help mitigate the impact EPSS-related safety outages may cause. In June, this population of customers will also receive a direct mail postcard focused on EPSS.

- In June 2022, PG&E sent an Outage Preparedness Guide to approximately 900,000 residential and non-residential customers who are more likely to be impacted by EPSS and Public Safety Power Shutoffs (PSPS), explaining the differences between the programs and available resources and steps to prepare. A digital version of this Outage Preparedness Guide was also emailed to approximately 850,000 customers. PG&E plans to send another 900,000 brochures to the remaining customers in August.

- In July 2022, a letter will be sent to approximately 10,000 AFN individuals who previously received portable batteries to advise them about battery preparation for safe operation in anticipation of wildfire season. Additional outreach has been conducted to promote this and other resources and programs, encouraging customer participation.

To help reduce the impact of the outages associated with EPSS, PG&E has expanded eligibility across several programs to make additional resources available and help all customers access the support they need. This includes:

- Expanding the Portable Battery Program to provide additional batteries at no cost to customers in the MBL Program. For 2022, in recognition of the potential for EPSS-related outages, PG&E removed the low-income requirement so that all MBL customers in high fire-risk areas are eligible. As of June 2022, approximately 13,700 batteries have been provided to customers since the inception of this program.

- Updating the Generator and Battery Rebate Program so that customers in scope of the EPSS program are eligible.

- Launching the Backup Power Transfer Meter Program, which includes a free home upgrade that makes it safer and easier to quickly connect backup power to homes.

PG&E is also conducting additional outreach to customers who may be eligible for the MBL Program based on PG&E's propensity modeling and or have self-identified as having an access or functional need (e.g., "Vulnerable" or "Disabled"). Supplementary collateral information sent to these individuals includes but is not limited to:

- An email sent in March 2022 and a corresponding postcard sent in May 2022 that reminded customers to keep their contact information up to date with PG&E.

- An MBL Acquisition direct mail and email campaign that began in April 2022 encouraging customers who may be eligible for the program to apply.

- An Annual Awareness Letter to MBL Tenants sent in May 2022 that provided resources to help customers prepare for wildfire season and potential outages.

- A Customer Email promoting available emergency planning resources through PG&E partnerships with the CA Network of 211s and the California Foundation for Independent Living Centers (CFILC) Disability Disaster Access and Resource Program was sent in June that provided MBL and AFN individuals with additional resources to help them prepare for an outage event.

In addition to direct customer outreach and support, PG&E also worked to communicate with and educate key stakeholders about EPSS.

- Hosted and participated in more than 110 local government forums with counties and cities to educate them about wildfire safety and local issues, including EPSS.

- Collaborated with tribal partners to share targeted outreach, including specific invitations to the AFN webinars.

- Conducted regular and ad-hoc meetings with tribes to discuss EPSS and support resources available for customers.

- For 2022, PG&E is anticipating approximately 350 million impressions on broadcast, digital and social media spots. As of June 30, 2022, PG&E is sharing information about EPSS on social media, including seven EPSS-focused posts on Twitter, three posts on Instagram, two posts on Nextdoor and four posts on Facebook.

- PG&E is regularly maintaining an EPSS-specific webpage on the pge.com website that includes educational information and support resources such as links to programs, digital versions of Outage Preparedness Guides and county-level maps that outline the areas protected by EPSS.

- PG&E is providing media with EPSS-focused news releases.

- PG&E published two EPSS-educational videos to inform the public and help mitigate the impact of power outages on customers protected by EPSS. These videos have nearly 2,000 views on YouTube to date.

- PG&E is conducting outreach to critical facilities and large commercial customers to raise awareness and educate these customers about EPSS.

PG&E will continue to use community engagement, local media, social media, and paid advertising to raise awareness and educate our customers and external partners about EPSS and available resources. Direct outreach to customers through email and direct mail will also continue throughout the year.

Remedy #5

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).*

Response to Critical Issue RN-PG&E-22-12 Remedy #5

PG&E's restoration response and resource staffing plan involves a multifaceted approach to identify and allocate resources to support patrol and restoration activities in 2022. This approach is based on existing practices in place within local divisions to support escalated outage response activity and is enhanced by the EPSS program's daily monitoring of patrol and restoration performance against established metrics. The EPSS program also developed additional strategies to support resource planning and augmentation for response to EPSS outages. These additional strategies include an update to its Storm Outage Prediction Project (SOPP) model, staging of helicopter assets throughout its service territory, a plan to surge when necessary, using inspection personnel, both internal and contractors, and when high volumes of customers are out for extended duration, shifting our local teams from planned work to outage response. PG&E's restoration response and resource staffing plan is detailed below:

a. **Standard Outage Response Protocols and Resource Escalation** – PG&E's standard protocols for outage response include dispatch of trouble personnel resources from within the division where the outage has occurred. When local trouble personnel resources are exhausted, division leadership in coordination with the local control center dispatch will assign local crew resources to support the patrol and restoration of the outage. If outage activity increases or durations are extended, the division will look to general construction crews or neighboring divisions within the Region to draw on available resources.

In order to monitor performance of field personnel response to and restoration of outages on EPSS-enabled circuits, the EPSS program has established a CAIDI metric to restore all outages on EPSS enabled circuits within 240 minutes or less. As of June 23, 2022, the program's YTD EPSS Program CAIDI has remained below 200 minutes. As the target is exceeded, the Project management Office (PMO), in partnership with its Field Operations partners identifies divisions and circuits where the CAIDI target is exceeded and determine the key drivers for the exceeded targets. If the target miss was due to resource shortfalls, and outage trends indicate the likelihood of the targets continuing to be missed, adjustments can be made around altering existing non-emergency workplans to allow additional resource capacity to support EPSS outage responses.

b. **Storm Outage Prediction Project (SOPP Model) –** A key resource to support local divisions in planning for daily resource requirements for anticipated outage activity is the Distribution System Operations SOPP. SOPP is a modeling system (a collection of models) that is used to predict the number of transformer level and above sustained outages per division for each of the next four days. The model combines wind, snow, and heat models into a single modeling system. The resource needs (crew and trouble personnel resources) are derived from the predicted Storm Outage (SO) numbers. For fair weather days, a historical background estimator has been developed to estimate the number of SOs.

For the 2022 EPSS program, the PG&E Meteorology team has incorporated actual 2022 EPSS outage data into the model to adjust the historic background data. This will allow division leadership to have visibility into a four-day period the estimated number of SOs, including those that may be associated with EPSS enabled circuits and therefore allow for better planning of the resources needed in response to an EPSS related outage.

c. **Rapid Response Patrol Helicopters** – Through our PSPS program, PG&E conducted an analysis of the resource requirements to conduct patrols on circuits within the HFRA. The EPSS program used this analysis to identify the aerial resource requirements necessary to augment ground patrols during the patrol and restoration of outages on EPSS-enabled circuits. The EPSS program's Rapid Response Helicopter patrol strategy augments field resources and allows for aerial patrols to take place in locations that are geographically challenged or unsafe to patrol by ground. This Rapid Response Helicopter plan provides for 16 helicopters to be staged in nine locations throughout the service territory. These helicopter resources can be operational, patrolling a zone, within 50 minutes or less from dispatch.

d. **Surge Personnel** – When the EPSS Program, in partnership with their field operations partners, identifies resource shortfalls to support patrol and restoration activities, PG&E's surge plan is to supplement field resources with system inspection staff. While internal resources are redirected to support EPSS operations, System Inspections would look to contract resources to maintain normal inspection operations. The program will evaluate in-season requirements and work with the System Inspection program if additional resources are required to support the program.

Remedy #6

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.*

Response to Critical Issue RN-PG&E-22-12 Remedy #6

PG&E has performed and will continue to perform benchmarking activities with other utilities on the topic of protective sensitive device settings. PG&E leads a monthly benchmarking meeting with California utilities including San Diego Gas & Electric Company (SDG&E), Southern California Edison Company (SCE), and NV Energy on the topic of utility wildfire risk reduction and system protection practices. This reoccurring meeting is an established forum where each utility shares the latest research, observations, and best practices with respect to the subject of wildfire risk reduction and system protection practices.

In April 2022, PG&E hosted a deep dive session and testing demonstration at our Applied Technology Services (ATS) with SCE and SDG&E to discuss sensitive relay / fast acting fuses / EPSS approaches that each IOU is taking, including continued opportunities to identify and share best practices. In addition to these re-occurring monthly meetings, PG&E has hosted several one-on-one virtual meetings with representative subject matter experts from utilities outside of California including PacifiCorp, Avista, and BC Hydro. The three California investor-owned utilities (SDG&E, SCE and PG&E) have recently completed a comprehensive benchmarking report[44] that documents their respective Fast Trip schemes and relay technologies in addition to those of PacificCorp Avista, and BC Hydro.

PG&E's benchmarking plan for EPSS includes the following periodic schedule:

- Continuation of the California utility benchmarking virtual meeting (Monthly)

[44] *See* Attachments 2022-07-11_PGE_22-12_RNR_R2_Atch03_Redacted or 2022-07-11_PGE_22-12_RNR_R2_Atch03CONF and 2022-07-11_PGE_22-12_RNR_R2_Atch04

- Full day deep dive benchmark and result sharing discussion with SDG&E and SCE (Biannual)
- Discussions with utilities outside of California as developments occur (Ad-hoc)
- Participation in industry working groups and conferences on the topic of protective relaying and wildfire risk mitigation (Ad-hoc)

Proposed standing agenda topics to be included:

- EPSS (Fast Trip) protection settings application, methodology, and practices
- EPSS event investigation findings, summaries, and effectiveness
- High impedance fault detection strategies and methods
- Rapid Earth Fault Current Limiter (REFCL) project updates
- Fault anticipation, line sensor, and downed conductor detection schemes and algorithms.

From participation in benchmarking meetings and discussions to-date, PG&E has validated several approaches developed to mitigate wildfire risk with EPSS. PG&E believes we have implemented one of the most comprehensive EPSS strategies. We have included Avista's[45] published article on their approach which we have also used for benchmarking[46] and validation. It is critical to note that each utility has its own unique risk profile as well as unique electrical circuit configuration which requires nuanced and operational specific approaches.

Remedy #7

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*

[45] *See* Attachment 2022-07-11_PGE_22-12_RNR_R2_Atch02

[46] *See* Attachments 2022-07-11_PGE_22-12_RNR_R2_Atch03_Redacted or 2022-07-11_PGE_22-12_RNR_R2_Atch03CONF and 2022-07-11_PGE_22-12_RNR_R2_Atch04

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

Response to Critical Issue RN-PG&E-22-12 Remedy #7

PG&E will submit a monthly report to Energy Safety beginning with the submission of our Revision Notice Response to RN-PG&E-22-12 and monthly thereafter through 2022. The first monthly report is included as Attachment 2022-07-11_PGE_22-12_RNR_R2_Atch05. In this report, PG&E is including information previously requested by the CPUC's Safety Enforcement Division (SED) in addition to the information requested by Energy Safety. We will submit the combined report to SED and Energy Safety in July and monthly thereafter.

The data requested can be found in the Attachment 2022-07-11_PGE_22-12_RNR_R2_Atch05 as explained in Table RN-PG&E-22-12-06 below.

Table RN-PG&E-22-12-06:
Location of Information Requested in PGE-22-12, Remedy #7

	Description	Location in Attachment and Notes
a	Circuit Protection Zones (CPZ) where EPSS is deployed (with ID)	Tab "CPZs"
b	The number of times EPSS resulted in a trip on each CPZ	Tab "Outages 060122_063022" in Column D (CPZ)
c	The number of customers that experienced an outage for each event	Tab "Outages 060122_063022" in Column L (CESO)
d	The restoration time for each outage	Tab "Outages 060122_063022" in Column I (Restoration Time)
e	The cause of the fault for each outage	Tab "Outages 060122_063022" in Column E (Cause)

	Description	Location in Attachment and Notes
f	The number of ignitions that occurred on lines enabled with EPSS	Tab "EPSS Ignition Data"
g	The number of ignitions that resulted in a wildfire greater in size than 10 acres	Tab "EPSS Ignition Data"[47]
h	The amount of time it took for PG&E to identify (and suppress if applicable) the ignition	Tab "EPSS Ignition Data" For each ignition associated with an EPSS zone in HFTD, PG&E will report the response time to the associated outage or call to respond by an external party and the time frame that additional de-energization actions were taken if the source of ignition was not already de-energized by equipment automatically de-energizing the line. Suppression of fires is the responsibility of the applicable Agency Having Jurisdiction.
i	Any changes made to EPSS over the month and explanation of why those changes were made	In response to observed evolution of wildfire risk throughout California and our service area, on June 6, 2022, our Wildfire Risk Governance Steering Committee approved EPSS enablement criteria changes that default to EPSS enablement unless specific disable criteria are met in R1 Fire Potential Index (FPI) and damp or calm conditions. EPSS can only be disabled when the FPI is R1 (low) and WS <19mph or RH>75% or DFM>9%. Furthermore, PG&E updated its EPSS forecasting methodology to a multi-model method that captures multiple weather model runs over multiple days to account for inherent variability in weather modeling.
j	Estimated ignition reductions resulting from EPSS including methodology for arriving at this estimate	The CPUC-reportable ignition reduction as a result of EPSS year to date in 2022 is provided in Table RN-PG&E-22-12-02 above. To determine EPSS ignition reductions, PG&E calculates ignition reduction from EPSS based on the following: CPUC Reportable Facility Ignitions (RFI) on primary conductor in HFTD areas on an EPSS enabled zone as compared to the annual average of ignitions during the 2018-20 time period.

In addition to the information identified above, Attachment 2022-07-11_PGE_22-12_RNR_R2_Atch05 includes the following information that has been requested by SED in the monthly EPSS reports:

[47] PG&E interprets 7(g) to reference EPSS ignitions referenced in 7(f).

- Total number of times a circuit has experienced an EPSS event
- Trends of scope and duration of outages on repeatedly impacted circuits (see tab “EPSS Outage Trends - CESO” and Tab “EPSS Outage Trends – Duration”)
- The number of customers impacted by each outage, specifically:
    - Number of medical baseline customers impacted
    - Number of customers who rely on electricity to maintain necessary life functions impacted
    - Number of well water customers impacted
    - Number of schools impacted
    - Number of hospitals impacted