PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans Discovery 2023
Data Response

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DRU Index #:		Requester:	Tom Long

SUBJECT: SYSTEM HARDENING/GENERAL

QUESTION 002

Comparing the wildfire mitigation work proposed in PG&E's WMP with the wildfire mitigation work proposed in PG&E's test year 2023 GRC (A.21-06-021):

a. Please describe any differences in wildfire mitigation programs proposed or volume of wildfire mitigation work proposed between the WMP and GRC for the years 2023-2025; and

b. For any differences (as described in subpart "a"), please provide a table that shows, on a program by program basis, the WMP proposal, the GRC proposal, and a description of the difference(s) between the two, including without limitation differences in volume or units of work. The table should include any wildfire mitigation programs that are proposed in one of the proceedings but not in the other.

ANSWER 002

The table below lists the wildfire mitigation programs proposed in the WMP and the GRC for the years 2023-2025 and describes differences between the two. The information provided below consists of summaries of longer discussions provided in either the WMP or the GRC.

The population of wildfire mitigation programs includes:

- The WMP Comprehensive Monitoring and Data Collection Mitigations (2023-2025 WMP, R1, pages 265-268);
- The WMP Operational Mitigations (2023-2025 WMP, R1, pages 268 -271);
- The WMP System Resilience Mitigations (2023-2025 WMP, R1, pages 271 - 274); and
- Wildfire mitigations included in PG&E's Test Year (TY) 2023 GRC but not included in the 2023-2025 WMP.

The information in the table demonstrates that PG&E's wildfire mitigation plans continue to evolve from the time we first filed our TY2023 GRC (June 30, 2021) to when we

submitted our 2023-2025 WMP.[1] Most of the mitigation programs forecast in the TY 2023 GRC are also included in the 2023-2025 WMP. The table shows that there are some differences in the volume of work between the GRC and the WMP.

From late 2020 (when PG&E developed our GRC forecasts) through early 2023 (when PG&E filed our WMP), PG&E continued to revise our wildfire mitigation strategy by phasing out programs such as Enhanced Vegetation Management (VM) and replacing it with new VM programs that are designed to target vegetation risk more efficiently in the highest risk areas of the High Fire Threat District/High Fire Risk Area (HFTD/HFRA).

Additionally, PG&E refined the scopes of work for other mitigations, as information from risk models were updated and/or we learned more about the interactions of combined mitigation strategies. For example, in the GRC, PG&E noted that we planned to install 100 remote operated SCADA sectionalizing devices each year between 2023 and 2026, but that plans could change pending results of our assessment to address the risks of Motor Switch Operator (MSO) and integration with other enhanced automation and wildfire mitigation efforts.

[1] PG&E submitted its WMP on March 27, 2023, and submitted a revision on April 6, 2023 (R1).

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
Comprehensive Monitoring and Data Collection Mitigations			
Detailed Asset Inspections Transmission – Ground	Transmission mitigations are not included in the GRC.	Complete detailed ground inspections on 27,000 transmission structures in PG&E's asset registry in 2023, 20,000 structures in 2024, and 22,000 structures in 2025.	Transmission mitigations are not included in the GRC.
Detailed Asset Inspections – Distribution	Distribution overhead assets in HFTD and HFRA are inspected in accordance with the Electric Distribution Preventive Maintenance (EDPM) Manual. PG&E's methods of inspection include detailed ground inspections, ground patrols, IR inspections, intrusive pole inspections, and Light Detection and Ranging (LiDAR) assessments.	Complete detailed ground inspections on 234,648 poles in 2023, 233,501 poles in 2024, and 244,000 in 2025.	PG&E planned to use the following risk informed inspection cycle in 2023-2026: • HFTD Tier 3 and Zone 1 – 1/3 (33 percent) annually – complete cycle every three years; • HFTD Tier 2 – 1/4 (25 percent) annually – complete cycle every four years; and • Non-HFTD – 1/5 (20 percent) annually – complete cycle every five years.
Intrusive Pole Inspections – Distribution	Intrusive pole inspections, also called Pole Test and Treat, are a way to evaluate in-service wood poles and are conducted on an approximate 10-year cycle for early detection of deterioration.	PG&E currently intrusively inspects wood poles on an approximate 10-year cycle, inspecting roughly 10 percent of the population annually. PG&E is prioritizing intrusive inspection of wood poles based on the time since the previous intrusive inspection.	PG&E proposed to intrusively inspect and re-treat approximately 10 percent of its pole population annually to ensure the program remains on a 10-year inspection cycle.

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Aerial Inspections – Distribution	PG&E plans on conducting Pole Top Drone Inspections and will capture photos of the PG&E structures covering mainly the top 1/3 of the structure. This type of aerial inspection will be focused on eliminating ignition risk from PG&E structures by conducting inspections more quickly.	In 2023, PG&E will prioritize the new aerial inspections where an ignition would potentially have the greatest consequences which include Extreme, Severe, and High consequence plat maps. The program will attempt an aerial inspection for all the Extreme and Severe plat maps and half of the High consequence plat maps as well, inspecting up to 38,500 structures. Based on 2023 results and learnings, PG&E will develop a more detailed aerial inspections plan for 2024 and 2025 that will incorporate lessons learned from conducting inspections at scale in 2023.	This is a new program in the WMP and was not included in the GRC.
Vegetation Management Inspections – Routine Transmission	PG&E's transmission VM program consists of several different methods for inspecting vegetation in proximity to transmission lines.	PG&E will develop a process of centralizing constraints resolution, continue inspections in the HFTD/HFRA, and enhance and refine Focus Tree Inspection Areas of Concern.	Transmission mitigations are not included in the GRC.
LiDAR Routine Inspections – Transmission	This program includes LiDAR inspection, visual verification of findings, and mitigation of vegetation encroachments on approximately 6,800 miles of transmission lines designated by NERC as critical and approximately 11,400 miles of transmission lines not designated as critical by NERC.	Collect LiDAR data of the Transmission System (17,500 circuit miles) including both HFTD / HFRA and non-HTFD, each year, 2023-2025.	Transmission mitigations are not included in the GRC.

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
VM Inspections – Transmission Tree Mortality, Second Patrol	PG&E conducts a Second Patrol aerial LiDAR inspection in the HFTD areas of the system at the height of the vegetation growing season which coincides with the beginning of what is historically the most active part of the California fire season. This patrol allows PG&E to conduct a supplemental assessment of potential tree growth following seasonal rain to reduce the potential of ignitions.	PG&E does not have a specific target or objective associated with this program.	Transmission mitigations are not included in the GRC.
VM Inspections – Routine Distribution	PG&E's Routine Regulatory Compliance work is based on an annual patrol of all PG&E distribution lines to support compliance with the CPUC's GO 95 Rule 35, and California Public Resources Code Sections 4292 and 4293.	PG&E will meet our regulatory compliance obligations. Additionally, PG&E will develop a process of centralizing constraints resolution and evaluate emerging technologies related to VM inspections.	PG&E annually inspects trees along approximately 81,000 miles of distribution lines.
VM Inspections – Distribution Second Patrols	In accord with regulatory requirements and/or PG&E procedures, the VM Second Patrol program performs scheduled patrols approximately six months before or after the routine patrol on overhead primary and secondary distribution facilities.	PG&E will meet our regulatory compliance obligations.	PG&E will meet our regulatory compliance obligations.
VM Defensible Space Inspections – Substation	PG&E assesses the area around Electric Substations in HFTD and HFRA areas to identify potential flammable fuels and vegetation for removal to minimize the potential for	Complete defensible space inspections at 131 distribution substations and at 61 Hydroelectric	PG&E's GRC forecast includes costs for substation vegetation management, but the forecast is not

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	ignition spread outside of facilities and to provide improved structure defense capability for firefighting purposes by ensuring there is a safe distance between vegetation and critical infrastructure.	Generation Substations and Powerhouses.	limited to VM substation defensible space inspections.
Weather Stations	PG&E's weather stations are used year-round to monitor temperatures, wind speeds, wind gusts and relative humidity and are exceptionally crucial during PSPS events.	PG&E will continue to use weather station data to inform PSPS decision-making and to verify weather model forecast performance. We will continue to make our weather station data available to the public and the meteorological community.	From 2023-2026, PG&E planned to continue to install additional weather stations as needed to fill in data gaps and better support PSPS operations. PG&E also planned to optimize the placement of some existing weather stations by moving them to more ideal and windier locations on circuits if possible.
Wildfire Cameras	PG&E sponsored over 600 wildfire cameras on the Alert California network since 2019. Camera detections also provides valuable information about the presence of new fires and the spread of existing fires.	PG&E is not currently evaluating adding new environmental monitoring systems or new networks to our existing operational capabilities. PG&E is evaluating the use of Wildfire Camera with Artificial Intelligence (AI) along with CAL FIRE, California Governor's Office of Emergency Services (Cal OES) and other agencies.	Between 2023-2026, forecasts are intended to cover replacement installations and operations and maintenance costs and will continue to provide and install the cameras; maintain and operate the cameras; and support and manage the program and software applications, as well as a Data Center with redundancy.
Fire Detection and Alerting Systems	Early fire detection systems, including satellite IR imaging, high-definition video, and land-based IR cameras, are located throughout the entire PG&E service territory including identified HFTD areas.	PG&E has currently deployed satellite detection and alerts from six satellites that are updated every 5 minutes and over 600 cameras covering 90 percent of the HFTD. Given this robust coverage, we are not currently evaluating adding new environmental monitoring systems	PG&E installed cameras that will provide 90 percent coverage of Tier 2 and Tier 3 of the HFTD. GRC forecasts were intended to cover replacement installations and operations and maintenance costs.

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
		or new networks to our existing operational capabilities.	
Distribution Fault Anticipation (DFA)	Event Classification Through Current and Voltage Monitoring Sensors (ECCVM) (also called Distribution Fault Anticipation) are substation-based devices measuring volts, amps, and arcing conditions. They provide detection and assistance in locating faults, abnormal power flow events, and categorization of events.	Develop scalable processes to: (a) analyze alarms and alerts from Early Fault Detection (EFD) and DFA sensors; (b) conduct field investigation and reporting; (c) track identified mitigations to completion; and (d) track effectiveness of issue identification and remediation using EFD/DFA technologies.	PG&E proposed to install additional ECCVM Sensors on 116 circuits annually from year 2023-2026 (464 circuits total).
Early Fault Detection Installations (EFD)	Radio Frequency (RF) sensors are sophisticated technology that listens for the RF signal that is generated by partial discharge arcing on alternating current (AC) circuits and uses precision time measurement of events to locate the source along the conductors. Early Fault Detection is the product name.	Develop scalable processes to: (a) analyze alarms and alerts from Early Fault Detection (EFD) and DFA sensors; (b) conduct field investigation and reporting; (c) track identified mitigations to completion; and (d) track effectiveness of issue identification and remediation using EFD/DFA technologies.	PG&E's proposed to install RF Sensors on an additional 65 circuits total in 2023-2026.
Line Sensor Installations	Line sensors are single phase, conductor mounted devices that continuously monitor electric lines to capture various disturbances, such as overcurrent events. They provide detection and assistance in locating faults.	Install Line Sensor devices on 40 circuits each year.	PG&E forecasted installing line sensors on approximately 50 circuits each year.
Operational Mitigations			
Temporary Distribution Microgrids	PG&E's temporary distribution microgrids are designed to reduce	No additional temporary distribution microgrid pre-installed	PG&E did not forecast costs for constructing new temporary

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	the number of customers impacted by PSPS events and support community resilience by powering a cluster of shared resources so that those resources can continue serving surrounding residents during PSPS events.	interconnection hubs (PIH) will be built in 2023. The program will close after improvement projects on existing sites are completed.	distribution microgrids for 2023-2026.
Community Microgrid Enablement Program (CMEP) and Microgrid Incentive Program (MIP)	CMEP and MIP are programs that support and provide incentives for the development of community-led multi-party microgrids.	CMEP and MIP are new programs in the WMP and were not included in the GRC.	N/A
Downed Conductor Detection	High impedance faults are conditions where line-to-ground faults (i.e., downed conductor) do not draw a large enough fault current (a function of contact resistance to ground) that a protective device can reliably sense and trip the circuit offline. These situations can create a potential ignition source.	Make capable for DCD 1,150 protective device controllers or relays. This count includes protection devices that due to repair status cannot receive the DCD settings, and circuit reconfiguration resulting in descoping of device.	PG&E did not forecast DCD work from 2023-2025 in the GRC.
Equipment Maintenance and Repair	PG&E performs maintenance and repair activities on our equipment to ensure that the equipment is properly installed and maintained to prevent operational failures and reduce system risk, including ignition risk.	PG&E did not set specific targets or objectives for this program.	PG&E's forecast included expense and capital costs related to the repair and replace work needed to address overhead maintenance conditions identified by PG&E's patrol and inspection process.
Enhanced Powerline Safety Settings (EPSS)	Enabling EPSS distribution and transmission line protection devices reduces the time it takes for line protective devices such as circuit	In 2022 PG&E expanded the scope of EPSS to all HFRAs in our service territory and select adjacent EPSS buffer areas. The WMP EPSS	PG&E proposed to expand the EPSS program to all circuits within both HFTD and HFRA areas and

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	breakers and line reclosers (LR) to de-energize a powerline when a fault occurs.	objective is to provide an updated EPSS reliability impact study each year.	some circuits within non-HFTD buffer zones.
Partial Voltage Force Out	The GRC did describe PG&E's Partial Voltage Detection program where Single-Phase and Three-phase SmartMeters™ send real-time alarms indicating partial voltage conditions to the Distribution Management System. Detection of partial voltage conditions allows Control Center Operators to dispatch field personnel to locations where equipment may be in a condition that increases wildfire risk. The scope of work in the GRC included only the program's operations and maintenance.	The Partial Voltage Force Out process leverages the SmartMeter™ network to help identify and respond to High Impendence faults. When a partial voltage (PV) alarm indicates low SmartMeter™ voltage on two or more SmartMeter™ devices at the fuse level, the Distribution Control Center Operator will force out the next upstream automatic protection device and dispatch response teams to the area of the alarm.	Partial Voltage Forecast Out is a new program in the WMP and was not included in the GRC.
Safety and Infrastructure Protection Team (SIPT)	SIPT crews perform high priority fire mitigation work, protect PG&E assets, and gather critical data to help prepare for and manage wildfire risk. SIPT crews perform both routine and emergency work.	The WMP does not include a forecast number of SIPT crews. The SIPT program supports resources performing work in the HFRA. They provide standby resources for PG&E crews performing work in high fire hazard areas, pre-treatment of PG&E assets during any ongoing fire, fire protection to PG&E assets, and emergency medical services.	PG&E's GRC forecast was based on staffing approximately 40 SIPT crews year-round, focusing on Tier 2 and Tier 3 HFTD areas. PG&E planned to add five additional engines and corresponding crews during the GRC period.
Pole Clearing Program	PG&E performs removal of vegetation around select transmission and distribution poles and towers, in accordance with PRC	Inspect, clear, and maintain, where clearing is necessary, 77,503 poles in 2023. 2024 and 2025 pole counts	PG&E did not identify a specific volume of pole clearing work but will

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	Section 4292, to maintain a firebreak of at least 10 feet in radius (out from the pole) and 8 feet up from the ground. These requirements apply in the state responsibility area during designated fire season.	will be adjusted by the ending pole population in the previous year.	comply with regulatory requirements set forth in PRC Section 4292.
Utility Defensible Space	UDS is a fuel reduction program to reduce vegetative fuels under and adjacent to power lines located within Tier 2 and Tier 3 HFTD areas. UDS expands vegetation clearance around certain poles to extend the firebreak.	PG&E did not propose a specific target or objective for UDS. UDS is based on a risk informed prioritization and has a more limited scope.	PG&E forecasts UDS on a cost basis and did not provide a volume of work. PG&E proposed a reduced scope of work for UDS compared to historic spending due to a lower volume of work as EPSS was implemented.
Wood Management	Utility work on vegetation creates debris and wood products which, if left unmanaged, can become fuel for wildfire. PG&E is required to reduce or adjust live fuels as they are generated from programs developed.	PG&E will conduct wood management activities to comply with PRC 4293, General Order 95 Rule 35, and Pub. Util. Code 8386.	PG&E will conduct wood management activities to comply with PRC 4293, General Order 95 Rule 35, and Pub. Util. Code 8386. PG&E forecasts program costs for wood management and did not provide a volume of work.
Vegetation Management (VM) for Operational Mitigations	This program is intended to help reduce outages and potential ignitions using a risk informed targeted plan to mitigate potential vegetation contacts based on historic vegetation caused outages on EPSS-enabled circuits.	PG&E did not propose specific targets or objectives for this program. If at any point PG&E determines this program does not effectively support efforts to reduce customer impacts due to Vegetation Outages on EPSS when compared to other viable approaches, PG&E will pause or discontinue the program.	This is a new mitigation in the WMP and was not proposed in the TY2023 GRC.

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
Focused Tree Inspections	PG&E is developing areas of concern (AOC) to better focus VM efforts to address higher risk areas that have experienced higher volumes of vegetation damage during PSPS events, outages and/or ignitions.	Identify the AOC and initiate a pilot program in at least one AOC.	This is a new mitigation in the WMP and was not proposed in the TY2023 GRC.
Transmission Integrated VM	Integrated VM for transmission promotes desirable, stable, low-growing plant communities that resist invasion by tall growing tree and brush species, using appropriate, environmentally sound, and cost-effective control methods.	IVM focuses on established Transmission-ROW corridors. Threshold triggers for implementing this procedure include incompatible vegetation exceeding 3 ft. in height and/or when incompatible vegetation is greater than 50 percent ground coverage within the ROW.	Transmission mitigations are not included in the GRC.
Emergency Response VM	All trees identified for work by pre-inspectors are evaluated for the priority of the required tree work. If vegetation is determined to be an immediate risk to PG&E facilities, described as a Priority 1 Condition in the VM Priority Tag Procedure, the condition will be mitigated within 24 hours of identification as long as conditions are safe for the tree crew to proceed with work.	PG&E does not identify specific targets or objectives for this program. PG&E will conduct Emergency Response VM as required.	Emergency Response VM is not specifically identified in PG&E's 2023 TY GRC but is considered part of PG&E's VM standard procedure.
Community Engagement	PG&E hosts safety-focused community engagement events, including regional town halls and community webinars to engage directly with customers. PG&E uses these events to convey local wildfire	PG&E will hold community engagement meetings within the five PG&E regions of service that will include, but are not limited to, a mix	PG&E's Customer Care GRC forecast includes costs for general awareness efforts and direct outreach to inform customers about

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	safety information in advance of wildfire season and events focusing on the impacts that wildfire safety efforts have on the community.	of webinars, open houses, town halls, and/or answer centers.	PSPS planning and wildfire safety initiatives.
PSPS Event	A PSPS event consists of the activities associated with the proactive de-energization of PG&E's electric transmission and/or distribution lines due to weather-related imminent threats to power line assets and increased risk of catastrophic wildfire.	The WMP does not include a forecast number of events per year. PSPS objectives are based on enhancements to PSPS guidance. WMP PSPS targets include reducing PSPS impacts by approximately 15,000 customer events (2023), 33,000 customer events (2024), and 55,000 customer events (2025) and providing portable batteries to 4,000 PG&E customers each year.	PG&E's GRC cost forecast is based on three events plus one additional borderline event per year.
System Resilience Mitigations			
Covered Conductor Installation – Distribution	Covered conductor installation, also referred to as Overhead System Hardening, involves the replacement of bare overhead primary (high voltage) conductor and associated framing with conductor insulated with abrasion-resistant polyethylene coatings (sometimes referred to as covered conductor or tree wire).	PG&E estimates it will install 235 miles of overhead covered conductor from 2023-2025. The estimated number of covered conductor miles are a subset of the system hardening target.	PG&E estimated it would install 270 miles of overhead covered conductor from 2023-2025.
10K Undergrounding	Undergrounding consists of relocating existing high risk overhead distribution lines underground. Undergrounding effectively eliminates the ignition risk	PG&E estimates it will underground a total of 1,350 miles, including 175 miles from the Butte County Rebuild, from 2023-2025.	PG&E estimated it would underground 1,250 distribution miles in its 10k undergrounding program and 100 miles in its Butte County

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	for overhead lines that have been placed underground.		Rebuild program from 2023-2025, a total of 1,350 miles.
Distribution Pole Replacements and Reinforcements	Distribution poles are inspected and evaluated to determine whether their condition allows them to support pole mounted equipment and safely keep energized conductors in the air.	Starting in 2023, will bundle distribution pole replacements with non-pole maintenance tags to gain efficiencies and minimize customer impacts. The goal of bundling is to perform all the corrective maintenance (pole and non-pole) on the line segment under one clearance.	PG&E's forecast included costs to replace 15,813 poles in 2023, 16,376 poles in 2024, and 15,936 poles in 2025.
Transmission Pole/Tower Replacements and Reinforcements	Maintenance, repair, life extension, and replacement of transmission structures in HFTD areas are integral means of mitigating risk associated with wildfire.	In 2022, in addition to reinforcement work, over 3,200 structures were replaced (the majority being wood poles replaced with steel). Going forward, similar levels of wood to steel replacement is expected (in the thousands of poles) and is included as part of the larger HFTD/HFRA transmission open tag reduction target.	Transmission mitigations are not included in the GRC.
Transmission Conductor Replacement	There are two levels of projects for transmission conductor hardening: larger projects in the Targeted Line Rebuild program; and smaller projects in the Dispersed Conductor Component (Splice) Hardening and Conductor Segment Replacements.	Remove or replace 43 circuit miles of transmission conductor on lines in 2023 and 5 miles in 2025. Install shunt splice(s) on 67 transmission lines (2023-2025).	Transmission mitigations are not included in the GRC.
Remote Grid	Throughout PG&E's service territory, pockets of isolated small customer loads are currently served via long electric distribution feeders,	PG&E did not include a quantitative target for Standalone Power System (SPS) units installed but recognizes that Remote Grids will continue to	PG&E proposed to scale its Remote Grid program in the GRC forecast time frame (2023-2026) from approximately 20 projects and 26

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	some of which traverse HFTD areas and require significant annual maintenance and vegetation management. The Remote Grid Program will remove these long feeders and serve customers from a Remote Grid.	contribute to the removal of lines within the overall system hardening goals for distribution.	line miles in 2023 to 69 projects and 90 line miles per year by 2026 if the initial projects are successful.
Distribution Protective Devices	Install additional line reclosers and Fuse Savers on the highest impacted protective zones to reduce the EPSS reliability impact.	Install and SCADA commission 75 new SCADA protective devices (Line Recloser, Fuse Saver, or Interrupter).	PG&E did not forecast installing line reclosers from 2023-2025. PG&E forecasted installing approximately 80 FuseSavers per year starting in 2023 in Tier 2 and 3 HFTD areas.
Transmission Line Removal in HFTD	PG&E investigates potentially idle transmission facilities. When these facilities are identified and confirmed to be within an HFTD area with no operational needs, they are prioritized for de-energization, grounding, and/or removal.	Remove or replace 43 circuit miles of transmission conductor on lines in 2023 and 5 miles in 2025.	Transmission mitigations are not included in the GRC.
Distribution Line Removal in HFTD	Distribution line removal is one of PG&E's mitigation alternatives to reduce wildfire risk in Tier 2 and Tier 3 HFTD areas.	PG&E estimates it will remove approximately 60 line miles from 2023-2025. Line removal is not a WMP target.	PG&E did not forecast a specific number of line removal miles in the GRC.
Single Phase Reclosers	A single phase recloser is a flexible, cost-effective, intelligent device which can replace fuses and has the capability to trip all phases (i.e., open and stop power flowing through all two or three phases if just one phase experiences a fault),	As part of the enablement of EPSS and its objective to protect all sections including fused lines with ganged protection using existing devices, installation of FuseSavers now has less direct impact on reducing ignition risk. Previously	PG&E forecasted installing approximately 80 FuseSavers per year starting in 2023 in Tier 2 and 3 HFTD areas.

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	reducing the risk associated with a wire-down event, where the downed wire could remain energized due to a back-feed condition from another phase of the circuit.	identified projects will continue to be built in 2023 and 2024 at which point the activity will be completed.	
Motor Switch Operator (MSO) Replacement	MSO switches were initially installed on PG&E's distribution system in mid-2019 as sectionalizing devices with the ability to reduce the scope of PSPS events. PG&E crews identified a risk that some MSO switches were reported to exhibit an arc flash during operation and PG&E halted further installations of MSO switches in late 2019. PG&E is replacing the MSO switches with reclosers, subsurface equipment, and other vacuum switch equipment that is approved for current usage in HFTD.	Replace or remove the MSOs from the 47 identified, as of January 26, 2023.	PG&E planned to install 100 remote operated SCADA sectionalizing devices each year between 2023 and 2026 but noted that plans could change pending results of its assessment to address the risks of MSOs and integration with other enhanced automation and wildfire mitigation efforts.
Surge Arrester – Removals	The Non-Exempt Surge Arrester Replacement program replaces non-exempt surge arresters with exempt surge arresters and corrects abnormal grounding issues where necessary.	Remove 663 non-exempt surge arrestors in 2023 where known grounding issues exist. PG&E did not set a target for surge arrestor removal in 2024 or 2025.	PG&E's goal was to replace the remaining approximately 21,000 HFTD surge arrestors in 2021 and complete units in the non-HFTD areas from 2023-2026.
Expulsion Fuse – Removal	The Expulsion Fuse Replacement Program replaces non-exempt fuses with exempt fuses in HFTD and HFRA regions. Exempt fuses are designed to reduce the potential for	Remove non-exempt expulsion fuses/ cutouts from 7,400 fuse locations identified on distribution poles.	Replace approximately 3,600 expulsion fuses (1,200 per year). System hardening and other programs are forecast to replace between 3,000 and 4,000 units as

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	release of electrical arcs, sparks, or hot material during operation.		part of the scope of their rebuild efforts.
Other Grid Topology Improvements to Mitigate PSPS – Distribution	Installing remotely operable SCADA sectionalizing devices and manually operated sectionalizing devices on the distribution system supports PG&E's ability to segment the distribution circuits close to designated meteorology shut-off polygons to reduce the customer impact and the scope of PSPS events.	Most of the highest impact locations have already been sectionalized with automated equipment, so there is reduced benefit (in terms of number of customers likely to benefit from such devices during PSPS events) when compared to work performed in previous years. PG&E will install and SCADA commission 75 new SCADA protective devices (Line Recloser, Fuse Saver, or Interrupter) in 2023.	PG&E planned to install 100 remote operated SCADA sectionalizing devices each year between 2023 and 2026 but noted that these plans could change pending results and integration with other enhanced automation and wildfire mitigation efforts.
Avian Protection	PG&E has an Avian Protection Plan that is designed to protect the avian population from contacting electrical components in our service territory. The plan applies to both the transmission and distribution overhead electrical facilities.	PG&E is working to ensure adequate separation between energized components by insulating these components. This can prevent incidental avian contact, which can potentially lead to electrical flashover and wildfire ignition.	PG&E forecast costs for capital modifications made to distribution poles in response to a bird incident and to retrofit poles in raptor concentration zones to mitigate bird-related outages.
Substation Animal Abatement	PG&E employs a substation animal abatement program focused on mitigating animal-related contact events within substations. This program addresses the risk associated with an arc-flash fire or sparking caused by animal contact with energized components that may project or propagate outside of	PG&E will continue to execute small scale animal abatement as identified through the corrective notification process. Additionally, PG&E will continue to monitor animal abatement project triggers at substations to identify and prioritize additional large-scale projects as needed.	The Animal Abatement subprogram continues to implement mitigation measures at substations identified through known animal contacts. PG&E is holding to a steady-state replacement rate for animal abatement mitigations.

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	HFTD/HFRA substations potentially resulting in a wildfire.		
HFTD and HFRA Open Tag Reduction - Transmission	Per PG&E's Transmission LC Notification Strategy Procedure (TD-8123P-101), ignition-related notifications in HFTD and HFRA areas have a higher priority than non-HFTD and non-HFRA, and non-ignition-related notifications.	PG&E will eliminate the known 16,831 HFTD and HFRA transmission Ignition Risk tags in 2023.	Transmission mitigations are not included in the GRC.
HFTD and HFRA Open Tag Reduction – Distribution	PG&E uses a risk-informed prioritization approach to address the highest risk issues on our system. Maintenance tags generated through our inspection programs are assigned a priority based on the potential safety impact.	Reduce 48 percent of the wildfire risk associated with backlog ignition risk tags from 151.1 (risk units as of January 1, 2023) by 72.5 (48%) risk units. (2023). Reduce 68 percent of the wildfire risk associated with backlog* ignition risk tags from 151.1 (risk units as of January 1, 2023) by 102.7 (68%) risk units. (2024) Reduce 77 percent of the wildfire risk associated with backlog* ignition risk tags from 151.1 (risk units as of January 1, 2023) by 116.3 (77%) risk units. (2025)	PG&E's forecast included expense and capital costs related to the repair and replace work needed to address overhead maintenance conditions identified by PG&E's patrol and inspection process.
Open Tag Reduction – Substation	PG&E performs corrective repairs and equipment replacements identified through maintenance and inspections of substations located in HFTD areas. This work is intended to correct deficiencies identified to ensure that substation equipment	The substation tag backlog is currently operating at "steady state." The current backlog of substation ignition risk related tags (found prior to 2022) in HFTD-were resolved by	PG&E's GRC forecast includes costs to operate and maintain our substations.

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	operates as designed and mitigates the risk of failure.	the end of 2022 except for seven tags that will be executed in 2023.	
Tree Removal Inventory	This is a long-term program intended to eventually work down trees that were previously identified through EVM inspections. Under the Tree Removal Inventory Program, PG&E will re-inspect and evaluate the condition of previously identified trees and determine if they should remain in the inspection program or be identified for removal.	Removal of 60,000 trees identified from the legacy EVM program.	This is a new mitigation in the WMP and was not proposed in the TY2023 GRC.
GRC Wildfire Mitigations Not Listed Above			
Rapid Earth Fault Current Limiter (REFCL)	REFCL technology mitigates ignitions from line-to-ground faults such as wire down or tree contacts. High-impedance, line-to-ground faults on distribution circuits are difficult to detect with traditional overcurrent protection and can become an ignition source.	PG&E does not currently plan to install any additional REFCL systems. PG&E will resume staged fault testing of the REFCL installation at the Calistoga substation in 2023 to complete additional pilot evaluation. If this is successful, PG&E will continue to evaluate REFCL, including whether any additional sites are appropriate for future installations.	PG&E forecasts deploying REFCLs at an additional two substations each year, but these plans could change pending pilot results and integration with other enhanced automation and wildfire mitigation efforts.
Enhanced VM	PG&E conducts EVM primarily in Tier 2 and Tier 3 HFTD areas to further mitigate the possibility of wildfire ignitions and/or downed wires due to vegetation conductor contact. This work includes establishing greater conductor to vegetation clearances and clearing	PG&E transitioned away from our Enhanced VM program at the end of 2022 and did not include it in the WMP.	PG&E transitioned away from our Enhanced VM program at the end of 2022. It is included in the GRC through 2022.

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	overhanging vegetation from distribution lines.		
Line Sectionalizing for PSPS	The installation of remote operated SCADA sectionalizing devices on PG&E's distribution system can support its ability to segment the distribution circuits near HFTD boundaries to reduce the impact and scope of PSPS events.	PG&E completed transmission and distribution PSPS line sectionalizing programs. Because there is limited incremental benefit to install additional switches, PG&E is not including these mitigation initiatives in this WMP.	PG&E planned to install 100 remote operated SCADA sectionalizing devices each year between 2023 and 2026 but noted that these plans could change pending results and integration with other enhanced automation and wildfire mitigation efforts.
Distribution, Transmission, and Substation: Fire Action Schemes and Technology (DTS-FAST)	DTSFAST is a system developed internally at PG&E. The system uses fraction of a second technologies to detect objects approaching an energized power line and respond quickly to shut off power before the object impacts the line	In 2022, PG&E filed a non-provisional patent application for DTS-FAST. For 2023, does not have field installation plans but will be working through the patent examination process.	DTSFAST technology is still early in its pilot phases and has not been successfully demonstrated. A longer term DTSFAST deployment plan will be dependent on findings of pilot.
Advance Fire Modeling (AFM)	The AFM is foundational element to the PSPS program and daily mitigation activities that reduce the risk of utility caused ignition. Fuel sampling and fire spread modeling initiatives improve, deploy, and maintain operational models that help PG&E predict the consequence and risk of fires.	PG&E describes our fire modeling activities in Sections 6 and 8.3.4.1 of the WMP.	PG&E's forecast costs to update, operate, and maintain our AFM models.
Wildfire Detection Meteorology Projects	PG&E Meteorology remains committed to advancing our weather forecasting capabilities by working with external numerical weather prediction experts. Weather model	PG&E describe our environmental monitoring systems and technologies and the procedures we use to evaluate and reduce weather	PG&E's forecast costs to conduct various wildfire detection meteorology projects.

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	data is foundational and informs many operational decisions throughout PG&E to prepare for forecasted conditions and mitigate risk, including through PSPS.	related risks within our service areas in Section 8.3.2 of the WMP.	
Emergency Preparedness and Response (EP&R)	PG&E developed one EP&R mitigation consisting of: improving personnel accountability and operations surrounding base camp activities; processes for checking in and out of the Emergency Operations Center; developing secondary emergency roles; and engagement mutual aid.	This program is not included in the WMP.	PG&E's forecast included annual costs to support the EP&R mitigation.
Generation Enablement and Deployment PMO	PG&E established a Generation Enablement and Development organization, whose goal is to procure and deploy temporary generation system wide across the four generation initiatives supporting PSPS mitigation.	This program is not included in the WMP.	PG&E's forecast included annual costs to fund the PMO.
Sensor IQ (SIQ)	The SIQ software works with existing SmartMeter™ devices to capture and store high-resolution, real time, and granular data on load, voltage, and outages to enable predictive maintenance data analytics.	This program is not included in the WMP.	If the SIQ technology proves to be effective in the early detection of wildfire risks, PG&E plans to extend the deployment of the SIQ technology to additional meters.
Community Wildfire Safety Program (CWSP) Program Management Office (PMO)	The CWSP PMO provides the foundational coordination, support, tracking, and governance needed to effectively execute our WMP, and	This program is not included in the WMP.	PG&E's forecast included annual costs to fund the CWSP PMO.

Wildfire Mitigation Program	Mitigation Description	2023-2025 WMP	2023 GRC
	manage the CWSP across multiple functions, internal teams, and work streams.		