State of California – A Natural Resources Agency
Gavin Newsom, Governor

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Caroline Thomas Jacobs, Director

To: Stakeholders for Southern California Edison Company's 2022 Wildfire Mitigation Plan Update

June 2, 2022

Enclosed is the Draft Decision of the Office of Energy Infrastructure Safety (Energy Safety) presenting its evaluation of Southern California Edison Company's 2022 Wildfire Mitigation Plan (WMP) Update.

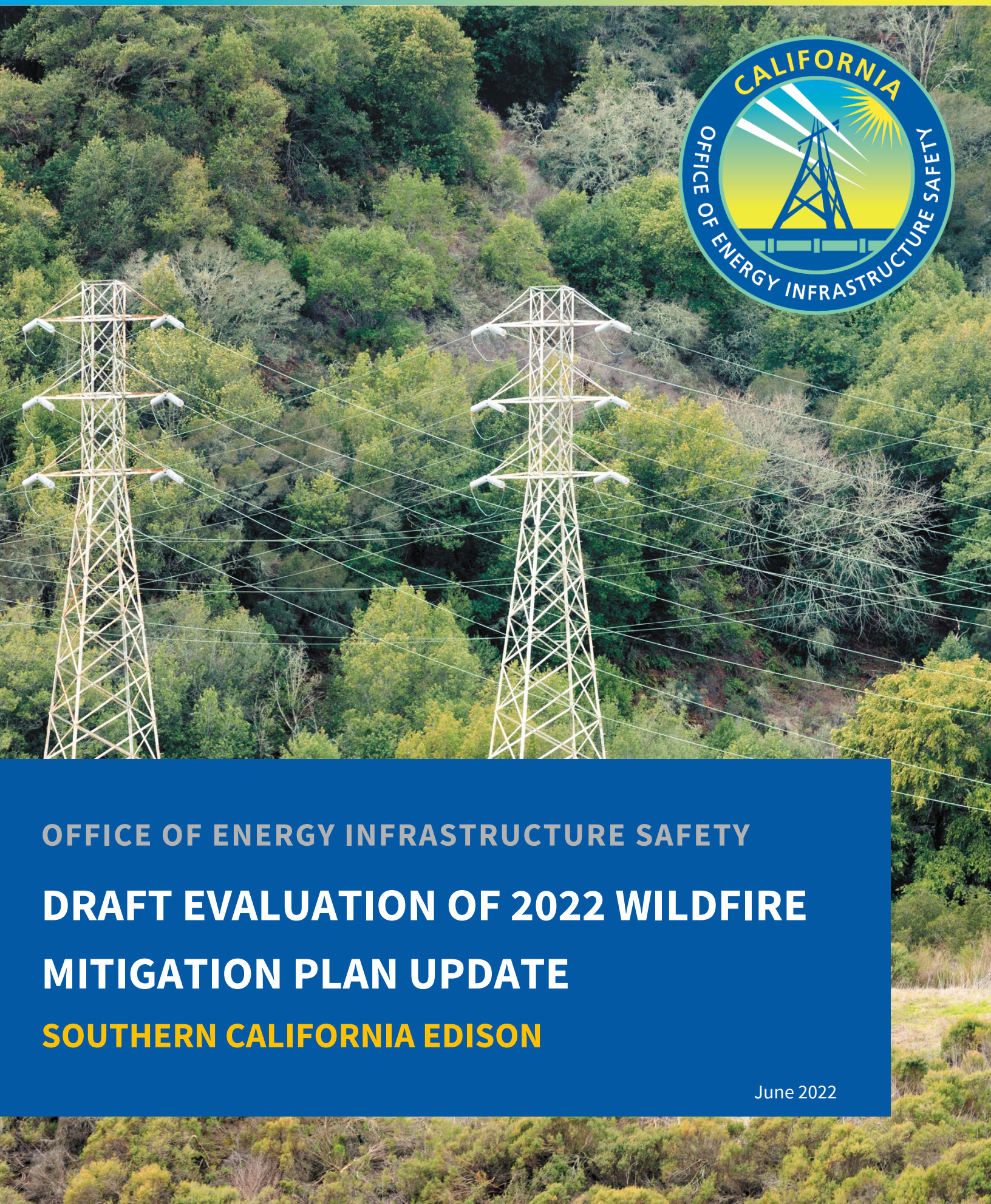
On June 2, 2022, this Draft Decision is hereby published for public review and comment. Comments must be submitted no later than June 22, 2022. Reply must be submitted no later than July 5, 2022.[1]

Comments must be submitted to Energy Safety's e-filing system in the 2022 Wildfire Mitigation Plans docket (#2022-WMPs).[2]

Sincerely,

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

[1] Dates falling on a Saturday or holiday as defined in Government Code Section 6700 have been adjusted to the next business day in accordance with Government Code Section 6707.
[2] Submit comments to the 2022-WMPs docket via the Energy Safety e-filing system here: https://efiling.energysafety.ca.gov/EFiling/DocketInformation.aspx?docketnumber=2022-WMPs (accessed May 19, 2022)



OFFICE OF ENERGY INFRASTRUCTURE SAFETY

DRAFT EVALUATION OF 2022 WILDFIRE MITIGATION PLAN UPDATE

SOUTHERN CALIFORNIA EDISON

June 2022

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Executive Summary

The Office of Energy Infrastructure Safety (Energy Safety) was formed in July 2021 to ensure electrical utilities take effective actions to reduce utility-related wildfire risk. Energy Safety strives to deliver near-term results while promoting a long-term utility vision to reduce wildfire and build cultures of safety.

The California Legislature enacted several measures requiring electrical corporations to reduce the risk of utility-caused catastrophic wildfires. Key legislative measures include Assembly Bills 1054 and 111, Public Utilities Code Sections 326(b) and 8389, Senate Bills 901 and 1028, and Government Code Section 15475 (see Section 1.1, "Legal Authority").

Pursuant to Public Utilities Code Section 8386.3(a), this Decision serves as Energy Safety's assessment and approval of Southern California Edison Company's (SCE's) Wildfire Mitigation Plan 2022 Update (2022 Update) submitted on February 18, 2022.

Energy Safety's Decision incorporates comments from the public and other stakeholders.

This Executive Summary includes a high-level summary of Energy Safety's assessment of SCE's maturity, progress, and areas in the current plan that Energy Safety determined warrant continued improvement. Energy Safety's comprehensive evaluation is included as Section 4, and a detailed list of all areas for continued improvement and required progress can be found in Section 7.

Maturity Model Evaluation

Energy Safety introduced a maturity model (the Utility Wildfire Mitigation Maturity Model) in 2020, providing a method to assess utility wildfire risk reduction capabilities and examine the relative maturity of individual wildfire mitigation programs. In February 2020, the utilities completed a survey that established a baseline for maturity as well as their anticipated progress over the three-year plan period. In 2021 and 2022, the utilities again completed the survey, enabling Energy Safety to monitor progress and ascertain potential improvements to maturity based on self-reported progress to date.

Energy Safety makes the following key findings regarding SCE's maturity progress in 2022 and over the three-year plan cycle. Detailed explanations of utility maturity are contained in each section of the evaluation.

- SCE has increased its maturity level for all but one of the 10 broad maturity categories since 2020. From 2021 to 2022, SCE's maturity level increased for all categories except vegetation management.
- The decrease to SCE's maturity level in vegetation management was due to a change in its interpretation of the cost effectiveness portion of two capability questions related to the use of vegetation cuttings. See Section 4.6.5, "Vegetation Management and Inspections" and Appendix B for further discussion of these questions and SCE's responses to Energy Safety's data requests.
- As of 2022, SCE's maturity level was two or greater (on a scale of zero to four) in all categories and three or greater in the categories of grid design and system hardening, emergency planning and preparedness and stakeholder cooperation and community engagement.
- SCE met or exceeded its 2021 projected end of cycle maturity level in 2022 for 46 out of the 52 surveyed capabilities.

Areas of Significant Progress

SCE has made significant progress over the past year and/or has matured in its mitigation strategies for future years in the following areas:

- SCE has improved its risk-based mitigation targeting by implementing three varying levels of risk from high to low. These three levels of risk take into account the level of risk assessed at a particular location, an improved egress calculation, and the use of machine learning for multiple facets of its risk assessment and modeling.
- SCE has expanded its weather station network and installed more weather stations per overhead mile than peer utilities, which aid its weather forecasting and situational awareness capabilities.
- SCE has introduced a suite of mitigations it calls 'CC++' in areas where covered conductor (CC) has already been installed or where undergrounding is infeasible. SCE states that CC++ increases the efficacy of covered conductor wire-down and equipment failure mitigation.
- SCE has implemented, and plans to continue implementing, continuous monitoring equipment. This includes meter alarming for downed energy conductor detection, Distribution Fault Anticipation, and early fault detection of malfunctions circuits in the high fire threat district.

- SCE mitigation initiatives reduced the duration, frequency and scope of its Public Safety Power Shutoff events in 2021 compared to the previous year, and further improvements are projected in 2022.

Areas for Continued Improvement

Energy Safety evaluated 2022 Updates with a particular focus on how each utility is driving down the risk of utility-related ignitions. The evaluation included assessing the utility's progress implementing wildfire mitigation initiatives, evaluating the feasibility of its strategies, and measuring year-to-year trends. As a result of this evaluation, Energy Safety identified areas where the utility must continue to improve its wildfire mitigation capabilities in future plans.

Section 4 contains Energy Safety's detailed assessment and resulting areas for continued improvement. A complete list of all SCE's areas for continued improvement is included in Section 7. An overview of select areas for continued improvement for SCE is provided below:

- SCE still has not incorporated and is not projecting incorporation of climate change in its risk modeling in 2022.
- SCE's weather station reporting frequency is well below that of its peers, at once every 10 minutes rather than every 30 seconds or less.
- SCE and other electrical utilities have not made any concrete commitments to applying lessons learned from the joint covered conductor effectiveness study.
- SCE is not completing work orders quickly enough. As of the first quarter of 2022, SCE had 8,460 overdue work orders, including six Priority 1 notifications created in 2020 and 13 created in 2021 that were still open.
- In 2021, SCE reported an increase in distribution-level ignitions from damage or equipment failure. Even when normalized for Red Flag Warnings, SCE reported increasing ignition trends for many equipment-type failures, particularly conductor.
- SCE and other electrical utilities are not collaboratively identifying and implementing best practices in vegetation management to reduce wildfire risk.

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1. Introduction and Background

Southern California Edison Company (SCE) submitted a comprehensive Wildfire Mitigation Plan (WMP or Plan) in 2020 covering a three-year term from 2020 through the end of 2022 (the current WMP cycle). SCE submits annual updates to that Plan for Office of Energy Infrastructure Safety (Energy Safety) approval or denial. This Decision represents Energy Safety's assessment of SCE's 2022 WMP Update (2022 Update), which SCE submitted on February 18, 2022, in response to Energy Safety's Final 2022 WMP Update Guidelines[1] (Guidelines).

Energy Safety approves SCE's 2022 Update.

1.1 Legal Authority

In 2018, following the devastating wildfires in 2016 and 2017, the California Legislature passed several bills increasing regulatory supervision of the electrical corporations' efforts to reduce utility-related wildfires. Assembly Bill (AB) 1054 (Statutes of [Stats.] 2019, Chapter [Ch.] 79) created Energy Safety (initially formed as the Wildfire Safety Division [WSD] at the California Public Utilities Commission [CPUC]) and tasked it with reviewing annual WMPs submitted by electrical corporations.

The main regulatory vehicle for Energy Safety to evaluate electrical corporations' wildfire risk reduction efforts is the WMP, which was first introduced in Senate Bill (SB) 1028 (Stats. 2016, Ch. 598) and further defined in subsequent legislation. Investor-owned electrical corporations[2] are required to submit WMPs assessing their level of wildfire risk and providing plans for wildfire risk reduction. The CPUC evaluated the utilities' first WMPs under the SB 901 (Stats. 2018, Ch. 626) framework in 2019.[3]

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

[2] In this document "utility" should be understood to mean "electrical corporation."

[3] See Rulemaking 18-10-007.

On July 1, 2021, all functions of the CPUC's WSD were transferred to Energy Safety.[4] Energy Safety "is the successor to […] and is vested with, all of the duties, powers, and responsibilities of the Wildfire Safety Division,"[5] including, but not limited to, jurisdiction for evaluating and approving or denying utilities' WMPs and evaluating compliance with the WMPs. Energy Safety must ensure utility wildfire mitigation efforts sufficiently address utility wildfire risk. To support its efforts, Energy Safety developed a long-term strategic roadmap, Reducing Utility-Related Wildfire Risk (2020).[6] This strategic roadmap underpins Energy Safety's evaluation of the WMPs.

1.1.1 Cost Recovery

Statute requires electrical corporations to seek cost recovery and prove all expenditures are just and reasonable in their General Rate Cases (GRCs) or an appropriate application.[7] Nothing in this Decision should be construed as approval of WMP-related costs.[8]

1.2 Multi-Year Plan Process

In February 2020, the utilities[9] submitted their three-year 2020-2022 WMPs. In 2020, Energy Safety conducted its evaluation and either approved, conditionally approved, or denied the Plans. In the case of conditional approval, Energy Safety identified areas for further improvement in the Plans, assigning these areas different severity levels, and required the utilities to address issues through various mechanisms depending on the designation of severity, Class A, B or C.

[4] Public Utilities Code § 326(b).

[5] Gov. Code § 15475.

[6] Energy Safety's strategic roadmap Reducing Utility-Related Wildfire Risk (2020) (accessed January 26, 2022): https://energysafety.ca.gov/who-we-are/strategic-roadmap/.

[7] Public Utilities Code § 8386.4(b).

[8] Energy Safety's approval does not relieve the electrical corporation of any and all otherwise applicable permitting, ratemaking, or other legal and regulatory obligations.

[9] Utilities that submitted a WMP in 2020: Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), San Diego Gas & Electric Company (SDG&E), PacifiCorp, Bear Valley Electric Service, Inc. (BVES), Liberty Utilities, Trans Bay Cable, LLC, and Horizon West Transmission, LLC.

In 2021, the utilities submitted updates to their 2020 WMP. Energy Safety evaluated the utilities' WMP Updates and either approved or denied the Plans. If Energy Safety identified a critical issue in a utility's Plan, Energy Safety issued a Revision Notice requiring the utility to remedy the issue prior to completion of Energy Safety's evaluation. (See Section 1.3.2 for more information on Revision Notices.) Upon receipt of the utility's response to the Revision Notice, Energy Safety determined if the response was sufficient to warrant approval of the WMP or insufficient such that denial of the WMP was warranted. Energy Safety issued a Revision Notice to SCE for its 2021 Update on May 4, 2021.[10] The Revision Notice included four critical issues and associated required remedies.

Plan year 2022 is the final year in the first three-year plan cycle. Therefore, Energy Safety's evaluation of SCE's 2022 Update focuses heavily on the progress the utility made over the three-year plan cycle and whether the utility matured in its understanding of its own wildfire ignition risks and appropriate mitigation activities to decrease those risks.

1.3 2022 Evaluation Process

Energy Safety issued WMP Update Guidelines (Guidelines) on December 15, 2021. The Guidelines streamline the reporting and evaluation and incorporate the requirements of SB 533 (Stats. 2021, Ch. 244). Pursuant to the adopted Guidelines, SCE submitted its 2022 Update on February 18, 2022.

Energy Safety begins evaluating WMPs and Updates by reviewing the submittal for completeness. Energy Safety determines whether the submittal addresses the statutory requirements contained in Public Utilities Code Section 8386(c) and the Guidelines. Energy Safety does not conduct a substantive evaluation at that time. If the WMP or Update is not complete, Energy Safety may reject the plan and require the utility to resubmit.

Once Energy Safety determines the WMP or Update is complete, Energy Safety begins its assessment using the criteria listed in Section 1.3.1. The prior year's WMPs or Updates are included in the review to gauge progress and trends.

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[10] The Wildfire Safety Division Issuance of Revision Notice for Southern California Edison Company's 2021 Wildfire Mitigation Plan Update and Notice of Extension of WSD Determination Per Public Utilities Code 8389.3(a) (accessed 5/230, 2022): https://energysafety.ca.gov/wp-content/uploads/docs/misc/wmp/2021/utility/sce/sce-2021-wmp-revision-notice.pdf.

At any time during the evaluation, Energy Safety may issue a Revision Notice for reasons listed in Section 1.3.2. The utility must respond to the Revision Notice and revise and resubmit the relevant sections of its WMP or Update.

1.3.1 Energy Safety Evaluation Criteria

Energy Safety evaluated 2022 Updates according to the following factors:

- *Completeness:* The utility comprehensively responds to the statutory requirements contained in Public Utilities Code Section 8386(c) and Energy Safety's Guidelines.
- *Technical and programmatic feasibility and effectiveness:* The proposed initiatives are technically feasible and effective in addressing the risks that exist in the utility's service territory. The proposed initiatives are programmatically feasible for the specific utility given its maturity and progress to date.
- *Resource use efficiency:* The proposed initiatives are an efficient use of utility resources and focus on achieving the greatest risk reduction at the lowest cost.
- *Demonstrated year-over-year progress:* The utility demonstrates sufficient progress on objectives and program targets reported in its 2021 Update.
- *Forward-looking growth:* The utility demonstrates a clear action plan to continue reducing utility-related ignitions and the scale, scope, and frequency of Public Safety Power Shutoff (PSPS) events.[11] In addition, the utility focuses sufficiently on long-term strategies to build the overall maturity of its wildfire mitigation capabilities while reducing reliance on shorter-term strategies such as PSPS and augmented vegetation management.
- *Progress metrics:* The utility tracks the degree to which its wildfire mitigation activity has changed the conditions of its wildfire risk exposure in terms of drivers of ignition probability.
- *Outcome metrics:* The utility uses outcome metrics to measure its performance and outcomes in its service territory in terms of both leading and lagging indicators of

[11] A Public Safety Power Shutoff (PSPS) event, also called a de-energization event, is when a utility proactively and temporarily cuts power to electric lines that may fail in certain weather conditions, in specific areas, to reduce electric facility-caused fire risk.

wildfire risk, PSPS risk, and other direct and indirect consequences of wildfire and PSPS, including the potential unintended consequences of wildfire mitigation work.

- *Program targets:* The utility uses targets to track its progress toward specific objectives for its wildfire mitigation activities.[12] Program targets track the utility's pace of activity completion as laid out in the WMP but do not track the efficacy of its activities. The primary use of these program targets is to track utility progress with its WMP.

To assess SCE's 2022 Update, Energy Safety relied on:

- SCE's WMP and Update submissions
- Input from the California Department of Forestry and Fire Protection (CAL FIRE)
- Public and stakeholder comments
- SCE's response to the Utility Wildfire Mitigation Maturity Survey (Maturity Survey)
- SCE's data submissions
- SCE's responses to data requests

Energy Safety's assessment of SCE's 2022 Update is summarized in Section 4.

1.3.2 Revision Notices

Public Utilities Code Section 8386.3(a) states, "Before approval, the division may require modifications of the plan." Energy Safety effectuates this provision by issuing a Revision Notice. The purpose of a Revision Notice is to hold utilities accountable for:

- Submitting a sufficiently detailed 2022 Update
- Addressing issues or improvement requests from the previous year
- Providing adequate data and information to justify proposed mitigation strategies

Examples of when Energy Safety may choose to issue a Revision Notice include, but are not limited to, the following:

[12] Objectives are unique to each utility and reflect the 1-, 3-, and 10-year projections of progress toward the WMP goal. See Section 4.4 for a review of the utility's objectives.

- The utility failed to implement the remedies detailed in the prior year's Decision[13]
- The utility did not provide sufficient information for evaluation
- The utility made a significant shift in its wildfire mitigation strategy without sufficient substantiation
- The utility's submission does not meet evaluation criteria listed in Section 1.3.1
- An element of the WMP that is critical to life-safety or property is unsatisfactory

Energy Safety did not issue a Revision Notice to SCE for its 2022 Update.

1.3.3 Final Decision

Upon completion of its review, Energy Safety determines whether each utility's 2022 Update will be:

- Approved (approval may include a requirement that the utility demonstrate continued growth in its 2023 WMP), or
- Denied (the utility does not have an approved2022 Update and must reapply for approval in 2023).

Energy Safety's approval of a WMP or WMP Update does not mean that the utility has reached the highest levels of maturity or has reduced its ignition risk to zero. Rather, approval means the utility has satisfied the evaluation criteria and substantiated its mitigation strategy such that implementation of the plan is appropriate. When Energy Safety approves a WMP or WMP Update, it does so with an eye toward continued improvement. Therefore, in this Decision, Energy Safety lists areas where the utility must continue to mature in its capabilities, known as Areas for Continued Improvement.

[13] Also called an Action Statement (2020, 2021).

2. Energy Safety Decision on SCE's 2022 Update

Pursuant to Public Utilities Code Section 8386.3(a), this Decision is the totality of Energy Safety's review of SCE's 2022 Update. SCE's 2022 Update is approved.

3. Public and Stakeholder Comments

Energy Safety invited stakeholders and members of the public to provide comments on the utilities' 2022 Updates. WMP comments were due on April 11, 2022, and reply comments were due on April 18, 2022. The following individuals and organizations submitted comments:

- California Department of Fish and Wildlife (CDFW)
- Green Power Institute (GPI)
- Mussey Grade Road Alliance (MGRA)
- Public Advocates Office at the CPUC (Cal Advocates)
- Rural County Representatives of California (RCRC)
- The Utility Reform Network (TURN)
- William B. Abrams

Comments on the 2022 Updates can be viewed in the 2022 Wildfire Mitigation Plan Updates (2022-WMPs) docket log.[14]

Energy Safety evaluated these comments, concurred with and, in some instances, incorporated the following stakeholder input on SCE's 2022 Update, as reflected in this Decision:

- SCE should consult CDFW and other responsible agencies as early as possible when implementing wildfire mitigation activities, to complete the required environmental documents and discretionary reviews (CDFW).
- SCE should "reduce the long-term need for extensive tree trimming and slash production" (GPI).

[14] 2022 Wildfire Mitigation Plan Updates (2022-WMPs) docket log: https://efiling.energysafety.ca.gov/Lists/DocketLog.aspx?docketnumber=2022-WMPs (accessed April 14, 2022).

- SCE's WMP activities and mitigations should address drivers that resulted in utility-caused wildfires (GPI, Abrams).
- SCE should evaluate risk outside of the High Fire Threat District (HFTD) based on risk model outputs to identify any necessary additional areas that pose high wildfire risk and adjust its wildfire mitigations activities accordingly (GPI).
- SCE and its peer utilities should provide more information on mitigation initiative lifecycle benefits used to determine risk-spend efficiency (RSE) estimates (GPI).
- SCE should perform a more compete assessment of the possible impacts of climate change on both probability of ignition and consequence (GPI).
- SCE and its peer utilities should expand their collaboration to share lessons learned on system hardening practices beyond covered conductor (Cal Advocates).
- SCE and its peer utilities should be more specific in reporting the inputs, outputs, and assumptions of models used to calculate the safety and financial risk of PSPS to customers (Cal Advocates).
- SCE and its peer utilities would benefit from forming a working group to study the use of rapid earth fault current limiter technology (MGRA).
- SCE should consider potential wildfire smoke exposure when estimating the risks and benefits from PSPS (MGRA).
- SCE should inform Energy Safety of the outcomes of its third-party covered conductor tests (MGRA).
- SCE and its peer utilities should provide more information on third-party consequence modeling assumptions (MGRA).
- SCE should plan and perform sensitivity analyses on planning models and risk-spend efficiency values in its 2023 WMP (GPI).
- SCE and its peer utilities should report on how they will address Aeolian vibration wear and tear on covered conductors (GPI).
- SCE should include a description of its program to evaluate the root causes of equipment-caused ignitions in its 2023 WMP (Cal Advocates).
- SCE should immediately fix its overdue maintenance and develop a plan for resolving future overdue maintenance (Cal Advocates).
- SCE should report on how its machine learning models are expected to improve its weather forecasting abilities in its 2023 WMP (Cal Advocates).

- SCE should report on the modeling technique progress it has made to address the "forecast bias" barrier to issuing timely notifications of PSPS events in its 2023 WMP (Cal Advocates).

In addition to the above, Energy Safety's review benefited from the discovery materials generated by data requests submitted to SCE by the stakeholders named above, in particular Cal Advocates and MGRA.

4. Energy Safety's Assessment of SCE's 2022 Update

The following sections present Energy Safety's comprehensive evaluation of SCE's 2022 Update, including Energy Safety's assessment of progress over the past year and throughout the current WMP cycle. Energy Safety considers SCE's past and current WMP and Update submissions to assess year-over-year trends and track Energy Safety's past requirements as well as the utility's own projections. In addition to comparing SCE's initiatives from year to year, Energy Safety also assesses any new programs, plans, or technologies SCE is proposing in its 2022 Update. The sections below assess past progress, encourage growth through new initiatives or approaches, and identify areas for continued improvement following up on 2021 requirements.

Before commencing its evaluation, Energy Safety found SCE's 2022 Update to be complete. [15]

4.1 Introductory Sections of the WMP

The introductory sections of the Guidelines[16] require the utility to report basic information regarding persons responsible for executing the plan and adherence to statutory requirements. Section 1 requires contact information (telephone and email) for the executive with overall responsibility and the specific program owners. In addition, Section 1 requires inclusion of the name and relevant background and credentials for all experts consulted in preparation of the 2022 Update. Contact information and names may be submitted in a redacted file.

Section 2 requires the utility to specify the location of the information required by Public Utilities Code Section 8386(c). Each utility must affirm that the WMP Update addresses each

[15] A statutorily required map of frequently de-energized circuits was not included in the original submission, but later provided by SCE in Data Request OEIS-SCE-22-003, Question 2 which can be found in the First Supplement to Southern California Edison Company's 2022 Wildfire Mitigation Plan Update: https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=52251&shareable=true.

[16] Final 2022 Wildfire Mitigation Plan Update Guidelines, Attachment 2.1 and 2.2 pp. 25-35 (accessed February 15, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

statutory requirement AND cite the section and page number(s) where each statutory requirement is addressed.

SCE provides the required information in Section 1 and 2 of its 2022 Update, including all information required by Public Utilities Code Section 8386(c).

4.2 Actuals and Planned Spending for Mitigation Plan

The actuals and planned spending section of the Guidelines[17] requires utilities to report a summary of WMP expenditures, actual and planned, for the current WMP cycle. This summary must include an estimated annual increase in costs to the ratepayer due to utility-related ignitions and wildfire mitigation activities. The Guidelines require that ratepayer impact calculations be clearly shown to demonstrate how the utility derived each value.[18]

SCE provides all required information regarding expenditures.

Energy Safety monitors expenditure data for accuracy and consistency. See Table 4.2-1 below for a comparison of the WMP actual and planned expenditures of the three large investor-owned utilities (large IOUs).[19]

Table 4.2-1: Actual and Planned WMP Expenditures - Large IOUs (2020-2022)

Utility	2020 Actual	2021 Actual	2022 Planned	Total WMP Cycle as Reported in 2022
PG&E	$ 4,461,563.98	$ 4,797,530.02	$ 5,963,945.08	$ 15,223,039.07
SCE	$ 1,948,054.11	$ 2,478,208.87	$ 2,416,740.96	$ 6,843,003.94
SDG&E	$ 568,420.18	$ 543,911.56	$ 770,393.23	$ 1,882,724.97

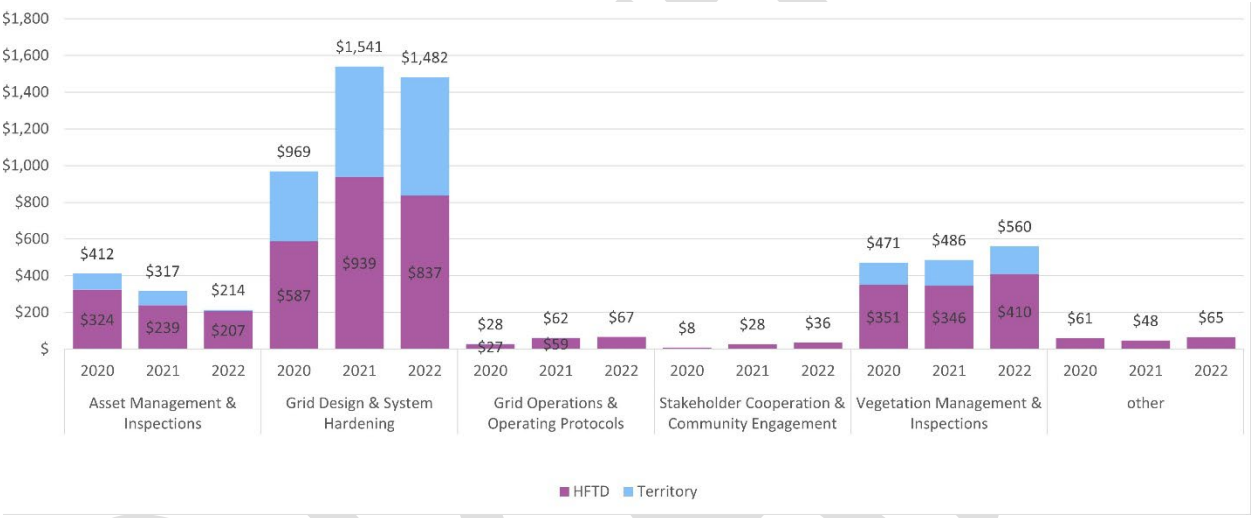
[17] Final 2022 Wildfire Mitigation Plan Update Guidelines, Attachment 2.3 pp. 37-40 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

[18] Nothing in the request for such information should be construed as approval of any such expenditure, which is left to the CPUC pursuant to Public Utilities Code Section 8386.4(b).

[19] In this document, the term "large investor-owned utilities" (or "large IOUs") refers to Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E), and Southern California Edison Company (SCE).

Internally, SCE's WMP expenditures are largest in the program categories of Grid Design and System Hardening, Vegetation Management and Asset Management and Inspections. All other program spending totaled together was relatively modest in comparison and occurred almost exclusively in HFTDs.

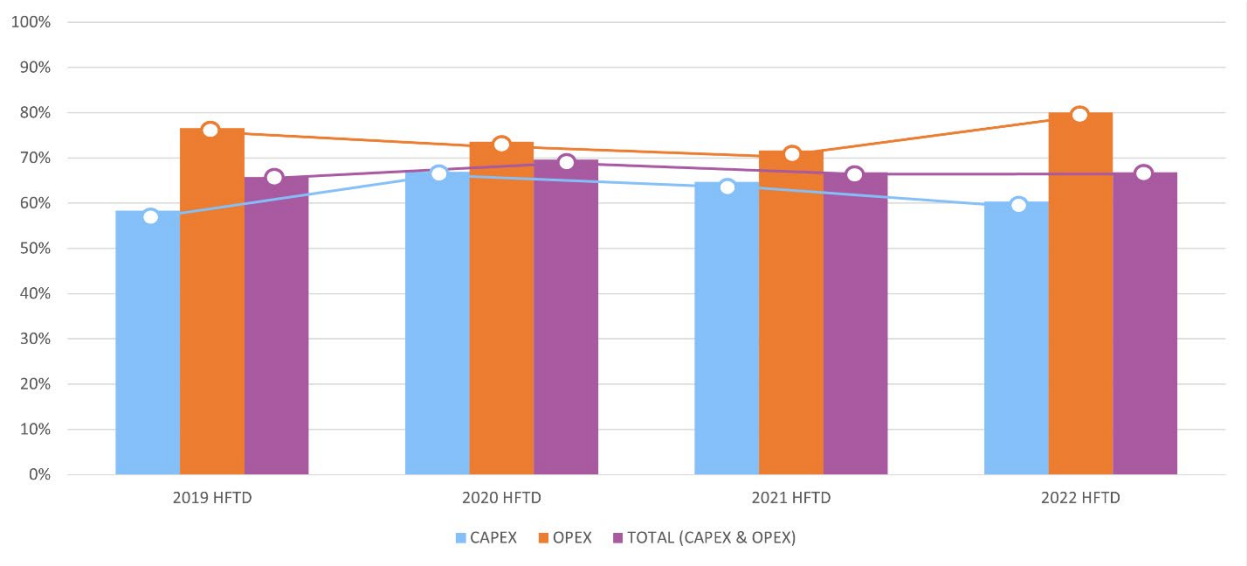
Figure 4.2-1: SCE HFTD and Total Territory Spending by Mitigation Category ($ millions)



According to data SCE submitted in Q4 of 2021, HFTDs make up only 27 percent of SCE's service territory.[20] Over the past three years, SCE's HFTD received approximately two-thirds of all WMP spending. SCE spent the most in its Grid Design and System Hardening program. Within this program, 55-60 percent of the spending is focused in its HFTD from 2020 through 2022. Given the size of the Grid Design and System Hardening spending, that lower percentage spending notably reduces SCE's overall percentage spending in its HFTD.

[20] SCE's HFTD is 27% of their service territory square miles, 25% of their overhead distribution miles, 35% of their overhead transmission miles, and contains 14% of their customers.

Figure 4.2-2: SCE's Capital, Operating and Total HFTD Expenditures as a Proportion of WMP Expenditures by Type and Territory Total



4.3 Lessons Learned and Risk Trends

The lessons learned and risk trends section of the Guidelines[21] requires utilities to report how their plans have evolved since 2021 based on lessons learned, current risk trends, and research conducted. This section also requires utilities to report on potential future learnings through proposed and ongoing research.

The utility must describe how it assesses wildfire risk in terms of ignition probability and estimated wildfire consequence using, at a minimum, CPUC-adopted risk assessment requirements (for large electrical corporations) from the General Rate Case (GRC) Risk-Based Decision-Making Framework Proceeding (formerly the Safety Model and Assessment Proceeding [S-MAP]) and the Risk Assessment Mitigation Phase (RAMP) Proceeding. The utility may additionally include other assessments of wildfire risk. The utility must:

- Describe how it monitors and accounts for the contribution of weather and fuel to ignition probability and wildfire consequence.
- Identify any areas where the CPUC's HFTD should be modified.

[21] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.4, pp. 41-50 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

- Identify any areas classified by the utility as "high fire threat" that differ from the CPUC's HFTD and explain why these areas are so classified.
- Rank trends anticipated to have the greatest impact on ignition probability and wildfire consequence.

SCE provides all required information on lessons learned, current risk trends, and research conducted.

Lessons Learned

SCE identifies 27 lessons learned across 12 WMP program categories. Energy Safety found that improved or updated data specifically informed 7 of those 27 lessons learned.[22] Some of the most significant lessons and resulting changes to WMP mitigation processes and policies reflected in the 2022 Update include the following:

- SCE determined that a wider range of both fuel- and wind-driven conditions were needed for its risk modeling. As a result, SCE increased use of weather scenarios and developed a more granular fuel model that accounts for regrowth to capture a wider range of fuel- and wind-driven climate conditions in risk modeling.
- SCE recognized its Wildfire Risk Reduction Model does not capture some qualitative risk factors, such as egress. As a result, it expanded severe-risk areas beyond those locations captured by ignition simulations alone by integrating consideration of qualitative factors, including population egress, historical fire frequency, and other factors.
- SCE recognized the need for more accurate weather modeling to improve the accuracy of customer notifications and the need for more time to evaluate improvements. To address this, SCE increased the use of machine learning weather modeling on 500 more weather stations at the start of the fire season to provide increased evaluation of the improvements to PSPS customer notification accuracy.

[22] First Supplement to Southern California Edison Company's 2022 Wildfire Mitigation Plan Update, pp. 7-15: https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=52251&shareable=true.

- SCE recognized the susceptibility of covered conductor installations to wear from Aeolian vibration and integrated vibration dampeners and vibration dampener retrofits into its covered conductor deployment and maintenance program.
- Acknowledging that in 2021, 30 percent of its CPUC-reportable ignitions involved secondary conductors and approximately 25 percent of those ignitions occurred in the HFTD, SCE began mitigating high-risk secondary conductor locations through inspection, vegetation management, and connection coverings.
- SCE found that existing fast curve settings (FCS) did not always provide adequate fast tripping in all portions of the circuitry in the HFTD, so SCE refined its FCS settings and increased its FCS coverage across all circuits in the HFTD.

Risk Drivers

Anticipated drivers of changes to ignition probability and wildfire consequence for SCE's territory include:

- Climate change, which will primarily impact temperatures and wind conditions, but secondarily impact fuel moisture and density and therefore wildfire ignition, spread, and intensity.
- Invasive insect species impacts, which may impact tree longevity, increasing the number of dead or dying trees in the mountainous areas of SCE's territory.
- Changes in population within SCE's territory, especially the access and functional needs (AFN) population within the HFTD, will impact wildfire consequence. Similarly, any growth in the non-residential critical infrastructure within the HFTD will also notably impact wildfire consequence.

SCE provided a list of wildfire risk drivers and their rankings as required by Energy Safety. SCE lists distribution conductor damage or failure, animal contact, and balloon contact as the three top-ranked wildfire risk drivers.

Research Studies

SCE has partnered with multiple institutions in financing and/or cooperatively participating in wildfire mitigation-related research studies. SCE reported on eight in-progress and two completed research studies in its 2022 Update.

The eight in-progress studies focus on vegetation and wildfire fuel management, PSPS impact mitigation, and situational awareness of weather conditions. They are:

- A joint utility study of the effectiveness of implementing recommended vegetation clearances pursuant to General Order 95, Rule 35, Appendix E. This study is discussed further in Section 4.6.5.2.
- A microgrid study conducted with the University of California, Los Angeles Luskin Center for Innovation to inform microgrid siting decisions, support PSPS events, and increase customer resiliency.
- An Electric Power Research Institute study on developing a fuel removal baseline in SCE service areas within the United States Forest Service (USFS) areas.
- A San Jose State University research project using light detection and ranging technology to study the nature and behavior of wind speeds above ground in complex terrain.
- A study with the University of Colorado Boulder to develop a heat map of the dynamic combustibility of fuels using publicly available remote sensing data to inform the timing of inspections and potential remediations. SCE will use this updated heat map to note changes in its service territory on a quarterly basis.
- A Cal Poly San Luis Obispo Wildland-Urban Interface Fire Institute case study of the impact of wildfire risk compared to the impact of a California Environmental Quality Act (CEQA) exemption. The goal is to provide justification for a Statutory Emergency Exemption from CEQA in some scenarios.
- A nascent San Jose State University wildfire interdisciplinary research study to develop new or improved wildfire prediction tools and community resilience policies.
- A University of California, Santa Barbara, gridded situational awareness research study, using the USFS's Wind Ninja tool, to create a real-time gridded observational data set that can be used to make more informed de- and re-energization decisions.

The two research studies with reported findings are:

- An ongoing Texas A&M study using distribution fault anticipation (DFA) software, which interprets variations in electrical currents in lines to anticipate deteriorating conditions or equipment. DFA software provides SCE with approximately 50 events per month from 190 installed DFA units for evaluation. The analysis of selected events, conducted in collaboration with Texas A&M, is anticipated to lead to the further refinement and improvement of the DFA algorithm and SCE's identification and analysis of the reported events. See Section 4.6.2.2 for further discussion of DFA implementation.

- An AFN qualitative study concluded in 2021. See Section 4.7.2 for further discussion of this study.

4.3.1 Areas for Continued Improvement

In determining its wildfire risk driver rankings, SCE factors in average outages and ignition rates to derive an adjusted risk score but does not factor in the risk of an ignition causing a wildfire. Consequently, the provided list is an ignition risk ranking, not a wildfire risk ranking. In its 2023 WMP, SCE must further refine its prioritized list of wildfire risks and drivers (2022 Update, Table 4-6, p. 48) by weighting each risk driver by likelihood of causing a catastrophic wildfire. For example, the utility must factor in whether an ignition caused by this driver tends to happen in high wildfire risk areas as identified by SCE's risk models, including the HFTD.

Requirements regarding the integration of climate change and its impacts into SCE's risk and consequence modeling are addressed in Section 4.6.1.3. However, on a related note, the large IOUs are each pursuing their own efforts to integrate considerations of climate change into their risk and consequence modeling. This can lead to duplicative efforts or conflicting results. The large IOUs must collaborate on incorporating climate change into their risk and consequence modeling. Additionally, state agencies and academic institutions are leading substantial efforts to quantify and estimate the future impacts of climate change, and the large IOUs could benefit from those efforts and the expertise of those involved. In its 2023 WMP, SCE must report on progress in collaborating with the other large IOUs in estimating climate change impacts and integrating those estimated climate change impacts into their risk and consequence modeling.

Energy Safety sets forth specific areas for improvement and associated required progress in Section 7.

4.4 Inputs to the Plan and Directional Vision for the WMP

The inputs and directional vision section of the Guidelines[23] requires the utility to rank and discuss trends it anticipates may have the greatest impact on ignition probability and wildfire

[23] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.5, pp. 52-57 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

consequence within the utility's service territory over the next 10 years. First, utilities must set forth objectives over the following timeframes: before the upcoming wildfire season, before the next annual update, within the next 3 years, and within the next 10 years. Second, utilities must report the current and planned qualifications of their workforce to meet these objectives.

4.4.1 Goal, Objectives, and Program Targets

The goal of the WMP is to ensure the utilities are sufficiently planning to reduce the number of ignitions caused by utility actions or equipment and minimize the societal consequences (with specific consideration of the impact on AFN populations and marginalized communities) of both wildfires and PSPS events.

This subsection of the Guidelines[24] requires utilities to provide their objectives, which are unique to each utility and reflect their 1-, 3-, and 10-year projections of progress toward the abovementioned goal. The Guidelines also require utilities to report their unique program targets. These are quantifiable measurements of activities identified in WMPs and Updates to show the utility's progress toward reaching its objectives.

SCE provides all required information.

SCE has 49 different performance targets for its 2022 Update programs.[25] A majority of the program performance targets focus on SCE's three largest broad programmatic spending categories: asset management and inspections, grid design and system hardening, and vegetation management and inspections. SCE provides additional current-year qualitative and quantitative objective targets for 10 broad program categories in Table 7-4.[26] Past and anticipated progress toward objectives is discussed as appropriate in the progress discussions of the relevant Mitigation Initiative and Maturity Evaluation sections (see Section 4.6 et seq.). However, SCE has made notable progress in the following objectives and related program targets:

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[24] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.5.1-2.5.3, pp. 53-54 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

[25] First Supplement to Southern California Edison Company's 2022 Wildfire Mitigation Plan Update, updated Table 5.3-1, pp. 32-38: https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=52251&shareable=true.

[26] SCE's 2022 Update, pp. 224-226.

- Covered Conductor Circuit Miles Installation: From 2019 through 2021, SCE installed 2,857 circuit miles of covered conductor in the HFTD/high fire risk areas (HFRA), 159 percent of its target of 1,796 circuit miles. SCE's 2022 covered conductor circuit miles target is 1,100, with approximately 50 percent of its 2022 Wildfire Covered Conductor Program scope targeting the riskiest 25 percent of the remaining circuit segments. When accounting for additional risks such as egress and extreme wind, SCE's grid hardening program is targeting 72 percent of its severe risk areas and highest risk segments.
- Vegetation Management Inspections Audited: SCE targeted 3,000 HFTD circuit miles for quality control (QC) inspections but completed 6,000 HFTD circuit miles of inspections. SCE performed QC audits on approximately 43 percent of its 13,890 HFTD overhead circuit miles[27] in 2020 and 2021.
- Weather Station Installations: SCE has installed 1,463 weather stations since the inception of its program, exceeding its target total of 1,065 for the period of 2019 through 2021. SCE has 31 weather stations per 1,000 overhead circuit miles, compared to 24 for SDG&E and 13 for PG&E.

SCE also provided program objectives and related strategies and key initiatives for 3-year and 10-year performance periods for the 10 broader program categories noted above.[28]

4.4.1.1 Areas for Continued Improvement

The further SCE's objectives extend from the current year, the less specific they become. For example, the 3-year and 10-year objectives for grid design and system hardening are:

- Execute key proven hardening activities to improve wildfire-related public safety and reduce the need for PSPS (the 3-year objective); and
- Minimize and mitigate wildfire risk by developing and deploying resilient grid designs, standards and architectures (the 10-year objective).[29]

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[27] According to data submitted to Energy Safety for the fourth quarter of 2021, SCE has 13,890 overhead circuit miles in its HFTD.

[28] SCE's 2022 Update, Tables 7-5 through 7-14, pp. 223-235.

[29] SCE's 2022 Update, p. 227.

The 3-year objectives are accompanied by a list of strategies or activities and a simple bullet list of key initiatives. SCE's 2022 Update did not include any quantitative or qualitative targets for WMP programs or measures that would contribute to reaching its stated 3-year objectives. In its 2023 WMP, SCE must include appropriate quantitative and qualitative targets for its 3-year objectives and related programs.

Energy Safety sets forth specific areas for improvement and associated required progress in Section 7.

4.4.2 Workforce Planning

This subsection of the Guidelines[30] requires utilities to report their workforce qualifications and training practices regarding utility-related ignitions and PSPS mitigation for workers in mitigation-related roles including:

- Vegetation inspections
- Vegetation management projects
- Asset inspections
- Grid hardening
- Risk event inspection

SCE provides all required information regarding worker qualifications and training practices within each listed role. For each role, SCE provided minimum qualifications, special qualifications, the percentage of full-time employees in the roles with relevant job titles, the percentage of its workforce that meets listed qualifications. SCE also described its plans to improve the qualifications of its workforce.

4.5 Metrics and Underlying Data

The metrics and underlying data section of the Guidelines[31] requires utilities to report metrics and program targets as follows:

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[30] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.5.4, pp. 56-57 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

[31] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.6, pp. 58-69 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

- *Progress metrics* that track how much utility wildfire mitigation activity has changed the conditions of a utility's wildfire risk exposure in terms of drivers of ignition probability.
- *Outcome metrics* that measure the performance of a utility and its service territory in terms of both leading and lagging indicators of wildfire risk, PSPS risk, and other direct and indirect consequences of wildfire and PSPS, including the potential unintended consequences of wildfire mitigation work.
- *Program targets* that track the utility's pace of completing proposed wildfire mitigation activities to show progress toward a utility's specific objectives.[32] Program targets do not track the efficacy of wildfire mitigation activities. The primary use of these program targets in 2022 is to assess the progress the utility made over the three-year plan cycle and whether the utility matured in its understanding of its own wildfire ignition risks and appropriate mitigations to decrease those risks.

This section also requires utilities to provide several GIS files detailing spatial information about their service territory and performance, including recent weather patterns, location of recent ignitions, area and duration of PSPS events, location of lines and assets, geographic and population characteristics, and location of planned initiatives.

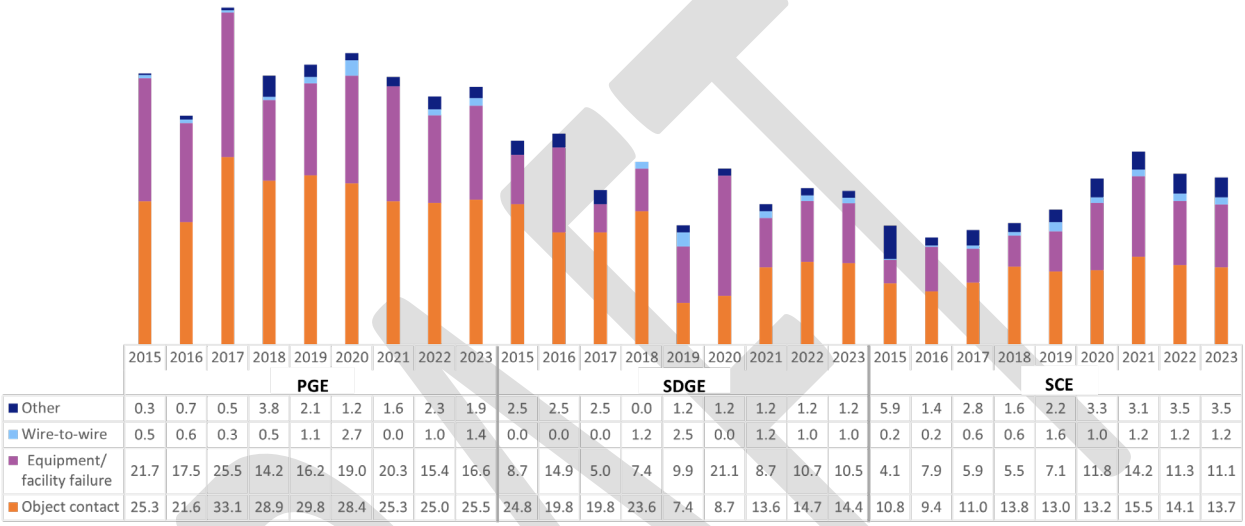
See Section 4.6.7, "Data Governance," for a detailed review of the utility's progress and areas for continued improvement in this topic area.

The figures below provide information on how the three large IOUs compare over the period 2015-2021 in actual numbers and 2022-2023 in projected numbers in terms of reported ignitions (Figure 4.5-1), risk events (Figure 4.5-2), Red Flag Warning circuit mile days per year (Figure 4.5-3), and asset inspection findings normalized by circuit miles inspected (Figure 4.5-4).

[32] Objectives are unique to each utility and reflect the 1-, 3-, and 10-year projections of progress toward the WMP goal. See Section 4.4 for a review of the utility's objectives.

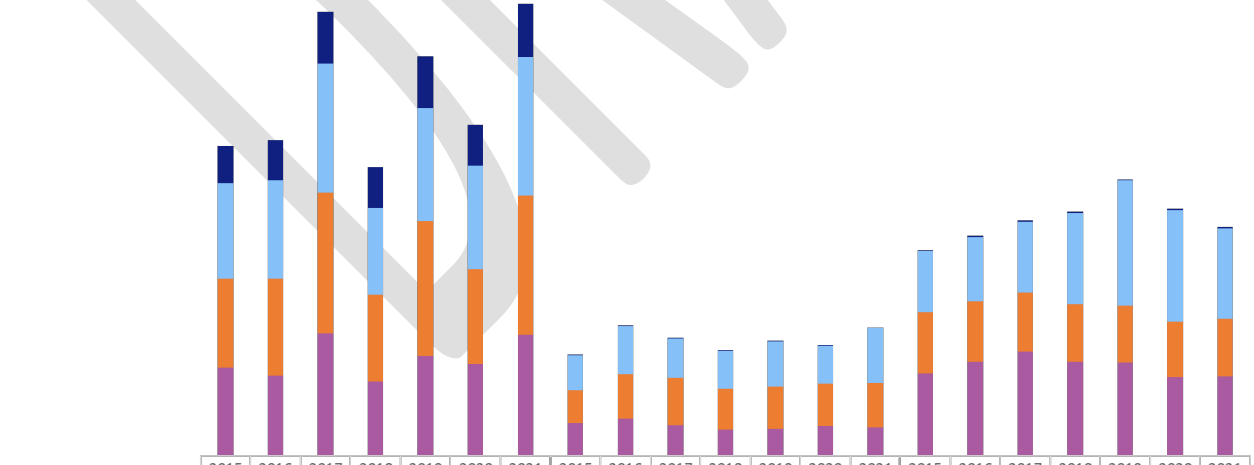
Figure 4.5-1: Ignitions per 10,000 Overhead Circuit Miles – Large IOUs (2015-2021 Actual, 2022-2023 Projected)

Figure 2.3a: Ignitions per 10,000 overhead circuit miles



	PGE									SDGE									SCE								
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2015	2016	2017	2018	2019	2020	2021	2022	2023	2015	2016	2017	2018	2019	2020	2021	2022	2023
Other	0.3	0.7	0.5	3.8	2.1	1.2	1.6	2.3	1.9	2.5	2.5	2.5	0.0	1.2	1.2	1.2	1.2	1.2	5.9	1.4	2.8	1.6	2.2	3.3	3.1	3.5	3.5
Wire-to-wire	0.5	0.6	0.3	0.5	1.1	2.7	0.0	1.0	1.4	0.0	0.0	0.0	1.2	2.5	0.0	1.2	1.0	1.0	0.2	0.2	0.6	0.6	1.6	1.0	1.2	1.2	1.2
Equipment/ facility failure	21.7	17.5	25.5	14.2	16.2	19.0	20.3	15.4	16.6	8.7	14.9	5.0	7.4	9.9	21.1	8.7	10.7	10.5	4.1	7.9	5.9	5.5	7.1	11.8	14.2	11.3	11.1
Object contact	25.3	21.6	33.1	28.9	29.8	28.4	25.3	25.0	25.5	24.8	19.8	19.8	23.6	7.4	8.7	13.6	14.7	14.4	10.8	9.4	11.0	13.8	13.0	13.2	15.5	14.1	13.7

Figure 4.5-2: Risk Events per Overhead Circuit Mile – Large IOUs (2015-2021 Actual)



	PGE							SDGE							SCE						
	2015	2016	2017	2018	2019	2020	2021	2015	2016	2017	2018	2019	2020	2021	2015	2016	2017	2018	2019	2020	2021
Wire to wire	0.05	0.05	0.07	0.05	0.07	0.05	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment/facility failure	0.13	0.13	0.17	0.12	0.15	0.14	0.18	0.05	0.06	0.05	0.05	0.06	0.05	0.07	0.08	0.08	0.09	0.12	0.17	0.15	0.12
Contact from object	0.12	0.13	0.19	0.11	0.18	0.13	0.18	0.04	0.06	0.06	0.05	0.06	0.06	0.06	0.08	0.08	0.08	0.08	0.07	0.07	0.08
Other	0.12	0.11	0.16	0.10	0.13	0.12	0.16	0.04	0.05	0.04	0.03	0.04	0.04	0.04	0.11	0.12	0.14	0.12	0.12	0.10	0.11

Figure 4.5-3: Red Flag Warning Overhead Circuit Mile Days per Year – Large IOUs (2015-2021 Actual)

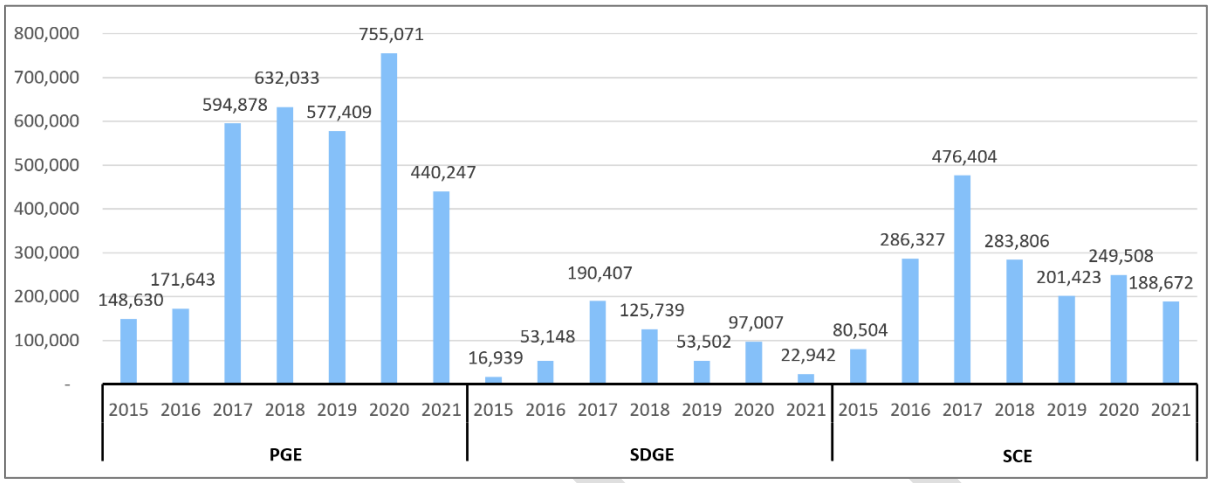
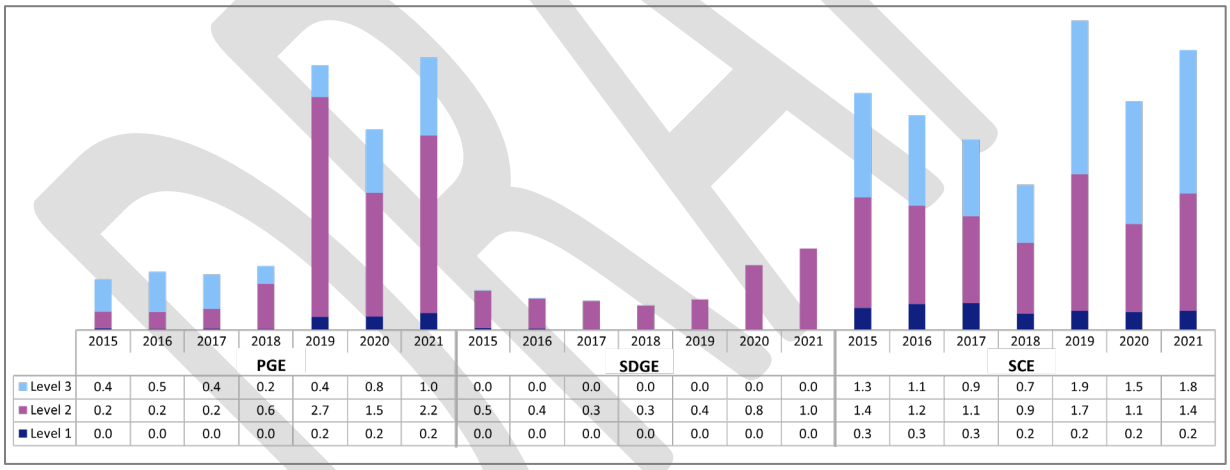


Figure 4.5-4: Asset Inspection Findings Normalized by Circuit Miles Inspected – Large IOUs (2015-2021 Actual)



	PGE							SDGE							SCE						
	2015	2016	2017	2018	2019	2020	2021	2015	2016	2017	2018	2019	2020	2021	2015	2016	2017	2018	2019	2020	2021
Level 3	0.4	0.5	0.4	0.2	0.4	0.8	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.1	0.9	0.7	1.9	1.5	1.8
Level 2	0.2	0.2	0.2	0.6	2.7	1.5	2.2	0.5	0.4	0.3	0.3	0.4	0.8	1.0	1.4	1.2	1.1	0.9	1.7	1.1	1.4
Level 1	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.2	0.2	0.2	0.2

4.6 Mitigation Initiatives and Maturity Evaluation

The mitigation initiatives and maturity evaluation section of the Guidelines[33] requires the utility to describe in its WMP Update each mitigation initiative it will undertake to reduce the risk of catastrophic wildfire. The Guidelines require the utility to self-report its current wildfire risk mitigation capabilities and plans for improvement in those capabilities.[34,35,36] The utility's self-reported capability level is referred to in this Decision as "maturity" and measured by Energy Safety's Utility Wildfire Mitigation Maturity Model (Maturity Model). Maturity levels range from zero to four, with four being the most mature. The utility reports on its maturity levels and mitigation initiatives using the same 10 categories, allowing Energy Safety to evaluate a utility's reported and projected maturity in wildfire mitigation in the context of its corresponding current and planned initiatives. The 10 maturity and mitigation initiative categories are listed below, with further details in Appendix D:

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[33] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.7, pp. 70-77 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

[34] The 2020 WMP Guidelines introduced the Utility Wildfire Mitigation Maturity Assessment as one of the four "key elements of the 2020 WMP submission and review process" (accessed April 29, 2022): https://energysafety.ca.gov/wp-content/uploads/docs/misc/docket/322133494.pdf.
The 2022 WMP Guidelines further defines the assessment process in Attachment 4: 2022 Maturity Model (accessed April 29, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true. From that document (p. 3): "Energy Safety requires each utility to complete an annual Maturity Survey to report on its current capabilities and plans for improvement in those capabilities."

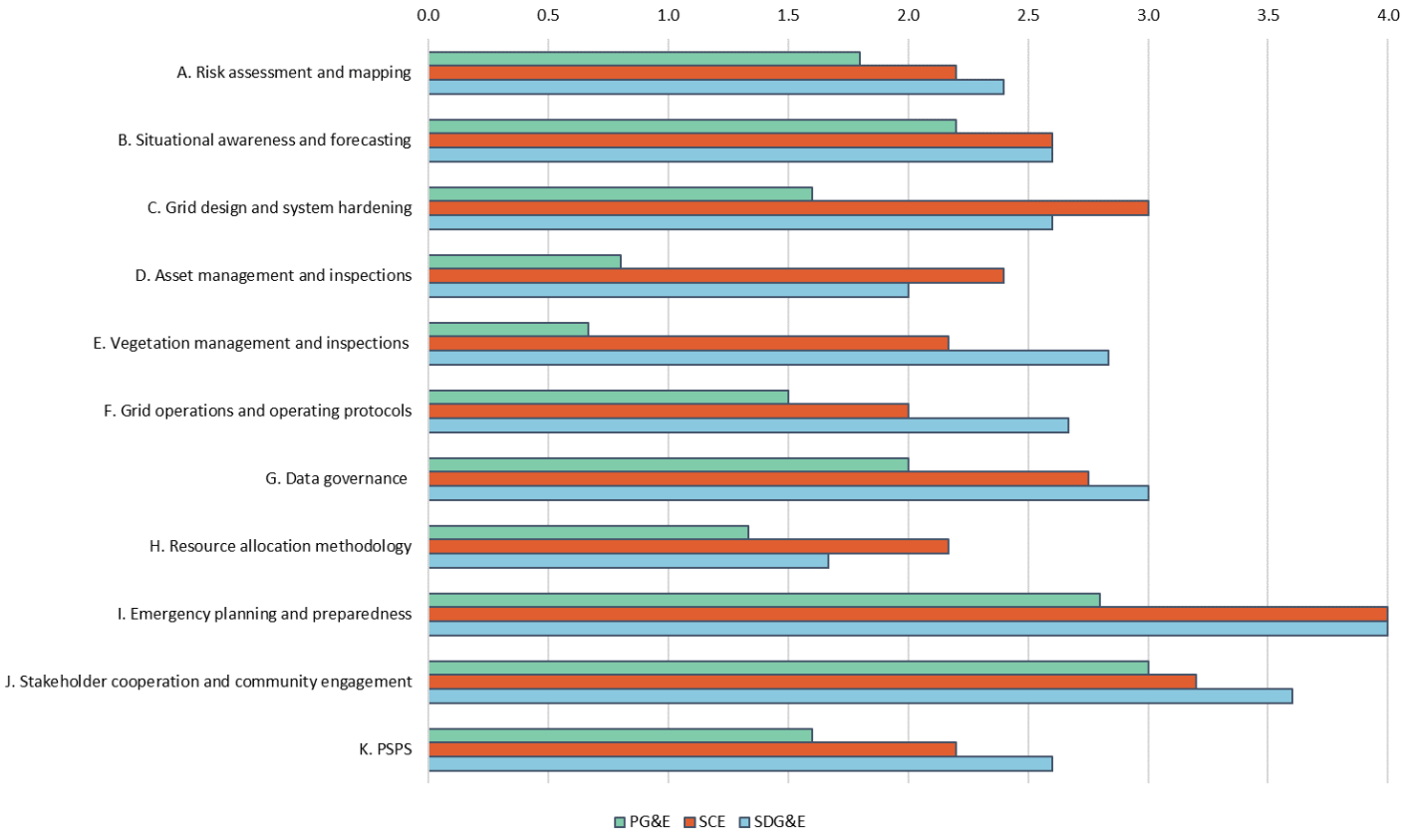
[35] The 2020 WMP Guidelines introduced the Utility Wildfire Mitigation Maturity Assessment as one of the four "key elements of the 2020 WMP submission and review process" (accessed April 29, 2022): https://energysafety.ca.gov/wp-content/uploads/docs/misc/docket/322133494.pdf.
The 2022 WMP Guidelines further defines the assessment process in Attachment 4: 2022 Maturity Model (accessed April 29, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true. From that document (p. 3): "Energy Safety requires each utility to complete an annual Maturity Survey to report on its current capabilities and plans for improvement in those capabilities."

[36] Utilities that submitted a WMP were required to complete a survey in which they answered specific questions which assessed their existing and future wildfire mitigation practices across 52 capabilities at the time of submission and at the end of the three-year plan horizon. The 52 capabilities are mapped to the same 10 categories identified for mitigation initiatives. The results of the survey can be found in Attachment 11.1. The most recent survey for each utility can be found on the Energy Safety website here: https://energysafety.ca.gov/what-we-do/electrical-infrastructure-safety/wildfire-mitigation-and-safety/wildfire-mitigation-plans/2022-wmp/ (accessed February 15, 2022).

- Risk assessment and mapping
- Situational awareness and forecasting
- Grid design and system hardening
- Asset management and inspections
- Vegetation management and inspections
- Grid operations and operating protocols
- Data governance
- Resource allocation methodology
- Emergency planning and preparedness
- Stakeholder cooperation and community engagement

Figure 4.6-1 and Table 4.6-1 below depict the self-reported maturity of the three large IOUs by initiative category for 2022. Maturity is measured on a scale from zero to four, with four being the highest.

Figure 4.6-1: Self-Reported Maturity by Category for the Large IOUs (2022)



Note that the above Figure 4.6-1 includes a "PSPS" category, which is not in the original Maturity Model. PSPS-related questions in the Maturity Survey are found under capabilities in various categories. The PSPS category in the figure above includes PSPS-related capabilities from the categories of situational awareness and forecasting, grid operations and operating protocols, and emergency planning and preparedness. It is calculated in the same way as the other categories.

Table 4.6-1: Self-Reported Maturity by Category for the Large IOUs (2022)

Category	PG&E	SCE	SDG&E
A. Risk assessment and mapping	2.00	2.20	2.40
B. Situational awareness and forecasting	2.20	2.60	2.60
C. Grid design and system hardening	1.60	3.00	2.60
D. Asset management and inspections	0.80	2.40	2.00
E. Vegetation management and inspections	1.17	2.17	2.83
F. Grid operations and operating protocols	1.50	2.00	2.67
G. Data governance	2.00	2.75	3.00
H. Resource allocation methodology	1.33	2.17	1.67
I. Emergency planning and preparedness	3.60	4.00	4.00
J. Stakeholder cooperation and community engagement	3.00	3.20	3.60

Figure 4.6-2 and Table 4.6-2 below depict SDG&E's projected growth in maturity by category for the current WMP cycle.

Figure 4.6-2: SCE Projected Growth in Maturity through Current WMP Cycle by Category (Feb. 2020-Jan. 1, 2023)

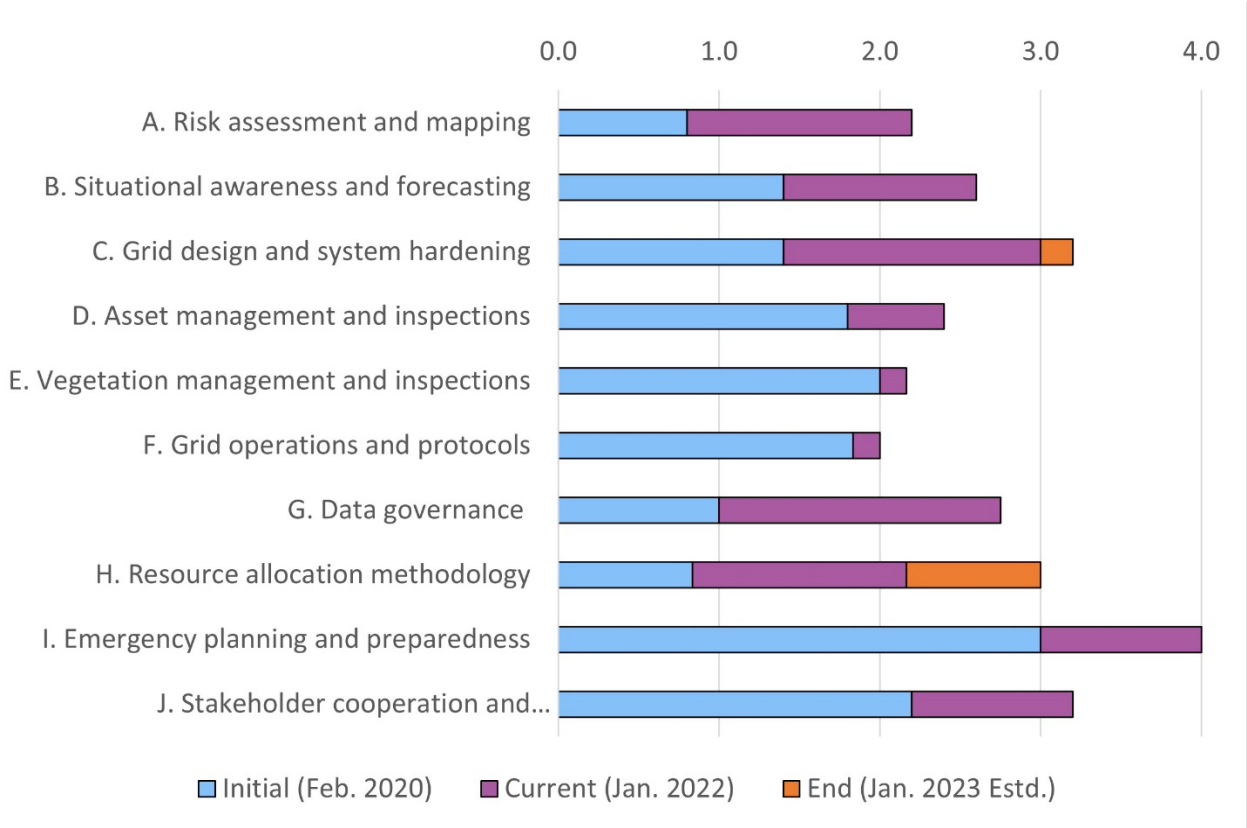


Table 4.6-2: SCE Projected Growth in Maturity through Current WMP Cycle by Category (2020-Jan. 1, 2023)

Category	2020	2021	2022	2023 Estimated
A. Risk assessment and mapping	0.8	1.4	2.2	2.2
B. Situational Awareness and Forecasting	1.4	1.6	2.6	2.6
C. Grid design and system hardening	1.4	2.4	3.0	3.2
D. Asset management and inspections	1.8	2.2	2.4	2.4
E. Vegetation management and inspection	2.0	2.8	2.2	2.2
F. Grid operations and protocols	1.8	1.8	2.0	2.0
G. Data governance	1.0	1.8	2.8	2.8
H. Resource allocation methodology	0.8	2.0	2.2	3.0
I. Emergency planning and preparedness	3.0	3.6	4.0	4.0
J. Stakeholder cooperation and community engagement	2.2	2.6	3.2	3.2

Below, Energy Safety evaluates SCE's wildfire mitigation initiatives across 10 categories in terms of the utility's Maturity Survey responses. Energy Safety discusses the utility's maturity progress for each category within the relevant wildfire mitigation initiative section.

4.6.1 Risk Assessment and Mapping

The risk assessment and mapping section of the Guidelines[37] requires the utility to discuss the risk assessment and mapping initiatives implemented to minimize the risk of utility-related ignitions. Utilities must describe initiatives related to equipment maps and modeling of overall wildfire risk, ignition probability, wildfire consequence, risk reduction impact, match-drop simulations,[38] and climate/weather-driven risks.

The parameters of risk assessment (discussed here) and resource allocation (discussed later in Section 4.6.8) to reduce wildfire risk derive from the CPUC's Risk-Based Decision-Making Framework (formerly S-MAP) and RAMP proceedings.[39]

The utility's risk modeling should ultimately inform the utility of the highest risk risk-spend efficiency (RSE) analyses discussed in Section 4.6.8.

4.6.1.1 Maturity Assessment

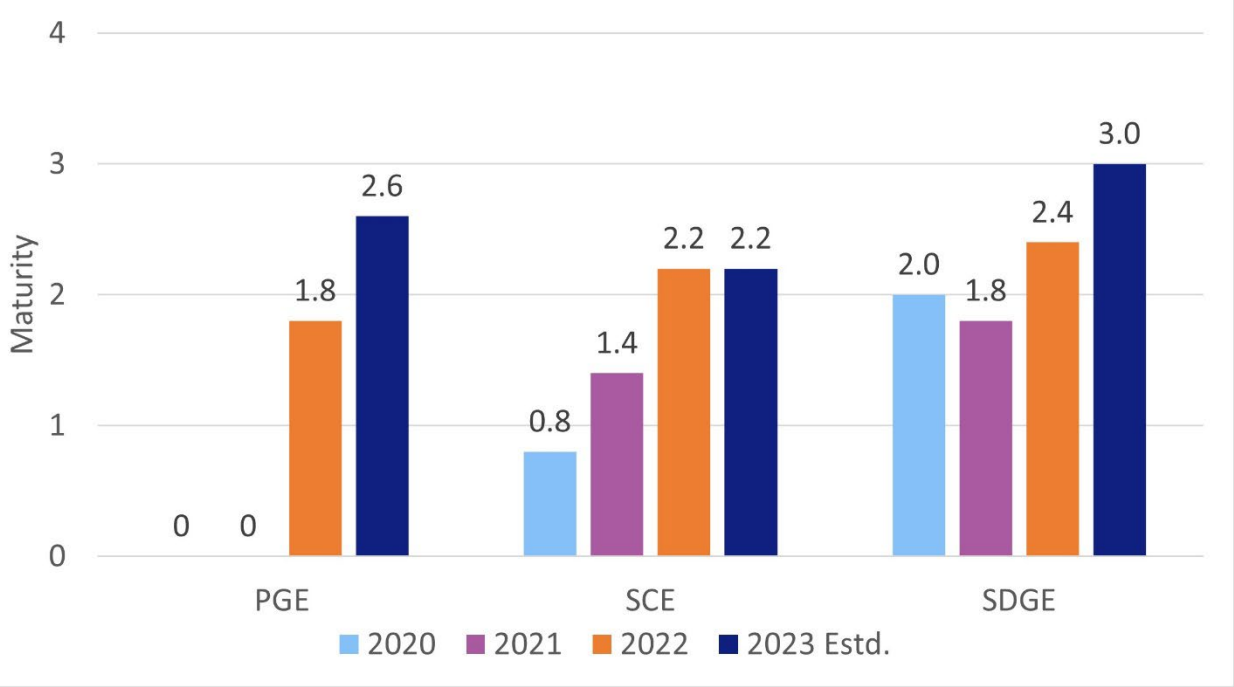
While SCE made progress in individual capabilities, discussed further below, SCE remains behind SDG&E in this category, and is projected to fall behind PG&E in maturity in 2023, as seen in in Figure 4.6.1-1 below.

[37] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.7.3, p. 74 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

[38] Simulations of the potential wildfire consequences of ignitions that occur along electric lines and equipment effectively showing the potential consequences if an ignition or "match was dropped" at a specific point in a utility's territory.

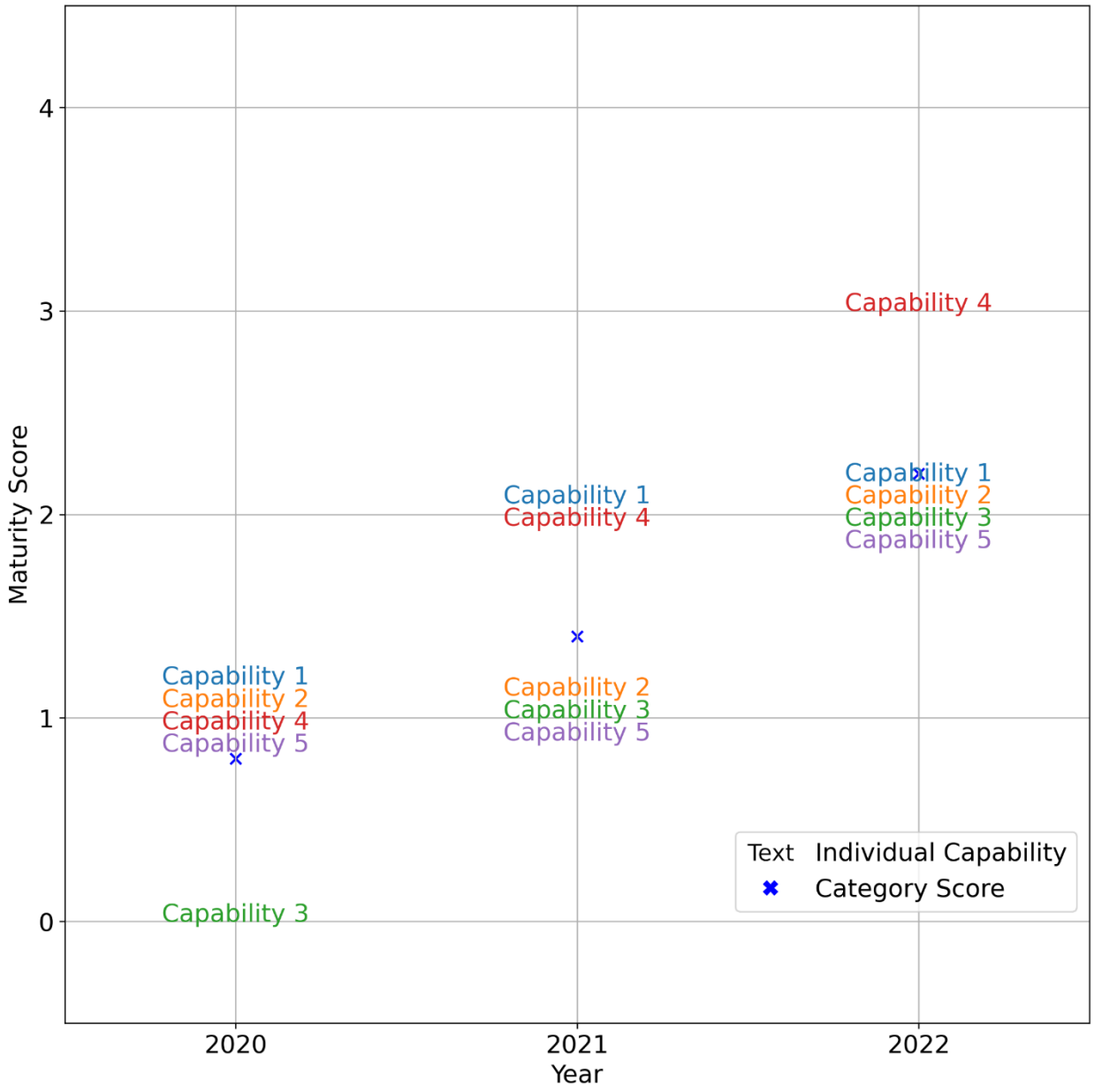
[39] The risk-based decision-making framework was adopted in the CPUC's D. 18-12-014 and refined in D. 21-11-009. An open CPUC proceeding R. 20-07-013 is addressing further developments to the risk-based decision-making framework. See the docket for this proceeding here: https://apps.cpuc.ca.gov/apex/f?p=401:56:0::NO:RP,57,RIR:P5_PROCEEDING_SELECT:R2007013 (accessed February 16, 2022).

Figure 4.6.1-1: Cross-Utility Maturity Levels for Risk Assessment and Modeling



SCE made continual progress from 2020 through 2022 in its maturity for risk assessment and mapping, with its average level increasing from 1.5 in 2021 to 2.2 in 2022, as seen in Figure 4.6.1-2 below.

Figure 4.6.1-2: SCE's Maturity by Capability in Risk Assessment and Mapping



A comparison of SCE's 2021 and 2022 Maturity Survey responses shows improved maturity in the following areas:

- SCE increased granularity from circuit-based to asset-based for weather scenarios.[40]
- SCE now includes modeling of how weather affects level of vegetation as part of its weather scenario risk assessments.[41]
- SCE increased its automation from <50 percent to >50 percent for its ignition risk calculation, estimation, and impact tools.[42]
- SCE now calculates ignition risk impact analysis for all seasons.[43]
- SCE includes level and condition of vegetation, weather, and combination of initiatives deployed in its estimates for risk reduction impacts.[44]
- SCE moved from a manual to a semi-automated process for detecting deviations between its risk model output and detected ignitions and propagations.[45]
- SCE now updates algorithms based on historical data, not just independent evaluations from experts.[46]

Areas limiting SCE's maturity include the following:

- From 2021 to 2022, SCE decreased from a higher maturity level of weather scenarios being "supported by historical data of incidents and near misses" to the lower maturity level of only undergoing "independent expert assessment."[47]
- SCE's weather scenario tool is only partially (<50 percent) automated.[48]

[40] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.I.c.

[41] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.I.e.

[42] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to A.II.b, A.III.d, and A.IV.b.

[43] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.III.c.

[44] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.IV.e.

[45] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.V.c.

[46] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.V.d.

[47] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.I.b.

[48] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.I.d.

- SCE's future weather and risk estimates will not account for climate change, which SCE had projected to do by January 1, 2023, according to its 2021 survey responses. This change in projection limited SCE's maturity.[49]
- SCE does not include real-time learning as part of its ignition risk assessment confirmation.[50]
- SCE does not include impacts on air quality and greenhouse gas reduction goals as part of its consequence risk metrics.[51]
- SCE does not verify ignition risk impact assessment outputs using real-time learning (such as machine learning).[52]

4.6.1.2 SCE's Progress

Throughout the current WMP cycle, SCE has continued to improve its risk assessment and mapping efforts through improvements to its Wildfire Risk Reduction Model (WRRM), as well as evaluation and identification of additional high-risk areas, included within HFTD. Specifically, since SCE submitted its 2021 Update, it has improved its risk assessment and mapping through the following:

- SCE states it has evaluated its system and organized it into three tranches based off the risks present: severe risk areas, high-consequence segments, and other areas within its HFRA. According to SCE:
    - Severe risk areas are areas SCE has identified as having elevated or extreme fire risk, including egress-constrained locations, areas of extreme high wind, and areas of high consequence in terms of acres burned.[53]
    - High-consequence segments are locations where "wildfire can propagate over large areas in a relatively short period of time and/or have the potential to be

[49] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.I.f.

[50] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.II.d.

[51] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.III.b.

[52] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.III.f.

[53] SCE's 2022 Update, p. 209.

frequently impacted by PSPS."[54] To determine consequence based on quick wildfire spread, SCE is now including additional consequence modeling to exceed prior spread models limited by an eight-hour timeframe. For this, SCE is using segments with a consequence risk of spreading 300 acres or more within the first eight hours using fire simulations, which SCE found to be a threshold for burning into larger fire sizes (greater than 10,000 acres) past eight hours for total burn area.[55]

- SCE states it is using machine learning for multiple facets of its risk assessment and modeling. It is using machine learning to improve wind forecasting accuracy, detect asset defects based on imagery, and estimate the probability of ignition driver based on assets.
- SCE states it has made further improvements in egress calculations, as discussed in Section 4.6.1.1 above. These include evaluating egress factors as part of determining areas of concern, consulting with local districts to identify known egress issues, and developing a framework outside of ignition simulations that evaluates egress. However, given that SCE must identify egress-constrained areas outside the current WRRM, that WRRM does not currently fully capture egress impacts.[56] SCE is working to evaluate how to include egress evaluations within the model moving forward.[57]
- Since its 2021 Update, SCE has participated in the Energy Safety-led Wildfire Risk Modeling Working Group established as required by the Final Action Statements on multiple utilities' 2021 Updates. The Wildfire Risk Modeling Working Group is ongoing, and guidance is still pending. At this time, SCE has not applied any changes to its risk modeling methodologies but plans to do so in future WMP submissions.

4.6.1.3 Areas for Continued Improvement

In addition to progress made, SCE must continue to improve in the following areas:

[54] SCE's 2022 Update, p. 214.

[55] SCE's 2022 Update, Figure SCE 7-19, p. 217.

[56] SCE's 2022 Update, Table SCE 4-1, p. 30.

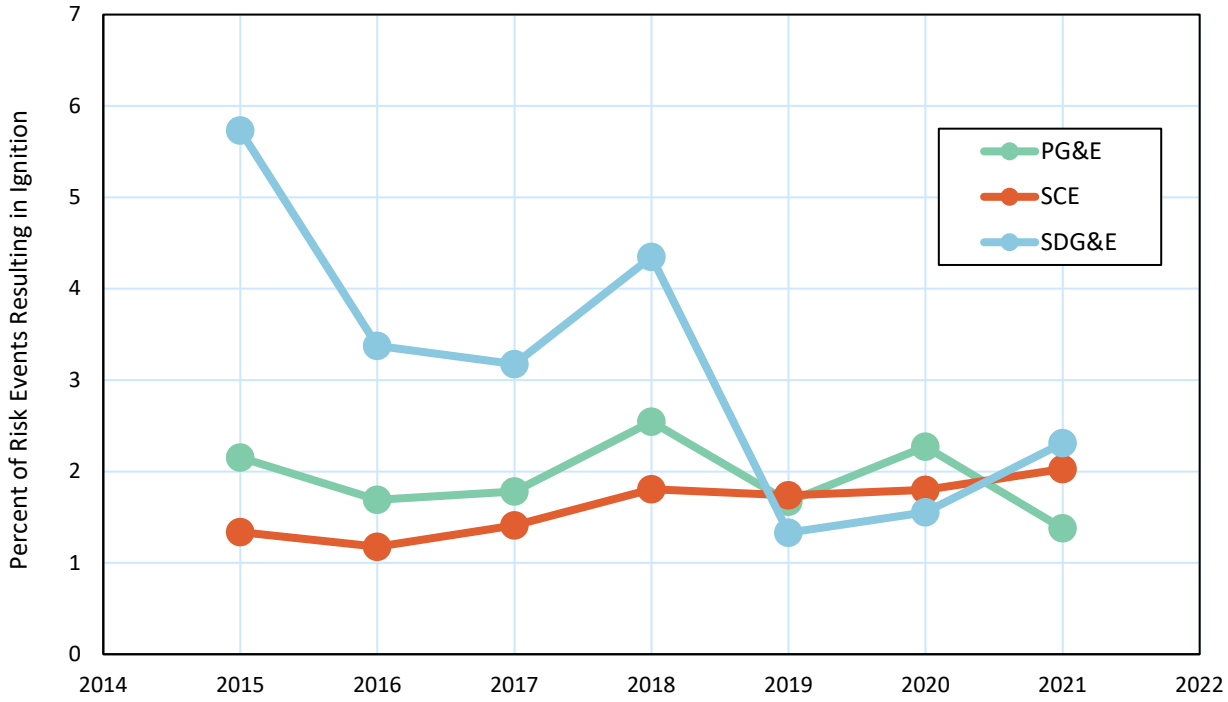
[57] SCE's 2022 Update, p. 288.

- As discussed in Section 4.6.1.2, SCE has made progress in evaluating wildfire spread beyond an eight-hour timeframe, which should provide a more accurate representation of consequence than evaluating wildfire spread with an eight-hour cap. SCE is providing for extended timeframes in segments with a consequence risk of spreading 300 acres or more within the first eight hours using fire simulations. However, SCE's current fire simulations do not account for the effects of suppression efforts within that timeframe. In some areas, that omission may result in overestimates of consequence. SCE's use of spread greater than 300 acres is likely based on incident status summary (ICS-209) reporting requirements, where incidents typically have initial attack suppression efforts.[58] The fires reported here are therefore not aligned with SCE's estimations for no suppression for eight hours. Without accounting for fire suppression, SCE's efforts may lose granularity in its highest-risk areas. 300-acre spread is a conservative measure that may over-account for risk given more fires would reach 300-acres within the model than would occur in real life where suppression efforts typically lessen the spread of the fire.
- SCE is not projecting to incorporate climate change into its risk modeling by January 1, 2023. As discussed in Section 4.6.1.1, SCE decreased in maturity for some climate change capabilities and no longer accounts for climate change when determining its weather scenarios. While SCE discusses improving its accounting for climate change in the future, SCE must provide updates on its integration of climate change into its risk modeling efforts moving forward.
- SCE does not currently account for vulnerable communities in its wildfire consequence risk assessments. Factors such as poverty, disability, and senior population ratios are vital in understanding the associated communal impacts of a wildfire, as socially vulnerable areas face more devastating impacts of wildfires due to less resource availability for recovery efforts. SCE must evaluate and implement these factors as part of wildfire consequence risk and must work with other utilities to determine best practices moving forward.
- SCE's ignition rate increased in 2021 across multiple drivers, including object contact, equipment failure, and wire-to-wire or contamination, as seen in Figures 4.6.1-3

[58] CAL FIRE 2020 Wildfire Activity Statistics, Table 6. Large Fires 300 Acres and Greater – Other Agencies Direct Protection Areas, 8-13.

through 4.6.1-6 below. SCE had a high likelihood of ignition from the wire-to-wire risk driver. The wire-to-wire risk driver had 6 ignitions out of 57 risk events and a relatively high average ignition rate of 23.68 percent from 2019 to 2021.[59] Energy Safety expects that, by implementing mitigation measures, SCE will decrease ignitions moving forward. SCE must analyze the cause(s) of its increased ignition events and implement corrective actions based on lessons learned.

Figure 4.6.1-3: Cross-Utility Ignitions per Risk Event – Object Contact



[59] SCE's 2022 Update, Tables 7.1 and 7.2, pp. 779-783.

Figure 4.6.1-4: Cross-Utility Ignitions per Risk Event – Equipment/Facility Failure

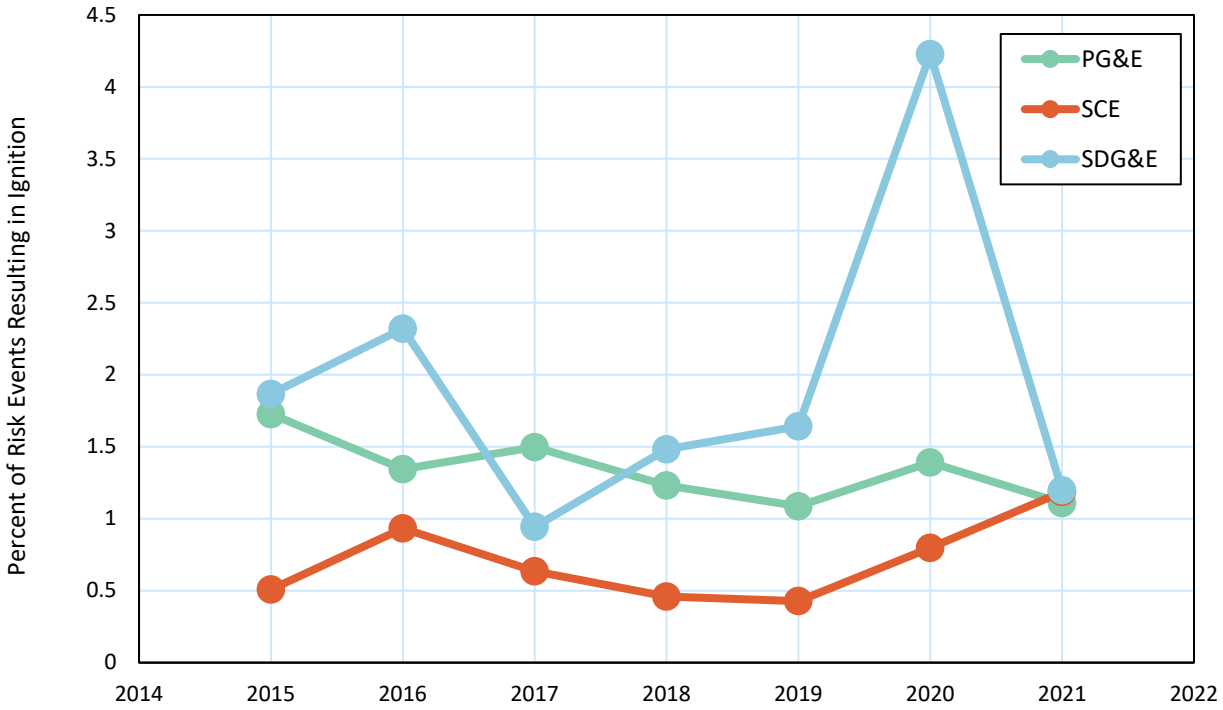


Figure 4.6.1-5: Cross-Utility Ignitions per Risk Event – Wire-to-Wire/Contamination

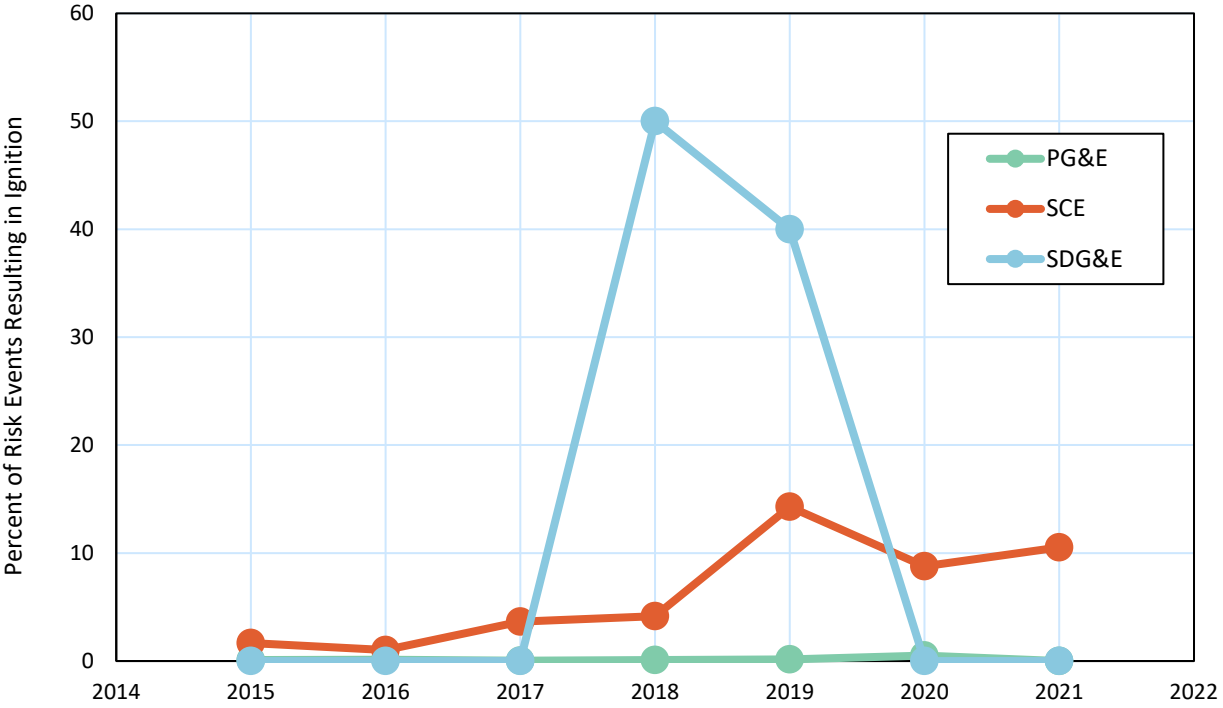
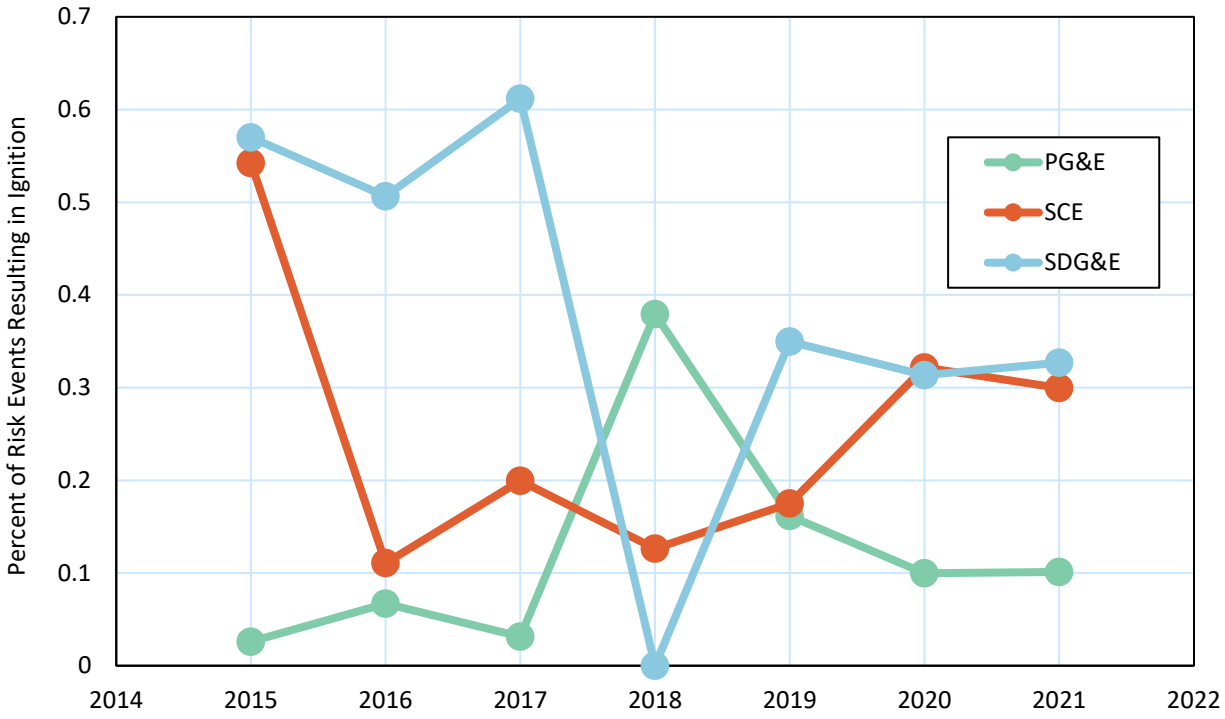


Figure 4.6.1-6: Cross-Utility Ignitions per Risk Event - Other



Energy Safety sets forth specific areas for improvement and associated required progress in Section 7.

4.6.2 Situational Awareness and Forecasting

A strong weather monitoring and situational awareness system is an essential ignition risk reduction strategy: it mobilizes a utility's response to potentially dangerous fire weather conditions and informs its decisions on PSPS implementation, grid design, and system hardening. It is also one of the least expensive risk reduction strategies.

The situational awareness and forecasting section of the Guidelines[60] requires the utility to discuss its use of cameras, weather stations, weather forecasting and modeling tools, grid monitoring sensors, fault indicators, and equipment monitoring. Situational awareness requires the utility to be aware of actual ignitions in real time and to understand the

[60] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.7.3 p. 74 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

likelihood of utility ignitions based on grid and asset conditions, wind, fuel conditions, temperature, and other factors.

The Guidelines refer to key situational awareness measures, including:

- Installation of advanced weather monitoring and weather stations that collect data on weather conditions to develop weather forecasts and predict where ignition and wildfire spread are likely
- Installation of high-definition cameras throughout a utility's service territory, with the ability to control the camera's direction and magnification remotely
- Use of continuous-monitoring sensors that can provide near-real-time information on grid conditions
- Use of a fire risk or fire potential index that takes numerous data points in given weather conditions and predicts the likelihood of wildfire
- Use of personnel to physically monitor areas of electric lines and equipment in elevated fire risk conditions

4.6.2.1 Maturity Assessment

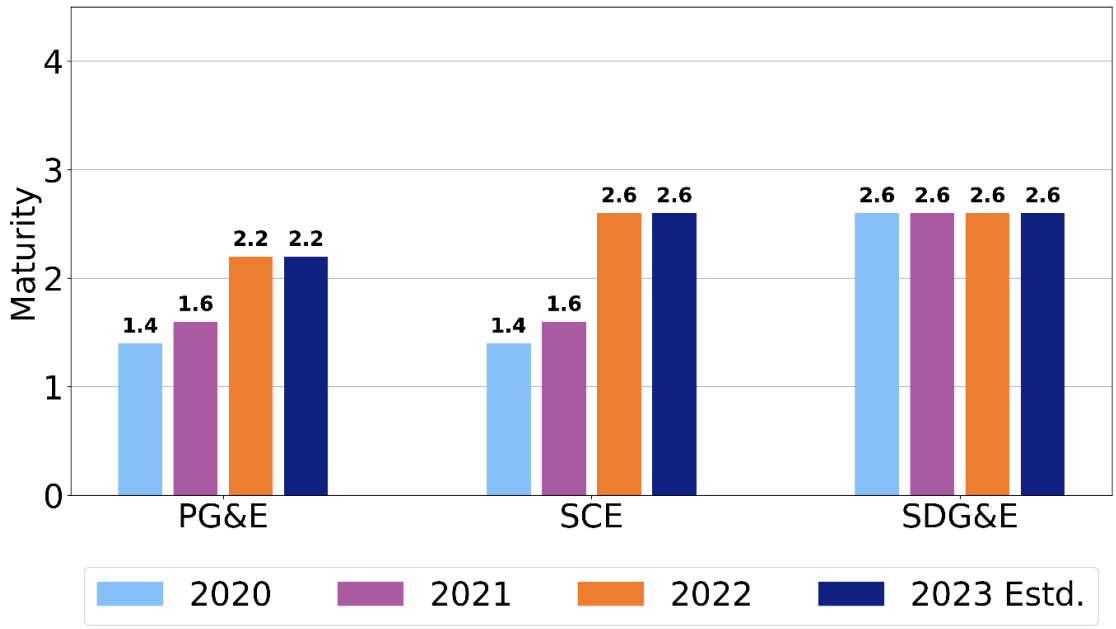
SCE's maturity level for the situational awareness and forecasting category has risen across the current WMP cycle. According to its responses on the 2022 Maturity Survey, SCE's maturity level is the same level as SDG&E's and higher than PG&E's in this category; see Figure 4.6.2-1 below. SCE has increased its maturity in situational awareness and forecasting from 2020 to 2022 in the following areas:

- It has improved its ability to detect ignitions on its grid and track fire spread locations with the addition of satellite monitoring fire detection capabilities.[61]
- It has progressed from circuit-based to span-level granularity of weather resolution and forecasting by increasing the number of weather stations across its distribution and sub-transmission circuits in its HFRA.[62]

[61] SCE's 2022 Update, pages 245-246: SCE's 2022 utility Wildfire Mitigation Maturity Survey, response to capability 10.

[62] SCE's 2022 Update, pages 265-269; SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to B.III.c.

Figure 4.6.2-1: Situational Awareness Maturity Level Progress



4.6.2.2 SCE's Progress

SCE has made the following progress throughout the current WMP cycle:

- SCE has over 1,463 weather stations deployed, 406 of which were completed in 2021. In 2022, SCE plans to install an additional 150-175 weather stations along its distribution, sub-transmission, and transmission circuits. SCE's goal, based on its analysis of HFTD weather stations to circuit mapping, is to have over 1,950 total weather stations by 2025. SCE's expanded weather station network coupled with addition of machine learning capabilities to 400-500 weather stations in 2022 may enhance its forecasting and decision-making for future PSPS events.
- SCE piloted the use of distribution fault anticipation (DFA) technology on 60 circuits in 2019 and 2020 for detecting incipient faults. In 2021, DFA collected data from the pilot program and found alerts for faults from arcing, induced conductor motion, and capacitor banks. SCE applied DFA to 130 additional circuits in 2021 and will apply it to 25 more in 2022, covering approximately 20 percent of the circuits in the HFTD. This technology, combined with its piloted early fault detection (EFD), may improve its ability to detect incipient failures.
- SCE installed two additional high-performance computing clusters and included the European Centre for Medium-Range Weather Forecasts model in its Next Generation

Weather modeling system. This enabled SCE to extend its PSPS weather forecasting to anticipate a PSPS event in the seven-day range, instead of the previous five-day range and may improve its accuracy.

- SCE piloted and continues to evaluate a wind profiler project in coordination with San Jose State University using light detection and radar technology to collect wind observations and measure wind speeds above ground more frequently at specific locations. The project may lead to improved PSPS decision-making and improved accuracy in terrain-influenced areas.
- SCE plans to work with the University of San Diego in 2022 to pilot satellite and artificial intelligence-based fire detection using its high-definition camera network for detection and notifications. This initiative is in alignment with those of peer utilities and with SCE's Maturity Survey results.

4.6.2.3 Areas for Continued Improvement

In addition to progress made, SCE must continue to improve in the following areas:

- SCE must explore the use of its wildfire consequence modeling software in near real time on any faults/outages in its HFTD. This will increase SCE's situational awareness and detection of possible utility-related ignitions from known fault locations and its awareness of the potential consequences. In its 2023 WMP, SCE must discuss how it explored using its wildfire consequence modeling on the locations of faults/outages in the HFTD as they happen.
- SCE must increase the frequency of the weather observation intervals on its weather station network. Peer utilities are able to collect weather data at intervals of 10-30 seconds, while SCE collects weather data every 10 minutes. This capability could improve situational awareness and aid in PSPS decision-making for near-real-time wind conditions. In its 2023 WMP, SCE must discuss how it plans to improve the frequency of data collection from its weather station network to 30 second weather data intervals.

Energy Safety sets forth specific areas for improvement and associated required progress in Section 7.

4.6.3 Grid Design and System Hardening

The grid design and system hardening section of the Guidelines[63] examines how the utility is designing its system to reduce ignition risk and what it is doing to strengthen its distribution, transmission, and substation infrastructure to prevent utility-related ignitions resulting in catastrophic wildfires. This section also requires discussion of routine and non-routine maintenance programs, including whether the utility replaces or upgrades infrastructure proactively rather than running facilities to failure. Programs in this category, which are often the most expensive aspects of a WMP, include initiatives such as the installation of covered conductors to replace bare overhead wires, undergrounding of distribution or transmission lines, and pole replacement programs. The utility is required, at a minimum, to discuss grid design and system hardening in each of the following areas:

- Capacitor maintenance and replacement
- Circuit breaker maintenance and installation to de-energize lines upon detecting a fault
- Covered conductor installation
- Covered conductor maintenance
- Crossarm maintenance, repair, and replacement
- Distribution pole replacement and reinforcement, including with composite poles
- Expulsion fuse replacement
- Grid topology improvements to mitigate or reduce PSPS events
- Installation of system automation equipment
- Maintenance, repair, and replacement of connectors, including hotline clamps
- Mitigation of impact on customers and other residents affected during PSPS events
- Other corrective action
- Pole loading infrastructure hardening and replacement program based on pole loading assessment program

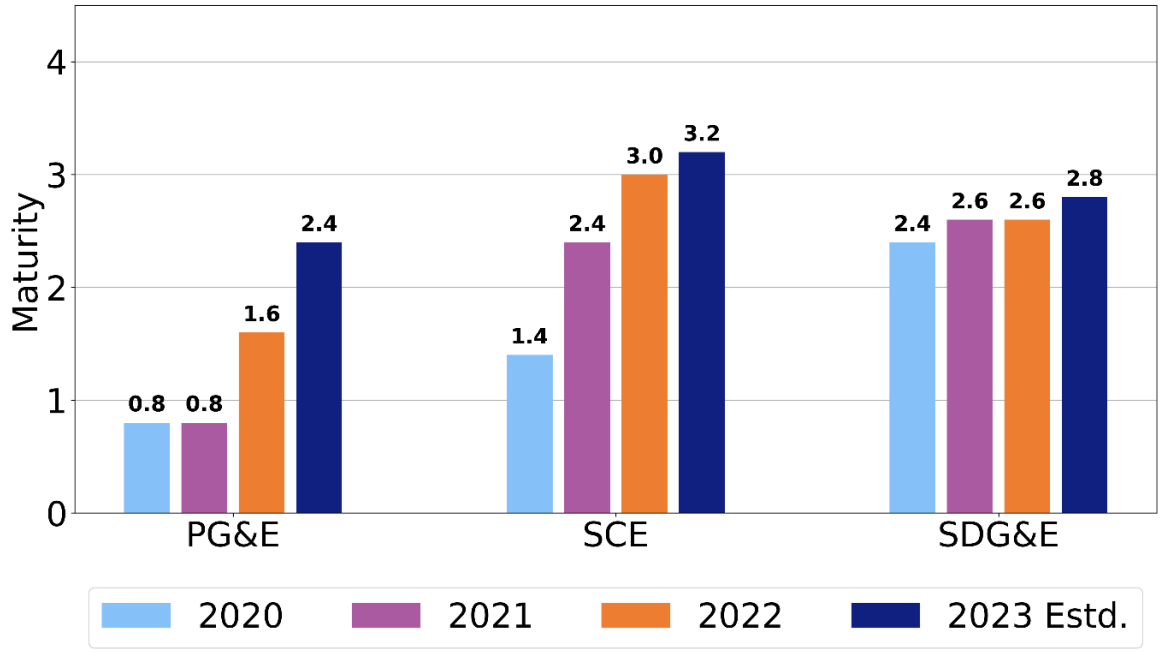
[63] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.7.3, pp. 74-75 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

- Transformer maintenance and replacement
- Transmission tower maintenance and replacement
- Undergrounding of electric lines and equipment
- Updates to grid topology to minimize risk of ignition in the HFTD
- Other areas if an initiative cannot feasibly be classified within those listed above

4.6.3.1 Maturity Assessment

As seen in Figures 4.6.3-1 and 4.6.3-2 below, SCE improved its maturity level for grid design and system hardening from 2021 to 2022. SCE has greater reliability based on distribution architecture than PG&E or SDG&E,[64] and SCE plans to calculate egress points based on traffic simulations by January 1, 2023.[65] Based on its survey responses, SCE is more mature in this area than PG&E and SDG&E, as seen in Figure 4.6.3-2 below.

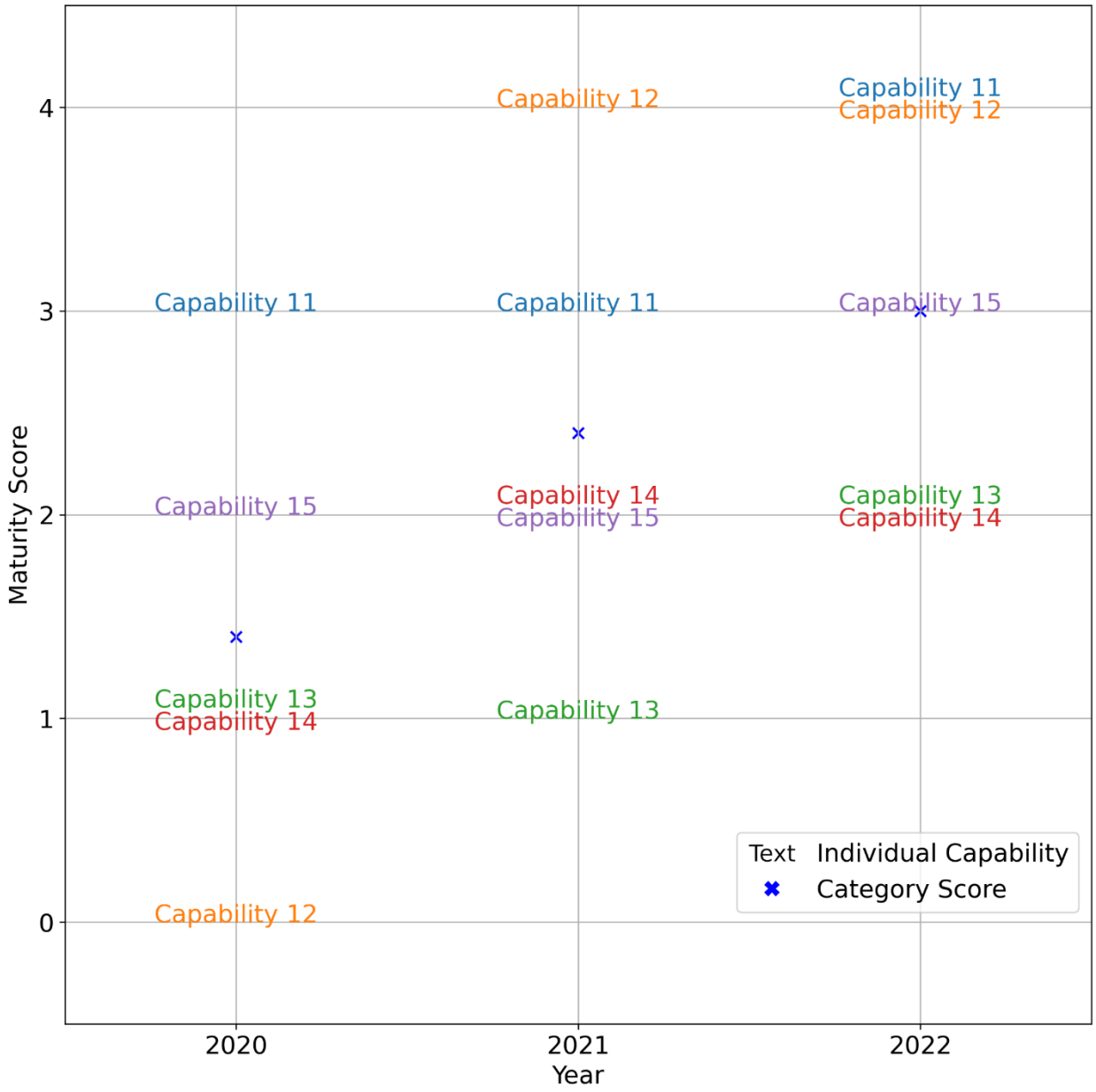
Figure 4.6.3-1: Cross-Utility Maturity for Grid Design and System Hardening



[64] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to C.III.a, C.III.b, and C.III.c.

[65] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to C.III.d.

Figure 4.6.3-2: SCE's Maturity Capabilities for Grid Design and System Hardening



As shown in Figure 4.6.3-2 above, SCE reports increased maturity in the following areas:

- SCE now uses risk estimates at the asset level rather than the span level and takes power delivery uptime into account (including PSPS and reliability impacts) when determining how to prioritize wildfire risk reduction initiatives.[66]
- SCE now uses egress as an input for grid topology design and plans to map egress based on traffic simulations by January 1, 2023.[67]
- SCE moved from estimating RSE at a circuit-based level to an asset-based level.[68]
- SCE uses independent evaluations and field testing to evaluate new hardening solution initiatives.[69]

SCE's maturity for grid design and system hardening is limited in the following areas:

- SCE has an n-1 redundancy level of grid reliability[70] for only 70 percent of customers in the HFTD and is not yet at the next maturity level of an n-1 redundancy level of grid reliability for at least 85 percent of customers in the HFTD.[71]
- SCE only includes "most" grid hardening initiatives within its evaluation, as opposed to all initiatives supported by independent testing.[72]
- SCE does not independently audit the performance of new initiatives.[73]

4.6.3.2 SCE's Progress

Throughout the current WMP cycle, SCE has continued to improve its grid design and system hardening by installing covered conductor, removing tree attachments, and piloting new

[66] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to C.I.a.

[67] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to C.III.d.

[68] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to C.IV.b.

[69] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to C.V.a.

[70] n-1 redundancy meaning the failure of a single component will result only in a short-term outage.

[71] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to C.III.b.

[72] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to C.IV.d.

[73] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to C.V.b.

technologies such as rapid earth fault current limiters (REFCL), DFA, and EFD. Since its 2021 Update, SCE has improved its grid design and system hardening by doing the following:

- SCE provided a flowchart that increases the transparency of its decision-making process for selecting its grid hardening mitigations. The flowchart shows that SCE focuses on the highest-risk miles identified through its risk modeling efforts.[74] The flowchart also includes a suite of mitigations SCE is calling "CC++" in areas where covered conductor has already been installed or where undergrounding is infeasible. CC++ includes covered conductor plus fire-resistant pole installation, asset inspections, sensitive protective device settings (which SCE calls fast curve settings or FCS)[75] for circuit breaker (CB) relays, and vegetation management activities (such as pole brushing, line clearing, and hazard tree management program) as necessary.[76] By using CC++, SCE may increase the effectiveness of its previously completed hardening efforts.[77] SCE states that including the CC++ suite increases the efficacy of covered conductor from medium to high for wire-down ignition mitigation, and from low to medium for equipment failure mitigation.[78]
- SCE states that it exceeded its goal of installing 1,000 to 1,400 miles of covered conductor in 2021 and has set a target of installing 1,100 to 1,250 miles of covered conductor in 2022, as seen in Table 4.6.3-1 below. SCE has also increased its targets for undergrounding from 11 to 13 miles in 2022, although SCE is still focusing mostly on covered conductor, as seen in Table 4.6.3-1 below.

[74] SCE's 2022 Update, Figure SCE 7-20: Grid Hardening Framework, p. 221.

[75] SCE's terminology for sensitive protective device settings.

[76] SCE's 2022 Update, Table SCE 9-5: List of Acronyms in 2022 WMP Update, p. 627.

[77] SCE estimates that CC++ increases effectiveness from 65% to 77%, Data Request OEIS-SCE-22-007, Question 5.

[78] SCE's 2022 Update, Table SCE 7-2: Efficacy of Mitigation Suites, p. 218. The "high", "medium", and "low" designations do not have a precise quantitative threshold, according to Data Request OEIS-SCE-22-008, Question 6.

Table 4.6.3-1: Grid Hardening Completion and Targets[79]

Program	2021 Target	2021 Performance	2022 Target	Target %/Top-Risk %
Covered Conductor	1,000-1,400 mi	1,503 mi	1,100-1,250 mi	50%/25%
Undergrounding	4-6 mi	6 mi	11-13 mi	100%/25%
CB Fast Curve	60-86	95	104-125	33%/25%
Vibration Damper Retrofit	N/A	N/A	100-115	98%/25%
Long Span Initiative (LSI)	300-600	361	1,400-1,800	22%/25%

- In 2021, SCE completed a wildfire and PSPS risk evaluation of 140 circuits within the HFTD. This included 62 circuits impacted by PSPS in 2019 and 2020, as well as six circuits that had no historical PSPS events but that SCE predicted would each have one qualifying event in the next two years.[80] SCE plans to complete system hardening (covered conductor, CC++, and undergrounding) at these PSPS-prioritized locations by September 1, 2022.[81] SCE currently considers increasing its wind thresholds for PSPS from 46 mph gusts to 58 mph gusts where covered conductor has been installed reducing the likelihood of a PSPS event occurring.[82] PSPS-prioritized locations include either circuits frequently impacted by PSPS events in the past, or expected to be affected based on historical data, quantified using the WRRM.

[79] SCE's 2022 Update, Table 5.3-1: List and Description of Program Targets, Last Five Years, pp. 129-135.

[80] SCE's 2022 Update, Table 5.3-1: List and Description of Program Targets, Last Five Years, p. 132.

[81] SCE's 2022 Update, Table SCE 7-4: Near-Term Strategy by WMP Category, p.225.

[82] SCE's 2022 Update, p. 682.

- SCE states that through its pilots and lab research, it found REFCL provides protection against phase-to-ground faults and has high mitigation effectiveness when used in conjuncture with covered conductor.[83] SCE states that, compared to undergrounding, covered conductor with REFCL also shows high efficacy for all ignition types, including phase-to-phase, phase-to-ground, wires-down, and equipment failure, with a potentially lower price point ($1.6-$5.6 million for undergrounding, compared to $1.3-$2.4 million for covered conductor/REFCL).[84] SCE plans to continue to run pilots in 2022, using a resonant grounded substation, ground fault neutralizer, and isolation transformer scheme. SCE states that the results of the pilots will inform SCE's REFCL scope in 2023 and moving forward.

SCE is now evaluating grid hardening initiatives to include mitigations for secondary conductor. This is discussed further in Section 4.6.4.

4.6.3.3 Areas for Continued Improvement

In addition to progress made, SCE must continue to improve in the following areas:

- While SCE made improvements from 2021 to its inspection checklist to identify covered conductor hardware and tracking,[85] SCE must continue to evaluate changes needed in its existing maintenance and inspection programs. The joint covered conductor study described in SCE's 2022 Update found the following:

  > *Several covered-conductor-specific failure modes exist that require operators to consider additional personnel training, augmented installation practices, and adoption of new mitigation strategies (e.g., additional lightning arrestors, conductor washing programs, etc.).*[86]

  SCE must evaluate its existing covered conductor maintenance program to ensure that failure modes and new equipment specifically required for covered conductor are

[83] SCE's 2022 Update, p. 324.

[84] SCE's 2022 Update, Table SCE 7-2: Efficacy of Mitigation Suites, p. 218.

[85] Data Request OEIS-SCE-22-002, Question 7.

[86] SCE's 2022 Update, Attachment H: Joint IOU Response to Action Statement-Covered Conductor, p. 646.

being properly evaluated and maintained to support the equipment' s expected lifetime.

- The joint covered conductor effectiveness study clarified the existing differences in approach toward and execution of covered conductor installation across utilities. However, SCE did not commit to applying any lessons learned. Many sections of the joint study state that the utilities will continue to do studies, collect documentation, or conduct discussions, rather than committing them to make changes. Many of the "next steps" described in the study also do not include concrete commitments (e.g., utilities are "continuing these efforts in 2022 and providing an update in their 2023-2025 WMPs"[87]). SCE must apply lessons learned from the joint covered conductor effectiveness study to its assessments of covered conductor and show that it is progressing as a result of its joint efforts with other utilities.[88]
- Energy Safety recognizes that CC++ may increase effectiveness against ignitions when compared to covered conductor on its own. However, most additional mitigation measures included in CC++ either are already used by SCE (e.g., asset inspections); are more temporary in nature, given the frequency at which they will be needed (e.g., vegetation management); or have potential negative impacts on reliability (e.g., FCS). Additionally, moving from covered conductor to CC++ increases the cost per mile by about $800,000,[89] which is an over 100% increase, with risk effectiveness increasing from 64 percent to 77 percent.[90] While SCE is already evaluating using REFCL in combination with and where covered conductor is installed, SCE must continue to evaluate additional permanent solutions (such as, but not limited to, EFD and DFA) to include within the covered conductor package to mitigate remaining ignition risk.
- Although SCE focuses primarily on its highest risk segments and severe risk areas, with 72 percent of SCE's grid hardening work planned within the two categories, as shown in Table 4.6.3-1 above, SCE has yet to address all of its severe risk areas, as seen in

[87] SCE's 2022 Update, p. 696.

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

[89] From $0.5-0.6 million for covered conductor to $1.3-1.4 million for CC++, 2022 Update, Table SCE 7-2: Efficacy of Mitigation Suites, p. 218.

[90] Data Request OEIS-SCE-22-007, Question 5.

Table 4.6.3-2 below. It is not clear why SCE does not currently have efforts scoped for the remaining severe risk areas, nor what SCE is doing in the interim to address and lower wildfire risk. While severe risks are newly identified by SCE as part of its 2022 WMP, SCE must provide a plan addressing the remaining severe risk areas, as well as further provide its interim solutions until system hardening or other more permanent solutions are in place to reduce ignition risk.

Table 4.6.3-2: SCE's Risk Area Project Status[91]

Category	Miles	Currently Hardened[92]	In-Flight Scope[93]	Not Scoped[94]
Severe Risk Areas[95]	1,925	37.66%	25.97%	36.36%
High-Consequence Segments	5,075	33.50%	26.60%	39.90%
Other HFTD Areas	2,700	17.59%	20.37%	62.04%
Total	9,700	29.90%	24.74%	45.36%

- SCE is reducing its scope for the vibration damper retrofit. Instead of retrofitting all previously installed covered conductor under 3,000 feet in elevation, SCE has analyzed what areas are most susceptible to Aeolian vibrations and plans to target those areas.

[91] SCE's Table SCE 7-3: Distribution Grid Hardening Analysis Results, p. 222. Section 4.6.1 discusses tranche definitions.

[92] This includes areas where covered conductor or undergrounding has already been energized.

[93] This includes projects that are in the process of installation, including design.

[94] This means projects that are not yet being pursued or scoped.

[95] See Section 4.6.1.2 for the definition of "severe-risk area."

While SCE explained the steps taken to evaluate where to retrofit covered conductor with vibration dampers, SCE must provide further analysis to support this reduced scope of vibration dampers on previously installed covered conductor.

Energy Safety sets forth specific areas for improvement and associated required progress in Section 7.

4.6.4 Asset Management and Inspections

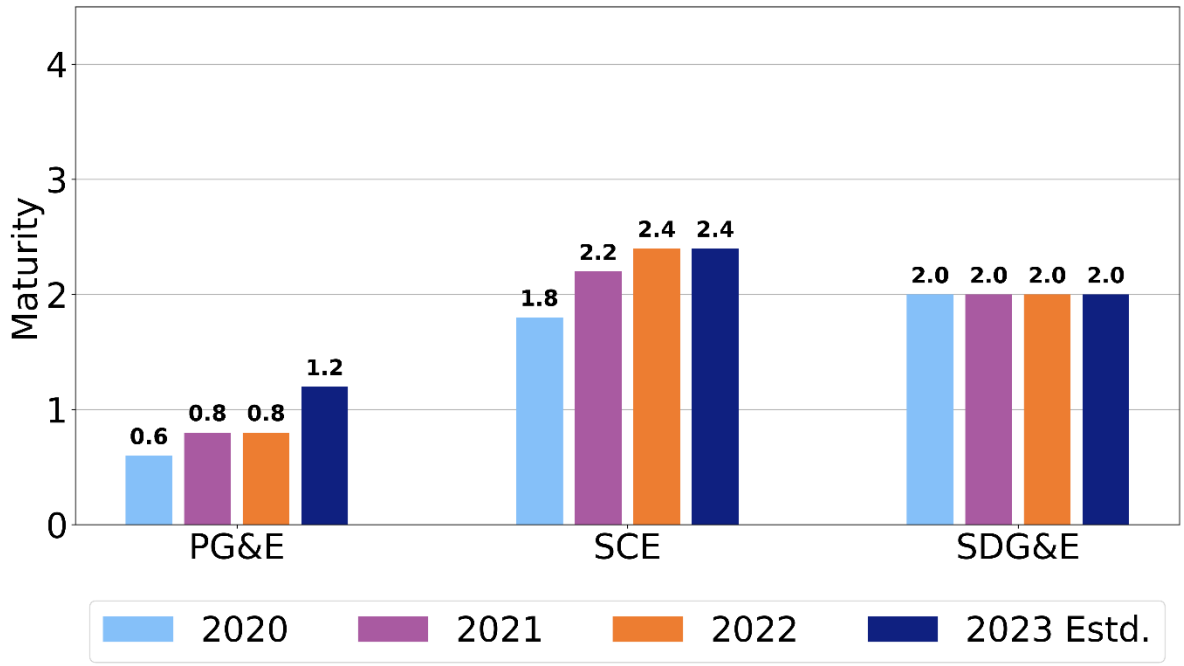
The asset management and inspections section of the Guidelines[96] requires the utility to discuss power line and infrastructure inspections for distribution and transmission assets within the HFTD. These include infrared, light detection and ranging (LiDAR), substation, patrol, and detailed inspections designed to minimize the risk of its facilities or equipment causing wildfires. The utility must describe its protocols relating to maintenance of any electric lines or equipment that could, directly or indirectly, relate to wildfire ignition. The utility must also describe how it ensures inspections are done properly through a program of quality control.

4.6.4.1 Maturity Assessment

SCE increased in maturity from 2020 to 2022. As of 2022, SCE has the highest asset management and inspections maturity level across the three large utilities, as seen in Figure 4.6.4-1 below.

[96] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.7.3, p. 75 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

Figure 4.6.4-1: Cross-Utility Maturity Levels for Asset Management and Inspections



SCE shows higher levels of maturity with the following:

- SCE's plans to implement continuous monitoring equipment for malfunction detection by January 1, 2023.[97]
    - SCE states it is using meter alarming for downed energy conductor detection systems and transformer monitoring logic as part of its continuous monitoring.
    - Currently, SCE states approximately 20 percent of its HFTD circuits have DFA units installed and 5-8 percent of its HFTD circuits will have EFD units installed by 2022.[98]
- SCE uses risk determined by predictive modeling for inspection scheduling.[99]

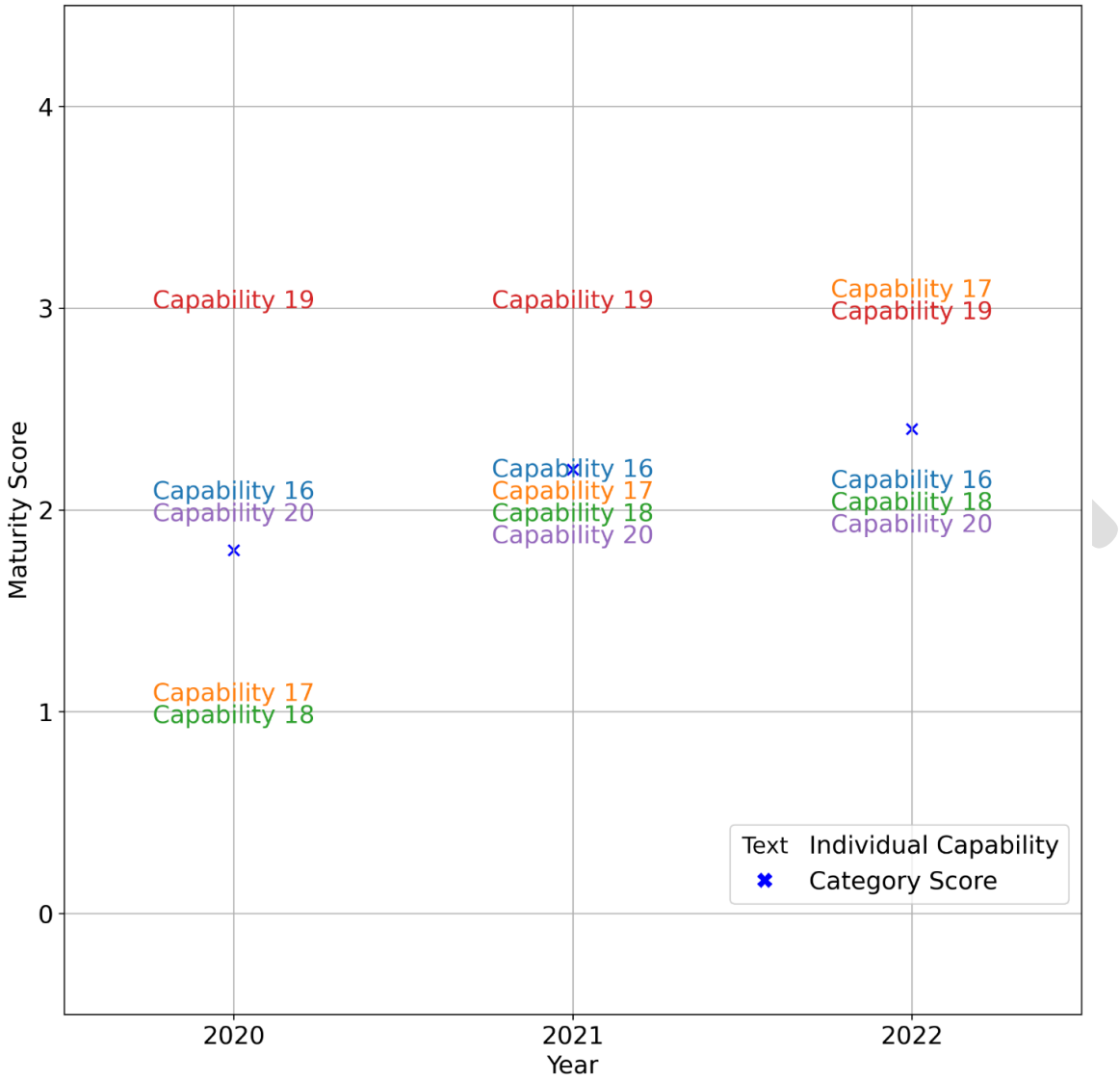
[97] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to D.I.c.

[98] Data Request OEIS-SCE-22-003, Question 14.

[99] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to D.II.b, D.II.c, D.II.e, D.II.f, D.II.h, D.II.i, and D.III.b.

From 2021 to 2022, SCE had a slight rise in capability maturity for asset management and inspections, as seen in Figure 4.6.4-2 below.

Figure 4.6.4-2: Capability Maturity Levels for Asset Management and Inspections



This is due to the increase in maturity for capability 17, relating to asset inspection cycles. From 2021 to 2022, SCE moved from using static maps to predictive modeling for scheduling its patrol inspections.[100]

The following factors limit SCE's maturity level for asset management and inspections:

- SCE's repairs and sensor outputs are not independently audited.[101]
- SCE's inspection procedures and checklists are not validated by independent experts nor dynamically updated in real time.[102]
- SCE has not yet integrated real-time sensor data for maintenance service intervals of equipment.[103]
- SCE's QA/QC is not automated for contractor activity and is not completed in real time.[104]

4.6.4.2 SCE's Progress

Throughout the current WMP cycle, SCE has continued to improve its asset management and inspection efforts by using infrared (IR) and corona scanning to augment existing inspections and by upgrading its inspection and maintenance tools. Since SCE submitted its 2021 Update, it has improved its asset management and inspections through the following:

- SCE states it is using risk model output to inform and prioritize locations of some of its inspections based on inspection type. SCE's goal is to further expand its use of modeling to inform scoping and planning of inspections within the next three years.[105] Inspections currently informed by risk modeling include the following:
    - Transmission High Fire Risk-Informed (HFRI) inspections
    - Distribution HFRI Inspections

[100] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to D.II.b, and D.II.c.

[101] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to D.I.a.

[102] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to D.III.b.

[103] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to D.II.c, D.II.f, D.II.i, and D.IV.b.

[104] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to D.V.a and D.V.c.

[105] SCE's 2022 Update, Table SCE 7-7, p. 230.

  - Distribution IR inspections
  - Transmission IR inspections and corona scanning
  - QA/QC Inspections

- Because SCE had 57 transmission wire-down events from conductor or splice failures in the past five years,[106] as additional inspections, SCE is performing LineVue, X-ray, and conductor core sampling to improve conductor and splice assessments. These initiatives should help identify issues of conductor internal degradation that are not otherwise visible. SCE must report on findings and benchmark with other utilities if the pilots prove successful.
- As of the end of 2021, SCE believes it has identified all C-hooks within the HFTD. SCE states that any additional C-hooks located through on-going inspections will be prioritized for replacement. SCE plans to complete all known C-hook replacements in 2022. For 2021 and 2022, SCE has scoped for replacement 53 C-hooks that are not bundled within planned existing projects.[107]
- In 2021, SCE had a high QA/QC pass rate of 98 percent for transmission inspections,[108] with no Level 1 (or Priority 1) findings and 23 Level 2 (or Priority 2) findings.[109] The top two categories within Priority 2 were conductor damage and insulator damage, with five findings in each of these categories.[110]
- In 2021, SCE had an increase in the number of distribution inspection findings per circuit mile, as seen in Figure 4.6.4-3 below. Level 2 (or Priority 2) and Level 3 (or Priority 3) findings rose the most. Findings increased because, in March 2021, SCE made inspection improvements resulting in a greater focus on identifying 3rd party

[106] SCE's 2022 Update, p. 357.

[107] SCE's 2022 Update, pp. 333-334.

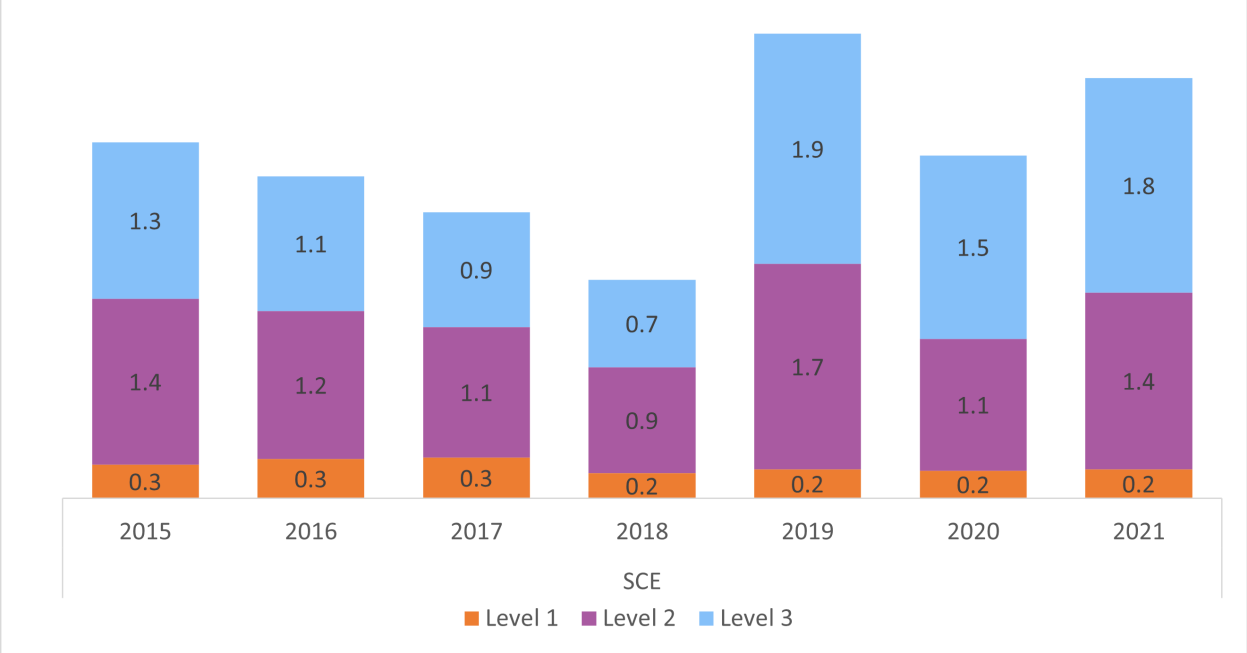
[108] SCE's 2022 Update, Table SCE 7-30, p. 389.

[109] Priority levels aligning with General Order (GO) 95 Rule 18, where Level 1 is for highest priority. Information from Data Request CalAdvocates-SCE-2022WMP-02-01.

[110] Data Request CalAdvocates-SCE-2022WMP-02-01.

issues.[111] Improvements included changes to the field survey and field employee training to better identify 3rd party issues.[112]

Figure 4.6.4-3: SCE Asset Inspection Findings per Circuit Mile Inspected



- SCE addressed the issue of maintaining hotline clamps identified in Energy Safety's 2021 Final Action Statement. While SCE still does not have a separate program to address hotline clamp replacements, SCE states that IR scanning enhances current inspections to identify issues relating to connectors, including hotline clamps. Additionally, SCE provided data showing that only three CPUC-reportable ignitions in 2020 and 2021 were caused specifically by hotline clamps. All three were less than 0.25 acres and not within the HFTD.[113]SCE's spend on asset management and inspections has decreased steadily, as seen in Figure 4.6.4-4 below. The spend decrease is due to cost decreases, including changes in the number of remediations, decreased unit costs for remediations, increased work bundling efficiencies, and deployment of new

[111] 3rd party issues meaning findings relating to facilities that are not owned by SCE, such as telecommunication equipment that shares pole space.

[112] Data Request OEIS-SCE-22-008 Question 5.a.i.

[113] SCE's 2022 Update, pp. 317-320.

technologies to decrease costs. Importantly, the decrease in spend is not due to changes in the amount of available human resources.[114]

Figure 4.6.4-4: Cross-Utility Year-to-Year Asset Management and Inspections Spending ($ thousands per circuit mile, 2020-2022)[115]

	PGE	SCE	SDGE
2020 Actual total	$9.89	$29.65	$18.47
2021 Actual total	$8.92	$22.82	$14.79
2022 Planned total	$9.19	$15.43	$21.54
Total	$27.99	$67.91	$54.79

4.6.4.3 Areas for Continued Improvement

In addition to progress made, SCE must continue to improve in the following areas:

- SCE states that it prioritizes any corrective actions on past-due work orders identified during asset inspections.[116] However, SCE does not provide quantitative targets for repairs and backlogged work orders. As of March 15, 2022, SCE had six Priority 1 work orders created in 2020 and 13 created in 2021 that were still open.[117] In total, as of February 1, 2022, SCE had 8,460 overdue work orders, as seen in Table 4.6.4-1 below. In its 2023 WMP, SCE must identify overdue repairs that present a potential ignition risk, and provide a plan to address the overdue repairs, including prioritization and quantitative targets for overdue repairs relating to wildfire risk, so that Energy Safety can track the completion and timing.

[114] Data Request OEIS-SCE-22-008 Question 5.

[115] Actual and projected spend ($K) per HFTD overhead circuit mile.

[116] Data Request CalAdvocates-SCE-2022WMP-07-11.

[117] Data Request CalAdvocates-SCE-2022WMP-07-12.

Table 4.6.4-1: SCE Backlogged Work Orders[118]

Voltage	Tier 2	Tier 3	Total
Distribution	1,623	3,550	5,173
Transmission	1,406	1,881	3,287

- In 2021, SCE reported an increase in distribution-level ignitions from damage or failure of conductors, fuses, lightning arrestors, connection devices, transformers, and other equipment (Figure 4.6.4-5). From 2020 to 2021, SCE remained steady in ignitions due to equipment damage or failures and projects a decrease in 2022 and 2023 (Figure 4.6.4-6). Even when normalized for Red Flag Warnings, SCE has observed increasing ignition trends over time for many equipment-type failures, particularly of conductors (Figure 4.6.4-7). SCE must provide more insight into how it analyzes and addresses these failures. SCE must also demonstrate that it is completing targeted mitigations specific to equipment types based on risk analysis performed in order to decrease ignitions in high-risk areas in the future. This may include implementing programs or augmenting inspections to address particular failure types.

[118] Data from "01 Supplemental_CalAdvocates-SCE-2022WMP-05-01A-DISTRIBUTION.xslx" and "02 Supplemental_CalAdvocates-SCE-2022WMP-05-02A-TRANSMISSION.xslx"

Figure 4.6.4-5: SCE Distribution Ignitions from Equipment

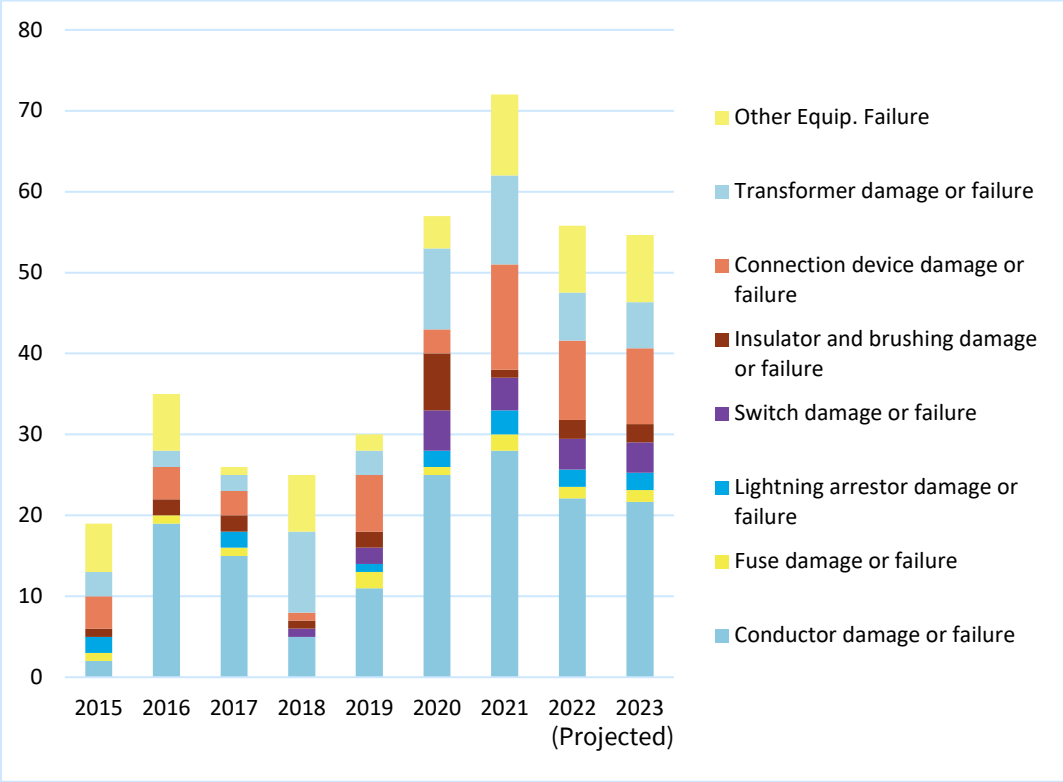


Figure 4.6.4-6: SCE Ignitions from Equipment in the HFTD

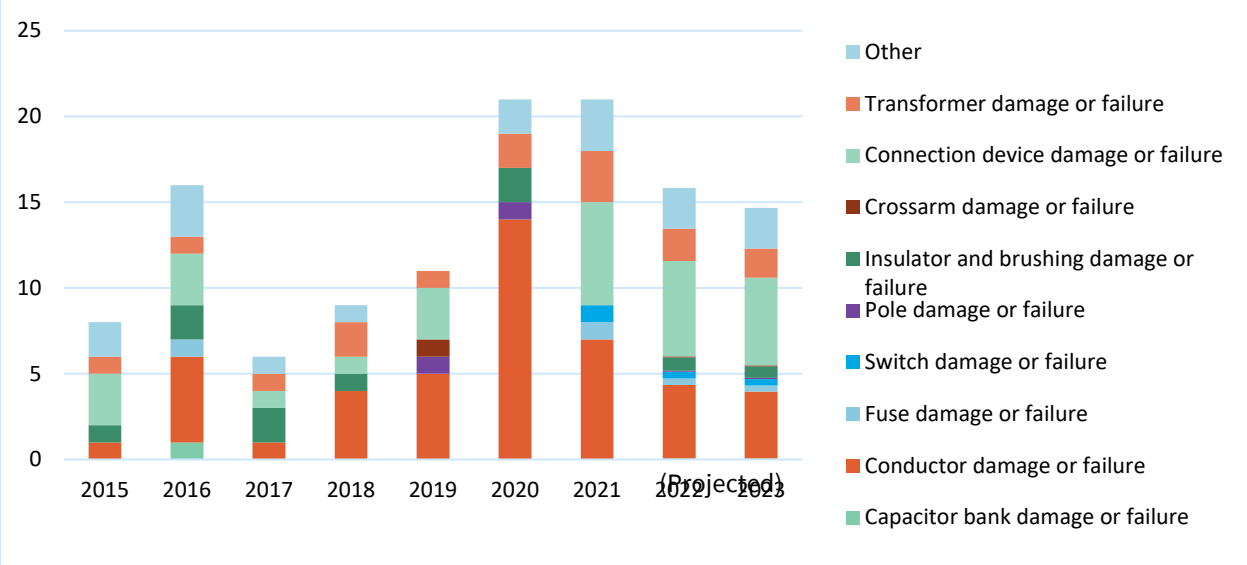
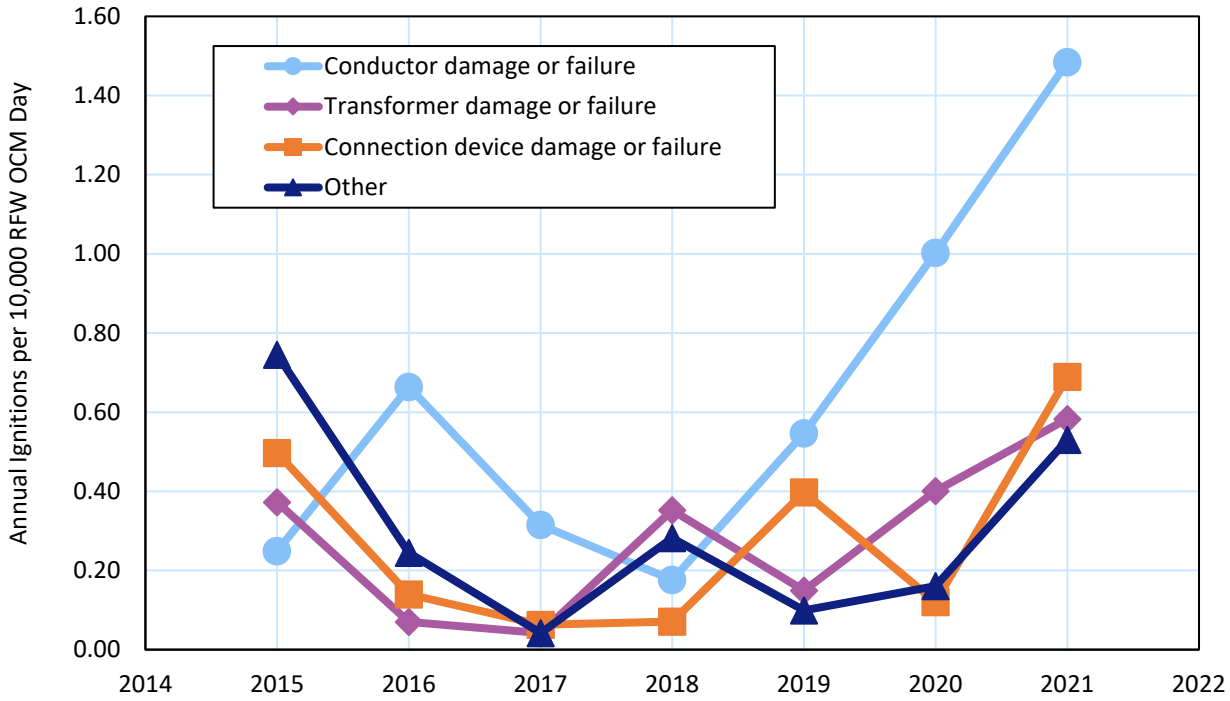


Figure 4.6.4-7: SCE Normalized Distribution Ignitions by Equipment Type



- In 2021, SCE had a 92 percent pass rate for its QA/QC of overhead detailed inspections,[119] with no Priority 1 findings and 346 Priority 2 findings identified.[120] The majority of the Priority 2 findings were related to secondary and service conductor damage or clearance issues.[121] SCE states it is currently evaluating how to better address secondary conductor findings, which caused 30 percent of SCE's CPUC-reportable ignitions in 2020 and 2021.[122] SCE implemented some mitigation measures, including updating its distribution inspection checklist to include secondary conductor issues. SCE must continue to develop and report on these mitigations and demonstrate an increase in its QA/QC pass rate for asset inspections moving forward.

[119] SCE's 2022 Update, Table SCE 7-30, p. 389.

[120] Data Request CalAdvocates-SCE-2022WMP-02-01.

[121] Data Request CalAdvocates-SCE-2022WMP-02-01.

[122] SCE's 2022 Update, p. 372.

Energy Safety sets forth specific areas for improvement and associated required progress in Section 7.

4.6.5 Vegetation Management and Inspections

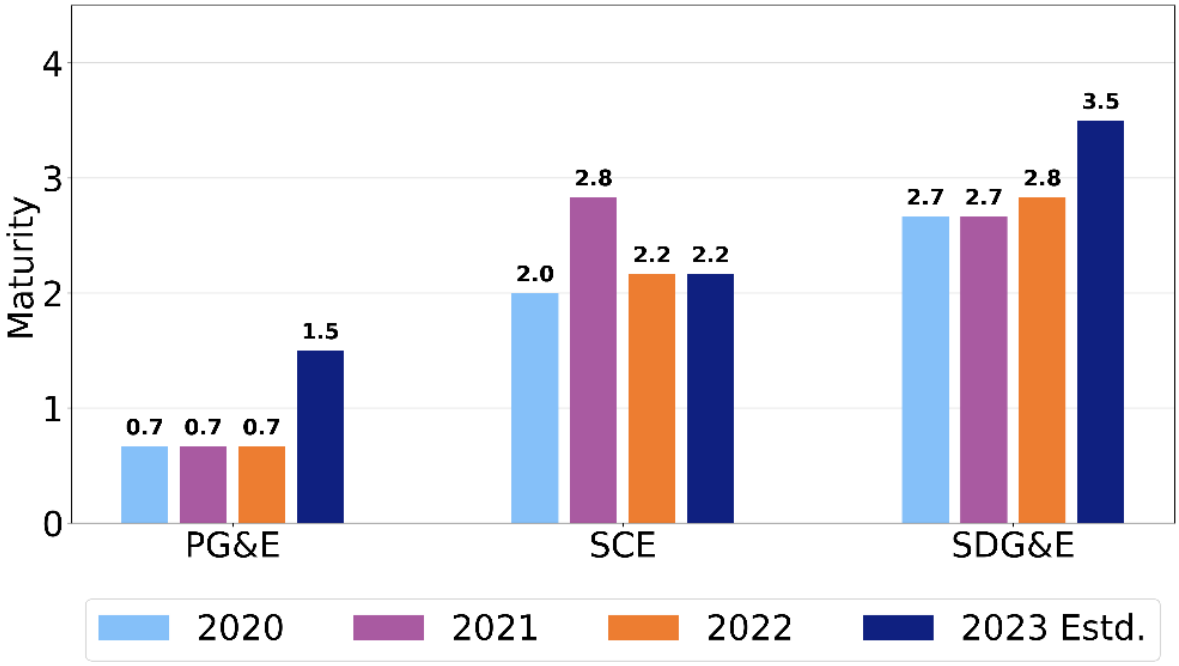
The vegetation management and inspections section of the Guidelines[123] requires utilities to discuss vegetation management inspections. The discussion must include inspections that go beyond existing regulation, as well as remote sensing inspections and patrol inspections of vegetation around distribution and transmission lines and equipment. Utilities must also discuss quality control of those inspections and limitations on the availability of workers. In addition, they must also discuss collaborative efforts with local land managers, including efforts to maximize benefit from fuel treatment activities and fire break creation as well as the collaborative development of methods for identifying "at-risk" vegetation, determining trim clearances beyond minimum regulations, and identifying and mitigating impacts from tree trimming and removal (e.g., erosion, flooding, etc.).

4.6.5.1 Maturity Assessment

Over the current WMP cycle, SCE's maturity level increased slightly from 2 to 2.2. Notably, SCE's maturity level in vegetation management dropped from 2.8 in 2021 to 2.2 in 2022 (Figure 4.6.5-1).

[123] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.7.3, pp. 75-76 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

Figure 4.6.5-1: Vegetation Management and Inspections Maturity Level Progress: Large IOUs



This decrease was due to a regression in three related questions:

- Capability 24: "Vegetation Grow-in Mitigation"
  - Does the utility work with local landowners to provide a cost-effective use for cutting vegetation?[124]
- Capability 25: "Vegetation Fall-in Mitigation"
  - Does the utility work with local landowners to provide a cost-effective use for cutting vegetation?[125]
  - Does the utility work with partners to identify new cost-effective uses for vegetation, taking into consideration environmental impacts and emissions of vegetation waste?[126]

[124] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to E.IV.h.

[125] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to E.V.f.

[126] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to E.V.g.

In 2021, SCE responded "Yes" to each of these questions, but in 2022, it responded "No." SCE informed Energy Safety that it had reinterpreted these questions with regard to the term "cost-effective."[127] Energy Safety asked SCE modified versions of these questions removing "cost-effective"; SCE responded "Yes" to each modified question.[128] With "Yes" responses to the modified questions, SCE's 2022 maturity level would be 2.83, the same as it in 2021.

Energy Safety asked the modified questions because it acknowledges that working with local landowners and partners to identify and/or provide uses for cut vegetation is not always cost-effective. Performing these actions regardless of cost-effectiveness is an indicator of a mature vegetation management program.

Accounting for these reinterpreted questions, SCE's maturity level for vegetation management remains flat at 2.83. Capabilities 22, 23, and 26 are at maturity level 2; for SCE to mature in these categories to level 3, SCE would need to mature the responses to the following limiting questions:

- How are vegetation inspections scheduled?[129]
- How are procedures and checklists determined?[130]
- At what level of granularity are the depth of checklists, training, and procedures customized?[131]
- How is the contractor and employee activity audited?[132]

4.6.5.2 SCE's Progress

Public Outreach

[127] Data Request OEIS-SCE-22-007, Question 07.

[128] Data Request OEIS-SCE-22-001, Question 01.

[129] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to E.II.b.

[130] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to E.III.b.

[131] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to E.III.c.

[132] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, responses to E.VI.a.

In 2021, SCE improved its outreach by releasing a public map viewer on its website,[133] allowing the public to see when and where line clearing activities will occur. This viewer is intended to increase transparency and provide notification to customers, communities, and governments on top of existing notification methods such as door knocks, doorhangers, and certified mailers.

Quality Assurance & Quality Control Performance

SCE has maintained or increased the percentage of work in compliance with regulation clearance distance (RCD), which is the minimum clearance required by regulation, and compliance clearance distance (CCD), which is SCE's internal standard (1.5 x RCD).

Table 4.6.5-1 shows percentage compliance per vegetation management activity type for 2019 through 2021. Additionally, SCE established acceptable quality levels (AQL)[134] of performance at 100 percent for RCD and 95 percent for CCD.[135]

Table 4.6.5-1: Quality Assurance & Quality Control Compliance Results for Vegetation Management - SCE[136]

Year	Transmission and/or Distribution	Regulation Clearance Distance (RCD) (% Work in Compliance)	Compliance Clearance Distance (CCD) (% Work in Compliance)
Overall			
2019	Transmission	99.95	99.02

[133] Link to public map viewer: https://sce2.maps.arcgis.com/apps/webappviewer/index.html?id=cf4fc477bca7482d9a26da04ab2988b9

[134] Acceptable quality level (AQL) is defined as follows: When a continuing series of lots is considered, a quality level which for purposes of sampling inspection is the limit of satisfactory process average. (Juran, Joseph, and A. Blanton Godfrey. "Quality handbook." Republished McGraw-Hill 173, no. 8 (1999): 34-51. Page 46.7) In other terms, AQL is the worst quality level that is still considered satisfactory. In this case, as SCE considers the AQL for CCD as 95%, if 95% of work audited is deemed compliant with CCD specifications and congruently 5% of that same work is considered non-compliant, SCE considers this "acceptable."

[135] Data Request OEIS-SCE-22-002, Question 13.

[136] This table is a recreation of a selection from a table provided in Data Request OEIS-SCE-22-002, Question 13.

Year	Transmission and/or Distribution	Regulation Clearance Distance (RCD) (% Work in Compliance)	Compliance Clearance Distance (CCD) (% Work in Compliance)
2019	Distribution	97.98	89.95
2020	Transmission & Distribution	98.58	94.42
2021	Transmission & Distribution	99.2	96.26
Pruning			
2020	Transmission & Distribution	99.21	93.53
2021	Transmission & Distribution	99.12	96.96
Pre-Inspector			
2020	Transmission & Distribution	99.21	97.16
2021	Transmission & Distribution	99.49	98.18

Tree Risk Index

In the vegetation management and inspections section of its 2022 Update, SCE mentions its Tree Risk Index (TRI) multiple times. The TRI "classif[ies] locations around [SCE's] overhead

equipment that have high vegetation contact risk."[137] In the near term, SCE will use the TRI to prioritize line clearing, hazard trees inspections, and quality control.[138]

SCE should continue to explore quantitative ways to incorporate not only its TRI but its risk and predictive modeling into vegetation management and inspections to optimize prioritization, protocols, and schedules, among many other activities.

SCE-21-07: Effectiveness of enhanced clearances

SCE-21-07 "Effectiveness of enhanced clearances," required SCE, in partnership with the other large IOUs, to participate in a multi-year vegetation clearance study. Since the publishing of Energy Safety's Final Action Statements on the utilities' 2021 Updates, the large IOUs have focused on standardizing definitions and reviewing options for creating a cross-utility database for tree-related risk events. Each utility performed an initial analysis studying the relationship between line clearance and vegetation related outages on its system.

SCE examined tree-caused circuit interruptions (TCCIs) on its distribution circuits before and after enhanced clearances. The "pre-enhanced" timeframe is considered to be 2015-2019, and "post-enhanced" refers to 2020 and future years. SCE's analysis shows that once enhanced clearances were implemented, there were fewer TCCIs (Figure 4.6.5-2). These initial results show that after SCE implemented enhanced clearances, TCCIs in the HFTD dropped 59 percent (Table 4.6.5-2). However, the number of ignitions caused by vegetation in the HFTD increased in 2021 over previous years (Figure 4.6.5-3).

[137] SCE's 2022 Update, p. 101.

[138] SCE's 2022 Update, p. 101.

Figure 4.6.5-2: Time Series of TCCIs – SCE[139]

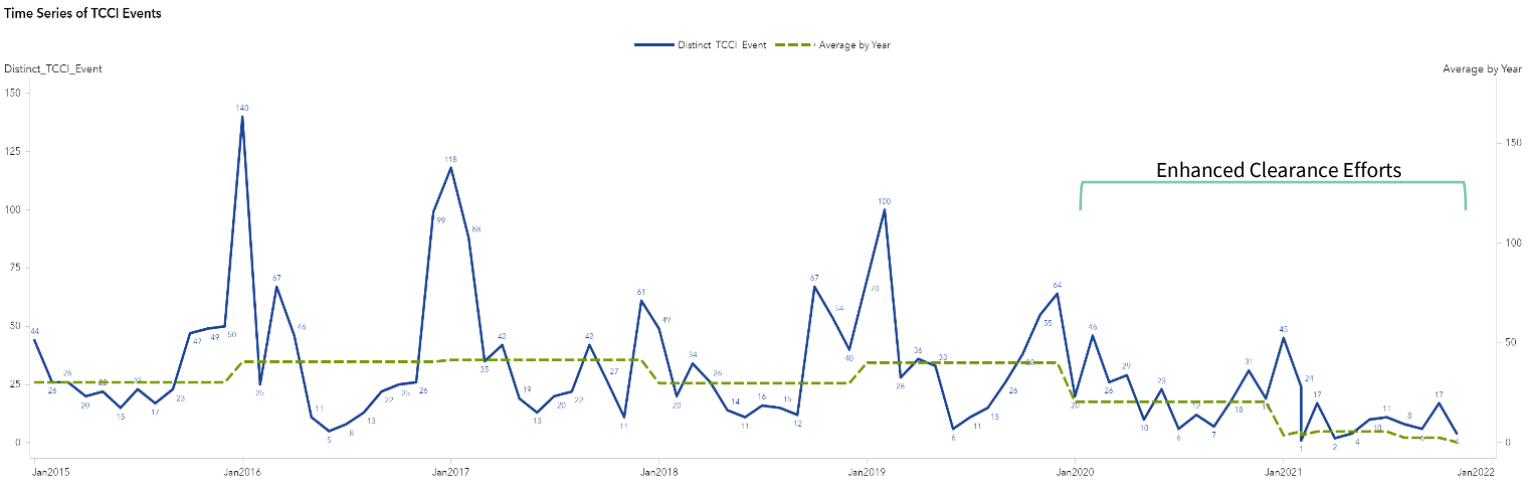


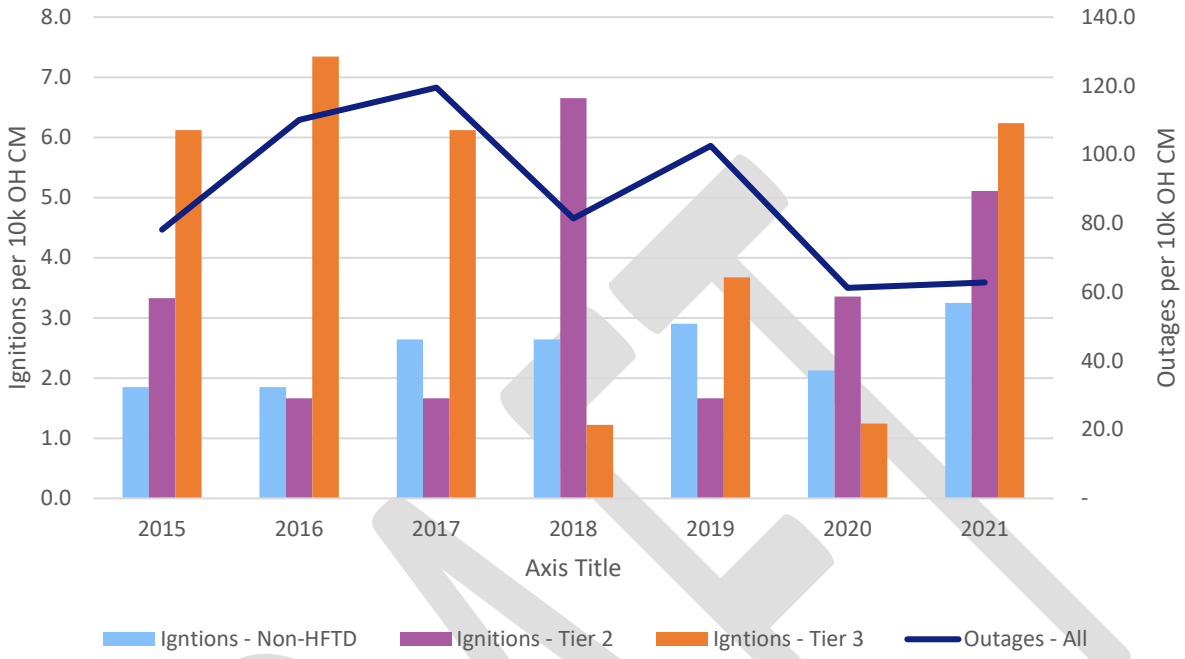
Table 4.6.5-2: Average TCCIs Before and After Enhanced Clearances - SCE[140]

Average Events Before and After Enhanced Clearances	Pre-Enhanced Clearances (2015-2019) Avg TCCIs per Year	Post Enhanced Clearances (2020-2021) Avg TCCIs per Year	Difference
HFTD	148.4	61.5	-59%
Non-HFTD	289.2	136	-53%
All	437.6	197.5	-53%

[139] SCE's 2022 Update, p. 700.

[140] SCE's 2022 Update, p. 700.

Figure 4.6.5-3: Vegetation-Caused Ignitions by HTFD Tier and Outages per 10,000 Overhead Circuit Mile (OH CM) – SCE



The large IOUs have set several objectives for 2022 for the multi-year vegetation clearance study:

- Hiring a third party to assist with achieving and validating the objectives of their multi-year vegetation clearance study.
- Standardizing data collection for tree-caused risk events and creating a cross-utility database of these events.
- Examining whether the correlation between enhanced clearances and a lower number of tree-caused outage events may be attributable to other factors beyond clearances, such as the management of hazard trees and the installation of covered conductor.

Because the study spans multiple years, Energy Safety expects SDG&E, PG&E, and SCE to show progress as they continue the study year to year. See Section 7 for Energy Safety's requirements for continued improvement related to the effectiveness of the enhanced clearances joint study.

SCE-21-09: Need for quantified vegetation management compliance targets

In response to SCE-21-09 "Need for quantified vegetation management compliance targets," SCE provided 12 vegetation management targets in Table 5.3-1, an increase from the three

targets it provided in its 2021 Update.[141] SCE's 2022 vegetation management targets represent a diversity of initiatives. For example, for initiative 7.3.5.19, "Vegetation management system," SCE will integrate its Hazardous Tree Program (including Dead & Dying Tree Removal and Hazard Tree Mitigation) and Routine Line Clearing into Arbora, its vegetation management system.[142] SCE has satisfied the requirements of SCE-21-09. Energy Safety expects SCE to report on these targets in its Quarterly Initiative Updates.

4.6.5.3 Areas for Continued Improvement

As discussed in the previous section, the large IOUs have jointly made progress addressing SCE-21-07, "Effectiveness of enhanced clearances." Energy Safety expects the large IOUs to continue their efforts and meet their self-identified objectives by the submission of the 2023 WMPs. Specifically, Energy Safety requires marked progress on development of data standards for the cross-utility tree-caused risk event database and creation of that database. Energy Safety also requires continuation of the effectiveness of enhanced clearances joint study through at least 2025.

Additionally, through analysis of utilities' current and its past WMP submissions, Energy Safety has identified the need for a scoping meeting to discuss how utilities could best learn vegetation management best management practices from each other. This scoping meeting may result in additional meetings, workshops, or the formation of a working group. Energy Safety believes this scoping meeting will lead to efforts to help clarify the current differences between electrical corporations' vegetation management programs and allow for collaboration among the electrical corporations, stakeholders, and academic experts. SCE must participate and collaborate with its peers and Energy Safety in this scoping meeting.

Energy Safety sets forth specific areas for improvement and associated required progress in Section 7.

[141] SCE's 2021 Update, Table 5.3-1.

[142] SCE's 2022 Update, Table 5.3-1, p. 140.

4.6.6 Grid Operations and Operating Protocols, Including PSPS

The grid operations and operating protocols section of the Guidelines[143] requires discussion of ways the utility operates its system to reduce wildfire risk. For example, disabling the reclosing function of automatic reclosers[144] during periods of high fire danger (e.g., Red Flag Warning conditions) can reduce utility ignition potential by minimizing the energy released and the duration of the release when there is a fault. This section also requires discussion of work procedures in conditions of elevated fire risk and protocols to reduce the frequency and scope of de-energization, including PSPS events (e.g., through sectionalization). Further, this section requires the utility to report whether it has stationed and/or on-call ignition prevention and suppression resources and services.

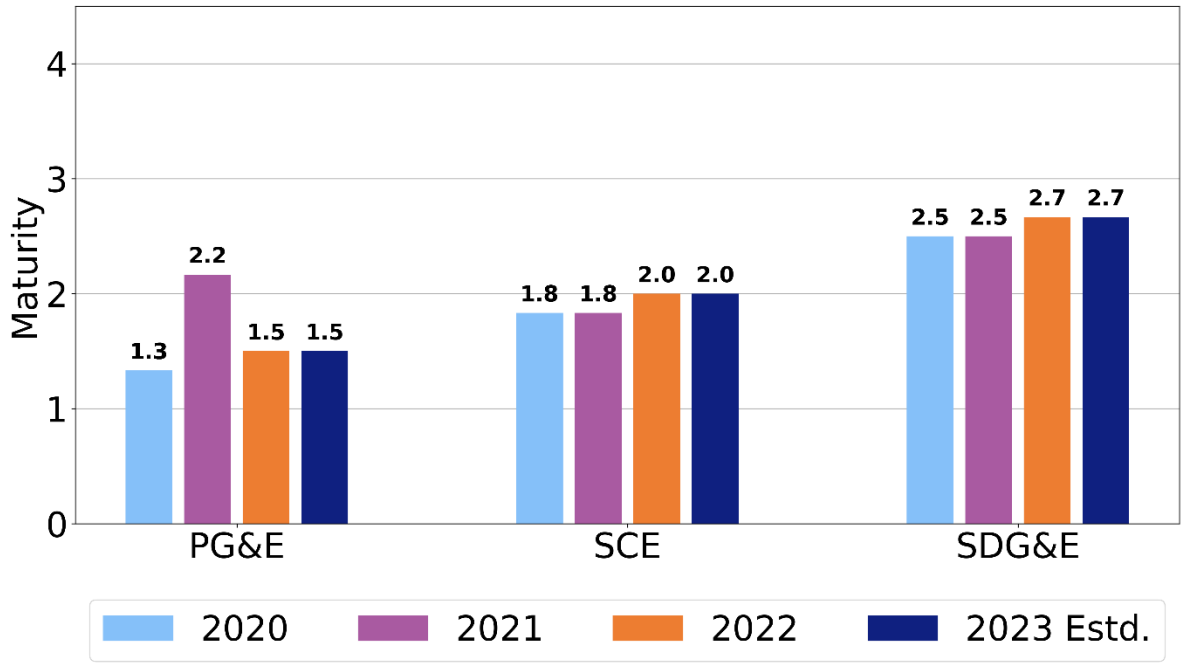
4.6.6.1 Maturity Assessment

SCE's average maturity for the grid operations and operating protocols category increased from 2021 to 2022. In this category, SCE self-reports higher maturity than PG&E and lower maturity than SDG&E. (SCE's 2022 maturity level is 2, PG&E's is 1.5, and SDG&E's is greater than 2.5; see Figure 4.6.6-1 below).

[143] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.7.3, p. 76 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

[144] A recloser is a switching device that is designed to detect and interrupt momentary fault conditions. The device can reclose automatically and reopen if a fault condition is still detected. However, if a recloser closes a circuit that poses the risk of ignition, wildfire may be the result. For that reason, reclosers are disabled in certain high fire risk conditions. During overcurrent situations, circuit breakers trip a switch that shuts off power to the electrical line.

Figure 4.6.6-1: Cross-Utility Maturity for Grid Operations and Protocols



SCE has one capability within this category at a low maturity level (level 0 or 1) – capability 29, "PSPS operating model and consequence mitigation." This is also a low-maturity capability for PG&E, based on 2022 survey results. Areas that are holding SCE back from maturing further include:

- SCE's customer communication on forecasted PSPS events.
- SCE's PSPS average customer downtime, which is greater than 0.5 hours.

4.6.6.2 SCE's Progress

In Energy Safety's Final Action Statement on SCE's 2021 Update, Energy Safety identified four issues and corresponding remedies in the grid operations and operating protocols section.[145] Energy Safety required SCE to provide quantitative analyses for each of its mitigation alternatives apart from covered conductor to show how each mitigation alternative changes system operations, PSPS thresholds, and PSPS impacts (i.e., estimated frequency, duration,

[145] Energy Safety's Final Action Statement on SCE's 2021 Update, pp. 76-78 (accessed April 7, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51701&shareable=true.

and number of customers impacted). Based on a review of SCE's November 1, 2021, Progress Report, Energy Safety finds that SCE has fully addressed this issue (see SCE-21-13 in Appendix A of this Decision). Other issues identified in 2021 and addressed in SCE's 2022 Update include the following:

- In 2021, SCE did not include Standard Operating Bulletin (SOB) 322 as an attachment, despite referencing this SOB and listing procedures when discussing SCE's automatic recloser protocols. In 2022, SCE provided SOB 322 as a confidential attachment.
- In 2021, SCE did not provide details on its Work Restrictions During Elevated Fire Conditions Program, now called the HFRA Hot Work Restriction and Mitigation Program. In 2022, SCE provided more specifics on these restrictions and mitigations, including details on activities affected, cancellation of work when PSPS conditions are present, and cancellation or delay of routine work when local fire conditions are present.
- In 2021, SCE did not have its own stationed or on-call ignition prevention and suppression resources and services. However, it has continued to provide funding for aerial suppression resources in its service territory, as required by Energy Safety's Final Action Statement on SCE's 2021 Update. SCE states that it established memoranda of understanding (MOUs) with Los Angeles, Ventura, and Orange County fire agencies to fund and support additional aerial suppression resources, such as helitankers and helicopters. SCE has also created a quick reaction force (QRF) with these same agencies to "coordinate and reach wildfires in their early stages."[146] SCE states that these aerial suppression resources were used multiple times in 2021.[147]

SCE has improved its grid operations and protocols throughout the current WMP cycle by analyzing and updating automatic recloser protocols, implementing additional high fire risk work measures and working to optimize resources to decrease PSPS outage durations. Specifically, since its 2021 Update, SCE has made the following progress on PSPS response and mitigation:

[146] SCE's 2022 Update, pp. 512-513.

[147] SCE's 2022 Update, p. 461.

- SCE implemented a dedicated PSPS incident management team (IMT) of 18 full-time employees trained in PSPS event management and incident command system (ICS) standards and procedures. SCE states that this decision was based on lessons learned in 2019 and 2020, when variation in resources and staffing from event-to-event created inefficiencies in PSPS operations and decision-making.[148]
- SCE launched or expanded several customer care programs:
    - In 2021, SCE launched a language translation service at its community resource centers (CRCs) during PSPS activations. The service supports over 120 languages, including American Sign Language. In addition, SCE displays Quick Response (QR) codes at its CRCs and community crew vehicle (CCV) sites during PSPS activations to allow for onsite customer feedback.
    - SCE implemented a 2-1-1[149] pilot to provide 24/7 support and services via call, web, and text, to affected customers during PSPS events. SCE states its 2-1-1 partnership connects customers with 10,000 community-based organizations (CBOs) across its service territory.[150] SCE plans to continue this service in 2022.
        - The 2-1-1 pilot also includes information and support for access and functional needs (AFN) customers. SCE developed a 2022 AFN Plan for PSPS Support (filed in January 2022) and intends to enhance its AFN communication and services in alignment with this plan.[151]
    - SCE expanded its Critical Care Backup Battery program to include Medical Baseline (MBL) customers residing in the HFTD and enrolled in either California Alternate Rates for Energy (CARE) or Family Electric Rate Assistance (FERA). In 2021, SCE deployed over 6,000 free portable backup batteries to eligible customers.

[148] SCE's 2022 Update, p. 445.

[149] 2-1-1 service agencies are intended to provide a comprehensive source of information about local resources and services.

[150] SCE's 2022 Update, p. 452.

[151] Southern California Edison Company's Access and Functional Needs Plan for Public Safety Power Shutoff Support Pursuant to Commission Decision in Phase Two and Phase Three of R.18-12-005 can be found here (accessed April 15, 2022): https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M449/K511/449511922.PDF.

4.6.6.3 Areas for Continued Improvement

As discussed above, SCE is changing its protective device settings in 2022 to increase sensitivity for detecting faults. These more sensitive settings, which SCE calls fast curve settings (FCS), are limited in use for its protective devices to when Red Flag Warning, Fire Weather Threat (FWT), Fire Climate Zone (FCZ), or Thunderstorm Threat declarations are present.[152] SCE began implementing FCS in 2018, with new strategies evaluated and approved by SCE senior management in February 2022.[153] Currently, SCE has around 900 of 1,071, or 84 percent, of its distribution circuits within the HFTD enabled with FCS capability through "a combination of circuit breakers and/or Remote Controlled Automatic Reclosers (RARs)."[154] By 2024, SCE is aiming to have 78 percent of its distribution lines in the HFTD enabled with FCS on circuit breakers; SCE states that the remaining distribution lines "will be protected by [RARs] with Fast Curves, and/or branch line fuses".[155]

SCE has also implemented FCS on 10 relays outside of the HFTD.[156] SCE estimates that circuit breakers with FCS have 15 percent greater mitigation effectiveness against ignitions. Figure 4.6.6-2 below shows this decrease in ignitions for circuits within the HFTD with FCS installed.[157] SCE had approximately 100 fast curve trip operations in 2020, none of which resulted in a CPUC-reportable ignition.[158]

[152] Data Request OEIS-SCE-22-002, Question 11.

[153] Data Request CalAdvocates-SCE-2022WMP-08, Attachment "Improved Fast Curve Setting Strategy," p. 3.

[154] Data Request OEIS-SCE-22-002, Question 11.

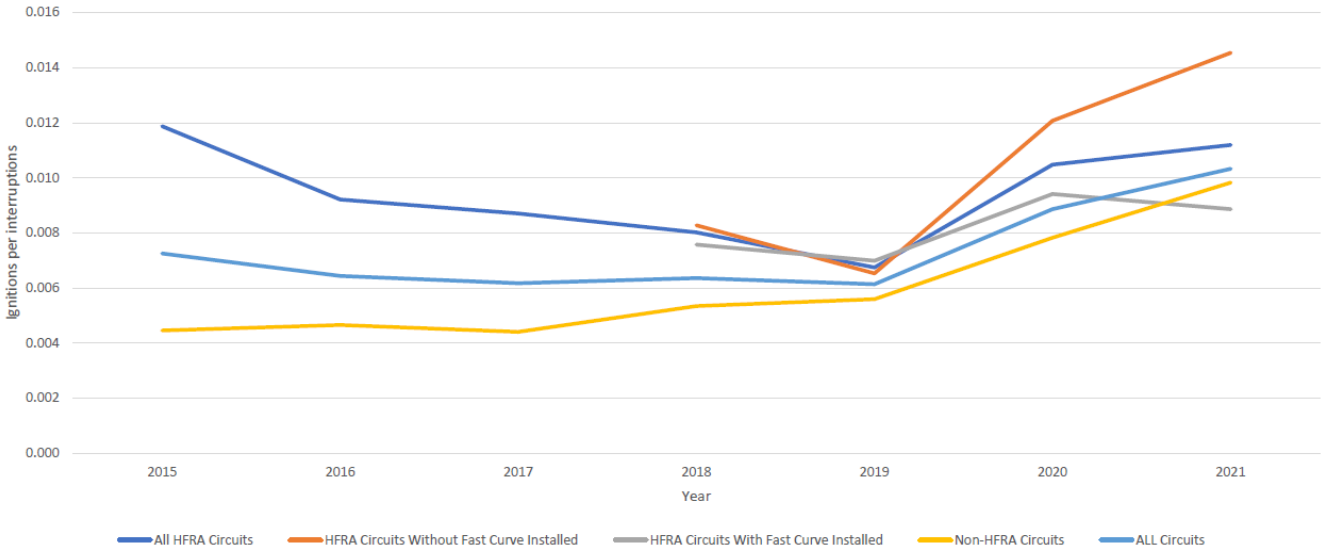
[155] Data Request OEIS-SCE-22-002, Question 12.

[156] Data Request OEIS-SCE-22-002, Question 12.

[157] Data Request OEIS-SCE-22-002, Question 12.

[158] Data Request CalAdvocates-SCE-2022WMP-08, Attachment "Improved Fast Curve Setting Strategy," p. 5.

Figure 4.6.6-2: SCE FCS Ignition Impacts (Ignition per interruption as a function of circuit)[159]



FCS lowers the minimum trip threshold while increasing the time delay.[160] SCE states that the changes in sensitivity should maintain reliability. SCE has not undertaken a formal reliability study for the impacts of FCS, although it states that FCS led to a 14-minute System Average Interruption Duration Index (SAIDI); that is, customers experienced a loss of power for a normalized average duration of 14 minutes.[161] Given that FCS could lead to an increase in outages, it is not clear how SCE has concluded that the changes would not impact reliability, and therefore broader public safety and cascading public safety impacts. SCE must analyze any reliability and public safety impacts and implement mitigations to reduce those impacts.

Energy Safety sets forth specific areas for improvement and associated required progress in Section 7.

[159] Data Request CalAdvocates-SCE-2022WMP-08, Attachment "Improved Fast Curve Setting Strategy," p. 5.

[160] Data Request CalAdvocates-SCE-2022WMP-08, Attachment "Improved Fast Curve Setting Strategy," p. 4.

[161] Data Request OEIS-SCE-22-002, Question 12.

4.6.7 Data Governance

The data governance section of the Guidelines[162] requires the utility to report information on its initiatives to create a centralized wildfire-related data repository, conduct collaborative research on utility ignition and wildfire, document and share wildfire-related data and algorithms, and track and analyze near-miss data.

4.6.7.1 Maturity Assessment

SCE's reported maturity for data governance has increased since the 2021 Update in two categories and remained stable in the other two. SCE rated itself at the highest possible level for the past two years for one of these two categories (data sharing with the research community). SCE's reported maturity is high relative to its peers.

In 2022, SCE plans to improve in its sensitivity analysis of models, but this will not affect its overall maturity level. SCE revised its projected end-of-cycle maturity for data governance down slightly due to inability to implement real-time data sharing by the end of 2022.

4.6.7.2 SCE's Progress

Since the 2021 Update, SCE reports it has completed design of its centralized data repository, begun consolidation of data sets from other systems, and implemented cloud platform infrastructure for analytics and a data portal.[163] SCE further reports that it has updated its predictive models,[164] has implemented a new standard form for risk event data collection, has expanded its fire incident preliminary analysis team, and is refining the tools and processes used by that team.[165] Energy Safety's Final Action Statement on SCE's 2021 Update[166] instructed the utility to provide a timeline for implementation of its centralized data repository and cloud analytics platform. SCE did so satisfactorily in its 2022 Update.

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[162] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.7.3, pp. 76-77 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

[163] SCE's 2022 Upate, section 7.3.7.1.4, pp. 465-466

[164] SCE's 2022 Update, section 7.3.7.3.4, pp. 469-470

[165] SCE's 2022 Update, section 7.3.7.4.4, pp. 472-473

[166] Office of Energy Infrastructure Safety's Final Evaluation of 2021 Wildfire Mitigation Plan Update Southern California Edison section 5.7, p. 82 (accessed April 19, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51701&shareable=true.

4.6.7.3 Areas for Continued Improvement

In its Final Action Statement on SCE's 2021 Update,[167] Energy Safety instructed SCE to provide additional details on its predictive models for transmission and sub-transmission systems and distribution asset risk models. SCE's response to this request in its data governance section did not provide sufficient information. Section 4.5 does not describe the models used relative to data governance, and instead directs the reader to another section of the Update that discusses risk modeling irrelevant to data governance. SCE must continue to improve the description of models referred to in Section 7.3.7.3 of the 2022 Update.

Energy Safety sets forth specific areas for improvement and associated required progress in Section 7.

4.6.8 Resource Allocation Methodology

The resource allocation methodology section of the Guidelines[168] requires the utility to describe its methodology for prioritizing programs by cost effectiveness. Utilities must discuss their risk reduction scenario analysis and provide a risk-spend efficiency (RSE) analysis for each aspect of the plan.

4.6.8.1 Maturity Assessment

SCE's 2022 Maturity Survey responses show continuously increasing maturity in resource allocation methodology over the current WMP cycle (Figure 4.6.8-1 below). The increase in maturity from 2021 to 2022 is explained by the large increase in granularity of RSE calculations. Last year, SCE calculated RSEs for vegetation management-related initiatives at a circuit level, whereas this year, SCE progressed to asset-level RSEs.[169] Despite SCE's progress, its resource allocation methodology maturity level is limited by its response to capability 41 ("To what extent does the utility allocate capital to initiatives based on risk-spend efficiency?").

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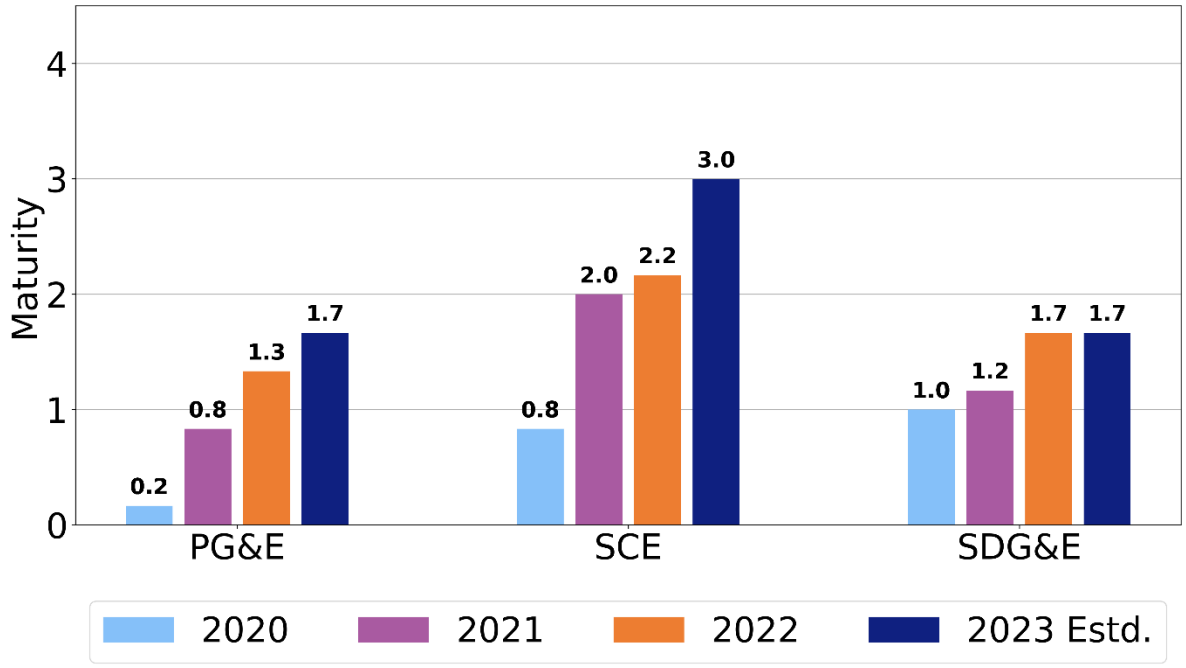
[167] Office of Energy Infrastructure Safety's Final Evaluation of 2021 Wildfire Mitigation Plan Update Southern California Edison section 5.7, p. 82 (accessed April 19, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51701&shareable=true.

[168] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.7.3, p. 77 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

[169] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to H.III.b.

Figure 4.6.8-1: Resource Allocation Methodology Across the Large IOUs



4.6.8.2 SCE's Progress

During the 2021 WMP evaluation, Energy Safety identified the importance of decision-making flowcharts to explain a utility's mitigation selection and prioritization process. This year, SCE provided a flowchart[170] to illustrate the utility's general approach to risk-based decision making to prioritize initiative selection and deployment. SCE separates its general decision-making flowchart into four main categories:

1. Evaluation/prioritization of wildfire and PSPS risk
2. Identifying mitigations
3. Evaluating and selecting mitigations
4. Scoping and deploying

In addition to the general decision-making flowchart, SCE provides a flowchart specific to grid design and system hardening.[171] This flowchart walks through SCE's decision-making process

[170] SCE's 2022 Update, Figure SCE 7-2, p. 195.

[171] SCE's 2022 Update, Figure SCE 7-20, p. 221.

for selecting covered conductor, CC++, undergrounding, and traditional hardening in high fire risk areas (HFRA) for distribution circuits.

SCE has also made progress on requirement SCE-21-01 in Energy Safety's Final Action Statement on SCE's 2021 Update, "RSE estimates not provided for all PSPS-related mitigation initiatives."[172] This year, SCE incorporated 22 additional activities into its RSE portfolio,[173] including PSPS-related and enabling initiatives. This increases the quantitative comparison of cost-effectiveness between various mitigation initiatives and brings more rigor to the decision-making process.

4.6.8.3 Areas for Continued Improvement

SCE must continue to improve its RSE verification process by including independent experts or other California utilities. According to its responses on the 2022 Maturity Survey, SCE's current RSE estimates are not confirmed by independent experts or other utilities in California. RSE estimates are an important decision-making factor as they are transparent and quantitative. It is crucial for SCE to confirm the accuracy of its RSE estimates with independent experts or other utilities in California. In its Maturity Survey response, SCE indicates that RSE estimates would be confirmed by independent experts or other California utilities starting January 1, 2023.[174] If SCE is unable to accomplish this goal, it must provide an action plan and timeline for third party confirmation of RSE estimates.

SCE's RSE portfolio does not capture emerging initiatives. In Maturity Survey question H.II.b, "What initiatives are captured in the ranking of risk-spend efficiency?" SCE selects, "All commercial initiatives" for 2022 and projects this same level of maturity in 2023. SCE does not plan to improve in this capability by capturing all commercial initiatives and emerging initiatives in its RSE portfolio. To drive effective growth of new initiatives, SCE must consider the RSE of those efforts and must seek to mature in this capability by providing an action plan for calculating RSEs for emerging initiatives in its 2023 WMP.

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[172] Office of Energy Infrastructure Safety's Final Evaluation of 2021 Wildfire Mitigation Plan Update Southern California Edison, p. 90 (accessed April 19, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51701&shareable=true.

[173] SCE's 2022 Update, pp. 69-71.

[174] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to H.V.c.

As discussed in Section 4.6.8.1, SCE's maturity in resource allocation methodology is limited by capability 41, which assesses the utilities' approach to portfolio-wide initiative allocation methodology. Question H.V.a is the question limiting SCE's maturity and specifically asks, "To what extent does the utility allocate capital to initiatives based on [RSE]?" SCE remains at the same level of maturity as last year, selecting "iii. Accurate RSE estimates for all initiatives are used to determine capital allocation within categories only. . ." However, SCE aims to progress in this area by January 1, 2023, selecting the response "iv. Accurate RSE estimates for all initiatives are used to determine capital allocation across portfolio. . ." for its 2023 projection. In its 2023 WMP, SCE must show that RSE estimates are used to determine capital allocations across its portfolio of mitigation initiatives (e.g., prioritizing between vegetation management and grid hardening).

Energy Safety sets forth specific areas for improvement and associated required progress in Section 7.

4.6.9 Emergency Planning and Preparedness

The emergency planning and preparedness section of the Guidelines[175] requires the utility to provide a general description of its overall emergency preparedness and response plan, including a discussion of how the plan is consistent with legal requirements for customer support before, during, and after a wildfire. This discussion must cover support for low-income customers, billing adjustments, deposit waivers, extended payment plans, suspension of disconnection and nonpayment fees, and repairs. The utility is also required to describe emergency communications before, during, and after a wildfire in languages deemed prevalent in its territory (CPUC Decision 19-05-036, supplemented by Decision 20-03-004),[176] and other languages required by the CPUC.

This section of the Guidelines also requires discussion of the utility's plans for coordination with first responders and other public safety organizations; plans to prepare for and restore service, including workforce mobilization and prepositioning of equipment and employees;

[175] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.7.3, p. 77 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

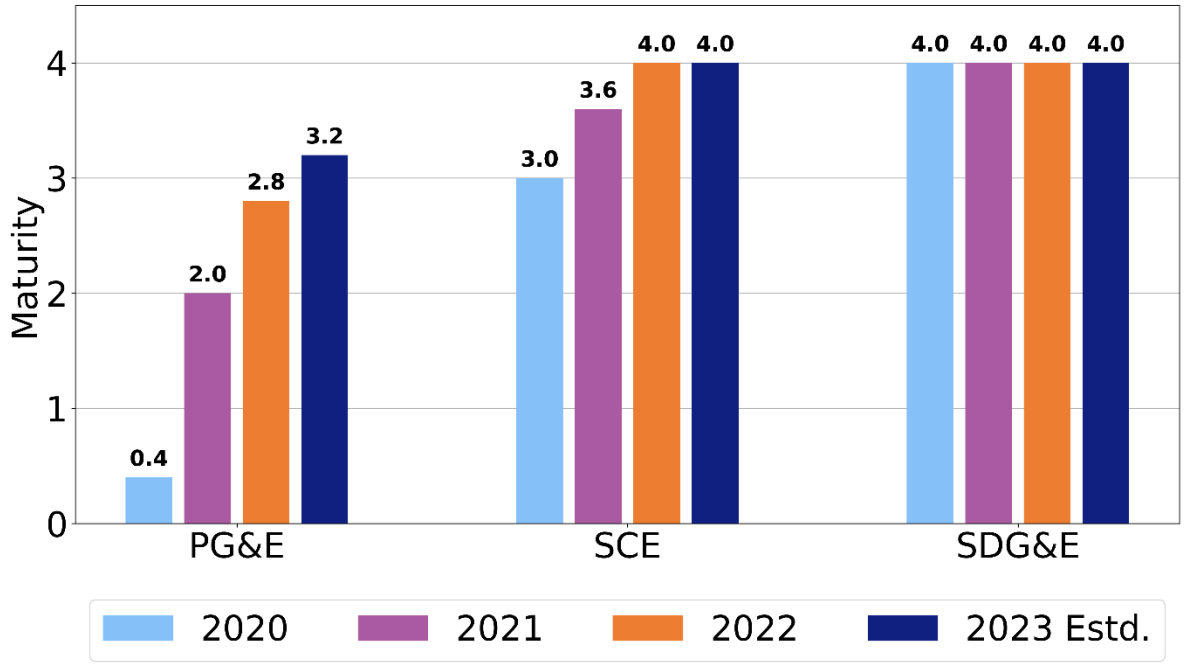
[176] A language is prevalent if it is spoken by 1,000 or more persons in the utility's territory or if it is spoken by 5% or more of the population within a "public safety answering point" in the utility territory. See California Government Code Section 53112 for more information.

and a showing that the utility has an adequately sized and trained workforce to promptly restore service after a major event.

4.6.9.1 Maturity Assessment

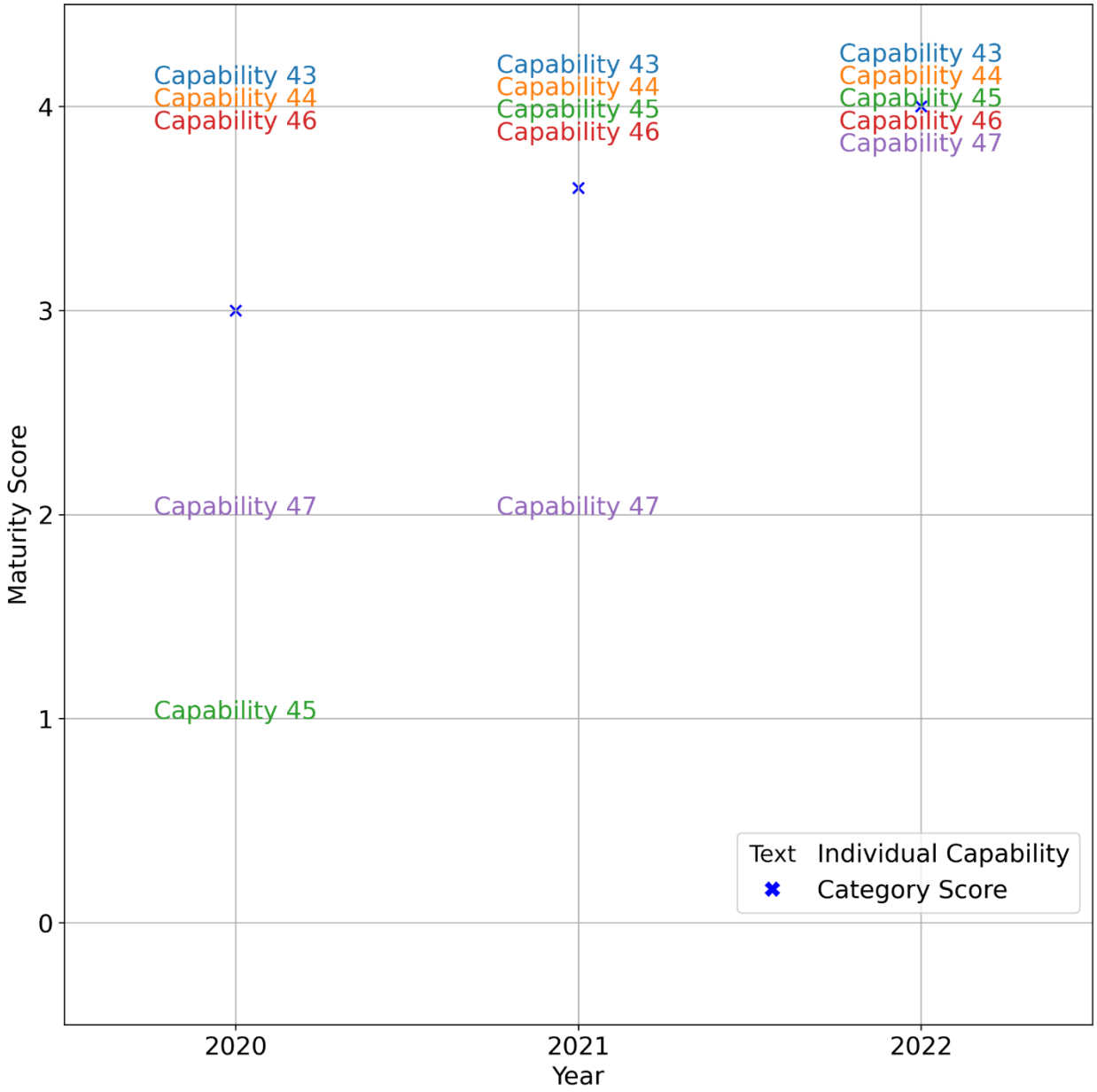
SCE's maturity in the emergency planning and preparedness category has gradually increased throughout the current WMP cycle (starting at 3 in 2020 and increasing to 3.6 in 2021 and 4 in 2022). SCE's 2022 maturity in this category is at the same level as SDG&E's and slightly higher than PG&E's (Figure 4.6.9-1).

Figure 4.6.9-1: Emergency Planning and Preparedness Maturity Across the Large IOUs



Based on its 2022 Maturity Survey responses, SCE's individual capability levels in this category either remained the same or increased from 2021, and SCE reports a level 4 maturity for all its emergency planning and preparedness capabilities, as seen in Figure 4.6.9-2 below.

Figure 4.6.9-2: SCE's Emergency Planning and Preparedness Maturity Level by Capability



In 2022, SCE improved in maturity in one emergency planning capability, with the remaining capabilities unchanged from 2021. In capability 47, "Processes for continuous improvement after wildfire and PSPS events," SCE improved by more than one level from 2021 to 2022. This is due to SCE responding "Yes" in 2022 (having responded "No" in 2021) to the question,

"Does the utility track the implementation of recommendations and report upon their impact?"[177,178]

4.6.9.2 SCE's Progress

SCE has made advancements in its emergency planning and preparedness programs and initiatives. Noteworthy areas of improvement include:

- Implementing a dedicated, full-time PSPS incident management team (IMT).[179, 180] In 2021, IMT members received incident command system (ICS) training based on Federal Emergency Management Agency guidelines and National Incident Management System and Standardized Emergency Management System models.[181] SCE plans to have all PSPS IMT members fully trained and qualified or requalified by July 1, 2022.[182]
- Expanding its customer care programs. Although SCE primarily discusses these programs within the context of its grid operations initiatives (Section 7.3.6.6), progress in the programs overlaps with emergency planning and preparedness (Section 7.3.9.3 and 7.3.9.5). SCE's customer care programs focus on three areas:
    - Community resource centers. In 2021, SCE launched a language translation service at its activated CRCs.[183]

[177] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, Question I.V.h.

[178] Here, "recommendations" refers to recommendations received from customers, local agencies, organizations, and other stakeholders following a wildfire or PSPS event.

[179] See Section 4.6.6.2 for further discussion of the IMT.

[180] SCE's 2022 Update, p. 445.

[181] SCE's 2022 Update, p. 479.

[182] SCE's 2022 Update, p. 480

[183] For additional information on SCE's CRCs, see section 4.6.6.2.

- Customer resiliency programs. SCE implemented a 2-1-1 pilot to provide 24/7 support and services to affected customers during PSPS events and expanded the service to include information and support for AFN customers.[184,185,186]
- Customer resiliency equipment. SCE expanded its Critical Care Backup Battery program to include Medical Baseline (MBL) customers residing in the HFTD and enrolled in either CARE or FERA. In 2021, SCE deployed over 6,000 free portable backup batteries to eligible customers.

4.6.9.3 Areas for Continued Improvement

Energy Safety has no areas for continued improvement for SCE under the emergency planning and preparedness section of its 2022 Update.

4.6.10 Stakeholder Cooperation and Community Engagement

The stakeholder cooperation and community engagement section in the Guidelines[187] requires the utility to report on the extent to which it will engage the communities it serves. This engagement includes cooperating and sharing best practices with community members, agencies outside California, fire suppression agencies, the U.S. Forest Service, and others engaged in vegetation management or fuel reduction.

4.6.10.1 Maturity Assessment

SCE's maturity in the stakeholder cooperation and community engagement category has gradually increased across the current WMP cycle (starting at 2.2 in 2020 and moving to 2.6 in 2021 and 3.2 in 2022). SCE's 2022 maturity level in this category is slightly lower than SDG&E's and slightly higher than PG&E's (all three large IOUs are between levels 3 and 4 in this category in 2022).

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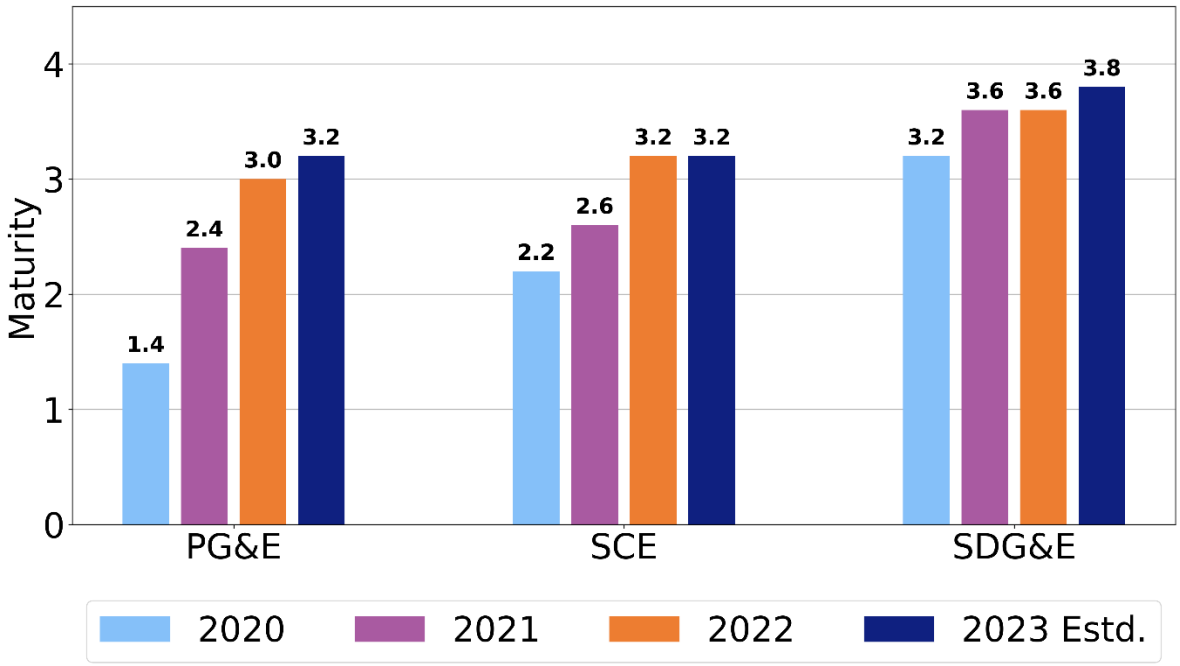
[184] For additional information on SCE's AFN services, see section 4.6.6.2.

[185] SCE's 2022 Update, p. 452.

[186] Southern California Edison Company's Access and Functional Needs Plan for Public Safety Power Shutoff Support Pursuant to Commission Decision in Phase Two and Phase Three of R.18-12-005 can be found here (accessed April 4, 2022): https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M449/K511/449511922.PDF.

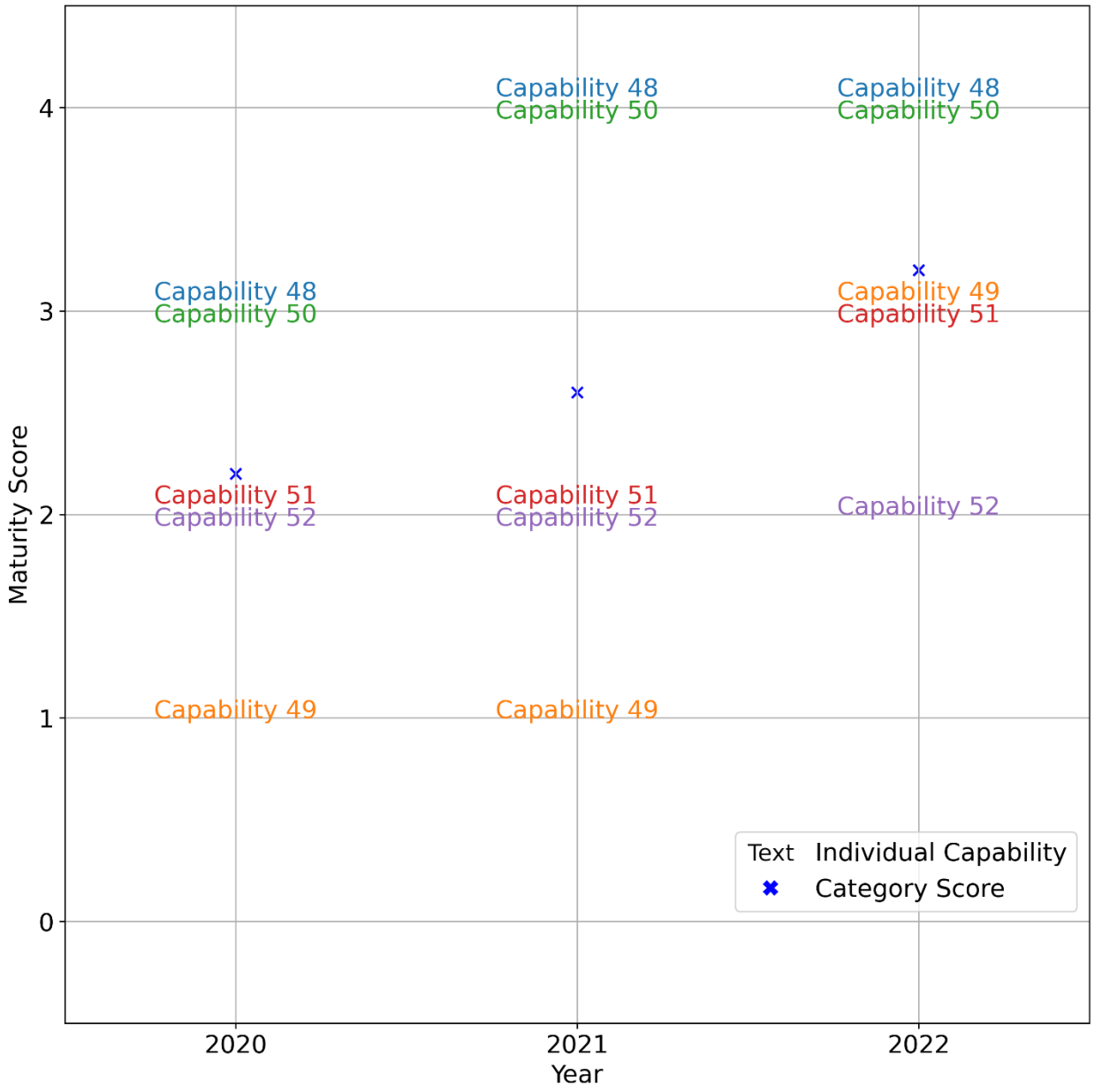
[187] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.7.3, p. 77 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

Figure 4.6.10-1: Stakeholder Cooperation and Community Engagement Across the Large IOUs



SCE's individual capability levels in this category either remained the same or improved, and SCE had no low maturity levels (0 or 1) for any of its stakeholder cooperation and community engagement capabilities, as seen in Figure 4.6.10-2 below.

Figure 4.6.10-2: SCE's Stakeholder Cooperation and Community Engagement by Capability



In 2022, SCE improved in maturity in two stakeholder cooperation capabilities, with the remaining capabilities at the same level as they were in 2021. In capability 49, "Engagement with communities on utility wildfire mitigation initiatives," SCE improved by more than one level. This is due to SCE's response to question J.II.c, "What percent of landowners are non-compliant with utility initiatives (e.g., vegetation management)?". In 2021, SCE reported level

(i) "More than 5%". In 2022, it reported level (v), "Less than 0.5%."[188] SCE has stated this significant increase in maturity was due to a change in interpretation of the question. In 2020 and 2021, SCE interpreted "non-compliant" as relating to enhanced clearances. SCE decided that since enhanced clearances are not a regulatory requirement,[189] landowner non-compliance with enhanced clearances should not be used to calculate the percentage of non-compliant landowners. In 2022, SCE calculated its maturity level by how many formal customer refusals it receives to perform the regulatorily required work.[190]

In capability 51, "Collaboration with emergency response agencies," SCE also improved its maturity since last year. This is due to SCE's response to question J.IV.a, "What is the cooperative model between the utility and suppression agencies?" In 2021, SCE responded (ii), "Utility cooperates with suppression agencies by notifying them of ignitions." In 2022, it responded (iii), "Utility cooperates with suppression agencies by working cooperatively with them to detect ignitions, in addition to notifying them of ignitions as needed."[191]

4.6.10.2 SCE's Progress

SCE has made overall advancements in its stakeholder cooperation and community engagement programs and initiatives. Noteworthy areas of improvement since 2021 include the following:

- In 2021, SCE partnered with Ventura, Los Angeles, and Orange County fire departments to create a QRF of aerial firefighting resources.
- In 2021, SCE established memoranda of understanding (MOUs) with Ventura, Los Angeles, and Orange County fire agency partners to provide funding for "stand-by time" of aerial suppression resources stationed throughout SCE's service territory. (Fire agencies are responsible for costs associated with flight time to fight fires.) SCE

[188] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to J.II.c.

[189] "Enhanced clearances" are 12 feet or more at time of trimming between the vegetation and the energized conductors and associated live parts. These clearances are "recommended minimum clearances" according to General Order 95, Rule 35, Appendix E. Required minimum clearances are defined by General Order 95, Section III, Table 1.

[190] Data Request OEIS-SCE-22-008, Question 1.

[191] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to J.IV.a.

states that these MOUs cover the "highest fire risk months." When asked which months, specifically, these MOUs cover during a call with Energy Safety on April 6, 2022, SCE stated that its critical fire season is mid-June/early-July through the Santa Ana wind season (i.e., through September), and the MOUs cover July through mid-December.

4.6.10.3 Areas for Continued Improvement

Energy Safety has no areas for continued improvement for SCE under the stakeholder cooperation and community engagement section of its 2022 Update.

4.7 Public Safety Power Shutoff (PSPS), Including Directional Vision for PSPS

In recent years, utilities have increasingly used PSPS to mitigate wildfire risk. PSPS events introduce substantial risk to the public and impose a significant burden on public services that must activate during these events. Energy Safety supports the use of PSPS only as a last resort and expects the utilities to present clear plans for reducing the scale, scope, and frequency of PSPS events.

In 2021, Energy Safety separated the reporting of PSPS from the reporting of mitigations and progress metrics to reflect the definition of PSPS as a last resort rather than a mitigation option (pursuant to CPUC Guidance Resolution WSD-002 and CPUC PSPS Decisions 19-05-036 and 20-03-004).[192] This section of the Guidelines[193] requires utilities to report their current and projected progress in PSPS mitigation, including lessons learned from the prior year, de-energization and re-energization protocols, PSPS outcome metrics, plans to reduce future PSPS impacts, and community engagement. The Guidelines specifically require utilities to

[192] When calculating RSE for PSPS, electrical corporations generally assume 100 percent wildfire risk mitigation and very low implementation costs because societal costs and impact are not included. When calculated this way, PSPS will always rise to the top as a wildfire mitigation tool, but it will always fail to account for its true costs to customers. Therefore, electrical corporations shall not rely on RSE calculations as a tool to justify the use of PSPS.

[193] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.8, pp. 78-83 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

address Senate Bill 533[194] requirements to identify circuits that have frequently been de-energized and provide measures for how utilities will reduce the need for, and impact of, future de-energization of those circuits.

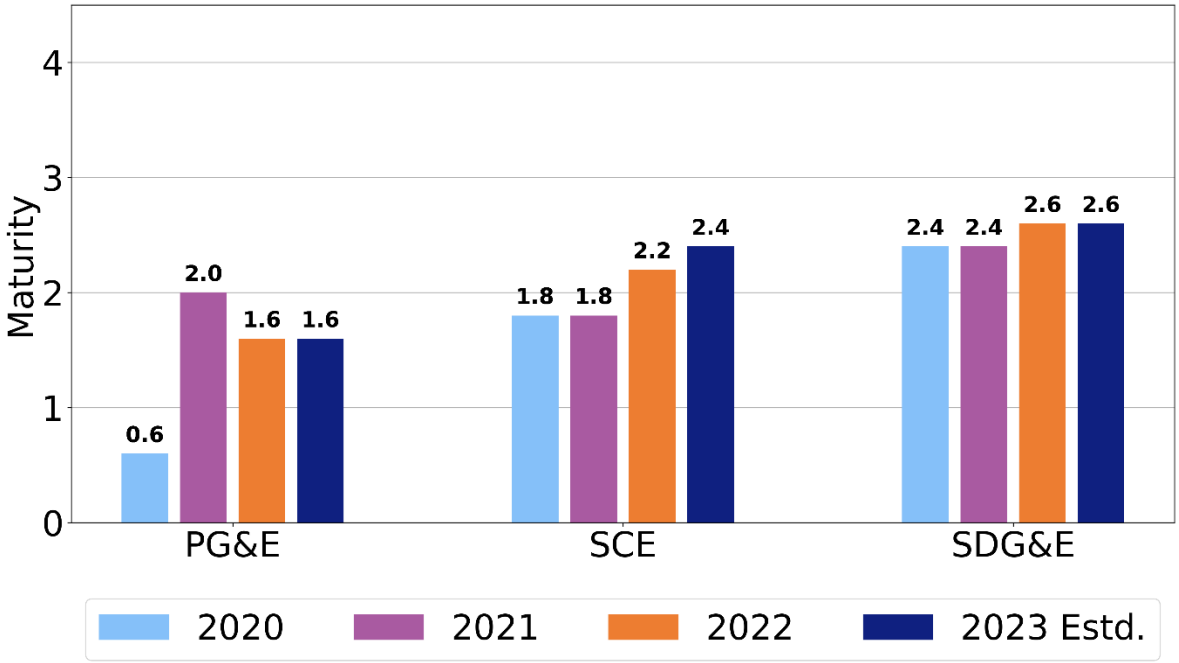
4.7.1 Maturity Assessment

The Maturity Model does not include a distinct PSPS category. PSPS questions in the Maturity Survey are found under capabilities in various maturity categories. The PSPS-related capabilities referenced here are in the maturity categories of situational awareness, grid operations and protocols, and emergency planning and preparedness.

According to its responses on the 2022 Maturity Survey, in several maturity categories and capabilities related to PSPS, SCE started the current WMP cycle at a moderate maturity level relative to its peers and generally remained there in 2021. In 2020 and 2021 the utility assessed itself at a maturity level of 1.8 across these PSPS categories and capabilities. This self-reported level increased by 0.4 in its 2022 assessment (to 2.2).

[194] Senate Bill No. 533, Chapter 244, An act to amend Section 8386 of the Public Utilities Code, relating to electricity: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB533 (accessed April 11, 2022).

Figure 4.7-1: PSPS Maturity



From 2021 to 2022, SCE's maturity level on PSPS increased in most areas, except the "PSPS operating model and consequence model" capability of the grid operations and protocols category, where it remained flat. Areas that may be preventing SCE from maturing further are discussed below.

SCE's maturity level has increased in the "estimation of wildfire and PSPS risk-reduction impact" capability of the risk assessment and mapping category. A further increase has been limited by lower self-assessed answers to one question and increased by answers to two others.

- In 2021 and 2022, SCE stated that its risk reduction impact tool estimates are assessed by an independent expert, which is the second-highest option for responding to the survey question. The highest level of maturity is that risk reduction impact tool estimates are assessed by independent experts, supported by historical data of incidents and near misses.[195]

[195] SDG&E's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.IV.b

- In 2021, SCE stated that its risk assessment tool is partially (<50 percent) automated. This year it stated that it is mostly (>=50 percent) automated, demonstrating maturity growth in this capability.[196]
- Regarding additional information used to estimate risk reduction impact, SCE assessed itself this year at the highest level (4), as opposed to the second-highest level last year. This answer indicates that in addition to using information about "existing hardware type and condition including operating history," SCE now uses "level and condition of vegetation; weather" and a "combination of initiatives already deployed."[197]

In the "grid design for resiliency and minimizing PSPS" capability of the grid design and system hardening category, SCE matured over the current WMP cycle. According to its Maturity Survey answers in 2020, 2021, and 2022, SCE considers only egress points as an input for grid topology design, not yet using traffic simulation mapping, microgrids, or other means to reduce consequence for customers at frequent risk of PSPS.[198] There is still room for growth in this area under this capability. In the grid operations and protocols category, SCE has increased its assessed maturity, though it still shows room for growth. Within this category, in the "PSPS operating model and consequence mitigation" capability, SCE was limited by the following responses in 2022:

- SCE specified that the share of customers communicated to in advance regarding forecasted PSPS events is >95 percent of affected customers (of a possible 99.9 percent) and >99 percent of MBL customers (of a possible 100 percent).[199] This is the second-lowest possible answer; SCE has not projected growth in this area and is below its peers on this question.
- In response to another survey question, after SCE submitted its Maturity Survey, it identified data discrepancies in its 2021 PSPS Post-Event Reports concerning its customer notification data and therefore lowered its answer to this question. Starting

[196] SDG&E's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.IV.d.

[197] SDG&E's 2022 Utility Wildfire Mitigation Maturity Survey, response to A.IV.e.

[198] SDG&E's 2022 Utility Wildfire Mitigation Maturity Survey, response to C.III.d.

[199] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to F.III.b.

in 2021, SCE began automating its PSPS Incident Management Team (IMT) workflows. This is expected to improve SCE's notification process in 2022. SCE expects its answer to improve for the next Maturity Survey.[200]

- Regarding average downtime per customer, SCE answered "less than 1 hour" and does not project improvement to 30 minutes, 15 minutes, or 6 minutes (the other available answer options).[201]
- When asked how it plans to decrease average downtime, SCE responded, "Average downtime should continue to decrease due to SCE's PSPS-driven grid hardening. Internal analysis has continued to identify circuit mitigations based on historical PSPS impacts. SCE plans to accelerate covered conductor installation, along with numerous other prescriptive mitigations (e.g., circuit exceptions, Remote Controlled Switches, weather stations). In parallel, SCE will continue to refine its PSPS risk modeling capabilities."[202] SCE provides analysis on how covered conductor, circuit segment exceptions, automated switching, temporary generators, undergrounding, and microgrids result in changes to system operations and thresholds for de-energization. It also estimated changes to frequency, duration, and number of customers impacted by PSPS events.[203] SCE projected reductions to PSPS duration, described below under PSPS Mitigation and displayed in Table 4.7.2-1.

In the "protocols for re-energization" capability, SCE was flat in maturity from 2020 to 2021 and showed improvement in maturity beginning in 2022.

- SCE's answer in 2022 was higher than in 2021 regarding level of systematization and automation. SCE indicated that the process for inspecting de-energized sections of the grid prior to re-energization is "mostly automated" (>=50 percent), not yet "primarily automated" with "minimal manual inputs." All utilities responding to the Maturity Survey consistently express this limitation.[204]

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[200] Data Request OEIS-SCE-22-003, Question 6 (regarding SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to F.III.b).

[201] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to F.III.e.

[202] Data Request OEIS-SCE-22-003, Question 5.

[203] SCE's 2022 Update, p. 116.

[204] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to F.V.b.

- In the "processes for continuous improvement after wildfire and PSPS events" capability of the emergency planning and preparedness category, SCE showed an increase in maturity level from 2021 to 2022.
- In response to the question of whether it tracks the implementation of recommendations and reports upon their impact, SCE answered "Yes" this year; in prior surveys, it answered "No."[205]

4.7.2 SCE's Progress

Outcome Metrics

SCE initiated 10 PSPS events in 2021.[206] This is the most of any utility in California during this timeframe (PG&E and SDG&E initiated five and one PSPS event, respectively). The events impacting the most customers occurred from January 12 to January 21, de-energizing 110,608 customers.[207] Further, on November 24 SCE de-energized 79,697 customers (see Table 4.7.2-1 below). For that event, SCE notified a total of 283,454 customers in five Southern California counties.

[205] SCE's 2022 Utility Wildfire Mitigation Maturity Survey, response to I.V.h.

[206] Post Event Reports at https://www.cpuc.ca.gov/consumer-support/psps/utility-company-psps-post-event-reports, accessed April 2, 2022.

[207] Per Public Utilities Code § 8370 "Customer" means a customer of a local publicly owned electric utility or of a large electrical corporation. A person or entity is a customer of a large electrical corporation if the customer is physically located within the service territory of the large electrical corporation and receives bundled service, distribution service, or transmission service from the large electrical corporation. https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=PUC&division=4.1.&title&part&chapter=4.5.&article (accessed May 4, 2022).

Table 4.7.2-1: 2021 PSPS Events.[208]

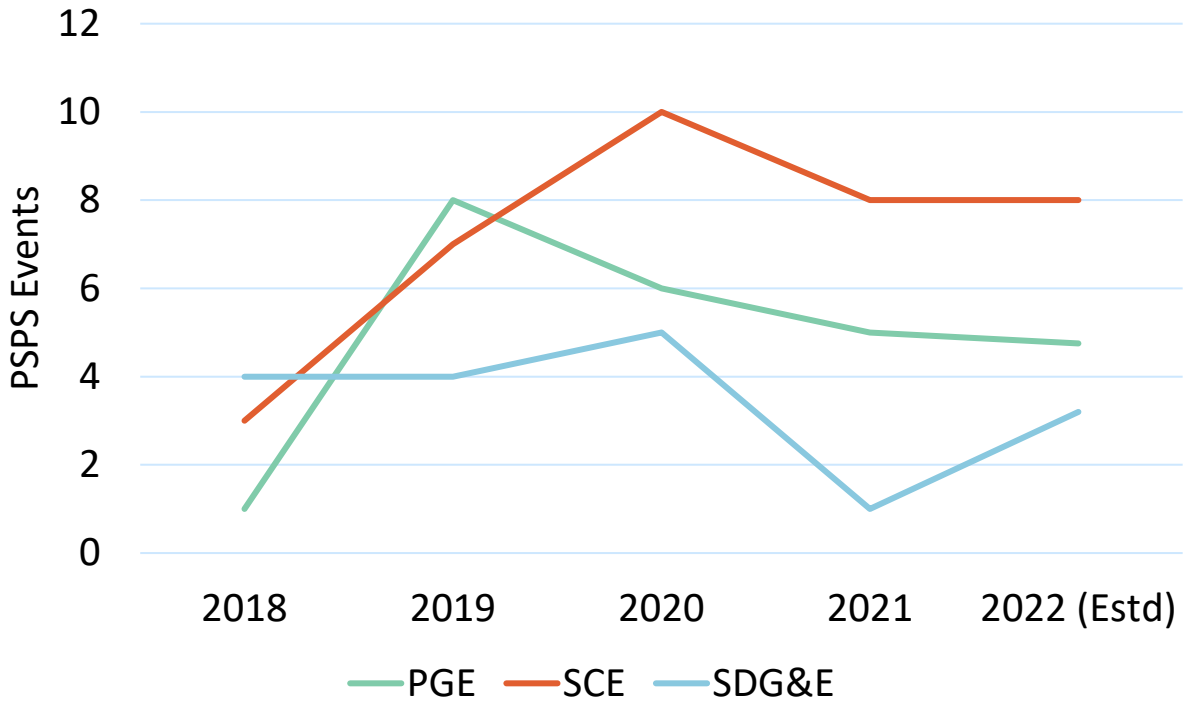
PSPS Event Initiation Date	Total Customer Accounts De-energized
Jan. 12, 2021	110,608
April 12, 2021	78
June 14, 2021	0
Sept. 30, 2021	9
Oct. 11, 2021	40
Oct. 15, 2021	104
Oct. 16, 2021	0
Oct. 22, 2021	112
Nov. 21, 2021	5,197
Nov. 24, 2021	79,697

Metrics provided in Table 11 of SCE's 2022 Update for the scale, scope, and frequency of PSPS events from 2018 to 2021 show that SCE is de-energizing customers more frequently than its peers in 2020 and 2021, with a downward trend from 2020 to 2021 (Figures 4.7.2-2, 4.7.2-3,

[208] Post Event Reports at https://www.cpuc.ca.gov/consumer-support/psps/utility-company-psps-post-event-reports, accessed April 2, 2022, and Southern California Edison Company's (U 338-E) Amended 2021 Post-Season Report (March 17, 2021).

and 4.7.2-4).[209] Although it had the most PSPS events (Figure 4.7.2-1), the number of customers impacted was lower than PG&E every year apart from 2021 (Figure 4.7.2-3).

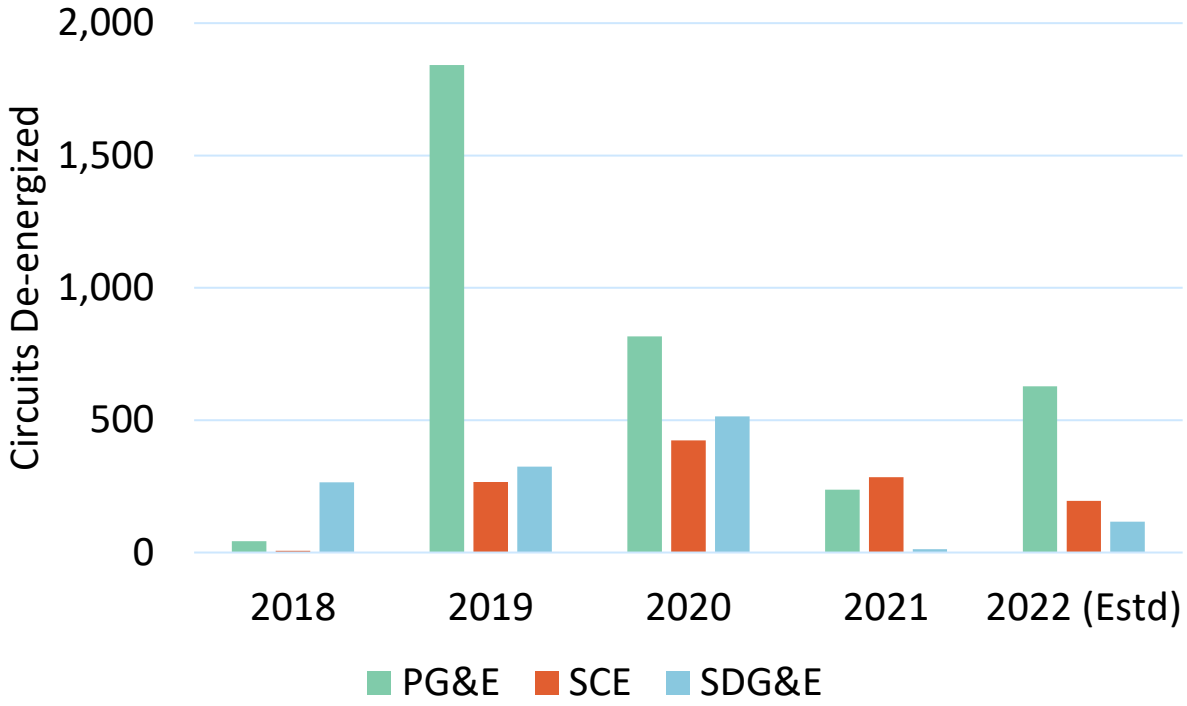
Figure 4.7-2: Recent Use of PSPS: Frequency of PSPS Events (Total) – Large IOUs (2018-2021 Actual, 2022 Projected)[210]



[209] Energy Safety Guidelines specify that Table 11, Row 1.a, should include only events with ultimately de-energized customers. CPUC's definition of PSPS is any initiated event, regardless of ultimate loss of electricity to customers. This is why Table 4.7.2-1 shows 10 events for 2021, whereas Figure 4.7.2-1 shows 8. Both numbers are correct.

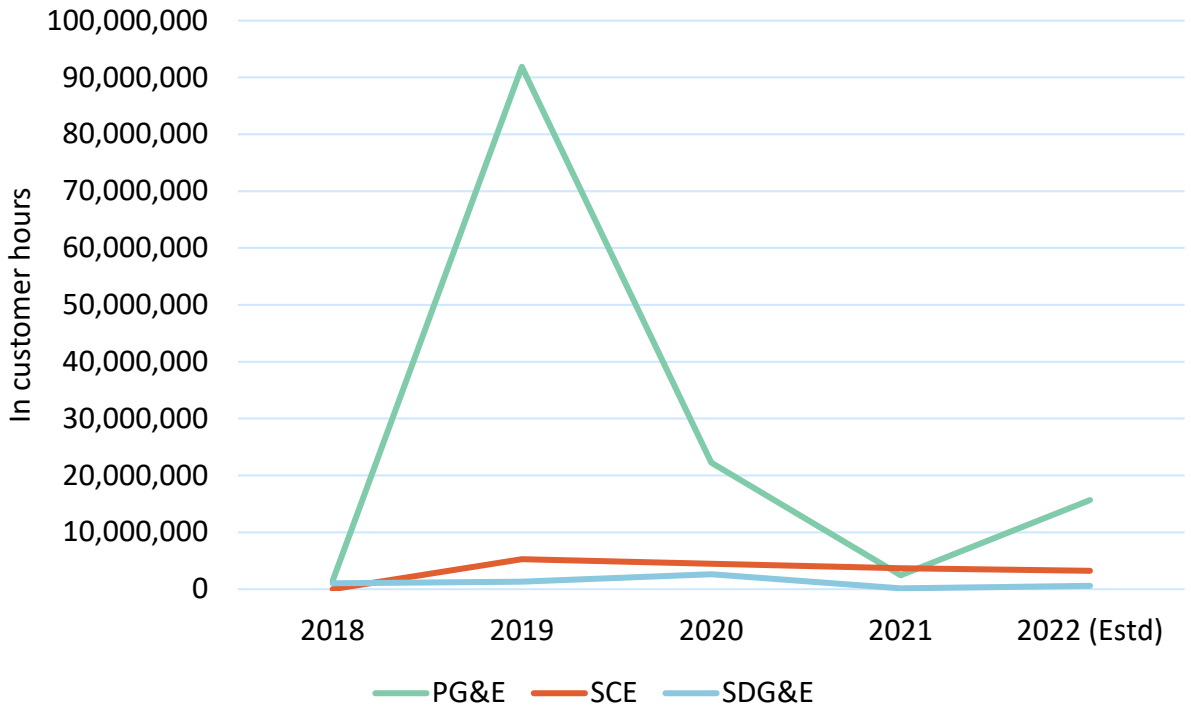
[210] SCE's 2022 Update, Table 11, PG&E's 2022 Update, Table 11, and SDG&E's 2022 Update, Table 11.

Figure 4.7-3: Recent Use of PSPS Circuits: Scope of PSPS Events (Total) by Overhead Circuit Mile – Large IOUs (2019-2021 Actual)[211]



[211] SCE's 2022 Update, Table 11; PG&E's 2022 Update, Table 11; and SDG&E's 2022 Update, Table 11.

Figure 4.7-4: Recent Use of PSPS: Duration of PSPS Events (Total) – Large IOUs (2018-2021 Actual, 2022 Projected)[212]



In its evaluation of SCE's 2021 Update, Energy Safety stated it was unclear whether SCE's mitigation targets applied to all customers or only those benefiting from circuits mitigated during 2021.[213] SCE has addressed these concerns in the 2022 Update, indicating that its discussion of planning strategies throughout Chapter 8 considers all circuits systemwide, unless otherwise indicated.[214] Energy Safety also asked SCE to provide its methodology for calculations in Table 11, which it did using a seven-year lookback (2015-2021). This analysis resulted in expected PSPS reductions of 14 percent in frequency, 25 percent in scope, and 17 percent in duration in 2022.[215]

[212] SCE's 2022 Update, Table 11; PG&E's 2022 Update, Table 11; and SDG&E's 2022 Update, Table 11.

[213] Office of Energy Infrastructure Safety's Evaluation of 2021 Wildfire Mitigation Plan Update, Southern California Edison (Final Action Statement on 2021 Wildfire Mitigation Plan Update – SCE), p. 194.

[214] SCE's 2022 Update, pp. 571-572.

[215] SCE's 2022 Update, pp. 571-572.

PSPS Mitigation

In 2021, the CPUC placed SCE in a Corrective Action Plan (CAP) due to the frequency of the PSPS events it executed in late 2020 and their impact on customers and communities. As reported by SCE[216] and confirmed by the CPUC, SCE has completed 131 of the 132 activities designed to reduce the potential need for and impact of PSPS events as well as to improve SCE's performance in executing them.[217] The CAP resulted in expediting work in focused areas that reduced the potential scale, scope, and frequency of PSPS events.

As shown in Table 4.7.2-2, SCE mitigation initiatives reduced the scale, scope, and frequency of PSPS, as analyzed by SCE. The accelerated 2021 mitigations and improved protocols discussed above enabled higher windspeed thresholds on hardened circuit segments and yielded greater PSPS reductions than previously projected. Principal among SCE's PSPS mitigations was the expedited grid hardening performed on 72 frequently impacted circuits.

Table 4.7.2-2: PSPS Reductions from Mitigations[218]

	2021 PSPS Events (reduction from 2020)	2021 Mitigation Impacts (reduction from 2020)	Estimated 2022 Mitigation Impacts (reduction from 2020)
Duration: Customer Minutes of Interruption (CMI)	-73%	-45%	-17%

[216] SCE's 2022 Update, p. 540.

[217] Southern California Edison Company's (U 338-E) Bi-Weekly Update on PSPS Corrective Action Plan, March 24, 2022, Appendix A. The remaining item, a microgrid at an elementary school, is reported as currently delayed by permitting and will be completed by June 30, 2022.

[218] SCE's 2022 Update, Table SCE 8-10, 2021 Anticipated PSPS Reductions; Table SCE 8-11, 2021 PSPS Season Impacts Compared to 2020 Season; and Table SCE 8-12 2022, Anticipated PSPS Reductions, pp. 551-552.

	2021 PSPS Events (reduction from 2020)	2021 Mitigation Impacts (reduction from 2020)	Estimated 2022 Mitigation Impacts (reduction from 2020)
Frequency: Number of Customers De-energized	-76%	-44%	-14%
Scope: Number of Circuits De-energized	-79%	-33%	-25%

SCE's 2022 plan is to scope or accelerate more than 150 miles of covered conductor, along with numerous other prescriptive mitigations (e.g., circuit exceptions, remote controlled switches, weather stations) for 42 targeted circuits that have yet to undergo accelerated hardening. In parallel, SCE will continue to refine its PSPS risk modeling capabilities and understanding of local weather and asset conditions to potentially modify certain Fire Potential Index (FPI) and windspeed thresholds. To the extent higher thresholds are adopted, SCE would expect reductions to PSPS impacts beyond those forecast above.[219] To prioritize circuits for hardening, SCE applied the methodology developed previously to calculate a PSPS Probability of De-energization (POD) score for each circuit using five years of back cast weather data. SCE ranked the circuits targeted for mitigation according to their predicted POD score and PSPS de-energization history.[220]

[219] SCE's 2022 Update, p. 552.

[220] Data Request OEIS-SCE-22-003, Question 7.

Protocols for de-energization and re-energization

SCE describes its protocols for PSPS de-energization in detail in the WMP and provides a decision flowchart and process description. Activation thresholds are computed for each circuit for the season.[221]

SCE improved its ability to forecast from five to seven days in advance of a potential PSPS event. It increased the number of weather stations, recalibrated its FPI, and uses machine learning with its weather station network.[222]

Regarding risk assessment, for each PSPS event, every circuit also has a de-energization threshold. De-energization thresholds are informed by a consequence score for each specific HFTD tier. The consequence score estimates the impact of an ignition on communities; the higher the score, the greater the risk to a particular location from wildfires.[223] SCE indicates it will continue to refine its PSPS risk modeling capabilities and understanding of local weather and asset conditions to potentially modify certain FPI and windspeed thresholds.

In 2021, SCE operationalized circuit segment level de-energization triggers where covered conductor was fully installed on an isolatable portion of a circuit. Areas with covered conductor can be allowed to remain powered during high winds, and areas with bare conductor could be isolated for de-energization. This approach demonstrates a more granular operational capability and allows for higher windspeed thresholds for those isolatable segments, meaning that these segments would be de-energized later in a PSPS event, if at all.

Starting in 2021, SCE began automating its PSPS IMT workflows, using a software automation tool developed to reduce processing time and minimize the potential for error. This better integrates PSPS, customer, and grid data and eliminates most manual efforts and handoffs.[224]

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[221] SCE's 2022 Update, p. 548.

[222] 2022 Update, Figure SCE 8-9, PSPS Decision-Making Flowchart/Diagram, p. 550.

[223] SCE's 2022 Update, p. 549.

[224] SCE's 2022 Update, pp. 533-534.

Community Engagement

As part of its PSPS CAP, SCE increased its marketing, education, and outreach to enroll qualifying customers into appropriate programs and services, such as its Medical Baseline (MBL) program.[225] SCE's marketing campaign emphasizes PSPS readiness and customer programs, specifically for vulnerable customers.

- SCE launched a dedicated web page where customers can self-certify as sensitive,[226] enroll in customer programs, and update their contact information.
- In 2021, SCE began engaging community-based organizations (CBOs) during activations to brief them to fulfill those customer needs (e.g., medical device or food needs).[227]
- SCE co-launched the California statewide AFN Advisory Council with other IOUs in 2020. The council's goals include raising awareness of the needs of access and functional needs (AFN) populations for communications, resources, and support.[228]
- In 2021, SCE expanded some of its customer care programs targeting AFN customers. For example, it expanded eligibility requirements for the Critical Care Backup Battery program to all MBL customers who are also enrolled in California Alternate Rates for Energy or Family Electric Rate Assistance and reside in SCE's high fire risk area. This expansion increased the number of eligible customers from 2,641 to over 13,000.[229]

In 2021, SCE completed a qualitative AFN research study that included both SCE customers and CBOs that serve AFN communities. The study identified gaps in public education,

[225] SCE's 2022 Update, p. 559.

[226] SCE's 2022 Update, p. 560. SCE defines "sensitive" here as "Households with one or more individuals who have self-certified that they have a serious illness or condition that could become life threatening if their electric or gas service is disconnected for nonpayment receive an in-person visit."

[227] SCE's 2022 Update, p. 560.

[228] SCE's 2022 Update, p. 561.

[229] SCE's 2022 Update, p. 562.

customer support, communication, and partner collaboration.[230] SCE incorporated its findings and recommendations in its 2022 AFN plan filing on January 31, 2022.[231]

To identify vulnerable populations, SCE uses internal enrollment data from customer programs and services. In 2022, it will use these data to increase its campaigns to identify and assist MBL customers.

Frequently De-energized Circuits

As required by the Guidelines[232] to address new legislation,[233] SCE provided a list of frequently de-energized circuits, and through a data request,[234] it provided a required map showing those circuits. The map shows 61 circuits experiencing frequent de-energizations during this period, categorized by frequency. For each circuit, SCE provided the required information, including circuit name, dates of outages, number of customers affected, and measures taken, or planned to be taken to reduce the need for and impact of future de-energization of those circuits.[235] These circuits are generally in mountainous areas of the HFTD surrounding the Los Angeles basin.

[230] SCE's 2022 Update, pp. 563-564.

[231] Pacific Gas and Electric Company's (U 39 E) 2022 Access and Functional Needs (AFN) Plan For Public Safety Power Shutoff (PSPS) Support, CPUC Rulemaking 18-12-005 (Filed December 13, 2018).

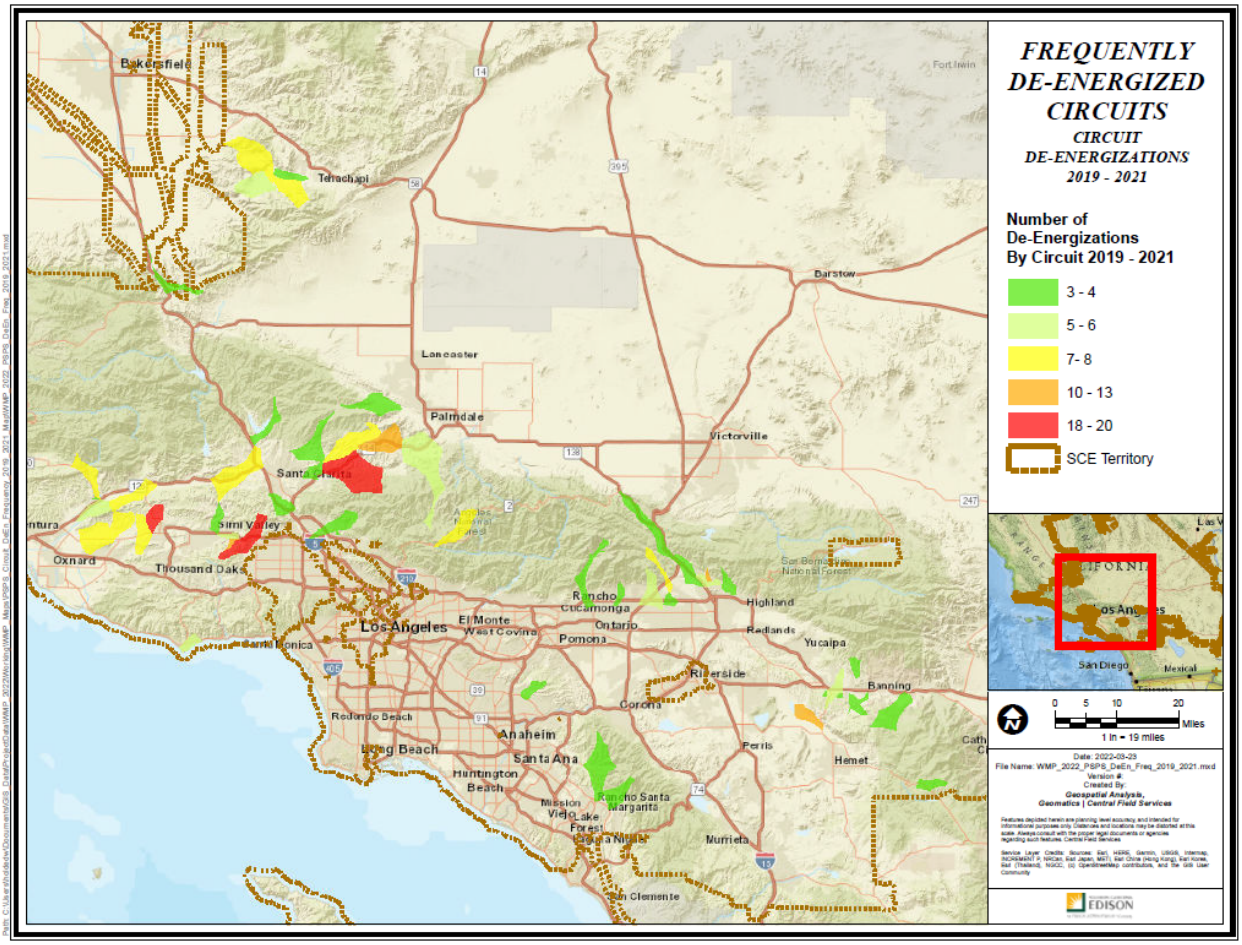
[232] 2022 Wildfire Mitigation Plan Guidelines Template, Attachment 2.7.3 p. 75 (accessed March 6, 2022): https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=51912&shareable=true.

[233] Senate Bill No. 533, Chapter 244, An act to amend Section 8386 of the Public Utilities Code relating to electricity, https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB533.

[234] Data Request OEIS-SCE-22-003, Question 3.

[235] SCE's 2022 Update, Table 8-2 Frequently De-energized Circuits, pp. 572-583.

Figure 4.7-5: Frequently De-energized Circuits Map[236]



4.7.3 Areas for Continued Improvement

In addition to progress made, SCE must continue to improve in the following areas:

- SCE indicated it will gradually include the benefits of hardened circuits as inputs to its PSPS consequence model. However, SCE set no specific timeframe for this. SCE must integrate the benefits of mitigation investments on hardened circuits and implement its condition-based risk-informed model capabilities to establish and use higher thresholds. SCE must clarify in its 2023 WMP whether higher PSPS thresholds were adopted prior to September 30, 2022. It is critical the adoption of higher thresholds

[236] Data Request OEIS-SCE-22-003, Question 3.

occurs in advance of the time of year when dry, windy weather conditions, combined with a heightened fire risk, are most often forecasted to drive potential PSPS events, generally in the fall after September 30.

- In 2021 field personnel inspecting lines prior to restoring power after PSPS events found 46 incidents of wind-related damage. This damage was on lines de-energized during PSPS events that potentially could have caused ignitions. CAL FIRE and Energy Safety asked SCE whether it has done any consequence modeling based on those damage points to better understand potential incidents that the shutoffs may have prevented. SCE responded it has not performed such modeling using the actual weather conditions at the time of the events.[237] SCE must report on progress to include observed PSPS event damage points as data input into its PSPS consequence models.
- SCE identified lessons learned from implementing 2021 PSPS events and specifically noted deficiencies with regard to operations in the face of a rapidly escalating PSPS event.[238] These were in the areas of notification and stakeholder engagement, restoration planning, resource availability, customer engagement, communication cadence, and improving forecasting models to improve communications. SCE must make progress in the following during 2022 and report on these areas in its 2023 WMP:
    - Continuing to refine weather forecasting capabilities to improve the ability to estimate wind speeds at specific locations where PSPS has occurred most frequently.
    - Using updated air operations training protocols for timely inspections to improve restoration times.
    - Increasing staff resources to address gaps in logistics processes for community resource center/community care vehicle supplies.
    - Providing customers more specific and accurate restoration time notification messages.

[237] Data Request OEIS-SCE-22-003, Question 10.

[238] SCE's 2022 Update, Table SCE 8-9 Lessons Learned Following 2021 PSPS Events, pp. 541-543.

- Providing sufficient notice for customers to prepare for potential de-energizations without notifying customers who are unlikely to be de-energized (over-notifying vs. under-notifying).
- Refining its weather models to inform customers more accurately of potential de-energization ahead of time.

Energy Safety sets forth specific areas for improvement and associated required progress in Section 7.

5. Next Steps

SCE is expected to continue to mature over the coming year. However, SCE must specifically demonstrate the required progress set forth in Section 7.

5.1 Change Orders

If SCE seeks to modify (reduce, increase, or end) WMP mitigation measures in response to data and results on electrical corporation ignition risk reduction impacts, SCE must submit a Change Order Report. At a high level, the objective of the change order process is to ensure the electrical corporation continues to follow the most effective and efficient approach to mitigating its wildfire risk. This could change as new information becomes available and as the electrical corporation gains experience and measures the outcomes of its initiatives. The Change Order Report must include significant shifts in the WMP starting from the date the WMP was submitted to Energy Safety for review.

The change order process is not the appropriate forum for the utility to change underlying assumptions, nor should the utility submit a change order that negates the strategic direction of its WMP. While Energy Safety promotes continued growth in response to new information, a utility should not make significant changes to its mitigation strategy over the course of the plan year.

The change order process provides a mechanism for the electrical corporation to make adjustments based on new information and experience. The goal of this process is to ensure that utilities make significant changes to their WMPs only if the utilities demonstrate these changes to be improvements per WMP approval criteria (i.e., completeness, technical feasibility, effectiveness, and resource use efficiency). Another goal of the change order process is to maximize Energy Safety's visibility and ability to respond to changes to the approved plan as efficiently and in as streamlined a way as possible. Finally, a change order allows the utility to explain whether a change is intentional or inadvertent.

Energy Safety will release further guidelines on the change order process in a separate document.

6. Consultation with the Office of the State Fire Marshal

The Office of the State Fire Marshal is a CAL FIRE program. Public Utilities Code Section 8386.3(a) requires Energy Safety to consult with the Office of the State Fire Marshal in reviewing electrical corporations' WMPs and WMP Updates. Energy Safety and CAL FIRE have a memorandum of understanding in place to facilitate this consultation.[239] The Office of the State Fire Marshal participated in all aspects of the evaluation, but this Decision does not purport to speak for the Office of the State Fire Marshal or CAL FIRE.

[239] Required by Public Utilities Code § 8386.5.

7. List of Utility Areas for Continued Improvement and Required Progress

Energy Safety evaluated 2022 Updates with a particular focus on how each utility is driving down the risk of utility-related ignitions. The evaluation included assessing the utility's progress implementing wildfire mitigation initiatives, evaluating the feasibility of its strategies, and measuring year-to-year trends. As a result of this evaluation, Energy Safety identified areas where the utility should continue to improve its wildfire mitigation capabilities in future plans. The complete list of all SCE's areas for continued improvement follows below.

- **SCE-22-01. Prioritized List of Wildfire Risks and Drivers.**
    - Description: Currently, SCE's prioritized list of wildfire risks and drivers (Table 4-6) weights the risk drivers by average outage multiplied by ignition rate; it does not account for the likelihood of the ignition to cause a catastrophic wildfire.
    - Required Progress: In its 2023 WMP, SCE must further refine its prioritized list of wildfire risks and drivers. It must do so by weighting each risk driver by likelihood of causing a catastrophic wildfire (e.g., does this ignition tend to happen in high wildfire risk areas identified by SCE's risk models, including the HFTD).
    - Discussed in Decision Section 4.3, "Lessons Learned and Risk Trends."

- **SCE-22-02. Collaboration and Research in Best Practices in Relation to Climate Change Impacts and Wildfire Risk and Consequence Modeling.**
    - Description: SCE and the other large IOUs are currently pursuing their own efforts at integrating the potential impacts of climate change in their risk and consequence modeling. They are not actively collaborating with each other on these efforts nor taking advantage of the existing climate change modeling expertise of state agencies and academic institutions.

- Required Progress: Prior to the submission of their 2023 WMPs, all electrical corporations (not including independent transmission operators) must participate in an Energy Safety-led scoping meeting to discuss how utilities can best learn from each other, external agencies, and outside experts. In addition, the climate change and risk modeling scoping meeting will identify future topics to explore regarding climate change modeling and impacts relating to wildfire risk. This scoping meeting may result in additional meetings or workshops or the formation a working group. Energy Safety will provide additional details on the specifics of this scoping meeting in due course.
- Discussed in Section 4.3, "Lessons Learned and Risk Trends."

- **SCE-22-03. Three-Year Objectives and Supporting Programs' Performance Targets.**
  - Description: SCE's 2022 Update did not include any quantitative targets for WMP mitigation measures that would contribute to reaching its stated three--year objectives.
  - Required Progress: In its 2023 WMP, SCE must include the near-term and three-year objectives related program performance targets, whether quantitative or qualitative, into Table 5.3-1 (or its successor in the 2023 Guidelines). This integration must include program performance targets through the end of 2025.
  - Discussed in Section 4.4, "Inputs to the Plan and Directional Vision for the WMP."

- **SCE-22-04. Inclusion of Community Vulnerability in Consequence Modeling.**
  - Description: SCE does not currently include the impacts of wildfire on communities, including considerations of community vulnerability, within consequence modeling.
  - Required Progress: Prior to the submission of their 2023 WMPs, all electrical corporations (not including independent transmission operators) must participate in an Energy Safety-led scoping meeting to discuss how to best learn from each other, external agencies and outside experts. In addition, the

community vulnerability scoping meeting will identify future topics to explore regarding integration of community vulnerability into consequence modeling and impacts relating to wildfire risk. This scoping meeting may result in an additional meetings or workshops or the formation of a working group. Energy Safety will provide additional details on the specifics of this scoping meeting in due course.

- Discussed in Decision Section 4.6.1, "Risk Assessment and Mapping."

- **SCE-22-05. Fire Suppression Considerations.**
  - Description: SCE's fire spread modeling does not currently factor in fire suppression effects (e.g., fire department efforts).
  - Required Progress: Prior to the submission of its 2023 WMP, SCE must work with other utilities to evaluate how to best account for, quantify, and model suppression effects on wildfire spread. Further guidance will be determined and covered during the risk model working group meetings established by Energy Safety's 2021 WMP Action Statements.
  - Discussed in Decision Section 4.6.1, "Risk Assessment and Mapping."

- **SCE-22-06. Ignition Risk Reduction.**
  - Description: From 2020 to 2021, SCE reported an increase in total ignition rates, particularly from wire-to-wire contacts.
  - Required Progress: In SCE's 2023 WMP, SCE must:
    - Analyze root causes and trends for the increases in ignitions broken down by sub-driver, including wire-to-wire contacts.
    - Provide SCE's plans to address increases in ignition rates broken down by risk drivers and sub-drivers, including efforts to address the root cause(s) outside of routine or program-level WMP initiatives.
  - Describe and quantify how SCE anticipates covered conductor and undergrounding initiatives will impact expected ignitions due to conductor damage or failure.

- **SCE-22-07. Wildfire Consequence Modeling Improvements.**
    - Description: SCE has not yet improved its wildfire consequence modeling to allow the utility to be informed and respond in near real-time as faults/outages occur in the HFTD.
    - Required Progress: In its 2023 WMP, SCE must discuss how it explored and/or implemented using its wildfire consequence modeling on the locations of faults/outages in the HFTD as they happen. This should include incorporating considerations of the given risk for associated locations based on risk modeling and prioritizing response based on risk.
    - Discussed in Decision Section 4.6.2, "Situational Awareness and Forecasting."

- **SCE-22-08. Weather Station Improvements.**
    - Description: SCE weather station observation intervals are not reported as frequently as peer utilities.
    - Required Progress: SCE must improve its weather station observation intervals to collect weather data more frequently than six times per hour. In its 2023 WMP SCE must improve the frequency that data is collected from its weather station network to match that of its peers. If unable to increase the data collection from its weather station network to that of its peers, SCE must present a plan to develop that functionality in its 2023 WMP.
    - Discussed in Decision Section 4.6.2, "Situational Awareness and Forecasting."

- **SCE-22-09. Joint Covered Conductor Lessons Learned.**
    - Description: SCE has yet to provide goals and timelines for implementing lessons learned from the covered conductor joint effectiveness study.
    - Required Progress: In its 2023 WMP, SCE must:
        - Provide a concrete list of goals with planned dates of implementation for any lessons learned in the covered conductor effectiveness joint study.
        - Provide a table indicating which WMP sections include changes (compared to its 2021 and 2022 Updates) as a result of the covered

conductor effectiveness joint study. This should include, but not be limited to:

- Changes made to covered conductor effectiveness calculations.
- Changes made to initiative selection based on effectiveness and benchmarking across alternatives.
- Inclusion of rapid earth fault current limiter (REFCL), open phase detection (OPD), early fault detection (EFD), and distribution fault anticipation (DFA) as alternatives, including for PSPS considerations.
- Changes made to cost impacts and drivers.
- An update on data sharing across utilities on measured effectiveness of covered conductor in-field and pilot results, including collective evaluation.

  - Discussed in Decision Section 4.6.3, "Grid Design and System Hardening."

- **SCE-22-10. Covered Conductor Inspection and Maintenance.**
  - Description: SCE must evaluate and update its covered conductor inspection and maintenance program.
  - Required Progress: All electrical corporations (not including independent transmission operators) must work to share and determine best practices for inspecting and maintaining covered conductor, including either augmenting existing practices or developing new programs. This should be considered as a continuation of the covered conductor study established by Energy Safety's 2021 WMP Action Statements. The study will continue to be utility-led, with the expectation for Energy Safety to be included as a participant.
  - Discussed in Decision Section 4.6.3, "Grid Design and System Hardening."

- **SCE-22-11. New Technologies Evaluation and Implementation**
  - Description: SCE needs to work and benchmark with other utilities to further evaluate new technologies and share progress on pilots and implementation.

- Required Progress: All electrical corporations (not including independent transmission operators) must collaborate to evaluate the effectiveness of new technologies that support grid hardening and situational awareness such as REFCL and DFA/EDF, particularly in combination with other initiatives. Utilities must also share practices and evaluate implementation strategies for these new technologies. This should be considered as a continuation of the covered conductor study established by Energy Safety's 2021 WMP Action Statements. The scope of this study should now be expanded to cover grid hardening overall. The study will continue to be utility-led, with the expectation for Energy Safety to be included as a participant.
- Discussed in Section 4.6.3, "Grid Design and System Hardening."

- **SCE-22-12. Residual Risk Reduction associated with Covered Conductor.**
  - Description: SCE is deploying a suite of mitigations under CC++ that should be seen as temporary solutions. SCE must strive to find more permanent solutions to address the remaining ignition risk.
  - Required Progress: In the 2023 WMP filing, SCE must:
    - Provide SCE's plan and timeline for moving forward with REFCL, including mileage and risk addressed.
    - Provide SCE's plan and timeline for moving forward with additional pilot technologies, such as DFA and EFD.
    - Include effectiveness evaluations of added mitigation measures for CC++ in comparison to undergrounding when determining initiative selection.
  - Discussed in Decision Section 4.6.3, "Grid Design and System Hardening."

- **SCE-22-13. Remaining Severe Risk Areas.**
  - Description: SCE does not have 36.36% of its self-defined severe risk areas accounted for within its grid hardening scope.
  - Required Progress: In the 2023 WMP filing, SCE must:

        - Provide a plan, including timeline, for scoping and addressing the remaining severe risk areas by the end of the 2023-25 WMP cycle.
        - Provide a plan for addressing the near-term risk in the remaining 36% of severe risk areas in the interim.
    - Discussed in Decision Section 4.6.3, "Grid Design and System Hardening."

- **SCE-22-14. Evaluation of Vibration Dampers.**
    - Description: SCE is scaling back on its vibration dampers retrofitting for installed covered conductor.
    - Required Progress: In its 2023 WMP, SCE must:
        - Provide a description of the analysis performed to determine local wind conditions that lead to Aeolian vibrations.
        - Provide further justification for why SCE is scaling back vibration damper installation for covered conductor retrofits.
        - Explain why it has not performed similar analysis for all covered conductor installations.

- **SCE-22-15. Targets Relating to Addressing Inspection Findings.**
    - Description: SCE's increased inspections (performed to exceed existing GO requirements and better address wildfire risk) resulted in a backlog of repairs.
    - Required Progress: In its 2023 WMP, SCE must:
        - Identify which open work orders directly present ignition risks and provide a plan to prioritize repairs that address the highest risk. This plan should cover a time period up to the end of 2023.
        - Provide quantitative targets for addressing repairs for infractions found during inspections, broken down by severity level of the finding.
    - Discussed in Decision Section 4.6.4, "Asset Management and Inspections."

- **SCE-22-16. Increases in Equipment Related Ignitions.**

- Description: SCE's equipment-related ignitions outside of the HFRA have increased,[240] particularly those related to conductor damage and failures.
- Required Progress: In its 2023 WMP, SCE must:
  - Provide failure mode, event, and trend analyses relating to recent increases in ignitions from equipment failures, including conclusions and lessons learned.
  - Provide a plan to specifically address ignitions in high-risk areas caused by conductor, transformer, and connection device damages and failure.
- Discussed in Decision Section 4.6.4, "Asset Management and Inspections."

- **SCE-22-17. Address Secondary Conductor Issues.**
  - Description: SCE has a high percentage of ignitions from secondary conductor, and a high find rate for findings relating to secondary conductor during inspections' QA/QC.
  - Required Progress: In its 2023 WMP, SCE must:
    - Provide its plan to mitigate and reduce secondary conductor ignitions in the future, including a timeline and status for the plan it provided in its 2022 Update.[241]
    - Demonstrate a decrease in the percentage of QA/QC findings relating to secondary conductor.
  - Discussed in Decision Section 4.6.4, "Asset Management and Inspections."

- **SCE-22-18. Progression of Joint Effectiveness of Enhanced Clearances Study.**
  - Description: The 2021 Action Statements required the Large IOUs to conduct a study assessing the effectiveness of enhanced clearances. Progress has been made in the study; however, the study must continue to progress.

[240] SCE predicts ignitions outside the HFRA to decrease in future years.

[241] SCE's 2022 Update, p. 371-372.

- Required Progress: By the submission of the 2023 WMPs, SCE, along with PG&E and SDG&E, must (1) standardize the data collection process for the cross-utility database of tree-caused risk events, (2) determine where and in what form the database will exist, and (3) examine, to the best of their ability, whether the correlation between enhanced clearances and the lower number of tree-caused outage events may be attributable to other factors beyond clearances, such as the management of hazard trees and the installation of covered conductor. Energy Safety expects the large IOUs to make incremental progress and update their analyses with each WMP submission through at least 2025.
- Discussed in Decision Section 4.6.5, "Vegetation Management and Inspections."

- **SCE-22-19. Participation in Vegetation Management Best Management Practices Scoping Meeting.**
  - Description: Vegetation management processes and protocols for the reduction of wildfire risk are not uniform across electrical corporations.
  - Required Progress: Prior to the submission of their 2023 WMPs, SCE and all other electrical corporations (not including independent transmission operators) must participate in an Energy Safety-led scoping meeting to discuss how utilities can best learn from each other and future topics to explore regarding vegetation management best management practices for wildfire risk reduction. This vegetation management best management practices scoping meeting may result in additional meetings or workshops or the formation of a working group. Energy Safety will provide additional details on the specifics of this scoping meeting later in 2022.
  - Discussed in Decision Section 4.6.5, "Vegetation Management and Inspections."

- **SCE-22-20. Protective Device Settings Sensitivity Impacts.**
  - Description: Although SCE estimates reduced reliability impacts from new sensitivity setting for protective devices, SCE has not performed full analysis on reliability and related public safety impacts for changes to its FCS.

- Required Progress: In its 2023 WMP SCE must:
  - Analyze any reliability impacts associated with changes in sensitivity of protective device settings, including a lookback for 2022 performance compared to 2021.
  - Describe mitigations implemented to reduce reliability impacts of FCS if noticeable impacts are observed.
- Discussed in Decision Section 4.6.6, "Grid Operations and Operating protocols, Including PSPS."

- **SCE-22-21. 4.6.7.3 Documentation of Models.**
  - Description: SCE does not provide sufficiently detailed information on models.
  - Required Progress: SCE's 2023 WMP submission must follow the appropriate template provided in the 2023 WMP Guidelines for the metrics and underlying data section when documenting the models described in section 7.3.7.3 of its 2022 Update submission.
  - Discussed in Decision Section 4.6.7, "Data Governance."

- **SCE-22-22. Third Party Confirmation of RSE Estimates.**
  - Description: SCE does not confirm its RSE estimates with independent experts or other utilities in California.
  - Required Progress: In its 2023 WMP, SCE must show that its RSE estimates are confirmed by a third party or detail an action plan and associated timeline for third party confirmation of all RSE estimates.
  - Discussed in Decision Section 4.6.8, "Resource Allocation Methodology."

- **SCE-22-23. RSE Estimates of Emerging Initiatives.**
  - Description: SCE does not calculate RSE estimates for emerging initiatives.
  - Required Progress: In its 2023 WMP, SCE must detail an action plan for calculating RSE estimates for emerging initiatives.
  - Discussed in Decision Section 4.6.8, "Resource Allocation Methodology."

- **SCE-22-24. RSE Estimates used for Capital Allocation.**
    - Description: SCE does not use RSE estimates as a factor for determining capital allocation across its portfolio of mitigation measures (e.g., prioritizing between vegetation management and grid hardening).
    - Required Progress: In its 2023 WMP, SCE must show that it is using RSE estimates to determine capital allocation across its portfolio of mitigation measures or detail an action plan and associated timeline for using RSE estimates to determine portfolio-level periodization.
    - Discussed in Decision Section 4.6.8, "Resource Allocation Methodology."

- **SCE-22-25. Increasing PSPS Thresholds on Hardened Circuits**
    - Description: SCE indicated it will gradually include the benefits of hardened circuits as inputs to its PSPS consequence model. However, SCE included no specific timeframe for when it will raise thresholds.
    - Required Progress: In its 2023 WMP, SCE must report on whether higher PSPS thresholds were adopted as a result of grid hardening measures. If so, SCE should confirm which circuits benefited and provide details on the extent to which PSPS thresholds were raised.
    - SCE must clarify in its 2023 WMP whether higher PSPS thresholds were adopted prior to September 30, 2022, for potential use during the time of year when dry, windy weather conditions, combined with a heightened fire risk, are most often forecasted to drive need for PSPS events. If it has not raised thresholds, SCE must explain why and by when it will include raised thresholds.
    - Discussed in Decision Section 4.7, "Public Safety Power Shutoff (PSPS), Including Directional Vision for PSPS."

- **SCE-22-26. PSPS System Damage in Consequence Modeling**
    - Description: In 2021 field personnel inspecting lines prior to restoring power after PSPS events found 46 incidents of wind-related damage. This damage

was on lines de-energized during PSPS events that potentially could have caused ignitions. SCE has not performed consequence modeling based on these damage points to better understand potential incidents that the shutoffs may have prevented.

- Required progress: In its 2023 WMP Update, SCE must report on progress to include observed PSPS event damage points as data input into its PSPS consequence models.

- **SCE-22-27. Lessons Learned from PSPS Implementation**
  - Description: As identified by SCE in its lessons learned from implementing 2021 PSPS events, SCE noted deficiencies regarding operations in the face of rapidly escalating events. Deficiencies were in the areas of notification and stakeholder engagement, restoration planning, resource availability, customer engagement, communication cadence, and improving forecasting models to improve communications.
  - Required Progress: In its 2023 WMP Update, SCE must report on progress in the following areas:
    - Refining weather forecasting capabilities to improve ability to estimate wind speeds at specific locations where PSPS events have occurred most frequently.
    - Using updated air operations training protocols for timely inspections to improve restoration times.
    - Increasing staff resources to address gaps in logistics processes for community resource center/community care vehicle supplies.
    - Providing customers more specific and accurate restoration time notification messages.
    - Providing sufficient notice for customers to prepare for potential de-energizations without notifying customers who are unlikely to be de-energized (over-notifying vs. under-notifying).
    - Refining its weather models to inform customers more accurately of potential de-energization ahead of time.

8. Conclusion

SCE's 2022 Update is approved.

Catastrophic wildfires remain a serious threat to the health and safety of Californians. Electrical corporations, including SCE, must continue to make progress toward reducing utility-related ignition risk. Energy Safety expects SCE to effectively implement its wildfire mitigation activities to reduce the risk of utility-related ignitions and the potential catastrophic consequences if an ignition occurs, as well as to reduce the scale, scope, and frequency of PSPS events. SCE must meet the commitments in its 2022 Update and fully comply with the conditions listed in this Decision to ensure it meaningfully reduces utility-related ignition and PSPS risk within its service territory.

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

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APPENDICES

Appendices

Appendix A. Status of 2021 WMP Issues

Energy Safety's 2021 Update Action Statement for each utility contained a set of "issues" and associated "remedies." Each issue was categorized into one of three groups:

- *Critical issues* were those for which Energy Safety issued a Revision Notice to the utility with required remedies. The utility submitted a revised Update addressing the critical issues, and Energy Safety re-evaluated the Update with the utility's revisions. Upon that review, issues may have been downgraded to either "key areas for improvement" or "additional issues," or were fully resolved.
- *Key areas for improvement* were areas Energy Safety identified as significant to reducing utility-related wildfire risk. Energy Safety provided remedies that utilities were required to address over the course of the year. Utilities were required to report on progress in these key areas in a progress report submitted to Energy Safety on November 1, 2021.
- *Additional issues* were those Energy Safety identified as areas for continued improvement to increase the maturity of the utility's wildfire mitigation capabilities. Energy Safety provided remedies that utilities were required to address over the course of the year. Utilities were required to report on progress in the 2022 WMP Update.

Issues identified in 2021 either have been resolved or are incorporated in the 2022 areas for continued improvement. The 2021 key areas for improvement are listed in Table A-1. The status column indicates whether each has been fully remedied. If not, the column notes where to find more information in this Decision.

Table A-1. SCE 2021 Key Issues Status

Issue #	Title	Status
SCE-21-01	RSE estimates not provided for all PSPS-related mitigation initiatives	Utility sufficiently addressed the required remedy.
SCE-21-02	RSE values vary across utilities	Utility sufficiently addressed the required remedy.
SCE-21-03	Lack of consistency in approach to wildfire risk modeling across utilities	Utility sufficiently addressed the required remedy.
SCE-21-04	Limited evidence to support the effectiveness of covered conductor	Addressed in Areas for Continued Improvement in Section 4.6.3 of this Decision.
SCE-21-05	Out-dated risk assessment used to justify the selection and scope of covered conductor as a mitigation initiative	Utility sufficiently addressed the required remedy.
SCE-21-06	Inadequate justification for scope and pace of its covered conductor program	Addressed in Areas for Continued Improvement in Section 4.6.3 of this Decision.
SCE-21-07	Inadequate joint plan to study the effectiveness of enhanced clearances	Addressed in SCE's Progress and Areas for Continued Improvement in Section 4.6.5 of this Decision.
SCE-21-08	Incomplete identification of vegetation species and record keeping	Utility sufficiently addressed the required remedy.

Issue #	Title	Status
SCE-21-09	Need for quantified vegetation management (VM) compliance targets	Utility sufficiently addressed the required remedy.
SCE-21-10	Inadequate transparency in accounting for ignition sources in risk modeling and mitigation selection	Addressed in Areas for Continued Improvement in Section 4.6.3.1 of this Decision.
SCE-21-11	Unclear how SCE's ignition models account for correlations in wind speeds, ignitions, and consequence	Utility sufficiently addressed the required remedy.
SCE-21-12	Insufficient evidence of effective covered conductor maintenance program	Addressed in Areas for Continued Improvement in Section 4.6.3 of this Decision.
SCE-21-13	Lack of specificity regarding how increased grid hardening will change system operations, change PSPS thresholds, and reduce PSPS events	Utility sufficiently addressed the required remedy.
SCE-21-14	Equivocating language used to describe RSE calculation improvements	Utility sufficiently addressed the required remedy.

Appendix B. Energy Safety Data Request Responses

The following are data requests and their responses from SCE referenced in the Decision above.

Regarding Maturity Model Survey – Vegetation management and inspection:

Data Request: OEIS-SCE-22-001 (Question 1)

Request date: March 3, 2022

Request:

a. We have multiple questions regarding the answers provided in the vegetation management and inspection section of the maturity model survey:

(Note: no discussion is required, provide only a Yes/No answer)

i. Considering Maturity Model Survey question E.IV.h, how would SCE answer this modified version: Does the utility work with landowners to provide a use(s) for vegetation cut on the landowner's property? (Yes/No)

ii. Considering Maturity Model Survey question E.IV.i, how would SCE answer this modified version: Does the utility work with partners to identify uses for cut (waste) vegetation, taking into consideration environmental impacts and emissions of vegetation waste? (Yes/No)

iii. Considering Maturity Model Survey question E.V.f, how would SCE answer this modified version: Does the utility work with landowners to provide a use(s) for vegetation cut on the landowner's property? (Yes/No)

iv. Considering Maturity Model Survey question E.V.g, how would SCE answer this modified version: Does the utility work with partners to identify uses for cut vegetation, taking into consideration environmental impacts and emissions of vegetation waste? (Yes/No)

Response date: March 8, 2022

Response:

Please see below for SCE's response for the modified maturity model questions.

i. Yes

ii. Yes

iii. Yes

iv. Yes

Regarding Off-Cycle Vegetation Management Inspections:

Data Request: OEIS-SCE-22-002 (Question 7)

Request date: March 15, 2022

Request:

a. Section 7.3.3.3 details the Covered Conductor Installation Program and 7.3.4 details the Asset Management and Inspections Program. Neither section includes details regarding the procedures and inspection criteria used for inspecting covered conductor.

   i. Provide all procedures and inspection criteria used for inspecting covered conductor.

Response date: March 17, 2022

Response:

As described in section 7.3.3.4 of the 2022 WMP Update, SCE does not have a separate covered conductor maintenance program. As part of the new construction, QA/QC is performed to make sure that work standards are adhered to for the installation of covered conductor. This is similar to bare wire, where SCE inspects the installation to ensure the work meets SCE standards and replaces or repairs improperly installed equipment. Additionally, ongoing covered conductor inspection and maintenance is included in High Fire Risk-Informed (HFRI) inspections and remediations and follows the same approach, schedule, and prioritization.

Additional information on the pace and quantity of SCE's HFRI program including scheduled maintenance and inspections to effectively maintain its covered conductor installations can be found in Section 7.3.4.9.1.

As mentioned in Section 9.3, SCE ensures that our inspection programs address covered conductor by including specific covered conductor-related questions in the inspections survey. These covered conductor-related questions are included below.

Distribution Ground Inspection Survey:

What type(s) of primary conductors are installed? Select all that apply.

NOTE: Only select primary conductor sizes and NOT taps/jumpers. Covered is tree wire. Aerial cable is bundled cable.

- Covered/insulated
- Copper
- Aluminum
- Aerial cable

For covered conductor – select all applicable directions covered conductor is installed? Select all that apply or select "No primary covered conductors installed".

- North
- South
- East
- West
- No primary covered conductor installed

For covered conductor – indicate if any of the following covered conductor covers are missing. Select all that apply or select "No missing covered conductor covers" or select "No primary covered conductor installed".

- Dead-end cover (Notification Required)
- Bare Tap (Notification Required)
- Connector cover (Notification Required)
- Fuse cover (Notification Required)
- Lightning arrestor cover (Notification Required)
- Equipment bushing cover (Notification Required)

- Pothead cover (Notification Required)
- No primary covered conductor installed
- No missing covered conductor cover

If covered conductor is installed, are there visible signs of tracking or damage on the outer jacket?

- Yes (Notification Required)
- No
- No primary covered conductor installed

For covered conductor – Are lightning arresters installed on structures containing the following equipment: RAR, RSR, Capacitors, Voltage Regulators, PTs associated with RCSs and PE equipment, Transformers, BLFs, and UG Dips?

- No (Notification Required)
- Yes
- No primary covered conductor installed
- No primary equipment present

For covered conductor – For line connections (excludes connections to equipment), what

jumper is used?

- PGW (Notification Required)
- Bare wire (If bare, will need to be covered with split tube) (Notification Required)
- Covered Conductor
- Wire with split tube
- No covered conductor installed

Aerial Distribution Inspections Survey:

What type(s) of primary conductors are installed?

- Covered/insulated
- Copper
- Aluminum
- Aerial cable

Are there visible signs of tracking or damage on the outer jacket of the covered conductor

- Yes (Notification Required)
- No

Are Protective Ground Wire (PGW) jumpers used for any covered conductor line connections?

- Yes (Notification Required)
- No
- Unable to Determine

Regarding Fast Response Settings:

Data Request: OEIS-SCE-22-002 (Question 11)

Request date: March 15, 2022

Request:

a. SCE is increasing their use of devices with fast response settings.
   i. What number and percentage of remote sectionalizing devices have the capability to enable these settings?
   ii. When would devices with such a setting capability within the HFTD be enabled (i.e. during days with an extreme FPI rating or PSPS-triggering conditions)?
   iii. How does SCE determine which devices are enabled and when?
   iv. How would conditions triggering a PSPS event differ from determining if more sensitive settings are enabled?

v. For the sensitive/fast protection settings, what is the increased sensitivity.

vi. Are the sensitive/fast protection settings factory based? If the sensitive/fast protection settings are nor factory-based, how are settings determined?

vii. Are the same sensitive/fast protection settings enabled for all devices? If not, how are settings for particular locations or devices determined?

Response date: March 18, 2022

Response:

i. SCE has 1,071 distribution circuits in HFRA. SCE currently has approximately 900 circuits protected by Fast Curve Settings (FCS) using a combination of circuit breakers and/or Remote Controlled Automatic Reclosers (RAR). There are approximately 1,100 RARs on the 900 HFRA circuits which have FCS. 100% of these RARs have the remote capability to enable (or disable) the FCS.

ii. All distribution circuits with this capability shall have their FCS enabled when a Red Flag Warning (RFW), Fire Weather Threat (FWT), Fire Climate Zone (FCZ), or Thunderstorm Threat is declared for the Switching Center and county affected.

iii. The FCS are enabled per System Operating Bulletin 322, under the following conditions:

Declaration of RFW, FWT, FCZ, Thunderstorm Threat

1. RFW issued by the National Weather Service (NWS). The NWS will declare a RFW anytime weather conditions warrant.

A. Recloser Restrictions will be applied to all sub-transmission and distribution circuits within the county under the declaration.

B. Operating Restrictions will be applied to all sub-transmission and distribution circuits within the county under the declaration.

2. FWT. SCE Weather Services will declare a FWT based on assessments provided by SCE's Meteorology Group of possible fire threats. Fire threats may also be declared by FCZ based on assessments provided by SCE Fire Science Group.

A. Recloser Restrictions will be applied to all sub-transmission and distribution circuits by Switching Center and county, unless Individual Recloser Restrictions are in effect for distribution per SOB-322. Refer to Section 3.5. FCZ recloser

restrictions will be applied to HFRA distribution circuits by zones utilizing the SOB-322 program.

B. Operating Restrictions: The Switching Center System Operator must reference the PSPS Watch List following a relay operation to determine if Operating Restrictions apply. Circuits that are not listed on the Watch List may be tested without a patrol.

3. Thunderstorm Threat. SCE Weather Services will declare a Thunderstorm Threat based on assessments provided by the Meteorology Group of possible thunderstorms producing dry lightning and strong downburst winds during periods of increased fire threat.

A. Recloser Restrictions will be applied to all sub-transmission and distribution circuits and circuit sections by Switching Center and county.

B. Operating Restrictions will be applied to all sub-transmission and distribution circuits and circuit sections by Switching Center and county.

4. Fire Climate Zones

• This group seeks approval to build on the existing seasonality approach of FCZ Operating Restrictions. The new methodology will include a weekly forecast of Fire Science's newly developed Fuels Index.

• Analysis has been conducted to determine breakpoints for fuel dryness and to determine periods of time that FCZ Operating Restrictions should be implemented on a weekly basis.

• Utilizing this new index will incorporate a weekly assessment of fuel dryness to limit the negative work impacts, improve reliability and customer experience, and allow for a more targeted approach in implementing FCZ Operating Restrictions.

iv. See responses to ii & iii above. SCE can command these changes from remote switching centers though a radio control network near real time. The commands can be sent to individual reclosers or also can be set to enable a group of reclosers depending on the operational needs.

v. SCE increases sensitivity by decreasing the time the relay takes to operate. This reduces the fault energy (I2t) by limiting the time the fault persists on the circuit. The

traditional time overcurrent response is dependent on a current/time curve which generally will take longer to operate for fault currents towards the end of line and faster for higher magnitude faults closer to the source. The Fast Curve response operates in a fast fixed time (0-2 cycle relay response time). The Fast Curve pickup sensitivity is different for each circuit and is set to a multiple of each circuit's minimum trip.

vi. No. For circuit breakers, the Fast Curve pickup is set to a multiple of each circuit's minimum trip (typically 4 or 5 times the minimum trip). The time delay for the Fast Curves is set to either 0 or 2 cycles depending on the available fault current at the source. For Remote Controlled Automatic Reclosers, Fast Curve pickup is set to a fixed 5 times multiple of each recloser's minimum trip and the time delay is set to 0 cycles.

vii. No, they're not the same settings however the same setting criteria is applied generally. Refer to response in v and vi. SCE has standardized recloser configuration settings which control the operation of the recloser. These settings reside as part of the local recloser controller, and SCE has elected to use these standard configuration settings for typical recloser installations whether they are related to HFRA circuitry or non-HFRA circuitry. As examples, these configuration settings include capabilities to block reclosing, block the ground relay, and activate fast curve settings

Regarding Fast Curve:

Data Request: OEIS-SCE-22-002 (Question 12)

Request date: March 15, 2022

Request:

a. SCE uses Fast Curve (FC) settings on selected circuit breaker relays.

   i. What percentage of relays currently have FC settings enabled?

   ii. What percentage of circuits within the HFRA use FC settings?

   iii. What is the target percentage of relays that are planned to have FC settings enabled by 2024?

   iv. If the target percentage of relays planned to have these FC settings enabled by 2024 is reached, what percentage of circuits within the HFRA would this account for?

v. How is SCE prioritizing enabling FC settings?

vi. Why did SCE implement FC settings on 10 relays outside of the HFRA?

vii. What "high fire threat conditions" trigger enabling the FC settings?

viii. Provide the percent effectiveness for ignition risk reduction and any associated calculations performed for enabling FC settings.

ix. Do FC settings affect reliability?

x. If FC impact reliability, provide any analysis completed to determine reliability impacts.

Response date: March 17, 2022

Response:

i. SCE has 4627 distribution circuits. Of those circuits, 642 have Fast Curves on the circuit breaker. This equates to 642/4627 = 14% of SCE distribution circuits have Fast Curves on the circuit breaker.

ii. SCE has 1071 distribution circuits in HFRA. SCE currently has approximately 900 circuits protected by Fast Curves using a combination of circuit breakers and/or Remotely Controlled Automatic Reclosers. 642 HFRA circuits have Fast Curves on the circuit breaker. This equates to 642/1071 = 60% of HFRA circuits have Fast Curves on the circuit breaker. The roughly 258 remaining HFRA circuits have Fast Curves on Remote Controlled Automatic Reclosers, with a total of approximately 1100 Remote Controlled Automatic Reclosers installed on HFRA circuits.

iii. By 2024, SCE is targeting to have roughly 200 more circuit breakers with Fast Curves. This equates to 842/1071 = 78% of distribution lines in HFRA protected by circuit breakers with Fast Curves. The remaining lines will be protected by Remote Controlled Automatic Reclosers with Fast Curves, and/or branch line fuses. Overall, this should provide 100% of HFRA distribution circuits with Fast Curve protected devices and/or branch line fuse.

iv. If SCE reaches it 2024 target, 78% of HFRA distribution lines will have circuit breakers with Fast Curves.

v. SCE is prioritizing the installation of circuit breakers with Fast Curves with planned construction work to bundle this effort with other station work along with availability of construction crews.

vi. SCE implemented Fast Curve settings on 10 relays outside of HFRA where other protective devices were required to be replaced due to space considerations, on circuit breakers which act as backup to HFRA circuits, or on circuits between 2018 to 2020 to provide arc flash protection while crews were working on the circuit. Since 2020, dedicated arc flash protective settings have been used to provide arc flash protection.

vii. The Fast Curve settings are enabled per System Operating Bulletin 322, under the following conditions:

Declaration of RFW, FWT, FCZ, Thunderstorm Threat

1. Red Flag Warning (RFW) issued by the National Weather Service. The NWS will declare a RFW anytime weather conditions warrant.

A. Recloser Restrictions will be applied to all sub-transmission and distribution circuits within the county under the declaration.

B. Operating Restrictions will be applied to all sub-transmission and distribution circuits within the county under the declaration.

2. Fire Weather Threat (FWT). SCE Weather Services will declare a FWT based on assessments provided by SCE's Meteorology Group of possible fire threats. Fire threats may also be declared by Fire Climate Zones (FCZ) based on assessments provided by SCE Fire Science Group.

A. Recloser Restrictions will be applied to all sub-transmission and distribution circuits by Switching Center and county, unless Individual Recloser Restrictions are in effect for distribution per Auto-322. Refer to Section 3.5. Fire Climate Zone (FCZ) recloser restrictions will be applied to HFRA distribution circuits by zones utilizing the Auto-322 program.

B. Operating Restrictions: The Switching Center System Operator must reference the PSPS Watch List following a relay operation to determine if Operating Restrictions apply. Circuits that are not listed on the Watch List may be tested without a patrol.

3. Thunderstorm Threat. SCE Weather Services will declare a Thunderstorm Threat based on assessments provided by the Meteorology Group of possible thunderstorms producing dry lightning and strong downburst winds during periods of increased fire threat.

A. Recloser Restrictions will be applied to all sub-transmission and distribution circuits and circuit sections by Switching Center and county.

B. Operating Restrictions will be applied to all sub-transmission and distribution circuits and circuit sections by Switching Center and county.

4. Fire Climate Zones

• This group seeks approval to build on the existing seasonality approach of FCZ Operating Restrictions. The new methodology will include a weekly forecast of Fire Science's newly developed Fuels Index.

• Analysis has been conducted to determine breakpoints for fuel dryness and to determine periods of time that FCZ Operating Restrictions should be implemented on a weekly basis.

• Utilizing this new index will incorporate a weekly assessment of fuel dryness to limit the negative work impacts, improve reliability and customer experience, and allow for a more targeted approach in implementing FCZ Operating Restrictions.

viii. CB with Fast Curve settings have a 15% mitigation effectiveness against ignition drivers such as contact-from-object and equipment/facility failure. Using the mitigation effectiveness at the sub-drivers, SCE calculated an associated RSE value of 17,873, which was high compared to other wildfire mitigation activities. This information can be found in SCE's 2022 WMP Update on Table SCE 4-11, beginning on page 72.

ix. Yes, Fast Curve settings do affect reliability during some fault conditions. The Fast Curves may operate either at the same time or faster than downstream devices and do not provide traditional relay coordination between protective devices on the circuit. This may cause larger sections of the circuit to be deenergized and may cause longer patrol times.

x. SCE does not presently differentiate between outages that would have remained the same, or potentially impacted a greater amount of circuitry as described in response ix. SCE has not included potential reliability benefits from ignition reductions from Fast Curve settings in the following SAIDI values. Fast Curves activated during adverse weather conditions contributed roughly 14 mins of SAIDI in 2021

Regarding Vegetation Management QA/QC:

Data Request: OEIS-SCE-22-002 (Question 13)

Request date: March 15, 2022

Request:

a. SCE conducts Quality Assurance/Quality Control (QA/QC) checks of its vegetation management program.

   i. Provide the QA/QC results for vegetation management broken down by inspection type completed in 2019, 2020, and 2021. This should include:

      (1) Percentage of inspections with infractions found (e.g., under-trimming, over-trimming, missed hazard tree, improper clean-up etc.);

      (2) Percentage of inspections with infractions found which required remediation (e.g., re-inspection, additional trimming, removal of a tree); and

      (3) List of lessons learned from infractions and associated changes made to inspections moving forward.

   ii. If unable to provide any of the data requested in Q013ai et seq., explain why that data is unavailable.

Response date: March 18, 2022

Response:

i. SCE's Vegetation Management (VM) QC inspection program commenced in April 2019. Initially, QC was focused on Vegetation Line Clearing (VLC) and later expanded to verification of prescribed Hazard Tree mitigations and the performance of independent HTMP risk assessments.

SCE is providing the following "Year End" performance summary data for VLC:

- 2019 Transmission Performance (Image 1)
- 2019 Distribution Performance (Image 2)
- 2020 Transmission and Distribution Performance (Image 3)
- 2020 Transmission and Distribution Performance: Pruning Contractors (Image 4)
- 2020 Transmission and Distribution Performance: Pre-Inspection Contractors (Image 5)
- 2021 Transmission and Distribution Performance (Image 6)
- 2021 Transmission and Distribution Performance: Pruning Contractors (Image 7)
- 2021 Transmission and Distribution Performance: Pre-Inspection Contractors (Image 8)

(1) and (2): The following metrics are captured during SCE's QC inspections for Vegetation Line Clearing and are shown in the high-level report summaries:

- **Regulation Clearance Distance (RCD)** is the minimum clearance required by regulation.
- **Compliance Clearance Distance (CCD)** is SCE's internal standard, which is 1.5 x RCD.
- **Grid Resiliency Clearance Distance (GRCD)** is the distance that SCE seeks to obtain at the time of trim, in accordance with CPUC recommendations in General Order 95, Rule 35, Appendix E. Because this distance is not something SCE can require a property owner to allow, SCE tracks this metric for its own program management purposes but does not consider the failure to obtain GRCD as a non-conformance.
- **ANSI A300 Pruning Quality (ANSI)**
- **Missed Tree Rate (MTR)** refers to trees identified by QC that are not listed in the database.
- **Inventory Inflation Rate (IIR)** refers trees listed in the database but not located in the field.
- **Work Type Accuracy (WTA)** refers to the accuracy of the pre-inspector's prescription, in terms of the type of trim needed (e.g., side-trim, crown reduction, etc.).
- **Species Identification (SI)** refers to the accuracy of the identification of tree species.

SCE has established the following Acceptable Quality Level (AQL) for performance:

- RCD = 100%
- CCD = 95%

The following is a summary of percentages and information contained in each subsequent image.1

Image	Year	T or D	Activity	RCD	CCD	ANSI	MTR	IIR	WTA	SI
1	2019	T	Overall	99.95	99.02					
2		D	Overall	97.98	89.95					
3	2020	T&D	Overall	98.62	94.42					
4		T&D	Pruning	98.58	93.53	99.56	N/A	N/A	N/A	N/A
5		T&D	PI	99.21	97.16	N/A	18.86	1.05	99.10	99.29
6	2021	T&D	Overall	99.20	96.26					
7		T&D	Pruning	99.12	96.94	99.82	N/A	N/A	N/A	N/A
8		T&D	PI	99.49	98.18	N/A	1.31	0.37	98.93	*

*Consistent with OEIS guidance, in 2021, SCE updated its species index records to delineate genus and species. This update created discrepancies between the record selection available to the pre-inspector prior to the update and the record selection available after the update, which makes this SI metric unreliable for identifying instances in which the pre-inspector selected the wrong species.

[1] The Vegetation Line Clearing QC program has evolved over time, and in 2019 did not track the ANSI, MTR, IIR, WTA, and SI metrics. The ANSI metric is only relevant to pruning/trimming work, whereas the MTR, IIR, WTA, and SI metrics are relevant to pre-inspections (PI).

9.0 Image 1 – 2019 Transmission Performance

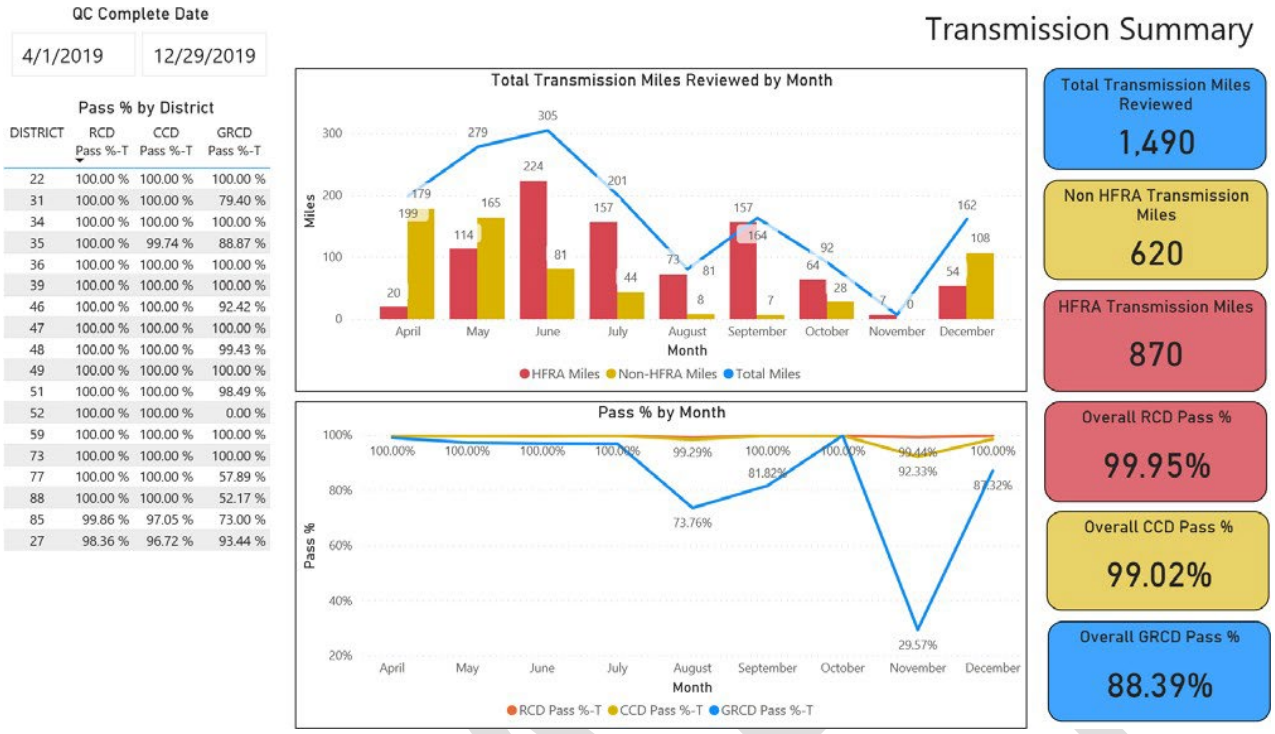


Image 2 – 2019 Distribution Performance

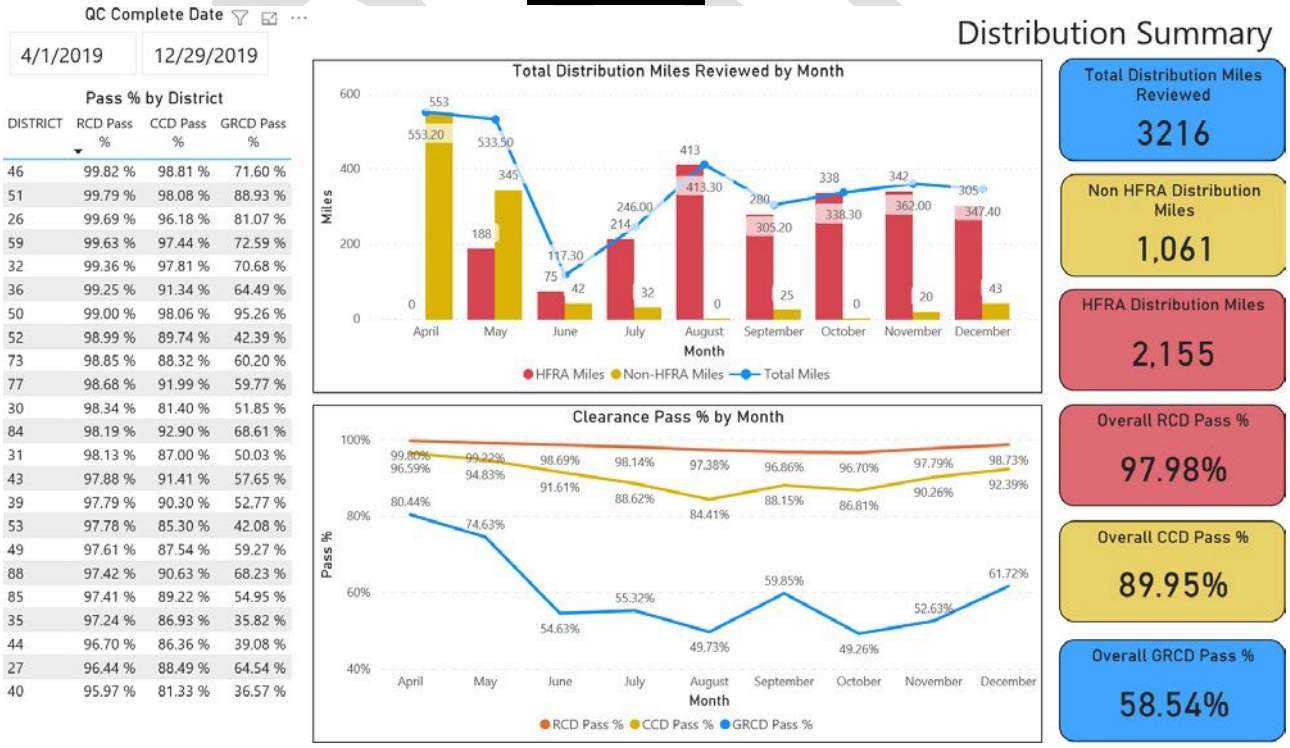


Image 3 – 2020 Transmission and Distribution Performance (Overall)

Image 4 – 2020 Transmission and Distribution Performance (Pruning Contractors)

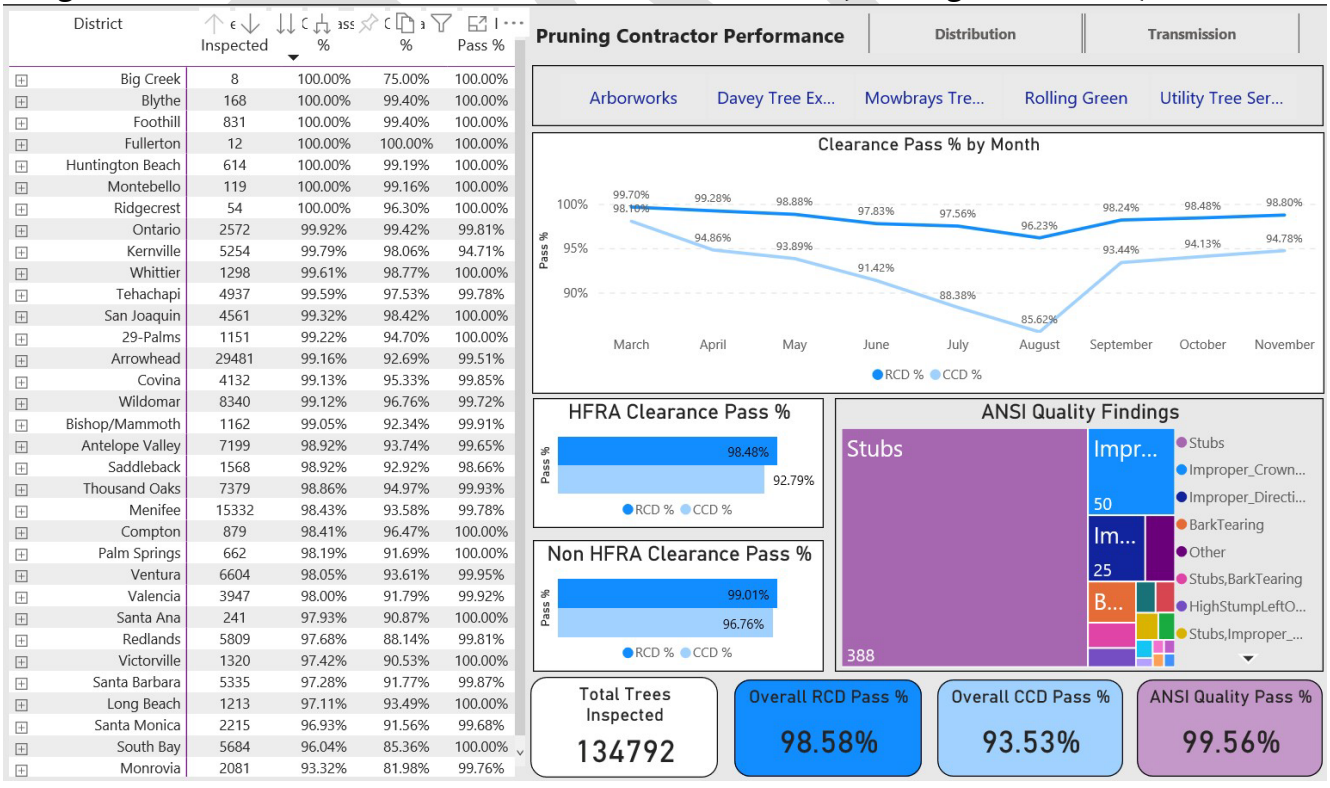
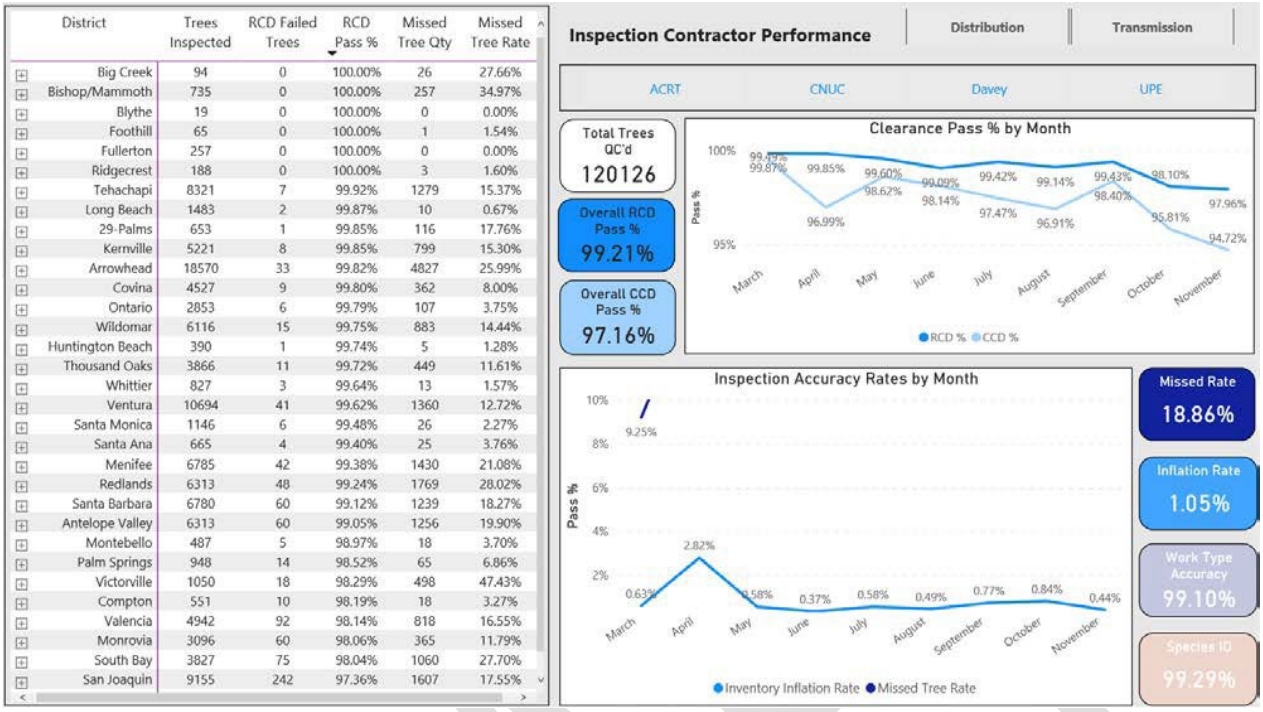
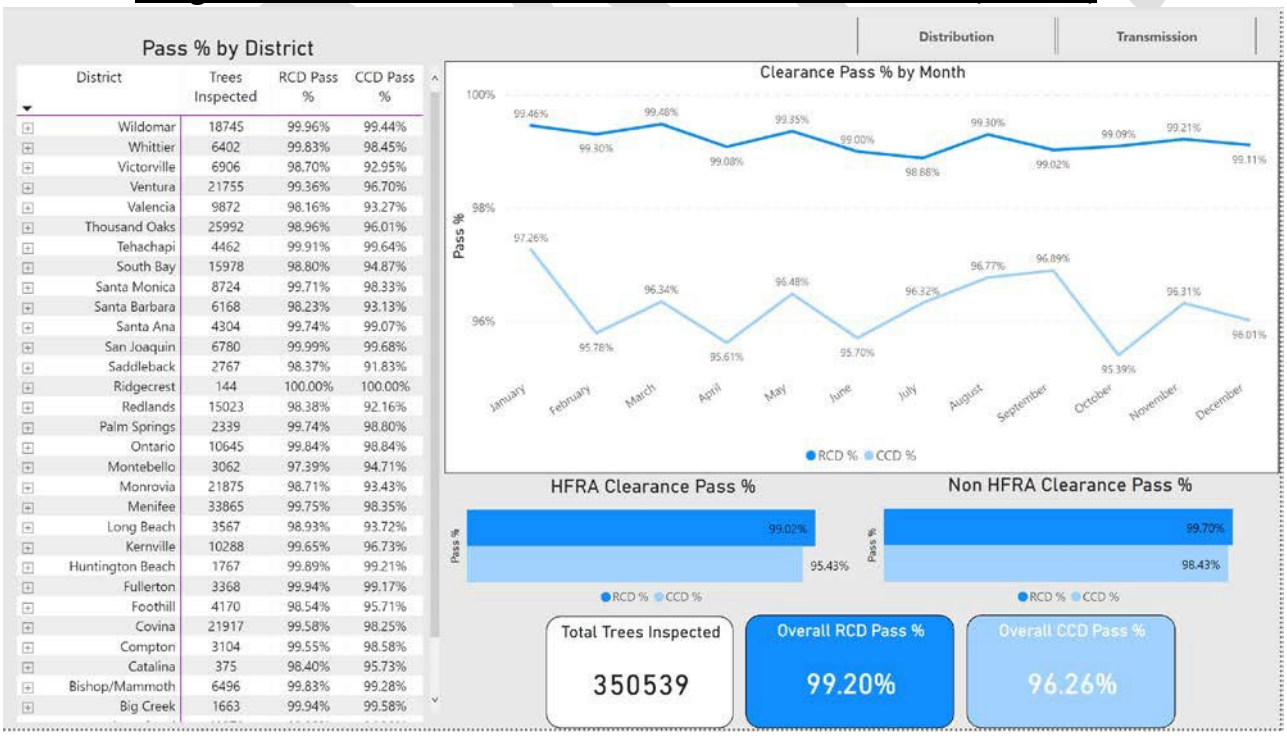


Image 5 – 2020 Transmission and Distribution Performance (Pre-Inspection Contractors)



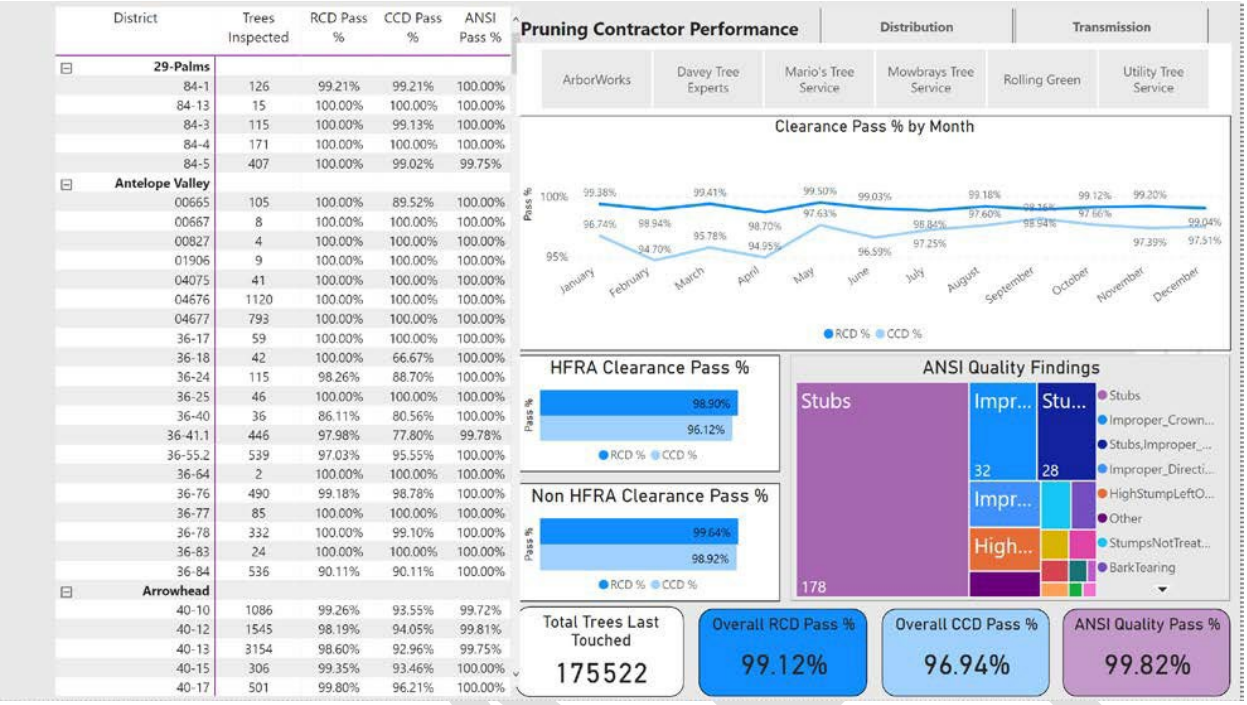
District	Trees Inspected	RCD Failed Trees	RCD Pass %	Missed Tree Qty	Missed Tree Rate
Big Creek	94	0	100.00%	26	27.66%
Bishop/Mammoth	735	0	100.00%	257	34.97%
Blythe	19	0	100.00%	0	0.00%
Foothill	65	0	100.00%	1	1.54%
Fullerton	257	0	100.00%	0	0.00%
Ridgecrest	188	0	100.00%	3	1.60%
Tehachapi	8321	7	99.92%	1279	15.37%
Long Beach	1483	2	99.87%	10	0.67%
29-Palms	653	1	99.85%	116	17.76%
Kernville	5221	8	99.85%	799	15.30%
Arrowhead	18570	33	99.82%	4827	25.99%
Covina	4527	9	99.80%	362	8.00%
Ontario	2853	6	99.79%	107	3.75%
Wildomar	6116	15	99.75%	883	14.44%
Huntington Beach	390	1	99.74%	5	1.28%
Thousand Oaks	3866	11	99.72%	449	11.61%
Whittier	827	3	99.64%	13	1.57%
Ventura	10694	41	99.62%	1360	12.72%
Santa Monica	1146	6	99.48%	26	2.27%
Santa Ana	665	4	99.40%	25	3.76%
Menifee	6785	42	99.38%	1430	21.08%
Redlands	6313	48	99.24%	1769	28.02%
Santa Barbara	6780	60	99.12%	1239	18.27%
Antelope Valley	6313	60	99.05%	1256	19.90%
Montebello	487	5	98.97%	18	3.70%
Palm Springs	948	14	98.52%	65	6.86%
Victorville	1050	18	98.29%	498	47.43%
Compton	551	10	98.19%	18	3.27%
Valencia	4942	92	98.14%	818	16.55%
Monrovia	3096	60	98.06%	365	11.79%
South Bay	3827	75	98.04%	1060	27.70%
San Joaquin	9155	242	97.36%	1607	17.55%

Image 6 – 2021 Transmission and Distribution Performance (Overall)



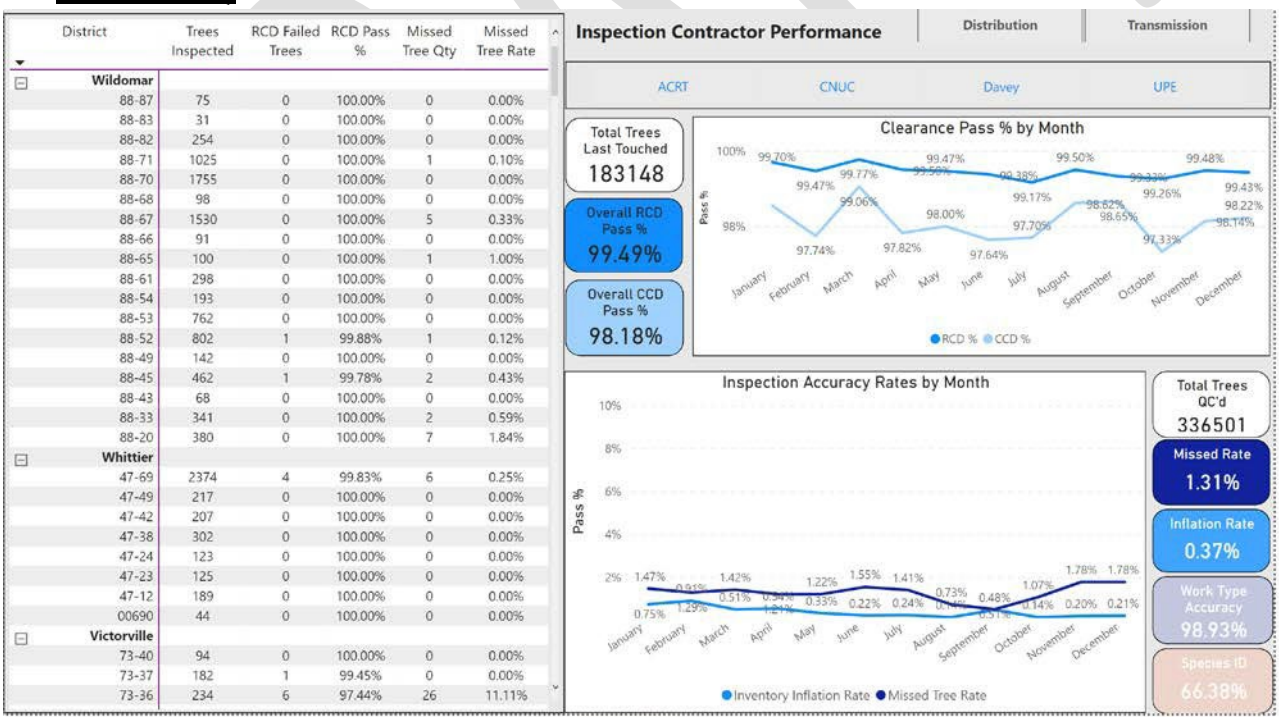
District	Trees Inspected	RCD Pass %	CCD Pass %
Wildomar	18745	99.96%	99.44%
Whittier	6402	99.83%	98.45%
Victorville	6906	98.70%	92.95%
Ventura	21755	99.36%	96.70%
Valencia	9872	98.16%	93.27%
Thousand Oaks	25992	98.96%	96.01%
Tehachapi	4462	99.91%	99.64%
South Bay	15978	98.80%	94.87%
Santa Monica	8724	99.71%	98.33%
Santa Barbara	6168	98.23%	93.13%
Santa Ana	4304	99.74%	99.07%
San Joaquin	6780	99.99%	99.68%
Saddleback	2767	98.37%	91.83%
Ridgecrest	144	100.00%	100.00%
Redlands	15023	98.38%	92.16%
Palm Springs	2339	99.74%	98.80%
Ontario	10645	99.84%	98.84%
Montebello	3062	97.39%	94.71%
Monrovia	21875	98.71%	93.43%
Menifee	33865	99.75%	98.35%
Long Beach	3567	98.93%	93.72%
Kernville	10288	99.65%	96.73%
Huntington Beach	1767	99.89%	99.21%
Fullerton	3368	99.94%	99.17%
Foothill	4170	98.54%	95.71%
Covina	21917	99.58%	98.25%
Compton	3104	99.55%	98.58%
Catalina	375	98.40%	95.73%
Bishop/Mammoth	6496	99.83%	99.28%
Big Creek	1663	99.94%	99.58%

Image 7 – 2021 Transmission and Distribution Performance (Pruning Contractors)



District	Trees Inspected	RCD Pass %	CCD Pass %	ANSI Pass %
29-Palms				
84-1	126	99.21%	99.21%	100.00%
84-13	15	100.00%	100.00%	100.00%
84-3	115	100.00%	99.13%	100.00%
84-4	171	100.00%	100.00%	100.00%
84-5	407	100.00%	99.02%	99.75%
Antelope Valley				
00665	105	100.00%	89.52%	100.00%
00667	8	100.00%	100.00%	100.00%
00827	4	100.00%	100.00%	100.00%
01906	9	100.00%	100.00%	100.00%
04075	41	100.00%	100.00%	100.00%
04676	1120	100.00%	100.00%	100.00%
04677	793	100.00%	100.00%	100.00%
36-17	59	100.00%	100.00%	100.00%
36-18	42	100.00%	66.67%	100.00%
36-24	115	98.26%	88.70%	100.00%
36-25	46	100.00%	100.00%	100.00%
36-40	36	86.11%	80.56%	100.00%
36-41.1	446	97.98%	77.80%	99.78%
36-55.2	539	97.03%	95.55%	100.00%
36-64	2	100.00%	100.00%	100.00%
36-76	490	99.18%	98.78%	100.00%
36-77	85	100.00%	100.00%	100.00%
36-78	332	100.00%	99.10%	100.00%
36-83	24	100.00%	100.00%	100.00%
36-84	536	90.11%	90.11%	100.00%
Arrowhead				
40-10	1086	99.26%	93.55%	99.72%
40-12	1545	98.19%	94.05%	99.81%
40-13	3154	98.60%	92.96%	99.75%
40-15	306	99.35%	93.46%	100.00%
40-17	501	99.80%	96.21%	100.00%

Image 8 – 2021 Transmission and Distribution Performance (Pre-Inspection Contractors)



District	Trees Inspected	RCD Failed Trees	RCD Pass %	Missed Tree Qty	Missed Tree Rate
Wildomar					
88-87	75	0	100.00%	0	0.00%
88-83	31	0	100.00%	0	0.00%
88-82	254	0	100.00%	0	0.00%
88-71	1025	0	100.00%	1	0.10%
88-70	1755	0	100.00%	0	0.00%
88-68	98	0	100.00%	0	0.00%
88-67	1530	0	100.00%	5	0.33%
88-66	91	0	100.00%	0	0.00%
88-65	100	0	100.00%	1	1.00%
88-61	298	0	100.00%	0	0.00%
88-54	193	0	100.00%	0	0.00%
88-53	762	0	100.00%	0	0.00%
88-52	802	1	99.88%	1	0.12%
88-49	142	0	100.00%	0	0.00%
88-45	462	1	99.78%	2	0.43%
88-43	68	0	100.00%	0	0.00%
88-33	341	0	100.00%	2	0.59%
88-20	380	0	100.00%	7	1.84%
Whittier					
47-69	2374	4	99.83%	6	0.25%
47-49	217	0	100.00%	0	0.00%
47-42	207	0	100.00%	0	0.00%
47-38	302	0	100.00%	0	0.00%
47-24	123	0	100.00%	0	0.00%
47-23	125	0	100.00%	0	0.00%
47-12	189	0	100.00%	0	0.00%
00690	44	0	100.00%	0	0.00%
Victorville					
73-40	94	0	100.00%	0	0.00%
73-37	182	1	99.45%	0	0.00%
73-36	234	6	97.44%	26	11.11%

The data provided below is focused on HTMP activities.

Regarding QC inspections for HTMP, two specific inspections are performed: (1) 100% QC to verify the prescribed mitigation was completed, and (2) independent QC risk-

assessments at a sampling rate of 99/2% Confidence Level/Confidence Interval. Note: due to current refreshing of the HTMP QC dashboard, exact data counts and images are not available, but are expected to be complete by April 30, 2022. Upon completion of the refresh, additional information related to the HTMP QC program can be provided to OEIS. The below information states approximate values, which are considered reasonably accurate.

With respect to QC inspections to verify that prescribed mitigations were performed, between January 2019 and October 2021, approximately 350,000 HTMP assessments were performed by the HTMP assessors resulting in approximately 45,000 prescribed mitigations. Of the 45,000 prescribed mitigations, approximately 40,000 have been performed, and of the 40,000, QC has been performed on approximately 38,000. Results of the QC inspections for remediation indicated that in most cases the prescribed mitigation was performed, although there were instances where the mitigation was considered incomplete (partial mitigation or debris left at the mitigation location).

SCE began QC of HTMP inspector's risk assessments in March 2020. Between March 2020 and December 2020, independent QC risk assessments were performed on 7,975 on trees with a risk score between 35-49. Of the 7,975, the average QC risk score was 43.02, compared to the average original HTMP assessment risk score of 40.04. which shows general alignment of the risk assessment process. Of the 7,975 QC assessments, approximately 1,329 trees were identified to have a risk score at or above the threshold for mitigation. Though SCE is aware that some of the 1,329 trees were ultimately mitigated subsequent to the QC, SCE does not have data to accurately report on this metric.

Between January 2021 and October 2021,2 independent QC risk-assessments were performed on 12,997 trees with a risk score between 35-49. Of the 12,997 assessments, the average QC risk assessment score was 44.72 compared to the average original assessment risk score of 41.56, which shows general alignment of the risk assessment process. Of the 12,997 QC assessments, approximately 2,700 trees were identified to have a risk score at or above the threshold for mitigation. Those trees were then reassessed a third time, and upon reassessment, approximately 13% of the returned scores resulted in a change in mitigation. Thus, of the 2,700 cases, approximately 350 tree assessments resulted in a change in mitigation, for a total non-conformance rate of 2.7% (350 divided by 13,000). To drive continuous improvement, in late 2021, additional QC requirements were implemented to refine the determination of whether mitigation should be required.

(3) List of Lessons Learned – Many of the lessons learned pertain to understanding the clearance requirements and the available tools to help the contractors achieve the required clearance, such as SCE's customer refusal management process. SCE also took measures to reduce the missed tree rate, including extensive training for SCE's pre-inspectors on identifying trees for trimming, including better identifying trees which currently met CCD, but would not hold adequate clearance distance for the full twelve-month trimming cycle. On a monthly basis, SCE meets with its pre- inspection and pruning contractors to discuss monthly and year-to-date performance, with an emphasis on quality. SCE QC also conducts benchmarking sessions with contractors to learn and share best-practices among its contractors.

ii. As stated above, the QC dashboard for HTMP is being refreshed with expected completion of April 30, 2022. Upon completion of the refresh, more complete QC data can be provided to OEIS if requested.

[2] SCE's QC program for HTMP continued after October 2021, including through the date of this response. But because SCE's data management system is being refreshed, data after October 2021 is not available at this time. SCE can supplement this response at a later date upon OEIS request.

Regarding Program Targets – Fire Science SA-8:

Data Request: OEIS-SCE-22-003 (Question 3)

Request date: March 22, 2022

Request:

a. In table 5.3 SA-8 SCE describes a missed target for SA-8 "evaluating current wildfire events in context of 40-year history of wildfires." In 2021 SCE planned to run the FPI 2.0 in parallel with the current FPI and compare outputs for the 2021 fire season.

   i. Please further explain the reason for the missed 2021 SA-8 target (page 128).

   ii. Did the SA-8 missed target prevent the ability to run the FPI 2.0 in parallel with its current FPI during the 2021 PSPS events?

   iii. If the SA-8 missed target did not prevent the ability to run the FPI 2.0 in parallel with its current FPI during the 2021 PSPS events, please provide an update on the evaluation of the FPI 2.0.

Response date: March 25, 2022

Response:

i – In 2021, SCE sought to accelerate several key enhancements to its modeling efforts to improve its weather forecast accuracy, which impacts PSPS. SCE relied on its modeling vendor to perform all major workstreams related to this effort, which meant that other projects with a lower priority could potentially be delayed. "Evaluating current wildfire events in context of 40-year history of wildfires" was one such project that SCE's modeling vendor had to postpone in order to prioritize the mission-critical model enhancement work in 2021. This project was deemed "lower priority" than enhancements to weather forecast accuracy because it had no impact on in-event PSPS decision-making. SA-8's project included the development of a "gridded" climatology for different weather and fuel moisture elements, which utilized SCE's 40-year historical data. This portion of the project was completed. The second part of the project involved the development of a product which would take the forecast for the selected elements and compare them to their respective climatologies at each grid cell to show how the forecasted event related to past weather and fuel conditions. This portion of the project will be completed in 2022.

ii – No. While SA-8's project relied on SCE's 40-year historical data set, it had no impact on the FPI 2.0 project.

iii – FPI 2.0 has been in development and is now being evaluated against the current FPI at both the Fire Climate Zone level and at the circuit level. While FPI 2.0 still needs to be calibrated against historical fire data to develop breakpoints and PSPS thresholds, SCE can still compare its output with the current FPI on a daily basis. Initial results show FPI 2.0 is more sensitive than the current FPI as it is more responsive to changes in windspeed. SCE is also in the process of creating a number of metrics which will allow for more side-by-side comparisons of the two indices prior to implementation.

Regarding PSPS Durations:

Data Request: OEIS-SCE-22-003 (Question 5)

Request date: March 22, 2022

Request:

a. On page 551 of its WMP SCE discusses CMI decreasing by 76% since 2020 with continued decreases of 17% for 2022 projected. Yet SCE regressed in its projected January 1, 2023 average downtime per customer in its 2022 Maturity Survey answer to Question "F.III.e During PSPS events, what is the average downtime per customer?" as follows: Last year answered "Less than 0.5 hour as of January 1, 2023"; this year answered "Less than 1 hour as of January 1, 2023."

   i. To what does SCE attribute a decrease in average downtime per customer in 2023?

   ii. How does SCE plan to increase average downtime per customer in 2023?

QFIIIe.
F.III.e During PSPS events, what is the average downtime per customer?

Your utility's responses last year were:
Present: ii
As of January 1, 2023: iii

	i. More than 1 hour	ii. Less than 1 hour	iii. Less than 0.5 hours	iv. Less than 0.25 hours	v. Less than 0.1 hours
Present	○	◉	○	○	○
As of January 1, 2023	○	◉	○	○	○

Response date: March 25, 2022

Response:

i. SCE interprets "downtime" to mean the system SAIDI-equivalent time for customers affected by actual PSPS de-energization events. SCE continues improve and to project improvement in this category in 2023. In 2021, SCE projected the improvement would rise to the next category of 0.5 hours. SCE currently projects it will continue to make progress within Category ii (Less than 1 hour), but no longer projects to improve into Category iii. (Less than 0.5 hours).

ii. SCE assumes this question asks about SCE's plans to decrease average customer downtime. Average downtime should continue to decrease due to SCE's PSPS-driven grid hardening. Internal analysis has continued to identify circuit mitigations based on historical PSPS impacts. SCE plans to accelerate covered conductor installation, along with numerous other prescriptive mitigations (e.g., circuit exceptions, RCSs, weather stations). In parallel, SCE will continue to refine its PSPS risk modeling capabilities.

Regarding PSPS Communications:

Data Request: OEIS-SCE-22-003 (Question 6)

Request date: March 22, 2022

Request:

a. Similarly, in answering maturity survey question F.III.b. What share of customers are communicated to regarding forecasted PSPS events? Your utility's responses Last year were: Present state ii; as of January 1, 2023 v. Your utility's responses this year were: Present state ii; as of January 1, 2023 ii. (NOTE: ii. >95% of customers and >99% of MBL in advance of PSPS action; v. >99.9% of customers and 100% of MBL in advance of PSPS action).

   i. To what does SCE attribute a decrease in customers communicated with in advance of PSPS action?

   ii. How does SCE plan to improve this metric in 2023?

QFIIIb.

F.III.b What share of customers are communicated to regarding forecasted PSPS events?

Your utility's responses last year were:
Present: ii
As of January 1, 2023: v

	i. Affected customers **are poorly communicated to**, with a significant portion not communicated to at all	ii. PSPS event are communicated **to >95% of affected customers and >99% of medical baseline customers** in advance of PSPS action	iii. PSPS event are communicated **to >98% of affected customers and >99.5% of medical baseline customers** in advance of PSPS action	iv. PSPS event are communicated **to >99% of affected customers and >99.9% of medical baseline customers** in advance of PSPS action	v. PSPS event are communicated **to >99.9% of affected customers and 100% of medical baseline customers** in advance of PSPS action
Present	○	◉	○	○	○
As of January 1, 2023	○	◉	○	○	○

Response date: March 25, 2022

Response:

i. SCE changed the 2023 projected maturity from Category v to Category ii in the 2022 WMP Maturity Model survey to align its response with its corporate goal. This change does not signify "a decrease in customers communicated with" relative to "Present."

SCE also plans to modify its response to the 2022 WMP Maturity Model survey for "Present" from Category ii to Category i based on validated notification data from 2021 PSPS events.

After SCE submitted its WMP Maturity Model responses in January 2022, and in advance of filing SCE's 2021 Post-Season Report in March 2022, SCE identified discrepancies in some data contained in its 2021 PSPS Post-Event Reports, notably around its customer notification data. Upon discovery of these discrepancies, SCE conducted a good faith quality assurance effort to validate certain key post-event report metrics, including the total number of customers de-energized, total number of customers notified/cancelled, missed pre-de-energization notifications, and missed cancellation notifications.

This effort resulted in updates to these metrics that SCE included in its 2021 Post-Season Report,[1] and for purposes of SCE's maturity model responses, should result in a corresponding reduction for its "Present" score from Category ii to Category i because SCE was not able to "communicate to > 95% of affected customers in advance of PSPS action" in 2021.

The larger scale events that occurred in late 2021 strained the limits of SCE's legacy processes resulting in delays in processing updated weather forecasts and informing pre-event notification efforts. These processing delays were intensified by our efforts to send pre-event notifications at the segment level to account for circuit segments with covered conductor and higher thresholds. This was especially prevalent in SCE's November 24, 2021 event, where weather conditions rapidly escalated during the event, and it was necessary to de-energize customers without prior notification.

ii. Starting in 2021, SCE began automating its PSPS IMT workflows, using Foundry, a tool developed by Palantir. Although these new capabilities were not operationalized at the time the November PSPS events, we have since operationalized core capabilities across our PSPS Incident Management Team to reduce processing time and minimize the potential for error. This project is expected to improve SCE's notification process in 2022 and beyond, and is described further in SCE's 2022 WMP Update, Chapter 8 beginning on page 538. In addition, SCE continues to enhance and refine its situational awareness and weather forecasting capabilities. SCE expects its maturity model score to improve to Category ii for the next maturity model survey.

[1] *See* SCE's Amended 2021 Post-Season Report is *available at* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M461/K182/461182763.PDF

Regarding PSPS Driven Grid Hardening:

Data Request: OEIS-SCE-22-003 (Question 7)

Request date: March 22, 2022

Request:

a. On page 311 SCE indicates as Part of 7.3.3.8.1 Circuit Evaluation for PSPS Driven Grid Hardening Work (SH-7) that "in 2022, SCE will evaluate approximately 70 highly impacted circuits based on previous PSPS events including those in 2021 to determine additional deployment of PSPS mitigations." On page 552, SCE mentions "SCE plans to scope or accelerate more than 150 miles of covered conductor scope, along with numerous other prescriptive mitigations (e.g., circuit exceptions, RCSs, weather stations) for 42 targeted circuits that have yet to undergo accelerated hardening." This appears to be the first mention of 42 PSP Driven circuits targeted for accelerated hardening.

   i. How many circuits are targeted as highly-impacted for grid hardening to address PSPS?

   ii. Where is the methodology discussed in the WMP for how those were determined?

   iii. If the methodology for determining those circuits was not included in the WMP, please describe the methodology.

Response date: March 25, 2022

Response:

Response to i:

The 70 circuits are the circuits being targeted for review in 2022 under SH-7; the results of this evaluation work in 2022 will inform the grid hardening work on these circuits in 2023. Separately, the 42 circuits discussed in Chapter 8 represent grid hardening work associated with circuits reviewed in 2021 under SH-7. This grid hardening work on these 42 circuits is projected to be completed in 2022.

Response to ii.

See page 311 under Region Prioritization section for SCE's methodology to identify highly impacted circuits, which states:

"*SCE applied the methodology developed previously to calculate a PSPS POD score for each circuit utilizing five years of backcast weather data. SCE ranked the circuits according to their predicted POD score and PSPS de-energization history.*"

Response to iii.

N/A

Regarding Ignition Drivers:

Data Request: OEIS-SCE-22-003 (Question 10)

Request date: March 22, 2022

Request:

b. Based off Table 7.2 from SCE's 2022 WMP Update, the following ignition drivers saw increases in ignitions for HFTD in 2021:

- Vegetation contacts
- Connection device damage or failure
- Other equipment failure
- Transformer damage or failure
- All other

For each of the above, provide the following:

i. A description of any failure mode analysis or fire incident analysis completed, with associated trends

ii. Changes made to practices mitigating associated risks, including section(s) within the 2022 WMP Update where changes are addressed, if applicable

Response date: March 25, 2022

Response:

i. SCE failure engineers investigate all CPUC reportable and other ignition events to determine the cause and understand the system's current state. The engineers perform an initial ignition and failure analysis review, including a review of repair orders, inspection records, outage records related to ignition events, communication with SCE first responders, field visits, and examination of failed equipment. The engineer's findings are reviewed with key stakeholders to confirm the investigation findings and check the event for accuracy. Furthermore, the failure engineers meet weekly with Asset Class engineers to discuss the recent findings to ensure that the ignition data is incorporated into the overall asset strategy for the applicable asset. Lastly, the ignition data is visualized into a dashboard that enables users to examine the data for trends. SCE engineers and other key stakeholders also conduct monthly meetings to discuss recent ignition events and current mitigations. The monthly meetings utilize the dashboard to help facilitate these discussions. The total ignitions that we see year to year will fluctuate and are impacted by multiple factors including, for example, climate change, weather and dry fuels. SCE notes some of the drivers listed have a relatively lower number of events, and one additional event could show an increase, where the change is due to other factors as noted above. Lastly, SCE points out that in 2021 less than 500 total acres burned in connection to SCE facilities.

ii. Changes made to SCE's practices that could mitigate the above risk drivers are:

Sub-cause Categories	Mitigations	2022 WMP Section
	Covered Conductor	Section: 7.3.3.3.1: Page 294 (SH-1)
	Undergrounding Overhead Conductor	Section: 7.3.3.16.1: Page 334 (SH-2)
	Expulsion Fuse Replacement-Branch Line Protection Strategy	Section 7.3.3.7: Page 308 (SH-4)
	Installation of System Automation Equipment - Remote Controlled Automatic Reclosers Settings Update 313	Section: 7.3.3.9 Page 313 (SH-5)
	Circuit Breaker Relay Hardware for Fast Curve	Section 7.3.3.2: Page 292 (SH-6)

Vegetation contacts	Tree Attachment Remediation	Section: 7.3.3.3.2: Page 301 (SH-10)
	Legacy Facilities	Section: 7.3.3.17.2: Page 340 (SH-11)
	Distribution HFRI Inspections and Remediations	Section 7.3.9.1 - Page 362 (IN-1.1)
	Hazard Tree Mitigation Program (HTMP)	Section 7.3.5.16.1: Page 425 (VM-1)
	Pole Brushing	Section 7.3.5.5.2 - Page 404 (VM-2)
	Expanded Clearances for Legacy Facilities	Section: 7.3.5.5.3 Page 407 (VM-3)
	Dead and Dying Tree Removal	Section: 7.3.5.16.2 Page 427 (VM-4)
	Rapid Earth Fault Current Limiter (REFCL)	Section: 7.3.3.12.2 (SH-17) Page 323
	Early Fault Detection (EFD)	Section: 7.1.5 Page 243
Connection device damage or failure	Covered Conductor	Section: 7.3.3.3.1: Page 294 (SH-1)
	Undergrounding Overhead Conductor	Section: 7.3.3.16.1: Page 334 (SH-2)
	Expulsion Fuse Replacement-Branch	Section 7.3.3.7: Page 308 (SH-4)
	Line Protection Strategy	
	Installation of System Automation Equipment - Remote Controlled Automatic Reclosers Settings Update 313	Section: 7.3.3.9 Page 313 (SH-5)
	Circuit Breaker Relay Hardware for Fast Curve	Section 7.3.3.2: Page 292 (SH-6)
	Tree Attachment Remediation	Section: 7.3.3.3.2: Page 301 (SH-10)
	Legacy Facilities	Section: 7.3.3.17.2: Page 340 (SH-11)
	Distribution HFRI Inspections and	Section 7.3.9.1 - Page 362 (IN-1.1)

	Remediations	
	Infrared inspections of distribution electric lines and equipment	Section 7.3.4.4 - Page 352 (IN-3)
	Pole Brushing	Section 7.3.5.5.2 - Page 404 (VM-2)
	Rapid Earth Fault Current Limiter (REFCL)	Section: 7.3.3.12.2 (SH-17) Page 323
	Early Fault Detection (EFD)	Section: 7.1.5 Page 243
Other equipment failure	Undergrounding Overhead Conductor	Section: 7.3.3.16.1: Page 334 (SH-2)
	Expulsion Fuse Replacement-Branch Line Protection Strategy	Section 7.3.3.7: Page 308 (SH-4)
	Installation of System Automation Equipment - Remote Controlled Automatic Reclosers Settings Update 313	Section: 7.3.3.9 Page 313 (SH-5)
	Circuit Breaker Relay Hardware for Fast Curve	Section 7.3.3.2: Page 292 (SH-6)
	Rapid Earth Fault Current Limiter (REFCL)	Section: 7.3.3.12.2 (SH-17) Page 323
Transformer damage or failure	Distribution Pole Replacement and Reinforcement, Including with Composite Poles	Section: 7.3.3.6: Page 306 (SH-1)
	Undergrounding Overhead Conductor	Section: 7.3.3.16.1: Page 334 (SH-2)
	Tree Attachment Remediation	Section: 7.3.3.3.2: Page 301 (SH-10)
	Legacy Facilities	Section: 7.3.3.17.2: Page 340 (SH-11)
	Distribution HFRI Inspections and Remediations	Section 7.3.9.1 - Page 362 (IN-1.1)

	Infrared inspections of distribution electric lines and equipment	Section 7.3.4.4 - Page 352 (IN-3)
	Pole Brushing	Section 7.3.5.5.2 - Page 404 (VM-2)
	Rapid Earth Fault Current Limiter (REFCL)	Section: 7.3.3.12.2 (SH-17) Page 323
	Early Fault Detection (EFD)	Section: 7.1.5 Page 243
All other	Undergrounding Overhead Conductor	Section: 7.3.3.16.1: Page 334 (SH-2)
	Legacy Facilities	Section: 7.3.3.17.2: Page 340 (SH-11)
	Distribution HFRI Inspections and Remediations	Section 7.3.9.1 - Page 362 (IN-1.1)
	Infrared inspections of distribution electric lines and equipment	Section 7.3.4.4 - Page 352 (IN-3)
	Rapid Earth Fault Current Limiter (REFCL)	Section: 7.3.3.12.2 (SH-17) Page 323

Regarding Continuous Monitoring:

Data Request: OEIS-SCE-22-003 (Question 14)

Request date: March 22, 2022

Request:

a. Regarding SCE's response to Question D.1.c, SCE selects that as of January 2023, there will be sensorized, continuous monitoring equipment determining the state and reliability of equipment.

   v. What continuous monitoring equipment is this referring to?

   vi. Does SCE plan to have all its HFRA covered by continuous monitoring equipment by 2023? If so, provide SCE's timeline for installation of implementation of type of continuous monitoring equipment. If not, provide the number and percentage of circuits that will be covered by continuous monitoring equipment.

vii. When does SCE plan to supplement scheduling inspections with information from continuous monitoring equipment?

Response date: [Month dd, yyyy]

Response:

As part of the response to Question D.1.c in the 2020 Maturity Model Response, SCE stated that SCE has already deployed technologies that can detect and report potential malfunctions before they cause ignition. MADEC, an industry leading technology developed by SCE, which remotely detects wire down signatures and other system anomalies by examining AMI voltage data, enabling SCE operators to proactively isolate potential problems on SCE's distribution grid, has been broadly applied across SCE's service area. SCE is continuing to advance the detection algorithm used in MADEC. Additionally, SCE is using meter data to support detection of internal degradation of transformers prior to failure. Both the MADEC detection system and the transformer monitoring logic are applied across the HFRA and non-HFRA.

With specific reference to EFD and DFA:

i. Additionally, Distribution Fault Anticipation (DFA) and Early Fault Detection (EFD) are other aspects of continuous monitoring equipment SCE installed across HFRA Distribution circuits.

ii. Approximately 20% of HFRA circuits have DFA units installed. Additional installations are not planned for 2022 or 2023. This year, SCE will focus evaluating alerts, events and data collection from installed DFA devices. DFA units are applied at the circuit level and provide coverage of the related circuit.

For EFD, in 2021, SCE had a total installed population of approximately 123 EFD units, including 100 on circuits previously equipped with DFA in order to compare and contrast their detection capabilities, 13 EFD units on sub-transmission circuits, and 10 units on circuits with previously identified issues through IR Scanning (to allow for technology comparison). In 2022, SCE will install an additional 50 units and strive to add up to 150 EFD units. These installation quantity targets for 2022 efforts, and the prior installation base, are expected to cover around 5-8% of SCEs total HFRA circuitry. Note that EFD can be applied for both distribution and transmission voltage levels. The circuit counts are not available for this future prediction as EFD is intended to be applied per HFRA circuit mile, and the amount of circuit miles varies for each circuit. EFD sensors are applied on circuits around every 3-5 miles

of circuitry, with a range of 3 miles between sensors on distribution circuits and 5-miles between sensors on transmission circuits.

iii. DFA alerts are evaluated and events of interest are selected for further inspection and analysis. For EFD, since this technology is still new and in pilot mode, SCE does not have a process in place to supplement scheduling inspections with information from EFD. Site evaluations initiated from EFD alerts are conducted separately from conventional inspection programs at this time.

Regarding Customer Rate Impacts:

Data Request: OEIS-SCE-22-003 (Question 18)

Request date: March 22, 2022

Request:

a. The estimated 2022 impact on customer bills is notably four times the actual bill impact in 2020 and 2021. SCE notes that for 2022, they included costs that were "included in the rates on January 1, 2022" or that they expect "to include in rates in 2022."

   i. What proportion of the estimated 2022 rate increase was "included in the rates on January 1, 2022" and what proportion of the 2022 rate increase does SCE expect "to include in the rates in 2022."

Response date: March 24, 2022

Response:

SCE interprets this question as applying to the category of costs designated as "increase in electric costs to ratepayer due to wildfire mitigation activities," which is the second category of costs in Table 3-3. Of the 1.02 cents/kWh SAR impact identified for 2022, 0.08 cents/kWh of that amount (*i.e.,* 7.8 percent) was included in rates as of January 1, 2022. The remaining amount (*i.e.,* 0.94 cents/kWh or 92.2 percent) is the proportion that SCE expects to include in rates in 2022 (or has already included in rates in 2022 via the March 1, 2022 rate change).

Regarding Fast Curve Setting Modifications and Reliability Impact:

Data Request: OEIS-SCE-22-007 (Question 1)

Request date: April 12, 2022

Request:

a. CalAdvocates-SCE-2022WMP-08 data request provides slides ("Improved Fast Curve Setting Strategy") presented by SCE during a March 18, 2022, meeting with Cal Advocates. Slide 4 compares existing versus new Fast Curve settings.

   i. Does SCE expect its new FC settings to result in any changes to reliability impacts? If yes, please provide information on these changes.

   ii. Please also provide any analysis performed to determine these projected reliability impacts.

Response date: April 15, 2022

Response:

i. SCE's modifications to the FC setting criteria are expected to increase sensitivity for fault detection capabilities without creating appreciable reliability impacts. The settings changes outlined on the referenced Slide 4 generally show a lower minimum trip threshold (increasing sensitivity) with an increased time delay. The increased time delay changes were implemented to improve coordination between FC and fuses.

As stated on page 294 in Section 7.3.3.2 of SCE's 2022 WMP Update, "The intent is to reduce the incident energy along an increased number of circuit miles, while maintaining customer electric service reliability."

ii. SCE has not performed an analysis to determine projected reliability impacts from the identified FC setting updates

Regarding CC++ Cost Effectiveness:

Data Request: OEIS-SCE-22-007 (Question 5)

Request date: April 12, 2022

Request:

a. Regarding CalAdvocates-SCE-2022-WMP-06 Q5.xlsx:

i. What is SCE's overall measured effectiveness by percentage of CC++?

ii. Did these calculations include CC++? If not, provide the same calculations with the added effectiveness of the additional mitigation measures included in CC++.

iii. Given SCE's 2022 WMP states "Each circuit segment was then assessed to determine the highest delta of mitigated risk between both mitigation options of undergrounding versus covered conductor" does that mean for each of the circuits shown, undergrounding was selected?

iv. Have there been any instances where covered conductor was selected over undergrounding? If so, provide the circuit, circuit ID, and associated effectiveness calculations for each instance.

Response date: April 15, 2022

Response:

i. SCE would like to clarify that the file "CalAdvocates-SCE-2022-WMP-06 Q5.xlsx" SCE previously provided included data supporting the prioritization process performed in 2020 for the targeted undergrounding 2022 plan year. SCE started evaluating CC++ as an option in the Year 2021. The overall measured effectiveness by percentage of CC++ is approximately 77 percent based on SCE's 2021 analysis using the latest WRRM model.

ii. As discussed in response to question (i), these calculations did not include CC++. As SCE's WRRM model is updated each year, there are some changes in the risk calculations. To provide reasonable and comparable results, SCE is providing the updated mitigated effectiveness values for Covered Conductor, Undergrounding, and CC++ using its 2021 WRRM model in attached file entitled"OEIS-SCE-22-007_Q5ii.xlsx" for the same circuits as provided in file "CalAdvocates-SCE-2022-WMP-06 Q5.xlsx."

iii. The circuits provided in file "CalAdvocates-SCE-2022-WMP-06 Q5.xlsx" were all potential candidate circuits when SCE evaluated and determined its 2022 targeted undergrounding scope in 2020. In determining its 2022 undergrounding scope SCE also considered other factors that may not be captured in our current risk models such as egress, terrain conditions, and installation feasibilities. Only certain portions of the circuits identified will be undergrounded. In 2022, SCE plans to complete 11 miles of targeted undergrounding and will strive to install up to 13 miles in SCE's HFRA. Portions of the circuits identified that are not targeted for undergrounding will

have covered conductor installed. As explained in Section 7.1.2.1 of SCE's 2022 WMP Update, SCE has refined its Integrated Grid Hardening Strategy to identify locations that it identifies as Severe Risk Areas, where SCE is likely to pursue a suite of grid hardening measures in addition to – and sometimes in lieu of – covered conductor. Such measures may include the targeted undergrounding of overhead lines and using other technologies such as REFCL. Additionally, the segments on the Atento, Phyton, Schmidt, and Taiwan circuits that are to be undergrounded in 2022, are also flagged for undergrounding in SCE's refined Integrated Grid Hardening Strategy.

iv. Yes, and regarding SCE's response to CalAdvocates-SCE-2022-WMP-06, Q5, there are portions of the circuits that will be undergrounded and portions that will have covered conductor. The effectiveness values and circuit names are provided in file "OEIS-SCE-22-007_Q5ii.xlsx."

Regarding Maturity Survey- Vegetation Management:

Data Request: OEIS-SCE-22-007 (Question 7)

Request date: April 12, 2022

Request:

a. SCE's response to the following maturity survey questions regressed from 2021 to 2022. In 2021, SCE had responded "Yes" to all these questions, but for 2022, changed its responses to "No." Explain why the responses to these questions changed from Yes to No.

   i. Capability 24: Vegetation Grow-in Mitigation

      1. E.IV.h Does the utility work with local landowners to provide a cost-effective use for cutting vegetation?

   ii. Capability 25: Vegetation Fall-in Mitigation

      1. E.V.f Does the utility work with local landowners to provide a cost-effective use for cutting vegetation?

      2. E.V.g Does the utility work with partners to identify new cost-effective uses for vegetation, taking into consideration environmental impacts and emissions of vegetation waste?

Response date: April 15, 2022

Response:

SCE modified its responses from "Yes" in 2021 to "No" in 2022 for the Maturity Survey questions 24.E.IV.h and 25.E.V.f, identified above, because SCE modified its interpretation of the questions, specifically with regard to the term "cost effective." SCE works with local landowners and partners to determine uses for cut vegetation. SCE also has standard processes to remove vegetation from the site and accommodates customer requests, such as cutting vegetation into firewood. These costs are included in the contractor's rates; there are not additional considerations concerning cost effectiveness.[1] Because it is unclear what constitutes "cost effective" for these questions, SCE provided conservative responses by selecting "No."

SCE changed its response from "Yes" in 2021 to "No" in 2022 for the Maturity Survey question 25.E.V.g. because SCE believes the question is vague and ambiguous. SCE took a conservative approach in its response so as to not affirm that SCE is undertaking efforts that the question does not clearly describe. However, SCE does work with partners to implement various uses of green waste disposal. For example, in relation to the 2020 Creek Fire, SCE leveraged a "curtain burner" to dispose of green waste in a manner that controls for air pollution and can be more cost effective than hauling waste.

As indicated in SCE's response to OEIS in Question 1 of Data Request Set OEIS-SCE-22-001, submitted on March 8, 2022, if the Maturity Model Survey questions identified above removed the term "cost-effective," SCE would respond "Yes" to the questions.

[1] SCE interpreted "cutting vegetation" to mean vegetation debris from pruning activities.

Regarding Landowner Non-Compliance Maturity:

Data Request: OEIS-SCE-22-008 (Question 1)

Request date: May 10, 2022

Request:

a. For referencing purposes, please provide a written response to the following question asked during a call with Energy Safety on April 6, 2022:
In response to question J.II.c of the 2022 Utility Wildfire Mitigation Maturity Survey which asks, "What percent of landowners are non-compliant with utility initiatives

(e.g., vegetation management)," SCE reported a level (v) "Less than 0.5%". This is a significant increase in maturity from its response to the 2021 Maturity Survey, where it reported a level (i) "More than 5%".

i. Please explain SCE's significant increase in maturity in this area.
ii. Has SCE taken steps to increase landowner compliance and cooperation with its mitigation initiatives?
    (1) If yes, please provide specific examples of such steps (e.g., outreach to or engagement with landowners).
    (2) If no, what is this increase in maturity (decrease in landowner non-compliance from >5% to <0.5%) attributed to?

Response date: May 12, 2022

Response:

i. SCE's increase in maturity score is due to a change in the interpretation of the maturity model question. In prior years, SCE's response was attributed to including customers that did not allow SCE to obtain enhanced vegetation to conductor clearance. In Q4 2021, SCE determined that refusal of enhanced clearances is not considered "non-compliance" because it is not a regulatory requirement and should not be used to calculate the percentage of non-complaint landowners. SCE's 2022 Maturity Survey response to this question is derived from formal customer refusals to perform the required work for the Heavy Tree Program and Routine Line Clearing.

ii. As explained in response to (i) above, the maturity model rating change is largely attributed to SCE's revised interpretation of the model question. However, SCE continues to look for opportunities to improve customer interactions. After the California Public Utilities Commission ("CPUC") updated General Order 95, Rule 35, Appendix E to recommend enhanced clearances and deeper trims, and with the implementation of SCE's Hazard Tree Management Program, SCE has needed to engage in more outreach to customers to help them understand the objectives of these programs and why their vegetation may need to be trimmed or removed. These activities also require SCE to enter customers' property to a greater degree than in the past. As a result, SCE implemented a more formal, robust protocol for customer notifications.

The formal process for customer notifications begins when SCE first attempts to make phone or physical contact with customers in order to obtain permission to proceed with planned work. Should the customer refuse, SCE initiates an escalation process, which varies depending on the type of mitigation and/or customer refusal.[1] If escalated discussion

attempts are unsuccessful, SCE sends a certified letter to the customer stating SCE's intention to proceed with work in accordance with Public Resource Code Section §4295.5.

Figure VIII-1 Pre-Work Notification, Consultation, Coordination

Some cities or counties require different pre-work notifications for customers. SCE will typically meet with a city annually to provide the annual maintenance schedule of the vegetation management grids. Some cities also require SCE to provide weekly email notifications to alert the city of the work being performed in the city. Other cities or counties require SCE to acquire permits to perform work in their respective areas. As shown in Figure VIII-39 above, the notification process begins at least 30-45 days ahead of a planned trim or removal.

Additionally, in March of 2021, SCE began performing Voice of the Customer surveys to gather qualitative customer feedback to help SCE understand its performance from the customer's point of view and will use this information to continue to improve customer interactions.

1 Generally, the notification consultant or tree trimming contractor will attempt to meet face-to-face with the customer to address concerns and explain the mitigation process. When necessary, SCE personnel will also engage with the customer.

Regarding Increased Inspection Findings Per Circuit Mile:

Data Request: OEIS-SCE-22-008 (Question 5)

Request date: May 10, 2022

Request:

a. In 2021, SCE had an increase in the number of inspection findings per circuit mile, where Level 2 (or Priority 2) and Level 3 (or Priority 3) findings rose the most.
   i. What are the causes behind the increase in inspection findings? Provide a description of the analysis performed, as well as conclusions including any relevant trends, inspection types, etc.
   ii. SCE's costs for asset management have been decreasing overtime. Provide an explanation as to why, including a breakdown for where costs have been decreasing and associated changes in resources as a result.

Response date: May 13, 2022

Response:

Question 05.a.i:

Based on SCE's correspondence with Energy Safety, SCE assumes this question is referring to the increase in Level 2 and Level 3 findings in HFTD from Distribution Detailed Inspections, per circuit mile inspected, as derived from Table 1 of SCE's Q4 2021 Non-Spatial Data Report (R2).

Based on this assumption, SCE divided the number of findings per level from distribution detailed inspections within HFTD for 2020 and 2021, by the total number of distribution detailed inspections performed each year in HFTD. The following table illustrates this calculation.

		A Q1	B Q2	C Q3	D Q4	E = A + B + C + D Total	F = Level findings / circuit miles	F Q1	G Q2	H Q3	I Q4	J = F + G + H + I Total	K = Level findings / circuit miles
#	Progress metric name	2020	2020	2020	2020	2020		2021	2021	2021	2021	2021	
1.b.	Number of circuit miles inspected from detailed inspections in HFTD - Distribution lines	4,137	4,537	4,232	3,495	16,401		3,831	5,471	2,762	97	12,161	
1.h.	Level 2 findings in HFTD for detailed inspections - Distribution lines	10,006	9,073	5,645	3,774	28,498	1.738	8,965	13,959	4,375	1,197	28,496	2.343
1.k.	Level 3 findings in HFTD for detailed inspections - Distribution lines	8,767	9,240	7,008	804	25,819	1.574	13,857	8,949	1,913	555	25,274	2.078

In general, SCE's distribution detailed overhead inspections, found generally the same number of findings for Level 2 and Level 3 in 2020 and 2021, however we performed fewer inspections in 2021 than in 2020. The drivers for the increase in findings per circuit miles for

Level 2 and Level 3 findings when comparing 2020 to 2021 were a result of an increase in identified 3rd party findings. SCE added a high level of emphasis on identifying 3rd party issues in the field starting in March 2021 and added detailed 3rd party survey questions with comprehensive field employee training, to ensure 3rd party issues are identified during field inspections to reduce risk.

Question 05.a.ii:

Based on SCE's correspondence with Energy Safety, SCE assumes this question is referring to the HFTD costs for the Asset Management & Inspections category as represented in Table 12 of SCE's Q4 2021 Quarterly Non-Spatial Data Report.

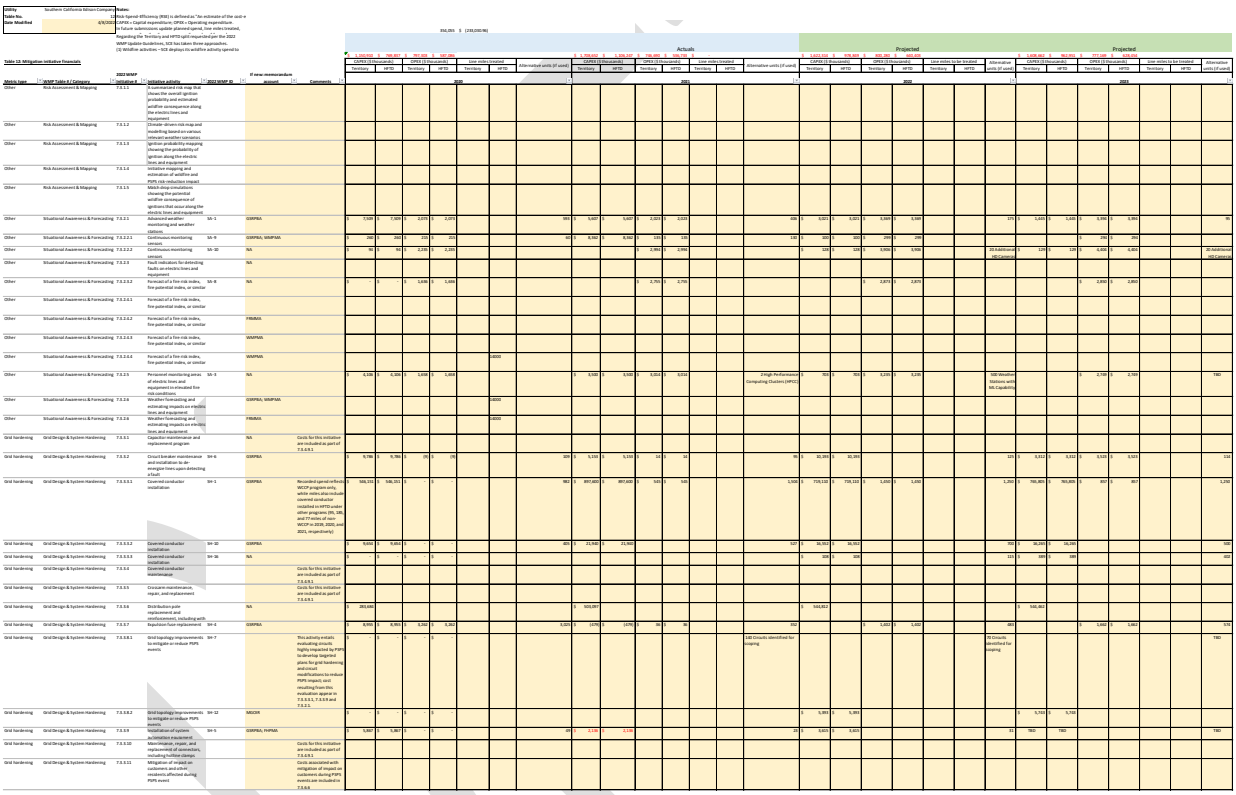
Please see attachment "OEIS-SCE-22-008 - 05.a.ii - Response - Financial Supporting Documentation.xlsx" for a disaggregation of the asset management and inspection category into activity level financial details, which helps to illustrate the programmatic drivers for the decrease in overall costs.

Regarding capital expenditures, SCE incurred HFTD capital expenditures of $149.9M in 2020 and $114.4M in 2021 for the overall asset management and inspections category. SCE forecasts spending $99.5M in 2022. Regarding O&M expenses, SCE incurred HFTD operational expenses of $173.9M in 2020 and $115.2M in 2021. SCE forecasts spending $107.4M in 2022. The decreases in costs for this category are due to the following reasons: changes in the number of remediations, unit costs of those remediations, impacts from work bundling efficiencies, and/or the costs of enabling technologies associated with this category. Resource changes were not an overall impact or driver to the year-to-year cost. Resources that perform inspections and remediations work can be leveraged across a number of different programs. As work increases or decreases across these programs, SCE adjusts its resource allocation according to the work required. For example, if there is less remediation work year-over-year, there will be less resources performing that work from year to year, and those resources are likely to be reassigned to other programs that require similar skillsets.

SCE notes that its response to a Cal Advocates Data Request (CalAdvocates-SCE-2022WMP-10, Q. 11), which requests similar information on asset management and inspections, may provide additional helpful context for review.

Spend in thousands $ of USD

WMP Category	2020							2021							2022		2020-2022 Planned (w/2020 and 2021 actuals)	
	Capital Planned	Capital Actual	Capital Δ	O&M Planned	O&M Actual	O&M Δ	2020 Total Actual	Capital Planned	Capital Actual	Capital Δ	O&M Planned	O&M Actual	O&M Δ	2021 Total Actual	Capital Planned	O&M Planned	Capital	O&M
Situational Awareness	$13.20	$12.00	$1.30	$10.40	$7.80	$2.60	$19.80	$21.40	$17.50	$3.90	$16.10	$10.90	$5.20	$28.40	$4.00	$13.70	$33.40	$32.40
Grid Design and System Hardening	$549.10	$583.20	($34.10)	$10.40	$4.00	$6.40	$587.20	$830.40	$936.50	($106.10)	$5.60	$1.70	$3.90	$938.20	$825.00	$11.00	$2,344.70	$16.60
Asset Management and Inspections	$244.10	$149.90	$94.30	$268.10	$173.90	$94.10	$323.80	$216.10	$114.40	$101.70	$136.50	$115.20	$21.30	$229.60	$99.50	$107.40	$363.80	$396.50
Vegetation Management and Inspections	-	$16.10	($16.10)	$137.20	$334.40	($197.20)	$350.60	$9.90	$11.00	($1.10)	$343.20	$319.30	$23.90	$330.30	$6.80	$402.70	$33.90	$1,056.50
Grid Operations and Protocols	$2.00	$6.80	($4.80)	$56.70	$20.10	$36.60	$27.00	$7.20	$14.50	($7.30)	$60.90	$45.00	$15.90	$59.50	$20.20	$46.40	$41.60	$111.50
Data Governance	-	$1.80	($1.80)	-	-	-	$1.80	$15.70	$9.30	$6.40	$1.10	-	$1.10	$9.30	$16.50	$4.10	$27.60	$4.10
Resource Allocation Methodology	-	-	-	-	$32.90	($32.90)	$32.90	-	-	-	$7.90	$13.20	($5.30)	$13.20	-	$10.40	-	$56.50
Emergency Planning and Preparedness	-	-	-	$12.20	$5.90	$6.30	$5.90	$0.20	-	$0.20	$1.70	$3.90	($2.20)	$3.90	-	$9.10	-	$19.00
Stakeholder Cooperation and Community	-	-	-	-	$7.80	($7.80)	$7.80	-	-	-	$23.40	$27.50	($4.10)	$27.50	-	$35.60	-	$70.90
New Innovations and Technologies	-	-	-	$4.70	$0.20	$4.60	$0.20	$8.40	$3.00	$5.40	-	$0.00	$0.00	$3.00	$7.00	-	$10.00	$0.20
Total	**$808.50**	**$769.80**	**$38.60**	**$499.80**	**$587.10**	**($87.30)**	**$1,356.90**	**$1,109.40**	**$1,106.20**	**$3.10**	**$596.30**	**$536.70**	**$59.60**	**$1,643.00**	**$978.80**	**$640.40**	**$2,854.90**	**$1,764.20**



Grid hardening	Grid Design & System Hardening	7.3.3.12	Other corrective action	SH-14	WMPMA	Additional 2021 recorded spend for this activity is included in 7.3.3.3.1 and 7.3.4.9.1	$ -	$ -	$ 554	$ 554		9715		$ 92	$ 92					361	$ 4,931	$ 4,931	$ 5,815	$ 5,815			1,800	$ 7,617	$ 7,617	$ 10,479	$ 10,479			3,587
Grid hardening	Grid Design & System Hardening	7.3.3.12.2	Other corrective action	SH-17	NA		$ 1,855	$ 1,855	$ -	$ -				$ 2,707	$ 2,707					1GFN	$ 10,596	$ 10,596					1 Iso Bank	$ 23,917	$ 23,917					1 GFN
Grid hardening	Grid Design & System Hardening	7.3.3.13	Pole loading infrastructure hardening and replacement program based on pole loading assessment program		NA	This is captured on Initiative 7.3.3.6.; under Distribution Pole Remediations																												
Grid hardening	Grid Design & System Hardening	7.3.3.14	Transformers maintenance and replacement		NA		$ 96,432		$ 1,399					$ 97,069		$ 1,275					$ 98,653		$ 1,482					$ 101,248		$ 1,521				
Grid hardening	Grid Design & System Hardening	7.3.3.15	Transmission tower maintenance and replacement	SH-13	WMPMA	Recorded 2021 spend for this activity is included in 7.3.4.10														52			$ 250	$ 250			21	$ -	$ -					-
Grid hardening	Grid Design & System Hardening	7.3.3.16	Undergrounding of electric lines and/or equipment	SH-2	WMPMA		$ 961	$ 961	$ -	$ -				$ 6,586	$ 6,586					6	$ 51,960	$ 51,960					13	$ 42,664	$ 42,664					11
Grid hardening	Grid Design & System Hardening	7.3.3.17.1	Updates to grid topology to minimize risk of ignition in HFTDs	SH-8	WMPMA		$ -	$ -	$ 125	$ 125			6			$ 946	$ 946			10			$ 1,384	$ 1,384			11	TBD	TBD					TBD
Grid hardening	Grid Design & System Hardening	7.3.3.17.2	Updates to grid topology to minimize risk of ignition in HFTDs	SH-11	WMPMA		$ -	$ -	$ 74	$ 74		9715		$ 190	$ 190	$ 132	$ 132			2 Projects, 17 Assessments	$ 1,925	$ 1,925	$ 660	$ 660			8 Projects, 13 Assessments	$ 1,800	$ 1,800	$ 199	$ 199			TBD
Grid hardening	Grid Design & System Hardening	7.3.3.17.3	Updates to grid topology to minimize risk of ignition in HFTDs	SH-15	WMPMA									$ 602	$ 602					16	$ 570	$ 570					25	$ 375	$ 375					7
Asset inspection	Asset Management & Inspections	7.3.4.1	Detailed inspections of distribution electric lines and equipment						$ 26,362							$ 26,522																		
Asset inspection	Asset Management & Inspections	7.3.4.2	Detailed inspections of transmission electric lines and equipment						$ 5,957							$ 5,759																		
Asset inspection	Asset Management & Inspections	7.3.4.3	Improvement of inspections	IN-8	WMPMA		$ 28,719	$ 28,719	$ 14,972	$ 14,972		9,715		$ 18,586	$ 18,586	$ 3,727	$ 3,727				$ 9,504	$ 9,504	$ 3,955	$ 3,955				$ 4,700	$ 4,700	$ 3,147	$ 3,147			
Asset inspection	Asset Management & Inspections	7.3.4.4	Infrared inspections of distribution electric lines and equipment	IN-3	Previously GSRPBA, Currently WMPMA		$ -	$ -	$ 791	$ 791		4,416	5,900			$ 464	$ 464			4,410			$ 427	$ 427			4,400			$ 430	$ 430			4,425
Asset inspection	Asset Management & Inspections	7.3.4.5	Infrared inspections of transmission electric lines and equipment	IN-4	WMPMA		$ -	$ -	$ 384	$ 384		1,005				$ 94	$ 94			1,046			$ 209	$ 209			1,000			$ 219	$ 219			1,000
Asset inspection	Asset Management & Inspections	7.3.4.5.1	Transmission Conductor & Splice Assessment	IN-9	NA																		$ 1,500	$ 1,500			150 spans w/ Line Vue, 70 splices with X-Ray, 15 Conductor Samples			$ 1,494	$ 1,494			150 spans w/ Line Vue, 70 splices with X-Ray, 15 Conductor Samples
Asset inspection	Asset Management & Inspections	7.3.4.6	Intrusive pole inspections		Base O&M				$ 6,133				146,621			$ 5,966				144,122			$ 6,952				143,600			$ 7,144				143,600
Asset inspection	Asset Management & Inspections	7.3.4.7	LiDAR inspections of distribution electric lines and equipment			Costs for this initiative are included as part of 7.3.5.7																												
Asset inspection	Asset Management & Inspections	7.3.4.8	LiDAR inspections of transmission electric lines and equipment			Costs for this initiative are included as part of 7.3.5.8																												
Asset inspection	Asset Management & Inspections	7.3.4.9.1	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations	IN-1.1	Previously FRMMA; GSRPBA; Currently WMPMA		$ 85,219	$ 85,219	$ 105,553	$ 105,553			367,067	$ 82,458	$ 82,458	$ 85,925	$ 85,925			359,947	$ 67,995	$ 67,995	$ 78,700	$ 78,700			359,988	$ 61,872	$ 61,872	$ 78,274	$ 78,274			360,000
Asset inspection	Asset Management & Inspections	7.3.4.9.2	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations	IN-5	NA		$ -	$ -	$ 403	$ 403			268			$ 149	$ 149			238			$ 70	$ 70			190			$ 69	$ 69			190
Asset inspection	Asset Management & Inspections	7.3.4.10	Other discretionary inspection of transmission electric lines and	IN-1.2	Previously FRMMA; GSRPBA; Currently WMPMA		$ 35,934	$ 35,934	$ 51,820	$ 51,820			66,942	$ 13,380	$ 13,380	$ 24,802	$ 24,802			41,614	$ 21,963	$ 21,963	$ 22,560	$ 22,560			38,000	$ 11,953	$ 11,953	$ 21,045	$ 21,045			37,995
Asset inspection	Asset Management & Inspections	7.3.4.11	Patrol inspections of distribution electric lines and equipment						$ 25,218							$ 27,315																		
Asset inspection	Asset Management & Inspections	7.3.4.12	Patrol inspections of transmission electric lines and equipment						$ 3,567							$ 4,561																		
Asset inspection	Asset Management & Inspections	7.3.4.13	Pole loading assessment program to determine safety factor		PLP Balancing Account				$ 15,133				125,714			$ 3,742				20,066			$ 497				2,000							
Asset inspection	Asset Management & Inspections	7.3.4.14	Quality assurance / quality control of inspections			Costs for this initiative are included as part of 7.3.4.9.1 and 7.3.4.10																												
Asset inspection	Asset Management & Inspections	7.3.4.15	Substation inspections		NA				$ 5,704							$ 4,209																		
Vegetation management project	Vegetation Management & Inspections	7.3.5.1	Additional efforts to manage community and environmental impacts				$ -	$ -	$ -	$ -						$ 20,599	$ 20,599						$ 16,710	$ 16,710						$ 16,641	$ 16,641			
Vegetation inspection	Vegetation Management & Inspections	7.3.5.2	Detailed inspections and management practices for vegetation clearances around		Previously Na, Currently VMBA				$ 25,756	$ 16,432			470k (Trees in HFTD)			$ 24,943	$ 15,914			600k (Trees in HFTD)			$ 23,242	$ 14,828			600k (Trees in HFTD)			$ 23,740	$ 15,146			600k (Trees in HFTD)
Vegetation inspection	Vegetation Management & Inspections	7.3.5.3	Detailed inspections and management practices for vegetation clearances around		Previously Na, Currently VMBA				$ 1,774	$ 1,132			180k (Trees in HFTD)			$ 2,345	$ 1,496			190k (Trees in HFTD)			$ 4,675	$ 2,983			100k (Trees in HFTD)			$ 4,594	$ 2,931			100k (Trees in HFTD)
Vegetation management project	Vegetation Management & Inspections	7.3.5.4	Emergency response vegetation management due to red flag warning or other urgent weather conditions			This activity is not individually tracked. Associated costs and units are captured in VM-2																												
Vegetation management project	Vegetation Management & Inspections	7.3.5.5.1	Fuel management (including all wood management) and management of "slash" from	VM-2	Previously WMPMA, Currently VMBA	Cost forecasts also include some transmission poles	$ -	$ -	$ 7,459	$ 7,459			230,000			$ 11,026	$ 11,026			163,100			$ 20,589	$ 20,589			170k Exempt Distribution Poles, 55k Non-			$ 21,240	$ 21,240			170k Exempt Distribution Poles, 55k Non-
Vegetation management project	Vegetation Management & Inspections	7.3.5.5.2	Fuel management (including all wood management) and management of "slash" from vegetation management activities	VM-3	Previously FHPMA, Currently VMBA		$ -	$ -	$ -	$ -			61			$ 349	$ 349			62			$ 1,185	$ 1,185			32			$ 280	$ 280			
Vegetation inspection	Vegetation Management & Inspections	7.3.5.6	Improvement of inspections																															
Vegetation inspection	Vegetation Management & Inspections	7.3.5.7	Remote sensing inspections of vegetation around distribution electric lines and equipment.													$ 1,181	$ 1,181			90 Circuit Miles			$ 3,182	$ 3,182			500 Circuit Miles			$ 3,224	$ 3,224			500 Circuit Miles
Vegetation inspection	Vegetation Management & Inspections	7.3.5.8	Remote sensing inspections of vegetation around transmission electric lines and equipment		Previously WMPMA, Currently VMBA		$ -	$ -	$ 4,092	$ 4,092		1227	1700 Circuit Miles			$ 3,180	$ 3,180			1590 Circuit Miles			$ 2,048	$ 2,048			1600 Circuit Miles			$ 1,903	$ 1,903			1600 Circuit Miles
Vegetation inspection	Vegetation Management & Inspections	7.3.5.9	Other discretionary inspections of vegetation around distribution electric lines and equipment																															
Vegetation inspection	Vegetation Management & Inspections	7.3.5.10	Other discretionary inspections of vegetation around transmission electric lines and equipment																															
Vegetation inspection	Vegetation Management & Inspections	7.3.5.11	Patrol inspections of vegetation around distribution electric lines and		Previously Na, Currently VMBA																		$ 18,283	$ 18,283						$ 18,832	$ 18,832			
Vegetation inspection	Vegetation Management & Inspections	7.3.5.12	Patrol inspections of vegetation around transmission electric lines and equipment		Previously Na, Currently VMBA											$ 29	$ 29						$ 962	$ 962						$ 991	$ 991			
Vegetation inspection	Vegetation Management & Inspections	7.3.5.13	Quality assurance / quality control of vegetation management	VM-5	Previously WMPMA, Currently VMBA		$ -	$ -	$ 3,966	$ 3,966		14,000				$ 3,221	$ 3,221						$ 6,159	$ 6,159			8000 Circuit Miles			$ 6,571	$ 6,571			8000 Circuit Miles
Vegetation management project	Vegetation Management & Inspections	7.3.5.14	Recruiting and training of vegetation management personnel			Recruiting costs for Vegetation Management activities are captured in general labor.																												
Vegetation management project	Vegetation Management & Inspections	7.3.5.15	Identification and remediation of "at-risk species"																															
Vegetation management project	Vegetation Management & Inspections	7.3.5.16.1	Removal and remediation of trees with strike potential to electric lines and equipment	VM-1	Previously GSRPBA, Currently VMBA		$ -	$ -	$ 46,685	$ 46,685			100,000 trees assessed			$ 32,432	$ 32,432			131,400 trees assessed			$ 42,636	$ 42,636			330 circuits assessed			$ 45,359	$ 45,359			200 circuits assessed
Vegetation management project	Vegetation Management & Inspections	7.3.5.16.2	Removal and remediation of trees with strike potential to electric lines and equipment	VM-4			$ -	$ -	$ 37,604	$ 37,604			9,000 removals identified			$ 16,165	$ 16,165			1,301 circuits assessed			$ 31,258	$ 31,258			900 circuits assessed			$ 36,212	$ 36,212			900 circuits assessed
Vegetation inspection	Vegetation Management & Inspections	7.3.5.17	Substation inspection																															
Vegetation management project	Vegetation Management & Inspections	7.3.5.18	Substation vegetation management			Associated costs are captured in 7.3.5.2																					169 Substations Inspected							
Vegetation management project	Vegetation Management & Inspections	7.3.5.19	Vegetation management enterprise system	VM-6	Previously WMPMA; GSRPBA, Currently VMBA		$ 16,128	$ 16,128	$ 1,056	$ 1,056				$ 11,005	$ 11,005	$ 635	$ 635				$ 6,800	$ 6,800	$ 3,500	$ 3,500				$ 2,300	$ 2,300	$ 3,800	$ 3,800			
Vegetation management project	Vegetation Management & Inspections	7.3.5.20	Vegetation management to achieve clearances around electric lines and equipment		Previously FHPMA, Currently VMBA				$ 326,799	$ 216,021						$ 333,802	$ 213,071						$ 379,262	$ 238,421						$ 347,246	$ 217,453			
Vegetation management project	Vegetation Management & Inspections	7.3.5.21	Vegetation management activities post-fire																															
Other	Grid Operations & Operating Protocols	7.3.6.1	Automatic recloser operations				$ 957							$ 2,239																				
Other	Grid Operations & Operating Protocols	7.3.6.2	Protective equipment and device settings.		NA																													
Other	Grid Operations & Operating Protocols	7.3.6.3	Crew-accompanying ignition prevention and suppression resources and services																															
Other	Grid Operations & Operating Protocols	7.3.6.4	Personnel work procedures and training in conditions of elevated fire risk																															
Other	Grid Operations & Operating Protocols	7.3.6.5	Protocols for PSPS re-energization				$ -	$ -	$ 111	$ 111						$ 394	$ 394						$ 709	$ 709						$ 738	$ 738			
Other	Grid Operations & Operating Protocols	7.3.6.6	PSPS events and mitigation of PSPS impacts	PSPS-2	Previously GSRPBA; FRMMA; WMPMA, Currently FRMMA; WMPMA		$ 6,843	$ 6,843	$ 11,092	$ 11,092		14,000	56 CRCs, 720 CCBB Batteries, 1041 Rebates	$ 3,285	$ 3,285	$ 25,632	$ 25,632			64 CRCs, 6021 CCBB Batteries, 2427 Rebates	$ 7,560	$ 7,560	$ 28,131	$ 28,131			2,750 CCBB Customers, 4,000 Battery Rebates			$ 22,894	$ 22,894			2,750 CCBB Customers, 4,000 Battery Rebates
Other	Grid Operations & Operating Protocols	7.3.6.6.1	PSPS Incident Management Team		NA		$ -	$ -	$ 8,935	$ 8,935				$ 11,217	$ 11,217	$ 14,812	$ 14,812				$ 12,650	$ 12,650	$ 14,953	$ 14,953				$ 4,550	$ 4,550	$ 15,987	$ 15,987			
Other	Grid Operations & Operating Protocols	7.3.6.6.2.1.2	Customer Resiliency Programs		NA											$ 37	$ 37																	
Other	Grid Operations & Operating Protocols	7.3.6.6.2.1.3	Customer Resiliency Equipment		NA		$ -	$ -	$ 4	$ 4						$ 4,138	$ 4,138						$ 2,595	$ 2,595						$ 2,000	$ 2,000			
Other	Grid Operations & Operating Protocols	7.3.6.7	Stationed and on-call ignition prevention and suppression resources and services																															
Other	Data Governance	7.3.7.1	Centralized repository for data	DG-1	Previously GSRPBA, Currently WMPMA		$ 1,796	$ 1,796	$ -	$ -		14,000		$ 9,341	$ 9,341						$ 16,487	$ 16,487	$ 4,132	$ 4,132				$ 8,115	$ 8,115	$ 5,660	$ 5,660			
Other	Data Governance	7.3.7.2	Collaborative research on utility ignition and/or wildfire																															
Other	Data Governance	7.3.7.3	Documentation and disclosure of wildfire-related data and algorithms																															
Other	Data Governance	7.3.7.4	Tracking and analysis of near miss data																															
Other	Resource Allocation Methodology	7.3.8.1	Allocation methodology development and application		Previously FRMMA; WMPMA, Currently WMPMA		$ -	$ -	$ 32,860	$ 32,860		14000				$ 13,246	$ 13,246						$ 10,372	$ 10,372						$ 10,644	$ 10,644			
Other	Resource Allocation Methodology	7.3.8.2	Risk reduction scenario development and analysis																															
Other	Resource Allocation Methodology	7.3.8.3	Risk spend efficiency analysis																															
Other	Emergency Planning & Preparedness	7.3.9.1	Adequate and trained workforce for service restoration	DEP-2	WMPMA		$ -	$ -	$ 616	$ 616			44 UAS Operators Trained			$ 377	$ 377			60 UAS Operators Trained			$ 1,777	$ 1,777			50 UAS Operators Trained			$ 1,863	$ 1,863			50 UAS Operators Trained
Other	Emergency Planning & Preparedness	7.3.9.2	Community outreach, public awareness, and communications efforts			Costs included in 7.3.10.1.2																												
Other	Emergency Planning & Preparedness	7.3.9.3	Customer support in emergencies			Costs included in 7.3.10.1.2																												
Other	Emergency Planning & Preparedness	7.3.9.4	Disaster and emergency preparedness plan			Costs included in 7.3.6.6.1																												
Other	Emergency Planning & Preparedness	7.3.9.5	Preparedness and planning for service restoration		Previously GSRPBA, Currently WMPMA		$ -	$ -	$ 5,328	$ 5,328		14,000				$ 3,530	$ 3,530						$ 7,337	$ 7,337						$ 7,386	$ 7,386			
Other	Emergency Planning & Preparedness	7.3.9.6	Protocols in place to learn from wildfire events																															
Other	Stakeholder Cooperation & Community Engagement	7.3.10.1.1	Community engagement	DEP-1.2	Previously GSRPBA, Currently WMPMA		$ -	$ -	$ 142	$ 142			9			$ 11	$ 11			11			$ 110	$ 110			9			$ 112	$ 112			9
Other	Stakeholder Cooperation & Community Engagement	7.3.10.1.2	Community engagement	DEP-1.3	Previously FRMMA; GSRPBA, Currently WMPMA		$ -	$ -	$ 5,490	$ 5,490		14,000				$ 9,100	$ 9,100						$ 11,443	$ 11,443						$ 11,489	$ 11,489			
Other	Stakeholder Cooperation & Community Engagement	7.3.10.1.3	Community engagement	DEP-4	Previously FRMMA, Currently WMPMA		$ -	$ -	$ -	$ -			5			$ 856	$ 856			9			$ 6,038	$ 6,038			6			$ 6,299	$ 6,299			6
Other	Stakeholder Cooperation & Community Engagement	7.3.10.2	Cooperation and best practice sharing with agencies outside CA																															
Other	Stakeholder Cooperation & Community Engagement	7.3.10.3	Cooperation with suppression agencies	DEP-5	WMPMA		$ -	$ -	$ 2,158	$ 2,158			1			$ 17,545	$ 17,545			3 MOUs			$ 18,000	$ 18,000			5			$ 17,707	$ 17,707			5
Other	Stakeholder Cooperation & Community Engagement	7.3.10.4	Forest service and fuel reduction cooperation and joint roadmap																															
Other	Alternative Technologies	7.1.E	Alternative Technology Pilot Programs		Previously GSRPBA; Currently WMPMA	Drivers and RSEs reflective of Early Fault Detection only	$ -	$ -	$ 159	$ 159		14000		$ 2,978	$ 2,978	$ 2	$ 2				$ 6,985	$ 6,985												

Regarding Grid Hardening Effectiveness:

Data Request: OEIS-SCE-22-008 (Question 6)

Request date: May 10, 2022

Request:

a. What are the efficacy thresholds SCE used for the "high", "medium", and "low" designations in Table 7-2 of SCE's 2022 WMP Update? Provide the associated effectiveness percentages for reducing ignition risk for the three.

Response date: May 13, 2022

Response:

Based on an analysis comparing 26 known risk drivers (e.g. vegetation contact, animal contact, and balloon contract) to the ignition modes listed in Table 7-2, SCE created the "high," medium," and "low," designations based on relative levels of effectiveness. For example, covered conductor is rated as "high" against phase-to-phase ignitions, as covered conductor is highly effective against the drivers that result in phase-to-phase ignitions, such as contact from object and wire-to-wire clash. In contrast, REFCL++ is rated as a "low" against phase-to-phase ignitions, as it has some effectiveness against that ignition type but it is not as effective as covered conductor. SCE utilized this type of relative ranking approach for the scores in the table, and as such the "high", "medium", and "low" designations do not have a precise quantitative threshold.

Regarding xxxx:

Data Request: OEIS-SCE-22-008 (Question #)

Request date: May 10, 2022

Request:

Response date: May 13, 2022

Response:

Appendix C. Comments on the Draft Decision

This appendix will contain Energy Safety's summary of stakeholder comments on the Draft Decision.

Appendix D. The Ten Maturity and Mitigation Initiative Categories

The following table presents the ten categories of questions on the Maturity Survey, and, where relevant, the version of the category name used in the 2022 WMP Guidelines or Decisions. All mitigation programs and initiatives should fit into one or more of the following categories. Some examples of activities or data products that fit under each category are listed.

Maturity and Mitigation Categories	Examples of Activities
1. Risk mapping and simulation; Per WMP Guidelines/this Decision document: Risk assessment and mapping	Risk and ignition probability mapping; match drop simulations; consequence mapping
2. Situational awareness and forecasting	Weather monitoring; weather station installation; fault indicator technology implementation; fire potential index
3. Grid design and system hardening	Capacitor maintenance and replacement; covered conductor installation and maintenance; expulsion fuse replacement; pole loading infrastructure hardening and replacement
4. Asset management and inspections	Infrared, LiDAR, or drone inspections and routine or detailed patrol inspections of distribution/transmission electric lines and equipment; intrusive pole inspections; pole loading assessments; quality assurance and quality control of inspections
5. Vegetation management and inspections	Fuel management and reduction of "slash"; LiDAR or drone inspections and routine or detailed patrol inspections of vegetation

Maturity and Mitigation Categories	Examples of Activities
	around distribution/transmission electric lines and equipment; inventory, remediation, or removal of hazardous vegetation; quality assurance and quality control of vegetation management inspections
6. Grid operations and protocols; Per this Decision document: Grid operations and operating protocols, including PSPS	Automatic recloser operations; protocols for re-energization after PSPS; mitigation of PSPS impacts; work procedures and training in conditions of elevated fire risk
7. Data governance	Centralized data repository; ignition/wildfire collaborative research; documentation/disclosure of wildfire-related data and algorithms; risk event data tracking and analysis
8. Resource allocation methodology	Method of allocation of resources; method of calculating the risk-spend efficiency of initiatives (not including PSPS, which is not considered a mitigation initiative within WMPs); risk reduction scenario development and analysis
9. Emergency planning and preparedness	Ensuring the utility has an adequate and trained workforce for service restoration; community outreach, public awareness, and communications efforts; customer support during emergencies
10. Stakeholder cooperation and community engagement	Cooperation with suppression agencies; community engagement efforts; sharing best practices and cooperating with agencies

Maturity and Mitigation Categories	Examples of Activities
	outside California; coordinating fuel management with the U.S Forest Service

8.1 Appendix E. Definition of Initiatives by Category

Category A. Risk Mapping and Simulation / Risk Assessment and Mapping

Category A. Risk Mapping and Simulation / Risk Assessment and Mapping Initiative Activity	Definition
A summarized risk map that shows the overall ignition probability and estimated wildfire consequence along the electric lines and equipment	Development and use of tools and processes to develop and update risk map and simulations and to estimate risk reduction potential of initiatives for a given portion of the grid (or more granularly, e.g., circuit, span, or asset). May include verification efforts, independent assessment by experts, and updates.
Climate-driven risk map and modeling based on various relevant weather scenarios	Development and use of tools and processes to estimate incremental risk of foreseeable climate scenarios, such as drought, across a given portion of the grid (or more granularly, e.g., circuit, span, or asset). May include verification efforts, independent assessment by experts, and updates.
Ignition probability mapping showing the probability of ignition along the electric lines and equipment	Development and use of tools and processes to assess the risk of ignition across regions of the grid (or more granularly, e.g., circuits, spans, or assets).
Initiative mapping and estimation of wildfire and PSPS risk-reduction impact	Development of a tool to estimate the risk reduction efficacy (for both wildfire and

Category A. Risk Mapping and Simulation / Risk Assessment and Mapping Initiative Activity	Definition
	PSPS risk) and risk-spend efficiency of various initiatives.
Match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment	Development and use of tools and processes to assess the impact of potential ignition and risk to communities (e.g., in terms of potential fatalities, structures burned, monetary damages, area burned, impact on air quality and greenhouse gas, or GHG, reduction goals, etc.).

Category B. Situational Awareness and Forecasting

Category B. Situational Awareness and Forecasting Initiative Activity	Definition
Advanced weather monitoring and weather stations	Purchase, installation, maintenance, and operation of weather stations. Collection, recording, and analysis of weather data from weather stations and from external sources.
Continuous monitoring sensors	Installation, maintenance, and monitoring of sensors and sensorized equipment used to monitor the condition of electric lines and equipment.
Fault indicators for detecting faults on electric lines and equipment	Installation and maintenance of fault indicators.

Category B. Situational Awareness and Forecasting Initiative Activity	Definition
Forecast of a fire risk index, fire potential index, or similar	Index that uses a combination of weather parameters (such as wind speed, humidity, and temperature), vegetation and/or fuel conditions, and other factors to judge current fire risk and to create a forecast indicative of fire risk. A sufficiently granular index shall inform operational decision-making.
Personnel monitoring areas of electric lines and equipment in elevated fire risk conditions	Personnel position within utility service territory to monitor system conditions and weather on site. Field observations shall inform operational decisions.
Weather forecasting and estimating impacts on electric lines and equipment	Development methodology for forecast of weather conditions relevant to utility operations, forecasting weather conditions and conducting analysis to incorporate into utility decision-making, learning and updates to reduce false positives and false negatives of forecast PSPS conditions.

Category C. Grid Design and System Hardening

Category C. Grid Design and System Hardening Initiative Activity	Definition
Capacitor maintenance and replacement program	Remediation, adjustments, or installations of new equipment to improve or replace existing capacitor equipment.

Category C. Grid Design and System Hardening Initiative Activity	Definition
Circuit breaker maintenance and installation to de-energize lines upon detecting a fault	Remediation, adjustments, or installations of new equipment to improve or replace existing fast switching circuit breaker equipment to improve the ability to protect electrical circuits from damage caused by overload of electricity or short circuit.
Covered conductor installation	Installation of covered or insulated conductors to replace standard bare or unprotected conductors (defined in accordance with GO 95 as supply conductors, including but not limited to lead wires, not enclosed in a grounded metal pole or not covered by: a "suitable protective covering" (in accordance with Rule 22.8), grounded metal conduit, or grounded metal sheath or shield). In accordance with GO 95, conductor is defined as a material suitable for: (1) carrying electric current, usually in the form of a wire, cable or bus bar, or (2) transmitting light in the case of fiber optics; insulated conductors as those which are surrounded by an insulating material (in accordance with Rule 21.6), the dielectric strength of which is sufficient to withstand the maximum difference of potential at normal operating voltages of the circuit without breakdown or puncture; and suitable protective covering as a covering of wood or other non-conductive material having the electrical insulating efficiency

Category C. Grid Design and System Hardening Initiative Activity	Definition
	(12kV/in. dry) and impact strength (20ft.-lbs) of 1.5 inches of redwood or other material meeting the requirements of Rule 22.8-A, 22.8-B, 22.8-C or 22.8-D.
Covered conductor maintenance	Remediation and adjustments to installed covered or insulated conductors. In accordance with GO 95, conductor is defined as a material suitable for: (1) carrying electric current, usually in the form of a wire, cable or bus bar, or (2) transmitting light in the case of fiber optics; insulated conductors as those which are surrounded by an insulating material (in accordance with Rule 21.6), the dielectric strength of which is sufficient to withstand the maximum difference of potential at normal operating voltages of the circuit without breakdown or puncture; and suitable protective covering as a covering of wood or other non-conductive material having the electrical insulating efficiency (12kV/in. dry) and impact strength (20ft.-lbs) of 1.5 inches of redwood or other material meeting the requirements of Rule 22.8-A, 22.8-B, 22.8-C or 22.8-D.
Crossarm maintenance, repair, and replacement	Remediation, adjustments, or installations of new equipment to improve or replace existing crossarms, defined as horizontal support attached to poles or structures

Category C. Grid Design and System Hardening Initiative Activity	Definition
	generally at right angles to the conductor supported in accordance with GO 95.
Distribution pole replacement and reinforcement, including with composite poles	Remediation, adjustments, or installations of new equipment to improve or replace existing distribution poles (i.e., those supporting lines under 65kV), including with equipment such as composite poles manufactured with materials reduce ignition probability by increasing pole lifespan and resilience against failure from object contact and other events.
Expulsion fuse replacement	Installations of new and CAL FIRE-approved power fuses to replace existing expulsion fuse equipment.
Grid topology improvements to mitigate or reduce PSPS events	Plan to support and actions taken to mitigate or reduce PSPS events in terms of geographic scope and number of customers affected, such as installation and operation of electrical equipment to sectionalize or island portions of the grid, microgrids, or local generation.
Installation of system automation equipment	Installation of electric equipment that increases the ability of the utility to automate system operation and monitoring, including equipment that can be adjusted remotely such as automatic reclosers (switching devices designed to detect and interrupt momentary faults that can reclose

Category C. Grid Design and System Hardening Initiative Activity	Definition
	automatically and detect if a fault remains, remaining open if so).
Maintenance, repair, and replacement of connectors, including hotline clamps	Remediation, adjustments, or installations of new equipment to improve or replace existing connector equipment, such as hotline clamps.
Mitigation of impact on customers and other residents affected during PSPS event	Actions taken to improve access to electricity for customers and other residents during PSPS events, such as installation and operation of local generation equipment (at the community, household, or other level).
Other corrective action	Other maintenance, repair, or replacement of utility equipment and structures so that they function properly and safely, including remediation activities (such as insulator washing) of other electric equipment deficiencies that may increase ignition probability due to potential equipment failure or other drivers.
Pole loading infrastructure hardening and replacement program based on pole loading assessment program	Actions taken to remediate, adjust, or install replacement equipment for poles that the utility has identified as failing to meet safety factor requirements in accordance with GO 95 or additional utility standards in the utility's pole loading assessment program.

Category C. Grid Design and System Hardening Initiative Activity	Definition
Transformers maintenance and replacement	Remediation, adjustments, or installations of new equipment to improve or replace existing transformer equipment.
Transmission tower maintenance and replacement	Remediation, adjustments, or installations of new equipment to improve or replace existing transmission towers (e.g., structures such as lattice steel towers or tubular steel poles that support lines at or above 65kV).
Undergrounding of electric lines and/or equipment	Actions taken to convert overhead electric lines and/or equipment to underground electric lines and/or equipment (i.e., located underground and in accordance with GO 128).
Updates to grid topology to minimize risk of ignition in the HFTD	Changes in the plan, installation, construction, removal, and/or undergrounding to minimize the risk of ignition due to the design, location, or configuration of utility electric equipment in the HFTD.

Category D. Asset Management and Inspections

Category D. Asset Management and Inspections Initiative Activity	Definition
Detailed inspections of distribution electric lines and equipment	In accordance with GO 165, careful visual inspections of overhead electric distribution lines and equipment where individual

Category D. Asset Management and Inspections Initiative Activity	Definition
	pieces of equipment and structures are carefully examined, visually and through use of routine diagnostic test, as appropriate, and (if practical and if useful information can be so gathered) opened, and the condition of each rated and recorded.
Detailed inspections of transmission electric lines and equipment	Careful visual inspections of overhead electric transmission lines and equipment where individual pieces of equipment and structures are carefully examined, visually and through use of routine diagnostic test, as appropriate, and (if practical and if useful information can be so gathered) opened, and the condition of each rated and recorded.
Improvement of inspections	Identifying and addressing deficiencies in inspections protocols and implementation by improving training and the evaluation of inspectors.
Infrared inspections of distribution electric lines and equipment	Inspections of overhead electric distribution lines, equipment, and right-of-way using infrared (heat-sensing) technology and cameras that can identify "hot spots," or conditions that indicate deterioration or potential equipment failures, of electrical equipment.
Infrared inspections of transmission electric lines and equipment	Inspections of overhead electric transmission lines, equipment, and right-of-way using infrared (heat-sensing)

Category D. Asset Management and Inspections Initiative Activity	Definition
	technology and cameras that can identify "hot spots," or conditions that indicate deterioration or potential equipment failures, of electrical equipment.
Intrusive pole inspections	In accordance with GO 165, intrusive inspections involve movement of soil, taking samples for analysis, and/or using more sophisticated diagnostic tools beyond visual inspections or instrument reading.
LiDAR inspections of distribution electric lines and equipment	Inspections of overhead electric distribution lines, equipment, and right-of-way using LiDAR (Light Detection and Ranging, a remote sensing method that uses light in the form of a pulsed laser to measure variable distances).
LiDAR inspections of transmission electric lines and equipment	Inspections of overhead electric transmission lines, equipment, and right-of-way using LiDAR (Light Detection and Ranging, a remote sensing method that uses light in the form of a pulsed laser to measure variable distances).
Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations	Inspections of overhead electric distribution lines, equipment, and right-of-way that exceed or otherwise go beyond those mandated by rules and regulations, including GO 165, in terms of frequency, inspection checklist requirements or detail, analysis of and response to problems

Category D. Asset Management and Inspections Initiative Activity	Definition
	identified, or other aspects of inspection or records kept.
Other discretionary inspection of transmission electric lines and equipment, beyond inspections mandated by rules and regulations	Inspections of overhead electric transmission lines, equipment, and right-of-way that exceed or otherwise go beyond those mandated by rules and regulations, including GO 165, in terms of frequency, inspection checklist requirements or detail, analysis of and response to problems identified, or other aspects of inspection or records kept.
Patrol inspections of distribution electric lines and equipment	In accordance with GO 165, simple visual inspections of overhead electric distribution lines and equipment that is designed to identify obvious structural problems and hazards. Patrol inspections may be carried out in the course of other company business.
Patrol inspections of transmission electric lines and equipment	Simple visual inspections of overhead electric transmission lines and equipment that is designed to identify obvious structural problems and hazards. Patrol inspections may be carried out in the course of other company business.
Pole loading assessment program to determine safety factor	Calculations to determine whether a pole meets pole loading safety factor requirements of GO 95, including planning and information collection needed to support said calculations. Calculations shall

Category D. Asset Management and Inspections Initiative Activity	Definition
	consider many factors including the size, location, and type of pole; types of attachments; length of conductors attached; and number and design of supporting guys, per D.15-11-021.
Quality assurance / quality control of inspections	Establishment and function of audit process to manage and confirm work completed by employees or subcontractors, including packaging QA/QC information for input to decision-making and related integrated workforce management processes.
Substation inspections	In accordance with GO 175, inspection of substations performed by qualified persons and according to the frequency established by the utility, including record-keeping.

Category E. Vegetation Management and Inspections

Category E. Vegetation Management and Inspections Initiative Activity	Definition
Additional efforts to manage community and environmental impacts	Plan and execution of strategy to mitigate negative impacts from utility vegetation management to local communities and the environment, such as coordination with communities to plan and execute vegetation management work or promotion of fire-resistant planting practices

Category E. Vegetation Management and Inspections Initiative Activity	Definition
Detailed inspections of vegetation around distribution electric lines and equipment	Careful visual inspections of vegetation around the right-of-way, where individual trees are carefully examined, visually, and the condition of each rated and recorded.
Detailed inspections of vegetation around transmission electric lines and equipment	Careful visual inspections of vegetation around the right-of-way, where individual trees are carefully examined, visually, and the condition of each rated and recorded.
Emergency response vegetation management due to red flag warning or other urgent conditions	Plan and execution of vegetation management activities, such as trimming or removal, executed based upon and in advance of forecast weather conditions that indicate high fire threat in terms of ignition probability and wildfire consequence.
Fuel management and reduction of "slash" from vegetation management activities	Plan and execution of fuel management activities that reduce the availability of fuel in proximity to potential sources of ignition, including both reduction or adjustment of live fuel (in terms of species or otherwise) and of dead fuel, including "slash" from vegetation management activities that produce vegetation material such as branch trimmings and felled trees.
Improvement of inspections	Identifying and addressing deficiencies in inspections protocols and implementation by improving training and the evaluation of inspectors.

Category E. Vegetation Management and Inspections Initiative Activity	Definition
LiDAR inspections of vegetation around distribution electric lines and equipment	Inspections of right-of-way using LiDAR (Light Detection and Ranging, a remote sensing method that uses light in the form of a pulsed laser to measure variable distances).
LiDAR inspections of vegetation around transmission electric lines and equipment	Inspections of right-of-way using LiDAR (Light Detection and Ranging, a remote sensing method that uses light in the form of a pulsed laser to measure variable distances).
Other discretionary inspections of vegetation around distribution electric lines and equipment	Inspections of rights-of-way and adjacent vegetation that may be hazardous, which exceeds or otherwise go beyond those mandated by rules and regulations, in terms of frequency, inspection checklist requirements or detail, analysis of and response to problems identified, or other aspects of inspection or records kept.
Other discretionary inspections of vegetation around transmission electric lines and equipment	Inspections of rights-of-way and adjacent vegetation that may be hazardous, which exceeds or otherwise go beyond those mandated by rules and regulations, in terms of frequency, inspection checklist requirements or detail, analysis of and response to problems identified, or other aspects of inspection or records kept.
Patrol inspections of vegetation around distribution electric lines and equipment	Visual inspections of vegetation along rights-of-way that is designed to identify

Category E. Vegetation Management and Inspections Initiative Activity	Definition
	obvious hazards. Patrol inspections may be carried out in the course of other company business.
Patrol inspections of vegetation around transmission electric lines and equipment	Visual inspections of vegetation along rights-of-way that is designed to identify obvious hazards. Patrol inspections may be carried out in the course of other company business.
Quality assurance / quality control of vegetation inspections	Establishment and function of audit process to manage and confirm work completed by employees or subcontractors, including packaging QA/QC information for input to decision-making and related integrated workforce management processes.
Recruiting and training of vegetation management personnel	Programs to ensure that the utility is able to identify and hire qualified vegetation management personnel and to ensure that both full-time employees and contractors tasked with vegetation management responsibilities are adequately trained to perform vegetation management work, according to the utility's wildfire mitigation plan, in addition to rules and regulations for safety.
Remediation of at-risk species	Actions taken to reduce the ignition probability and wildfire consequence attributable to at-risk vegetation species,

Category E. Vegetation Management and Inspections Initiative Activity	Definition
	such as trimming, removal, and replacement.
Removal and remediation of trees with strike potential to electric lines and equipment	Actions taken to remove or otherwise remediate trees that could potentially strike electrical equipment, if adverse events such as failure at the ground-level of the tree or branch breakout within the canopy of the tree, occur.
Substation inspection	Inspection of vegetation surrounding substations, performed by qualified persons and according to the frequency established by the utility, including record-keeping.
Substation vegetation management	Based on location and risk to substation equipment only, actions taken to reduce the ignition probability and wildfire consequence attributable to contact from vegetation to substation equipment.
Vegetation inventory system	Inputs, operation, and support for centralized inventory of vegetation clearances updated based upon inspection results, including (1) inventory of species, (2) forecasting of growth, (3) forecasting of when growth threatens minimum right-of-way clearances ("grow-in" risk) or creates fall-in/fly-in risk.

Category E. Vegetation Management and Inspections Initiative Activity	Definition
Vegetation management to achieve clearances around electric lines and equipment	Actions taken to ensure that vegetation does not encroach upon the minimum clearances set forth in Table 1 of GO 95, measured between line conductors and vegetation, such as trimming adjacent or overhanging tree limbs.

Category F. Grid Operations and Operating Protocols

Category F. Grid Operations and Operating Protocols Initiative Activity	Definition
Automatic recloser operations	Designing and executing protocols to deactivate automatic reclosers based on local conditions for ignition probability and wildfire consequence.
Crew-accompanying ignition prevention and suppression resources and services	Those firefighting staff and equipment (such as fire suppression engines and trailers, firefighting hose, valves, and water) that are deployed with construction crews and other electric workers to provide site-specific fire prevention and ignition mitigation during on-site work
Personnel work procedures and training in conditions of elevated fire risk	Work activity guidelines that designate what type of work can be performed during operating conditions of different levels of wildfire risk. Training for personnel on these guidelines and the procedures they prescribe, from normal operating

Category F. Grid Operations and Operating Protocols Initiative Activity	Definition
	procedures to increased mitigation measures to constraints on work performed.
Protocols for PSPS re-energization	Designing and executing procedures that accelerate the restoration of electric service in areas that were de-energized, while maintaining safety and reliability standards.
PSPS events and mitigation of PSPS impacts	Designing, executing, and improving upon protocols to conduct PSPS events, including development of advanced methodologies to determine when to use PSPS, and to mitigate the impact of PSPS events on affected customers and local residents.
Stationed and on-call ignition prevention and suppression resources and services	Firefighting staff and equipment (such as fire suppression engines and trailers, firefighting hose, valves, firefighting foam, chemical extinguishing agent, and water) stationed at utility facilities and/or standing by to respond to calls for fire suppression assistance.

Category G. Data Governance

Category G. Data Governance Initiative Activity	Definition
Centralized repository for data	Designing, maintaining, hosting, and upgrading a platform that supports storage, processing, and utilization of all utility

Category G. Data Governance Initiative Activity	Definition
	proprietary data and data compiled by the utility from other sources.
Collaborative research on utility ignition and/or wildfire	Developing and executing research work on utility ignition and/or wildfire topics in collaboration with other non-utility partners, such as academic institutions and research groups, to include data-sharing and funding as applicable.
Documentation and disclosure of wildfire-related data and algorithms	Design and execution of processes to document and disclose wildfire-related data and algorithms to accord with rules and regulations, including use of scenarios for forecasting and stress testing.
Tracking and analysis of near miss data	Tools and procedures to monitor, record, and conduct analysis of data on near miss events.

Category H. Resource Allocation Methodology

Category H. Resource Allocation Methodology Initiative Activity	Definition
Allocation methodology development and application	Development of prioritization methodology for human and financial resources, including application of said methodology to utility decision-making.
Risk reduction scenario development and analysis	Development of modeling capabilities for different risk reduction scenarios based on wildfire mitigation initiative

Category H. Resource Allocation Methodology Initiative Activity	Definition
	implementation; analysis and application to utility decision-making.
Risk spend efficiency analysis	Tools, procedures, and expertise to support analysis of wildfire mitigation initiative risk-spend efficiency, in terms of MAVF and/ or MARS methodologies.

Category I. Emergency Planning and Preparedness

Category I. Emergency Planning and Preparedness Initiative Activity	Definition
Adequate and trained workforce for service restoration	Actions taken to identify, hire, retain, and train qualified workforce to conduct service restoration in response to emergencies, including short-term contracting strategy and implementation.
Community outreach, public awareness, and communications efforts	Actions to identify and contact key community stakeholders; increase public awareness of emergency planning and preparedness information; and design, translate, distribute, and evaluate effectiveness of communications taken before, during, and after a wildfire, including Access and Functional Needs populations and Limited English Proficiency populations in particular.
Customer support in emergencies	Resources dedicated to customer support during emergencies, such as website pages

Category I. Emergency Planning and Preparedness Initiative Activity	Definition
	and other digital resources, dedicated phone lines, etc.
Disaster and emergency preparedness plan	Development of plan to deploy resources according to prioritization methodology for disaster and emergency preparedness of utility and within utility service territory (such as considerations for critical facilities and infrastructure), including strategy for collaboration with Public Safety Partners and communities.
Preparedness and planning for service restoration	Development of plans to prepare the utility to restore service after emergencies, such as developing employee and staff trainings, and to conduct inspections and remediation necessary to re-energize lines and restore service to customers.
Protocols in place to learn from wildfire events	Tools and procedures to monitor effectiveness of strategy and actions taken to prepare for emergencies and of strategy and actions taken during and after emergencies, including based on an accounting of the outcomes of wildfire events.

Category J. Stakeholder Cooperation and Community Engagement

Category J. Stakeholder Cooperation and Community Engagement Initiative Activity	Definition
Community engagement	Strategy and actions taken to identify and contact key community stakeholders; increase public awareness and support of utility wildfire mitigation activity; and design, translate, distribute, and evaluate effectiveness of related communications. Includes specific strategies and actions taken to address concerns and serve needs of Access and Functional Needs populations and Limited English Proficiency populations in particular.
Cooperation and best practice sharing with agencies outside CA	Strategy and actions taken to engage with agencies outside of California to exchange best practices both for utility wildfire mitigation and for stakeholder cooperation to mitigate and respond to wildfires.
Cooperation with suppression agencies	Coordination with CAL FIRE, federal fire authorities, county fire authorities, and local fire authorities to support planning and operations, including support of aerial and ground firefighting in real-time, including information-sharing, dispatch of resources, and dedicated staff.
Forest service and fuel reduction cooperation and joint roadmap	Strategy and actions taken to engage with local, state, and federal entities responsible for or participating in forest management and fuel reduction activities; and design

Category J. Stakeholder Cooperation and Community Engagement Initiative Activity	Definition
	utility cooperation strategy and joint stakeholder roadmap (plan for coordinating stakeholder efforts for forest management and fuel reduction activities).

Appendix F. Glossary of Terms

Term	Definition
AB	Assembly bill
AFN	Access and functional needs
ALJ	Administrative law judge
BVES	Bear Valley Electric Service
CAISO	California Independent System Operator
Cal Advocates	Public Advocate's Office
CAL FIRE	California Department of Forestry and Fire Protection
CBO	Community-based organization
CEJA	California Environmental Justice Alliance
CNRA	California Natural Resources Agency
CPUC	California Public Utilities Commission
D.	Decision
DFA	Distribution fault anticipation
DR	Data request
EBMUD	East Bay Municipal Utility District
EFD	Early fault detection
EPIC	Electric Program Investment Charge

Term	Definition
EPUC	Energy Producers and Users Coalition
EVM	Enhanced vegetation management
FERC	Federal Energy Regulatory Commission
FGDC	Federal Geographic Data Committee
FIRIS	Fire Integrated Real Time Intelligence System
FMEA	Failure Modes and Effects Analysis
FPI	Fire Potential Index
GIS	Geographic information systems
GO	General order
GPI	Green Power Institute
GRC	General rate case
HFRA	High fire risk area
HFTD	High fire threat district
HWT or Horizon West	Horizon West Transmission
I.	Investigation
ICS	Incident command system or structure
IOU	Investor-owned utility

Term	Definition
ISA	International Society of Arboriculture
ITO	Independent transmission operator
IVM	Integrated vegetation management
IVR	Interactive voice response
JIS	Joint information system
kV	Kilovolt
Liberty	Liberty Utilities / CalPeco Electric
LiDAR	Light detection and ranging
LTE	Long-term evolution
Maturity Model	Utility Wildfire Mitigation Maturity Model
Maturity Survey	Utility Wildfire Mitigation Maturity Survey
MARS	Multi-attribute risk score
MAVF	Multi-attribute value function
MBL	Medical Baseline
MGRA	Mussey Grade Road Alliance
MMAA	Mountain Mutual Aid Association
NERC	North American Electric Reliability Corporation
NFDRS	National Fire Danger Rating System
OCFA	Orange County Fire Authority

Term	Definition
OEIS or Energy Safety	Office of Energy Infrastructure Safety
OP	Ordering paragraph
OPD	Open phase detection
OPW	Outage-producing winds
PG&E	Pacific Gas and Electric Company
PLP	Pole Loading Assessment Program
PMO (PacifiCorp)	Project Management Office
PMO (SCE)	Public Safety Program Management Office
PMU	Phasor measurement unit
PoF	Probability of failure
PoI	Probability of ignition
PRC	Public Resources Code
PSPS	Public Safety Power Shutoff
Pub. Util. Code or PU Code	Public Utilities Code
QA	Quality Assurance
QC	Quality Control
R.	Rulemaking
RAMP	Risk Assessment and Management Phase
RAR	Remote automatic reclosers

Term	Definition
RBDM	Risk-based decision making
RCP	Remedial compliance plan
RCRC	Rural County Representatives of California
REFCL	Rapid earth fault current limiter
RFW	Red Flag Warning
RSE	Risk-spend efficiency
SAWTI	Santa Ana Wildfire Threat Index
SB	Senate bill
SCADA	Supervisory control and data acquisition
SCE	Southern California Edison Company
SDG&E	San Diego Gas & Electric Company
S-MAP	Safety Model Assessment Proceeding, now the Risk-Based Decision-Making Framework Proceeding
SMJU	Small and multijurisdictional utility
SUI	Wildland-urban interface
TAT	Tree Assessment Tool
TBC	Trans Bay Cable
TURN	The Utility Reform Network
USFS	United States Forest Service

Term	Definition
VM	Vegetation management
VRI	Vegetation Risk Index
WMP	Wildfire Mitigation Plan
WRRM	Wildfire Risk Reduction Model
WSAB	Wildfire Safety Advisory Board
WSD	Wildfire Safety Division
WSIP	Wildfire Safety Inspection Program