Application No.:	A.23-10-001	
Exhibit No.:	SCE-01	
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SOUTHERN CALIFORNIA EDISON®

(U 338-E)

Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management

Before the

Public Utilities Commission of the State of California

Rosemead, California
October 3, 2023

Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management

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I.

INTRODUCTION

A. Summary of Request

Southern California Edison Company (SCE) respectfully requests that the California Public Utilities Commission (CPUC or Commission) authorize SCE to recover incremental 2022 recorded operations and maintenance (O&M) expenses totaling $112.914 million and capital expenditures totaling $135.736 million in SCE's Wildfire Mitigation Plan Memorandum Account (WMPMA) and Fire Risk Mitigation Memorandum Account (FRMMA) associated with wildfire mitigation activities. SCE also requests that the CPUC authorize SCE to recover incremental 2022 O&M expenses totaling $245.168 million recorded in SCE's Vegetation Management Balancing Account (VMBA) associated with vegetation management activities. The Final Decision, (D.)21-08-036, approving Track 1 of SCE's 2021 General Rate Case (GRC) specifically authorized SCE to seek reasonableness review of, and cost recovery for, incurred costs above the authorized amounts for both 2022 wildfire mitigation costs recorded in the WMPMA and the FRMMA,[1] as well as 2022 vegetation management costs recorded in the VMBA.[2] The testimony is organized in the following manner:

- Chapter II: SCE's wildfire mitigation activities.
- Chapter III: SCE's vegetation management activities.
- Chapter IV: SCE's determination of incrementality for 2022 recorded costs.
- Chapter V: SCE's cost recovery ratemaking proposals.
- Chapter VI: SCE's affordability metrics.

Table I-1, below, displays the incremental revenue requirements SCE requests.

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[1] The GRC Track 1 Final Decision separately authorized a scope of work and associated capital expenditures for SCE's Wildfire Covered Conductor Program (WCCP), with SCE having the ability to seek reasonableness review of, and cost recovery for, costs above the authorized scope, as recorded in the Wildfire Risk Mitigation Balancing Account (WRMBA). Because the Commission's authorization for the WCCP was for the 2019 to 2023 cumulative period, SCE is not seeking reasonableness review of the capital expenditures associated with the installation of covered conductor through its WCCP in this Application. *See* D.21-08-036, p. 205.

[2] For 2022 VMBA costs, recovery of costs between 100 percent and 115 percent of the authorized amount may be made by a Tier 2 advice letter. SCE is only required to file an application to demonstrate the reasonableness of recorded costs more than 115 percent of the authorized amount. *See* D.21-08-036, p. 186.

Table I-1
2022 Wildfire Mitigation and Vegetation Management
Summary of Initial Revenue Requirement Request[3] [4]
($ in millions)

Line No.	Item Description	WMPMA	FRMMA	VMBA	Total Rev Req
1	**O&M Expense**	**$ 88.842**	**$ 24.072**	**$ 245.168**	**$ 358.082**
2	Capital Related Revenue Requirement				
3	Depreciation	$ 5.241	$ -	$ -	$ 5.241
4	Income Taxes	$ (3.599)	$ -	$ -	$ (3.599)
5	Property Taxes	$ 0.210	$ -	$ -	$ 0.210
6	Return	$ 6.691	$ -	$ -	$ 6.691
7	**Total Capital Related Revenue Requirement**	**$ 8.544**	**$ -**	**$ -**	**$ 8.544**
8	**Subtotal**	**$ 97.386**	**$ 24.072**	**$ 245.168**	**$ 366.626**
9	Interest	$ 3.803	$ 0.960	$ 10.453	$ 15.217
10	Less: PSPS Disallowance	$ (2.500)	$ -	$ -	$ (2.500)
11	Franchise Fees & Uncollectibles	$ 1.092	$ 0.277	$ 2.827	$ 4.196
12	**Total Revenue Requirement**	**$ 99.781**	**$ 25.309**	**$ 258.448**	**$ 383.538**

B. Background

California's wildfire risk has dramatically increased in recent years, due to climate change, drought, and other factors, such as increased development in wildland-urban borders. The full magnitude of the increased threat, and the significance of its potential consequences, became apparent in 2017, when California experienced five of the most destructive wildfires in its history, up to that point. That trend of increasing wildfire risk generally continued through 2022. As drought conditions intensified across the state, the 2022 wildfire season demonstrated the continued urgency of wildfire prevention, event response, and emergency preparedness. Per CAL FIRE's Incident Archive,[5] 7,477 wildfires impacted California in 2022 and burned 331,360 acres. At the same time, in 2022, SCE necessarily incurred significant wildfire mitigation and vegetation management costs for critical activities designed

[3] The Public Safety Power Shutoff (PSPS) disallowance is discussed in Chapter V.B.4.

[4] The revenue requirement in this summary does not currently include capital expenditures categorized as Construction Work in Progress (CWIP) as of August 2023. *See* Chapter V.C.1.

[5] *See* CAL FIRE's 2022 Fire Season Incident Archive, available at https://www.fire.ca.gov/incidents/2022 (accessed on September 11, 2023).

to preserve customers' and communities' safety and to maintain compliance with various regulatory requirements.

1. Wildfire Mitigation

There is nothing more fundamental to SCE's mission than the safety of the public, SCE's customers, and its employees and contractors. As such, SCE has undertaken, and is continuing, consequential efforts to mitigate the risk of wildfires associated with its equipment. This foundational commitment to protect public safety against wildfires is reflected throughout SCE's 2021 and 2025 GRC showings, SCE's 2021 Wildfire Mitigation and Vegetation Management application (2021 WM/VM), and in this current Application.

In SCE's 2021 GRC and in its approved 2022 Wildfire Mitigation Plan (WMP),[6] SCE outlined the measures it would implement to reduce wildfire risk and PSPS impacts to its customers and communities in High Fire Risk Areas (HFRAs). During 2022, SCE successfully and substantially implemented all these measures, including grid hardening, risk-informed inspections and remediations, vegetation management around power lines, situational awareness, and customer programs to minimize the impacts of PSPS to customers, and partnered with fire agencies for aerial suppression resources. These mitigation measures are detailed in Chapter II.

For 2022, the Commission authorized $102.841 million in wildfire mitigation O&M expenses and $89.559 million in non-WCCP wildfire mitigation capital expenditures and permitted SCE to seek after-the-fact reasonableness review of incurred costs incremental to those authorized amounts.[7] SCE's incremental non-WCCP 2022 wildfire mitigation costs are recorded in either the WMPMA or the FRMMA. In 2022, on a wildfire mitigation activity portfolio basis, SCE expended $89.731 million[8] in O&M expenses and $135.736 million in capital expenditures above 2022 GRC-authorized levels for

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6 The Office of Energy Infrastructure Safety (Energy Safety) approved SCE's 2022 WMP on July 20, 2022.

7 *See* D.21-08-036, p. 251 and Advice 4639-E.

8 The $89.731 million in expended O&M does not include the $2.5 million PSPS disallowance discussed in Chapter V.B.4. The $89.731 million is calculated by summing the $88.842 million recorded in the WMPMA and $0.889 million of the $24.072 million recorded in the FRMMA. The balance of the FRMMA amount is discussed under vegetation management.

wildfire mitigation work.[9] Overall, and as further described in Chapter II for each wildfire mitigation activity, this level of spending was needed to protect public safety, adhere to regulatory requirements and statutes, and comply with SCE's approved WMP commitments.

2. Vegetation Management

The threat posed by California wildfires and the potential for significant consequences necessitated that utilities act with urgency to enhance and expand their traditional vegetation management practices over the past several years. In 2017, the Commission recognized this need in D.17-12-024 [High Fire Threat District (HFTD) Decision]. The HFTD Decision imposed new fire-safety regulations, including increasing the minimum clearance from 18 inches to a minimum of four feet between vegetation and utilities' electric distribution assets and increasing the recommended clearance at the time of trim to 12 feet in high fire areas.[10] The Commission concluded that, although these changes in regulations would result in increased costs, "such costs are offset by the substantial public-safety benefits of keeping bare line conductors clear of vegetation…."[11]

For 2022, the Commission authorized $180.485 million in VMBA-eligible O&M expenses and established a 115 percent reasonableness threshold.[12] SCE's 2022 recorded VMBA costs associated with vegetation management activities consist of Routine Line Clearing; Hazard Tree Programs; Seasonal Patrols, Areas of Concern, and Emergent Work; Structure Brushing; Quality Assurance/Control; Weed Abatement; Remote Sensing; and Environmental Programs supporting Hazard Tree Programs and Structure Brushing. Across this portfolio of activities, SCE incurred $245.168

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[9] The 2021 GRC Track 1 Final Decision authorized the creation of the WRMBA, but only for WCCP capital expenditures; in 2022, SCE undertook other grid hardening work and other wildfire mitigation capital projects that are eligible for recovery via the WMPMA and the FRMMA, upon a finding of reasonableness by the Commission of the incremental spend tracked in those accounts.

[10] The HFTD Decision required compliance with the new clearance requirements in HFTD Tier 3 areas by September 30, 2018 and in Zone 1 and HFTD Tier 2 areas by June 30, 2019.

[11] *See* D.17-12-024, p. 102.

[12] The Commission provided that recorded VMBA costs more than 115 percent of the authorized amount could be recovered after a finding of reasonableness in a subsequent application. *See* D.21-08-036, p. 186 and Advice 4639-E.

million in incremental costs above the 115 percent threshold in the VMBA, largely as the result of increased scope and higher contractor rates. These activities are described in Chapter III.

For 2022, the Commission also authorized approximately $2.264 million in costs related to environmental support of Routine Line Clearing vegetation management, as part of the larger adopted forecast for environmental programs.[13] SCE incurred $23.183 million in incremental O&M expenses for the environmental support of Routine Line Clearing activities above the authorized amount, in part due to deeper tree trims, utilization of an enhanced Environmentally Sensitive Area (ESA) Geographic Information System (GIS) layer to identify work points[14] where environmental support is required, and a significant increase in vegetation management work requiring environmental surveys and field support. These incremental environmental support costs are recorded in the FRMMA, and the testimony supporting them is found in Chapter III, as those costs directly support Routine Line Clearing vegetation management.

C. Incrementality Assessment

In this Application, SCE is seeking to recover costs incurred in 2022 and recorded in the WMPMA, FRMMA, and VMBA for wildfire mitigation and vegetation management activities that are incremental to GRC-authorized amounts, for a total initial revenue requirement of $383.538 million.

As discussed in Chapter IV and consistent with the approach used in A.22-06-003 (i.e., SCE's analogous 2021 WM/VM Application), SCE uses a "portfolio" approach to determine incrementality, separately for wildfire mitigation activities and vegetation management activities. The portfolio approach compares the total recorded costs across all the activities that SCE is permitted to record in the applicable memorandum or balancing accounts to the authorized amount for those activities, combined.

With respect to the *wildfire mitigation* activities, in lieu of calculating incrementality based on each individual activity or sub-activity compared to the 2022 GRC-authorized amounts, SCE compared

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[13] *See* D.21-08-036, pp. 437-438. For Track 1 of SCE's 2021 GRC, the authorized amount for environmental support of Routine Line Clearing is embedded in the $27.683 million authorized for Environmental Services.

[14] A work point is a field in SCE's work management system to geographically plot the location of required vegetation work.

the collective recorded costs of those activities to the 2022 GRC-authorized amount for all the activities combined. This is consistent with Public Utilities Code § 8386.3(d)(1), which provides that an electric utility "shall not divert revenues authorized by the Commission to implement the wildfire mitigation plan to any activities or investments outside of the plan."[15] The costs of the portfolio of wildfire mitigation activities eligible for recovery through the WMPMA and the FRMMA are related to non-WCCP Grid Hardening, Enhanced Operational Practices, Fire Science and Advanced Modeling, Enhanced Situational Awareness, Organizational Support, PSPS, Aerial Suppression, and Wildfire Mitigation Training and Development. Additionally, costs for Technology Solutions related to vegetation management software are recorded to the WMPMA, as those costs relate directly to a vegetation management activity in SCE's 2022 WMP. The ensuing testimony describes the work performed with respect to these activities in Chapter II and Chapter III and examines incrementality, at the portfolio level, in Chapter IV.

The same approach is taken with respect to the VMBA. For *vegetation management*, the costs of the portfolio of activities recorded in the VMBA are related to Routine Line Clearing; Hazard Tree Program; Seasonal Patrols, Areas of Concern, and Emergent Work; Structure Brushing; Quality Assurance/Control; Weed Abatement; Remote Sensing; and Environmental Programs. SCE determined incremental costs for this portfolio of vegetation management activities by comparing the combined total recorded spend for all vegetation management activities in 2022 to 115 percent of the GRC-authorized amount. This is consistent with the Commission's direction in the 2021 GRC Track 1 Final Decision, which provided, "We should authorize a two-way VMBA to track the difference between the authorized O&M expenses for all vegetation management activities in this proceeding and SCE's recorded expenses for these activities, along with a requirement that recovery of costs in excess of 115

[15] The most effective and feasible way to effectuate this statutory requirement is to utilize a portfolio approach when determining incrementality. This is because a portfolio approach: (1) directly ring fences amounts authorized for wildfire mitigation activity, so there is no possibility these amounts are inadvertently diverted to non-wildfire mitigation activities; (2) eliminates the scenario where SCE would have to somehow refund underspends of authorized amounts for a specific wildfire mitigation activity (and no such ratemaking mechanism is in place for SCE to do this) and then re-charge customers for that same refunded amount due to an overspend recorded in the memorandum account for a different wildfire mitigation activity; and (3) assuming all else being equal, mathematically results in the same outcome for customers.

percent of the authorized amount for VMP activities be made by application."[16] The vegetation management work performed in 2022 is described in Chapter III and incrementality is examined in Chapter IV.

Finally, costs related to environmental support for SCE's Routine Line Clearing vegetation management program are recorded in the FRMMA rather than the VMBA. In the 2021 GRC, those costs were forecast separately from vegetation management costs and were authorized in the 2021 GRC Track 1 Final Decision under SCE's Environmental Programs activity. SCE determined the incremental costs for environmental support of Routine Line Clearing by comparing the recorded costs for that activity to the amount authorized for 2022 for the subset of the authorized costs for Environmental Programs that relate to Routine Line Clearing. The environmental support work is described in Chapter III, and the incrementality is examined in Chapter IV.

[16] *See* D.21-08-036, p. 656 (Conclusions of Law (CoL) 70).

II.

WILDFIRE MITIGATION

In this chapter, SCE describes the wildfire mitigation activities it undertook in 2022 to reduce the risk of wildfire in its service area,[17] excluding costs associated with vegetation management, which are discussed in Chapter III. In this Application, SCE is seeking review of and cost recovery for only those costs that are incremental to the costs authorized in the 2021 GRC for the 2022 attrition year at the wildfire mitigation portfolio level and that were recorded or are eligible for recovery in the WMPMA and the FRMMA. While incrementality of these costs is assessed on a portfolio level (see Chapter IV, below), the testimony in this chapter describes and justifies the total amount of work completed and the associated costs for all 2022 wildfire mitigation activities, even for individual activities for which SCE's 2022 recorded costs were below the 2022 GRC-authorized amount for those categories. This detailed testimony is meant to outline the breadth and depth of SCE's wildfire mitigation efforts, to allow for a fulsome assessment of the reasonableness of the totality of SCE's wildfire mitigation costs.

A. Grid Hardening

This section of testimony describes SCE's grid hardening efforts and associated 2022 costs. Table II-2, below, summarizes SCE's total 2022 spend for applicable grid hardening activities.

[17] This chapter excludes 2022 WCCP capital expenditures. In the GRC Track 1 Final Decision, the Commission authorized capital expenditures associated with a scope of 4,500 miles of covered conductor and its associated capital-related revenue requirement for the WCCP for the period 2019-2023 (with the ability to seek cost recovery after a reasonableness review for capital expenditures above 110 percent of the authorized amount). *See* D.21-08-036, CoL 74. To the extent necessary, SCE will seek reasonableness review and cost recovery for incremental capital expenditures associated with its WCCP via a separate application after 2023 recorded costs are finalized, consistent with D.21-08-036.

Table II-2
Grid Hardening
Total Spend for 2022 by GRC Activity
($ in millions)

GRC / Work Activity	Total Capital Expenditures	Total O&M Expenses	Recovery Account for Incremental Amounts
High Fire Risk Area (HFRA) Sectionalizing Devices	$ 18.600	$ 1.027	WMPMA
Fusing Mitigation	$ 0.056	$ 0.002	WMPMA
Distribution Fault Anticipation (DFA)	$ 0.588	$ 0.513	WMPMA
Targeted Undergrounding (TUG)	$ 29.587	$ -	WMPMA
Emerging Technologies (Alternative Technologies)	$ 16.154	$ 1.254	WMPMA
Total	**$ 64.985**	**$ 2.796**	

1. Overview

SCE's grid hardening program includes activities to reduce the ignition risks associated with SCE's infrastructure. In this testimony, SCE is seeking reasonableness review and cost recovery for its incremental costs[18] associated with 2022 work for the activities shown in Table II-2.

2. High Fire Risk Area (HFRA) Sectionalizing Devices

As part of SCE's grid hardening efforts, sectionalizing devices, such as circuit breaker relay hardware for fast curve settings, Remote Automatic Reclosers (RARs) and Remote Vertical Switches, are deployed in HFRA to mitigate fault-related ignition risks and isolate circuit segments to reduce the scope of PSPS events. In 2022, SCE incurred $1.027 million in O&M expenses and $18.600 million in capital expenditures for SCE's HFRA Sectionalizing Devices program.

[18] SCE's portfolio approach to determining incrementality is discussed in Chapter IV.

a) Circuit Breaker Relay Hardware for Fast Curve Settings

(1) Work Description and Need

A fault is an electrical disturbance in the power system accompanied by a sudden increase in current. A protective relay is a device designed to open a circuit breaker (CB) when it detects a fault. The CB, then, interrupts the current flow on the circuit by cutting the power supply to minimize damage to the circuit and reduce the probability of an ignition. The speed at which a protective relay opens the CB is set but can be adjusted. "Fast curve" settings increase the speed by which the relay responds to a fault, compared to conventional settings, further reducing the probability of ignition. Beginning in 2018, SCE initiated a program to deploy fast curve settings in protective relays that control substation. These fast curve settings may require upgrades to the protective relays that control the CB.

To enable fast curve settings on a circuit that would otherwise be unable to accommodate this improvement, as part of the 2019 WMP, SCE developed a plan to upgrade older electromechanical relays with new microprocessor relays capable of being set with fast curve settings.

(2) 2022 Scope and Cost of Work Performed

SCE's work included the installation of new protective relays set with fast curves to increase how quickly they react to faults, which helps to limit the potential for faults that result in ignitions. The scope for 2022 targeted remaining HFRA circuits that have electromechanical relays and require relay upgrades on their substation circuit breakers to install the fast curve settings. SCE incurred O&M expenses of $1.027 million in 2022 and capital expenditures of $15.291 million to update relay hardware for fast curve settings on 117 circuit breakers.

b) New Remote Automatic Reclosers (RARs)

(1) Work Description and Need

A recloser is a device capable of shutting off electric power when a fault occurs and is most often applied in overhead distribution construction configurations. RARs

are reclosers capable of interrupting fault current that can be remotely monitored and operated typically with a radio. RARs operate in a similar fashion to a substation circuit breaker but are located on selected locations on distribution lines to facilitate isolating specific portions of the feeder, as opposed to the entire circuit. This limits the number of customers affected by an outage while also providing the added benefit of increased sensitivity for detecting lower magnitude faults. As such, RAR devices can isolate circuit sections and detect and isolate fault currents.

Traditionally, SCE installs automation equipment such as RARs to improve reliability and provide operational flexibility. In recent years, including in 2022, SCE has increasingly deployed these technologies as part of its wildfire mitigation and PSPS minimization strategies.

(2) 2022 Scope and Cost of Work Performed

This activity includes the installation of new RARs which, as previously described, allow SCE to sectionalize circuits into smaller portions, limiting the potential size of de-energizations and outages. These devices enable more granular operational capability at the circuit segment level. This approach allows for higher windspeed thresholds for calling PSPS events on those segments where covered conductor has been fully installed on an isolatable portion of a circuit. For this activity in 2022, SCE evaluated previously impacted PSPS circuits and identified 15 new RARs that would likely help avoid similar de-energization impacts in the future, once installed. SCE incurred 2022 capital expenditures of $2.667 million.

c) Vertical Switches

(1) Work Description and Need

Vertical switch replacement is an activity in SCE's portfolio of wildfire mitigation measures intended to improve switching performance on distribution circuits. The "vertical switch" term describes a subset of gang-operated overhead pole switches that are installed with vertical line construction. Most legacy vertical switches are installed upon wood crossarms, which can twist, shrink, and warp. Crossarm changes can adversely impact the

vertical switch bell crank system and may lead to potential performance issues for these switches which may result in arcing, sparks, or potential ignitions. SCE's vertical switch program seeks to remove or replace some legacy distribution vertical switches in the HFRA, principally those that are mounted upon wooden crossarms. The goal of the project is to address findings from enhanced inspections of vertical distribution switches that identified defects that could lead to arcing and spark shower events. To address the findings, SCE installed all new factory assembled composite crossarm mounted vertical switches to enhance grid reliability and reduce ignition risks.

(2) 2022 Scope and Cost of Work Performed

During 2022, SCE incurred costs associated with the replacement of 16 switches and the removal of two switches under the vertical switch program. The 2022 total recorded capital expenditures of $0.642 million include costs for material, planning, and construction for the 13 switches replaced in 2022, as well as planning and material costs for work that will be constructed in 2023.

3. Fusing Mitigation

SCE's Fusing Mitigation program installs and replaces existing fuses on smaller branch lines within HFRA with new fusing, which reduces the amount of energy associated with faults.

a) Current Limiting Fuses (CLFs)

(1) Work Description and Need

Fuses are protection devices consisting of a filament that melts and breaks an electric circuit if the current exceeds the fuse's rating. SCE deploys fusing to limit ignition risks, improve protection coordination with circuit breaker relay and RAR Fast Curve settings, and improve customer electric service reliability. Using CLFs to provide branch line protection is the standard for SCE's system in HFRA. CLF fusing was selected for its fault energy reduction capability and the containment of expulsion materials as compared to conventional fuses. As such, the CLFs have been an integral part of branch line protection

strategy since the program's inception in 2018.[19] The fault energy reduction with CLFs results in less and potentially smaller incandescent particles (sparks) during a fault event and can limit damage to equipment. Fewer sparks, and potentially smaller particles, help reduce ignition risk by either cooling sufficiently or avoiding contact with fuel material. Fault energy can also influence equipment failures such as conductor, splices, and connectors, which can create the potential for ignitions. Limiting the fault energy can avoid failure of these components, and avoidance of failure can reduce the potential for ignition from associated sparks or a downed conductor.

(2) 2022 Scope and Cost of Work Performed

In 2022, SCE incurred O&M expenses of $0.002 million and capital expenditures of $0.056 million associated with the installation of CLFs. Most of the CLF costs incurred by SCE in 2022 were also recorded in claim work orders. SCE is not seeking recovery of the claims costs in this filing.

4. Distribution Fault Anticipation (DFA)

a) Work Description and Need

Distribution Fault Anticipation (DFA) technology detects incipient failures (e.g., the precursors of equipment failures), which can lead to faults on the distribution lines, such as conductor degradation from repeated contact with other conductors or conductor separations due to arcing connections. DFA uses intelligent electronic devices that monitor electrical system measurements to recognize current and voltage signatures indicative of potential incipient failures. This capability supports timely completion of remedial actions to avoid faults and potentially reduce ignition incidents. Due to its ability to remotely access and retain data for grid events, DFA also enables SCE access to substantial amounts of fault data for focused analysis to support potential repairs and/or mitigations. DFA is one of the few

[19] This was discussed in SCE's Grid Safety and Resiliency Program (GSRP) Application (A.)18-09-002.

commercially available systems that can provide this type of capability. In 2022, SCE deployed 25 DFA units on its system, completing the prior years' target to install 155 DFA units.

b) 2022 Scope and Cost of Work Performed

SCE deployed 25 DFA units in 2022 and incurred $0.513 million in O&M expenses and $0.588 million in capital expenditures. Scope selection was based on criteria, including the number of outages, both momentary and sustained, experienced on these 25 circuits, the number of circuits a substation served within the HFRA, the proportion of circuit miles that were overhead, and the availability of rack space within the relevant substation. The 2022 O&M expenses include the costs to install and maintain DFA devices, fund an annual service agreement with Texas A&M University to host the DFA data (whose cost depended on the number of DFA units-in-service), and fund 6 months of the previous years' service agreement, as agreed to in the service contract. The work associated with the installation of additional DFA devices was started prior to receiving the 2021 GRC Track 1 Final Decision,[20] which did not approve SCE's funding request for DFAs on a forecast basis pending the finalization of the pilot study results. That is, in 2021, SCE purchased 155 DFA units and installed and commissioned (e.g., put in-service) 130 units in HFRA to increase circuit coverage and expand the sample size for evaluation of DFA technology. The remaining 25 DFA units were commissioned in 2022, which, in addition to the 130 units commissioned in 2021, expanded the sample size of data collected to validate the technology. SCE commissioned the remaining 25 DFA units in 2022 because it had already purchased the equipment, performed the engineering analysis, and identified the deployment location for all 155 DFA units in 2021.

SCE first initiated the DFA pilot in 2019, at a time when the technology for continuous monitoring of the electric system was extremely limited and before full-scale deployment of SCE's wildfire system hardening mitigations. DFA, at the time, was the only commercially available product that had the potential to monitor repeat fault events on SCE's

[20] *See* D.21-08-036, pp. 211-213.

system and included other incipient fault detection and capacitor bank monitoring benefits. In the years following, SCE monitored its DFA installation fleet and continued the evolution of wildfire mitigation options and approaches. SCE found that DFA can detect certain electrical-driven issues (e.g., fault-induced conductor slap) and has additional benefits for public and employee safety such as detecting precursors to underground component failures. The capability provided by DFA, and DFA like devices, for near real time monitoring to detect and locate degraded equipment along with improvements for fault locating remains part of SCE's broader wildfire mitigation strategy.

5. Targeted Undergrounding (TUG)

a) Overview

This section discusses the scope and costs associated with SCE's TUG Program in HFRA. SCE recorded total capital expenditures of $29.587 million for the completion of approximately 15 miles of TUG in 2022.

b) Work Description and Need

Undergrounding refers to the conversion of an existing overhead electric system, which consists of poles, wires, and related equipment, to underground facilities that consist of trenches containing conduit banks that house the wires, vaults, and/or pad mounts for transformers and other equipment. SCE's wildfire program is called Targeted Undergrounding (TUG) because it focuses undergrounding in targeted areas to further reduce wildfire risk and increase reliability within its highest fire risk areas. Criteria for TUG include: 1) limited exit and entry points to communities; 2) high burn frequency; 3) high wind speeds exceeding covered conductor Public Safety Power Shutoff thresholds; 4) exceptionally high potential consequence (could burn more than 10,000 acres within 8 hours); 5) communities of elevated concern; and 6) operational feasibility. TUG virtually eliminates the risk of ignitions and outages associated with drivers such as wire contact with objects (i.e., vegetation, mylar balloons, debris, etc.) and wire-to-wire faults. In addition to those risk drivers, TUG also reduces fault conditions that can weaken and sometimes cause electrical stresses on hardware and insulators, leading to energized

wire down events or electrical arcing. Moreover, while the deployment of covered conductor may significantly increase the PSPS wind threshold for de-energization, covered conductor does not entirely prevent those de-energizations during extreme wind events. Undergrounding virtually eliminates the need to call PSPS events on circuits that are undergrounded.

SCE's analysis of CPUC-reportable fires, as well as additional fires from its Electric Safety Incident Reports associated with its overhead distribution system between 2017 and 2021, shows that, on average, there are approximately 44 ignitions associated with SCE's equipment in its HFRA per year. The primary drivers are contact from foreign object (50 percent) and equipment/facility failure (33 percent). The remaining 17 percent are attributable to wire-to-wire contact, as well as other causes, such as contamination, vandalism, or unknown causes.

For the TUG miles installed in 2022, SCE only addressed energized electric conductors for the primary system and did not include secondary, services, or any non-electric facilities.[21] Undergrounding utility systems typically takes between 25 to 48 months from initial scoping to in-field project completion depending on the size and complexity of each individual undergrounding project.[22] This process consists of four phases as shown in Figure II-1: Initiate, Plan, Schedule, and Execute. For the miles completed in 2022, the initial scoping for some projects started as early as 2020.

[21] Under SCE's latest risk framework, the Integrated Wildfire Mitigation Strategy (IWMS), SCE will be including primary, secondary, and services, if needed, starting in 2024.

[22] This estimate does not include the time between in-field project completion to work order close-out.

Figure II-1
Timeline of Undergrounding Work

In the Initiate Phase, scope is determined based on SCE's risk model. Once the initial scope is identified through risk prioritization, SCE performs a high-level feasibility assessment to determine the level of difficulty of construction based on location and terrain.

Once scoping is finalized, work is moved to the Plan Phase. During this phase, a project manager is assigned to oversee the work and design resources are assigned to initiate the work order, design the project, map the circuit miles, procure the materials, and initiate obtaining permits. On average, this process takes nine to 15 months assuming there are no competing demands on resources for planning and no delays in environmental/agency approvals.

Once the underground work is fully designed, permitted (including obtainment of easements), and cleared of environmental constraints, it gets authorization to proceed and is provided to SCE's regional districts for the Schedule Phase. In the Schedule Phase, materials are acquired, permits are verified, work is scheduled, and circuit maps are revised, if found inconsistent with what is shown in the database. Design resources and project management teams also collaborate with customers, local governments, and state agencies to provide project details prior to the start of construction. Scheduling can take between nine to 15 months.

For the Execute Phase of undergrounding, depending on the scope and location of the project, community outreach may be required. There are also numerous other resources that act in support of project execution. Resources will work to schedule outages when an outage is required to perform the undergrounding work and will determine whether a backup generator is necessary to support the existing customers on the circuit during an outage. Also, SCE develops and schedules alternate traffic plans, as needed, based on applicable laws of the city where work is taking place. Once the project is ready to start, construction will proceed with necessary monitoring to help ensure adherence to the design standards. Even after construction has started, delays can occur due to weather (i.e., rain/snow, Red Flag Warning days, etc.), material delays, permit requirements, and environmental constraints (i.e., nesting birds). SCE estimates the average construction time to be from five to 15 months, which assumes no significant delays. To complete the construction, both civil and electrical crews are required to perform the work. There are many factors that may impact the total project lifecycle, including permitting and environmental requirements, easements, geography and terrain, construction resource availability, and other construction-related factors.

There are four stages of construction during the Execute Phase: civil infrastructure construction, cable installation, cutovers, and removal. The civil infrastructure construction stage consists of installing duct banks and underground structures. Duct banks installation could be performed using either open trench methods or trenchless technology. Open trench method consists of digging a continuous trench and installing round plastic conduit below the surface of the roadway. This method entails saw cutting the existing asphalt or concrete street, if the trench is in the street, and excavating a trench with a backhoe, trencher, or rock wheel.

In the cable installation stage, electrical crews place new utility lines within the new conduits. Vaults and manholes, installed during the civil stage as needed, accommodate cable pulling and electrical connections as well as any underground equipment

being relocated from the overhead system. These structures vary in size from 7'x18'x8' for the largest vaults to 5'x10'6"x7' for the smallest standard manhole.

Following the installation of the new equipment, in the cutover stage, all properties are switched over from the overhead lines to the new underground systems. In the last stage of removal, overhead primary and secondary conductors, as well as any SCE-only poles (e.g., not associated with a joint owner) will be removed. If the pole has other non-electric facilities, SCE will top off the pole.

c) 2022 Scope and Cost of Work Performed

The 2022 scope was selected based on SCE's evaluation of circuit segments based on multiple criteria, including wildfire risk scoring, PSPS impacts, and local SCE knowledge of terrain and topography to identify potential undergrounding candidates.[23] SCE also reviewed egress in areas that may be challenging to evacuate should a fire occur and areas where customers may require electric service to provide essential public health and safety services. First, SCE evaluated the wildfire risk scores at a circuit segment level to rank all the circuit segments in HFRA based on the risk mitigation effectiveness of targeted undergrounding. SCE identified four districts to further analyze, each containing a relatively high concentration of high-ranking circuit segments, pursuant to SCE's risk-informed methodology. Once these districts were selected for analysis, SCE assembled a cross-functional working team to review the feasibility of undergrounding and compare it with the effectiveness of other mitigations. After collecting input from this cross-functional working team, SCE's field engineering personnel completed additional analysis of undergrounding constructability and cost. SCE also considered the possible mitigation of PSPS impacts on customers. SCE evaluated opportunities to modify circuit configurations, including the use of targeted undergrounding, on circuits that have experienced multiple PSPS events to reduce the number of customers affected. At the

[23] *See* Workpaper, Targeted Undergrounding Scoping Methodology, pp. 7-18.

conclusion of this process, SCE identified a short list of potentially feasible undergrounding projects for 2022.[24]

The total amount of TUG-related capital expenditures incurred in 2022 of $29.587 million was associated with construction costs for the approximate 15 miles completed in 2022, as well as material and design/planning costs for plan years 2023 to 2024. SCE completed 4 miles more than the planned 11 miles due to the low- to medium-difficulty miles in 2022, which were easier to construct than initially forecast. When SCE's 2021 GRC Track 1 Application was developed in 2019, SCE's initial unit cost estimates were based on completed Rule 20A projects, which include undergrounding overhead equipment such as primaries, secondaries, services, and telecommunication wires with various levels of difficulty to construct (e.g., Brea and Fullerton to Lake Elsinore and Mammoth Lakes). However, the completed TUG projects in 2022 had a relatively lower level of difficulty to construct (e.g., Riverside County), which is the primary reason for the cost difference, and did not include secondaries, services, or telecommunication wires and, thus, resulted in lower costs.

Undergrounding costs per mile for distribution voltages can vary significantly based on population density, topography, permitting and environmental clearances, paving, and labor (e.g., SCE labor versus contract resources). The miles SCE converted to an underground system in 2022 were in sparsely populated areas. The topographical conditions of the selected miles were less expensive on a per-mile basis compared to steep, hilly terrain that are found in other parts of SCE's service area. Minimal bends and obstacles reduced the need for additional re-routing circuitry for the underground conversion. The projects generally had no curbs or gutters, decreasing the need to re-pave after the underground installation was complete.

6. Emerging Technologies

This section discusses SCE's emerging technologies (formerly Alternative Technologies), including the rapid earth fault current limiter (REFCL), early fault detection

[24] The 2021 TUG scope was selected using a similar process.

(EFD), high-impedance (Hi-Z) relay evaluations, transmission open phase detection (TOPD), distribution open phase detection (DOPD), and spacer cables pilot.

a) Rapid Earth Fault Current Limiter (REFCL)

(1) Work Description and Need

REFCL is a family of technologies that detects ground faults and rapidly reduces the fault current. This technology works like a safety switch and reduces the likelihood of a fire ignition if a power line contacts the ground or a grounded object. Most public safety hazards from high voltage electrical equipment come from ground faults. This includes most downed wire incidents, energized conductor contacts, events involving underground equipment failures, arc flashes, step and touch voltage incidents, and fire ignitions.

For its pilots in 2020 and 2021, SCE studied variants of REFCL technology: Ground Fault Neutralizer (GFN) and Grounding Conversions (e.g., Resonant Grounding and Isolation Transformers) installed to target circuitry in HFRA. SCE is exploring multiple approaches because SCE's system is not homogenous; these technologies require specific configuration and the most cost-effective and/or efficient solution may vary across SCE's service area. The pilot programs were intended to determine the feasibility for these technologies on SCE's system.[25] Energy Safety has encouraged SCE and other California electric utilities to accelerate REFCL pilot programs, as they have provided promising initial results as potentially effective mitigations to address ignition risk associated with ground faults.[26]

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[25] For a detailed description of the outcomes of these REFCL pilots *see* REFCL Projects at SCE available at https://www.sce.com/sites/default/files/AEM/Supporting%20Documents/2023-2025/Rapid%20Earth%20Fault%20Current%20Limiter%20(REFCL)%20Projects%20at%20Southern%20California%20Edison.pdf (accessed on September 11, 2023).

[26] *See* Energy Safety's Draft Decision on SCE's 2023-2025 WMP, p. 87: "Additionally, SCE must continue to collaborate with other utilities on efforts relating to grid hardening. In its 2026-2028 Base WMP, SCE, along with other utilities, must submit a report which discusses continued efforts including: […] The IOUs' continued efforts to evaluate new technologies being piloted and deployed. (*Continued*)

(2) 2022 Scope and Cost of Work Performed

SCE incurred $13.558 million in capital expenditures in 2022 for GFN activities. This included the costs of the pilot system at Neenach Substation (including system reconfiguration) as well as preparatory costs for future sites in future years (e.g., engineering, planning, and equipment procurement). SCE made changes to the GFN at Neenach Substation based on lessons learned from its installation, such as increased automation and connecting the GFN directly to the neutral phase of the source transformer instead of through a grounding transformer to simplify future installations. As SCE's first GFN installation, the experience at Neenach can be applied to future GFN projects. Given the promising nature of the REFCL, SCE initiated engineering/material procurement for GFN installations at Acton and Phelan substations in 2023 and Banducci/Del Sur Substations in 2024. These sites were selected through a risk analysis and are particularly promising candidates due to their large HFRA footprint and predominantly 3-wire construction.

SCE also incurred capital expenditures of $0.063 million for another type of REFCL technology called Grounding Conversions, which are typically much smaller projects that affect smaller portions of circuitry than GFN projects. These costs covered the installation of additional fault energy reduction equipment, called an Arc Suppression Coil, on the Corsair circuit Isolation Transformer installation.

This must include, but not be limited to: REFCL, EFD, DFA, falling conductor protection, use of smart meter data, open phase detection, remote grids, and microgrids."

See also Energy Safety's Draft Decision on SDG&E's 2023-2025 WMP, p. 38: "SDG&E does not include in its WMP any discussion of its exploration into rapid earth fault current limiters (REFCL) as a potential mitigation, instead stating that it does not employ REFCL. The area for continued improvement identified in Energy Safety's 2022 WMP Decision SDGE-22-13, New Technologies Evaluation and Implementation, required SDG&E to evaluate the effectiveness of new technologies such as REFCL through collaboration with other utilities, including implementation strategies. In its 2025 Update, SDG&E must provide an update on its progress evaluating the use of REFCL as a mitigation or provide an explanation why SDG&E finds REFCL not logical and/or feasible to use as a mitigation. This is important particularly given the potential risk reduction benefits of REFCL when paired with other mitigations such as covered conductor."

b) Early Fault Detection (EFD)

(1) Work Description and Need

EFD technology continuously monitors lines and proactively detects undesirable, degraded, or pre-failure system conditions, such as severed strands on a conductor, vegetation contact, or deterioration of insulating material on conductors (known as tracking). EFD can help to quickly identify these types of conditions and often detects conditions that are not visible or identifiable with existing practices. The EFD technology detects high frequency radio emissions that can occur from arcing (high-energy discharge) or partial discharge (lower energy discharge) conditions on the electric system.[27] The EFD units are pairs of sensors installed on transmission and distribution circuits that are able to provide location(s) of concern on the electrical system for further evaluation. This may result in proactive remedial action, which can prevent further degradation or fault events that could lead to an ignition or other electric service reliability impacts.

SCE's present applications of the EFD technology include using paired sensors for both transmission and distribution circuit radio frequency monitoring for electrical asset degradation.

(2) 2022 Scope and Cost of Work Performed

In 2022, SCE installed 51 EFD units (2 sensors per line), primarily on distribution lines, for total O&M expenses of $0.035 million and a total capital expenditure of $1.751 million.[28] The cost of EFD deployment included design, materials, and installation costs for 2022 installations and planning costs for 2023 work. The 2022 and 2023 scope included updating design requirements to include field measurements of cellular communication signal

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[27] *See* EFD SWER Trial Final Report dated June 23, 2019. https://www.energy.vic.gov.au/__data/assets/pdf_file/0021/461145/EFD-SWER-TrialFinal-Report.pdf.

[28] SCE's 2025 GRC notes that in 2022 there were 46 EFD units deployed. However, in 2022, SCE added to its total unit count 5 additional EFD units that were installed but were not originally counted due to problems such as intermittent communication issues. Including these units brings the total to 51 units.

strength, following previous lessons learned when SCE experienced communications issues following EFD construction. SCE selected scope for 2022 based on the aggregate scores on a circuit from SCE's risk model and normalized the data to identify the most efficient siting of sensor pair installations.

c) High-Impedance (Hi-Z) Relay Evaluations

(1) Work Description and Need

Hi-Z is a protective algorithm within the relay that can detect Hi-Z fault conditions that are often associated with downed wire or arcing events (i.e., vegetation contact or contact with a bird's nest that causes a prolonged electric discharge). SCE's traditional distribution circuit protection elements are based on overcurrent, meaning the protection elements rely on fault current magnitude to trigger the relay to operate. The overcurrent element is configured higher than load current levels to avoid nuisance device operations that may create outages from normal load current levels. Hi-Z fault conditions are those in which a distribution circuit often produces current below the load current and can present some ignition risk if left unaddressed.

In lab testing, SCE has demonstrated that Hi-Z relays can detect Hi-Z fault conditions that may go un-detected by traditional overcurrent protection elements. SCE's pilot program collects information on the operation of Hi-Z relays in the field. The relays were configured to produce alarms during the pilot to understand how these operations may affect customer outages.

(2) 2022 Scope and Cost of Work Performed

In 2022, SCE deployed 20 Hi-Z relay installations, each serving sections of 12kV and 16kV distribution HFRA circuitry for total O&M expenses of $0.011 million and a total capital expenditure of $0.446 million. SCE installed these Hi-Z relays to ensure there was adequate sample data to help evaluate the technology. The HFRA locations were selected based on having voltage sensors with minimum required current levels (e.g., ≥ 25 amps).

d) Transmission Open Phase Detection (TOPD)

(1) Work Description and Need

TOPD is a technology that helps reduce ignition risks associated with the high voltage transmission system by detecting and isolating a single open phase event that is the result of an energized line separating before it contacts the ground. An open phase condition refers to a scenario where phases are being physically disconnected on the system, potentially due to broken conductor or hardware/splice failure. An open phase condition that goes undetected may cause an energized conductor to fall and potentially lead to a fault or ignition. TOPD is a technology that facilitates de-energization of an open phase line before it can contact the earth resulting in a fault event, which may result in an ignition if not de-energized. This technology updates settings on existing equipment and reduces ignition risks associated with high voltage transmission systems.

In 2019, SCE evaluated the effectiveness of the open phase detection scheme using real-time digital simulation. Test results indicated the technology worked as intended; that is, TOPD was able to correctly identify all open phase condition testing events simulated. SCE is presently piloting TOPD technology in detection mode only, to provide additional confidence that the technology will operate as intended, before enabling the functionality to isolate detected open phase events. In December 2022, SCE enabled the ability to isolate on TOPD settings for five transmission lines. In December 2022, SCE enabled the ability to isolate on TOPD settings for five transmission lines.

(2) 2022 Scope and Cost of Work Performed

In 2022, SCE incurred $1.193 million in O&M expenses to update transmission lines with TOPD logic. SCE deployed TOPD logic on eleven transmission lines located in both Tiers 2 and 3 of SCE's HFRA.

e) Distribution Open Phase Detection (DOPD)

(1) Work Description and Need

DOPD is a technology that focuses on reducing ignition risk associated with wire-down incidents by detecting and isolating for open phase events that are the result of an energized line separating. DOPD leverages existing recloser installations at circuit tie-points in conjunction with upstream source reclosers. The reclosers will transmit data via high-speed radio installations to detect open phase conditions.[29]

SCE is presently piloting DOPD technology in detection mode only, to provide additional confidence that the technology will operate as intended, before enabling the isolation capability. The DOPD pilot project was configured to provide detection capability only for one or two open phases. The pilot effort also helps SCE understand the potential for additional circuit outages related to the increased sensitivity of this protection system. The costs, functionality, and new communication components are being evaluated during the pilot. Initial pilot results regarding DOPD functionality are encouraging, and SCE is continually improving the detection algorithm based on the pilot findings and evaluation.

(2) 2022 Scope and Cost of Work Performed

In 2022, SCE incurred $0.047 million in capital expenditures to deploy installation of the open phase detection logic at two locations. This provided the opportunity to evaluate the reliability of long-term evolution communication for DOPD technology. SCE also incurred $0.015 million in O&M expenses to retrieve information from existing DOPD installations. Currently, a field crew must be deployed to retrieve data from the DOPD schemes to be analyzed after an open phase event is detected. The analysis helps verify that the DOPD scheme operates as intended.

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[29] Bolbolian, V., Kirkpatrick, B., Ojeda, A., Ramdoss, R., Rorabaugh, J., Swisher, A. (2022, January 20). Heading off Southern California wildfires: distribution open phase detection. T&D WORLD. Available at https://www.tdworld.com/wildfire/article/21182896/heading-off-southern-california-wildfires-distributionopen-phase-detection (accessed on September 11).

f) Spacer Cables Pilot

(1) Work Description and Need

A spacer cable system is an overhead system in which covered conductor is supported by high-strength, diamond-shaped spacers that are installed approximately every 30 feet within the span of each pole (see Figure II-2). The insulating properties of the spacers allow the messenger and the covered conductor to be bundled into a compact area, thus strengthening the span and reinforcing covered conductor. A spacer cable system, once implemented, can improve covered conductor's effectiveness against tree fall-ins. While the mitigation effectiveness of spacer cables is lower than undergrounding, spacer cables can be a potential alternative in areas where undergrounding is infeasible due to terrain challenges.

In the fourth quarter of 2022, SCE conducted a spacer cables pilot to analyze the constructability, training, and projected costs of spacer cables to determine whether spacer cables can be added as a tool in the grid hardening toolbox in areas deemed to be infeasible to underground.[30] The pilot was necessary to determine if the installation practices and the equipment needed to install spacer cables were aligned with SCE's practices and if additional equipment would be required to be purchased aside from SCE's typical fleet for covered conductor installations. The pilot results indicated that spacer cables are incompatible with SCE's practices and would incur additional significant expense to execute. For example, SCE cannot widely deploy spacer cables due to construction standards, limiting its effectiveness. Due to these factors, SCE found that spacer cables are not as economical as other alternatives that are already part of SCE's operations (i.e., aerial bundled cable). Currently, SCE does not plan to conduct further pilots on spacer cables.

[30] *See* SCE's 2023 WMP Update, p. 231, Table 8-1.

Figure II-2
Spacer Cable System

(2) 2022 Scope and Cost of Work Performed

SCE's spacer cables pilot was performed on six spans or about 800 feet of covered conductor in 2022 at a capital expenditure of $0.289 million.[31] These costs were necessary to carry out the pilot and its evaluation and ultimately supported SCE's conclusion to move forward with other, more economical mitigation alternatives. This work provided customers the additional benefit of a strengthened covered conductor system. In other words, this system has all the benefits that covered conductor can provide, plus the additional strength of the bundled wire, which can better withstand risk drivers, such as contact from objects like a fallen tree branch.

B. Enhanced Operational Practices (EOP)

Below, Table II-3 summarizes SCE's total 2022 spend for EOP.

[31] Spacer cables pilot 2022 capital expenditures were inadvertently recorded to the WCCP instead of Emerging Technologies (formerly Alternative Technologies).

Table II-3
Enhanced Operational Practices
Total Spend for 2022 by GRC Activity
($ in millions)

GRC / Work Activity	Total Capital Expenditures	Total O&M Expenses	Recovery Account for Incremental Amounts
Inspections	$ -	$ 51.431	WMPMA
Remediations	$ 109.088	$ 56.555	WMPMA / FRMMA
HFRI Technology Solutions	$ 29.106	$ 8.934	WMPMA
Total	**$ 138.194**	**$ 116.920**	

1. Overview

This section of testimony describes SCE's EOP and their associated 2022 costs. The sub-activities within EOP are: (1) Inspections; (2) Remediations; and (3) High Fire Risk-Informed (HFRI) Technology Solutions.

2. Inspections

a) Overview

SCE regularly inspects the electrical equipment within its service area, pursuant to the CPUC regulatory requirements (General Order (GO) 95 and GO 165), as well as its own internal engineering standards that go beyond the GO 95 and GO 165 requirements, to ensure the provision of safe and reliable power to its customers. GO 95 provides guidance on overhead electric line construction standards and GO 165 provides guidance on the minimum timing for inspections.

All inspections are conducted with the intent of identifying problems or potential problems on SCE's system. When a problem is identified, through either ground, aerial, IR, corona scans, or conductor and splice assessments, a notification is generated. A notification is then given a priority, P1, P2, or P3, depending on the severity of the risk created by the identified condition, and the notification is scheduled for remediation. Remediation costs may be

either an O&M expense or a capital expenditure, pursuant to existing accounting standards and requirements.

SCE has enhanced its inspection program within its HFRA, since 2018, based on continuously improving data and ignition risk analysis. For example, to identify equipment or structure degradation that occurs between inspection compliance cycles that could lead to a potential ignition risk, SCE conducts more frequent and ignition-focused risk inspections in HFRA beyond GO 165 requirements ("High Fire Risk-Informed inspections" or "HFRI inspections"). Prior to 2019, distribution detailed inspections entailed a ground-based visual inspection conducted by inspectors within HFRA and non-HFRA.

In 2019, a crossarm failed on a pole and resulted in a small fire. An investigation revealed that the crossarm was damaged, and the damage was not visible from the ground. Thus, in 2019, SCE began to also perform aerial detailed visual inspections via helicopter or drone as shown, below, in Figure II-3 in HFRA to supplement ground-based inspections to identify deterioration or unfavorable asset conditions, such as a damaged pole top as shown, below, in Figure II-4. Ground inspections continue to be necessary because they help detect equipment/structure conditions that are difficult to identify via aerial inspections, such as condition of guy anchors, see Figure II-5, damaged wood pole and frame, see Figure II-6, damaged service and service on ground, see Figure II-7 and Figure II-8, respectively.

Since 2020, following the lessons learned from the Creek Fire, SCE's Fire Science team has identified Areas of Concern (AOCs) in HFRA based on actual current year conditions, which are areas that pose increased fuel-driven (Summer AOCs) and wind-driven (Fall AOCs) fire risk. The AOCs are identified based on several factors, including fire history, current and near-term weather conditions, fuel type, exposure to wind, and egress, among others. To mitigate the potential risk in AOCs, SCE implements an action plan in the AOCs that includes inspections of the assets (e.g., distribution, transmission, and generation) and acceleration of remediations for the assets with the highest risk.

In 2022, to further address the risk of defects in transmission equipment that may not be visible, SCE added transmission conductor and splice assessment in HFRA to complement existing processes such as infrared and corona scans to help prevent ignitions.

Also, in 2022, SCE piloted 360-degree inspections for inspections on 33kV distribution assets and below, which consisted of performing the ground and aerial inspections for the structure on the same visit. 360 inspections will not typically be performed by one individual, but, instead, by both an inspector and a pilot. In some cases, a single inspector will perform an inclusive ground and aerial inspection.

Figure II-3
Drone (left) and SCE Helicopter (right)

Distribution Aerial Inspection (Drone)	SCE Helicopter
	

Figure II-4
Damaged Pole Top (Drone Capture)

Distant	At Close Range
	

Figure II-5
Loose Guy Anchor

Figure II-6
Damaged H-Frame on a 12kV Circuit

Distant	At Close Range
	

Figure II-7
Damaged Service

Figure II-8
Service on Ground

The portfolio of inspection programs, within HFRA, is outlined, below, in Table II-4, which identifies the inspection types and cycle times for both distribution and transmission.

Table II-4[32]
2022 Portfolio of Inspection Programs

Inspection Type	Description	Distribution Cycle	Transmission Cycle
HFRA Ground	Compliance-based inspections from the ground vantage point.	5 Years	3 Years
	Comprehensive risk-based inspections from the ground vantage point.	As Identified	As Identified
HFRA Aerial	Performing comprehensive risk-based inspections from the aerial vantage point.	As Identified	As Identified
Transmission Conductor and Splice Assessment	Method to find anomalies, which are not apparent or visibly exposed.	-	Dependent on Work Scope
Infrared (IR) Inspections and Corona Scans	(Distribution and Transmission) IR - Thermal differences among components and equipment.	As Identified	As Identified
Areas of Concern (AOCs) - Ground-Based and Aerial	Similar to ground and aerial, however determined by fuel and weather conditions.	Annually Dependent on Emergent Conditions	Annually Dependent on Emergent Conditions

b) HFRA Ground

(1) Work Description and Need

(a) Distribution and Transmission

During an HRFA ground inspection, SCE physically visits the structure being inspected and a thorough visual inspection of the structure is performed from the ground. If any issues are identified during ground inspections, the inspector submits remediation notifications prioritized by the severity of the issues identified.

Ground inspections are one component of the manner SCE inspects distribution and transmission equipment. Performing ground inspections helps detect equipment and structure conditions that pose risk to asset integrity and safety, such as damaged conductor and missing cotter keys, as shown in Figure II-9 and Figure II-10, respectively.

[32] Long Span Initiative (LSI) was excluded from this table, as it is more aligned with Grid Hardening. However, its historical costs were recorded under EOP and will be discussed later. For future purposes, SCE has reorganized LSI under Grid Hardening.

Figure II-9
Damaged Primary Conductor on a 12kV Circuit Distant (left) and At Close Range (right)

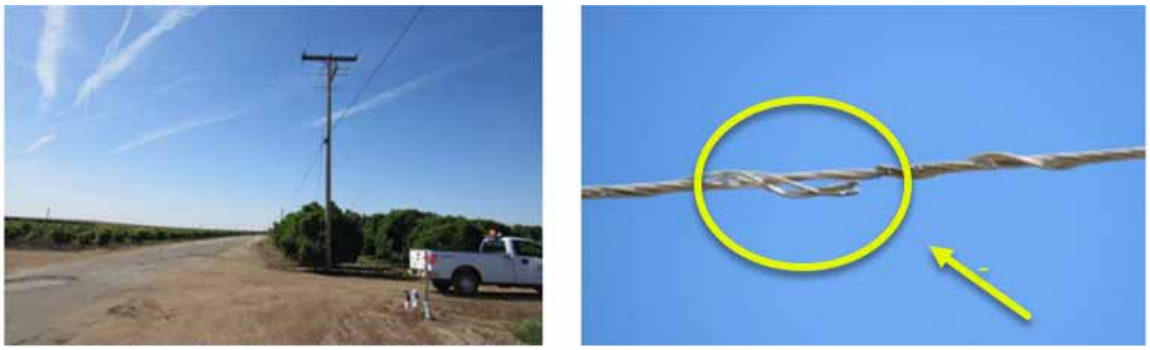
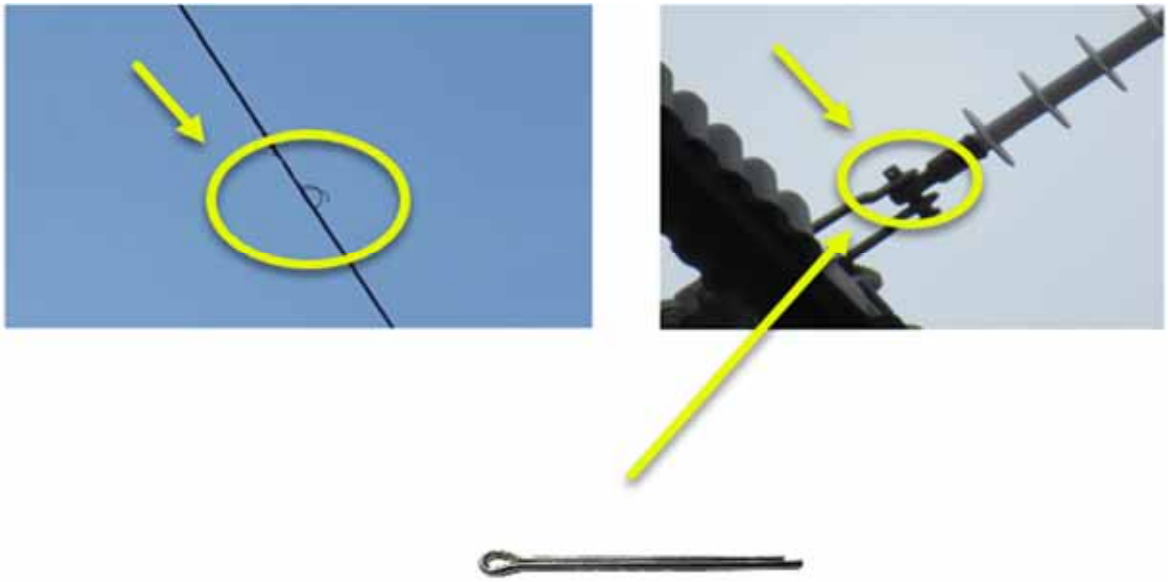


Figure II-10
Damaged Primary Conductor (left) and Missing Cotter Key (right) on 12kV Circuits, Sample Cotter Key (bottom)



(2) <u>2022 Scope and Cost of Work Performed</u>

For distribution, SCE incurred $8.200 million in O&M expenses in 2022 to perform HFRI ground inspections on approximately 163,000 distribution assets in SCE's

HFRA. The ground inspections comprised approximately 131,000 inspections, pursuant to SCE's HFRI program, 16,200 inspections, pursuant to SCE's AOC program, and 12,800 inspections, pursuant to GO 165 compliance requirements. In performing this volume of inspections, SCE achieved its 2022 WMP target for distribution ground inspections, which was to perform between 150,000 to 180,000 ground inspections.[33]

Each inspection was completed by an inspector, who is qualified, per SCE's internal standards, as an Electric System Inspector, and who performs a comprehensive inspection survey. Each year, inspections are targeted to occur before peak wildfire season, which typically begins in September. SCE completed 2022 HFRI inspections that targeted 56 percent of SCE's distribution structures located in HFRA. These structures cumulatively account for approximately 97 percent of the total modeled relative ignition risk associated with overhead distribution structures in SCE's HFRA. In addition to identifying structures in need of remediation, the additional asset information benefits SCE by improving existing models or creating new models, responding to the various detailed reporting and data provision requirements from the CPUC and Energy Safety, and further enhancing SCE's wildfire risk mitigation capabilities.

For transmission, SCE incurred $1.550 million in O&M expenses in 2022 to perform ground inspections on approximately 17,600 transmission assets in SCE's HFRA. The ground inspections comprised 13,000 inspections pursuant to the HFRI program, 1,400 inspections pursuant to the AOC program, and 2,900 inspections, pursuant to GO 165 compliance requirements. Each inspection was performed by either a Transmission Senior Patrolman or Lineman, both of which are qualified electrical workers. Each year, inspections are targeted to occur before peak wildfire season, which typically begins in September. SCE completed 2022 inspections that targeted 48 percent of the structures in HFRA, which cumulatively account for approximately 97 percent of the total modeled relative ignition risk

[33] SCE 2022 WMP Update p. 136.

associated with transmission structures in SCE's HFRA. In performing this volume of inspections, SCE achieved its 2022 WMP target for transmission ground inspections, which was to perform between 16,000 to 19,000 ground inspections.[34]

c) HFRA Aerial

(1) Work Description and Need

(a) Distribution and Transmission

In addition to ground inspections previously described, in 2022, SCE also performed aerial inspections of assets to provide a 360-degree view of the structures and equipment. Aerial inspections are performed by helicopters and/or drones that take high-definition digital images of each overhead structure, including pole tops, wooden crossarms, steel structures, and conductor/hardware. Aerial inspections are utilized to perform an objective condition assessment of structures based on the latest data gathered from an aerial vantage point. The aerial vantage point provides a different perspective of the structure's integrity. Remediation requests for an asset are reviewed to assess whether there is pending work already identified on the asset to minimize the creation of duplicate notifications.

Aerial images captured allow a more detailed review of assets and can capture certain perspectives that cannot be captured from the ground. Figure II-11, below, shows a deteriorated crossarm that is not able to be seen from the ground view. Figure II-12 shows missing transmission cotter keys that, due to size of the structures, can be difficult to observe from the ground.

[34] SCE 2022 WMP Update p. 136.

Figure II-11
Distribution Deteriorated Crossarm Ground (left) and Aerial (right)

Figure II-12
Transmission Missing Cotter Key Distant (left) and At Close Range (right)

(2) 2022 Scope and Cost of Work Performed

For distribution aerial inspections, SCE incurred $29.074 million in O&M expenses in 2022 to perform aerial inspections on approximately 157,000 distribution assets. The aerial inspections comprised approximately 130,000 inspections, pursuant to SCE's

HFRI program, 17,000 inspections, pursuant to SCE's AOC program, and 10,000 inspections, pursuant to GO 165 compliance requirements. In performing this volume of inspections, SCE achieved its 2022 WMP target for distribution aerial inspections, which was to perform between 150,000 to 180,000 aerial inspections.[35]

For transmission, SCE incurred $8.697 million in O&M expenses in 2022 to perform aerial inspections on approximately 17,000 transmission assets. The aerial inspections comprised approximately 13,000 inspections, pursuant to SCE's HFRI program, 1,500 inspections, pursuant to SCE's AOC program, and 2,600 inspections, pursuant to GO 165 compliance requirements. In performing this volume of inspections, SCE achieved its 2022 WMP target for transmission aerial inspections, which was to perform between 16,000 to 19,000 aerial inspections.[36]

d) Long Span Initiative (LSI)

(1) Work Description and Need

SCE's LSI consists of identifying and remediating distribution circuits of a certain length, spans with mixed conductor, spans that have a sharp angle, or spans that transition between vertical and horizontal configuration. All these types of long spans can have a higher probability of conductor clash in adverse wind conditions.

(2) 2022 Scope and Cost of Work Performed

In 2022, SCE incurred $0.081 million in O&M expenses to perform LSI inspections on 1,000 spans of distribution circuits.

[35] SCE 2022 WMP Update p. 136.

[36] SCE 2022 WMP Update p. 136.

e) Transmission Conductor and Splice Assessment

(1) Work Description and Need

In 2022, SCE used enhanced transmission conductor and splice inspections methods (LineVue and X-Ray, see Figure II-13) in HFRA to complement existing inspection processes to help prevent future ignitions. LineVue determines the deterioration of the steel core cross-sectional area of the conductor steel core and detects any localized breaks or corrosion pits on the steel wires and loss of the zinc galvanized layer (see Figure II-14). X-Ray is used on conductor splices to verify proper installation as well identify broken strands or deformities (Figure II-15). X-Ray inspections are more effective than visual inspections in identifying these issues given the difficulty in seeing internal issues or improper termination installations. Conductor core sampling is an in-depth inspection performed on a 15-foot conductor section in a laboratory to determine the current health of conductor and estimates the component end-of-life. SCE included these enhanced inspection methods to identify anomalies and any underlying issues to replace/remediate conductors and/or splices that have a higher probability of failure. In addition, these methods help to capture issues that may not be visibly apparent to the human eye or other inspection technologies.

Figure II-13
Transmission Conductor and Splice Assessment

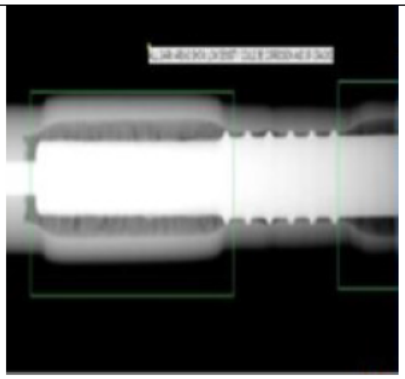
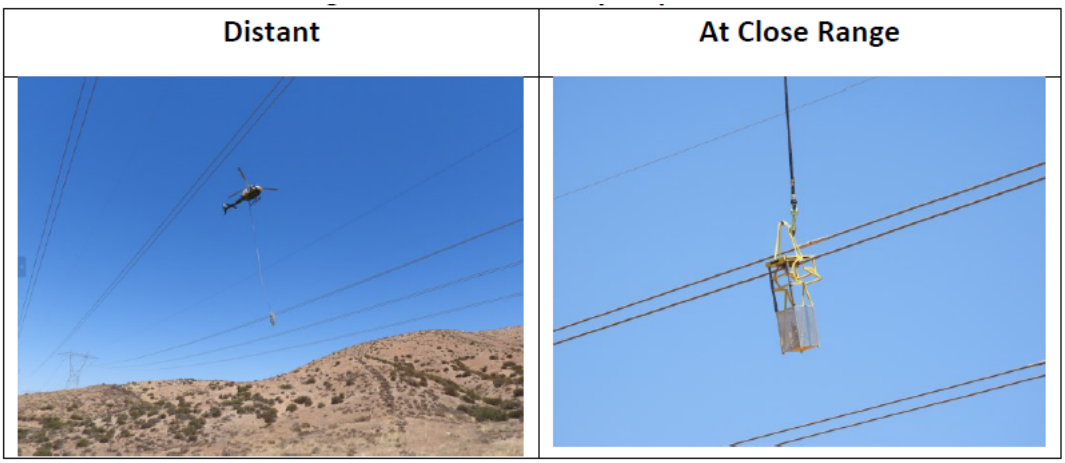
LineVue	X-Ray
	
Utilizes a magnetic flux to detect the degradation of the steel core of the conductor.	Takes an internal image of the splice, which is used to determine degradation due to corrosion/improper installation.

Figure II-14
Line Vue Inspection

Distant	At Close Range
	

Figure II-15
X-Ray Inspection



(2) 2022 Scope and Cost of Work Performed

For transmission, SCE incurred $1.792 million in O&M expenses to perform conductor and splice assessments on approximately 79 spans with LineVue, 63 splices with X-Ray and 6 conductor samples. In performing this volume of inspections, SCE achieved its 2022 WMP target for transmission conductor and splice assessment, which was to inspect between 75 to 150 spans with LineVue and inspect between 50 to 70 splices with X-Ray and collect 5 to 15 conductor samples.[37]

f) Infrared (IR) Inspections and Corona Scans

(1) Work Description and Need

(a) Distribution IR

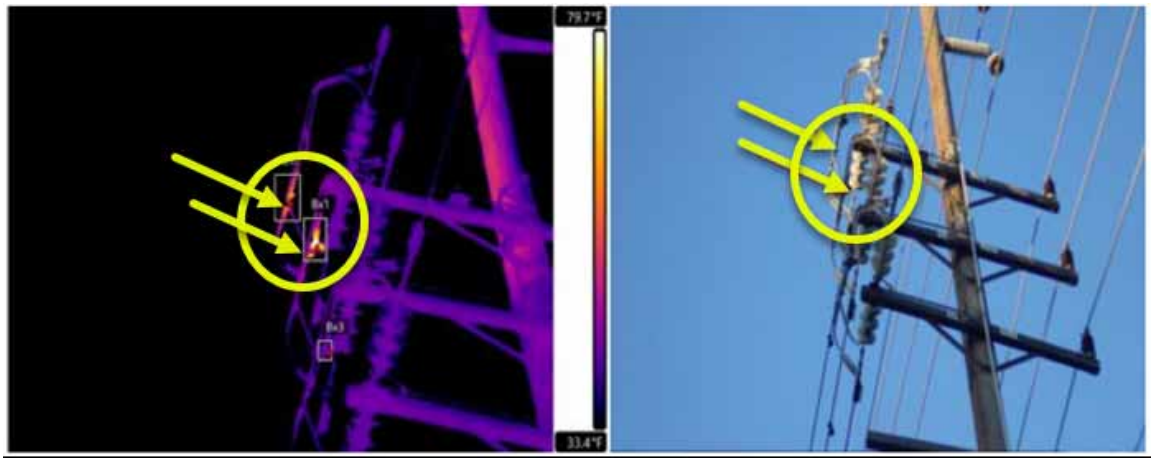
Distribution IR is used to scan and detect temperature differences between components and identify heat signatures of components called "hot spots," which may indicate deterioration in structures and equipment not visible to the naked eye. Most inspections have been performed from vehicles; however, a small percentage of the inspections require the inspector to hike to the structure or perform the inspection from a helicopter. SCE evaluated the need for IR inspections on its distribution circuits and found that these inspections

[37] SCE 2022 WMP Update p. 138.

offer a substantial benefit beyond standard visual inspection. SCE had benchmarked methods to evaluate distribution overhead lines and learned that using IR technology to detect thermal differences and identify hot splices and connectors can be leading indicators of asset failure. SCE piloted IR inspections of energized distribution lines and equipment in 2017 and 2018 to help reduce the risk of conductor failure. Following the pilot, SCE deemed it prudent to inspect all distribution facilities in HFRA over a two-year cycle, using IR technology.

IR inspections can detect conditions that may indicate a wide range of anomalies, including but not limited to, failing switch and fuse contacts, poor connections, loose bushings, overloaded/failing transformers, and other issues that can result in component failure. The images in Figure II-16 show a comparison of a thermal imagery (left) and a standard imagery (right). The IR scan image captures the temperature differences between components and identifies the "hot spots" and the component referenced for comparison. This condition would not have been captured during visual inspections.

Figure II-16
Distribution Infrared Inspection Thermal (left) and Standard (right) on 16kV Circuit



Vehicle inspections utilize a two-person crew, with the passenger aiming an IR camera at overhead facilities as the driver drives through the area. If a structure is out of range from the vehicle, the inspector will hike to the structure based on the inspector's estimation of the time required to hike to and from the structure and geographical

constraints including terrain conditions. A 15-minute one-way hike to the structure is typical, provided there are no additional safety concerns. The driver remains with the vehicle while the inspector hikes to the structure. Helicopters are used when structures are inaccessible via a vehicle or by foot, with only the inspector in attendance in comparison to a two-person crew for vehicles.

IR inspections on circuits in SCE's HFRA are completed every other year (i.e., 50 percent per year). Structures within the circuits are grouped by district which are then prioritized by relative risk. Risk is calculated by multiplying the probability of ignition by the wildfire consequence risk score, followed by the summation of the risk scores for each structure in the district. The sum of the relative risk scores is ranked highest to lowest and are then scheduled accordingly. Generally, the highest-ranked areas are performed during the first year of the two-year cycle (i.e., approximately 50 percent of the biannual scope), and the remaining during the second year.

(b) <u>Transmission (IR and Corona Scans)</u>

During transmission IR and corona scanning, specialized IR and ultraviolet (corona) light cameras are mounted to helicopters and the line is flown, capturing data at splices, conductor connection/attachment points, and insulators. Like the distribution IR inspection, the transmission IR inspection is used to scan and detect temperature differences and heat signatures of components, which may indicate problems that could result in component/conductor failure. Corona scanning is a technology that is only being used on the higher voltage transmission circuits in HFRA as insulator issues are not as common on lower voltage distribution circuits. Corona identification is neither visual nor thermal. Corona detection is accomplished by identifying ultraviolet energy, which is generated by electric discharge or "leakage" due to ionization of air surrounding high voltage electric components. In some cases, the leakage is substantial enough that it may result in an arc flash and potential ignition. The corona imaging identifies conductors that have broken strands by showing the ultraviolet energy

that is generated by electric discharge. It is very difficult to identify this type of issue with conventional photographs.

Transmission corona scans are performed in conjunction with IR scanning. The IR scan detects temperature differences and heat signatures of components, which may indicate problems not visible to the naked eye that could result in potential component/conductor failure. An example of an anomaly captured by a corona scan is shown in Figure II-17, which shows a comparison of conventional, IR and corona images of the same transmission line. In 2022, SCE utilized internal resources to conduct all aspects of the IR and corona inspections. SCE's Air Operations division mounted an IR and corona camera and flew the circuits to capture images such as the image shown in Figure II-18.

Figure II-17
Transmission 500kV Line Visual (left), Infrared (center) and Corona (right)

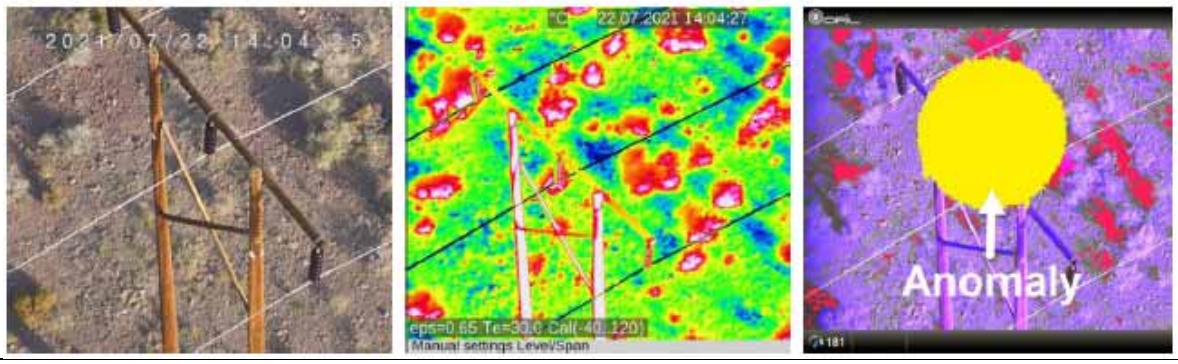


Figure II-18
SCE Helicopters (left) and Mounted with Infrared and Corona Camera (right)

(2) 2022 Scope and Cost of Work Performed

For distribution, SCE incurred $0.467 million in O&M expenses in 2022 to perform distribution IR inspections on 4,408 overhead distribution circuit miles, which represented approximately 50 percent of overhead distribution circuit miles in HFRA. In performing this volume of inspections, SCE met its WMP target of 4,408 distribution IR inspections.[38]

For transmission, SCE incurred $0.076 million in O&M expenses to perform transmission IR and corona scans on approximately 1,062 miles of transmission circuits deemed to be high-risk within HFRA. In performing this volume of inspections, SCE met its WMP target of 1,000 transmission IR inspections.[39]

g) Areas of Concern (AOC) – Ground-Based and Aerial

(1) Work Description, Need, and 2022 Scope and Cost of Work Performed

The 2020 fire season was significant[40] and included several fires with very little wind on them, occurring across California in Summer months, and unique, in that many of the early season fires were driven more by dry fuels and less by wind events. Prior to the 2020 fire season, SCE's wildfire mitigation had been focused on wind-driven fires. To mitigate this risk of fires mainly driven by dry fuels, SCE's Fire Science Team identified other areas in the service area where SCE may have this type of fire exposure due to dry vegetation and extreme terrain. These areas became the AOC and the Inspections Team rapidly executed inspections in these areas to inform accelerated remediations. Before performing these AOC inspections and remediations, SCE performed an assessment of the cost in comparison to the risk and consequences and determined that the risk far outweighs the cost, thereby validating the

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38 SCE 2022 WMP Update p. 136.

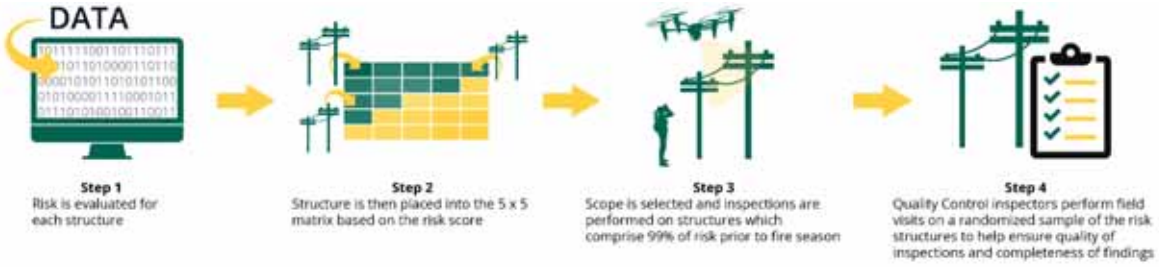
39 SCE 2022 WMP Update p. 137.

40 In 2020, over 4.2 million acres burned, resulting in the largest wildfire season in California's modern history. https://www.fire.ca.gov/incidents/2020.

need for these targeted AOC efforts. The methodology to identify AOC polygons, which are small geographic areas of SCE's HFRA that allow for more granular evaluation of risk, is based on several additional factors, including fire history, weather conditions, fuel type, vegetation moisture, terrain, exposure to wind, and egress constraints, among others. SCE's AOC scope of work includes all distribution, transmission, and generation structures associated with whole circuits and vegetation within the surrounding topographical areas in the AOC polygons. SCE plans its HFRI, AOCs, and compliance-based inspection work so that multiple inspections are not conducted on the same structure during the same year. As a result, a structure within the HFRA that may not otherwise have been inspected through an HFRI inspection but falls within an AOC polygon is now inspected through the AOC program. AOC inspections have a higher priority than HFRI inspections, due to the AOC's risk being driven by current, on-the-ground conditions. Any notifications, resulting from these inspections, are then placed on a compliance remediation schedule. To focus resources on the highest-risk notifications and identify remediations that need to be accelerated, prior to the start of wildfire season, SCE assesses each AOC notification on several dimensions: pending work on the structure, compliance deadlines, probability of ignition (POI), and wildfire consequence risk score.

Because risk levels vary across SCE's HFRA, structures are prioritized for inspection based on POI and consequence. In determining the 2022 Distribution HFRI inspection scope, SCE used the locational risk categorization from its IWMS Risk Framework, incorporated the latest risk modeling, and appropriate reserve capacity needed for resources to perform emergent AOCs. Figure II-19 outlines the process by which SCE incorporates risk through its inspection scoping processes.

Figure II-19
Evaluation of Risk for Distribution



In 2022, SCE shifted to a 5x5 matrix with one dimension of the matrix representing five levels of POI risk and the other dimension representing five levels of consequence. The structures that fall into Severe Risk Area and High Consequence Area IWMS tranches and qualify as the highest risk structures in their respective 5x5 matrix are inspected more frequently. This is illustrated in Figure II-20. Each 5x5 matrix in the figure represents the portion of the structure population that qualifies as the specific IWMS tranche (i.e., Severe Risk Areas, High Consequence Areas, or Other HFRA). The percentages within each cell represents the percent of total risk associated with the structures within the population. The percent of total risk takes into consideration the number of structures in the cell which may result in a higher percentage in a relatively lower risk cell compared to a relatively higher risk cell (i.e., POI Level 5, Consequence Level 1 contains a higher risk total percent then POI Level 1, Consequence Level 1).[41]

[41] Risk as measured by multiplying probability of ignition by wildfire consequence risk score. The same 99 percent risk coverage applies to SCE's Transmission Detailed Inspections.

Figure II-20
Visualization of Risk Analysis for Distribution

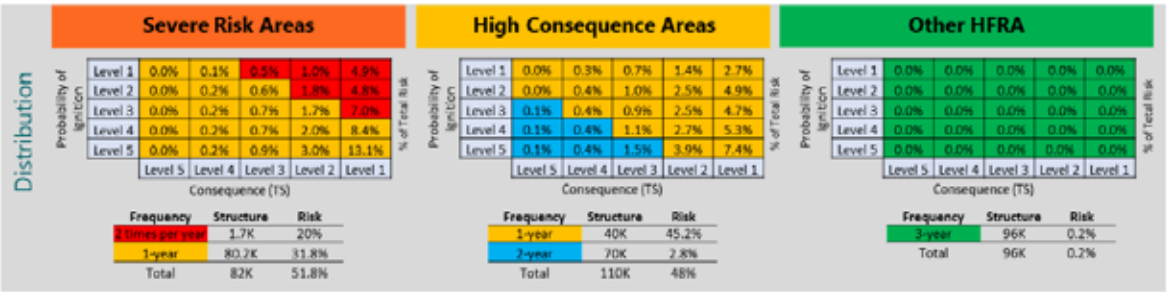
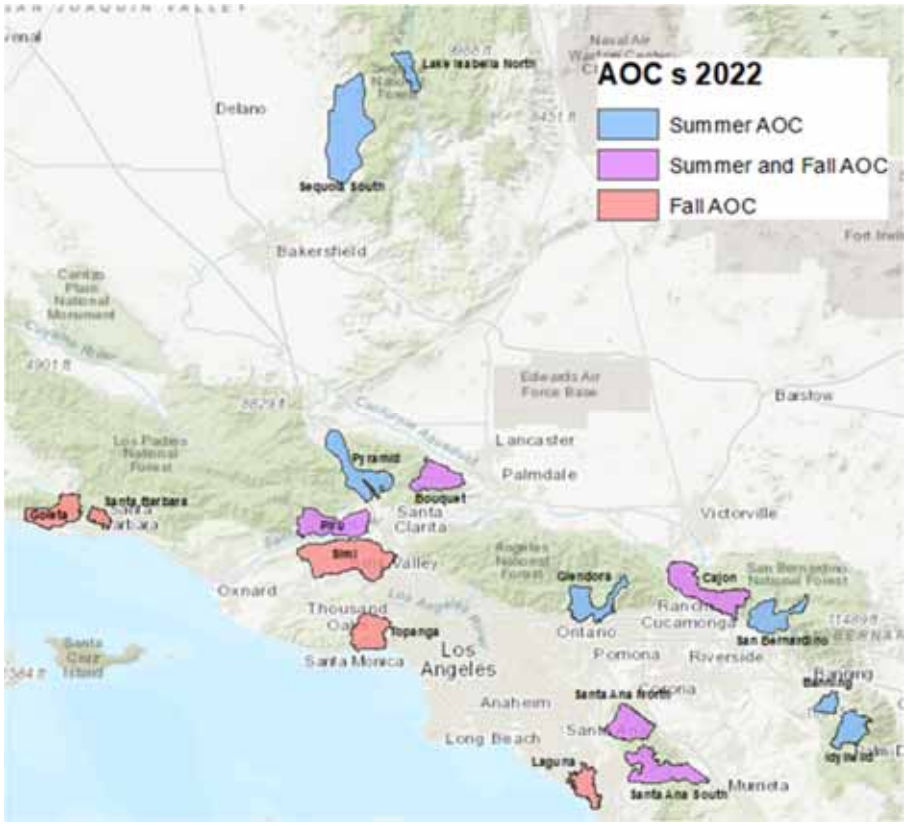


Figure II-21, below, shows the AOC from 2022. For AOC inspections performed in 2022, SCE incurred $0.507 million in O&M expenses for transmission and $0.916 million in O&M expenses for distribution.

Figure II-21
Summer and Fall 2022 AOCs



h) Generation Inspections

(1) Work Description, Need, and 2022 Scope and Cost of Work Performed

In 2022, SCE incurred approximately $0.070 million in O&M expenses to perform 222 high fire risk inspections on generation structures. In performing this volume of inspections, SCE surpassed its WMP target for generation inspections.[42] Generation facilities and related assets are in or near heavily forested areas with a potential for higher wildfire propagation. SCE performs high fire risk inspections on assets such as powerhouses, substations, transformer decks, gauging stations, pull boxes, and weather stations. Ground-based inspections on these assets allow SCE to detect equipment issues and mitigate ignition risks.

3. Remediations

a) Overview

This section discusses the remediation activities for the notifications identified by the inspection programs previously discussed, which include HFRA ground, HFRA aerial, transmission conductor and splice assessment, IR inspections and corona scans, and ground-based and aerial AOCs. SCE conducts the inspection programs previously described to identify GO 95-related issues, as well as any additional hazards through a remediation notification process. Remediation notifications identified through these inspections are prioritized, based on the severity of the findings. The notification types, remediation timeframes, and a breakdown of all notifications captured are shown in Table II-5 and Table II-6. Generally, remediations are completed, pursuant to compliance timeframes. All remediations identified by an inspection are subject to the requirements of GO 95, Rule 18-B, which prescribes timeframes for when notifications must be remediated.

[42] SCE 2022 WMP Update p. 137.

Table II-5
Notification Types and Remediation Timeframes

Priority	Remediation Timeframes	Examples
P1 issues require action, as soon as the issue is discovered, either by fully remediating the condition or by temporarily repairing the equipment or structure to allow for follow-up corrective action.	Condition must be made safe within 24 hours, and work must start within 72 hours.	Vegetation touching line, broken crossarm or insulator, burned connector, wire laying on crossarm, pins backing out, shoes coming apart.
P2 issues are lower risk and, therefore, may be resolved within 36 months, based on the existing safety and reliability condition and location. If the P2 issue is located within HFRA and poses a potential fire risk, remediation work is scheduled to be completed within 12 months. In an extreme fire threat area of Tier 3, the maximum remediation time is within 6 months.	Remediate within 6 to 12 months, depending on Tier 2 or Tier 3 location. Lower risk P2s may be resolved within 36 months, if they do not pose a potential fire risk, based on existing safety and reliability conditions.	Vegetation near line, deteriorated crossarm or splice, insufficient pole depth, damaged insulator.
P3 issues do not require near-term remediation, as they do not pose material safety, reliability, or fire risks and will either be repaired or re-evaluated at or before the next detailed inspection.	Remediation within 5 years.	Missing items, reflector strips, ground moldings, guy wire guards, high voltage signs, dampers damaged.

Table II-6[43,44]
Inspection Notifications Identified in 2022 (P1 and P2)

Category	Distribution	Transmission	Total Notifications
HFRA Ground	37,901	696	38,597
HFRA Aerial	2,163	292	2,455
Transmission Conductor and Splice Assessment	-	46	46
Infrared (IR) Inspections and Corona Scans	25	22	47
Areas of Concern (AOCs) - Ground-Based and Aerial	4,280	10	4,290
Total Notifications	**44,369**	**1,066**	**45,435**

b) HFRI Remediations – Distribution

(1) Work Description and Need

SCE conducts the inspection programs previously described to find and fix issues associated with potential wildfire risks through a remediation notification process. Remediation notifications identified through these inspections are prioritized based on the severity of the findings. For notifications identified within AOCs, they are further prioritized by risk, with the highest risk notifications requiring remediation prior to that year's Summer or Fall wildfire season. In 2022, SCE completed distribution remediations identified through risk-informed inspections, including ground-based, aerial, and IR. A large portion of the capital distribution remediations were crossarm replacements, but other equipment replacements were also included in this work, such as pole hardware replacements, bird guard replacements, and conductor repair and/or replacement. Poles requiring replacement were generally due to visible deterioration, such as rotting, avian damage, or excessive bowing and splitting or twisting.

43 For 2022, the majority of P3 notifications were completed by bundling work with other HFRA activities and treated as opportunity maintenance.

44 The notification counts in Table II-6 include "notify third-party" notifications. These notifications are outside SCE's control since a third-party (either a customer or a communication infrastructure provider) has created an issue that requires remediation on an SCE asset. Although SCE cannot force the third-party to remediate, SCE notifies them of the outstanding issue to satisfy its obligation with respect to these issues. SCE continues to monitor these notifications and requests the third parties remediate the identified issues.

(2) 2022 Scope and Cost of Work Performed

In 2022, SCE completed repairs and replacements associated with risk-informed and compliance-based inspections, including ground-based, aerial, and IR, and prioritized those remediations based on regulatory compliance due dates. When scheduling and performing compliance-driven remediation work, SCE also considers work bundling, outage requirements, permitting restrictions, crew availability, other programmatic efforts, and specialty equipment needs. SCE continues to bundle the work at the structure and circuit segment levels to the extent feasible for economic efficiency and to minimize the impact of remediation work on customers, as well as to reduce the volume of repeat outages, road closures and traffic restrictions. In certain cases, this resulted in future-year scope being accelerated in advance of the established compliance due date (i.e., pole replacement being accelerated from a future year to align with a crossarm replacement due in the current year). This resulted in approximately 1,604 future-year notifications being pulled forward into 2022 for completion. Additionally, there were several past due notifications that were not completed due to prior-year operating constraints such as resource availability, permitting delays, and weather deferrals. The past due notifications are risk ranked with the higher risk impact notifications prioritized for remediations. Table II-7 shows the number of completed distribution remediations, differentiated between capital and O&M and by priority level.[45]

Table II-7
Capital and O&M Distribution Remediations Completed in 2022

Priority Type	Capital	O&M	Grand Total
P1	945	908	1,853
P2	4,453	16,315	20,768
Total	**5,398**	**17,223**	**22,621**

SCE incurred $80.534 million of capital expenditures to remediate a total of 5,398 P1 and P2 notifications. The nature of high fire-risk remediation work typically

[45] In addition to the notifications completed through the HFRI Distribution Remediation program, SCE also addressed notifications as part of other programmatic work (i.e., through SCE's WCCP).

positioned crews in difficult-to-access locations, which increased travel times and often required the use of specialty equipment, such as helicopters or cranes, which increased costs. Electrical work in HFRA is often considerably more challenging given the terrain, limited access, permitting requirements, and the need for additional staging locations and laydown sites. In addition, SCE also included additional inspection questions and criteria from lessons learned. The additional questions and criteria resulted in a higher volume of notifications from the inspections and consequently, a higher number of remediations. As such, SCE incurred $45.098 million in O&M expenses for completing 17,223 P1 and P2 distribution remediation notifications in 2022. Of those P1 and P2 notifications, the five most frequent remediation-type categories were as follows: crossarm replacements, bird guard replacements, pole anchor repairs, conductor repairs and pole hardware replacements. Table II-8 further describes the types of issues found for each type of distribution notification. Once an inspection is conducted, remediations are required to be performed in accordance with Rule 18 of GO 95.

Table II-8
The Most Common Types of Capital and O&M
Distribution Remediation Notifications

Category	Description
Crossarm Replacements	Replacement of deteriorated crossarms showing signs of excessive damage such as cracks, splits, pitting, or burns.
Bird Guard Replacements	Replacement of avian protection cover on a pole.
Pole Anchor Repairs	Repair or replacement of damaged or loose guy wires and anchor attachments that may result in unbalanced strain on a pole.
Conductor Repairs	Conductor damage, fraying, or clearance issues that require either repair or replacement.
Pole Hardware Replacements	Miscellaneous hardware repair and replacement on a structure, including, but not limited to, installation of split bolts, line spacers, ridge-pin construction, lightning arrestors, and insulator replacements.

c) HFRI Remediations – Transmission

(1) Work Description and Need

Like distribution, SCE completed transmission capital and O&M remediations identified through risk-informed inspections, including ground-based, aerial, IR and corona scans, and conductor and splice assessments. These remediations were prioritized, based on compliance due dates. Most of the capital remediations were pole replacements, but other equipment replacements were also included in this work. Poles requiring replacement were generally due to rotting and/or aging, avian damage, caused by woodpeckers, or excessive bowing and splitting or twisting. Other equipment replacement can include the new/reinforced towers, conductor replacement, and the replacement of equipment on the structure (i.e., switches). O&M remediations include the repair of electrical structures/equipment, and the replacement of more minor items, such as insulators, crossarms, or guys. O&M remediations also include brushing or vegetation removal, which resulted from risk-informed inspections and not vegetation management program work, as required by city or county fire codes or pursuant to Public Resources Code (PRC) § 4292.

(2) 2022 Scope and Cost of Work Performed

In 2022, SCE completed repairs and replacements associated with transmission notifications (see Table II-9) identified through risk-informed and compliance-based inspections. SCE recorded $19.510 million of capital expenditures and $3.557 million of O&M expenses to perform remediations. Like distribution assets, SCE's ground-based, aerial, IR and corona scans, and conductor and splice assessment inspection protocols identified these necessary remediations, and SCE prioritized the resulting necessary repairs, based on regulatory compliance due dates. SCE considered several additional factors when scheduling and performing compliance-drive remediation work, which, like distribution, included outage requirements, permitting restrictions, crew availability, and specialty equipment needs. Table II-9 shows the number of P2[46] transmission remediations completed, split by capital and O&M.

Table II-9
Capital and O&M Transmission Remediations Completed in 2022

Priority Type	Capital	O&M	Grand Total
P2	411	1,331	1,742
Total	**411**	**1,331**	**1,742**

Table II-10, below, describes the most common types of transmission remediation notifications.

46 Transmission P1 notifications are considered breakdown repairs and not charged to wildfire. Transmission P3 notifications are minor, in nature, and generally bundled with other HFRA work.

Table II-10
The Most Common Types of Capital and O&M
Transmission Remediation Notifications

Category	Description
Crossarm	Deteriorated crossarms showing signs of excessive damage such as cracks, splits, pitting, or burns.
Pole	Visual failures identified as Priority 1 and Priority 2 conditions: -Priority 1 requires immediate action. Split, decay, hole/boring, or other exterior damage that has significantly compromised the integrity of the pole. Failure is imminent. -Priority 2 issues are lower risk and, therefore, may be resolved within six months for Tier 3 or 12 months for Tier 2 within HFRA. Split or decay at a critical point of attachment, hole/boring that allows light through the pole, and significant exterior damage.
Brushing	Vegetation growth around electrical structure.
Conductor	Conductor damage, fraying, or clearance issues that require either repair or replacement.
Pole Hardware	Miscellaneous hardware repair and replacement on a structure, including, but not limited to, installation of split bolts, line spacers, ridge-pin construction, lightning arrestors, and insulator replacements.
Guying	Damaged or loose guy wires and anchor attachments that may result in unbalanced strain on a pole.

d) Long Span Initiative (LSI)

(1) Work Description and Need

SCE's LSI consists of identifying and remediating distribution circuits over a certain length, spans with mixed conductor, spans that have a sharp angle, or spans that transition between vertical and horizontal configuration. All these types of long spans can have a higher probability of conductor clash in adverse wind conditions.

SCE completed conductor blow-out studies to evaluate risk factors and determine worst-case conditions that could lead to wire-to-wire contact on over-sagged conductors. In 2019 SCE used ground inspection finding results to determine the probability of a wire-to-wire contact causing an ignition by evaluating conductor type and length of span. After ground inspections were completed in 2019, SCE improved its risk-informed capabilities and analyses and in 2020. SCE began using Light Detection and Ranging (LiDAR) on its distribution

long spans to identify locations with potential issues and planned to remediate the highest risk locations upon field validation. SCE selected the LSI Remediation program due to the speed of deployment for line spacer installations and its effectiveness against wire-to-wire contact. Additionally, LSI has a relatively high risk spend efficiency (RSE) compared to other mitigation programs. Alternatively, LSI remediation can be performed during installation of covered conductor, however a more proactive and quicker approach is warranted, given the risk associated with wire-to-wire contact, especially during extreme wind events. LSI system hardening activities typically involve installing one of the following remediations: line spacers, longer crossarms, ridge pin construction, inter-set poles, or box construction. There are times when these remediations cannot be used, due to the uniqueness of the span and construction; in those cases, SCE defaults to the faster, lower cost options before covered conductor is used. The bulk of the long span remediations completed in 2022 were the result of 2019 ground-based inspections that carried with them assigned compliance due dates.

(2) 2022 Scope and Cost of Work Performed

In 2022 SCE completed 1,694 long span remediations. Of the 1,694 units completed, 1,130 units qualified for wildfire-related cost recovery under the LSI scope. In performing this volume of remediations, SCE achieved its 2022 WMP target for long span initiative, which was to perform between 1,400 to 1,800 long span remediations.[47] SCE typically employs work bundling to drive efficiencies and lower costs. When LSI work is bundled with other types of work, it may not qualify for wildfire-related cost recovery in the LSI work activity and will, instead, be accounted for through other programmatic work. In 2022, SCE recorded $7.965 million of capital expenditures and $3.895 million in O&M expenses for this sub-activity.

[47] SCE 2022 WMP Update p. 134.

e) Areas of Concern (AOC) Remediations

(1) Work Description and Need

As mentioned earlier, the AOCs are identified based on several factors, including fire history, current and near-term weather conditions, fuel type, vegetation moisture, terrain, exposure to wind, and egress, among others. SCE's Fire Science team identifies AOCs in HFRA, based on actual current year conditions, which are areas that pose increased fuel-driven (Summer AOCs) and wind-driven (Fall AOCs) fire risk. To mitigate the potential risk in AOCs, SCE implements an action plan in the AOCs that includes inspections of the assets (i.e., distribution, transmission, and generation) and acceleration of remediations for the assets with the highest risk.

(2) 2022 Scope and Cost of Work Performed

For AOC remediations in 2022, SCE incurred $0.384 million in O&M expenses and $0.986 million in capital expenditures for distribution AOC-related remediations and $0.238 million in O&M expenses for transmission AOC-related remediations. These AOC remediations are like the types of issues remediated for transmission and distribution assets, however, due to the issues identified in HFRA Severe Risk and High Consequence Areas, the remediations are accelerated in Summer and Fall before the peak of fire season.

f) Wildfire Capital-Related O&M Expenses and Wildfire Covered Conductor Remediation

(1) Wildfire Capital-Related O&M Expenses

(a) Work Description and Need

The costs discussed in this section represent expenses incurred for work that is necessary when capital additions or replacements are being performed and are not capitalized, pursuant to standard accounting guidelines. In this testimony, SCE has combined transmission/substation and distribution together for purposes of discussion, because they follow the same guidelines and the capital-expense relationship. Table II-11 provides examples where a capital expenditure would result in related O&M expenses being incurred.

Table II-11
Examples of Capital Expenditures and Their Related O&M Expenses

Capital Expenditure Example	Resulting Related Expense	Rationale
Pole Replacement	Replacement of insulators.	Insulators are a minor item installed on crossarms, which are also replaced at the time the pole is replaced.
Capacitor Bank Replacement	Moving conductors to make space for the new capacitor bank.	Rearranging and changing the location of plant not retired.
Conductor Replacement	Replacing a crossarm or adding new brackets to a pole.	Crossarms and brackets are minor items of the pole unit of property, which are not being replaced.
4kV Cutover	Replacing crossarms without replacing the pole, or replacing insulators without replacing the conductor.	Crossarms are minor items of the pole, and insulators are minor items of the conductor units of property, which are not being replaced.
New Service Connection	Rearranging an exisiting circuit to accommodate the new line extension.	Rearranging and changing the location of plant not retired.

As these examples show, "related expense" is directly related to capital expenditures. Therefore, as capital expenditures increase or decrease, there is a corresponding change to the related O&M expenses.

(b) 2022 Scope and Cost of Work Performed

In 2022, the incurred capital-related O&M expenses of $1.546 million was derived from both transmission and distribution capital work orders, which SCE primarily incurred for inspections and remediations. The associated capital work orders were related to the performance of preventive and reactive maintenance in SCE's wildfire mitigation programs.

(2) Construction Standards Remediation

In 2022, SCE spent $1.411 million in O&M expenses to address two initiatives under this activity: 1) remediation associated with the findings on existing covered conductor installations, which resulted in a cost of $0.257 million;[48] and 2) joint investor-owned utilities (IOUs) testing of covered conductor, resulting in a one-time cost of $1.154 million. The three IOUs, including SCE, Pacific Gas and Electric Company (PG&E), and San Diego Gas and Electric Company (SDG&E), are each responsible for one-third of the costs associated with the testing of covered conductor. To the extent PG&E and SDG&E reimburse SCE for the joint testing costs, SCE will apply the reimbursements as a credit to SCE's Base Revenue Requirement Balancing Account (BRRBA) to refund customers or reduce the amount requested through this Application, if the Application is still pending at the time of the reimbursement.

(a) Work Description and Need – Covered Conductor (CC) Remediation

CC Remediation is work SCE performed in 2022 on certain earlier-installed covered conductor projects to bring those installations to SCE's current construction and design standards. This work was important to help ensure the continued full effectiveness of CC and to prevent potential wire downs that could pose ignition risk.

(b) 2022 Scope and Cost of Work Performed – CC Remediation

During physical field visits, inspectors observed some covered conductor installations completed in 2018 and 2019 did not adhere to SCE's standards. Specifically, through the observation of approximately 3,500 covered conductor structures, inspectors found 576 structures did not fully adhere to SCE's current engineering standards. The issues are grouped into six distinct categories: 1) missing lightning arrester on equipment pole; 2)

[48] We are seeking cost recovery separately from WCCP, since these activities are a result of covered conductor installations, regardless of the programs that drive the installations.

excessive angle; 3) over-tensioned conductor; 4) wrong material used (insulator and jumper); 5) missing wildlife covers; and 6) partially exposed conductor. Of the 576 structures, SCE identified 172 structures as having medium-to-high priority to remediate and the remaining 404 low priority structures (i.e., missing wildlife or fuse covers) are to be naturally remediated through bundling with other work. Prior to 2022, SCE completed the remediation of 116 of the 172 medium-to-high priority structures. In 2022, SCE remediated another 45 medium-to-high priority structures, incurring $0.257 million in O&M expenses.[49] For the remediation of the 45 structures performed in 2022, as shown in Figure II-22, the majority (89 percent) of the identified issues resulted in minor repairs, which included the installation of lightning arresters, wildlife covers, appropriate insulator and jumper, and covering the partially exposed conductor. The remaining 11 percent of the repair work required a replacement of crossarm to address the excessive angle issue.

Figure II-22
Summary of Construction Issues Addressed / Completed in 2022

Construction Issue	SCE Standards Requirement	Number of Construction Issues* Addressed / Completed in 2022	Percent
1. Missing Lightning Arrester on Equipment Pole	Lightning arresters must be installed on equipment poles on covered conductor systems.	38	57.6%
2. Excessive Angle	The line angle must not exceed the critical crossarm angle limits, per the table in SCE's standards. Apply the appropriate crossarm construction (i.e., double crossarm or double dead-ends) to reduce the mechanical stress.	7	10.6%
3. Over-Tensioned Conductor	Must follow the correct methods and the new sag / tension tables for covered conductor, as shown in the standards.	0	0.0%
4. Wrong Material Used (Insulator and Jumper)	Must use polymer insulators with covered conductor. Must use the same covered condcutor size for jumper wires.	1	1.5%
5. Missing Wildlife Covers	Appropriate wildlife covers must be installed for dead-ends, connectors, fuses, lightning arrresters, equipment bushings, and potheads.	19	28.8%
6. Partially Exposed Conductor	Any exposed conductor must be covered. For example, exposed parts of conductors at dead-ends, connectors, and splices must be covered with the appropriate covers, as specified in the standards.	1	1.5%
	Total	**66**	**100%**

*Note that a structure can have multiple construction issues. For 2022, SCE addressed 45 structures with 66 construction issues.

[49] There remain 11 medium-to-high priority structures to be remediated in 2023/2024.

(c) Work Description and Need – Joint IOU CC Testing

SCE has been benchmarking and testing covered conductor effectiveness since the inception of the program.[50] As part of a continual enhancement effort, which also aligns with Energy Safety's Areas for Continued Improvement regarding SCE's 2022 WMP, SCE conducted the joint IOU CC testing with Exponent, Incorporated (herein referred to as Exponent),[51] an independent third-party, with collaboration with PG&E and SDG&E, to further understand the effectiveness of covered conductor to mitigate wildfire risk at the driver level and to reduce PSPS impacts.[52]

The objectives of the testing sub-workstream are to evaluate, through physical testing, the performance of covered conductor as compared to bare conductor for historically documented failure modes. As an example, testing covered conductor performance in preventing incidental phase-to-phase and phase-to-ground faults caused by contact with vegetation, conductor slapping, wildlife, and metallic balloons. To meet this objective, SCE, PG&E, and SDG&E collaborated on conducting additional research and testing of covered conductor. This effort has two phases. The first phase, which is now complete, had objectives to identify failure modes for covered conductors, document a utilities' consensus Failure Modes Effects and Analysis for covered conductors, and collect all previously conducted testing that informs on the performance of covered conductor for identified failure modes. The joint IOU CC testing, in this section, is associated with second phase to assess those previously identified failure modes.

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[50] *See* 2021 GRC Track 1 Application, WPSCE04Vol05APt01, Covered Conductor Compendium, pp. 4-246.

[51] Exponent is an engineering and scientific consulting firm with expertise in root cause and failure analysis.

[52] 2022 WMP, Energy Safety's Areas for Continued Improvement (ACI), SCE-21-04, pp. 639-696.

(d) 2022 Scope and Cost of Work Performed – Joint IOU CC Testing

In 2022, SCE incurred $1.154 million for Exponent to perform the joint IOU CC testing and analysis.[53],[54] Exponent's investigation included lab-based testing of 17kV and 35kV rated 1/0 ACSR,[55] provided by SCE. Exponent conducted several testing scenarios that assessed various contact-from-object, wire down, flammability, water ingress scenarios, and system strength.

The testing of contact-from-object (i.e., phase-to-phase contact) demonstrates that CC is effective at reducing arcing and the potential for ignitions whenever the insulation is intact, and the operating voltage is within normal ranges. Potential for ignition exists when the insulation is damaged/removed. This testing also involved energizing the CC at extreme voltages much higher than the CC was designed to withstand.

The wire-down testing investigated ignition risk posed by CC and bare wire wire-down events. Flaws were introduced to the covering to represent various scenarios during a CC wire-down.

The flammability testing subjected a small segment of conductor to local radiant heat to simulate how CCs would react to various magnitudes of wildfires. The magnitude of the heat represents surface fires, brush fires, and crown fires. Crown

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[53] *See* Workpaper Joint IOU Covered Conductor Testing Cumulative Report 12-22-22_Redacted, Effectiveness and Implementation Considerations of Covered Conductors: Testing and Analysis, available at https://www.sce.com/sites/default/files/AEM/Supporting%20Documents/2023-2025/Joint%20IOU%20Covered%20Conductor%20Testing%20Cumulative%20Report%2012-22-22_Redacted.pdf (accessed on September 11, 2023).

[54] SCE, PG&E, and SDG&E agreed to perform the joint IOU CC testing; however, SCE has retained the services of Exponent to perform all work necessary. The resulting amount of $1.154 million that SCE incurred will be split amongst the three IOUs. SCE is preparing a claim to submit to PG&E and SDG&E for the joint IOU CC testing costs. To the extent PG&E and SDG&E reimburse SCE for the joint testing costs, SCE will apply the reimbursements as a credit to SCE's BRRBA to refund customers or reduce the amount requested through this Application, if the Application is still pending at the time of the reimbursement.

[55] Aluminum conductor with steel reinforcement.

fires with a long residence time have the highest potential to cause damage to the covering of the conductor.

Water ingress testing was performed to evaluate the corrosion susceptibility for instances when the covering is removed. The test was varied by utilizing a tool specifically designed to remove the covering to expose a length of bare conductor and removing the covering manually without unique tools; the conductor material was also varied to include copper and aluminum. The conductor was then placed vertically with a dedicated reservoir of fluorescent water at the top to simulate moisture intrusion.

Salt spray testing was also performed to evaluate the susceptibility of exposed ends of CC to corrosion in coastal and industrial environments. This testing utilized a 5 percent salt solution for 168 hours with a SO^2[56] solution introduced intermittently. The testing varied like the water intrusion testing, but also added artificial defects to simulate mid-span damage and performed the testing on bare conductors as well. After the salt-spray corrosion testing, Exponent evaluated the tensile testing strength of the various aluminum, copper, and steel strand samples.

As a result of the testing, and in addition to more granular analysis, SCE made changes to its estimated effectiveness of covered conductor, increasing it from approximately 67 percent to approximately 72 percent. Testing results will be further discussed through meetings and workshops to determine any additional potential lessons learned. The IOUs also continue to share data regarding recorded effectiveness and will further evaluate several covered conductor-related subject areas including maintenance and inspection practices, new technologies, and a framework for calculating the effectiveness of the combination of mitigations.

[56] Sulfur dioxide.

g) Generation Remediations

(1) Work Description, Need, and 2022 Scope and Cost of Work Performed

SCE incurred $0.083 million in O&M expenses and $0.093 million in capital expenditures to perform 17 remediations for generation assets. These remediations were related to grounding grid upgrades such as replacing dirt with asphalt and installing lightning arresters to improve safety and reduce risk of equipment failure.[57]

4. HFRI Technology Solutions

a) Overview

Technology solutions are a set of related software, hardware, and/or services that lay the foundation to support and digitize SCE's wildfire risk mitigation initiatives in HFRA. HFRI technology solutions are part of the inspection improvement process where SCE continues to develop and adopt capabilities and technology solutions to gain efficiency and productivity of the end-to-end inspection process, incorporate risk-based scheduling, and improve asset management functions. The scope of the work within this activity is separated into three wildfire risk mitigation workstreams: inspections and remediations, data governance, and technology solutions (Arbora). Table II-12 summarizes SCE's total 2022 spend for HFRI Technology Solutions activities.

[57] SCE also incurred $0.343 million in O&M expenses for retrofits and upgrades for Legacy Facilities. Although these costs were recorded with Generation Inspections and Remediations, the costs are more closely associated with Grid Hardening Wildfire activities and efforts. Legacy Facilities are SCE's older hydroelectric power generation facilities that have been in operation for many years, and as a result, some equipment or components may be outdated or require significant maintenance. SCE has been transitioning away from these Legacy Facilities and investing in newer, more efficient, and environmentally friendly generation resources.

Table II-12
HFRI Technology Solutions
($ in millions)

Item No.	GRC / Work Activity	Total Capital Expenditures	Total O&M Expenses
1	Inspections & Remediations	$ 8.561	$ 4.437
2	Data Governance	$ 13.420	$ 1.211
3	Technology Solutions (Arbora)	$ 7.125	$ 3.286
	Total HFRI Technology Solutions	**$ 29.106**	**$ 8.934**

b) Inspections and Remediations

(1) Work Description and Need

Since 2019, SCE has been progressively implementing new technology solutions in support of SCE's inspection redesign effort, transitioning from a compliance, time-based inspection process to a risk-informed inspection process. These solutions support inspectors with improved processes and data to inform decisions regarding the health of the transmission and distribution field assets in HFRA. They also aim to better integrate the aerial and ground inspection business processes for both transmission and distribution, as well as to provide information and analytics on field assets across inspection, data collection, and remediation on a single digital platform. In addition, the solutions leveraged new technology capabilities like artificial intelligence (AI), machine learning (ML), assisted reality, and automation to increase the overall operational efficiency, consistency, and data quality.

Prior to the implementation of Field Mobility Platform 360 (FMP360), SCE crews used manual, paper-based systems to track execution and work status in the field. SCE's FMP360 is the technology support tool that automates high fire risk notifications and helps expedite the execution and closure of work orders. It is important that infrastructure work be scheduled and executed in a manner that prioritizes the critical needs in HFRA, minimizes outages to SCE's customers, and maintains safety for the public and SCE's crews in the field. This tool replaced the paper-based remediation process with a mobile application for both SCE field workers and contractors to capture remediation data and work status. FMP360

integrates with the source data in Consolidated Mobile Solution (CMS) to ensure timely documentation and closure of notifications in real-time. CMS is a system of record for field remediation work interconnected with FMP360. In turn, CMS updates work order status in SAP. FMP360 also provides SCE transparency into scheduled work by contractor or region.

(2) 2022 Scope and Cost of Work Performed

In 2022, SCE incurred $8.561 million in capital expenditures and $4.437 million in O&M expenses for the development of the InspectForce application software in support of the aerial and ground inspection capabilities, including AI and assisted reality, and the deployment of the scope mapping tool (SMT) and development of FMP360 as part of remediations work in HFRA.

The primary driver for the capital expenditures was the implementation of technology projects in support of SCE's inspection redesign effort. At the time, SCE focused on the deployment of InspectForce as the consolidated asset inspection platform to better integrate both aerial and ground inspection processes and establish a foundation for improving data quality and record accuracy. InspectForce ensures that data collected is available, accessible, timely, accurate, consistent, and complete. This single digital solution enables analytics across collected inspection data. SCE also implemented technology solutions that incorporate advanced technologies, such as AI, ML, and assisted reality. These advanced technologies provide more consistent and higher quality image capture, enabling the use of ML algorithms to provide more expedient identifications of asset defects across multiple inspection programs. InspectForce was first piloted in 2022 for transmission ground and aerial, and the tool was successfully utilized to complete the inspection cycle and capture and record relevant information. FMP360, an application primarily focused on mitigations, began to roll out in mid-2022 and will continue into the second quarter of 2023 to all distribution line construction and transmission contractors engaged in wildfire remediations. In addition, the deployment of the SMT, was completed in 2022. The SMT provides capabilities to assist with prioritizing, scheduling, and executing work in the field. SMT is a suite of GIS viewers. The distribution

engineering team is currently using the tool for work bundling to improve field productivity on wildfire ignition risk mitigation work.

The 2022 recorded O&M expenses for this activity can be classified into these categories: 1) licensing and subscription fees; 2) operational and maintenance support; 3) basic end-user operational change management support; and 4) data charges. Licensing and subscription fees include application licenses and vendor support associated with the various technology solutions. The operational and maintenance support include the preparation and installation of appropriate software for iPads.

c) Data Governance

(1) Work Description and Need

Over the past several years, SCE has built a centralized, unstructured, cloud data repository called the EzyData platform to store petabytes of data collected, as part of SCE's wildfire mitigation initiatives. SCE's aerial- and ground-based inspections have resulted in the gathering of massive amounts of remote sensing data, such as images, videos, and LiDAR data to aid in the identification and remediation of asset failures and wildfire ignition risk hazards related to SCE's assets located in HFRA. The scale of this data collection made it too large and complex to be stored, managed, and analyzed, using traditional data-processing solutions, and required the implementation of an effective and reliable cloud-based modern data solution.

SCE conducted a series of internal workshops to gather information on as-is processes and tools that are used to manage and report on data related to assets, wildfire mitigation initiatives (vegetation management inspections, vegetation management projects, asset inspections, and grid hardening), PSPS events, and risk events (wire-down events, ignitions, and unplanned outages). Information gathered from the workshops was used in the development of a design for the establishment of a centralized wildfire data repository. At the core of the EzyData architecture, data is centralized and available to share, using Application Programming Interface(s) (APIs) and advanced analytics.

The implementation of this solution allows SCE to a) effectively intake, organize, store, analyze, and visualize remote sensing metadata collected for wildfire mitigation initiatives, such as aerial inspections, ground inspections, vegetation management, etc.; and b) enables SCE's data scientists to develop, train, test, and deploy ML models at a scale to improve decision-making for various business processes. The base implementation of the EzyData platform is complete, including the ability to ingest, tag imagery with asset meta-data, search and visualize data on a map, and make data available to other systems. SCE has also deployed a data science platform to allow for the development of computer vision AI algorithms to be trained and developed to enable human-assisted AI identification of potential ignition-risk conditions. The primary focus of SCE's data science work is to augment AI algorithms, so they more accurately detect potential ignition risk and fault conditions on SCE's assets.

The Google Cloud Platform was used for consolidation of LiDAR data for visualization and analytics for the purpose of inspection, vegetation, and encroachment activities. SCE considered alternatives for data governance including an on-premises solution for both structured and unstructured data. However, given the projected growth within unstructured data and the volume of data (particularly video), pictures and LiDAR would have exceeded the data center capacity within a few years, requiring additional storage and processing capacity in SCE's data center, which would be more expensive than utilizing SCE's EzyData cloud-based solution. Additionally, SCE's current data center does not support AI and ML processing.

In 2021 and continuing into 2022, the Wildfire Safety Data Management (WiSDM) project was initiated for implementing the WMP data sharing capability, which is anticipated to advance SCE's data governance capabilities, including meeting the Energy Safety capability maturity level to centralize wildfire data and more efficiently deliver the data to the Energy Safety every quarter. The WiSDM platform collects data from many legacy enterprise platforms that contain asset inspection, PSPS, and other wildfire mitigation work management data, replacing the need for manual collection of data from individual systems.

As part of the WiSDM program, SCE conducted a series of internal workshops to gather information on as-is processes and tools that are used to manage and report on data related to assets, wildfire mitigation initiatives (vegetation management inspections, vegetation management projects, asset inspections, and grid hardening), PSPS events, and risk events (wire-down events, ignitions, and unplanned outages). Information gathered from the workshops was used in the development of a design for the establishment of a centralized wildfire data repository. At the core of the WiSDM architecture, data is centralized and available to share, using APIs.

(2) 2022 Scope and Cost of Work Performed

In 2022, SCE incurred $13.420 million in capital expenditures and $1.211 million in O&M expenses for the development of a centralized cloud-based data repository and data platform. As part of the ongoing development of SCE's data governance strategy and implementation, the development in this workstream will continue for several years until these technologies fully mature. The capital expenditures for this technology were focused on collecting inspection data, both terrestrial and aerial, in a central repository for data analysis concentrated on identifying assets that require mitigation to decrease the risk of wildfire ignition and address public safety concerns. The use of a Central Data Platform allows SCE to use data analysis, artificial intelligence and review assets from multiple sources and viewpoints to identify risk conditions that a ground-based or aerial based inspection alone may not capture. The investment in this data platform is a prudent use of funding as it allows for SCE to evolve its inspection techniques and AI models, over time, to evolve its wildfire mitigation capabilities. This is superior and more cost effective than just relying on periodic and specific inspections where data may be fragmented across dispersed systems that do not provide a historical and comprehensive view of the assets.

EzyData Google Cloud AI platform was configured late 2021 and in the first quarter of 2022, and two new distribution defect detection models were stabilized in May 2022, further expanding the AI platform. Also, solution analysis was completed for aerial

LiDAR data integration, which will be implemented using the EzyData Google Cloud Platform to transfer historical LiDAR program source data to a third-party platform.

Additionally, the WiSDM project completed solution analysis in mid-2022, where an approved solution architecture was defined, along with detailed system requirements that will be utilized for traceability and testing. The WiSDM project finished the design phase in 2022 and moved to the build phase, regarding the centralized data repository and data portal for structured data. The project successfully completed the deployment of all planned capabilities in 2023.

The 2022 recorded O&M expenses for this activity can be classified into these categories: licensing and subscription fees, operational and maintenance support, basic end-user operational change management support, and data charges. Licensing and subscription fees include application licenses and vendor support associated with the various technology solutions. The operational and maintenance support include normal time labor costs related to the extraction, consolidation, and automation of the wildfire data for SCE's Quarterly Data Reports to the Energy Safety.

d) Technology Solutions (Arbora)

(1) Work Description and Need

As part of SCE's 2020 WMP and the long-term strategy for vegetation management, SCE developed an integrated vegetation management software solution that aims at integrating vegetation management programs across the organization to streamline vegetation-related work efforts that can overlap across large geographic areas. Built on the Salesforce platform, Arbora is a single, scalable, and easy-to-use system that allows SCE and its contract partners to manage and execute vegetation management efforts more effectively. Prior to Arbora, managing and monitoring work for each vegetation program required reliance on multiple systems, some requiring the use of Excel spreadsheets to create, update, and close work activities; manage schedules; and view up-to-date reports. As vegetation management programs expand in scope and user base, systems and processes became increasingly complex to scale and

maintain. As of 2021, SCE completed deployment of Arbora for the Dead, Dying, and Diseased Tree Removal Program, which remained in use for the program in 2022. In 2022, SCE continued building capabilities to support the Hazard Tree Management Program and began development of capabilities for Routine Line Clearing.

(2) 2022 Scope and Cost of Work Performed

In 2022, SCE recorded $7.125 million in capital expenditures. SCE incurred costs of $4.385 million for vendor development labor and support resources, $1.570 million for iPads and the deployment to field workers, $0.891 million in supplemental contracts and costs for materials, and $0.279 million in labor costs and other miscellaneous costs. The costs reflect spending required to complete development for the Hazard Tree Program and Routine Line Clearing capabilities,[58] as well as to initiate development of capabilities supporting SCE's vegetation management emergent work.

In 2022, SCE recorded $3.286 million in O&M expenses. SCE incurred costs of $2.936 million for vendor operational and maintenance support and $0.350 million in software licensing costs.[59] The spend consisted of monthly enhancements and routine maintenance to the capabilities supporting the Hazard Tree Program and Routine Line Clearing.

C. Fire Science and Advanced Modeling

Table II-13 summarizes SCE's total 2022 spend for Fire Science and Advanced Modeling activities.

[58] SCE met its 2022 WMP Update targets for Arbora, as shown in SCE's 2022 WMP Update at p. 140 for program target VM-6 Vegetation Management Work Management Tool (Arbora).

[59] The costs for the Arbora software platform that supports vegetation management programs, Technology Solutions, are recorded in the WMPMA, and not in the VMBA. Those costs relate directly to an activity in SCE's 2022 WMP Update and, therefore, are appropriate to record in the WMPMA. *See* SCE's 2022 WMP Update, p. 430-433.

Table II-13
Fire Science and Advanced Modeling
Total Spend for 2022 by GRC Activity
($ in millions)

GRC / Work Activity	Total Capital Expenditures	Total O&M Expenses	Recovery Account for Incremental Amounts
Fire Science and Advanced Modeling	$ 0.766	$ 7.482	WMPMA
Total	**$ 0.766**	**$ 7.482**	

1. Overview

SCE's Fire Science and Advanced Modeling activity includes multiple projects and sub-activities that affect situational awareness, PSPS, and various grid hardening efforts, all of which support the goal of reducing the threat of wildfires associated with utility equipment. SCE's Fire Science program was developed for the purpose of gathering relevant scientific and technological advancements to help mitigate risks from wildfires associated with utility infrastructure. This involves the integration of multiple scientific disciplines to synthesize and analyze data to help model atmospheric conditions and assess fire potential. Weather and fuels modeling spans multiple areas, including modeling weather and vegetation conditions, as well as modeling the spread and behavior of wildfires. Fire Science's activities are critical to SCE's situational awareness, PSPS execution, day-to-day operations, and effective wildfire mitigation planning and execution. Fire Science is the foundation of the PSPS program as customer notifications for such events are based on weather and fire potential forecasts.

In 2022, SCE used data derived from its weather stations and other sources in combination with fire science and weather and fuels modeling techniques to develop new predictive models that helped SCE focus its wildfire mitigation efforts and strategies more effectively.

2. Advanced Modeling Computer Hardware

a) Work Description, Need, and 2022 Scope and Cost of Work Performed

The use of high-performance computing is necessary to run SCE's in-house weather modeling, which is foundational to the PSPS program. Numerical weather modeling involves millions of computations to generate weather and fuel moisture forecasts to meet the requirements of the Fire Science and Meteorology teams. Each of SCE's High-Performance Computing Clusters is the equivalent of approximately 250 laptop computers and generates tens of millions of data points per day. SCE runs forecasts twice per day out to seven days at a level of granularity that exceeds that of most publicly available prognostic data. To operate these high-performance computers, SCE has engaged a third-party vendor to provide maintenance services and has annual subscription services from Technosylva and Atmospheric Data Solutions, Limited Liability Company. In 2022, SCE recorded $2.128 million in O&M expenses to support these activities.

3. Fire Science Enhancements

a) Work Description, Need, and 2022 Scope and Cost of Work Performed

SCE's fire science enhancements are comprised of the continuation of the Santa Ana Wind Outlook and Self-Organizing Maps (SOMs). SCE's Santa Ana Wind Outlook subscription allows SCE to continue receiving 1-month and 3-month ahead forecasts of Santa Ana winds over the service area. The model consists of several components, including an ML approach to help determine the approximate number of days over the forecast period in which Santa Ana wind conditions will occur. These forecasts are used in combination with SCE's seasonal outlooks to help inform the frequency of these events when planning for inspections and remediations across SCE's service area.

SOMs are a form of pattern recognition used to identify meteorological scenarios that lead to extreme weather events. For example, SOMs may be used to identify Santa

Ana winds and their characteristics, such as magnitude, duration, and location. SOMs can also relate weather patterns to fire activity to show which fires may exhibit extreme fire behavior based on weather scenarios. This type of pattern recognition can be used as a predictive tool in helping identify potential PSPS events and situations where multiple large fires can occur simultaneously. SOMs can be incorporated into climate change modeling to show what trends exist in critical weather patterns that may pose a threat to SCE's infrastructure. In 2022, SCE recorded $0.372 million in O&M expenses to enhance the fire science program.

(1) Fire Potential Index (FPI)

SCE's current FPI is a direct input into PSPS decision-making and provides an estimate of fire potential risk at the circuit level. Since the FPI is one of the pillars for determining when or if to initiate PSPS, it is imperative that work to improve the accuracy of wildfire assessment continues. In 2022, SCE formulated a new FPI (2.0) by placing more emphasis on wind speeds and adding a new fuels component to account for the diversity of fuel conditions across SCE's service area. SCE will evaluate FPI 2.0's performance against the current FPI with the goal of integrating FPI 2.0 into the PSPS decision-making process in a measured approach over time.

4. Fire Spread Modeling

a) Work Description, Need, and 2022 Scope and Cost of Work Performed

SCE's fire spread modeling capabilities provide risk and consequence information, projecting how much a wildfire will impact a community. Specifically, SCE uses fire simulation applications, FireCast, FireSim, and the Wildfire Risk Reduction Model (WRRM) from its vendor Technosylva to help understand the impact wildfires may have on downstream communities. While FireCast and FireSim use real-time weather forecasts to calculate actual risk, WRRM uses historical data to measure relative risk to help with the prioritization of grid hardening activities. Depending on the location, some wildfires will be more impactful, regardless of size, due to the presence of populations, buildings, and utility assets in the area,

among other factors. SCE continues to make important investments in fire spread modeling technology to help identify areas that are at high risk for large wildfires, which can have devastating consequences.

In 2022, SCE also worked with Technosylva to perform a PSPS Asset Risk Analysis to help establish consequence criteria as a potential independent, additional data point for PSPS decision-making. The work with Technosylva involved the development of the building loss factor, and the response complexity metric. Technosylva also performed a Risk Associated with Value Exposure analysis to help understand additional risk factors, both static and dynamic, that contribute to possible consequences from fires associated with SCE's assets. There were additional tasks that Technosylva performed, such as updating its fuels layer and providing fire behavior analyst support for ongoing and emerging fire activity. In 2022, SCE recorded $1.236 million in O&M expenses for these tasks.

5. Fuel Sampling Program

a) Work Description, Need, and 2022 Scope and Cost of Work Performed

Dry fuel conditions contribute to increased wildfire risk. As such, SCE incorporates fuel moisture conditions in its PSPS decision-making process. While local fire agencies conduct fuel sampling, SCE determined it would be beneficial to sample in areas where major fuel sampling gaps exist both spatially and temporally. SCE takes real-time measurements of vegetation moisture at 15 sites across its service area. Live fuel moisture sampling provides ground truth observations biweekly that: 1) help assess how receptive the fuels are to fire; 2) help align FPI values when forecasts of live fuel moisture are misaligned with observations; and 3) help train ML models that provide estimates of live fuel moisture on a grid. In 2022, SCE continued to sample live vegetation moisture at 15 locations across its service area every two weeks and incurred $0.220 million in associated O&M expenses. The costs associated with this activity include samplers' time to collect the vegetation and to ship and process the samples at a

laboratory. Results are, then, returned to SCE, in a reported form, to help with the assessment of fire potential.

6. Remote Sensing

a) Work Description, Need, and 2022 Scope and Cost of Work Performed

Remote sensing is a rapidly expanding, diverse industry that contains a broad array of applications, some of which can be used to obtain information on the characteristics and health of vegetation. Having this knowledge in semi-real time is important in understanding how much vegetation is on the ground, how old it is, what type it is, and how much moisture is in it, since these are all factors that play a significant role in the initiation and spread of wildfires. SCE leverages remote sensing technology using satellite imagery to collect additional information on weather, fuels, and fire activity to enhance SCE's overall risk modeling, wildfire modeling capabilities and situational awareness capabilities.

In 2022, SCE began to work with Earth Labs in association with the University of Colorado at Boulder to develop a Vegetation Buildup Index, which is a product that contains a heat map showing the approximate areas where the dynamic combustibility of fuels is greatest. The Vegetation Buildup Index considers vegetation moisture, type, and amount, as well as the long-term climatological effects upon the vegetation.

In 2022, SCE partnered with San José State University to help observe winds above ground level, during two PSPS wind events, using LiDAR technology. After each event, the LiDAR data was processed and analyzed to help understand the behavior of each wind event, and the ability of this technology to help forecast the onset of strong winds at ground level. In 2022, SCE recorded $0.141 million in O&M expenses for its remote sensing activities.

7. Academic Research Partnerships

a) Work Description, Need, and 2022 Scope and Cost of Work Performed

During 2022, SCE partnered with the academic community to devise a new method to derive more complete wind risk profiles along infrastructure during PSPS events and to develop local nowcasting techniques with the University of California at Santa Barbara. As a result of the work performed by the University of California at Santa Barbara, SCE has implemented a new short-term weather forecast model to predict wind trends during PSPS events and is working to implement a new observation model that will improve situational awareness during weather events. In addition, SCE is a member of the Wildfire Interdisciplinary Research Center through San José State University in which various projects related to wildfire science are funded and supported. SCE is also part of the Wildland-Urban Interface (WUI) Fire Institute through California Polytechnic State University at San Luis Obispo, which makes significant contributions to solving the WUI fire problem through research and education that innovates, informs policy, disseminates information, and educates students, professionals, and stakeholders to reduce WUI fire consequences, costs, and losses. In 2022, SCE recorded $0.291 million in O&M expenses for this activity.

8. Weather and Fuels Modeling

a) Work Description, Need, and 2022 Scope and Cost of Work Performed

SCE's in-house weather and fuels modeling is foundational to PSPS and grid operations. Because knowing when and where severe weather conditions will impact SCE's infrastructure is important for an appropriate proactive response, it is vital that current operational weather and fuels modeling capabilities are maintained and that planned improvements to SCE's in-house modeling capabilities continue. In 2022, SCE expanded its ML weather forecast capability, procured the European Centre for Medium-Range Weather Forecasts weather model output, and completed updating its Live Fuel Moisture models by incorporating

additional vegetation species. These enhancements were necessary to improve the overall accuracy, granularity, and dependability of SCE's forecasts of weather, vegetation moisture, and fire potential, all of which directly impacts PSPS decision-making. In 2022, SCE recorded $3.089 million in O&M expenses for this activity.

9. Asset Risk Modeling and Operational Analytics

a) Work Description, Need, and 2022 Scope and Cost of Work Performed

SCE is developing a weather visualization tool that, along with a more robust graphic user interface, will allow users to view and analyze large amounts of internal and external weather and fuel data quickly and efficiently. This will represent a marked improvement over the current process in which users are retrieving information, primarily in static map form from vendors and cannot effectively overlay SCE infrastructure on top of the forecast weather outcome to understand the risk profile. This new tool will allow SCE to visualize in-house and external weather and fuels model sources in a single location, will be dynamic, and will have access to SCE GIS layers important for making PSPS decisions. This will facilitate meteorologist/fire scientist analysis and improve communication of the expected weather impacts. In 2022, SCE's recorded O&M expenses of $0.005 million and capital expenditures of $0.766 million for this activity.

D. Enhanced Situational Awareness

Table II-14 summarizes SCE's total 2022 spend for Enhanced Situational Awareness activities.

Table II-14
Enhanced Situational Awareness
Total Spend for 2022 by GRC Activity
($ in millions)

GRC / Work Activity	Total Capital Expenditures	Total O&M Expenses	Recovery Account for Incremental Amounts
Enhanced Situational Awareness	$ 3.514	$ 5.534	WMPMA
Total	**$ 3.514**	**$ 5.534**	

1. Overview

Comprehensive situational awareness is fundamental to SCE's ability to make informed operational decisions and to help ensure service delivery, particularly during periods of elevated fire risk that may lead to wildfire and/or PSPS activity. To increase situational awareness, SCE created the Situational Awareness Center Capability where meteorologists provide weather forecasts, analytics, and hazard advisories to support the execution of activities, such as PSPS. These tools increase SCE's ability to effectively prepare for and respond to wildfire-related risks by improving its understanding of the nuances associated with critical system operations, including granular weather conditions across the system and other external factors that affect the daily operation of the grid. High resolution weather and fire modeling products, made possible through High-Performance Computing Clusters technology, are utilized by SCE's Fire Science and Weather Services teams to enhance situational awareness. These tools increase SCE's capacity to better forecast elevated weather conditions and potential wildfire activity, which in turn leads to better decision-making information during regular operations and emergencies and are used by SCE's fire management officers, as well.

2. Weather Stations

a) Work Description, Need, and 2022 Scope and Cost of Work Performed

SCE's weather stations provide data such as sustained wind speed, wind gust speed, direction of wind, humidity, and temperature. Adding these microclimate monitoring

capabilities within the SCE service area has increased its situational awareness for severe weather and high wind events and provides more granular data to existing weather forecast models. This microclimate weather station investment increases SCE's ability to safely and efficiently monitor adverse weather conditions related to electrical assets.

Observations from weather stations are key inputs into ML models. The ML models help reduce forecast bias (the average difference between forecast and observed values) by using SCE's network to gain an understanding of the typical forecast error in past events and applying that knowledge to predictions from its in-house models. SCE's weather stations are also being used as part of an academic partnership geared towards continued improvement of situational awareness during PSPS and non-PSPS events. For example, the data from the weather stations is being used to develop an ML-based observations model that fills in gaps in the observing network, allowing for improved monitoring of storm conditions. This effort will allow SCE to make better informed decisions, during PSPS, to keep its customers and employees safe, during elevated fire weather conditions.

In 2022, SCE recorded $3.048 million in O&M expenses related to maintaining SCE's weather station network to include routine maintenance, repairs, ongoing vendor support, and data plans. As SCE's network of weather stations has grown, maintenance is required on more stations and vendor support and data plans are charged on a per station basis. In 2022, SCE recorded $3.439 million in capital expenditures, which included the purchase of additional weather stations, installation labor, dual communication enhancements for increased data reads, as well as communication redundancy, contractor station siting efforts, and sub-transmission and bulk-transmission pole loading and tower analyses. In 2022, SCE had a Wildfire Mitigation goal of 150 weather stations, with a stretch goal of 175. In 2022, SCE installed 160 weather stations.

3. High-Definition (HD) Cameras

a) Work Description, Need, and 2022 Scope and Cost of Work Performed

HD camera live feeds aid SCE in faster information gathering, which have proven critical for asset protection, and provide fire confirmation capabilities for situational awareness to incident management teams when necessary. Although SCE has access to fire progression information through other public means (i.e., satellite technology, monitoring news channels, social media, and/or 911 calls information relayed to SCE) and can dispatch SCE personnel to determine fire severity, SCE deployed HD cameras to expedite information gathering regarding fire location and progression for quicker situational awareness. The access to information sooner allows for faster decisions to be made for asset protection and necessary resources. The HD cameras are also used to monitor and evaluate weather and fuel conditions for the purpose of understanding ignition potential and consequence. SCE will continue to partner with impacted fire agencies and public safety partners throughout SCE's HFRA to provide critical HD camera live feeds that support the fire agencies' effective deployment of air and ground resources. Through year-end 2022, SCE installed 182 HD cameras, providing visual coverage of approximately 90 percent of its HFRA.

In 2022, SCE recorded $1.991 million in O&M expenses, due to recurring monthly costs. The major drivers of HD cameras' non-labor costs are data subscription fees, network communication fees, routine maintenance, and tower lease fees, which are paid on a per-camera basis. SCE recorded $0.075 million in capital expenditures. SCE determined that there were blind spots within its service area where infrastructure and some WUI areas were unable to be seen in the existing camera viewsheds. In SCE's Wildfire Mitigation Plan, SCE had a goal of installing up to 20 HD Cameras. As a result, SCE installed 16 additional cameras in 2022 to address identified blind spots.

4. Wildfire Response, Modeling, Analytics, and Weather Forecasting

a) Work Description, Need, and 2022 Scope and Cost of Work Performed

To continue to advance its fire science and weather modeling capabilities to support situational awareness, PSPS execution, and various grid hardening efforts, SCE required labor to manage its Fire Science and Advanced Modeling program, which is staffed by meteorologists, fire scientists, and other fire management personnel. SCE implemented technology advancements, such as ML, probabilistic forecasting, and remote sensing, as discussed in Section C, which supports SCE's goal of reducing the threat of wildfires associated with utility equipment. In 2022, SCE recorded $0.495 million in O&M expenses for these activities.

E. Organizational Support

Table II-15 summarizes SCE's total 2022 spend for Organizational Support activities.

Table II-15
Organizational Support
Total Spend for 2022 by GRC Activity
($ in millions)

GRC / Work Activity	Total Capital Expenditures	Total O&M Expenses	Recovery Account for Incremental Amounts
Organizational Support	$ -	$ 8.758	WMPMA / FRMMA
Total	**$ -**	**$ 8.758**	

1. Overview

The costs covered in this section were incurred in 2022 for program management support for Risk Modeling, Grid Resiliency Project Management activities, Organizational Change Management (OCM), and Human Resources activities.

2. Work Description, Need, and 2022 Scope and Cost of Work Performed

a) Risk Modeling Services

In 2022, SCE incurred $0.888 million in O&M expenses for risk modeling services. Technosylva has been used by SCE, since 2020, to model wildfire consequences for both wildfire mitigations and PSPS risk analysis and is an integral part of the risk modeling described in SCE's WMP. Additionally, risk modeling services have been used to develop a Wildfire Catastrophe Model, used widely by the insurance industry, which simulates thousands of possible wildfire events applied to SCE's service area and reflecting its mitigation strategies. The output has been used to drive analysis in several areas of wildfire risk, including analysis of remaining wildfire risk across SCE's service area, analysis of wildfire self-insurance amounts, and providing a stochastic dataset to compare results of existing risk models.

b) Compliance Intake and Program Management

In 2022, SCE incurred $0.281 million in O&M expenses for an independent evaluator to review and assess SCE's compliance with its WMP. Per Section 8386.3 of the Public Utilities Code, Energy Safety, in consultation with the Office of the State Fire Marshall, makes available a list of qualified independent evaluators with experience in assessing the safe operation of electrical infrastructure. SCE is required to engage one of the independent evaluators to determine whether SCE funded the activities included in its WMP. Energy Safety authorizes SCE and the other electrical corporations to recover the cost of the independent evaluator in rates.

c) Grid Resiliency Project Management Support

In 2022, SCE incurred $6.161 million in O&M expenses for Grid Resiliency Project Management Support. The Wildfire Safety organization (formerly Grid Resiliency and Public Safety Program Management Organization (PMO)) continues the centralized management and oversight of SCE's wildfire mitigation efforts that began in 2018. The volume of wildfire mitigation-related work associated with the coordinating, planning, project managing, and reporting across the enterprise and to external entities remains high and

requires rapid execution to meet short timeframes. Additionally, as part of the WMP, SCE was asked to onboard third-party reviewers to assess activities, such as HFRA safety observations and RSE. The $6.161 million total O&M expenses include the following activities.

Supplemental project management resources included a third-party review required for the WMP RSE methodology, WMP financial performance analysis and reporting, and regulatory work. Additionally, support was provided for the wildfire-related aerial inspections process and program enhancements, including centralized LiDAR program assessment. In 2022, SCE recorded $3.351 million in O&M expenses for these PMO activities.

Since 2019, SCE has enlisted support to strengthen contractor oversight and safety observations to proactively address SCE's wildfire mitigation efforts. During 2022, over 3,500 field observations were conducted on field work during execution and over 550 opportunities for improvement were identified. These opportunities for improvement include, but are not limited to, proper use of personal protective equipment, pre-job safety briefings, work area protection, and use of tools and equipment. After each observation, a follow-up email is sent to the contractor representative, the SCE representative, and the SCE safety team. In 2022, SCE recorded $2.810 million in O&M expenses for this activity.

d) <u>Organizational Change Management (OCM)</u>

The Wildfire Safety organization oversees OCM activities to prepare and support SCE employees and contractors in implementing new technologies and operational processes to perform SCE's wildfire mitigation work activities. OCM focuses on ensuring process/technology changes are clearly defined, communicated, and adopted. OCM involves: (1) identifying impacted personnel; (2) developing communication materials about the objectives and importance of a program, the expected roles and responsibilities and the need for changing responsibilities and a plan of action; (3) supporting message delivery; (4) assessing readiness of the impacted employees to perform the required functions and provide additional information as needed; (5) developing training materials; (6) supporting training delivery; (7) monitoring ability of new teams to perform their functions and support teams as needed; and (8) analyzing what

could be improved for future efforts. These OCM efforts are critical to ensure effective implementation of wildfire mitigation activities to reduce ignition risk. This OCM support was provided to inspection programs, vegetation management assessment and maintenance programs, and PSPS technology and programs. In 2022, SCE recorded $1.213 million in O&M expenses for these activities.

e) Human Resources Support

In 2022, SCE incurred $0.214 million in O&M expenses for Talent Acquisition. This expense is comprised of $0.128 million in O&M expenses for incremental Human Resources talent acquisition services for wildfire mitigation programs, including recruiting, candidate screening, interview selection support, and other hiring activities. Additionally, SCE incurred $0.086 million O&M expenses in learning and development support for the development and management of training materials for wildfire mitigation projects. Both the talent acquisition and learning and development support was provided by SCE internal labor and supplemented by contract services.

F. Public Safety Power Shutoff (PSPS)

Table II-16 summarizes SCE's total 2022 spend for PSPS-related activities.

Table II-16
Public Safety Power Shutoff
Total Spend for 2022 by GRC Activity
($ in millions)

GRC / Work Activity	Total Capital Expenditures	Total O&M Expenses	Recovery Account for Incremental Amounts
PSPS Customer Support	$ -	$ 25.635	WMPMA
PSPS Execution	$ 0.006	$ 11.856	WMPMA
PSPS Technology Solutions	$ 19.136	$ 8.547	WMPMA
Total	**$ 19.142**	**$ 46.038**	

1. Overview

SCE continues to undertake significant efforts to protect the safety of the public and to mitigate the risk of wildfires associated with electric facilities by developing a robust infrastructure program to manage wildfire-related risks. As a measure of last resort, under certain circumstances, SCE must utilize the proactive de-energization of power lines to avoid the risks of catastrophic wildfires. This is known as PSPS (i.e., the proactive de-energization of electrical equipment due to the threat of existing or impending wildfire to help ensure public safety). The feedback SCE received throughout the PSPS events in 2020, in President Batjer's letter on January 19, 2021, and during the Commission meeting on January 26, 2021, made clear the areas SCE had to improve regarding PSPS. Efforts to improve SCE's PSPS performance are iterative and ongoing. In 2021, SCE developed a comprehensive Action Plan that described over 130 concrete activities targeted at improving PSPS communications and reducing the frequency, scope, and impact of PSPS during the 2021 fire season in response to the letter from CPUC then-President Batjer. By Spring 2022, SCE had completed all but one of the Action Plan activities.

Beyond meeting the Commission's requirements related to PSPS events, SCE recognizes that while PSPS lowers the risk of wildfire ignitions, these extended outages can have very real impacts on its customers. SCE expects to continue to reduce the scope, frequency, and duration of PSPS events as it makes progress on its grid hardening work and executes its wildfire mitigation initiatives. SCE made additional efforts to improve performance in 2022, including enhancements to the Integrated PSPS Event Management System (iPEMS) and Central Data Platform (CDP)[60] that was built in 2021 (and launched in 2022) to consolidate and automate PSPS operations.

SCE's PSPS actions are guided by four fundamental objectives: (a) protect public safety; (b) keep the power on for as many customers as possible; (c) communicate clearly and accurately; and (d) minimize the impact of de-energizations through customer programs. In

[60] CDP is further described in section c) Wildfire Mitigation and Vegetation Management Technology Solutions; (3) PSPS Technology Solutions; (b) IMT Customer Notifications.

support of this, SCE has developed processes and procedures for programs specifically targeted to reduce this risk and mitigate the impacts of outages. Below, SCE discusses: (1) PSPS Customer Support, which provides support to customers and communities in the event of an actual PSPS event; (2) PSPS Execution, which includes the processes for activating an Incident Management Team (IMT) to manage a potential PSPS event and related costs and programs; and (3) Technology Solutions, which are the technology investments necessary to support PSPS-related work.

As more fully discussed in Chapter V.B.4, SCE is not seeking recovery of $2.500 million of incremental O&M expenses related to PSPS-program-related activities to effectuate a disallowance, resulting from the Commission's Safety and Enforcement Division's (SED) investigation of SCE's 2020 PSPS events. Pursuant to the agreement between SED and SCE, $0.500 million of the 2022 disallowance is applied to incremental spend associated with PSPS-related customer outreach and, more specifically, partnering with Community-Based Organizations (CBOs) to conduct education and outreach for their constituents and provide SCE with monthly reporting on outreach effort. The remaining $2.000 million of the 2022 disallowance is applied to incremental spend associated with PSPS notifications and, more specifically, enhancements to the Emergency Outage Notifications System to improve communications with customers.

2. PSPS Customer Support

a) Overview

When necessary, SCE activates its PSPS event process, which entails implementing a series of detailed notifications to its customers, public safety partners, and other entities on potential PSPS activity. In addition, throughout the year, SCE provides consistent and frequent messaging designed to build customer awareness and understanding of what a PSPS event is, inform customers on how such events may impact them, and encourage and aid customers to build their own resiliency plans for de-energization. SCE's PSPS Customer Support strategy uses a mix of communication channels to provide this awareness and information.

In 2022, SCE recorded $25.635 million in O&M expenses for PSPS Customer Support activities, which is an essential component of SCE's wildfire mitigation portfolio. SCE's 2022 increase in recorded costs was primarily due to SCE's implementation of PSPS support programs that were not included in SCE's 2021 GRC filing, including the Critical Care Backup Battery (CCBB) Program ($9.809 million), the launch of the PSPS 211 Service Pilot ($0.973 million), and other programs and pilots to support customers during de-energization events. Below, the details for the PSPS Customer Support activities, and the work performed are discussed.

b) Work Description, Need, and 2022 Scope and Cost of Work Performed

(1) Access and Functional Needs (AFN) Enhancements

AFN Enhancements are activities and services that have been identified to enhance SCE's ability to better support customers with AFN and mitigate the impacts of PSPS. These enhancements include ongoing and new activities based on feedback from external stakeholders as required by D.21-06-034[61] and directed mandates from the CPUC. These critical enhancements include AFN self-identification surveys, increased paid engagement with Community-Based Organizations (CBOs), direct support services such as food support, and resiliency items specific to customers with AFN. As a result, in 2022, SCE incurred $0.843 million in O&M expenses in direct customer support for customers who were affected by PSPS, conducting customer self-identification campaign for customers who are powered by frequently impacted circuits, performing usability research on SCE.com for customers with AFN, and increasing accessibility of joint IOU education and outreach by enhancing the PrepareForPowerDown.com website. Lastly, SCE entered new partnerships with CBOs that focused on meeting AFN needs.

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[61] *See* D.21-06-034, p. 114, available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M389/K955/389955672.PDF (accessed on April 20, 2023).

(2) Community Outreach and In-Language Translations

SCE continues to educate customers and the public on PSPS, including the conditions that trigger PSPS, and how to prepare for PSPS and emergencies. As part of these efforts, SCE has provided a multilingual outreach campaign since 2018. The campaign provides information on SCE's actions to mitigate the risk of wildfires and on programs and resources for customers impacted by PSPS. The campaign includes newspaper, radio, digital, social media, search ads, and direct customer mailings.

In 2022, SCE recorded $7.824 million in O&M expenses to create new education/advertising campaigns and in-language outreach for wildfire and PSPS-related communications as required by the Commission in D.19-05-042, D.20-03-004, and D.21-06-034.[62] This campaign and other wildfire and PSPS communications are provided in 19 languages, plus 3 indigenous dialects, in addition to English.

(3) Customer Research and Education

SCE conducts customer research to understand customers' attitudes/opinions about PSPS-related experiences, and then to determine how best to educate customers at the right time and through the right channels regarding wildfire mitigation and preparedness activities. This customer research work activity includes: (1) annual tracking study used to measure how well SCE performs in notifying customers pre, during, and post event, and how different communication channels perform relative to one another; (2) post-PSPS event Voice of the Customer follow-up surveys to customers requesting feedback on their PSPS experience; (3) post-event surveys with customers who attended a community event or interacted

[62] *See* D.19-05-042, pp. 91-92, available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M296/K598/296598822.PDF (accessed on April 20, 2023).
See D.20-03-004, pp. 12-16, available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M329/K824/329824881.PDF (accessed on April 20, 2023).
See D.21-06-034, p. 93, available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M389/K955/389955672.PDF (accessed on April 20, 2023).

with SCE's services provided by Community Resource Centers (CRC) or Community Crew Vehicles (CCV) during a PSPS event; and (4) as needed, research to improve other specific aspects of the PSPS program, such as surveys regarding the content of PSPS notifications or the optimized rebate structure for Portable Power Stations and Backup Generators. In 2022, SCE incurred $1.880 million in O&M expenses for these activities. SCE's 2022 increase in recorded costs from its 2021 GRC filing was primarily due to the increase in its customer research and education activities that was not anticipated during its 2021 GRC filing development.

(4) Critical Care Backup Battery (CCBB) Program

The CCBB program addresses the needs of SCE's Medical Baseline (MBL) Allowance program customers residing in HFRA by fully funding the cost of portable backup batteries to operate medical equipment during PSPS events. In October 2019, Governor Newsom signed Senate Bill (SB) 167 into law, which authorizes electrical corporations to deploy backup electrical resources or provide financial assistance for backup electrical resources to those customers receiving medical baseline allowances and who meet specified requirements.[63] In response, in July 2020, SCE launched the CCBB program to provide fully subsidized portable backup batteries to operate critical medical equipment during power outages due to PSPS events or other emergencies. In 2021, to increase customer participation, SCE expanded the CCBB program eligibility to include customers who are 1) enrolled in the MBL Allowance program (i.e., removed Critical Care requirement, which is a subset of the MBL Allowance program); 2) enrolled in either the California Alternate Rates for Energy (CARE) or Family Electric Rate Assistance (FERA) program; and 3) reside in the HFRA. Additionally, SCE increased program awareness through marketing and outreach through direct mail, outbound phone calls, door knocking, and increased CBO engagement (CBOs inform and educate their community members). SCE continued to meet monthly with other IOUs to share best practices and, to the best extent possible, align program strategies.

[63] Requirements include residing in Tier 1 or Tier 2 HFRA and being enrolled in the MBL Allowance program.

To align with guidance issued in D.21-06-034[64] and to administer a program to support resiliency for customers that rely on electricity to maintain necessary life functions, SCE again expanded the program eligibility in August 2022 to include all customers enrolled in the MBL Allowance program that reside in an HFRA (i.e., SCE removed the requirement for CARE or FERA enrollment). Outreach was also conducted to new customers who had not been contacted to participate in the program previously. Since launching the CCBB program in 2020, SCE has enrolled 10,720 customers in the program and deployed 10,207 free portable backup batteries to eligible customers. In 2022, SCE recorded $9.809 million in O&M expenses to deploy 3,466 portable backup batteries to eligible customers.

(5) EMobility Phase 2

The mobile electric vehicle charger pilot was initiated to test solutions that keep customers from being stranded during PSPS events. The PSPS OIR Phase 2 Decision required the IOUs to implement pilot projects to investigate the feasibility of mobile and deployable electric vehicle Level 3 fast charging for areas impacted by PSPS events.[65] SCE investigated the commercial availability of mobile electric vehicle chargers (MEVC) and electric vehicle driver needs and found that no off-the-shelf MEVC existed that met requirements for charging speeds, deployability, capacity, and customer throughput. A request for information and a subsequent request for qualifications were released and awarded in 2021 for the development of a custom solution to pilot and test safe and reliable mobile electric vehicle charging in areas impacted by PSPS events.

SCE issued a purchase order in October 2021 for the design and development of a MEVC capable of charging electric vehicles at a rate up to 50kW that is legally

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64 *See* D.21-06-034, p. A10, available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M389/K955/389955672.PDF (accessed on April 20, 2023).

65 *See* D.20-05-051, pp. 54-55, available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M339/K524/339524880.PDF (accessed on April 20, 2023).

transportable on all public roads by a standard shipping container trailer. In 2022, the vendor selected worked with SCE on the design specifications of the MEVC and delivered the first of two charging skids that comprise the MEVC, resulting in $0.261 million in O&M expenses. The second charging skid of the MEVC was delivered in the first quarter of 2023. SCE has begun its pre-deployment testing of the MEVC in preparation for pilot deployments during the 2023 wildfire season.

(6) PSPS 211 Service Pilot

The Commission requires electric IOUs to administer a program to support resiliency for customers with AFN in preparation for and during PSPS events.[66] As a result, the electric IOUs developed the PSPS 211 Service Pilot as a statewide solution that provides 24/7 live support during PSPS events, as well as information and resource referrals to customers with AFN. The PSPS 211 Service connects customers with AFN to direct services such as shelf-stable food, hot meal deliveries, transportation, and/or temporary accommodations to help customers stay safe during potential PSPS outages. These services are available during PSPS events to help AFN customers by, for example, providing accessible transportation from a CRC back to the customer's home.

SCE's PSPS 211 Service (211) also connects customers with CBOs. These CBOs offer social services to the community that may mitigate the impact of PSPS events (e.g., referring customers to an organization that could lend a battery for power assistive technology, paratransit agency to schedule accessible transportation, or a food pantry to support food needs). When not providing assistance, during a PSPS event, the 211 effort focuses on outreach to customers with AFN that are living in SCE's HFRA. The 211 also helps AFN

[66] *See* D.21-06-034, p. A10 ("Each electric IOU must administer a program to support resiliency for customers that rely on electricity to maintain necessary life functions…[s]uch support and services for each customer may include, for example, free backup batteries that energize such equipment, transportation to a community resource center or other location of the customer's choosing, other forms of support identified in consultation with these customers… Each utility's program must include, at minimum, each of the aforementioned forms of support and services."), available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M389/K955/389955672.PDF (accessed on April 20, 2023).

individuals develop personalized safety and emergency plans, which are referred to as Care Coordination. As part of the safety and emergency plan, the 211 connects customers with existing programs that can help them prepare for outages and assist them in completing applications for SCE programs, such as CARE, FERA, or MBL Allowance.

In 2022, the PSPS 211 Service incurred $0.973 million in O&M expenses. The PSPS 211 Service has screened over 59,785 customers that are eligible for Care Coordination. As a result, approximately 14,829 eligible customers expressed interest in Care Coordination, and SCE assisted with the preparation of individualized safety plans for over 7,000 Care Coordination Contacts. Further, the PSPS 211 Service provided active PSPS response to 20 SCE customers in 2022.

(7) Meter Mounted Adapter Pilot

The Meter Mounted Adapter Pilot (previously referred to as PSPS GenerLink Meter) is a pilot to field test a plug-and-play meter socket-mounted transfer switch that allows a customer to connect their personal portable generator to the customer's electric panel for use during PSPS events. The transfer switch is installed between SCE's meter and the electric panel and allows the homeowner to safely connect their generator directly into this adapter to power their home during a PSPS de-energization event. This switch eliminates the inconvenience of running power extension cords through an open door or window from a portable generator to power certain power-driven medical devices, appliances, lights, or outlets. Due to the limited electric panel amperage rating authorized for this pilot demonstration, SCE discontinued this pilot in December 2022. SCE will continue to investigate other newer technologies that will support a program offering that is expandable to a larger customer base, compatible with most existing electric panels installed in customer homes. In 2022, the O&M expenses for this activity was $104.

(8) PSPS Newsletter

SCE provides an annual PSPS newsletter (with separate versions for HFRA and non-HFRA customers) to residential and business customers that highlight SCE's

wildfire mitigation efforts and what SCE is doing to reduce the impacts of PSPS events on its customers.[67] The non-HFRA PSPS newsletter focuses on outage safety tips, how customers can prepare for emergencies, and includes an update on SCE's wildfire mitigation efforts. Both newsletter versions include a detachable, leave-behind decal that directs customers to visit sce.com for PSPS information, customer care resources, and emergency preparedness tips. The back panel of the newsletters also contain SCE's contact center phone numbers in multiple languages, in case customers desire to speak with a representative, as well as links to the sce.com/PSPS page so customers can read PSPS information in their preferred language. Electronic versions of the HFRA and the non-HFRA newsletter in 19 languages that are prevalent in SCE's service area can be accessed by customers, community partners and CBOs on SCE's Wildfire Communications Center landing page. In 2022, SCE recorded $1.781 million in O&M expenses for the distribution of its PSPS Newsletter to its customers.

(9) Portable Power Station Rebate Program

The Portable Power Station Rebate Program (previously referred to as Residential Battery Station Rebates) was initiated when SCE identified the need for customers to utilize a backup battery to power small electronics, including lighting, TVs, routers, and modems, as well as the ability to charge devices such as cell phones, laptops, and tablets in the event of an extended outage or a PSPS event. The Portable Power Station Rebate Program is available to all SCE customers residing in an HFRA or served by circuits passing through HFRA that are impacted by PSPS. Under this program, these customers are issued a rebate by SCE for purchasing qualified power stations. Originally, this program provided up to five $75 rebates to customers for purchasing a portable power station for their general home or small business resiliency needs. As of September 1, 2022, the rebate amount increased to $150 per portable power station. In 2022, SCE incurred $0.482 million in O&M expenses to provide 2,138 Portable Power Station rebates.

[67] These newsletters included a QR code to facilitate quick access to SCE's PSPS decision-making video.

(10) Resiliency Zones Pilot

In 2020, SCE developed the Resiliency Zones Pilot to target remote communities impacted by multiple PSPS events in 2019. The goal of the pilot was to help ensure that customers providing essential services identified in remote communities would remain energized during a PSPS event. The Pilot provided funding for generator deployment and electric infrastructure enhancements to connect to onsite generation for up to three customers in seven remote communities. Customers identified as providing essential services meet basic needs such as fuel, mini mart, convenience store, or pharmaceutical services. SCE sought the support of county and community leaders to help identify customers to participate in the Pilot. SCE executed eight Resiliency Zones agreements in 2020 and 2021, respectively, and construction on the last site was completed in the second quarter of 2022. Although enrollment into the Resiliency Zones Pilot closed in 2021, in 2022, SCE incurred $0.101 million in O&M expenses to fund the electric infrastructure enhancement for the final Resiliency Zone site in Bridgeport and the deployment of generators to two Resiliency Zone sites during PSPS events.

(11) Portable Generator Rebate Program

The Portable Generator Rebate Program (previously referred to as Well Water Generator Incentive Program) assists customers living in HFRA communities whose electrical needs extend beyond the limited power supply offered by a portable power station by offsetting the cost of purchasing a portable generator. As background, during community meetings facilitated by SCE in 2019 and 2020, SCE learned that some customers may not have access to well water, during PSPS events, and required a portable generator to receive water from onsite wells. SCE launched the program in June 2020 by offering a $300 rebate on the purchase of a qualified portable generator ($500 for customers enrolled in CARE or FERA). In July 2021, SCE revised the program eligibility requirements and rebate amounts, based on customer survey feedback. Eligibility based on water-pumping dependency was removed, and the eligibility requirements of MBL Allowance program enrollment was added to increase accessibility to the higher rebate amounts. SCE anticipated an uptake in rebate claims associated

with MBL, and, therefore, reduced the rebate amount from $300 to $200 to remain within budget for that program year. As of September 1, 2022, the rebate amount increased up to $600 for income-qualified and MBL Allowance-enrolled customers that reside in an HFRA. In 2022, SCE recorded $0.449 million in O&M expenses to issue 991 Portable Generator rebates.

(12) Surveys, CBOs, and Staffing

SCE continues to partner with an extensive network of CBOs enlisted to conduct in-language wildfire safety and PSPS preparedness customer education and outreach throughout its service area, with particular emphasis on HFRA. Approximately 50 CBOs conducted outreach in HFRA and were incentivized, according to SCE's pay-for-performance framework.[68] SCE also incurs expenses for management of the wildfire-specific CBO performance-based compensation, cross-IOU collaboration, and other critical functions and work required to comply with the Commission-mandated prevalent language requirements set forth in D.20-03-004.

In addition to SCE's own internal PSPS-focused research and pursuant to D.20-03-004,[69] as discussed below, SCE conducts annual pre- and post-wildfire season surveys, as do the other California IOUs, with residential and business customers throughout SCE's entire service area with a special focus on those living in HFRAs. The purpose of these surveys is to evaluate the effectiveness of SCE's wildfire safety and preparedness communications and outreach, including communications sent to customers before, during, and after PSPS events. These large-scale pre-and-post wildfire season surveys are administered to customers by phone or email in 19 prevalent languages, in addition to English. In 2022, SCE recorded $1.066 million in O&M expenses for these activities.

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[68] SCE identifies CBOs through a request for proposal process and then incentivizes them to share SCE PSPS and Wildfire preparedness information with constituents. CBOs provide monthly reporting on their outreach efforts to SCE.

[69] *See* D.20-03-004, pp. 19-25.

(13) In-Event Battery Loan Pilot

The In-Event Battery Loan Pilot supports customers with AFN who live in an HFRA and utilize a medical device or assistive technology for independence, health, or safety. Customers who participate in the pilot are those who would not otherwise be eligible or have yet to apply for CCBB. The pilot provides in-event support to customers that escalate a need for SCE to accommodate the provision of temporary power for a medical device or assistive technology during a PSPS activation. Community- and faith-based organizations (CBOs and FBOs) intake customer escalations and provide that information to the contractor, who then coordinates with the customer on the battery delivery. During this process, the contactors provide the customers with an overview of the safe operation of the portable battery and arrange a date and time for battery retrieval. The customers must confirm use of a medical device or assistive technology that supports independence, health, or safety, and are notified of the potential for de-energization as part of a PSPS activation. In 2022, SCE recorded $0.159 million in O&M expenses associated with this pilot.

(14) Townhall Community Meetings

SCE holds wildfire safety community meetings to share information about its WMP, PSPS, customer programs, and emergency preparedness resources. In 2018 and 2019, SCE hosted the meetings in-person in communities in HFRA, where customers had the opportunity to interact with SCE staff and ask questions. From 2020 to 2022, the meetings were held virtually due to the COVID-19 pandemic and were offered to all customers in HFRA. The recordings of the meetings and presentation decks are posted on SCE's website. In 2022, SCE hosted ten wildfire community safety meetings prioritizing HFRA counties. Due to COVID-19 restrictions, all meetings were held virtually. In 2022, SCE recorded $0.006 million in O&M expenses for this activity.

3. PSPS Execution

a) Overview

PSPS Execution is comprised of sub-activities that drive the preparation, communication, and management of PSPS events. In 2022, SCE's PSPS IMT was activated ahead of forecasted severe weather events six times, although customer de-energizations were only necessary in three of these events. While SCE mitigation efforts played a role in the reduced number of PSPS events relative to 2021, there were also fewer severe weather events in 2022 that included a combination of high winds and extremely dry vegetation.

In 2022, SCE recorded $11.856 million in O&M expenses and $0.006 million in capital expenditures for PSPS Execution activities, which is comprised of sub-activities that drive the design, development, implementation, execution, and management of PSPS events. The sub-activities are described in the next section.

b) Work Description, Need, and 2022 Scope and Cost of Work Performed

(1) PSPS Execution Incident Management Team (IMT) / PSPS Program Development

SCE uses the Incident Command System (ICS) as a best practice for emergency response, regardless of incident size or type. This program closely adheres to state and federal emergency management guidance for readiness standards. ICS has been successfully utilized at SCE for several years. SCE uses an IMT as its functional structure to respond in a cohesive, integrated manner during any emergency activation, including those related to wildfires and PSPS events.

SCE has established and trained a dedicated PSPS IMT team staffed to respond to PSPS events and advance operational protocols and enhancements. A dedicated team has more robust skills and deeper PSPS knowledge, leading to higher performance levels under emergency conditions. Additionally, this specialized team can quickly codify best practices and lessons learned to improve performance from one event to another.

Having a dedicated team supports consistent decision making, deeper PSPS-specific subject matter experience, and greater ability to support continuous improvement, integration of new regulatory requirements and capabilities into existing processes, and advanced planning during non-event periods. SCE established this dedicated team in the fourth quarter of 2020 with five resources, added three more in 2021, and ramped up to eleven resources through 2022 to effectively plan, manage, and execute the PSPS IMT.

The PSPS IMT oversees and executes PSPS protocols, which detail how PSPS activation, notification, de-energization, and service restoration processes work (i.e., roles and responsibilities, decision-making processes, and execution). The team relies on sophisticated tools and technology to monitor ongoing weather conditions that could pose a risk to SCE infrastructure. These tools and technology are used to help SCE anticipate the need for possible PSPS activation, monitor weather events, evaluate real time forecasts, provide communications to affected customers and public safety partners, and enable the IMT under the leadership of the Incident Commander to make complex decisions about when to implement and when to end PSPS events. The dedicated PSPS IMT is supplemented by additional PSPS-trained IMT members during PSPS activations.

When SCE forecasts that windspeed and FPI conditions are likely to breach circuit-specific thresholds for activation and monitoring for potential PSPS, SCE activates its PSPS IMT and begins preparations for the upcoming event (notifications, pre-patrols, etc.). The IMT uses a variety of quantitative and qualitative factors to guide its decision on whether de-energization on each circuit or circuit segment is necessary, including the FPI, real-time data from weather station sensors and field observers (when available), and the results of SCE's PSPS In-Event Risk Calculator Tool (which accounts for potential public safety risks of PSPS). When fire weather conditions subside, SCE begins patrolling impacted circuits to check for any damage that could potentially present a public safety hazard when re-energizing circuits. Once field resources confirm that it is safe to re-energize the circuit(s), power is restored, and local government and customers are notified of re-energization. Most circuits or

circuit segments can be restored within eight hours, although some circuits, including those requiring helicopter patrol, will require daylight for safe inspections. These circuits might not be restored within eight hours.

In 2022, SCE recorded $2.781 million in O&M expenses. Of that amount, SCE recorded $2.586 million in O&M expenses for PSPS IMT activities and $0.195 million in O&M expenses program development costs for PSPS compliance documentation procedure and process development.

(2) PSPS Operations

The PSPS Operations group is comprised of functional area managers, power system operations specialists, advisors, and specialists who are responsible for activities that span both 'blue-sky' days and when activated, to execute PSPS events. When not activated for PSPS, the team is focused on the development and continuous improvement of the processes, procedures, protocols, and systems that are critical to effective and efficient PSPS event execution. Because the grid is dynamic, the team routinely conducts detailed reviews to validate switching mitigation plans, circuit exceptions, thresholds, and circuit to weather station assignments, amongst other preparedness activities. The PSPS Operations team is also responsible for the development, maintenance, and operation of the Integrated PSPS Event Management System (iPEMS) and CDP, the two core systems used to manage and execute PSPS events. The team is also responsible for developing, delivering, and managing operational training, operational compliance, and other administrative tasks required for event execution.

When activated for a PSPS event, PSPS Operations personnel staff a specialized PSPS Task Force that is part of SCE's overall IMT structure and are responsible for providing oversight and guidance for the execution of PSPS protocols on the transmission, sub-transmission, and distribution circuits in SCE's HFRA. Once activated, the PSPS Task Force reviews and, as needed, updates switch plans and procedures for impacted HFRA circuits, and, when possible, transfers customer loads to non-impacted circuits to minimize customer impacts during PSPS events. The PSPS Task Force also initiates pre-patrols on in-scope circuits prior to

the period of concern (POC) to identify and attempt to mitigate potential equipment damage or hazardous conditions that could be a source of ignition prior to the event.

During the POC, the PSPS Task Force communicates with the Grid Operations, Transmission and Distribution, Air Operations, and Distribution and Operations Engineering teams, among others, regarding circuits on the POC list. They coordinate with field personnel performing live field observations (LFO) to identify possible hazards, obtain real-time situational awareness of field conditions, and request manual device switching, when available, to minimize the de-energization footprint. PSPS activation events include proactive de-energization of circuits with overhead lines within SCE's HFRA, upon approval by the Incident Commander, if, under the circumstances, local weather conditions pose an imminent and significant threat to public safety that cannot otherwise be adequately mitigated. The PSPS Task Force is responsible for providing up-to-date situational awareness of the electric grids and environmental conditions to the Incident Commander throughout the incident. Once the threat to public safety has abated and the hazardous weather conditions have subsided, the PSPS Task Force coordinates restoration activities including circuit patrols by field personnel to identify and remediate any potential damage or hazardous conditions. If no damage is found, restoration efforts continue until all customer load is restored. If damage is found, the PSPS Task Force coordinates switching activities to energize as much customer load as possible, and once repairs are completed, restore the remaining customers. After the event has concluded, the PSPS Task Force is responsible for gathering and submitting operations-related data for various PSPS post-event reporting activities. In 2022, SCE recorded $4.995 million in O&M expenses for these activities.

(3) <u>Line Patrols</u>

Line patrols are an important part of SCE's PSPS program and are one of many inputs that the PSPS IMT considers when initiating PSPS Protocols. Line patrols provide critical sources of situational awareness information that allow for the safe execution of SCE's PSPS protocols before and during a PSPS event, and after weather conditions have

abated. SCE trains qualified electrical workers to perform pre-patrols and LFO for PSPS events. Before an event, line patrols are conducted by Qualified Electrical Workers (i.e., Troublemen, Senior Patrolmen, etc.) to examine electrical equipment and surrounding environment hazards to identify potential issues that may be exacerbated by the upcoming wind event. During an event, qualified personnel can be deployed to HFRA to take live wind readings, visually inspect SCE's overhead circuit integrity, and to watch for other localized environmental hazards (i.e., airborne debris). Personnel performing LFOs may be deployed to monitor and patrol impacted areas by vehicle, on foot, or by air (via helicopter or drone), as appropriate, depending on congestion, visibility, accessibility, weather, time, urgency, and topography. LFOs provide real-time data to SCE's PSPS IMT to inform operational decision making. After concerning weather conditions have abated, SCE dispatches teams to patrol all circuits that were de-energized to identify broken equipment, downed wires, or debris in the lines. Circuits found with damage will be repaired, prior to restoration. In 2022, SCE recorded $1.379 million in O&M expenses for this sub-activity.

(4) Emergency Generators for PSPS Mitigation (Customer Side Generators)

SCE has implemented programs to help mitigate the impact of de-energization events, using mobile generators.[70] In preparation for the 2021 PSPS season, SCE engineered and modified the grid to interconnect mobile generators to serve areas of very low fire risk, should the upstream overhead lines feeding these neighborhoods be interrupted. SCE prepared five circuits with this capability.

SCE continues to work collaboratively with local governments, first responders and essential service providers to provide awareness of PSPS and to educate them on the importance of developing a resiliency plan that addresses backup power needs for their facilities which provide critical life and safety functions. However, if essential service

[70] This was previously referred to as mobile generator deployment.

providers are unable to sustain critical life and safety operations during an extended power outage, SCE will consider requests to provide temporary mobile backup generation.

In 2022, SCE recorded $0.926 million in O&M expenses for emergency generators as part of the PSPS Mitigation sub-activity.

(5) Community Resource Centers (CRCs) and Community Crew Vehicles (CCVs)

SCE provides in-person support to its customers through CRCs and CCVs during PSPS events. This support includes access to device charging, restrooms, water, snacks, ice or ice vouchers, and resiliency kits, which contain a tote bag, LED lightbulb or flashlight, pre-charged phone battery, information on SCE and community resiliency programs and resources, and personal protective equipment (i.e., masks, hand sanitizers, etc.) but are subject to change based on need and stakeholder feedback. SCE continues to update its services to better support customers. In 2021, SCE began offering onsite translation for over 120 languages including American Sign Language and medical thermal bags with ice vouchers and instant ice packs for individuals who need to keep medication cool. In 2022, SCE added wheelchair and privacy screen availability at CRCs and piloted a service that allows customers to leave their medical device at a CRC or CCV for charging. SCE also purchased two satellite devices to improve communication capabilities in remote communities impacted by PSPS. These devices provide WiFi connectivity for customers in locations where traditional cellular service may be unavailable.

CRCs also provide an opportunity for customers to sign up for PSPS alerts, update their contact information, and receive answers to questions regarding PSPS and SCE's customer assistance programs. In 2022, SCE's eight CCVs were deployed to affected communities that do not have a CRC location in their community or as a supplement to CRCs. SCE has deployed these vehicles with the required equipment and technology to enable SCE staff to transport and distribute water, snacks, and resiliency kits, and enable customers to make or receive communication. CCVs can be quickly activated to serve customers and can be set up

in open areas without a standing facility and/or in remote areas. CCVs have been especially useful in limiting indoor interactions during the COVID-19 pandemic.

As of December 31, 2022, SCE had contracts with 63 CRCs in different locations on stand-by and, together with CCVs, SCE can support customers throughout its service area. SCE can simultaneously activate approximately 15 sites across its service area to support customers impacted by PSPS events at any given time. In 2022, SCE activated 11 CRCs for a total of 14 days and deployed CCVs in 25 locations for a total of 36 days in multiple counties, which include Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, and Ventura counties to support community members impacted by PSPS events. Approximately 1,700 customers visited the CRCs and CCVs, during PSPS events in 2022. In 2022, SCE recorded $0.365 million in O&M expenses and $0.006 million in capital expenditures for this sub-activity.

(6) PSPS Response and Compliance

In 2019, SCE established a dedicated Wildfire and PSPS Response group to provide direct support for PSPS and wildfire mitigation efforts. This includes supporting high-impact work activities for improving and executing the PSPS protocols, implementing enhanced situational awareness tool (i.e., supercomputers, high-resolution forecasting, HD cameras, and weather stations), and developing processes and procedures to help ensure compliance with regulatory mandates. Beginning in 2020, SCE onboarded additional full-time resources to staff the dedicated PSPS IMT, which was established for the purpose of responding to PSPS events and advancing operational protocols and enhancements during normal daily operations. A dedicated team creates greater consistency across PSPS activations when communicating with customers and public safety partners. Additionally, this specialized team can more quickly adapt and make changes from one event to another. SCE has identified several technology improvements to streamline operations, provide a common operating practice and enhance timely response operations. In 2022, SCE recorded $1.410 million in O&M expenses for this activity.

4. PSPS Technology Solutions

a) Overview

The PSPS Technology Solutions are software projects that improve PSPS programs and protocols to minimize the potential risk of wildfire from electrical infrastructure and minimize customer impacts through technology investments. In 2022, SCE recorded $8.547 million in O&M expenses and $19.136 million in capital expenditures for PSPS Technology Solutions activities.

b) Work Description, Need, and 2022 Scope and Cost of Work Performed

(1) Emergency Outage Notification System

The Emergency Outage Notification System (EONS) is the primary tool used to keep customers informed before, during, and after emergency outages, including PSPS events. EONS allows SCE to communicate to all customers impacted by PSPS via their preferred communication channels. Customers can elect to receive communications via email, voice calls, text messages, and/or auto-enrollment. SCE's vendor for EONS is Message Broadcast.

In 2021, SCE further enhanced the capabilities of the Message Broadcast system to send notifications in the customer's preferred language, which they can select from the six core languages available in the Preference Center on SCE.com. Additionally, SCE began work on enhancements to the Preference Center to offer communications in 23 languages and American Sign Language. In 2022, SCE engaged in multiple activities aligned with the objectives outlined in the 2021 PSPS Action Plan and ongoing guidance from the Commission.[71] These activities included enhancing customer communication and refining SCE's

[71] *See* D.21-06-034, available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M389/K955/389955672.PDF (accessed on September 12, 2023) and Proposed AEO of Southern California Edison Company's Execution of 2020 Public Safety Power Shutoff Events, available at https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/safety-and-enforcement-division/acos-and-aeos/sdge-administrative-enforcement-order---2020.pdf (accessed on September 11, 2023).

PSPS operational procedures. Additionally, the activities extended to ongoing improvements in reporting accuracy, data quality enhancements, revisions to notification template content, and the expansion of PSPS address-level alerts to incorporate email notifications that were previously only offered as voice and text. SCE incurred $4.253 million in O&M expenses in 2022 for these enhancements and capabilities.

(2) IMT Customer Notifications

One of SCE's goals in the 2021 PSPS Action Plan was to enhance the CDP in IMT Customer Notification activity. It included improving data and reporting accuracy; establishing PSPS operational workflow, analytics, and reporting; and enhancing the notification process. SCE conducted an extensive review of all the ongoing information technology processes and systems that support PSPS and identified the need for a CDP that would act as a foundation for PSPS data collection and help achieve the above listed goals. Based on the evaluation of potential solutions and vendors, SCE determined that Palantir was best suited to provide a CDP. In 2021, initial use cases, such as automating the approval of the monitored circuit list and the POC and visualization of weather forecast metrics, were implemented and began supporting operational PSPS activations. In 2022, SCE released additional use cases to create a complete PSPS solution to further support the PSPS Action Plan, expanding upon customer experience and optimizing PSPS operations.

In late 2022, SCE began work on customer complaint tracking, pursuant to a CPUC requirement, to create a standardized complaint tracking form accessible to all personnel or liaisons that manage incoming complaints to be able to quickly synthesize the data for reporting purposes.[72] This will allow SCE to consolidate and standardize the complaint data in a way that will allow for streamlined compliance reporting. The reporting will include the total number and summary of complaints with the ability to segregate complaints by categories.

[72] *See* pp.15-16 of the Proposed AEO of Southern California Edison Company's Execution of 2020 Public Safety Power Shutoff Events, available at https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/safety-and-enforcement-division/acos-and-aeos/sdge-administrative-enforcement-order---2020.pdf (accessed on September 11, 2023).

Additionally, in 2022, key initiatives included enhancing PSPS operations and the development of Customer Notifications Enhancements, the Automation of PSPS CPUC Post-Event Reporting, as well as Weather Data Integration and Trending. The plan also aimed to establish a PSPS Common Operating Picture and integrate Fire Weather Threat Reports into the existing PSPS Workflow. Additional focus areas involved PSPS Data Quality use case enhancements, such as voltage profile and customer information connectivity, as well as a redesign of the PSPS workflow related to segmentation.

SCE incurred $1.412 million in O&M expenses and $13.210 million in capital expenditures in 2022 for these activities.

(3) PSPS Website Improvements

SCE.com provides a dedicated, interactive, and informative webpage to help customers increase their awareness about PSPS, provide information about becoming more resilient during events, and receive up-to-date information, regarding events in their area. Other information on SCE.com includes the impacts of de-energization, the available resources during events, and the identifying contact the public should expect to hear from, as well as the timeframe. The landing page is linked to other pertinent pages on SCE.com, such as the Outage Map, where PSPS-specific event information is available as well as information on activated CRCs and CCVs.

The information provided on SCE.com is critical to SCE's customers and stakeholders. Based on the feedback collected in 2020 from surveys used to understand customer concerns, SCE found that customers had difficulty navigating its website for information about the outages. In 2021, SCE's PSPS Action Plan required SCE to deploy a series of features designed to make it easier for customers to access information. The changes for SCE.com include improving the consolidated outage map, providing current weather conditions and information from SCE's weather stations, and improving PSPS alerts and customer preference flexibility options to enable customer engagement, regarding wildfire-related risks and activities. SCE also deployed the seven-day PSPS Weather Awareness map. To help

customers plan for a potential PSPS event, this map displays the manner counties in SCE's service area could be affected by dangerous weather conditions up to seven days in advance.

Additionally, SCE's PSPS Public Safety Partner Portal – launched in June 2021 – offers Public Safety Partners the ability to register, view pertinent information related to PSPS events, as well as plan for PSPS events by leveraging the data provided in the planning portion of the Public Safety Partner Portal. SCE worked throughout 2021 and 2022 and completed the above listed SCE.com enhancements. To complete the SCE.com enhancements, SCE incurred $2.883 million in O&M expenses and $5.122 million[73] in capital expenditures in 2022 for these activities.

(4) Line Patrol-Related Technology Solutions

In 2022, SCE launched an operating restriction and PSPS planning and switching project called the Hazard Event Restriction and Management Emergency System (HERMES), which is a new technology to implement and manage operating restrictions and optimized circuit switching on the distribution system. A common use of HERMES is to implement operating restrictions for parts of the distribution system with a high risk of wildfires and to lower the potential ignition risk from electrical equipment. As a planned component of the Grid Management System (GMS), HERMES is also being developed to utilize automation in the GMS to execute optimized switching programs for PSPS de-energization events while deconflicting planned outages. HERMES seeks to differentiate normal restrictions on parts of the distribution system from restrictions due to more emergent, hazardous conditions associated with wildfire risk mitigation and PSPS. These wildfire-related restrictions include event de-energization on circuits of concern (PSPS), limitations on field work, and imposing limits on certain automated devices (i.e., recloser). HERMES will enable a more surgical application of operating restrictions when and where the risks warrant, while also optimizing switching plans

[73] SCE recorded $5.066 million in capital expenditures for PSPS website improvements and recorded $0.056 million in capital expenditures for in-language requirements related to enabling in-language translations of PSPS content on sce.com.

that will assist in reducing the scope, frequency, and duration of PSPS events for SCE's customers. SCE incurred $0.804 million in capital expenditures in 2022 for this work.

G. Aerial Suppression

Table II-17
Aerial Suppression
Total Spend for 2022 by GRC Activity
($ in millions)

GRC / Work Activity	Total Capital Expenditures	Total O&M Expenses	Recovery Account for Incremental Amounts
Aerial Suppression	$ -	$ 18.200	WMPMA
Total	**$ -**	**$ 18.200**	

1. Work Description, Need, and 2022 Scope and Cost of Work Performed

Multiple concurrent wildfires have stretched the pool of aerial firefighting assets available in SCE's service area at critical times. The limited availability of these suppression resources has increased the potential for wildfires to escape the initial attack stage and become more destructive, putting SCE's customers, communities, and infrastructure at greater risk. To address this risk, since 2019, SCE has partnered with local county firefighting agencies by providing the funding to create a quick reaction force (QRF) of aerial firefighting resources. These agencies have indicated they do not have the budget to contract with these resources themselves. Table II-17 summarizes SCE's total 2022 spend for Aerial Suppression activities.

The QRF is composed of four aerial firefighting helicopters (three helitankers and one intelligence and reconnaissance aircraft), support personnel, and equipment to bolster firefighting capabilities. These resources are capable of being rapidly deployed virtually anywhere in SCE's service area, either individually or as a fleet. The intelligence and reconnaissance aircraft has the capability to provide safe coordination of operations in both day and night, and as such, the QRF helicopters were among the first in the world to safely conduct

nighttime aerial fire suppression operations. As noted in Wildfire Today,[74] the cost of fire suppression on the 2022 Route Fire, using the QRF at night, was an order of magnitude less than the firefighting costs for the Marple Fire in the same area in 1996. The report compares the 2022 Route Fire to the 1996 Marple Fire, which started in about the same location at the same time of the day and time of year in similar weather conditions. By midnight, the 1996 Marple Fire had exceeded 10,000 acres and continued spreading for two or three days until it was stopped at 19,860 acres. In contrast, the spread of the 2022 Route Fire was stopped at 8 a.m. on Day 2. The three helicopters dropped water and retardant much of the night to hold it at a ridge on the north side, allowing hand crews and dozers to complete a fire line. "It is very difficult to compare the suppression costs of two fires that occurred 26 years apart, but the authors of the QRF report estimated that the cost of the 1996 Marple Fire in today's dollars would be somewhere between $70 million and $140 million. The cost of the 2022 Route Fire was $7 million to $8 million."[75] The QRF has demonstrated its ability to make significant progress in containing fires at night, when higher humidity and lower wind speeds reduce wildland fire spread and activity, increasing the effectiveness of the water or fire-retardant drops.

While aerial suppression resources will not always be able to stop a fire at the onset, aerial resources help reduce the area burned and number of structures damaged or destroyed. As a result, SCE's damage assessment and restoration costs are minimized.

From January 1, 2022 to December 1, 2022, there were a total of 201 day drops and 301 night drops. The fleet dropped 707,940 gallons of water, 34,200 gallons of fire retardant, and 23,035 gallons of gel in total.

In 2022, the QRF responded to 27 unique fires within SCE's service area. Notably, the QRF was dispatched to the Gulch Fire, Route Fire, East Fire, Ridge Fire, and Fairview Fire, among others. The helitankers were able to help suppression efforts on these fires,

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[74] *See* Wildfire Today, available at https://wildfiretoday.com (accessed on September 11, 2023).

[75] *See* QRF Report, available at https://fireaviation.com/2022/10/01/report-shows-use-offour-helicopter-quick-reaction-force-through-the-night-limited-final-size-of-route-fire/ (accessed on April 20, 2023).

helping reduce potential consequences. SCE provided aerial suppression resources to reduce wildfire risk to the customers and communities it serves, and to protect SCE's equipment assets from damage. While aerial suppression resources may not be able to stop a fire at the onset, they can be used to reduce the area and assets ultimate burned and enable faster response times.

In 2022, SCE incurred $18.200 million in O&M expenses for 165 days of coverage, as shown in Table II-18.

Table II-18
2022 QRF Recorded O&M Expenses

Number	County	MOU Amount
1	Ventura	$3,638,250
2	Los Angeles	$5,544,000
3	Orange	$9,018,100
	Total	**$18,200,350**

H. Wildfire Mitigation Training and Development

SCE annually trains field employees and briefs its contractors engaged in wildfire mitigation activities. Regular training updates occur based on proactive operational changes or identified risks. Training activities promote sound decision-making enabling the field workforce to respond quickly to upset conditions that potentially impact the health and safety of the population SCE serves. Table II-19 summarizes SCE's total 2022 spend for Wildfire Mitigation Training and Development.

Table II-19
Wildfire Mitigation Training and Development
Total Spend for 2022 by GRC Activity
($ in millions)

GRC / Work Activity	Total Capital Expenditures	Total O&M Expenses	Recovery Account for Incremental Amounts
Wildfire Mitigation Training and Development	$ -	$ 0.299	WMPMA
Total	**$ -**	**$ 0.299**	

1. Work Description, Need, and 2022 Scope and Cost of Work Performed

For 2022, SCE recorded $0.299 million in O&M expenses for wildfire mitigation-related training for PSPS, including the development of materials and for employees in both transmission and distribution. SCE develops technical training programs that prepare employees to perform their jobs safely, comply with regulatory requirements[76] and laws, and maintain system reliability. To help ensure adequate training for employees and contractors to restore service, SCE conducts specific training on an annual basis for field workers responsible for the restoration of power after emergencies. SCE also provides specialized training yearly for IMT members, who oversee and execute de-energization and restoration protocols.

SCE trains PSPS field personnel and briefs its contractors engaged in wildfire mitigation activities on requirements and potential impacts of PSPS protocols. Training is provided based on proactive operational changes or identified risks. Hazard-specific training, particularly PSPS training, covers specific protocols, issues, or actions associated with hazards SCE may need to mitigate or respond to. This training ensures experienced personnel and new resources tasked with coordinating restoration are well versed in company processes and procedures.

Training activities promote sound decision-making and reduce the chance of ignitions or restoration delays, potentially impacting the health and safety of the population SCE serves. Continuous training for employees and briefing for contractors are necessary to work within the same framework and structures. SCE provides this type of training throughout the year on an annual basis to promote year-round awareness of SCE's PSPS protocols. Ultimately,

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[76] *See* D.19-05-042, available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M296/K598/296598822.PDF (accessed on April 20, 2023).
See D.20-05-051, available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M339/K524/339524880.PDF (accessed on September 26, 2023).
See D.21-06-034, available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M389/K955/389955672.PDF (accessed on September 12, 2023).

the costs for these emergent activities support efforts to provide transmission and distribution employees with the skills and knowledge necessary to perform their job in accordance with new procedures, work methods, and associated technology.

III.

VEGETATION MANAGEMENT

In this chapter, SCE describes the vegetation management activities performed to comply with applicable regulations, reduce the risk of vegetation-related ignitions, reduce outages, and promote reliability in its service area in 2022. In this Application, SCE is seeking review of, and cost recovery for, only those incremental vegetation management costs that are more than 115 percent of the amounts authorized in the GRC for the VMBA,[77] as well as environmental support costs recorded in the FRMMA. Table III-20 summarizes SCE's total 2022 spend for Vegetation Management activities.

The testimony in this Chapter III describes the total portfolio of vegetation management work completed in 2022. The incrementality assessment follows separately in Chapter IV.

Table III-20
Vegetation Management
Total Spend by Recovery Account in 2022
($ in millions)

Cost Recovery Account	Reference to Testimony	O&M Recorded (A)	FERC Jurisdictional (B)	GRC Authorized (C)	Non-Incremental Costs (D)	Incremental Costs (A-B-C-D)
VMBA [1]	Vegetation Management	$ 466.390	$ 13.665	$ 207.558	$ -	$ 245.168
FRMMA [2]	Vegetation Management	$ 27.471	$ 2.024	$ 2.264	$ -	$ 23.183
Total		**$ 493.861**	**$ 15.689**	**$ 209.821**	**$ -**	**$ 268.351**

Note:
[1] GRC authorized amount for the VMBA comprises 115% of the authorized amount.
[2] $2.264M GRC Authorized for Environmental Support to Vegetation Management is not part of VMBA but is the amount authorized for environmental support related to line clearing activities under Environmental Programs.

A. Overview

Since the late 2010s and as initially described in SCE's 2018 GSRP and 2021 GRC applications for Tracks 1 through 4, SCE's Vegetation Management program has evolved significantly in response to increased wildfire risk, while continuing to maintain service reliability. The Commission approved SCE's vegetation management programs in Track 1 of the 2021 GRC, which provided cost recovery related to Routine Line Clearing; Hazard Tree Program; Seasonal Patrols, AOC, and Emergent Work;

[77] The 2021 GRC Track 1 Final Decision authorized a two-way VMBA to track the difference between the authorized and recorded O&M expenses for all vegetation management activities, along with a requirement that SCE seek reasonableness review and recovery of costs more than 115 percent of the authorized amount via a subsequent application. *See* D.21-08-036, p. 656 (CoL 70).

Structure Brushing; Quality Assurance/Control; Weed Abatement; Remote Sensing LiDAR; as well as Environmental Programs that support Vegetation Management.[78] Authorization for costs were aligned with five GRC activities containing the above programs: Distribution Routine Vegetation Management; Transmission Routine Vegetation Management; Fire Hazard Prevention; Dead and Dying Tree Removal; and Wildfire Vegetation Management.

In addition, in the 2021 GRC Track 1 Final Decision, the Commission authorized the establishment of the two-way VMBA, which records the difference between authorized O&M expenses adopted in D.21-08-036 for vegetation management activities and actual O&M expenses incurred for vegetation management activities.[79] SCE records costs related to environmental support for its vegetation management Routine Line Clearing program in the FRMMA.

In 2022, SCE incurred costs for its vegetation management activities that exceeded the GRC-authorized amount primarily because of higher contractor costs across all programs, due to legislation mandating higher compensation to tree trimmers,[80] higher contractor insurance costs, continuing tight contractor labor markets, and wage and expense inflation, among other factors.[81]

Ultimately, SCE strives for cost containment through robust procurement practices, including execution of competitive bidding events every two to three years for core contractor work. As part of the

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[78] *See* D.21-08-036, CoL 63, 64, and 66, p. 655.

[79] *See* D.21-08-036, Ordering Paragraph (OP) 14, p. 680.

[80] SB 247 became effective on January 1, 2020 and specifies qualifications for electrical line clearance tree trimmers performing work to comply with the vegetation management requirements in an electrical corporation's wildfire mitigation plan and requires that qualified line clearance tree trimmers be paid no less than a specified prevailing wage rate. In SCE's 2021 GRC Track 3 (which addressed wildfire and vegetation management costs incurred in 2020), SCE was authorized to recover all incremental line clearance costs incurred in HFRA, including SB 247-related costs (*see* D.22-06-032, p. 101 (Finding of Fact 72). In Advice 4881-E, submitted on October 6, 2022, SCE sought Commission approval to recover approximately $35.4 million in incremental line clearance costs incurred in 2020 for non-HFRA due to the passage of SB 247 through SCE's Z-Factor memorandum account. SCE incurred a $10 million Z-factor deductible. On September 21, 2023, the Commission approved Advice 4881-E in Resolution E-5287.

[81] SCE's contracts with vegetation management vendors include numerous rates for various types of work. As an illustrative example of higher contractor rates, SCE's average unit trim rate for Routine Line Clearing was approximately $210 in 2022. When SCE submitted its 2021 GRC Track 1 application in 2019, the average rate was approximately $105 when converted to 2022 dollars (approximately $82 in 2018 constant dollars), as noted in SCE's 2021 GRC Track 1 forecast in WPSCE02V06 Confidential, p. 2.

bidding process, SCE conducts a thorough search for all experienced and qualified contractors and invites them to respond to formal Requests for Proposal. Upon the submission of required safety, pricing, and technical information by bidders, SCE narrows the respondents in successive rounds as SCE evaluates technical and commercial terms through bid analysis, interviews, and total cost of ownership modeling.[82] SCE then conducts multiple negotiation rounds with vetted and short-listed bidders to ultimately secure contracts that provide the best value possible. This process entails a thorough review of vendor bids from financial, commercial, and operational standpoints.

SCE's total recorded costs for Vegetation Management in 2022 were spent to support the following objectives: (1) meet compliance requirements, which are vital for service reliability; and (2) adhere to its approved 2022 WMP Update to reduce ignition and other public safety risks that can occur when vegetation contacts energized high-voltage wires. In so doing, SCE prioritizes its work by considering risk analysis (e.g., Hazard Tree Management Program), as well as the advancement of programs that may allow SCE to take advantage of technological improvements for more optimal work results (e.g., LiDAR inspections). In certain instances, SCE's work expanded in tandem with its vegetation management programs (e.g., Quality Assurance/Control) or because of other SCE programs (e.g., AOC).

Table III-21 provides a summary of the total spend incurred in the VMBA and the FRMMA in 2022 by vegetation management program.

[82] Total cost of ownership modeling provides an evaluation of competitively solicited bids based on the total life-cycle cost of services including any potential costs beyond the lump sum or unit prices paid.

Table III-21
Total Spend by Program in 2022
($ in millions)

Program	Total O&M Expenses	Recovery Account
Routine Line Clearing - Inspections	$ 29.662	VMBA
Routine Line Clearing - Mitigation	$ 329.200	VMBA
Hazard Tree Management Program	$ 21.368	VMBA
Dead, Dying, and Diseased Tree Removal	$ 24.404	VMBA
Seasonal Patrols	$ 10.689	VMBA
Areas of Concern	$ 0.410	VMBA
Emergent Work	$ 14.542	VMBA
Structure Brushing	$ 10.469	VMBA
Quality Assurance/Control	$ 5.523	VMBA
Weed Abatement	$ 4.262	VMBA
Remote Sensing	$ 3.086	VMBA
Environmental Support	$ 40.247	VMBA / FRMMA
Vegetation Management Total Spend	**$ 493.861**	

B. Routine Line Clearing

1. Work Description and Need

Routine Line Clearing comprises SCE's largest Vegetation Management program by volume and cost and consists primarily of compliance-based ground inspections as well as trimming and removal mitigation activities across SCE's entire transmission and distribution networks. In this program, SCE endeavors to prevent vegetation from encroaching into its electrical assets by maintaining clearance zones in accordance with various regulatory requirements, including CPUC GO 95 Rule 35 (Cases 13 and 14) and Rule 37, PRC § 4292 and § 4293, 1 CCR Sections 1250-1258, and FAC-003-4.

SCE's transmission and distribution lines have traditionally been annually inspected by ground-based inspectors for compliance with state and federal vegetation management requirements. During these inspections, the inspector identifies vegetation that requires trimming or removal to meet program requirements regarding vegetation clearance distances from the lines and considers a tree's anticipated growth over the ensuing twelve months. Additionally, the inspector investigates emergent vegetation concerns raised by customers and addresses inspection findings requiring immediate planning or schedule coordination to mitigate the work point.

In its maintenance of clearance zones, as described in Figure III-23, SCE categorizes the zones from the least to the greatest distance requirement into the following categories.

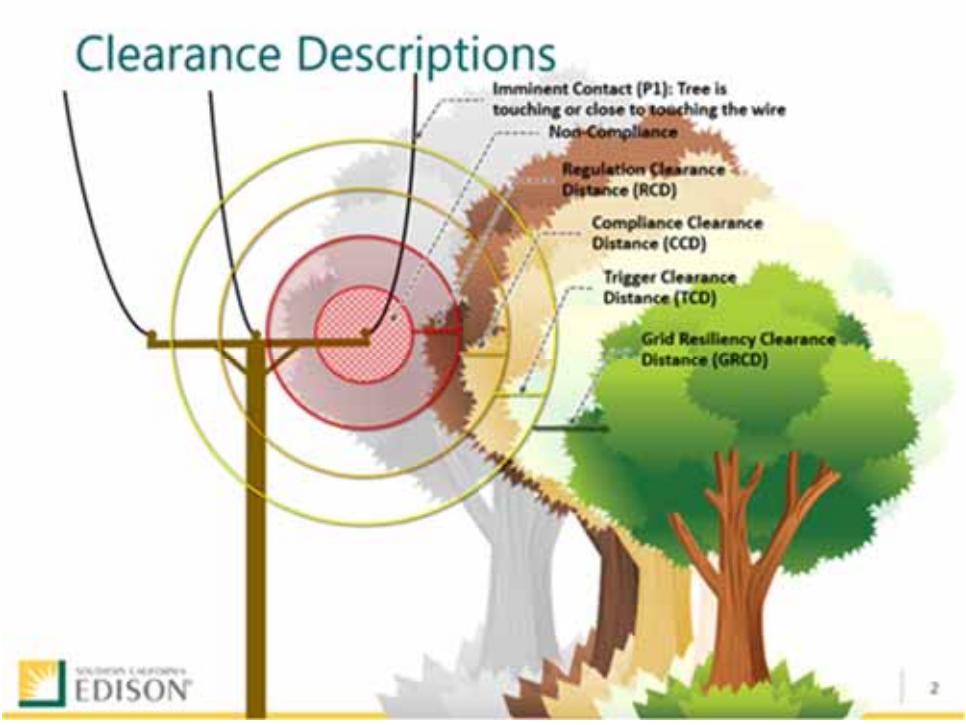
(1) Regulation Clearance Distance (RCD), which reflects the minimum clearance distance required by the respective regulations;

(2) Compliance Clearance Distance (CCD) is SCE's internal minimum clearance standard, which is 1.5 times the RCD;

(3) Trigger Clearance Distance (TCD) is an additional 3 feet beyond the CCD and the distance that triggers the need for a mitigation (based on voltage and tree species); and

(4) Grid Resiliency Clearance Distance (GRCD), which aligns with the recommended expanded line clearance distance in accordance with GO 95 Rule 35 Appendix E.

Figure III-23
Routine Line Clearance Descriptions



SCE's mitigation work aligns with International Society of Arboriculture (ISA) standards for pruning, such as ANSI A300. This may include revisiting each lateral branch and trimming to avoid

sprouting and regrowth, which, if left unattended, may trigger more frequent trims. In most occurrences, trimming and/or removal will conclude within 30 to 60 days after the inspection prescriptions are provided to the contractor.

In performing mitigation work, the contractor generally performs directional trimming and crown reductions to minimize any adverse tree health and/or structural integrity conditions and to encourage future tree growth away from SCE overhead lines. If a contractor is unable to trim the vegetation to maintain applicable clearances for the annual pruning cycle, the contractor will pursue complete removal of the vegetation to help ensure compliance. Contractors generally use a series of standard equipment (i.e., bucket trucks and/or rigging equipment for manual climbs). However, in certain environmentally sensitive areas that restrict off-road access to trucks, contractors may rely on all-terrain vehicles or snowmobiles (in weather impacted areas) for access to trees.[83] In these cases, SCE will work with the appropriate agency to help ensure SCE complies with applicable requirements. In addition to completing trimming and/or removal work, the contractor is also responsible for the management of debris generated from line clearing activity.

While SCE performs mitigation for both transmission and distribution assets[84] in a similar fashion, specifically for transmission assets, SCE also considers conductor dynamics when determining the clearance distances that need to be maintained. Conductor dynamics involve conditions where the line sags in hot conditions or with heavier loads, and where the line sways in windy conditions. This is consistent with regulatory requirements that mandate greater clearance distances for high voltage transmission lines.

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[83] When evaluating the need for specialty equipment, SCE also considers if the equipment provides additional safety benefits or greater work efficiency. This additional cost for special equipment can provide a net benefit while also ensuring compliance, safety, and wildfire risk reduction.

[84] One distinct function related to line clearing along distribution circuits, as opposed to transmission circuits, is that SCE performs seasonal patrols during the Summer months in areas where topography or vegetation conditions are known to pose a threat to SCE's facilities, during extreme weather events. These seasonal patrols provide additional verification of compliance with the clearance distances required by GO 95 and PRC § 4293. *See* Section III.D.1. for discussion about Seasonal Patrols.

In addition to trimming and/or removing trees, SCE incurs costs in Routine Line Clearing for auxiliary services that support the execution of line clearing work, such as customer program support, traffic control, and obtaining environmental approval for work. For customer program support, SCE has implemented a step in the process whereby "notification consultants" are used to explain prescribed work and obtain approvals, when required, from individual property owners in advance of tree trimmers' mitigation work. Furthermore, additional engagement may be required to coordinate the mitigation activity and resolve any impediments or concerns. In addition, SCE uses traffic control services to help ensure the safety of the public and its contractors. For instance, these services aid in mitigation in residential areas due to a higher volume of required ingress and egress, as communities continue to have more at-home workers because of on-going hybrid or remote work conditions. Finally, as further described in more detail in Section III.I, SCE's vegetation management work may require environmental support, and contractors provide the coordination efforts to help ensure approval is obtained prior to commencing mitigation work.

2. 2022 Scope and Cost of Work Performed

Table III-22
Routine Line Clearing Total Spend in 2022
($ in millions)

Work Activity	Total O&M Expenses	Recovery Account
Routine Line Clearing - Inspections	$ 29.662	VMBA
Routine Line Clearing - Mitigation	$ 329.200	VMBA
Routine Line Clearing Total Spend	**$ 358.862**	

In 2022, SCE incurred O&M expenses of $29.662 million in inspection costs and O&M expenses of $329.200 million in mitigation costs for Routine Line Clearing, as summarized in Table III-22. SCE performed over 840,000 trims and removals and met its approved 2022 WMP Update targets.[85] [86] Due to the significant use of contractor labor for both inspection and mitigation work, Routine Line

[85] SCE's 2022 WMP Update was approved by Energy Safety on July 20, 2022.

[86] *See* SCE 2022 WMP Update, p. 141 for 2022 target details related to activity targets "Detailed inspections and management practices for vegetation clearances around distribution electrical lines, and equipment" and "Detailed inspections and management practices for vegetation clearances around transmission infrastructure lines, and equipment."

Clearing costs were heavily impacted by increased contractor rates previously described in Section III.A.

C. Hazard Tree (HT) Program

SCE also conducts the HT Program in HFRA, which aims to reduce ignition and wildfire risk by removing or trimming trees with the potential to strike electric lines and equipment. In this program, inspectors assess the site and structural condition of trees that could fall into or otherwise impact electrical facilities and potentially lead to ignitions and outages.

The HT Program targets two categories of trees: (1) live trees, which historically have formed the scope of the Hazard Tree Management Program (HTMP); and (2) dead or dying trees, which historically have formed the scope of the Dead, Dying, and Diseased Tree Removal Program.

1. Hazard Tree Management Program

a) Work Description and Need

SCE conducts the HTMP on a three-year cycle with the goal of assessing and prescribing mitigation as needed on relevant or subject trees in HFRA. This program excludes Routine Line Clearing inventory, or trees that are located within the clearance distance required by GO 95 (e.g., the CPUC compliance zone) and entails more detailed inspection and evaluation of trees that are located farther away from lines in the Utility Strike Zone (USZ).[87] The program is designed to help SCE identify trees not targeted by other vegetation management programs that may be hazardous to SCE's assets but are not at risk of growing into the RCD, as previously described in Section III.B.1. As part of HTMP, SCE mitigates ignition risk from live trees or parts of a live tree that could fall or blow into SCE's lines.[88]

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[87] The USZ is the area containing electric assets from which a tree or a portion of a tree can directly strike electric assets.

[88] Vegetation can create a risk to SCE assets when the vegetation is in fall-in zones (e.g., where vegetation can fall into energized equipment), grow-in zones (e.g., beneath the energized equipment), blow-in zones (e.g., within general blow-in proximity to energized equipment), drop-in zones (where tree limbs overhang energized equipment), and side grow-in zones (e.g., adjacent to energized equipment).

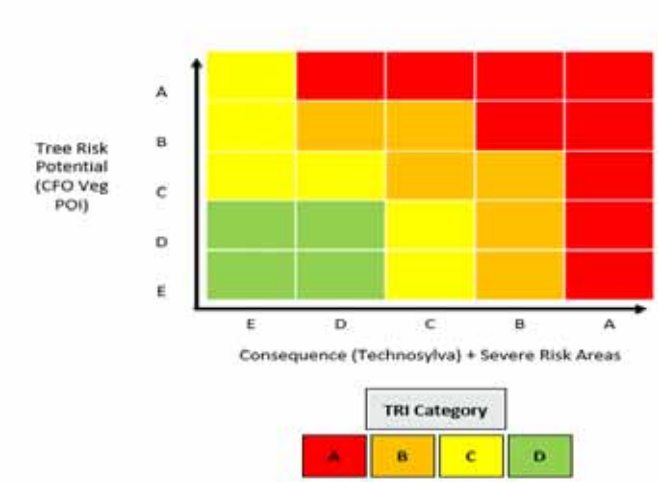
SCE developed the HTMP, in part, in response to data indicating that vegetation-caused faults are primarily caused by live trees. Additionally, based on SCE's tracking of Tree Caused Circuit Interruptions (TCCIs), a significant portion of TCCIs originate from outside the CPUC compliance zones but within the broader USZ. The cause and origin of failure are often trees falling over or branches or palm fronds breaking off and blowing into lines. As a result, in this program SCE assesses the condition and conducts mitigation of live trees and vegetation outside the CPUC compliance zone but within the broader USZ in HFRA that pose a threat to SCE facilities.

(1) Tree Risk Index Model

SCE uses risk prioritization to schedule and perform its HTMP work. In 2021, SCE developed the Tree Risk Index (TRI) model to classify locations around its overhead equipment that have high vegetation contact risk. The TRI model utilizes a matrix methodology like that used for High Fire Risk-Informed (HFRI) inspections. On one axis, it factors in the probability of a fire starting from an SCE asset (i.e., Contact from Object and Probability of Ignition); on the other axis, it factors in the number of acres that would be affected by a fire (i.e., Consequence (Technosylva) and Severe Risk Areas). The combination of the two factors results in a risk prioritization by grid, with TRI Category A representing the highest risk and TRI Category D representing the lowest risk.

Figure III-24 displays the matrix currently used in the TRI model. The higher risk grids are found in the upper right section of the matrix and the lower risk grids are found in the lower left section of the matrix.

Figure III-24
TRI Model Matrix



In 2022, SCE began using the TRI model to prioritize risk for several of its vegetation management activities. Specifically, the model assists in the following determination: (1) HTMP annual scope and re-inspection frequency; (2) scheduling and timing of Routine Line Clearing work to align with peak wildfire season; (3) quality control inspections scope for Routine Line Clearing; and (4) Seasonal Patrols inspections optimization. Grids in the highest risk category, Category A, are inspected annually, while grids in Categories B, C, and D follow a three-year inspection cycle.

(2) <u>Tree Assessment Process</u>

HTMP requires inspectors, who are certified arborists, to inspect the USZ, which is the area on either side of SCE's electrical assets from which a tree or a portion of a tree could strike or impact electric assets. The USZ can vary significantly based on the height of the trees, slope conditions, and potential for wind driven vegetation. The HTMP inspectors complete a Level 2 assessment on subject trees.[89]

Typically, any tree in the USZ that is taller than its distance from SCE equipment can be a subject tree and is assessed by the inspector to identify either tree attributes or site conditions that could cause the tree to fail. After determining that a tree requires assessment, the

[89] A Level 2 assessment is comprised of a detailed 360-degree ground-based visual assessment of the tree and its surrounding site. A Level 2 assessment includes walking completely around the tree, looking at the site, buttress roots, trunk, and branches.

inspector inputs data into the HTMP Tree Risk Calculator (TRC) to compute a risk score. The TRC was developed using the standards set forth by the ISA Tree Risk Assessment Qualification to determine a risk score for each tree assessed and recommend a mitigation based on the risk score. Inspectors also consider the distance from SCE's utility lines or equipment, as by definition, a tree only poses a risk if there is a target that the tree, or part thereof, can strike.

The inspector utilizes the TRC to determine a risk score based on six criteria: (1) Voltage Impact; (2) Fire Impact; (3) Likelihood of Impact; (4) Tree Lean; (5) Tree Height Factor; and (6) Site Condition Attributes. The final risk score, which can range from 1 to 100 with a score of 100 representing the highest level of risk, helps inform inspectors in determining the appropriate mitigation. In addition to the TRC risk score, the inspector uses professional experience and judgment in recommending a mitigation. In some instances, the inspector may recommend a mitigation different from that suggested by the TRC. SCE continues to improve the TRC based on field experience and understanding of best practices.

(3) Tree Removal and Mitigation

The majority of HTMP remediation involves tree removals. This contrasts with the Routine Line Clearing mitigations, which typically involve trims. Removals are performed by contractors using a combination of industry-standard methods such as: (1) directional felling; (2) climb-sectionalize; (3) crane; and (4) high hazard. Contractors are also responsible for removing the resulting debris, except in certain locations where the United States Forest Service (USFS) allows the debris to be cut into smaller pieces and scattered along the forest floor.

Remediation timelines are informed by the assigned risk score from the TRC. SCE does not typically remediate trees with a risk score of 1 to 49.[90] For trees with a risk score of 50 to 99, SCE generally targets remediation within 180 days of obtaining access and authority to

[90] These TRC risk scores serve as a guide for the HTMP inspector in considering remediation. In certain instances, having a lower risk score does not negate the necessity of remediation for that tree.

complete the remediation.[91] Trees identified in a Priority 1 (P1) work order require remediation within 24 hours of observation.[92]

b) 2022 Scope and Cost of Work Performed

Table III-23
HTMP Total Spend in 2022
($ in millions)

Program	Total O&M Expenses	Recovery Account
Hazard Tree Management Program	$ 21.368	VMBA
Hazard Tree Management Program Total Spend	**$ 21.368**	

In 2022, SCE recorded O&M expenses of $21.368 million for HTMP, as shown in Table III-23. SCE performed almost 5,500 removals and mitigations (pruning) as part of HTMP, originating from approximately 26,000 assessments, and met its approved 2022 WMP Update targets.[93] Like Routine Line Clearing, total costs for HTMP inspections and remediation were impacted by increased contract rates.

2. Dead, Dying, and Diseased Tree Removal Program

a) Work Description and Need

SCE's Dead, Dying, and Diseased Tree Removal Program was established in response to the epidemic of dead and dying trees brought on by climate change, years of drought, and bark beetle infestation. In 2014, as a result of then-Governor Jerry Brown's declaration of a state of emergency regarding drought mitigation in Resolution ESRB-4, SCE began taking measures to increase vegetation inspections and remove hazardous, dead, and sick trees and other vegetation near power lines

[91] Property owner approval may be required prior to SCE performing remediation. SCE endeavors to contact property owners and seek approval when tree removal is recommended. In many cases, there are multiple steps required to acquire approval, such as researching public property records, identifying property owners, providing incentives, and/or reaching mutually acceptable resolutions (e.g., providing replacement trees). When more extensive interactions are required, SCE's Event Expediating team coordinates communication, sends letters to customers notifying them a tree needs to be remediated on their property, and works within SCE's organization to obtain approval.

[92] P1 work orders comprise any vegetation that is expected to imminently fail and contact SCE's electrical assets, as defined further in SCE's operational procedures UVM-08, Section 4.1.

[93] *See* SCE's 2022 WMP Update, p. 139 for 2022 target details for Hazard Tree Management Program (VM-1).

and poles. Additionally, GO 95 and PRC § 4923 contain requirements that SCE mitigate the hazards posed by dead trees or those that are identified as significantly compromised. Accordingly, SCE continues to proactively remove dead, dying, and diseased trees that could fall on or contact SCE's electrical facilities. Unlike trees located near power lines that must be trimmed to prevent encroachment, large dead or dying trees can fall into power lines from well outside of the CPUC compliance zone.

For this program, SCE conducts both inspections and mitigation, usually in the form of removals. SCE prioritizes inspections for Dead, Dying, and Diseased Tree Removal in accordance with California's Task Force Tree Mortality Map.[94] Under this program, SCE conducts patrols in HFRA beyond the CPUC compliance zone to identify and remove dead, dying, or diseased trees affected by drought conditions and/or insect infestation. SCE uses a contract workforce that identifies dead, dying, and diseased trees on an ongoing basis. In accordance with ANSI A300, the contractors perform a Level 1 visual assessment that focuses on identifying obvious tree defects (e.g., dead branches, leaning) that are observable from the side of the tree nearest the electric facilities. This can be ground-based, vehicle-based, or aerial-based (e.g., fixed-wing, helicopter, drone, LiDAR), as appropriate for the site conditions, type of infrastructure, and tree population being considered. During a typical inspection for this program, a tree is classified as dead when the canopy has declined by 75 percent or greater and/or is significantly infected with bark beetles or other invasive insects, which is apparent based on a visual assessment. The tree is subsequently designated for removal.

Removals for the Dead, Dying, and Diseased Tree Removal Program are conducted in the same manner as removals for HTMP, as previously described in Section III.C.1.a)(3).

[94] The Dead, Dying, and Diseased Tree Removal Program targets trees for inspection and mitigation in HFRA that are identified in the California Mortality mapping inventory, available at https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd498069.pdf (accessed on September 11, 2023).

b) 2022 Scope and Cost of Work Performed

Table III-24
Dead, Dying, and Diseased Tree Removal Program Total Spend in 2022
($ in millions)

Program	Total O&M Expenses		Recovery Account
Dead, Dying, and Diseased Tree Removal	$	24.404	VMBA
Dead, Dying, and Diseased Tree Removal Total Spend	**$**	**24.404**	

In 2022, SCE recorded $24.404 million in O&M expenses for inspections and remediations for the Dead, Dying, and Diseased Tree Removal Program, as shown in Table III-24. SCE removed approximately 9,000 dead and/or diseased trees and met its approved 2022 WMP Update targets.[95] Like Routine Line Clearing and HTMP, total costs for Dead, Dying, and Diseased Tree Removal Program inspections and mitigations were impacted by increased contract rates.

D. Seasonal Patrols, Areas of Concern (AOC), and Emergent Work

SCE also conducts inspection and mitigation work through Seasonal Patrols, AOC, and Emergent Work operations. Like Routine Line Clearing and the HT Program, total costs for Seasonal Patrols, AOC, and Emergent Work were impacted by increased contract rates. Table III-25 shows the respective 2022 costs for these work activities.

Table III-25
Seasonal Patrols, Areas of Concern, and Emergent Work Total Spend in 2022
($ in millions)

Program	Total O&M Expenses		Recovery Account
Seasonal Patrols	$	10.689	VMBA
Areas of Concern (AOC)	$	0.410	VMBA
Emergent Work	$	14.542	VMBA
Seasonal Patrols/AOC/Emergent Work Total Spend	**$**	**25.641**	

[95] *See* SCE's 2022 WMP Update, p. 140 for 2022 target details for Dead and Dying Tree Removal (VM-4).

1. Seasonal Patrols

a) Work Description and Need

SCE conducts seasonal patrols in areas where topography or vegetation conditions are known to pose a threat to SCE's assets during extreme weather events, such as peak fire season and periods of high wind conditions. Seasonal patrols include Canyon Patrols, Operation Santa Ana, and At-Risk Patrols. Canyon Patrols are performed annually, in areas where downslope, off-shore winds have greater potential to compromise trees conditioned to growing under primarily on-shore winds, to verify that certain circuits located in canyons are free from vegetation encroachments. Operation Santa Ana is a joint patrol effort conducted in the late Summer and Fall with state and local fire authorities, to inspect overhead powerlines and poles in the HFRA. At-Risk Patrols consists of work that helps ensure electrical service reliability outside of the seasonal scope of Canyon Patrols and Operation Santa Ana.

b) 2022 Scope and Cost of Work Performed

SCE's inspection and mitigation contractors for Seasonal Patrols perform work based on hourly time and expense rates. Mitigations typically require four to eight hours for trimming work, and significantly more time for removals.

In 2022, inspections from Seasonal Patrols resulted in more than 6,000 mitigations with O&M recorded expenses of $10.689 million, with roughly 30% of costs incurred for inspections. SCE executed this work in alignment with its approved 2022 WMP Update.[96]

2. Areas of Concern (AOC)

a) Work Description and Need

In addition to Seasonal Patrols, SCE conducts patrols and performs associated mitigations related to AOC in HFRA during the Summer and Fall. SCE identifies AOC through analysis of fire history, prior dates the area burned, current and future weather and fuel conditions, vegetation type and amount, community impact, and SCE infrastructure. The Summer AOC scope focuses on areas

[96] *See* SCE's 2022 WMP Update, pp. 415-416.

with potential for significant fuel-driven fire activity, while the Fall AOC scope targets wind-driven events.

b) 2022 Scope and Cost of Work Performed

In 2022, SCE performed more than 90 mitigations and associated inspections for AOC, resulting in O&M expenses of $0.410 million, as previously shown in Table III-25. SCE executed this work in alignment with its approved 2022 WMP Update.[97]

3. Emergent Work

a) Work Description and Need

SCE also performs emergent work, which is the mitigation of vegetation-related threats that have been identified by customers, inspectors, and trimming crews, or which originates from other Vegetation Management programs (e.g., Quality Control) or other SCE operating groups (e.g., transmission and distribution electrical asset inspections). Unlike Routine Line Clearing, emergent work is generally unplanned and typically occurs outside of the standard vegetation management cycle because of factors such as faster-than-anticipated tree growth or unpredictable weather events.

b) 2022 Scope and Cost of Work Performed

In 2022, SCE recorded $14.542 million of O&M expenses to complete almost 7,000 Priority 2 (P2) work orders. P2 work orders relate to any observed vegetation condition that is currently stable but where it appears that vegetation may cause a failure of electric assets, as defined further in SCE's operational procedures UVM-08, Section 4.1. Because this work fluctuates from year to year and is unpredictable, SCE is billed using an hourly T&E rate, which results in higher costs for work on each tree. This emergent work to remediate the identified P2 conditions is critical for maintaining the safety of the electrical system and helping prevent vegetation-related faults and/or ignitions from occurring.

[97] *See* SCE's 2022 WMP Update, pp. 400-402.

E. Structure Brushing

1. Work Description and Need

The Structure Brushing program removes vegetation at the base of select sub-transmission[98] and distribution structures to reduce the chance of ignition and/or fire spread, due to a spark or contact with failed equipment. PRC § 4292 requires utilities in certain areas and at certain times to "maintain around and adjacent to any pole or tower which supports a switch, fuse, transformer, lightning arrester, line junction, or dead end or corner pole, a firebreak, which consists of a clearing of not less than 10 feet in each direction from the outer circumference of such pole or tower." Specifically, the Structure Brushing program removes vegetation to create 10-foot radial (when attainable) and eight-foot vertical clearance.

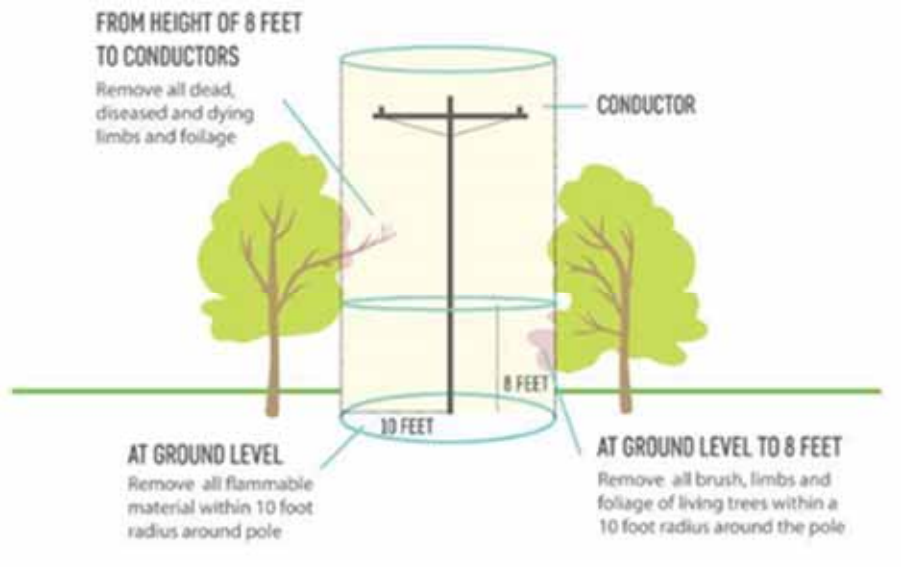
Structure Brushing mitigates the risk posed by vegetation at the base of poles and structures, which can provide the fuel needed to convert a spark from equipment failure into a fire. This vegetation can also support fire propagation, especially during dry and windy conditions. Additionally, even where the equipment is not the source of the ignition, brush surrounding a pole may catch fire and damage electric assets, impeding power restoration and reconstruction efforts.

Figure III-25 illustrates the clearance requirements for SCE's compliance scope subject to PRC § 4292.[99]

[98] Sub-transmission structures are typically lines with voltages that are at least 66kV and less than 220kV.

[99] The structure brushing program maintains clearance from the ground up to eight feet. Clearances above eight feet are maintained by Routine Vegetation Management.

Figure III-25
Brush Removal Near SCE Structures in Compliance with PRC § 4292



As part of Structure Brushing's expanded scope, SCE maintains the same clearance distances for certain high-risk structures in HFRA. The expanded scope comprises high-risk structures that are incremental to the compliance scope, such as select structures that are in HFRA, but exempt from PRC § 4292, structures in AOC, or structures with non-exempt equipment and highest potential wildfire consequence.

2. <u>2022 Scope and Cost of Work Performed</u>

Table III-26
Structure Brushing Total Spend in 2022
($ in millions)

Program	Total O&M Expenses	Recovery Account
Structure Brushing	$ 10.469	VMBA
Structure Brushing Total Spend	**$ 10.469**	

In 2022, SCE recorded $10.469 million for Structure Brushing O&M expenses, as shown in Table III-26. During this period, SCE cleared approximately 180,000 structures and met its approved

2022 WMP Update targets.[100] Like Routine Line Clearing, total costs for Structure Brushing were impacted by increased contract rates, due to the newly negotiated rates in contract agreements which went into effect in the Summer of 2022.

F. Quality Assurance/Control

1. Work Description and Need

SCE performs Quality Assurance/Control (QC) for Vegetation Management's three largest programs: (1) Routine Line Clearing; (2) HTMP; and (3) Dead, Dying, and Diseased Tree Removal Program.

The QC process is performed by a separate and objective team of third-party inspectors who review recently trimmed trees to verify they were trimmed to the proper clearance distance. For Routine Line Clearing, the QC program includes inspection of all distribution circuits with TRI Ranking Category A High Fire Risk. When practical, SCE also inspects distribution circuits with TRI Ranking Categories B, C, and D and samples miles with Confidence Levels (CL) and Confidence Intervals (CI) of 99/2 percent. Sampling for transmission circuits is performed using a CL/CI of 99/5 percent.[101] In addition, SCE targets QC of every vendor's activities, so if a vendor's work has not been inspected based on the above criteria, SCE will select one of the vendor's grids for QC.

For HTMP, SCE performs two specific QC activities. First, the Quality Control Inspector (QCI) performs an independent tree risk assessment using SCE's TRC to verify the accuracy of tree risk scores assigned by the HTMP inspector. Because trees with scores of 49 or below are not typically mitigated, the QCI generally reviews trees assigned a risk score between 35-49 to provide assurance that SCE did not miss a borderline tree for mitigation. QC samples these trees at a CL/CI of 99/2 percent. Second, QC also verifies 100 percent of HTMP removals and mitigation to confirm completion of work.

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[100] *See* SCE's 2022 WMP Update, for 2022 target details for Expanded Pole Brushing (VM-2) at p. 139, "Emergency response vegetation management due to red flag warning or other urgent climate conditions" at p. 142, and "Poles brushed per PRC 4292" at p. 144.

[101] See Section III.C.1.a)(1) for more details on TRI rankings.

For the Dead, Dying, and Diseased Tree Removal Program, QC performs 100 percent verification to confirm that all trees identified for removal have been removed and that no new adjacent hazards have been created due to the tree's removal.

SCE began a pilot for QC of Structure Brushing in July of 2022. For this program, QC focuses on confirming structures subject to PRC § 4292 have been properly brushed. QC for Structure Brushing uses a CL/CI of 99/2 percent.

2. 2022 Scope and Cost of Work Performed

Table III-27
Quality Assurance/Control Total Spend in 2022
($ in millions)

Program	Total O&M Expenses	Recovery Account
Quality Assurance/Control	$ 5.523	VMBA
Quality Assurance/Control Total Spend	**$ 5.523**	

In 2022, SCE recorded $5.523 million in O&M expenses, as shown in Table III-27. QC inspected 9,241 circuit miles, of which 5,535 were in HFRA, and 3,706 were in non-HFRA, and met its approved 2022 WMP Update targets.[102] These miles comprised 480,000 trees and/or mitigations inspected and the conformance rate for 2022 was 99.57 percent for RCD in Routine Line Clearing. Like Routine Line Clearing, total costs for Quality Assurance/Control were impacted by increased contract rates due to pay increases for QCIs who were promoted, as well as overall market pressures partially attributed to the unionization of this workforce in the utility industry.

G. Weed Abatement

1. Work Description and Need

In its Weed Abatement program, SCE manages vegetation on SCE transmission rights-of-way (ROW) and specific easement properties in accordance with PRC § 4291 and § 4292. To

[102] *See* SCE's 2022 WMP Update, p. 144 for 2022 target details for activity target "Vegetation Inspections Audited Annually." While SCE noted in its approved 2022 WMP Update that it anticipated completing approximately 8,000 circuit miles for QC, of which approximately half were allocated for HFRA, the actual work volume was higher, to help ensure QC coverage of work performed by all vendors and to inspect vendors or areas selected by SCE's arborist-certified Senior Specialists for QC work.

maintain compliance, SCE will typically abate the entire area and/or create fire breaks between one to four times per year, depending on re-growth. Methods used to abate weeds and dead/dying vegetation include mowing, pruning, weed whacking, and chemical treatment. Abatement distances differ by city and county and are generally 100 to 200 feet from structures and 10 to 50 feet from roadways and combustible fences. Contractor laydown yards are also treated for weeds on a quarterly basis. SCE manages vegetation on 1,500 unique parcels throughout the year as part of the Weed Abatement program, with an average parcel size of five acres. Annual rains and heat have an impact on parcel maintenance, as these factors traditionally affect weed growth.

2. 2022 Scope and Cost of Work Performed

Table III-28
Weed Abatement Total Spend in 2022
($ in millions)

Program	Total O&M Expenses	Recovery Account
Weed Abatement	$ 4.262	VMBA
Weed Abatement Total Spend	**$ 4.262**	

In 2022, SCE recorded $4.262 million in O&M expenses, as shown in Table III-28. SCE completed approximately 1,900 passes across almost 1,100 parcels. Each parcel comprises approximately five acres. SCE executed this work in alignment with its approved 2022 WMP Update.[103] Like Routine Line Clearing, total costs for Weed Abatement were impacted by increased contract rates.

H. Remote Sensing

1. Work Description and Need

SCE primarily uses LiDAR as its remote sensing technology for inspections. LiDAR is a surveying inspection method used by SCE on both transmission and distribution lines that measures distance to a target by illuminating the target with pulsed laser light and measuring the reflected pulses with a sensor. Differences in laser return times are then used to make digital three-dimensional representations of field conditions at the time of survey. For transmission lines, SCE models the data

[103] *See* SCE's 2022 WMP Update, p. 403.

against engineering information to calculate the maximum sag and sway of conductors (modeled conditions under maximum current load and maximum wind load) and compares the resulting conductor positions under those "worst case scenarios" to existing vegetation as determined by LiDAR for the purposes of determining where mitigation is required. SCE provides LiDAR data to ground inspectors conducting foot patrols on circuits, when available, to assist them in identifying potential encroachments and help them validate that right of way clearances fully account for conductor dynamics.

In 2022, SCE used LiDAR data for transmission assets in two different ways: 1) first, the LiDAR data aided traditional ground inspections by identifying trees with grow-in and fall-in potential under all conditions of conductor dynamics; and 2) second, the LiDAR data was used as the inspection itself, with ground inspectors deployed only to LiDAR-identified points on low inventory circuits (in lieu of inspecting entire circuits) to write prescriptions on specific trees or groups of trees.

For distribution assets, SCE successfully deployed LiDAR for distribution circuits for the first time in support of AOC. This method was used as a quicker way to identify abnormal growth and unexpected risks. Inspectors were deployed to verify LiDAR points on the ground and, because of the accuracy of LiDAR measurements, did not have to inspect the entire circuit.

In addition, SCE continues to explore satellite for remote sensing capability. Satellite technology is still evolving, and the imagery obtained can vary when it comes to quality and timing.

2. 2022 Scope and Cost of Work Performed

Table III-29
Remote Sensing Total Spend in 2022
($ in millions)

Program	Total O&M Expenses	Recovery Account
Remote Sensing	$ 3.086	VMBA
Remote Sensing Total Spend	**$ 3.086**	

In 2022, SCE incurred O&M expenses of $3.086 million for LiDAR use, as shown in Table III-29. SCE used LiDAR to inspect approximately 3,700 transmission circuit miles and

approximately 1,600 distribution circuit miles and met its approved 2022 WMP Update targets.[104] Additionally, minimal O&M expenses were incurred to pilot satellite use for remote sensing.

I. Environmental Programs

1. Work Description and Need

SCE provides environmental support for Vegetation Management programs, which is critical to help ensure compliance with federal and state environmental laws and regulations. The environmental laws and regulations that SCE is required to comply with include, but are not limited to:

- Federal Endangered Species Act (FESA)
- California Endangered Species Act (CESA)
- Migratory Bird Treaty Act (MBTA)
- California Fish and Game Code (FGC)
- California Environmental Quality Act (CEQA)
- National Environmental Policy Act (NEPA)
- California Fully Protected Species Regulations
- Federal Clean Water Act
- Rivers and Harbor Act
- National Historic Preservation Act
- Archaeological Resources Protection Act
- Forest Service Organic Act of 1897
- California Coastal Act

SCE's environmental support activities are critical, non-discretionary functions required to ensure compliance with all applicable environmental laws and regulations and permit requirements. Failure to comply with environmental laws and regulations, or to obtain required permits, before engaging in Vegetation Management activities, can result in violations, fines, penalties, work shut-

[104] *See* SCE's 2022 WMP Update, p. 145 for 2022 target details related to activity targets "LiDAR Vegetation Inspections – Distribution" and "LiDAR Vegetation Inspections – Transmission."

downs, reputational damage, and/or revocation of Special Use Permits (SUP), which allow SCE to perform work on U.S. Forest Service and National Park Service lands.

SCE utilizes a tool called the ESA layer to identify work points where environmental support is required.[105] This tool is a GIS layer designed to identify locations, or work points, where vegetation management activities may require site-specific environmental requirements or permitting. In 2021, SCE implemented significant expansion of the ESA layer, due to the increased vegetation management work scope, intensity of impact for the work performed to mitigate wildfire risks, and compliance with programmatic permits.[106] The enhanced ESA layer identified a significant increase in the volume of work points requiring environmental reviews, which included surveying and monitoring requirements. In addition, SCE incorporated environmental support for trouble orders and add-ons to ensure compliance for this work. SCE anticipates this increased workload and enhanced environmental support will continue to be required in future years.

Vegetation Management environmental support activities encompass environmental reviews (e.g., intake, coordination, review, reporting, development and maintenance of geospatial data management and analysis tools using GIS, SUP tasks, and agency permitting) and field support (e.g., coordinating and scheduling environmental surveys, field monitoring, and agency reporting). Activities also include environmental support for trouble orders[107] (e.g., work related to emergent conditions for vegetation), and instances where vegetation management crews identify additional field work not prescribed by the pre-inspectors ("add-ons"). SCE performs environmental review and support for this

[105] A work point is a field in SCE's work management system to geographically plot where vegetation work is required.

[106] In 2018 and 2019, SCE significantly increased its wildfire risk mitigation activities, including expanded vegetation management, resulting in deeper, more extensive trims triggering a higher volume of work necessitating environmental support and agency review and permitting. This more extensive work triggered the application of more and additional environmental requirements, which subsequently necessitated the expansion and updating of the ESA layer.

[107] Trouble orders comprise work for emergency conditions (P1s) and non-emergency conditions (P2s) related to vegetation.

work, which includes identifying the appropriate measures to take in the event a prescription changes in the field.[108]

Environmental support for SCE's vegetation management programs has grown significantly since 2019, when SCE greatly increased its response to wildfire risks with substantially more vegetation management mitigation work. This work took the form of deeper trims, often in previously untouched areas; the newly adopted live tree removal program (HTMP); and an expanded scope for Structure Brushing. As a result of this increased vegetation management scope, SCE required support for environmental review of a larger geographic area, and in many cases, a more intense environmental support work scope, than previously performed. In its 2021 GRC Track 1 application submitted in August 2019, SCE could not have accurately predicted with a reasonable level of accuracy the level of work required to provide sufficient environmental support for the increased volume and accompanying environmental impact of vegetation management in this GRC period. As a result, SCE continues to incur costs beyond the authorized amount for environmental support of vegetation management programs in 2022.

2. 2022 Scope and Cost of Work Performed

Table III-30
Environmental Support for Vegetation Management Total Spend in 2022
($ in millions)

Program	Total O&M Expenses		Recovery Account
Environmental Support	$	12.776	VMBA
Environmental Support	$	27.471	FRMMA
Environmental Support Total Spend	**$**	**40.247**	

SCE's 2022 recorded O&M expenses of $40.247 million for environmental support of vegetation management programs, as shown in Table III-30, which include $27.471 million for Routine

[108] Appropriate measures include biological, archaeological, and waters desktop reviews and field support (surveys, monitoring, post assessment). For these types of activities, it may be the case that the identified "add on" work can proceed with standard environmental measures or can proceed using the same measures attached to the original work point. In other instances, the work may require a standard environmental review, and work will not proceed until that review is performed.

Line Clearing,[109] $5.373 million for Structure Brushing, $2.804 million for HTMP, and $4.599 million for the Dead, Dying, and Diseased Tree Removal Program.

In 2022, SCE continued to provide environmental support for an increased volume of work triggered by the 2021 ESA layer enhancements.[110] In addition, 2022 activities encompassed field support for a large volume of work points located in waterways, with environmental reviews for most of this work completed in the 2021 timeframe. Finally, SCE incorporated additional updates to the ESA layer (e.g., inclusion of the Western Joshua Tree Warning Zone to address species candidate listing). These updates help strengthen environmental compliance as a more effective and accurate trigger for environmental review and the implementation of environmental controls, requirements, and avoidance and minimization measures.

SCE incurred $27.471 million in O&M expenses for environmental support of Routine Line Clearing work in 2022. SCE performed environmental reviews for approximately 137,000 work points and provided field support for approximately 95,000 work points. The volume of surveys was largely driven by work points located in waterways and work conducted during nesting bird season, which can last between February and August. The volume of monitoring support was driven by work points located in waterways and higher-cost specialized biologists required to perform work in sensitive and permitted areas (e.g., Yosemite Toad presence in District 50 and issuance of the Yosemite Toad Biological Opinion and associated permit conditions; Arroyo Toad permit with increased monitoring requirements for specially certified biologists). SCE acquired necessary permits from the California Department of Fish and Wildlife (CDFW) to perform vegetation management work in waterways, and

[109] In the 2021 GRC, SCE did not include in its forecast for Environmental Programs any amounts for the environmental support for the HTMP, the Dead, Dying, and Diseased Tree Removal Program, or Structure Brushing. The environmental support costs for those programs were charged directly to Vegetation Management and subsequently recorded in the VMBA.

[110] SCE incorporated revisions to the ESA layer in 2021 to help ensure it identified areas where vegetation management work required environmental review and controls to comply with environmental laws and permits. 2021 enhancements included new and expanded datasets and layers (e.g., USFS Region 5 threatened and endangered species occurrence and occupied habitat data, and waterways and riparian areas encompassing wetlands and waters resources regulated by CDFW and other agencies) to screen and review SCE's vegetation management work activity locations pursuant to various state and federal regulations.

incurred additional costs for permitting activities (e.g., preparation of permit applications, conducting surveys to provide riparian and sensitive species impact information) and implementation of permits' requirements (e.g., surveys, monitoring). SCE also incurred additional costs due to an increase in the volume of requests from vegetation management crews for P1 trouble orders and add-ons requiring environmental support.

SCE incurred $5.373 million in O&M expenses for environmental support of Structure Brushing in 2022. SCE performed environmental reviews for approximately 146,200 structures and provided field support for approximately 19,400 structures. Approximately 3,800 structures required preparation and submittal of environmental analyses reporting to agencies (i.e., "agency notifications"). In 2022, SCE continued to provide environmental support for an increased volume of structures requiring reviews and surveys resulting from the 2021 ESA layer enhancements. SCE also expanded its notification activities related to Conservation, Reserve Sites, Open Space, and Preserves (CROPS) and public lands agencies for structure brushing work.[111]

SCE incurred O&M expenses of $2.804 million for environmental support of HTMP and $4.599 million for environmental support of the Dead, Dying, and Diseased Tree Removal Program in 2022. For HTMP, SCE performed environmental reviews for approximately 2,700 tree removals and provided field support for approximately 2,100 tree removals. Approximately 900 tree removals required agency notifications. For the Dead, Dying, and Diseased Tree Removal Program, SCE performed reviews for approximately 5,300 tree removals and provided field support for approximately 6,000 tree removals. Approximately 4,100 tree removals required agency notifications. 2022 included new permitting requirements for various species (e.g., Yosemite toad, Pacific fisher) under SCE's Master Special Use Permit, which increased environmental support for HTMP and Dead, Dying, and Diseased tree removals in national forest lands. SCE also provided support for vegetation management work in the Sierra National Forest,[112] with a significant volume of tree removals under the Dead, Dying,

[111] Structures located in the CROPS sites required environmental reviews, coordination with local natural resource landowners, and surveying activities for these sites.

[112] SCE's District 50 in the Sierra National Forest is home to several sensitive species, including the Yosemite toad and Pacific fisher, with additional agency coordination and permitting requirements.

and Diseased Tree Removal Program. This work required additional support for agency coordination, GIS analysis, environmental reviews, field training, surveys, and monitoring.

IV.

DETERMINATION OF INCREMENTALITY FOR 2022 RECORDED COSTS

A. Overview

SCE is requesting reasonableness review of, and cost recovery for, incremental 2022 wildfire mitigation O&M expenses and capital expenditures, and incremental 2022 vegetation management activity O&M expenses above 115 percent of the GRC-authorized amount. SCE is also seeking environmental support O&M expenses associated with vegetation management activities that are incremental to the amounts authorized in the GRC. For all costs sought for recovery in this Application, SCE determined the costs were: (1) associated with the activities previously described that would not have been incurred "but for" SCE's wildfire mitigation and/or vegetation management activities; (2) CPUC-jurisdictional; and (3) incremental to GRC-authorized amounts, including the 115 percent reasonableness threshold for the VMBA, as further described in this chapter. The costs that SCE is requesting recovery for in this Application meet these three criteria.

Additionally, in SCE's 2021 WM/VM Application, A.22-06-003, the Commission's Utility Audit Branch (UAB) was directed to conduct an audit to determine whether SCE's incremental 2021 wildfire mitigation and vegetation management costs recorded in the WMPMA, FRMMA and VBMA were "reasonable, sufficiently supported, ***incremental in nature***, directly attributable to the designated accounts, and ***in compliance with applicable Public Utilities Code (PUC) Sections, CPUC Decisions,*** SCE's policies and procedures, and other relevant criteria."[113] After spending six months conducting field inspections, meetings and interviews and submitting over 300 data requests, the UAB's Final Audit Report included no finding disputing the incrementality of SCE's costs.[114] In this Application, SCE is assessing incrementality in the same manner used in A.22-06-003, as audited by the UAB.

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[113] UAB Final Audit Report in A.22-06-003, dated June 22, 2023, p. 1.

[114] UAB's Final Audit Report included three findings related to an unsubstantiated expenditure in the FRMMA totaling $120,036, an overstatement of FF&U due to the inadvertent use of the prior GRC's FF&U rate, and an unsubstantiated capital-related revenue requirement associated with CWIP expenditures.

B. Wildfire Mitigation Incremental Costs

Overall, SCE is seeking review of and cost recovery for $87.231 million in incremental 2022 wildfire mitigation O&M recorded expenses and $135.736 million in incremental 2022 wildfire mitigation capital expenditures, as shown in Table IV-31 and Table IV-32.

Table IV-31
Summary of Recorded and Incremental
2022 Wildfire Mitigation O&M Expenses
($ in millions)

	2022 Wildfire O&M Expenses					
Reference to Testimony	**O&M Recorded (A)**	**FERC Jurisdictional (B)**	**GRC Authorized (C)**	**PSPS Disallowance (D)**	**Incremental Costs (A-B-C-D)**	**Memorandum Account**
Grid Hardening	$ 2.796					WMPMA
Enhanced Operational Practices	$ 116.920					WMPMA/FRMMA
Fire Science & Advanced Modeling	$ 7.482					WMPMA
Enhanced Situational Awareness	$ 5.534					WMPMA
Organizational Support	$ 8.758	$ 10.273	$ 106.240	$ 2.500	$ 87.693	WMPMA/FRMMA
Public Safety Power Shutoff (PSPS)	$ 46.038					WMPMA
Aerial Suppression (Air Operations)	$ 18.200					WMPMA
Wildfire Mitigation Training & Development	$ 0.299					WMPMA
Environmental Remediation Programs	$ 0.678					WMPMA
Total	**$ 206.706**	**$ 10.273**	**$ 106.240**	**$ 2.500**	**$ 87.693**	(i)
A&G Capitalization	$ 3.860	$ -	$ 3.399	$ -	$ 0.461	(ii)
Total Net of A&G Capitalization	**$ 202.846**	**$ 10.273**	**$ 102.841**	**$ 2.500**	**$ 87.231**	(i)-(ii)

Table IV-32
Summary of Recorded and Incremental
2022 Wildfire Mitigation Capital Expenditures
($ in millions)

	2022 Wildfire Capital Expenditures				
Reference to Testimony	**Recorded Capital (A)**	**FERC Jurisdictional (B)**	**GRC Authorized (C)**	**Incremental Costs (A-B-C)**	**Memorandum Account**
Enhanced Operational Practices	$ 138.194				WMPMA
Enhanced Situational Awareness	$ 3.514				WMPMA
Fire Science and Advanced Modeling	$ 0.766	$ 1.306	$ 89.559	$ 135.736	WMPMA
Grid Hardening	$ 64.985				WMPMA
Public Safety Power Shutoff (PSPS)	$ 19.142				WMPMA
Total	**$ 226.601**	**$ 1.306**	**$ 89.559**	**$ 135.736**	

Costs associated with the activities described in the prior chapters are costs that would not have been incurred "but for" SCE's wildfire mitigation efforts and are thus considered eligible to be recorded in the WMPMA and the FRMMA. SCE created wildfire-specific work orders in its accounting system to

ensure that the costs of these activities were separately tracked from SCE's other activities. Once costs exceed total GRC-authorized amounts, SCE began recording costs into the two memorandum accounts.

1. Wildfire Mitigation Activities

As previously described, incremental wildfire mitigation-related costs for O&M expenses and capital expenditures are eligible for recovery in the WMPMA and the FRMMA. To determine incrementality, SCE compared the CPUC-jurisdictional portion of these wildfire mitigation-related costs to the relevant amount authorized for 2022 in Track 1 of SCE's 2021 GRC at the wildfire mitigation activities portfolio level.[115] SCE's accounting system utilizes regulatory indicators that enable SCE to separate CPUC-jurisdictional costs. Recorded costs have been jurisdictionalized between CPUC and FERC using the adopted jurisdictional factors from the 2021 GRC Track 1 Final Decision.[116] SCE excluded the FERC-jurisdictional costs from its recovery request in this Application.

Incrementality for SCE's wildfire mitigation activities is assessed at the wildfire mitigation portfolio level and is determined by reviewing total recorded 2022 spend for the wildfire mitigation activities and comparing that to the total dollars authorized for 2022 for wildfire mitigation-related activities.

First, SCE consolidated total CPUC-jurisdictional costs across all wildfire mitigation-related activities. Then, SCE compared this total recorded amount with the total wildfire mitigation-related activities GRC-authorized amounts for 2022. Wildfire mitigation portfolio level costs that are higher than the GRC-authorized level is considered incremental.

Although traditionally the CPUC appropriately views incrementality on an activity-specific basis,[117] in this Application SCE is assessing wildfire mitigation costs on a portfolio basis, consistent with the statutory prohibition of shifting costs used to implement an approved WMP to

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[115] *See* Advice 4639-E.

[116] *See* D.21-08-036, p. 539.

[117] *See,* e.g.*,* D.21-08-024; D.92-03-094, 1992 Cal. PUC LEXIS 236, at *7-8; D.83-12-068 at 8-9, 1983 Cal. PUC LEXIS 1156, at *12; and the pending May 17, 2022 Proposed Decision of ALJ Wong in Track 3 of A.19-08-013.

programs outside of the WMP.[118] If SCE spent less than authorized in a specific wildfire activity, SCE believes it is appropriate (and required) to use that difference to offset overspending on other wildfire mitigation-related activities prior to calculating incremental amounts. This helps ensure consistency with the statutory prohibition against shifting costs used to implement an approved WMP. Therefore, by utilizing a total portfolio approach, SCE ensures that all authorized wildfire mitigation funding is spent on wildfire mitigation-related activities and only seeks recovery for any spend above that total authorized amount.

2. Cost Category Breakdown

a) SCE Labor

In 2022, SCE incurred a total of $4.590 million of O&M expenses and $11.248 million of capital expenditures for incremental internal labor related to wildfire mitigation work that was needed to reduce the likelihood of fires associated with or threatening utility assets. These SCE resources performed, among other things, inspections and patrols of utility equipment, proactive grid hardening work, and remediation work beyond the level of work authorized in the GRC for 2022. SCE is including these wildfire mitigation-related labor costs in this request because they meet all the criteria of incremental costs, as previously set forth.

b) Contractor Labor

In 2022, SCE recorded $54.365 million in O&M expenses and $74.186 million in capital expenditures for incremental contractor work associated with wildfire mitigation activities. Specifically, in 2022, SCE utilized contract crews to help mitigate wildfire risks throughout SCE's service area. These contractor resources performed, among other things, proactive grid hardening work and remediation work beyond the level of work authorized in the GRC for 2022. SCE is including these wildfire mitigation-related contractor labor costs in this request because they meet all the criteria of incremental costs, as previously set forth.

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[118] *See* Public Utilities Code § 8386.3(d)(1) ("An electrical corporation shall not divert revenues authorized by the Commission to implement the wildfire mitigation plan to any activities or investments outside of the plan.").

c) Material and Equipment and Other Costs

SCE recorded $28.276 million in O&M expenses and $50.303 million in capital expenditures for material and equipment and other costs incurred while performing wildfire mitigation efforts that were not already recovered in 2022 GRC-authorized rates and are, therefore, incremental costs.[119] SCE's 2022 material and equipment and other costs were necessary to directly support the wildfire mitigation activities they are associated with. SCE is including these wildfire mitigation-related material and equipment and other costs in this request because they meet all the criteria of incremental costs, as previously set forth.

C. Vegetation Management Incremental Costs

Table IV-33 demonstrates the total recorded O&M expenses in 2022 for the Vegetation Management programs previously discussed, and the incremental costs above the authorized amounts that SCE seeks to recover in this Application, which total $268.351 million. This table also shows which accounts vegetation management expenses recorded to—the reason some costs were recorded in the FRMMA rather than the VMBA is explained in the section that follows.

Table IV-33
Summary of Recorded and Incremental
2022 Vegetation Management
O&M Expenses by Activity
($ in millions)

2022 Vegetation Management O&M Expenses						
Reference to Testimony	O&M Recorded (A)	FERC Jurisdictional (B)	GRC Authorized With Threshold [1] (C)	Non-Incremental Costs (D)	Incremental Costs (A-B-C-D)	Balancing/Memorandum Account
Vegetation Management	$ 466.390	$ 13.665	$ 207.558	$ (0.000)	$ 245.168	VMBA
Vegetation Management	27.471	2.024	2.264	-	23.183	FRMMA
Total	**$ 493.861**	**$ 15.689**	**$ 209.821**	**$ (0.000)**	**$ 268.351**	

[1] $2.26M GRC Authorized for Environmental Support to Vegetation Management is not part of VMBA but is the amount authorized for environmental support related to line clearing activities under Environmental Programs.

1. Vegetation Management Activities

Vegetation management-related costs are tracked under unique vegetation management O&M expense objects. SCE's accounting system utilizes regulatory indicators that enable SCE to

[119] SCE's expenditures for, "other costs" incurred while performing wildfire mitigation efforts are comprised of activities related to T&D division overhead costs for distribution, transmission, and substation support.

separate CPUC-jurisdictional costs from FERC-jurisdictional costs. Recorded costs have been jurisdictionalized between the CPUC and FERC using the adopted jurisdictional factors from the 2021 GRC Track 1 Final Decision.[120] SCE excluded the FERC-jurisdictional costs from its request in this Application.

In determining incrementality, apart from environmental support for line clearing activities, SCE compared the CPUC-jurisdictional portion of these vegetation management-related costs to the relevant 2022 amount authorized in the GRC for the VMBA.[121] First, SCE consolidated total CPUC-jurisdictional spend across all vegetation management-related activities. Then, SCE compared this total spend with the total vegetation management-related costs authorized for recovery via the VMBA (including the 15 percent reasonableness threshold) for 2022.[122] This is consistent with the Commission's direction in the 2021 GRC Track 1 Final Decision, which provided: "We should authorize a two-way VMBA to track the difference between the authorized O&M expenses ***for all vegetation management activities in this proceeding*** and SCE's recorded expenses for these activities, along with a requirement that recovery of costs in excess of 115 percent of the authorized amount for VMP activities be made by application."[123] SCE already received approval to recover 2022 recorded vegetation management costs between 100 to 115 percent of the GRC-authorized amount via Advice 5049-E.

With respect to environmental support costs, SCE forecast approximately $2.264 million for environmental support activities necessary to support vegetation management's routine line clearing program (inspections and trims/removals to maintain clearance distances) in the Environmental

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[120] *See* D.21-08-036, pp. 538-39.

[121] *See* Advice 4639-E.

[122] *See* D.21-08-036, p. 656 (CoL 70) and Advice 4639-E.

[123] *See* D.21-08-036, p. 656 (CoL 70) (emphasis added).

Programs activity.[124] The Commission adopted SCE's forecast in its 2021 GRC Track 1 Final Decision.[125] Thus, with respect to environmental support for routine line clearing, in determining incrementality, SCE compared the actual recorded CPUC-jurisdictional portion of Environmental Programs costs related to environmental support of routine line clearing of $25.447 million to the GRC-authorized amount of $2.264 million. SCE recorded the incremental costs of $23.183 million in the FRMMA. In the 2021 GRC, SCE did not include in its forecast for Environmental Programs any amounts for the environmental support for the HTMP program, the Dead and Dying Tree Removal program, or the structure brushing activities. The environmental support costs for those programs were recorded in the VMBA, as previously discussed.

During the 2021 GRC proceeding, in SCE's August 30, 2019 Update Testimony, SCE informed the Commission about certain mandated contractor labor cost increases, driven by SB 247, that were going to *materially* increase SCE's vegetation management costs. The Track 1 Final Decision declined to incorporate these important changes in the authorized funding for the 2021 GRC cycle.[126] In large part as a direct result of that regulatory deferral, the VMBA was materially under-collected in 2022. In addition, pursuant to the 2021 GRC Track 1 Final Decision, vegetation management costs are captured in the VMBA, regardless of whether those costs are related to HFRA or non-HFRA regions, or whether they are compliance-driven or risk-informed. Accordingly, there is no need, in this Application, to parse wildfire mitigation-specific or any other subset of vegetation management costs. Overall, SCE is seeking review of and cost recovery for $268.351 million in 2022 incremental vegetation management O&M recorded expenses across all vegetation management programs, as shown in Table IV-33.

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[124] Exhibit SCE-06 Vol.-04 Testimony at p. 12 in SCE's 2021 GRC Track 1 includes SCE's Environmental Services Department's 2021 GRC total O&M request of $27.683 million. The approximate $2 million for environmental support of Vegetation Management resides within the $27.683 million in Figure II-5 Environmental Services Recorded 2014-2018/Forecast 2019-2021.

[125] *Id*; *see* D.21-08-036, p. 438.

[126] *See* D.21-08-036, pp. 181-83.

2. Cost Category Breakdown

a) SCE Labor

In 2022, SCE incurred a total of $5.290 million of O&M expenses for incremental SCE labor related to vegetation management work. These SCE resources coordinated and oversaw, among other things, inspections and patrols of utility equipment, proactive line clearance tree trimming, dead and dying tree removals, and remediation work beyond the level of work authorized in the 2021 GRC. SCE is including these vegetation management-related labor costs in this request because they meet all the criteria for incremental costs. The incremental SCE labor costs would not have been incurred "but for" the necessary vegetation management work.

b) Contractor Labor

In 2022, SCE recorded $275.126 million in O&M expenses for incremental contractor work associated with vegetation management activities. These costs were significantly impacted by the implementation of SB 247 and other factors, as discussed in more detail in Chapter III.E. SCE maintains Purchase Orders with contractors that reflect market rates at the time the Purchase Orders were established. These contractor resources performed, among other things, inspections (including hazard tree assessments), tree trimming, tree removals, other remediations (such as structure brushing), environmental review and monitoring, and quality control inspections, in line with the type and level of work included in accordance with SCE's approved 2022 WMP.

c) Material and Equipment and Other Costs

In 2022, SCE recorded a credit of $12.065 million in O&M-related incremental material and equipment and other costs associated with vegetation management activities.[127] SCE ended the year with a credit balance, due to the accruals reversals for work completed at the end of 2021.

[127] SCE's expenditures for, "other costs" incurred while performing wildfire mitigation efforts are comprised of activities related to T&D division overhead costs for distribution, transmission, and substation support.

V.

COST RECOVERY RATEMAKING PROPOSALS

A. Purpose

The purpose of this chapter is to present SCE's cost recovery proposal for the incremental 2022 costs eligible for recovery in the Wildfire Mitigation memorandum accounts (WMPMA and FRMMA) and the VMBA. As previously discussed, for the Wildfire Mitigation memorandum accounts, SCE is seeking reasonableness review and recovery of the incremental costs at the wildfire mitigation portfolio level related to the programs and activities tracked and recorded in those accounts. For the VMBA, SCE is seeking reasonableness review and recovery of the incremental costs above the authorized amount, inclusive of the 115 percent reasonableness threshold,[128] related to the vegetation management costs recorded in that account (service area-wide). SCE proposes the Commission review and approve the recorded incremental wildfire mitigation- and vegetation management-related costs as just and reasonable.

Table V-34, below, summarizes the initial revenue requirement associated with the incremental 2022 costs that have been recorded in the WMPMA, FRMMA, and VMBA, as of August 31, 2023.[129] SCE proposes to recover the revenue requirement through customers' distribution rates.

Concurrent with the filing of this Application, SCE is filing a *Motion for Interim Rate Recovery* (IRR). The motion requests approval for IRR of 85 percent of the requested revenue requirement, equating to approximately $312 million (excluding interest) or $325 million (including interest, as of August 31, 2023), over a 12-month period commencing on March 1, 2024. Upon approval of SCE's IRR request, SCE proposes to transfer the approved IRR amounts from the WMPMA, FRMMA, and VMBA to the distribution subaccount of the Base Revenue Requirement Balancing Account (BRRBA) for recovery in customers' distribution rates, beginning March 1, 2024, or as part of the next available rate change after the effective date of the IRR decision. If a final decision in this Application authorizes an

[128] *See* D.21-08-036, p. 656 (CoL 70) and Advice 4639-E.

[129] The initial revenue requirement set forth in this Application does not include capital expenditures categorized as CWIP as of August 2023; SCE's proposed ratemaking for CWIP amounts is explained in Chapter V.C.1.

amount less than what has already been collected through this IRR mechanism, SCE would return any overcollection to customers, with interest, calculated at the approved rate. This overcollection would be effectuated as a beginning period credit adjustment in the distribution subaccount of the BRRBA.

Effective upon a final Commission decision in this Application, and if the Commission authorizes an amount more than what has already been collected through the IRR mechanism, SCE will transfer the remaining authorized revenue requirement, including any additional capital-related revenue requirement and interest that will accrue to the WMPMA, FRMMA, and VMBA during the pendency of this proceeding, to the distribution subaccount of the BRRBA for recovery from customers over a 12-month period. In addition to the initial transfer, SCE will continue to transfer any ongoing revenue requirement associated with the capital expenditures eligible for recovery via the WMPMA to the distribution subaccount of BRRBA for recovery in rates, on an annual basis, until the ongoing revenue requirement is included in GRC-authorized base rates.

If SCE's IRR Motion is not granted, upon a final decision in this Application, SCE will transfer the entire authorized revenue requirement, including any additional capital-related revenue requirement and interest that will accrue to the WMPMA, FRMMA, and VMBA over the pendency of this proceeding, to the distribution subaccount of the BRRBA for recovery from customers over a 12-month period. In addition to the initial transfer, SCE will continue to transfer any ongoing revenue requirement associated with the capital expenditures eligible for recovery via the WMPMA to the distribution subaccount of BRRBA for recovery in rates, on an annual basis, until the ongoing revenue requirement is included in GRC-authorized base rates.

Table V-34
Summary of Cost Recovery Request for Revenue Requirements
as of August 31, 2023[130]
($ in millions)

Line No.	Item Description	WMPMA	FRMMA	VMBA	Total Rev Req
1	**O&M Expense**	**$ 88.842**	**$ 24.072**	**$ 245.168**	**$ 358.082**
2	Capital Related Revenue Requirement				
3	Depreciation	$ 5.241	$ -	$ -	$ 5.241
4	Income Taxes	$ (3.599)	$ -	$ -	$ (3.599)
5	Property Taxes	$ 0.210	$ -	$ -	$ 0.210
6	Return	$ 6.691	$ -	$ -	$ 6.691
7	**Total Capital Related Revenue Requirement**	**$ 8.544**	**$ -**	**$ -**	**$ 8.544**
8	**Subtotal**	**$ 97.386**	**$ 24.072**	**$ 245.168**	**$ 366.626**
9	Interest	$ 3.803	$ 0.960	$ 10.453	$ 15.217
10	Less: PSPS Disallowance	$ (2.500)	$ -	$ -	$ (2.500)
11	Franchise Fees & Uncollectibles	$ 1.092	$ 0.277	$ 2.827	$ 4.196
12	**Total Revenue Requirement**	**$ 99.781**	**$ 25.309**	**$ 258.448**	**$ 383.538**

B. Overview of SCE's Wildfire Mitigation and Vegetation Management Accounts

1. WMPMA

On June 4, 2019, the Commission issued D.19-05-038, approving SCE's 2019 WMP. This Decision also authorized SCE to "open the memorandum account described in Public Utilities Code § 8386(e), which provides: 'At the time it approves each [WMP], the [C]ommission shall authorize the utility to establish a memorandum account to track costs incurred to implement the plan.'"[131] In authorizing this Section 8386(e) memorandum account, the Commission specified that SCE could not "seek or obtain double recovery of the costs tracked in its Public Utilities Code § 8386(e) memorandum account in any other account, including [FRMMA]."[132]

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[130] The initial revenue requirement, set forth in this Application, does not include capital expenditures categorized as CWIP, as of August 31, 2023. SCE's proposed ratemaking for CWIP amounts is explained in Chapter V.C.1.

[131] *See* D.19-05-038, OP 18 (quoting former Public Utilities Code § 8386(e) now codified at § 8386.4(a)).

[132] *See* D.19-05-038, OP 19.

Pursuant to OPs 18 and 19 of D.19-05-038, SCE submitted Advice 4022-E to establish the WMPMA to track costs incurred to implement SCE's approved WMPs that are (1) not currently reflected in other Commission revenue requirements being paid by customers in rates (e.g., in Commission-approved GRC base rates revenue requirements); (2) not pending approval by the Commission via a separate SCE proposal (e.g., in SCE's now-approved GSRP application, A.18-09-002); and (3) not being tracked in an existing Commission-authorized memorandum account (e.g., in SCE's previously-effective Fire Hazard Prevention Memorandum Account or Catastrophic Event Memorandum Account). The costs in the WMPMA will then be presented to the Commission for reasonableness review and cost recovery in a future application, consistent with Public Utilities Code § 8386.4(b).

2. FRMMA

On September 21, 2018, former Governor Jerry Brown signed SB 901, which set in motion wide-ranging activities to strengthen California's ability to prevent and recover from catastrophic wildfires. In addition to measures directed at other entities, SB 901 requires electric utilities to prepare and submit WMPs that describe the utilities' plans to prevent, combat, and respond to wildfires. The Commission opened R.18-10-007 on October 25, 2018 to implement the provisions of SB 901.

On January 18, 2019 and March 12, 2019, SCE submitted Advice 3936-E and Advice 3936-E-A, respectively, proposing the establishment of the FRMMA, in compliance with Public Utilities Code § 8386(j). As described in Advice 3936-E:

> SB 901 authorizes SCE to establish two separate memorandum accounts to track incremental costs SCE incurs to mitigate wildfire risk. One memorandum account, which SCE proposes to establish in this advice letter, is intended to "track costs incurred for fire risk mitigation that are not otherwise covered in the electrical corporation's revenue requirement."[133] The second memorandum account, which is to be established upon approval of SCE's 2019 WMP, is intended to "track costs incurred to implement the plan."[134]

[133] *See* Public Utilities Code § 8386.4(b)(1).

[134] *See* Public Utilities Code § 8386.4(a).

The Commission approved Advice 3936-E/E-A on March 12, 2019 and approved an effective date for FRMMA of January 18, 2019.

3. VMBA

In D.21-08-036, the Final Decision in Track 1 of SCE's 2021 GRC, the Commission authorized SCE to create a two-way balancing account, the VMBA, to record the difference between GRC-authorized O&M expenses for all vegetation management activities and SCE's incurred expenses for these activities. On September 10, 2021, SCE submitted Advice 4586-E to establish Preliminary Statement Part AAAA, VMBA. In accordance with D.21-08-036 and SCE's Commission-approved tariff, cost recovery for amounts more than 115 percent of authorized amounts is to be requested by application. Recovery of any undercollection that is less than 115 percent of the authorized amount, as well as the refund of any overcollection, is to be requested via a Tier 2 advice letter.[135] Accordingly, in this Application, SCE is seeking reasonableness review for recovery of incremental O&M expenses above 115 percent of the authorized amount for 2022. On June 14, 2023, SCE submitted Advice 5049-E to recover 2022 vegetation management costs between 100 and 115 percent of the authorized amount in accordance with D.21-08-036.[136]

Additionally, on October 2, 2019, Governor Gavin Newsom signed a new wildland fire prevention bill into law, SB 247, with an effective date of January 1, 2020. Among other requirements, as previously discussed, the new law specifies the qualifications for electrical line clearance tree trimmers, performing work to comply with the vegetation management requirements in an electrical corporation's wildfire mitigation plan. SB 247 also added Section 8386.6 to the Public Utilities Code, which now requires all qualified line clearance tree trimmers or trainees, under the direct supervision and instruction of qualified line clearance tree trimmers, be remunerated no less than a first period

[135] D.21-08-036, OP 14.

[136] On July 24, 2023, the Commission's Energy Division approved Advice 5049-E with an effective date of July 14, 2023.

apprentice electrical utility lineman.[137] In 2022, the additional costs associated with this statutory change recorded to the VMBA, in addition to all of SCE's other vegetation management labor costs.

4. PSPS Disallowance

On June 14, 2023, the Commission issued Resolution ALJ-440, instituting a $6 million permanent disallowance of PSPS program-related costs in the settlement agreement to resolve all issues related to the Commission's Safety and Enforcement Division's investigation of SCE's 2020 PSPS events. SCE agreed to permanently waive its right to seek cost recovery for $6 million of PSPS program-related O&M expenses focused on customer outreach, critical care backup batteries, and notification requirements that are eligible for tracking in the WMPMA and/or the FRMMA. Of the $6 million, $2.5 million of the disallowance is to apply to 2022 incremental costs and the remaining $3.5 million is to apply to 2023 incremental costs.[138] As a result, SCE has reduced its cost recovery request in this Application by $2.5 million, as shown on Line 10 of Table V-34, in compliance with the Resolution.

C. Incremental Revenue Requirements Associated with 2022 Wildfire Mitigation and Vegetation Management Recorded Costs

1. WMPMA

In this Application, SCE is seeking recovery of $88.842 million of incremental O&M expenses incurred and recorded in the WMPMA in 2022, along with the corresponding interest, and $135.736 million of WMPMA-eligible incremental capital expenditures incurred in 2022, resulting in an initial capital-related revenue requirement of $8.544 million as of August 31, 2023.

Of the $135.736 million of WMPMA-eligible incremental capital expenditures incurred in 2022, $22.742 million were still classified as CWIP as of August 31, 2023 – meaning they have not yet transferred to Plant-In-Service as Capital Additions and, therefore, do not have a revenue requirement recorded in the WMPMA yet. Because the $22.742 million of capital expenditures are incremental to the amounts authorized in SCE's GRC for 2022, as assets become ready for service, SCE

[137] *See* Public Utilities Code § 8386.6(a)(b).

[138] *See* Resolution ALJ-440, p. 4.

will transfer the corresponding amounts from CWIP to Plant-In-Service as Capital Additions and record the corresponding capital-related revenue requirement in the WMPMA.[139] On an annual basis, SCE will transfer the ongoing revenue requirement associated with the approved $135.736 million of capital expenditures from the WMPMA to the distribution subaccount of the BRRBA for recovery in rates until the ongoing revenue requirement is included in GRC-authorized base rates.

a) Capital-Related Revenue Requirement

The capital-related revenue requirement, which is based on Plant-In-Service, includes depreciation expense, applicable taxes, SCE's applicable return associated with SCE's capital expenditures, and interest. SCE's capital-related revenue requirement, as previously shown in Table V-34, was derived based on direct capital expenditures of $112.995 million,[140] as previously shown in Table IV-32.

(1) Capital Additions and Plant-In-Service

Capital expenditures are not included in rate base until the assets are ready for service. The accounting for this is prescribed by the FERC. When incurred, capital expenditures record to FERC Account 107, CWIP. While in CWIP, costs typically accrue capitalized financing costs, referred to as Allowance for Funds Used During Construction (AFUDC), at rates based on a prescribed formula in the FERC Uniform System of Accounts (USOA). Once the assets are ready for service, cumulative costs, including both corporate overheads and AFUDC, are transferred from CWIP to Plant-In-Service as Capital Additions. At this same time, AFUDC accruals are stopped, the cumulative balance is included in rate base, and depreciation expense begins.

(2) Depreciation Expense

To provide service to its customers, SCE incurs expenses and makes capital expenditures. Generally Accepted Accounting Principles and the application of FERC USOA govern whether a particular cost should be capitalized or expensed. While SCE earns a return on its

[139] *See* SectionV.C.1.(a)(1) for additional details regarding Capital Additions and Plant-In-Service.

[140] $135.736 million in capital expenditures less $22.742 million in CWIP = $112.994 million.

capital assets by applying an authorized rate of return to its rate base, SCE's return of investors' capital occurs through depreciation expense. Depreciation expense, recorded in the WMPMA, is accrued at depreciation rates authorized in SCE's applicable GRC. Depreciation provides a mechanism for the recovery of the original cost of the capital expenditures, and the future cost to retire those assets over their useful life. The expense is calculated, starting from the date Capital Additions are recorded as Plant-In-Service. The recorded Plant-In-Service is the base to which the annual depreciation rate is applied.

(3) Income/Property Taxes

The recovery of costs recorded in SCE's WMPMA includes the related income tax expense. For ratemaking purposes, income tax expense is a function of revenue requirement, cost-of-service amounts, and capital expenditures, as adjusted to comply with income tax rules. Total income tax expense is equal to the current federal and state income tax expense, plus the deferred income tax expense. SCE utilizes flow-through tax ratemaking, as required by the Commission,[141] which can cause the total capital-related revenue requirement to be negative in certain years. The tax entries in WMPMA include the following tax adjustments:

- Tax Depreciation
- Removal Costs
- Synchronized Interest
- Capitalized Software
- Deduction of State Income Taxes
- Tax Repair Deductions

SCE computes tax expense using the applicable federal corporate tax rate of 21 percent and the state corporate tax rate of 8.84 percent.

[141] Unless normalization treatment is required by the Internal Revenue Service or previously allowed by the Commission.

(4) Return on Rate Base

SCE calculated the rate of return on rate base, using the currently authorized rate of return of 7.44 percent, as approved in D.22-12-031 (as corrected in D.23-01-002) and Advice 4933-E. On a recorded basis, SCE will update its rate of return on rate base to be consistent with the then-current authorized rate of return.

(5) Interest

The balance recorded in the WMPMA accrues monthly interest, using the three-month non-financial commercial paper rate as specified in SCE's Commission-approved tariff.

b) Revenue Requirement and Summary of Entries in the WMPMA

Table V-35 summarizes the entries recorded in the WMPMA for 2022 incremental costs as of August 31, 2023. As previously discussed, SCE is also seeking approval to recover the revenue requirement associated with the $22.742 million of capital expenditures categorized as CWIP as of August 31, 2023, after the Capital Additions-related revenue requirement associated with those expenditures are recorded in the WMPMA. SCE believes it is reasonable for the Commission to authorize SCE to further update the amount of CWIP that has closed to plant in the advice letter implementing a final decision in this proceeding, which would allow any additional amounts that record as a revenue requirement to be recovered in customers' rates.[142]

[142] The actual calculation of the capital-related revenue requirement is formulaic in nature and was uncontested in SCE's 2021 WM/VM Application (A.22-06-003).

Table V-35
Wildfire Mitigation Plan Memorandum Account (WMPMA) for 2022
($ in millions)

Line No.	Item Description		Annual Summary[1]
1	**O&M Expense**	$	88.842
2	Capital Related Revenue Requirement		
3	Depreciation	$	5.241
4	Income Taxes	$	(3.599)
5	Property Taxes	$	0.210
6	Return	$	6.691
7	**Total Capital Related Revenue Requirement**	$	8.544
8	PSPS Disallowance	$	(2.500)
9	Interest	$	3.803
10	**Total Revenue Requirement**	**$**	**98.689**

[1] Excludes FF&U

2. FRMMA

a) Revenue Requirement and Summary of Entries in the FRMMA

Table V-36 summarizes the recorded entries in the FRMMA for 2022. In this proceeding, SCE is seeking recovery of the incremental 2022 O&M expenses, and the corresponding interest, recorded in the FRMMA.

Table V-36
Fire Risk Mitigation Memorandum Account (FRMMA) for 2022
($ in millions)

Line No.	Item Description		Annual Summary[1]
1	**O&M Expense**	$	24.072
2	Capital Related Revenue Requirement		
3	Depreciation	$	-
4	Income Taxes	$	-
5	Property Taxes	$	-
6	Return	$	-
7	**Total Capital Related Revenue Requirement**	$	-
8	Interest	$	0.960
9	**Total Revenue Requirement**	**$**	**25.032**

[1] Excludes FF&U

3. VMBA

a) Revenue Requirement and Summary of Entries in the VMBA

Table V-37 summarizes the recorded entries in the VMBA for 2022. In this proceeding, SCE is seeking recovery of the incremental 2022 O&M expenses recorded in the VMBA that exceed 115 percent of the GRC-authorized amount.

Table V-37
Vegetation Management Balancing Account (VMBA) for 2022
($ in millions)

Line No.	Item Description	Annual Summary[1]	
1	**O&M Expense**	$	245.168
2	Capital Related Revenue Requirement		
3	Depreciation	$	-
4	Income Taxes	$	-
5	Property Taxes	$	-
6	Return	$	-
7	**Total Capital Related Revenue Requirement**	$	-
8	Interest	$	10.453
12	**Total Revenue Requirement**	**$**	**255.621**

[1] Excludes FF&U

D. Recovery of the Revenue Requirement Associated with Incremental 2021 Capital Expenditures

On June 3, 2022, SCE filed its 2021 Wildfire Mitigation and Vegetation Management Application (A.22-06-003) to, in pertinent part, seek cost recovery of its incremental 2021 wildfire mitigation-related capital expenditures. At the time of filing, approximately $21.09 million of SCE's incremental 2021 wildfire mitigation-related capital expenditures were categorized as CWIP. In A.22-06-003, SCE has requested the authority to recover the revenue requirement associated with the CWIP by transferring the capital-related revenue requirement of capital expenditures found reasonable that will record in the 2021 WMPMA once the CWIP becomes a Capital Addition to the distribution subaccount of the BRRBA. However, to the extent that SCE's request is partially or fully denied in A.22-06-003, in this Application, SCE is substantiating the capital-related revenue requirement associated with $16.88 million of the $21.09 million that has become a Capital Addition with a recorded revenue requirement in the WMPMA as of August 31, 2023. SCE is further requesting that it be allowed to substantiate the

revenue requirement associated with the $4.206 million that is remaining in CWIP status as of August 31, 2023 in Rebuttal Testimony in this proceeding and/or in the advice letter implementing a final decision in this proceeding. These capital expenditures were presented for review in SCE's 2021 WM/VM application and should be found, per se, reasonable upon a final decision in A.22-06-003. The actual calculation of the capital-related revenue requirement is formulaic in nature and was uncontested in A.22-06-003.[143] Again, to the extent SCE is allowed to fully recover 2021 CWIP amounts as proposed in A.22-06-003 (which is most preferable given the reduction in interest expense that would be included in customers' rates), this request here will become moot. However, SCE is not expecting a final decision in A.22-06-003 until the first quarter of 2024 and is not yet informed of the Commission's decision on SCE's 2021 CWIP cost recovery proposal set forth in A.22-06-003.

[143] Finding 3 of the UAB Final Audit Report stated that SCE's CWIP request was unsubstantiated because the actual revenue requirement had not been calculated but did not take issue with the actual formula for calculating a capital-related revenue requirement once it becomes a Capital Addition.

VI.
AFFORDABILITY METRICS

A. Affordability Metrics

On August 4, 2022, the Commission adopted D.22-08-023, which directs when and how the affordability metrics adopted in D.20-07-032 will be applied in Commission energy, water, and communications proceedings and further developed the tools and methodologies used to calculate the affordability metrics. OP 5 of D.22-08-023 requires that SCE include the affordability metrics in any initial filing of a proceeding with a revenue increase estimated to exceed one percent of currently authorized revenues systemwide for a single fuel. Because the revenue requirement requested in this Application exceeds one percent of SCE's currently authorized revenues (i.e., exceeds $174.291 million), SCE is required to introduce the Affordability Ratio 20 (AR 20) by climate zone, Affordability Ratio 50 (AR 50) by climate zone, and Hours-at-Minimum-Wage (HM) associated with revenues in effect at the time of the filing.[144] SCE is also required to include essential usage bills by climate zone, underlying the affordability metrics associated with revenues in effect at the time of the filing; average usage bills by climate zone associated with revenues in effect at the time of the filing; and, for climate zones with Areas of Affordability Concern (AAC) as defined in the most recent annual Affordability Report, AR 20 by climate zones subdivided by Public Use Microdata Area.[145] In addition, SCE must introduce the aforementioned metrics along with changes in the AR 20 by climate zone, AR 50 by climate zone, and HM associated with the proposed new revenue requested annually for each year in which the new revenues are proposed.[146]

SCE used two scenarios to calculate the required affordability metrics. Scenario 1 assumes no IRR and, therefore, limits the impact of the proposed new revenue to 2025 and only includes metrics associated with that year. Scenario 2 assumes SCE's IRR request is adopted and

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[144] D.22-08-023, OP 5.

[145] *Id.*

[146] *Id.,* OP 6.

results in revenue requirement changes in both 2024 and 2025 (continuing into 2026). Therefore, Scenario 2 provides the impacts in years 2024 and 2025 and includes the metrics associated with those years. Both scenarios are based solely on the recorded revenue requirements as of August 31, 2023 and do not include additional capital-related revenue requirements and interest expense that will record during the pendency of the proceeding.

In Appendix B, SCE included the required affordability metrics that compare essential usage bills as of October 1, 2023, utilizing AR 20 and AR 50. SCE also included the analysis on HM and the analysis on AAC utilizing AR 20 by climate zone.

Appendix A

Witness Qualifications

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF KENNETH BORNGREBE

Q. Please state your name and business address for the record.

A. My name is Kenneth Borngrebe, and my business address is 2244 Walnut Grove Avenue, Rosemead, California 91770.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am Director of the Environmental Services Department. I am responsible for developing and implementing programs necessary for SCE to comply with applicable environmental requirements.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Bachelor of Science degree in Biology from University of California, Riverside, and a Master of Business Administration degree from California State University, Los Angeles. I have twenty-five years of experience in the development and implementation of environmental programs. I have fifteen years of experience working for SCE. Prior to my role at SCE, I was the Manager of Siting and Permitting at First Solar Development, LLC.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF THOMAS BRADY

Q. Please state your name and business address for the record.

A. My name is Thomas Brady, and my business address is 6030 North Irwindale Avenue, Irwindale, California 91702.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am a Principal Manager for Business Resiliency. I am responsible for SCE's Emergency Response Operations, Emergency Operations Center, Watch Office, Fire Management, and Capability Building. I provide oversight and strategic direction for SCE's emergency response programs by developing and implementing strategies to help ensure the company and its employees are well-prepared to prevent, protect, mitigate, respond to, and recover from disruptive events - natural or manmade disasters.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Bachelor of Science degree in Business Administration from California State Polytechnic University, Pomona, and a Master of Business Administration degree from University of Southern California – Marshall School of Business. I have over 16 years of experience leading complex programs and projects focused on mitigating public safety risks associated with natural and manmade hazards through the deployment of operational practices and technologies.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY

QUALIFICATIONS AND PREPARED TESTIMONY

OF BRIAN CHEN

Q. Please state your name and business address for the record.

A. My name is Brian Chen, and my business address is 2 Innovation Way, Pomona, California 91768.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am a Director for SCE's Asset Management Program. I am responsible for overseeing the development of SCE's strategy to acquire, maintain, and replace electrical assets to maintain a functioning grid.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Bachelor of Science degree from Purdue University, as well as a Master of Science degree and a Doctor of Philosophy degree from University of Texas at Austin in Civil Engineering. I have over 12 years of experience working in the electric utility sector.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF SUNNY CHU

Q. Please state your name and business address for the record.

A. My name is Sunny Chu, and my business address is 2 Innovation Way, Pomona, California 91768.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am a Principal Manager within the Wildfire Safety organization. I lead a team that is responsible for both the development and implementation of SCE's wildfire mitigation strategy, which includes system hardening, inspection, and vegetation management strategy development and scoping. Additionally, my team is responsible for optimizing SCE's portfolio of wildfire programs and projects based on risk model outputs.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Bachelor of Science degree in Finance from California State Polytechnic University, Pomona. I have over 15 years of experience in SCE, including roles in the Transmission and Distribution business unit, as well as Asset Strategy and Planning. I held analytical roles in SCE's Business Process and Technology Integration group supporting capitalized software projects and held roles as both a Supervisor and a Regional Planning and Performance manager in the Distribution business line responsible for overseeing construction projects in SCE's Metro West region. Prior to the Wildfire Safety organization, I held the role of Performance and Reporting Senior Manager focused specifically on Distribution's portfolio of wildfire mitigation projects.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF RAYMOND FUGERE

Q. Please state your name and business address for the record.

A. My name is Raymond Fugere, and my business address is 2 Innovation Way, Pomona, California 91768.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am the Director of Wildfire Safety (WS) within SCE's Asset Strategy and Planning organizational unit. WS is comprised of the following three functions:

- Wildfire Mitigation Strategy, which develops scope and strategy for SCE's wildfire mitigation programs and performs failure and root cause analysis of SCE facilities involved in fires. Then, it utilizes that information to develop an optimized and cohesive wildfire fire mitigation portfolio that is enhanced to deploy the right mitigations in the right locations.
- Wildfire Operations, which actively performance manages the deployment of SCE's wildfire mitigations against established targets, examines potential innovative technologies that could help reduce SCE's wildfire risk, and supports regulatory proceedings.
- Wildfire Reporting and Project Management, which project manages large cross-organizational wildfire safety projects and manages SCE's internal and external messaging concerning wildfire-related activities.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Bachelor of Science degree in Chemical Engineering from University of California, Santa Barbara. I joined SCE in 2014 in the capacity of Manager of Federal Energy Regulatory Commission (FERC) / North American Electric Reliability Corporation (NERC) compliance. In 2015, I was transitioned into the position of Compliance Strategy Manager. In 2016, my title was changed to Maintenance and Inspection Manager. In 2019, I was promoted to Principal Manager of Asset Assessment and Data Strategy (AA&DS). In 2021, during a reorganization, I was placed into the position of Principal Manager of Wildfire Mitigation Strategy. In March of 2023, I was promoted into my current position. Prior to joining SCE, I worked at the California Public Utilities Commission for 14 years, in various capacities.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF JEFF GOODING

Q. Please state your name and business address for the record.

A. My name is Jeff Gooding, and my business address is 2131 Walnut Grove Avenue, Rosemead, California 91770.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am the Information Technology (IT) Principal Manager for Enterprise Architecture at SCE. I am responsible for managing and developing SCE's enterprise architectures, IT cost estimates, setting enterprise standards, and designing technology solutions to meet business and customer needs.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Bachelor of Science degree in Marketing Management, and a Master of Business Administration degree from California State Polytechnic University, Pomona. With over 30 years of software development and architecture experience, I have worked in varying capacities at several companies, including The Keith Companies from August 1988 to January 1990, David Evans and Associates, Incorporated from January 1990 to March 1994, Rapid Access Systems, Incorporated from March 1994 to June 1997, Cap Gemini/Ernst & Young, LLC (Ernst & Young, LLC was acquired by Cap Gemini) from June 1997 to 2003. In October 2003, I began to work as a Senior Systems Engineer at SCE. From there, I held management positions overseeing SCE's SmartConnect Advanced Metering Infrastructure (AMI), Smart Grid Systems Engineering, and Enterprise Architecture for Energy and Security. I began my current position as an IT Principal Manager for all IT Enterprise Architecture in March of 2019.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF ALYSSA GRIGORYAN-MARQUEZ

Q. Please state your name and business address for the record.

A. My name is Alyssa Grigoryan-Marquez, and my business address is 1 Innovation Way, Pomona, California 91768.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am a Principal Manager for Vegetation Management, Strategy & Planning within the Vegetation, Inspections, and Operational Services organizational unit of SCE. I am responsible for SCE and contract personnel, supporting Vegetation Management activities throughout our service territory.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Doctor of Philosophy degree in Business Psychology with an emphasis in Organizational Leadership from Chicago School of Professional Psychology. For the past 15 years at SCE I have held various leadership roles in Inspections, Aerial Inspections, Human Resource Strategic Business Partners, Employee Relations, and, most recently, in Vegetation Management. I began my current position as Principal Manager of Vegetation Management in May of 2023.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management,* as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF JAEL GURROLA

Q. Please state your name and business address for the record.

A. My name is Jael Gurrola, and my business address is 2244 Walnut Grove Avenue, Rosemead, California 91770.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am currently the Principal Manager of Operational Finance within the Corporate Finance organizational unit of SCE. I am responsible for developing, implementing, and tracking financial performance indicators for the Transmission and Distribution Operating Unit. I also develop key financial controls that include wildfire mitigation activities and track wildfire financial performance.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Bachelor of Science degree in Mechanical Engineering from University of California, San Diego, and a Master of Business Administration degree from University of Phoenix. I have over 15 years of experience in Financial Planning and Analysis and Operational Finance. In this capacity, I have built financial performance capabilities for Information Technology, Generation (non-Nuclear), Generation (Nuclear), and Transmission and Distribution. I have also implemented enterprise-wide initiatives, such as the creation and implementation of Operating Plan processes that allow for a higher level of transparency to work performed in the field.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY

QUALIFICATIONS AND PREPARED TESTIMONY

OF VALARIE HERNANDEZ

Q. Please state your name and business address for the record.

A. My name is Valarie Hernandez, and my business address is 4777 Irwindale Avenue, Irwindale, California 91706.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am the Principal Manager of Customer Care Outreach and Engagement within SCE's Customer Engagement Division. In this role, I am responsible for managing Public Safety Power Shutoff Support, Consumer Affairs, Community and Climate Equity, and Customer Strategic Engagement.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Bachelor of Science degree in Organizational Leadership from University of La Verne. I have over 30 years of experience in the utility industry and have held various positions of increasing responsibility across SCE, including Customer Service and Audits.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management,* as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF THOMAS JACOBUS

Q. Please state your name and business address for the record.

A. My name is Thomas Jacobus, and my business address is 6030 North Irwindale Avenue, Irwindale, California 91702.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am a Principal Manager for Business Resiliency. I am responsible for SCE's Business Resiliency activities including Emergency Preparedness and Response, Mutual Assistance, and Meteorology to provide oversight and strategic direction for business continuity and crisis management programs.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Bachelor of Science degree in Criminal Justice from Northeastern University, and a Master of Arts degree in Criminal Justice from Anna Maria College in Paxton, Massachusetts. I have over 20 years of experience in critical infrastructure protection and emergency management, Incident Command System, Crisis Management, Business Continuity, Security System Design, Project Management, and Operations Management. I have served in various leadership roles with SCE leading broad corporate initiatives such as SCE's adoption and implementation of the Incident Command System, Wildfire Mitigation and Response Planning, and company-wide full-scale exercises and mutual assistance efforts. I have served as the Chair of the Western Region Mutual Assistance Group and currently serve as SCE's alternate board member for the California Utilities Emergency Association and Co-Chair of the Southern California Critical Lifelines Group.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF KAREN MCKELVIE

Q. Please state your name and business address for the record.

A. My name is Karen McKelvie, and my business address is 2 Innovation Way, Pomona, California 91768.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am a Principal Manager for Wildfire Safety Reporting and Project Management. I am responsible for managing key initiatives needed to support and execute SCE's wildfire mitigation activities and directly oversee new governance processes to add/modify activities into SCE's Wildfire Mitigation Plan.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Bachelor of Arts degree in Business Administration from California State University, Fullerton, and a Master of Business Administration degree from University of Redlands. I have been a certified Project Management Professional (PMP) since 2010, a Certified Scrum Master (CSM) since 2020, and a Lean Six Sigma (LSS) Green Belt since 2021. I have over 25 years of experience in leadership and project management in both the financial services and public utility industries. I spent 23 years with a business process outsourcing company, currently named Conduent, Incorporated, in which I held multiple positions in the student lending division, including Director of Project Management, Director of Transformation, and Director, Chief of Staff. Within these roles, I was responsible for staff development, the advancement of projects for both internal and external clients, and managed $150M annual budget from both a revenue and expense perspective.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF MATTHEW PEACORE

Q. Please state your name and business address for the record.

A. My name is Matthew Peacore, and my business address is 2131 Walnut Grove Avenue, Rosemead, California 91770.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am the Information Technology (IT) Principal Manager for digital design and solutions as part of the Digital Accelerator organization. In this role I am responsible for:

- Developing and maintaining digital architectures and solution design;
- Developing and managing advanced analytics solutions;
- Developing and maintaining digital standards and methodologies and management of the digital center of excellence;
- Managing digital products and developing and maintaining the portfolio roadmap for digital solutions.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Bachelor of Science degree in Mechanical Engineering from University of Southern California (USC), as well as a Master of Business Administration degree from USC. For the past 24 years, I have held various information technology leadership roles in application development, solution delivery, systems support, architecture, and innovation, with expertise in analytics, supply chain management, sales, manufacturing, human resources, learning and development, engineering, and energy/utilities. Of those 24 years, I have worked for the last 12 years at SCE, and, prior to that, at the Capital Group Companies and Mars, Incorporated.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY

QUALIFICATIONS AND PREPARED TESTIMONY

OF ERIN PULGAR

Q. Please state your name and business address for the record.

A. My name is Erin Pulgar, and my business address is 8631 Rush Street, Rosemead, California 91770.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am the Principal Manager of the California Public Utilities Commission (CPUC) Cost Recovery group within SCE's State Regulatory Operations Department. As such, I am primarily responsible for managing the consolidated revenue requirement and rate change process, including the creation, implementation, and management of all CPUC balancing and memorandum cost recovery accounts.

Q. Briefly describe your educational and professional backgrounds.

A. I received Bachelor of Arts degrees in Public Relations and Political Science from University of Southern California. I have over 10 years of experience working at SCE. Prior to my current position, I case managed SCE's Energy Resource Recovery Account Forecast and General Rate Case Phase 2 proceedings. I have also worked in SCE's Regulatory Tariffs group and in the Revenue Services Organization, where I was responsible for operational compliance with SCE's billing-related tariffs. Before joining SCE, I worked six years for AeroVironment, Incorporated as a program manager responsible for implementing engineering projects related to electric vehicle charging and other energy-related areas. I have previously testified before the CPUC.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY

QUALIFICATIONS AND PREPARED TESTIMONY

OF ANDREW SWISHER

Q. Please state your name and business address for the record.

A. My name is Andrew Swisher, and my business address is 7400 Fenwick Lane, Westminster, California 92683.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am a Consulting Engineer in the Asset Engineering group within the Transmission and Distribution organizational unit of SCE. As part of the Asset Engineering team, I am focused on leading Distribution System Standards and Apparatus Specifications.

Q. Briefly describe your educational and professional backgrounds.

A. I received Bachelor of Science degrees in Electrical and Computer Engineering from California State Polytechnic University, Pomona, and a Master of Engineering degree in Electrical Engineering from University of Idaho, Moscow. I am a registered professional engineer with the state of California.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management,* as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF EVANGELINE TORRES

Q. Please state your name and business address for the record.

A. My name is Evangeline Torres, and my business address is 2131 Walnut Grove Avenue, Rosemead, California 91770.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am a Principal Manager within Information Technology's (IT) Enterprise Services - Solution Planning and Delivery Transmission and Distribution (T&D) Portfolio organization. I have accountability for IT's software development and delivery of technology projects supporting T&D, as well as the Asset Strategy and Planning organization. My role is to provide direction and oversight to a team of Senior Managers, Senior Project Managers, and Project Managers that directly manage the projects throughout their Software Development Lifecycle (SDLC). I oversee the SCE IT teams that partner with peer organizations to confirm the appropriateness of project estimates, utilize project governance committees to manage scope, adhere to the use of standard documentation, elicit clear requirements to reduce change requests, ensure the use of requirements trace-ability documentation to avoid gaps in development, and manage functional and non-functional testing to confirm solutions performance and support user adoption.

Q. Briefly describe your educational and professional backgrounds.

A: I received a Bachelor of Arts degree in Business Administration from University of La Verne, a certification in "IT Essentials for Business Leaders" from Pepperdine Graziadino School of Business, a certificate in "Edison Risk Management Fundamentals" from Stanford University Center for Professional Development, completed the "Project Management Masters Certificate Program" from George Washington University/ESI, possess certificates in Project Fundaments, Risk Management, Managing Multiple Projects from University of California, Irvine, and completed an Organizational Change Management Certification (OCM) from PROSCI. I have worked for SCE for over 30 years. My experience spans across Customer Service (CS), T&D, and IT. I have served as an operational supervisor and manager within CS and T&D, as well as a Project Manager, a Program Manager, and a Portfolio Manager within CS, T&D, and IT. I have managed operational improvement projects, organizational re-alignment projects, and, for most of my career, technology projects. I have several years of experience managing projects on the

Client side, having oversight of requirements development, process design, user acceptance testing, deployment management, and OCM. I also have several years of experience managing projects and managing project managers on technology projects throughout the projects' SDLC within the IT organization.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF AL WATSON

Q. Please state your name and business address for the record.

A. My name is Al Watson, and my business address is 6090 North Irwindale Avenue, Irwindale, California 91702.

Q. Briefly describe your present responsibilities at Southern California Edison Company (SCE).

A. I am a Senior Manager of Public Safety Power Shutoff (PSPS) Compliance and Training. I am responsible for overseeing and managing PSPS training and ensuring the organization's PSPS operation activities comply with relevant regulations and industry standards. My role involves a combination of training development, implementation, and regulatory adherence.

Q. Briefly describe your educational and professional backgrounds.

A. I received a Bachelor of Arts degree in Organizational Leadership from California State Polytechnic University, Humboldt. I have over 21 years of experience in Power System Realtime Operations with combined experience from SCE, the California Independent System Operator (ISO), and San Diego Gas and Electric Company. I have extensive knowledge in training, regulatory compliance, electric Transmission and Distribution grid optimization, ensuring electric system security and reliability, managing grid access, grid allocation, mitigation, and have overseen multiple grid emergencies and PSPS situations across the states of California.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-01, entitled *Direct Testimony in Support of Southern California Edison Company's Application for Authorization to Recover 2022 Incremental Costs Related to Wildfire Mitigation and Vegetation Management*, as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

Appendix B

Affordability Metrics

Affordability Metrics - Affordability Ratio 20 (AR 20) and Affordability Rate 50 (AR 50) Impacts

		Current - October 1, 2023							Proposed - 2025							Change			
		Average Usage		Essential Usage					Average Usage		Essential Usage					Essential Usage			
Climate Zone	Estimated # of Housing Units[1]	Basic Bill[2]	All-Electric Bill[2]	Basic Bill[2]	All-Electric Bill[2]	Average Bill[2]	Average Bill Electric Service AR 20	Average Bill Electric Service AR 50	Basic Bill[2]	All-Electric Bill[2]	Basic Bill[2]	All-Electric Bill[2]	Average Bill[2]	Average Bill Electric Service AR 20	Average Bill Electric Service AR 50	Average Bill $ Change	Average Bill % Change	Average Bill Electric Service AR 20 Incremental Change	Average Bill Electric Service AR 50 Incremental Change
10 hot (Sec 745)	1,347,156	$ 232.67	$ 184.31	$ 134.96	$ 152.40	$ 136.57	7.36%	2.42%	$ 237.18	$ 187.92	$ 137.66	$ 155.42	$ 139.30	7.13%	2.33%	$ 2.73	2.0%	-0.2%	-0.1%
13 hot	166,335	$ 244.07	$ 263.33	$ 145.35	$ 224.48	$ 151.33	8.26%	3.21%	$ 248.78	$ 268.40	$ 148.24	$ 228.84	$ 154.33	8.15%	3.15%	$ 3.00	2.0%	-0.1%	-0.1%
14 hot	466,812	$ 228.78	$ 238.45	$ 133.28	$ 192.63	$ 138.43	11.54%	3.34%	$ 233.21	$ 243.07	$ 135.95	$ 196.40	$ 141.20	11.27%	3.22%	$ 2.76	2.0%	-0.3%	-0.1%
15 hot	235,147	$ 279.24	$ 223.17	$ 205.04	$ 186.26	$ 202.36	13.18%	3.74%	$ 284.60	$ 227.50	$ 209.03	$ 189.91	$ 206.30	12.75%	3.60%	$ 3.94	1.9%	-0.4%	-0.1%
16 cool	150,603	$ 170.79	$ 177.66	$ 121.55	$ 189.95	$ 133.99	8.09%	2.69%	$ 174.15	$ 181.15	$ 124.00	$ 193.66	$ 136.67	7.91%	2.62%	$ 2.68	2.0%	-0.2%	-0.1%
5 warm	7,859	$ 126.67	$ 125.32	$ 169.50	$ 226.50	$ 189.42	10.95%	2.94%	$ 129.22	$ 127.84	$ 172.83	$ 230.89	$ 193.12	10.96%	2.89%	$ 3.70	2.0%	0.0%	0.0%
6 cool	943,130	$ 146.56	$ 113.54	$ 101.10	$ 102.77	$ 101.38	7.18%	1.61%	$ 149.48	$ 115.84	$ 103.17	$ 104.87	$ 103.46	7.19%	1.57%	$ 2.08	2.0%	0.0%	0.0%
8 cool	1,246,054	$ 175.19	$ 130.96	$ 101.10	$ 104.78	$ 101.50	8.16%	1.76%	$ 178.63	$ 133.59	$ 103.17	$ 106.92	$ 103.58	8.22%	1.70%	$ 2.08	2.0%	0.1%	-0.1%
9 warm	1,160,081	$ 206.12	$ 154.13	$ 126.24	$ 124.23	$ 126.07	8.88%	2.10%	$ 210.14	$ 157.18	$ 128.78	$ 126.73	$ 128.60	9.22%	2.03%	$ 2.53	2.0%	0.3%	-0.1%

[1]Estimated # of Housing Units is based on the 2020 Affordability Ratio Calculator (ARC)

[2]All bill calculations include the Residential Bi-Annual Climate Credit

Affordability Metrics - Hours-at-Minimum Wage (HM) Impacts

		Current - October 1, 2023										Proposed - 2025										Change									
		Average Usage		Essential Usage								Average Usage		Essential Usage								Essential Usage									
Climate Zone	Estimated # of Housing Units[1]	Basic Bill[2]	All-Electric Bill[2]	Basic Bill[2]	All-Electric Bill[2]	Average Bill[2]	Average Bill State ($15.50/hr.)[3]	Average Bill Los Angeles City ($16.04/hr.)[3]	Average Bill Los Angeles Co. Malibu City Santa Monica City ($15.96/hr.)[3]	Average Bill West Hollywood ($17.50/hr.)[3]	Average Bill Pasadena City ($16.11/hr.)[3]	Basic Bill[2]	All-Electric Bill[2]	Basic Bill[2]	All-Electric Bill[2]	Average Bill[2]	Average Bill State ($15.50/hr.)[3]	Average Bill Los Angeles City ($16.04/hr.)[3]	Average Bill Los Angeles Co. Malibu City Santa Monica City ($15.96/hr.)[3]	Average Bill West Hollywood ($17.50/hr.)[3]	Average Bill Pasadena City ($16.11/hr.)[3]	Average Bill State Hour Change	Average Bill State % Change	Average Bill Los Angeles City Hour Change	Average Bill Los Angeles City % Change	Average Bill Los Angeles Co. Malibu City Santa Monica City Hour Change	Average Bill Los Angeles Co. Malibu City Santa Monica City % Change	Average Bill West Hollywood Hour Change	Average Bill West Hollywood % Change	Average Bill Pasadena City Hour Change	Average Bill Pasadena City % Change
10 hot (Sec 745)	1,347,156	$ 232.67	$ 184.31	$ 134.96	$ 152.40	$ 136.57	8.8	-	8.6	-	-	$ 237.18	$ 187.92	$ 137.66	$ 155.42	$ 139.30	9.0	-	8.7	-	-	0.18	2.0%	-	-	0.17	2.0%	-	-	-	-
13 hot	166,335	$ 244.07	$ 263.33	$ 145.35	$ 224.48	$ 151.33	9.8	-	-	-	-	$ 248.78	$ 268.40	$ 148.24	$ 228.84	$ 154.33	10.0	-	-	-	-	0.19	2.0%	-	-	-	-	-	-	-	-
14 hot	466,812	$ 228.78	$ 238.45	$ 133.28	$ 192.63	$ 138.43	8.9	-	8.7	-	-	$ 233.21	$ 243.07	$ 135.95	$ 196.40	$ 141.20	9.1	-	8.8	-	-	0.18	2.0%	-	-	0.17	2.0%	-	-	-	-
15 hot	235,147	$ 279.24	$ 223.17	$ 205.04	$ 186.26	$ 202.36	13.1	-	-	-	-	$ 284.60	$ 227.50	$ 209.03	$ 189.91	$ 206.30	13.3	-	-	-	-	0.25	1.9%	-	-	-	-	-	-	-	-
16 cool	150,603	$ 170.79	$ 177.66	$ 121.55	$ 189.95	$ 133.99	8.6	8.4	8.4	-	8.3	$ 174.15	$ 181.15	$ 124.00	$ 193.66	$ 136.67	8.8	8.5	8.5	-	8.5	0.17	2.0%	0.17	2.0%	0.17	2.0%	-	-	0.17	2.0%
5 warm	7,859	$ 126.67	$ 125.32	$ 169.50	$ 226.50	$ 189.42	12.2	-	-	-	-	$ 129.22	$ 127.84	$ 172.83	$ 230.89	$ 193.12	12.5	-	-	-	-	0.24	2.0%	-	-	-	-	-	-	-	-
6 cool	943,130	$ 146.56	$ 113.54	$ 101.10	$ 102.77	$ 101.38	6.5	6.3	6.4	-	-	$ 149.48	$ 115.84	$ 103.17	$ 104.87	$ 103.46	6.7	6.4	6.5	-	-	0.13	2.0%	0.13	2.0%	0.13	2.0%	-	-	-	-
8 cool	1,246,054	$ 175.19	$ 130.96	$ 101.10	$ 104.78	$ 101.50	6.5	6.3	6.4	-	-	$ 178.63	$ 133.59	$ 103.17	$ 106.92	$ 103.58	6.7	6.5	6.5	-	-	0.13	2.0%	0.13	2.0%	0.13	2.0%	-	-	-	-
9 warm	1,160,081	$ 206.12	$ 154.13	$ 126.24	$ 124.23	$ 126.07	8.1	7.9	7.9	7.2	7.8	$ 210.14	$ 157.18	$ 128.78	$ 126.73	$ 128.60	8.3	8.0	8.1	7.3	8.0	0.16	2.0%	0.16	2.0%	0.16	2.0%	0.14	2.0%	0.16	2.0%

[1]Estimated # of Housing Units is based on the 2020 Affordability Ratio Calculator (ARC)

[3]Minimum Wage values are based on values in effect on January 1, 2023

[2]All bill calculations include the Residential Bi-Annual Climate Credit

Affordability Metrics - Areas of Affordability Concern
Affordability Ratio 20 (AR 20) by Climate Zone by Public Use Microdata Area (PUMA)
Essential Usage Bills

PUMA	County/City	Electric Climate Zone	Estimated # of Housing Units[1]	Current - October 1, 2023 Electric Service AR 20	Proposed - 2025 Electric Service AR 20	Incremental Change Electric Service AR 20
03719	Los Angeles County (Central)--Glendale City	SCE 9	17	24.30%	25.34%	1.04%
03766	Los Angeles County (South)--Long Beach City (Southwest & Port) PUMA	SCE 6	39,619	19.32%	19.71%	0.39%
03731	Los Angeles County (Central)--West Hollywood & Beverly Hills Cities PUMA	SCE 9	64,887	41.08%	49.37%	8.29%
05904	Orange County (Central)--Irvine City (Central) PUMA	SCE 6	13,038	19.30%	20.95%	1.65%
05904	Orange County (Central)--Irvine City (Central) PUMA	SCE 8	109,702	19.42%	21.11%	1.69%

[1]Estimated # of Housing Units is based on the 2020 Affordability Ratio Calculator (ARC)

Affordability Metrics - Affordability Ratio 20 (AR 20) and Affordability Rate 50 (AR 50) Impacts

		Current - October 1, 2023							Proposed - 2024							Change			
		Average Usage		Essential Usage					Average Usage		Essential Usage					Essential Usage			
Climate Zone	Estimated # of Housing Units[1]	Basic Bill[2]	All-Electric Bill[2]	Basic Bill[2]	All-Electric Bill[2]	Average Bill[2]	Average Bill Electric Service AR 20	Average Bill Electric Service AR 50	Basic Bill[2]	All-Electric Bill[2]	Basic Bill[2]	All-Electric Bill[2]	Average Bill[2]	Average Bill Electric Service AR 20	Average Bill Electric Service AR 50	Average Bill $ Change	Average Bill % Change	Average Bill Electric Service AR 20 Incremental Change	Average Bill Electric Service AR 50 Incremental Change
10 hot (Sec 745)	1,347,156	$ 232.67	$ 184.31	$ 134.96	$ 152.40	$ 136.57	7.36%	2.42%	$ 236.53	$ 187.40	$ 137.27	$ 154.98	$ 138.91	7.30%	2.39%	$ 2.33	1.7%	-0.1%	0.0%
13 hot	166,335	$ 244.07	$ 263.33	$ 145.35	$ 224.48	$ 151.33	8.26%	3.21%	$ 248.10	$ 267.67	$ 147.83	$ 228.21	$ 153.89	8.27%	3.20%	$ 2.57	1.7%	0.0%	0.0%
14 hot	466,812	$ 228.78	$ 238.45	$ 133.28	$ 192.63	$ 138.43	11.54%	3.34%	$ 232.57	$ 242.40	$ 135.57	$ 195.85	$ 140.80	11.48%	3.30%	$ 2.36	1.7%	-0.1%	0.0%
15 hot	235,147	$ 279.24	$ 223.17	$ 205.04	$ 186.26	$ 202.36	13.18%	3.74%	$ 283.83	$ 226.88	$ 208.45	$ 189.38	$ 205.73	13.06%	3.70%	$ 3.37	1.7%	-0.1%	0.0%
16 cool	150,603	$ 170.79	$ 177.66	$ 121.55	$ 189.95	$ 133.99	8.09%	2.69%	$ 173.66	$ 180.64	$ 123.64	$ 193.13	$ 136.28	8.06%	2.68%	$ 2.29	1.7%	0.0%	0.0%
5 warm	7,859	$ 126.67	$ 125.32	$ 169.50	$ 226.50	$ 189.42	10.95%	2.94%	$ 128.85	$ 127.47	$ 172.35	$ 230.25	$ 192.59	11.04%	2.93%	$ 3.17	1.7%	0.1%	0.0%
6 cool	943,130	$ 146.56	$ 113.54	$ 101.10	$ 102.77	$ 101.38	7.18%	1.61%	$ 149.05	$ 115.51	$ 102.87	$ 104.57	$ 103.16	7.24%	1.60%	$ 1.78	1.8%	0.1%	0.0%
8 cool	1,246,054	$ 175.19	$ 130.96	$ 101.10	$ 104.78	$ 101.50	8.16%	1.76%	$ 178.13	$ 133.21	$ 102.87	$ 106.61	$ 103.28	8.24%	1.75%	$ 1.78	1.8%	0.1%	0.0%
9 warm	1,160,081	$ 206.12	$ 154.13	$ 126.24	$ 124.23	$ 126.07	8.88%	2.10%	$ 209.56	$ 156.74	$ 128.41	$ 126.37	$ 128.24	9.08%	2.08%	$ 2.17	1.7%	0.2%	0.0%

[1]Estimated # of Housing Units is based on the 2020 Affordability Ratio Calculator (ARC)

[2]All bill calculations include the Residential Bi-Annual Climate Credit

Affordability Metrics - Hours-at-Minimum Wage (HM) Impacts

		Current - October 1, 2023										Proposed - 2024									Change									
		Average Usage		Essential Usage								Average Usage		Essential Usage							Essential Usage									
Climate Zone	Estimated # of Housing Units[1]	Basic Bill[2]	All-Electric Bill[2]	Basic Bill[2]	All-Electric Bill[2]	Average Bill[2]	Average Bill State ($15.50/hr.)[3]	Average Bill Los Angeles City ($16.04/hr.)[3]	Average Bill Los Angeles Co. Malibu City Santa Monica City ($15.96/hr.)[3]	Average Bill West Hollywood ($17.50/hr.)[3]	Average Bill Pasadena City ($16.11/hr.)[3]	Basic Bill[2]	All-Electric Bill[2]	Basic Bill[2]	All-Electric Bill[2]	Average Bill[2]	Average Bill State ($15.50/hr.)[3]	Average Bill Los Angeles City ($16.04/hr.)[3]	Average Bill Los Angeles Co. Malibu City Santa Monica City ($15.96/hr.)[3]	Average Bill West Hollywood ($17.50/hr.)[3]	Average Bill Pasadena City ($16.11/hr.)[3]	Average Bill State Hour Change	Average Bill State % Change	Average Bill Los Angeles City Hour Change	Average Bill Los Angeles City % Change	Average Bill Los Angeles Co. Malibu City Santa Monica City Hour Change	Average Bill Los Angeles Co. Malibu City Santa Monica City % Change	Average Bill West Hollywood Hour Change	Average Bill West Hollywood % Change	Average Bill Pasadena City Hour Change	Average Bill Pasadena City % Change
10 hot (Sec 745)	1,347,156	$ 232.67	$ 184.31	$ 134.96	$ 152.40	$ 136.57	8.8	-	8.6	-	-	$ 236.53	$ 187.40	$ 137.27	$ 154.98	$ 138.91	9.0	-	8.7	-	-	0.15	1.7%	-	-	0.15	1.7%	-	-	-	-
13 hot	166,335	$ 244.07	$ 263.33	$ 145.35	$ 224.48	$ 151.33	9.8	-	-	-	-	$ 248.10	$ 267.67	$ 147.83	$ 228.21	$ 153.89	9.9	-	-	-	-	0.17	1.7%	-	-	-	-	-	-	-	-
14 hot	466,812	$ 228.78	$ 238.45	$ 133.28	$ 192.63	$ 138.43	8.9	-	8.7	-	-	$ 232.57	$ 242.40	$ 135.57	$ 195.85	$ 140.80	9.1	-	8.8	-	-	0.15	1.7%	-	-	0.15	1.7%	-	-	-	-
15 hot	235,147	$ 279.24	$ 223.17	$ 205.04	$ 186.26	$ 202.36	13.1	-	-	-	-	$ 283.83	$ 226.88	$ 208.45	$ 189.38	$ 205.73	13.3	-	-	-	-	0.22	1.7%	-	-	-	-	-	-	-	-
16 cool	150,603	$ 170.79	$ 177.66	$ 121.55	$ 189.95	$ 133.99	8.6	8.4	8.4	-	8.3	$ 173.66	$ 180.64	$ 123.64	$ 193.13	$ 136.28	8.8	8.5	8.5	-	8.5	0.15	1.7%	0.14	1.7%	0.14	1.7%	-	-	0.14	1.7%
5 warm	7,859	$ 126.67	$ 125.32	$ 169.50	$ 226.50	$ 189.42	12.2	-	-	-	-	$ 128.85	$ 127.47	$ 172.35	$ 230.25	$ 192.59	12.4	-	-	-	-	0.20	1.7%	-	-	-	-	-	-	-	-
6 cool	943,130	$ 146.56	$ 113.54	$ 101.10	$ 102.77	$ 101.38	6.5	6.3	6.4	-	-	$ 149.05	$ 115.51	$ 102.87	$ 104.57	$ 103.16	6.7	6.4	6.5	-	-	0.11	1.8%	0.11	1.8%	0.11	1.8%	-	-	-	-
8 cool	1,246,054	$ 175.19	$ 130.96	$ 101.10	$ 104.78	$ 101.50	6.5	6.3	6.4	-	-	$ 178.13	$ 133.21	$ 102.87	$ 106.61	$ 103.28	6.7	6.4	6.5	-	-	0.11	1.8%	0.11	1.8%	0.11	1.8%	-	-	-	-
9 warm	1,160,081	$ 206.12	$ 154.13	$ 126.24	$ 124.23	$ 126.07	8.1	7.9	7.9	7.2	7.8	$ 209.56	$ 156.74	$ 128.41	$ 126.37	$ 128.24	8.3	8.0	8.0	7.3	8.0	0.14	1.7%	0.14	1.7%	0.14	1.7%	0.12	1.7%	0.13	1.7%

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Affordability Metrics - Areas of Affordability Concern
Affordability Ratio 20 (AR 20) by Climate Zone by Public Use Microdata Area (PUMA)
Essential Usage Bills

PUMA	County/City	Electric Climate Zone	Estimated # of Housing Units[1]	Current - October 1, 2023 Electric Service AR 20	Proposed - 2024 Electric Service AR 20	Incremental Change Electric Service AR 20
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03766	Los Angeles County (South)--Long Beach City (Southwest & Port) PUMA	SCE 6	39,619	19.32%	19.64%	0.32%
03731	Los Angeles County (Central)--West Hollywood & Beverly Hills Cities PUMA	SCE 9	64,887	41.08%	44.93%	3.85%
05904	Orange County (Central)--Irvine City (Central) PUMA	SCE 6	13,038	19.30%	20.19%	0.89%
05904	Orange County (Central)--Irvine City (Central) PUMA	SCE 8	109,702	19.42%	20.33%	0.91%

[1]Estimated # of Housing Units is based on the 2020 Affordability Ratio Calculator (ARC)

Appendix C

Acronyms

No.	Acronym	Description
1	A&G	Administrative and General
2	A.	Application
3	a.m.	ante meridiem, before noon
4	AAC	Areas of Affordability Concern
5	Advice	Advice Letter
6	AFN	Access and Functional Needs
7	AFUDC	Allowance for Funds Used During Construction
8	AI	Artificial Intelligence
9	AL	Advice Letter
10	ALJ	Administrative Law Judge
11	AOC	Areas of Concern
12	APIs	Application Programming Interface(s)
13	AR	Affordability Ratio
14	BRRBA	Base Revenue Requirement Balancing Account
15	CAL FIRE	California Department of Forestry and Fire Protection
16	Cal.	California
17	CARE	California Alternate Rates for Energy
18	CB	Circuit Breaker
19	CBO	Community-Based Organization
20	CC	Covered Conductor
21	CCBB	Critical Care Backup Battery
22	CCD	Compliance Clearance Distance
23	CCV	Community Crew Vehicle
24	CDFW	California Department of Fish and Wildlife
25	CDP	Central Data Platform
26	CEQA	California Environmental Quality Act
27	CESA	California Endangered Species Act
28	CI	Confidence Intervals
29	CL	Confidence Levels
30	CLF	Current Limiting Fuse
31	CMS	Consolidated Mobile Solution
32	CoL	Conclusions of Law
33	CPUC	California Public Utilities Commission
34	CRC	Community Resource Center
35	CROPS	Conservation, Reserve Sites, Open Space, and Preserves
36	CWIP	Construction Work In Progress
37	D.	Decision
38	DFA	Distribution Fault Anticipation
39	Dist.	Distribution

No.	Acronym	Description
40	DOPD	Distribution Open Phase Detection
41	E	Electric
42	e.g.	exempli gratia, for example
43	EFD	Early Fault Detection
44	Energy Safety	The Office of Energy Infrastructure Safety
45	EONS	Emergency Outage Notification System
46	EOP	Enhanced Operational Practices
47	ESA	Environmentally Sensitive Area
48	etc.	et cetera, and the other things
49	FBOs	Faith-Based Organizations
50	FERA	Family Electric Rate Assistance
51	FERC	Federal Energy Regulatory Commission
52	FESA	Federal Endangered Species Act
53	FF&U	Franchise Fees & Uncollectibles
54	FGC	California Fish and Game Code
55	FMP360	Field Mobility Platform 360
56	FPI	Fire Potential Index
57	FRMMA	Fire Risk Mitigation Memorandum Account
58	GFN	Ground Fault Neutralizer
59	GIS	Geographic Information System
60	GMS	Grid Management System
61	GO	General Order
62	GRC	General Rate Case
63	GRCD	Grid Resiliency Clearance Distance
64	GSRP	Grid Safety and Resiliency Program
65	HD	High-Definition
66	HERMES	Hazard Event Restriction and Management Emergency System
67	HFRA	High Fire Risk Area
68	HFRI	High Fire Risk-Informed
69	HFTD	High Fire Threat District
70	Hi-Z	High-Impedance
71	HM	Hours-at-Minimum-Wage
72	HPCC	High-Performance Computing Clusters
73	HT	Hazard Tree
74	HTMP	Hazard Tree Management Program
75	i.e.	id est, that is
76	ICS	Incident Command System
77	IEEE	Institute of Electrical and Electronics Engineers

No.	Acronym	Description
78	IMT	Incident Management Team
79	IOU	Investor-Owned Utility
80	iPEMS	Integrated PSPS Event Management System
81	IR	Infrared
82	IRR	Interim Rate Recovery
83	ISA	International Society of Arboriculture
84	IWMS	Integrated Wildfire Mitigation Strategy
85	kV	Kilovolt
86	kW	Kilowatt
87	kWh	Kilowatt-hour
88	LED	Light-Emitting Diode
89	LEXIS	LexisNexis
90	LFO	Live Field Observation
91	LiDAR	Light Detection and Ranging
92	LSI	Long Span Initiative
93	MBL	Medical Baseline
94	MBTA	Migratory Bird Treaty Act
95	MEVC	Mobile Electric Vehicle Chargers
96	ML	Machine Learning
97	MOU	Memorandum of Understanding
98	NEPA	National Environmental Policy Act
99	No.	Number
100	O&M	Operations and Maintenance
101	OCM	Organizational Change Management
102	OP	Ordering Paragraph
103	P	Priority
104	P1	Priority 1
105	P2	Priority 2
106	P3	Priority 3
107	PES	Power and Energy Society
108	PG&E	Pacific Gas and Electric Company
109	PMO	Program Management Organization
110	POC	Period of Concern
111	POI	Probability of Ignition
112	PRC	Public Resources Code
113	PSPS	Public Safety Power Shutoff
114	PUC	Public Utilities Code
115	QC	Quality Control
116	QCI	Quality Control Inspector

No.	Acronym	Description
117	QR	Quick-Response
118	QRF	Quick Reaction Force
119	RAR	Remote Automatic Recloser
120	RCD	Regulation Clearance Distance
121	REFCL	Rapid Earth Fault Current Limiter
122	Rev Req	Revenue Requirement
123	RFP	Requests for Proposal
124	ROW	Rights-of-Way
125	RSE	Risk Spend Efficiency
126	SB	Senate Bill
127	SCE	Southern California Edison Company
128	SDG&E	San Diego Gas and Electric Company
129	SED	Safety and Enforcement Division
130	SMT	Scope Mapping Tool
131	SO^2	Sulfur Dioxide
132	SOMs	Self-Organizing Maps
133	SUP	Special Use Permits
134	SWER	Single Wire Earth Return
135	T&D	Transmission and Distribution
136	T&E	Time and Equipment
137	TCCI	Tree Caused Circuit Interruptions
138	TCD	Trigger Clearance Distance
139	TOPD	Transmission Open Phase Detection
140	Trans	Transmission
141	TRC	Tree Risk Calculator
142	TRI	Tree Risk Index
143	TUG	Targeted Undergrounding
144	UAB	Utility Audits Branch
145	USFS	United States Forest Service
146	USOA	Uniform System of Accounts
147	USZ	Utility Strike Zone
148	VM	Vegetation Management
149	VMBA	Vegetation Management Balancing Account
150	VMP	Vegetation Management Program
151	WCCP	Wildfire Covered Conductor Program
152	WiFi	Wireless Fidelity
153	WiSDM	Wildfire Safety Data Management
154	WM	Wildfire Mitigation

No.	Acronym	Description
155	WM/VM	Wildfire Mitigation and Vegetation Management
156	WMP	Wildfire Mitigation Plan
157	WMPMA	Wildfire Mitigation Plan Memorandum Account
158	WRMBA	Wildfire Risk Mitigation Balancing Account
159	WRRM	Wildfire Risk Reduction Model
160	WUI	Wildland-Urban Interface