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Ratesetting

TO PARTIES OF RECORD IN RULEMAKING 18-10-007:

This is the proposed decision of Administrative Law Judge (ALJ) Sarah R. Thomas and ALJ Peter V. Allen. Until and unless the Commission hears the item and votes to approve it, the proposed decision has no legal effect. This item may be heard, at the earliest, at the Commission's May 30, 2019 Business Meeting. To confirm when the item will be heard, please see the Business Meeting agenda, which is posted on the Commission's website 10 days before each Business Meeting.

Parties of record may file comments on the proposed decision as provided in Rule 14.3 of the Commission's Rules of Practice and Procedure.

The Commission may hold a Ratesetting Deliberative Meeting to consider this item in closed session in advance of the Business Meeting at which the item will be heard. In such event, notice of the Ratesetting Deliberative Meeting will appear in the Daily Calendar, which is posted on the Commission's website. If a Ratesetting Deliberative Meeting is scheduled, *ex parte* communications are prohibited pursuant to Rule 8.2(c)(4)(B).

/s/ ANNE E. SIMON

Anne E. Simon

Chief Administrative Law Judge

AES:avs

Attachment

Decision **PROPOSED DECISION OF ALJ THOMAS AND ALJ ALLEN**
(Mailed 4/29/2019)

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to
Implement Electric Utility Wildfire
Mitigation Plans Pursuant to
Senate Bill 901 (2018).

Rulemaking 18-10-007

**DECISION ON PACIFIC GAS AND ELECTRIC COMPANY'S
2019 WILDFIRE MITIGATION PLAN PURSUANT TO SENATE BILL 901**

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**DECISION ON PACIFIC GAS AND ELECTRIC COMPANY'S
2019 WILDFIRE MITIGATION PLAN PURSUANT TO SENATE BILL 901**

Summary

Catastrophic wildfires have devastated California in recent years. The Legislature enacted Senate Bill (SB) 901 in 2018 mandating action by this Commission on Wildfire Mitigation Plans submitted by the electrical corporations we regulate. This is one in a series of decisions we are issuing to act on the 2019 Plans of the three large California investor owned utilities, the three small/multijurisdictional utilities, and two independent transmission owners. This decision acts specifically on the Wildfire Mitigation Plan of Pacific Gas and Electric Company (PG&E).

PG&E's Wildfire Mitigation Plan contains each of the elements required in SB 901, Public Utilities Code Section 8386(c). This decision requires PG&E to meet certain reporting requirements, capture data, improve its metrics for evaluating performance, and update its next Wildfire Mitigation Plan in the areas of inspection and maintenance, vegetation management, system hardening, and situational awareness.

There are several aspects of the company's planned mitigation that require improvement or other follow-up activity. These areas for improvement include the following:

- 1) Better metrics for analyzing how PG&E's proposed mitigation measures fit together, as well as the individual effectiveness of each measure;
- 2) Metrics and analysis to evaluate the quality and effectiveness of the company's inspection programs, including its "enhanced" inspection program and preexisting routine inspection program, in preventing catastrophic wildfires started by utility ignitions;
- 3) Further analysis and tracking of at-risk tree species;

- 4) Analysis of data to determine whether PG&E's new vegetation-pole clearances have contributed to reduced ignitions, especially during critical weather conditions;
- 5) PG&E's efforts to partner with local departments of public works to develop skilled labor and other resources and address the resource constraints it alleges;
- 6) Whether recloser disabling, along with other mitigations, could reduce the need for de-energization (Public Safety Power Shutoffs or PSPS); and
- 7) Additional information on how PG&E intends to share its risk analysis with first responders and other stakeholders.

Along with this decision, the Commission is issuing a guidance decision that addresses issues that are common to all of the Wildfire Mitigation Plans, and applies to the Plans of all respondent electrical corporations. Thus, PG&E is bound by both the requirements of this decision and the general guidance decision.

1. Overview of PG&E's Wildfire Mitigation Plan

According to Pacific Gas and Electric Company (PG&E), the primary objective of its 2019 Wildfire Mitigation Plan (WMP or Plan) is to reduce the risk of potential wildfire-causing ignitions associated with PG&E's electrical facilities in areas identified as high fire risk in the Commission's fire threat map proceeding. These high risk areas constitute more than one-half of PG&E's 70,000 square miles of service territory.

PG&E states that its Plan focuses on reducing the risk of wildfires in the Commission's High Fire-Threat District (HFTD) areas, considering wind-related outage data, CPUC-Reportable Ignition Data, topographical and climatological data, wildfire spread and consequence studies, and an egress risk score, to

further expand the risk analysis in the HFTD areas. The Plan builds on PG&E's Community Wildfire Safety Program, which was launched in March 2018.

Key objectives identified by PG&E in its 2019 WMP include proposals for conducting enhanced safety inspections of utility assets in HFTD areas, hardening its electric system against wildfires by installing stronger, more resilient poles and covered power lines, expanding PG&E's vegetation management around its power lines, including clearing overhanging branches directly above and around power lines, and increasing situational awareness.

With respect to several mitigation measures such as enhanced vegetation management, increased inspections and system hardening, PG&E asserts that its mitigation efforts are hampered by lack of resources, including shortages in trained workers and certain equipment, as well as by other barriers such as lack of access to private property.

Although we expect more detail and analysis in future WMPs as detailed below, PG&E's WMP contains the required elements set forth in Senate Bill (SB) 901. Table 2 of PG&E's WMP contained a helpful cross reference to each item in SB 901's list of required WMP elements as compared to PG&E's Plan.

We focus below on the elements of PG&E's WMP that solicited the most comments from parties.¹

¹ On April 25, 2019, PG&E filed a second amended WMP proposing to extend the timelines on many of its major wildfire mitigation efforts. We do not act on those proposals in this decision since they were filed too late to be considered and to receive party comment.

2. Inspection and Maintenance

2.1. PG&E's Proposed Inspection and Maintenance Program

According to its WMP,² PG&E currently uses multiple methods to conduct inspections of its distribution, transmission and substation assets. These methods include visual observations of infrastructure when performing other routine work in an area, periodic patrols and inspections of infrastructure, and targeted diagnostic and condition-based testing and monitoring. These routine inspections of PG&E's overhead and underground electric systems, including its electric substation inspections, are designed in accordance with the requirements of the Commission's General Orders (GO) 95, 165 and 174. PG&E's existing inspections involve travel to the asset, ground and air visual observation, detection and assessment of abnormal conditions, notification, prioritization and execution of repairs, and documentation needed for safe and reliable operation.

PG&E's WMP proposes new inspection procedures that it asserts will exceed the standards currently required by the Commission in its GOs and related rules. PG&E refers to these new inspection activities as its "Wildfire Safety Inspection Program" (WSIP), which will involve "accelerated" inspections of overhead electric facilities and substations in HFTD areas.³ PG&E asserts these inspections will enable the company to identify and proactively repair or replace components that are at risk of initiating fires in HFTD. PG&E's plan

² Citations to party comments contain the filer's abbreviated name and the page reference. Intervenor comments were all filed on March 13, 2019, and electrical corporation reply comments filed on March 22, 2019. Citations to PG&E's WMP contain the title "PG&E WMP" and the page reference.

³ PG&E WMP, at 53.

includes targets to inspect 685,000 distribution poles, 50,000 transmission structures, and 200 substations.

PG&E states that its WSIP was developed using a risk-based approach that included a Failure Modes and Effects Analysis (FMEA). PG&E describes this analysis as utilizing a multi-disciplinary team comprised of experts in fields such as operations, engineering, and asset management to review data that could indicate equipment failure or conditions that increase ignition risk. According to PG&E, this analysis is used to target inspections to areas of risk. When WSIP inspections reveal maintenance issues or conditions that may increase fire risk, PG&E states, the problem can either be immediately corrected or recorded as a deficiency which is then reviewed and prioritized according to standardized criteria for measuring risk.

PG&E also describes its efforts to use Geographic Information System (GIS) data concerning the location of electrical facilities to target its WSIP. PG&E states that it is working to improve its GIS data, including designating a single point of contact at PG&E for all wildfire-related GIS needs. As with other areas of its WMP such as vegetation management, PG&E asserts that its WSIP is hampered by a lack of resources, including shortages in trained workers and certain equipment, as well as by other barriers such as permitting delays or lack of access to private property.

2.2. Parties' Comments – and Maintenance

Parties provided significant comments on several aspects of PG&E's WSIP, including whether the WSIP represents incremental work beyond its routine inspection program. Some ratepayer advocates note that the WSIP includes a huge increase in inspection costs over the amount authorized in the last General

Rate Case (GRC), but that the scope of the enhanced inspections is very similar to the scope of routine inspections.

Specifically, the Commission's Public Advocate's Office (Cal Advocates) notes that PG&E estimates that its distribution, transmission and substation inspection costs range from a low of \$798 million to a high of \$1.396 billion, making inspection one of the highest budgeted areas in the WMP, and representing 57% of its 2019 forecast costs. This estimate is expected to cover inspections of 685,000 poles in HFTD through the WSIP plan, in addition to routine inspections.

Many parties cite the large cost increase to question whether PG&E's prior inspection program met pre-existing statutory requirements. For example, The Utility Reform Network (TURN) points out that GO 165 already requires Overhead Detail Inspections (ODI) every five years and requires that the utilities fix all identified "corrective actions" so that all structures and equipment function safely. According to TURN, the scope of the proposed enhanced inspections and repairs so closely tracks the scope required for ODI compliance that it is almost identical.

California Environmental Justice Alliance (CEJA) notes that PG&E proposes to spend over \$1 billion on inspections, an increase from \$15 million authorized in PG&E's last GRC. In this regard, CEJA cites SB 901, which requires utilities to "[m]onitor and audit the effectiveness of electrical line and equipment inspections, including inspections performed by contractors, carried out under the plan and other applicable statutes and commission rules."⁴ CEJA suggests it

⁴ Pub. Util. Code § 8386(c)(19)(C).

is uncertain whether PG&E has collected data to support the effectiveness of its inspections under existing regulations. If not, CEJA posits this may indicate that PG&E has not reviewed data from past inspections to determine the relationship between inspections, ignitions, and prevention of catastrophic wildfires. As CEJA states, in addition to not studying past inspections for lessons learned, it is not clear why PG&E must inspect the same equipment multiple times, and why it cannot combine inspections. CEJA states the increase from \$15 million in the last GRC to over \$1 billion must be accompanied by analysis in future WMPs to show how the past inspections did not comply with existing regulations and how PG&E intends to measure the effectiveness of the WSIP in preventing catastrophic wildfires. CEJA argues that without an analysis of how effective past inspections have been, it is impossible to know what aspects of PG&E's inspection practices need to be enhanced.

PG&E responds to TURN and CEJA by stating that past inspections did not focus on the specific aspects to be examined under the WMP. PG&E explains that GO 165's inspection requirements relied on a five-year inspection cycle, consistent with industry practice in 1997. The Commission noted at the time that more frequent inspections might be prudent.

According to PG&E, it is proposing to ramp up its inspections by an estimated 130-400% compared to 2018. PG&E also states that it will complete high priority corrective actions identified during the inspections, at a forecast cost of \$194 million to \$371 million in expenses and \$504 million to \$1.25 billion in capital costs. Some intervenors suggest that to address issues of possible duplication between WSIP and routine inspections, the Commission should closely monitor whether PG&E meets its existing and enhanced inspection targets.

PG&E argues that the minimum inspection cycle that was appropriate in the past may no longer be adequate given the growing threat of extreme weather and wildfires associated with climate change, justifying an accelerated inspection schedule and more targeted inspections. PG&E states that it is performing routine and WSIP inspections simultaneously on the 185,000 distribution structures in the HFTD areas it would have inspected in 2019 under its GO 165 inspection schedule. PG&E claims that the routine inspections will be enhanced by the elements of the WSIP. PG&E emphasizes its use of a risk-based analysis to determine what aspects of its overhead electric system could be single points of failure that could lead to fire ignitions, and allowing the WSIP to accelerate inspections of areas and infrastructure at higher risk of wildfire. Again, the company asserts that past inspections did not focus on the specific aspects examined under the WSIP.

According to PG&E, the current minimum cycle may no longer be adequate. Fire season is now extended due to prolonged periods of high temperatures, extreme dryness, tinder-dry grass, and record-high winds, increasing the number of wildfires and making them more dangerous. Due to climate change, what used to be adequate for safe operation may no longer be enough, according to PG&E.

As a number of parties note, California faces the effects of climate change, including more frequent periods of extreme weather conditions. As Office of Safety Advocate (OSA) notes, PG&E acknowledges in its WMP that high wind corridors due to topography and location are being considered in their modeling for Risks and Drivers, but PG&E has not yet identified any areas in its territory that will be upgraded due to these conditions. As PG&E explains in its WMP:

Topography can be an important risk factor for fire danger in certain areas within PG&E's service area. For example, lee-side mountain slopes can be prone to strong downslope winds under certain weather conditions, which can cause increased risk of wires down and/or contact between uninsulated conductors in that area, leading to potential wildfire ignition. Winds can also be funneled through canyons and mountain passes, resulting in similar effects.⁵

OSA recommends that PG&E investigate unique topography within its service territory; the WMP indicates that PG&E in fact is conducting these investigations. As OSA notes, within Tier 2 and Tier 3 areas are high fire risk locations that include mountain ridges, canyons and other topographical features that create extreme wind corridors. OSA recommends, and we agree, that PG&E should utilize this information to develop targeted enhanced inspections (of both overhead distribution and transmission facilities) and determine quickly if structural improvements are necessary for their most vulnerable assets. We assume PG&E will consider these points as it conducts its topographical investigation and report those results in the 2020 WMP.

Intervenors also provided comments on PG&E's discussion of workforce barriers it expects to encounter in implementation of its WSIP. Joint Local Governments⁶ suggest that the Commission closely monitor whether utilities use sufficiently trained personnel to carry out the inspections, and that utilities partner with local public works agencies to take advantage of the skilled labor and other resources those departments can offer. Intervenors also note that

⁵ PG&E WMP, Section 3.2.4.

⁶ Joint Local Governments include: the County of Mendocino, the County of Napa, the County of Sonoma and the City of Santa Rosa.

PG&E provides little detail on either specific actions or timelines for improving its GIS system, despite its claims that these efforts are critical to its inspection plans.

2.3. Discussion – Inspection and Maintenance

As a preliminary issue, we agree with the Joint Local Governments that PG&E should investigate partnering with local departments of public works, which may have qualified personnel and resources that would allow PG&E to take advantage of skilled labor and other resources from those departments to support inspection work and other aspects of its WMP. PG&E appears to be open to these efforts, and we direct the company to follow through on this strategy and provide updates in its next WMP.

Intervenors' suggestion that the magnitude of PG&E's request may call into question whether its previous inspection program met GO 165 and other requirements does raise concerns. For example, of the 685,000 poles in HFTD that PG&E plans to inspect, only 185,000 are due for inspection this year under the existing schedule for GO 165. TURN notes that, given the GO 165 requirement to conduct detailed inspections at least every five years, the remaining 500,000 poles PG&E intends to inspect this year were inspected at some point within the previous five years, and that a large percentage of these poles may have been inspected in the previous two years. If so, it seems possible that PG&E is either duplicating recent inspections unnecessarily, or that its previous inspections were not adequate to ensure safe operation.

Further, PG&E asserts that it is conducting "enhanced" inspections in part to exceed GO requirements. However, with respect to the minimum inspection frequencies provided by GO 165, GO 95, Rule 31.2 states, "Lines shall be inspected frequently and thoroughly for the purpose of ensuring they are in

good condition so as to conform with these rules....” As such, it is not necessarily beyond GO 95 requirements to conduct inspections more frequently or thoroughly than specified in GO 165, as those are minimum requirements.

When PG&E seeks cost recovery, it shall explain the increase in inspection costs over the last GRC, and we expect parties to raise this issue in future cost recovery proceedings as well. Future proceedings may also examine the issue of whether PG&E did enough in terms of inspections to comply with pre-existing GOs and regulations.

It appears that PG&E will now be doing significantly more inspections under its WMP than it did in the past, but this increase in activity is not by itself sufficient to show that its WSIP mitigates or lowers the risk of wildfire. As CEJA and others suggest, the Commission needs metrics that measure how effective the WSIP is in preventing catastrophic wildfires caused by utility ignitions. PG&E explains that its WSIP accelerates and expands inspections at areas of higher risk of wildfire, and enhances the criteria for inspections of these elements.

In its WSIP, PG&E focuses on what aspects of its overhead system could contribute to fire ignition. Based on that analysis, PG&E states that it is now increasing inspections of ignition sources in HFTD that were not contemplated when GO 165 was adopted. CEJA’s recommendation that PG&E must show in future WMPs how the past inspections did not comply with existing regulations does not appear productive. However, as CEJA suggests and Pub. Util. Code Section 8386(c)(19)(C) mandates, PG&E should be required to include in its future WMP the metrics and analysis it intends to use to determine the quality and the effectiveness of all its inspection programs, including WSIP and preexisting routine inspection programs.

We note that PG&E's WSIP is in the very early stages of development and implementation. Thus, PG&E can benefit from taking seriously parties' feedback in comments and from the workshops, and continuing to work with stakeholders to develop meaningful ways to measure the efficacy of increased inspections and enhanced GIS capabilities, and presenting those results in next year's WMP. We also expect PG&E to continue to examine SDG&E's inspection program carefully in assessing industry best practices for monitoring and auditing the effectiveness of inspections.

We find that the accelerated approach to inspections and maintenance described in PG&E's WMP complies with the requirements of SB 901, Pub. Util. Code Section 8386(c)(9). Still, this finding does not give PG&E a blank check for the activities described in its Plan. PG&E is currently placing WSIP costs in a memorandum account. At such time as PG&E seeks cost recovery, PG&E may need to show cost-effectiveness and how elements of its WSIP are necessary to address new risks, over and above what is required by GO 165.⁷

3. System Hardening

3.1. PG&E's System Hardening Program

PG&E proposes significant investment in system hardening, including what it describes as an ongoing, long-term (more than five years) capital

⁷ GO 165 requirements are minimum compliance requirements only. Moreover, GO 95, Rule 31.2 requires facilities to be "inspected frequently and thoroughly" to ensure compliance with GO 95 requirements and safe operation. While PG&E (and other utilities) may have relied solely on meeting the minimum inspection requirements of GO 165, new inspection regimes do not necessarily go above and beyond existing requirements. The requirement to inspect "frequently and thoroughly" has always been in GO 95. If GO 165 inspection timeframes were insufficient, PG&E (and all utilities) should have inspected as frequently and as thoroughly as necessary to ensure facilities were in good condition and in compliance with GO 95 requirements.

investment program to rebuild portions of PG&E's overhead electric distribution system. Under this program, PG&E proposes replacing bare overhead conductor with covered conductor, replacing some infrastructure with equipment identified by the California Department of Forestry and Fire Protection (CAL FIRE) as low fire risk, upgrading or replacing transformers to operate with more fire-resistant fluids, installing more resilient poles to increase pole strength and fire resistance, and in rare cases, undergrounding. PG&E's ultimate goal is to upgrade approximately 7,100 circuit miles in Tier 2 and Tier 3 HFTD areas, with a goal of upgrading 150 of those circuit miles in 2019. PG&E suggests that its system hardening proposal would result in a full rebuild of the overhead distribution system. PG&E intends these activities to increase the overall strength of its electric distribution system, replace aging assets, and reduce risk from external factors, such as vegetation or animals contacting lines and "line slap" resulting from high winds that may cause lines to slap together and generate sparks.

PG&E explains that it initiated a system hardening program in 2018, pursuant to its 2017 GRC Risk Assessment Mitigation Phase (RAMP) Report, in which it proposed the targeted replacement of bare overhead conductor with covered conductor in high-risk wildfire areas. Based on subsequent analysis, PG&E proposes several additional system-hardening measures in its WMP, including the types of asset replacement and upgrades described above. PG&E proposes performing this work in HFTD, with work prioritized based on PG&E's risk modelling of the distribution circuits. This risk modelling considers factors such as the likelihood of asset failure, risk of wildfire spread and consequences, and egress risk (number of escape routes available to a community).

The proposed work would include replacement of bare overhead high voltage conductors with conductor insulated with abrasion-resistant

polyethylene coats (also referred to as covered conductor). The advantages and disadvantages of covered conductor were discussed at a workshop in this proceeding on February 27, 2019. As to hardening its distribution and transmission poles by using non-wood pole material, PG&E focuses on the increased strength properties in steel and composite poles as compared with wood poles.

4. Parties' Comments – System Hardening

Intervenor comments on PG&E's system hardening proposals echo some of the concerns about its inspection plan, discussed above. Overall, parties express concerns about the cost effectiveness of PG&E's system hardening activities, and the pace at which the system hardening work is expected to be implemented this year. In particular, OSA recommends that the pace of system hardening be accelerated. OSA suggests that PG&E address its labor force limitations by partnering with manufacturers to accelerate material production, and work towards developing the skilled workforce necessary to perform additional system hardening work in the areas that PG&E has identified as priorities.

The Joint Local Governments⁸ note the similarities between the PG&E's WMP and the Fire Prevention Plans (FPPs) that PG&E has been required to file with the Commission since 2012. Joint Local Governments suggest that PG&E has not provided much detail on the effectiveness of system hardening activities conducted pursuant to its FPPs, and that more information on the effectiveness of past actions could both inform the development of its WMP system hardening

plans and provide insight into the expected performance of system hardening proposed in the WMP.⁹

OSA identifies another issue regarding PG&E's primary overhead distribution facilities. According to OSA's consultant, Liberty Consultant Group, PG&E's distribution system still uses #6 copper conductor, now recognized as obsolete and subject to breakage and arcing risks. PG&E still has 1,959 circuit miles of #6 copper conductor in Tier 2 and 754 circuit miles of #6 copper conductor in its Tier 3 areas. OSA recommends that PG&E prioritize the replacement of its existing small #6 copper conductor located in Tier 2 and 3 with the highest-ranking conductor available in the company's circuit hardening prioritization methodology, and do so on an expedited construction schedule. PG&E responds that conductor size is one of the factors that PG&E considers within the risk model to determine what areas to replace. While PG&E agrees that #6 copper is a priority to be replaced, PG&E points out there are other small conductors that are also at high risk.

Intervenors recommend the following modifications that they assert would improve PG&E's WMP:

- PG&E should provide additional analysis to show whether its proposed covered conductor program is redundant with other wildfire mitigation activities, including vegetation management measures planned, or with de-energization, also known as Public Safety Power Shutoffs (PSPS).
- PG&E should conduct a risk analysis that considers both the likelihood and consequences of ignition to validate its

⁹ Joint Local Governments' Comments at 3.

prioritization model before using it as the basis for deploying covered conductor in HFTD areas.

- PG&E's plan for installation of covered conductors should be limited until their effectiveness in mitigating wildfire risk has been shown.
- PG&E should provide additional analysis to show that its proposed system hardening activities are either required or reflect best practices for mitigating the potential for catastrophic wildfires.
- Given that past inspections have shown violations of GO 95, PG&E should provide additional information showing that its current inspection programs meet existing requirements.
- PG&E should provide additional information on the performance of steel poles in wildfire conditions to justify their use as a mitigation measure.
- PG&E should provide more detail on how it decides whether undergrounding is appropriate, particularly with respect to areas with ingress/egress bottlenecks and in high-fire-threat zones.

Its response, PG&E explains that the system hardening section of its WMP focuses primarily on the wildfire mitigation work that it intends to do in 2019, which is targeted to address issues and geographic areas that it has identified as priorities through its risk analysis. PG&E notes that the WMPs will be filed on an annual basis, and it expects to include additional system hardening in future years.

PG&E emphasizes that the system hardening activities it proposes for 2019, though limited in size, will provide information to inform future analyses of the performance and cost effectiveness of its various system hardening measures. Because the WMPs are expected to be submitted annually, PG&E

suggests that it can use the results of this year's activities to help inform future wildfire mitigation actions, in an iterative process.

PG&E also expresses its intention to address supply chain and labor issues that could impact the schedule of its system hardening program, recommends that the pace and scope of system hardening should be informed by its experience this year, and notes future plans will be informed by the 2019 experience.

PG&E defends its proposal to expand the use of covered conductors to reduce risk of ignition from vegetation contact and asserts that the benefits of covered conductors outweigh concerns expressed by commenters that covered conductors could result in additional high impedance faults. Finally, PG&E provides additional explanation of its plans to replace some wooden poles with composite and steel poles, which it states are more flame resistant and at lower risk of failure during both high wind and wildfire conditions.

5. Discussion – System Hardening

Given the small percentage of bare wire conductors PG&E proposes to harden in 2019, it appears unlikely that system hardening will substantially mitigate catastrophic wildfire threat in time for the 2019 wildfire season.

While we do not assess the reasonableness of PG&E's proposed costs in this decision, it is worth noting that the labor- and equipment-intensive nature of the reconductoring proposal means it is one of the most expensive items in the WMP. PG&E estimates it will cost at least \$ 236.9 million to reductor 150 miles or 0.15 percent of its overhead system in 2019. Assuming that the 7,100 circuit miles of PG&E's system located in Tier 3 HFTD areas are eventually hardened, the magnitude of costs that the Commission will need to analyze in future GRCs is enormous. The implicit assumption in OSA's recommendation to

accelerate system hardening is that PG&E can establish in future proceedings the need for and cost-effectiveness of system hardening. At this point, we have insufficient information on which to reach this conclusion.

In future WMPs, PG&E should provide more information on the efficacy and cost-effectiveness of its proposed system hardening activities, along with more information on the costs and benefits of alternative options. This detail may strengthen PG&E's plan by allowing the Commission and parties to evaluate the relative merits of different potential activities. As PG&E notes in its response to party comments, we expect the development and implementation of wildfire mitigation measures to be an iterative process, with annual WMP filings evolving over time as we learn more about the effectiveness of various mitigation measures.

Given the lack of information on the efficacy and cost effectiveness of many of the proposed system hardening measures, as well as the overlap of multiple mitigation approaches (*e.g.*, system hardening, enhanced vegetation mitigation, and de-energization) in PG&E's WMP, we expect PG&E to provide significantly more data and analysis in its future plans. This will provide a better basis for PG&E, the Commission, CAL FIRE and parties to fully analyze and evaluate the potential effectiveness of PG&E's proposed mitigation measures and how these mitigation measures fit together.

Finally, as TURN notes, it would be useful to know whether any of the ignitions in 2014-2018 occurred on circuits when reclosers were disabled under one of the existing programs. Disabling a recloser means that if a line faults, the recloser will not reestablish a connection in the line so that the line is not energized thereafter. If recloser disabling, perhaps combined with other system protection strategies, can minimize the risk of ignitions, those strategies could

reduce the need for circuit reconductoring or power shutoffs. This analysis should be included in PG&E's next WMP.

Regarding the need for a skilled labor force, we encourage PG&E to partner with local entities as suggested by the Joint Local Governments.

In summary, we find that PG&E's WMP includes a system hardening component, consistent with SB 901, Pub. Util. Code Section 8386(c)(12), but that PG&E should include additional information, metrics and analysis discussed in this decision in its 2020 WMP.

6. Vegetation Management Plan

6.1. PG&E's Proposed Vegetation Management Plan

Vegetation management is one of the highest cost elements of PG&E's WMP. PG&E proposes to spend between \$800 million and \$1.3 billion to support an expansion of its vegetation management program. In January 2018, the Commission adopted the HFTD Map, which increased the amount of PG&E's service area classified as posing high fire-threat. The HFTD Map replaced the previous fire threat maps adopted on an interim basis in 2012. The interim fire-threat maps also had a distinct focus on facilities in "Southern California,"¹⁰ which had included only a small part of PG&E's service area (about 15%). Subsequent to the adoption of the new HFTD Map in 2018, PG&E began enhanced vegetation management (EVM) work in HFTDs.

The EVM activities described in PG&E's WMP include clearing of vegetation from directly above and around distribution lines. This work is intended to limit ignitions and downed wires due to vegetation-conductor

¹⁰ In accordance with D.12-01-032 at 48, "Southern California" was defined as consisting of the following counties: Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, and Ventura.

contact. The EVM program proposed by PG&E would accomplish this by both keeping vegetation away from where powerlines can fall and removing healthy trees that could fall on powerlines. PG&E asserts all of the EVM measures exceed current regulatory requirements.¹¹

PG&E's enhanced vegetation management program primarily consists of overhang clearing, targeted tree species work, and fuel reduction. This work involves two main components in HFTD areas: 1) trimming all trees to a 12-foot radius from power lines and trimming all branches hanging above power lines, and 2) removing healthy trees that are identified as having the potential to hit power lines if they fall down (fall-ins). PG&E is additionally proposing to trim all overhangs above overhead wire, creating a four-foot corridor from conductor to sky. PG&E's proposed Fuel Reduction Program would reduce vegetation under and up to 15 feet on either side of power lines in HFTD areas, and PG&E further intends to target the top 10 species of trees for removal as hazardous. These 10 species caused 75% of vegetation-related fire ignitions in Tier 2 and 3 areas; however, they also comprise over half of all trees in PG&E's service territory.¹²

PG&E has 25,200 distribution circuit miles in HFTD areas. PG&E plans to clear overhangs from about 2,450 circuit miles in 2019 alone, which it estimates will mean the removal of approximately 305,000 trees. This is in addition to the 70,000 trees PG&E expects to remove through its pre-existing drought and tree mortality CEMA program in this time period. In comparison, the CEMA

¹¹ Table 14 of PG&E's WMP (at 70) characterizes many of the "enhanced" efforts as "exceeding" existing requirements.

¹² PG&E WMP, Attachment E.

program removed about 225,000 trees over the past five years. In addition, PG&E asserts that it trims or removes approximately one million trees per year through its routine Vegetation Management programs.

As in its WMP inspection and system hardening proposals, PG&E cites a lack of qualified labor (in this instance, tree workers qualified to perform potentially hazardous vegetation management work) as a potential obstacle to the full implementation of its WMP. Similarly, PG&E predicts that the need to work with landowners and communities, and to comply with federal, state, and local permitting and environmental regulations, may pose challenges to its EVM program or create delays in its implementation. During the February 27, 2019 Commission Workshop on vegetation management, PG&E, along with other utilities, stated it is working to incorporate lessons learned and take corrective measures based on feedback from customers and communities.

6.2 Parties Comments – Vegetation Management

The Parties raise several concerns about PG&E's Enhanced Vegetation Management proposals, including the following:

- Will PG&E's EVM proposal result in the unnecessary removal of healthy trees?
- Will the benefits of aggressive tree trimming and tree clearing activities outweigh the costs?
- Is PG&E's proposed Fuel Reduction Program, which would reduce vegetation under and up to 15 feet on either side of power lines in HFTD areas, likely to reach a point of diminishing returns compared to a smaller clearance requirement accompanied by different mitigation measures? Is this proposal the most cost-effective use of funding for wildfire mitigation?
- Has PG&E justified expanded EVM clearance requirements that exceed regulatory requirements?

- Does or will PG&E engage in clear-cutting, removing trees without proper permits, or failure to remove tree debris after cutting or trimming?
- Has PG&E experienced other problems since it initiated EVM in 2017, and if so, what corrective measures has PG&E implemented in response to feedback?
- Should PG&E provide communities with more input or control over the wildfire mitigation measures conducted in their areas, for example allowing communities to decide between less EVM with a lower de-energization threshold or vice-versa?
- Will PG&E's EVM program actually help prevent catastrophic wildfires?
- How will the usefulness or success of PG&E's EVM be measured?
- How will the impacts of PG&E's EVM on the risk of wildfire be distinguished from other fire prevention measures that it may take, including system hardening and targeted de-energization?
- Are the planned EVM, covered conductor, and de-energization activities redundant, or do they each solve separate problems?
- Has PG&E sufficiently engaged with local governmental entities to expedite permitting?

As Mussey Grade Road Alliance (MGRA) describes, the PG&E EVM proposal should address three distinct vegetation ignition mechanisms: 1) "fall ins," in which a tree that is tall enough to strike a power line topples into it; 2) "blow-ins," in which vegetation that is detached by high winds blows into utility infrastructure; and 3) overhanging vegetation breaks, which result in vegetation dropping onto lines from above. Parties note that all of these scenarios are more likely during high winds, and if these winds also occur during an extreme fire weather event, there is the potential for catastrophic fire

ignition and spread. Vegetation-driven fires occurring under low wind conditions can also result from tree fall-in, such as the Butte fire, but these do not statistically represent the utility-related fires in California that have caused the most harm.

Some parties assert that PG&E's EVM may target significantly more trees than necessary, given the consequences of widespread tree removal. For example, trees provide support for other trees, reduce carbon, and provide other important ecological benefits which may be lost due to aggressive tree removal. CEJA in particular cautions that further information and evidence is necessary before such a large expansion of EVM, in which thousands of healthy trees could cut down to maintain a significantly larger clearance. CEJA recommends more transparency in PG&E's EVM program to provide the public with information on the types of trees that the utility considers hazardous.

Several parties, including TURN, are concerned that the Commission and parties lack sufficient information to evaluate the efficacy of recent vegetation management changes or the proposed conductor to sky overhang corridor. TURN urges the Commission to order PG&E to analyze available data to determine the degree to which the new minimum clearance requirement and recommended clearance at time of trim in HFTD have contributed to a reduced incidence of ignitions, especially during critical weather conditions.

Some parties are concerned about the impact of diminishing returns for radial vegetation clearances: that the additional work to clear a few more feet around a conductor may provide little or no additional value compared to slightly smaller clearance radii. In addition, parties raised a related issue of whether PG&E needs to comply with 12 foot clearances when Table 1 of GO 95 only requires 4 feet and Appendix E recommends "a time of trim" clearance of

12 feet in HFTD areas. TURN, for example, notes that though the proposal to comply with the recommended 12-foot clearance and to trim all overhangs appears useful, insufficient data is provided to evaluate the usefulness of PG&E's radial clearance and conductor-to-sky overhang corridor proposals. Even parties that did not express serious concerns about the scope of PG&E's EVM suggest that PG&E could improve communication about its EVM activities with landowners.

In reply comments, PG&E acknowledges the merit of several suggestions from parties, including that it increase communication with landowners, and inform landowners that PG&E will remove tree-trimming debris upon request. PG&E also refers to the iterative nature of its WMPs, and expresses a willingness to incorporate feedback received from parties and the public in future WMPs.

On the other hand, PG&E objects to several party suggestions, noting that in some circumstances, allowing communities to make decisions to reject or customize wildfire mitigation approaches in their area could cause problems or create risks for nearby communities. For example, PG&E suggests that allowing a community to request less EVM in trade for a lower de-energization threshold could result in increased risks or more frequent de-energization of downstream communities that prefer a different approach.

PG&E disputes the claim that it has not provided sufficient information and analysis on which to determine the effectiveness of its EVM proposal, and asserts that its responses to parties' data requests support its assertion that its covered conductor and vegetation management programs address different risks and provide incremental benefits. PG&E further argues that, because it is not possible to install covered conductor across the entire HFTD before fire season, or even in the next five years, additional mitigation measures cannot wait for the

full rollout of system hardening. According to PG&E, vegetation management plays an important, near-term risk management role. PG&E also asserts that CAL FIRE has more ability than PG&E to address some parties' broader concerns regarding landowner compliance with fire safe and defensible space regulations.

6.3 Discussion – Vegetation Management

Several parties, including the Joint Local Governments, TURN, MGRA and Cal Advocates question how to evaluate the relationship between measures such as EVM, system hardening and de-energization. This question raises the related issue of whether using more of one particular mitigation measure reduces the need for others, and what metrics should be developed to measure this. In the near term, the conservative approach is to be aggressive with these measures, but we expect far more analysis of this issue in PG&E's future WMPs. As PG&E points out, it is not possible to install covered conductor across the entire HFTD before fire season, or even in the next five years, so at least in the short term, EVM will play an important role. At the same time, PG&E must develop metrics and present analysis on the interplay between various measures. Our discussion of metrics requirements for PG&E expands on these points.

Improving communications and partnerships with local governments such as the Joint Local Governments that are parties to this proceeding may also provide additional benefits, such as local training programs for increasing PG&E's access to skilled labor needed for vegetation management. While PG&E asserts that the lack of skilled arborists is a long-term problem given the extent of PG&E territory in HFTD areas, it is a problem that the many governmental agencies located in HFTD areas may be able to help PG&E solve. PG&E must work with other stakeholders to help solve the problem, and not simply avoid conducting mitigation.

While PG&E's WMP contains a vegetation management program as required by SB 901, Pub. Util. Code Section 8386(c)(8), the program raises questions that require further analysis. It appears that the 10 species of trees PG&E intends to target as hazardous constitute 51% of the trees within PG&E's vegetation management database. MGRA points out that SDG&E's data shows that certain types of trees such as eucalyptus and sycamore are ten times more likely than oaks to cause outages. MGRA recommends that all utilities should keep a total inventory of trees in the vicinity of their equipment and use this kind of data when prioritizing vegetation management, rather than simply keeping track of the raw number of outages.

In future WMPs, PG&E should describe how it tracks and manages "at risk" species of trees. PG&E should reconduct its analysis to determine at-risk tree species and include all vegetation-caused outages and wire down events in the analysis, and not simply rely on vegetation-caused ignition data.

We agree with TURN that the Commission and parties lack sufficient information to evaluate the efficacy of recent vegetation management changes or PG&E's proposed conductor-to-sky overhang corridor. We agree that PG&E should analyze available data to determine the degree to which the new minimum clearance requirement¹³ and recommended clearance at time of trim in HFTD have contributed to a reduced incidence of ignitions, especially during critical weather conditions. This analysis is important as a means to study the

¹³ The new clearance refers to the 4-foot vegetation clearance requirement for distribution lines in the HFTD adopted in 2012 where the interim fire maps were adopted. This requirement was applied to PG&E's service territory in D.17-12-024. Regardless of what the Commission orders in this decision, PG&E's metrics for its WMP should match its metrics for paying out employee bonuses such as its Short-Term Incentive Plan.

diminishing return in risk reduction as a function of increased vegetation clearance distance.

This issue deserves consideration in future WMPs, including analysis of the efficacy of the new clearance, which should show how PG&E will measure whether the new clearances in HFTD have reduced the incidence of ignitions, especially during Red Flag Warning conditions or elevated Fire Potential Index (FPI) days.¹⁴ It is reasonable to require PG&E to provide additional data and analysis in support of its proposals in future plans, including development of new metrics to better measure the performance of PG&E's EVM to inform future WMPs.

7. De-Energization

7.1 PG&E's De-Energization/Public Safety Power Shut-Off Program

According to Public Utilities Code Section 8386(c)(6), each electrical corporation's WMP shall include protocols for disabling reclosers and de-energizing portions of the electrical distribution system. Most of the issues raised by parties with regard to PG&E's proposal on de-energization (also known as Public Safety Power Shut-Off or PSPS) will be addressed in the de-energization Rulemaking, R.18-12-005.

PG&E's WMP includes discussions of several aspects of its de-energization program, including the circumstances under which PG&E would consider de-energization, the potential for sectionalizing its system to allow de-energization to be targeted to smaller geographic regions, the use of reclosers

¹⁴ The Commission discusses in the accompanying guidance decision reasons why taking action during Red Flag Warnings may be too limited given the common occurrence of such warnings.

in high fire risk conditions, and communication and notification procedures. One mitigation strategy is planned resilience zones, which PG&E describes as “areas that can be isolated from the broader grid and energized by mobile generation during PSPS events,”¹⁵ which PG&E asserts will allow important community resources to safely receive electricity during de-energization events. PG&E asserts that its PSPS Program is modeled on SDG&E’s Power Shut-Off Plan and complies with Resolution ESRB-8. PG&E acknowledges that the requirements set forth in Resolution ESRB-8 will remain in effect until or unless they are superseded by a new decision in R.18-12-005, and states that it will comply with any changes to de-energization procedures that are adopted in R.18-12-005.

7.2. Parties’ Comments – De-Energization/SPS

Parties provided numerous comments and suggestions related to PG&E’s PSPS program, which we discuss only briefly because the issues are within the scope of the Commission’s de-energization rulemaking. Parties that commented on this issue include Cal Advocates, TURN, MGRA, Small Business Utility Advocates (SBUA), the California Farm Bureau, CEJA, Peninsula Clean Energy Authority (PCEA)/Sunrun Inc., and East Bay Municipal Utility District (EBMUD). A common theme in parties’ comments on PG&E’s de-energization proposal is the need for additional information on de-energization procedures in future WMPs.

The Joint Local Governments generally support PG&E’s plan to disable automatic reclosers when the fire threat level is high or extreme; however, they

¹⁵ PG&E WMP, at 9.

would like to see more information in the WMP on the practical issues relating to reclosers that must be manually disabled, including whether this could result in delays in re-energization. The Joint Local Governments also support PG&E's efforts to sectionalize its distribution circuits in an effort to reduce the impacts of de-energization incidents. The Joint Local Governments support the proposal that in 2019, PG&E could ring-fence Tier 2 and Tier 3 HFTDs with equipment that would allow sectionalizing of lines at the boundaries of the fire threat zones.

SBUA recommends greater use of undergrounding, and opposes the use of automatic reclosers as a standard practice, asserting that this they may "elevate the risk of catastrophic wildfires" upon re-energization while in contact with vegetation. TURN suggests that to minimize wildfire risk in 2019, PG&E should focus its efforts and resources on operational practices such as recloser blocking, improved situational awareness, and de-energization.

The Joint Local Governments support resilience zone development and recommend that PG&E engage with local communities when determining the appropriate use and placement of these zones. CEJA goes even further, arguing that PG&E should implement both mobile and stationary community resource centers (CRCs) for use by communities during outages. These strategies are intended to mitigate the impact of a shutoff on public safety, as required by SB 901. CEJA suggests that the details of CRCs may be discussed in the de-energization proceeding, but argues for inclusion of CRCs in utility WMPs as soon as possible, as a placeholder for developing CRCs through a community-driven process.

Other parties, including PCEA/Sunrun, support PG&E's resilience zone concept and further propose an evolution to resilience zone microgrids over time, noting the interest of community choice aggregators in increasing electric-

service resilience. Similarly, SBUA supports PG&E's plan to establish resilience zones that it hopes would operate like microgrids.

In its reply to party comments, PG&E supports the idea of engaging with local communities in developing resilience zones, and asserts that SBUA misunderstands PG&E's recloser program, which disables many reclosers on a daily basis. Otherwise, PG&E recommends deferring a detailed examination of other concerns to R.18-12-005, the ongoing de-energization proceeding.

7.3. Discussion – De-Energization/PSPS

As many parties suggest, the bulk of the Commission's examination of de-energization will take place in R.18-12-005. For the purposes of this decision, the key question is whether PG&E included a discussion of de-energization in its WMP that complies with the requirements of SB 901.

Based on the information provided in PG&E's WMP and its Reply Comments, we find that PG&E's WMP contains a de-energization element. PG&E's de-energization program is subject to the requirements of ESRB-8, until such time as ESRB-8 is supplemented or supplanted by another decision.

With respect to the issues raised by parties, we expect that consideration of communication and coordination issues, specific questions related to the use of de-energization, and the possible use of resilience zones and community resource centers may take place in R.18-12-005, and are most appropriately addressed there. At the same time, as suggested by several parties, the Commission's review of future WMPs would benefit from the inclusion of additional information on the impacts of de-energization and answers to some of the questions raised by parties to this proceeding. We expect a future decision in R.18-12-005 to address what future WMPs should include with respect to de-energization.

8 Situational Awareness

8.1 PG&E's Situational Awareness Program

In its WMP, PG&E discusses its Enhanced Situational Awareness and Known Local Conditions program. PG&E states that this program was created to actively monitor and/or model potential wildfire occurrence and improve timeliness and response efforts, should an ignition occur. PG&E intends the program to inform several of PG&E's other wildfire mitigation activities, including its de-energization program, Wildfire Recloser Disable Program, and emergency response efforts.

PG&E proposes to spend approximately \$31.9 million on situational awareness in its 2019 Wildfire Mitigation Plan, for the following situational awareness activities:

- Installing 200 new weather stations in 2019 at a density of one station roughly every 20 circuit miles in HFTD areas within PG&E's service area. PG&E states that this would double its weather stations.
- Installing a network of high-definition cameras (70 in 2019 and about 600 total by 2022) to assist PG&E and emergency responders to monitor over 90 percent of PG&E's HFTD areas.
- Working with fire detection algorithm developers to develop wildfire detection and alert systems utilizing satellite imagery.
- Using data from new weather stations to build advanced fire modelling capabilities into PG&E's existing meteorological models.

Using these situational awareness tools will help PG&E make decisions about when to initiate operational risk reductions measures such as PSPS and the Wildfire Reclosing Disable Program.

8.2. Parties' Comments - Situational Awareness

Overall, parties do not appear to object to PG&E's Situational Awareness Plan, but have questioned how PG&E will coordinate its efforts with third parties such as local governments and first responders. Parties recommend that PG&E develop a situational awareness framework consistent with that implemented by SDG&E, and share it with first responders and local governments. Such a system would include weather stations, camera networks, fire detection, and wireless fault indicators as a best practice.

As Joint Local Governments point out, it is not clear with whom PG&E will share its data collection programs, or whether PG&E's proposed situational improvements will include a web-based or dashboard component to facilitate access by first responders and others. Parties including EBMUD also suggest that PG&E share camera and weather station information and all other critical situational information including fire and weather data with first responders and local governments.

PG&E responds that it is intending to build a situational awareness framework similar to that deployed by SDG&E. PG&E also plans to share data from its weather stations and cameras, and expects to consider ways to share information from its satellite system once that system has been fully tested and deployed. PG&E states that it coordinates with businesses, first responders, and public safety officials about emerging threats, including deploying "Public Safety Specialists" and field observers to interface with CAL FIRE incident commanders, report on field conditions, and investigate reported wildfires. PG&E further commits to ensuring that its Wildfire Safety Operations Center (WSOC) communicates with first responders in emergencies.

8.3. Discussion – Situational Awareness

It is not clear how PG&E plans to share data collected from its situational awareness systems or the results of its fire spread modeling system with local governments, first responders, and others. PG&E asserts that its fire spread modeling system will be available to be run in real time for specific existing fires to understand the predicted spread; ideally, it should be available to governments and first responders who may be affected by elevated fire risk conditions.

Going forward, it is essential that PG&E find ways to share real-time information, including fire and weather data and modeling with affected agencies, governments, critical services and first responders. For example, to be most effective, the satellite fire detection system, which will provide frequently updated information to PG&E's own web application, should be directly accessible to first responders and local governments. Similarly, PG&E's Storm Outage Prediction Model, which will be updated in near real-time, should be shared with emergency response personnel outside PG&E, and in particular emergency responders should be able to view the application's dashboard directly.

Sharing this information in real time with first responders could enhance public emergency response and therefore increase public safety. As past tragic wildfires show, time is of the essence in saving lives during wildfires. The information collected and modeled by PG&E is critical to public safety and the ability of people in affected communities to respond to and escape wildfires. This information must be available in real time to local governments and first responders to help local evacuation plans to succeed in saving lives.

We understand that PG&E is not yet at a point where it has developed all the means necessary to share vital information. However, PG&E must make it a top priority to articulate a plan for communicating the fire and weather data and modeling information from its WSOC in real time during potential or actual emergency events with affected agencies, governments, and first responders. The information to be shared includes but is not limited to any data collected through weather stations, cameras, satellite fire detection, or fire spread modeling. Receiving this data in real time will allow first responders and local entities to determine when and where to deploy life-saving measures such as activating evacuation plans via sirens and other local communication measures, assisting the elderly and disabled during evacuations, and mobilizing additional assistance as necessary.

Though we find that PG&E's WMP contains a discussion of situational awareness plans, PG&E should provide additional information on how it intends to share the information and analysis with first responders and others via a Tier 1 Advice Letter due no later than 30 days after the Commission issues this decision. As part of this filing, PG&E shall explain fully the WSOC's decision-making criteria, the point(s) at which fire-related information will be communicated, and through what mediums PG&E plans to communicate this information to first responders and local government agencies. We cannot emphasize strongly enough: PG&E's wildfire-related information, data, modeling of data and communications need to be transparent and conveyed effectively and directly in real time to local decision-makers and first responders who can then pass it on to their communities.

PG&E's future WMPs **must**^[TSR1] also address how PG&E has disseminated this information to governments and first responders during the previous

planning year, how effective the communications and information-sharing has been, and what measures PG&E intends to take in the upcoming planning year to address unanswered questions and any shortcomings that it or others see in its emergency plans.

9 Emergency Preparedness/ Outreach and Response

9.1 PG&E's WMP Proposal - Emergency Preparedness, Outreach and Response

Pursuant to Section 8386(c)(16), this section of the Plan includes a discussion of PG&E's emergency response plan, including public outreach and communications, as well as customer support during and after an emergency including information and financial support. PG&E's plan describes emergency communications and outreach before, during and after a wildfire emergency.

PG&E's Fire Prevention Plan (FPP) is a comprehensive set of plans, procedures, processes, and activities related to prevention, detection, response to, and recovery from ignitions that can grow into a wildfire. The FPP is a component of PG&E's Company Emergency Response Plan (CERP), which is PG&E's overall emergency preparedness and response plan.

According to PG&E's plan, when PG&E detects a wildfire, it takes several standard actions. These actions include activating one or more emergency centers, placing personnel on alert status and having them take readiness steps, reviewing emergency plans, identifying personnel for restoration activities, and canceling non-critical meetings. PG&E also describes some steps it will take to keep customers informed, including utilizing specific communications channels and coordinating with local entities. The Plan details public outreach before, during and after a wildfire.

9.2. Parties' Comments – Emergency Preparedness Outreach and Response

The emergency preparedness and outreach section of PG&E's WMP drew significant party comment. Parties recommend that PG&E increase its outreach and communication about wildfire preparedness, high fire threat conditions, wildfire threats, and de-energization. CEJA suggests that PG&E's Plan should include direct notification of customers in the event of a wildfire threat, to be modeled on a system SDG&E uses to directly notify customers of wildfire. CEJA explains that this is especially important for more vulnerable populations and communities and urges coordination with community-based organizations for outreach.

Parties also recommend specific actions for PG&E to take, such as increasing its use of active and direct outreach methods like community meetings, providing more education focused on wildfire risk and emergency preparation, providing online notification to businesses that provide essential services including health services providers, increasing outreach associated with possible de-energization events, and conducting outreach in both HFTD and non-HFTD areas.

In its reply comments, PG&E states it already takes many of these actions, and is open to expanding its outreach in many of the ways that parties suggest to better reach providers of critical services in communities. In its response to party comments, PG&E expresses willingness to work with Joint Local Governments to discuss communication issues in specific situations, and suggests that the effectiveness of communications can be addressed in future Plan proceedings or other venues identified by the Commission.

SBUA argues for better IOU outreach and education about wildfires to small business, noting that small businesses play an important role in remote

locations and urban neighborhoods that do not have access to commercial centers. SBUA recommends that the Commission require the utilities to develop notification procedures tailored to small business customers, with a prioritized status for small health service providers, including primary care physicians, emergency rooms, and veterinarian services, and critical small commercial centers. SBUA explains that these categories of small businesses are particularly important during wildfire emergencies for communities that may otherwise have no access to essential goods and services. In its response, PG&E acknowledges the importance of small business, and states that it will consider small business needs in its outreach efforts.

9.3. Discussion – Emergency Preparedness, Outreach and Response

While we find that PG&E's WMP contains a discussion of emergency preparedness and outreach in compliance with statutory requirements, we agree with parties there is room for improvement, particularly in the areas of communications. PG&E recognizes in its Reply Comments the importance of effective communication with local governments and first responders. As in the Situational Awareness section, in its next WMP PG&E shall provide more information on these issues, and especially how it intends to share information with first responders and local governments.

In addition, it is not clear from either the Plan itself or from PG&E's Reply Comments how the Plan provides for direct notification to customers of a wildfire threat in their area. PG&E is directed to report back to the Commission in its 2020 WMP describing the steps it has taken to facilitate communications with customers during a wildfire threat situation. We decline at this time to order PG&E to develop an outreach plan specifically targeted to small

businesses, but agree that these customers should be reached through broader outreach campaigns.

10 Support to Utility Customers During and After a Wildfire

10.1 WMP Proposal – Support to Utility Customers During and After a Wildfire

In R.18-03-011, the Commission adopted certain customer protections available in emergencies. The protections apply in the event the Governor of California declares a state of emergency because a disaster has either resulted in the loss or disruption of the delivery or receipt of utility service and/or resulted in the degradation of the quality of utility service. The protections adopted in D.18-08-004 include the following: (a) support for low-income customers; (b) billing adjustments; (c) deposit waivers; (d); extended payment plans; (e) suspension of disconnection and nonpayment fees; (f) repair processing and timing; (g) access to utility representatives; (h) outage reporting; and (g) emergency communications.

10.2. Discussion- Support to Utility Customers During and After a Wildfire

While parties did not specifically address R.18-03-011, PG&E is obligated to comply with the protections afforded in declared emergencies. Further, SB 901 contains several provisions related to an electrical corporation's emergency preparedness, response and communications before, during and after a wildfire.

Pub. Util. Code Sections 8386(c)(13), (16) and (17) require a WMP to contain emergency preparedness and response plans that comply with mandates involving communications with cities and counties, preparation for and restoration of service after a wildfire, and public outreach. Specifically, the statute requires the WMP filer to share its plan with relevant cities and counties

to provide input and feedback, and update and improve the plan at least every two years. It also requires the WMP to list persons responsible for plan execution, establish procedures for notifying impacted customers, establish protocols for restoration of service, and create a workforce mobilization plan for its employees before and after a wildfire. The statute mandates that a WMP include a plan for community outreach and public awareness before, during, and after a wildfire in an array of languages including English, Spanish, and the top three languages in California as determined by United States census data.

Pub. Util. Code Section 8386(c)(18) requires a WMP to comply with the requirements we adopted in D.18-08-004 (R.18-03-011) requiring emergency customer support during and after a wildfire. The requirements are: (a) support for low-income customers; (b) billing adjustments; (c) deposit waivers; (d) extended payment plans; (e) suspension of disconnection and nonpayment fees; (f) repair processing and timing; (g) access to utility representatives; and (h) access to outage reporting and emergency communications.

Decision 18-08-004 also requires an electric utility to discontinue billing and prorate any monthly access charge or minimum charges to the customer after a wildfire. Additionally, when implementing support for low-income residential customers, D.18-08-004 requires an IOU to contact all community outreach contractors and community-based organizations who assist in enrolling hard-to-reach low-income customers into CARE after a wildfire (or other listed emergency). The decision adopts a method for the IOU to track its expenses related to the customer protections.

11 Metrics, Monitoring and Reporting

11.1 PG&E's WMP Proposal - Metrics, Monitoring and Reporting

Section 6 of PG&E's WMP discusses Performance Indicators and Monitoring. In this section, PG&E refers to targets and indicators, rather than goals and metrics. PG&E defines a target as a work performance goal that reflects either work done to reduce risk or the quality of that work. PG&E states that it will refine these targets each year, and will evaluate its performance against the goals outlined in the previous year's Plan. PG&E intends to continue to set goals for risk reductions.

PG&E uses metrics it calls indicators to assess the Plan's performance in reducing wildfire ignitions. PG&E expects to use these indicators to identify and track trends resulting from performance of the Plan's programs. PG&E states it will monitor trends to understand the impact of its programs, and explains that it may change and reprioritize programs based on these indicators. In addition to monitoring and internal and external auditing of programs, PG&E notes an Independent Evaluator will review Plan performance and report directly to the Commission.

PG&E includes work performance targets for 2019 for each program, as set forth in Table 9, Section 4 of its WMP. PG&E asserts that these targets are intended to enable the Commission to evaluate compliance with its Plan.

11.2. Parties' Comments

The parties' main critiques of PG&E's proposed metrics can be summarized as follows:

- Merely performing a certain amount of work does not necessarily improve safety if the right work is not selected or if the work is not done properly.

- To track performance over time and provide input into future WMPs, utilities will need to collect historical and trend data in addition to ignition data.
- Utility-specified goals for performing a certain amount of work should not be used to assess whether PG&E has complied with its Plan.
- At this initial stage in the implementation of SB 901, utility compliance with wildfire mitigation should be measured by their compliance with existing rules, regulations and standards that are designed to prevent catastrophic wildfires.
- Indicators could be useful metrics if their improvement is correlated with reduction in the risk of catastrophic wildfires.
- For future plans, PG&E should provide more detail regarding risk analysis, risk-spend efficiency, and alternative strategies.

Parties express concerns about several aspects of PG&E's proposed targets and indicators. Specifically, several parties argue that PG&E's targets concentrate too much on inputs (numbers of trees cut or miles of covered conductor installed) rather than results or outputs (the effectiveness of such mitigation in reducing ignitions, faults or wire down events). Parties assert that the appropriate evaluation of the WMP's effectiveness should reflect how well PG&E's proposed mitigations reduce the risk of catastrophic wildfires, rather than whether PG&E has met its own operational targets.

TURN, for example, suggests that simply performing a certain volume of work does not necessarily promote safety if the work is not properly targeted and not performed properly. Further, while PG&E's performance of the work described in its WMP should be monitored and evaluated, TURN argues that its

specific targets for work to be performed should not be treated as compliance requirements triggering potential violations and penalties.

Similarly, Mr. William Abrams characterizes PG&E's proposed metrics as focusing on activities, rather than risk. PG&E disagrees and argues that its targets and indicators are both measurable and verifiable, by including specific data and numbers that can be readily verified and measured. Multiple parties suggest that PG&E should have an expected risk reduction goal/target included in its Plan for each measure.

Some parties recommend that, given the evolving and dynamic nature of conditions that can impact these indicators, PG&E should be required to provide more specific information about the time and location of ignitions or other relevant incidents such as the FPI rating, wind speed measurements, and HTFD location. Parties assert that PG&E does not discuss how data from metrics contained in its past FPPs influenced the content or direction of the WMP.

OSA proposes that additional Commission metrics be developed. For example, OSA suggests that PG&E should track the number of wires down, the number of wires down that remain energized, and its response time to wires down reports.

Along these lines, MGRA recommends tracking performance, including outage data. MGRA suggests that if utilities collect historical and trend data, those results could be used to inform future WMPs. For example, MGRA analyzed SDG&E's outage data showing that SDG&E's vegetation management program that targeted the highest risk areas had a noticeable effect on outages in those areas when wind speed was included. MGRA believes that if circuits are redesigned over time to be more granular, PG&E could use trend data to identify

the factors correlated with risk, which would allow PG&E to target mitigation measures more effectively, such as enabling isolated shut-off.

Cal Advocates and EPUC note that PG&E's WMP does not identify the risk reduction or risk spend efficiency (RSE) of its proposed mitigation measures. In its Reply, PG&E notes that such information is now found in proceedings such as RAMP and the GRC.

EPUC criticizes the lack of a causal relationship between a particular mitigation measure and indicator or outcome. As EPUC points out, PG&E will perform its proposed mitigation work and will analyze the trends in indicators, but there does not appear to be a way to connect the mitigation measure with any specific outcome. EPUC also states that because PG&E does not establish a target for actual risk reduction, we cannot evaluate whether a mitigation measure achieves its intended level of risk reduction, thus cost-effectively addressing existing and future risks. Similarly, CEJA recommends that PG&E develop metrics to assess the effectiveness of its mitigation measures, and should change its activities if data shows that those are not as effective as other options in reducing risk of catastrophic wildfires.

In its response to party comments, PG&E describes its current data collection activities, which include tracking of wires down and other aspects of performance recommended by parties. PG&E disputes the claim that its recommended indicators are not causally related to risk reduction. PG&E asserts that changes in wires down and equipment-caused ignitions can be correlated to where PG&E has performed system hardening, so if there are fewer such events in the areas where PG&E has conducted system hardening, this may be one indicator of the success of this program. Similarly, PG&E asserts that the amount of EVM can be correlated to vegetation-caused outages and ignitions. PG&E

acknowledges there may be other factors causing wires down or ignitions, but argues that having specific measurable operational targets and programs will assist in measuring performance of the programs.

EPUC's comments suggest a need for further refinement to PG&E's metrics, and GPI discusses the value of using both activity-based and performance-based metrics. GPI and others also argue that it is not enough to compare the activity metrics with the targets; PG&E should also provide sufficient context to understand whether there is a substantial benefit from the activity.

11.3. Discussion - Metrics

While PG&E discusses items that it characterizes as "metrics," merely counting numbers of measures does not get at the statutory requirement to reduce catastrophic wildfire. While such counting may give the Commission an indication of PG&E's activities, metrics are supposed to help "evaluate the plan's performance" according to Pub. Util. Code Section 8386(c)(4). This evaluation must consider whether the Plan is effective in mitigating the risk that SB 901 is focused on: the risk of catastrophic wildfire. Pub. Util. Code Section 8386(a) ("Each electrical corporation shall construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of catastrophic wildfire posed by those electrical lines and equipment.")

PG&E's WMP does not contain significant analysis of the effectiveness of PG&E's FPPs or how past experience under the FPPs informed the WMP, and the great majority of the "metrics" proposed in PG&E's WMP are better characterized as program execution targets.

The aim of the WMP portion of the statute is clear: *"Each electrical corporation shall construct, maintain, and operate its electrical lines and equipment in a*

manner that will minimize the risk of catastrophic wildfire posed by those electrical lines and equipment.” Pub. Util. Code Section 8386(a) (emphasis added). Every aspect of the Plan, including metrics, must be analyzed with this goal in mind.

Even if the risk elements associated with fire spread potential are not directly in the control of utilities, it is imperative to track data showing when and where ignitions are occurring to properly evaluate and scope the risk of catastrophic wildfires posed by electrical lines and equipment. Accordingly, metrics that track the number of elevated fire danger days (whether RFWs, FPI ratings, or NFDRS data are used as the indicator), and the number and types of potential ignition events (*e.g.*, wire down, blown fuses, vegetation contact, etc.) that occur on those days are imperative. Such metrics can provide the type of insight needed to better understand and properly analyze the risk of catastrophic fires caused by electrical lines and equipment.

We expect continuous refinement of the metrics, with input from the parties, as more experience is gained under the annual WMP filing process. As we have discussed in previous sections, many of the proposed mitigation measures target the same risks, stacking multiple mitigation measures on top of each other, making it nearly impossible to decipher the risk reductions attributable to individual mitigations. We cannot find, as PG&E suggests, that each measure meets a different need. In addition, with regard to “targets,” in terms of quantifying work done, we agree with the many parties that contend targets do not qualify as metrics for Plan performance. Metrics are not intended to support the Commission’s ability to determine whether the utility is in compliance with the WMP, but rather to inform the Commission on whether the programs proposed in the WMP are effective at minimizing the risk of catastrophic wildfire from electrical lines and equipment. To that end, PG&E’s

“indicators” or “metrics” must identify and track trends associated with utility-caused wildfires.

The annual WMP filings will be an iterative process as information is collected and knowledge gained. However, going forward, metrics found in the WMP should explain how the programs and strategies in the Plan measurably reduce the risk of catastrophic wildfire posed by utility assets, while ensuring that the various programs target different risks and are not redundant. There must be a way to connect the mitigation measure with the outcome to evaluate the efficacy of the measure.

Metrics that would be useful and informative, and that one or more IOU proposed in a WMP, include those listed below. This decision requires PG&E to work with the Commission’s Safety and Enforcement Division on a template for reporting each of these data points in a format that is consistent with other IOUs:

- Wire Down Events Within HFTD Areas;
 - The number of wire down events within HFTD areas, when the FPI is rated as very-high or higher.
- Equipment Caused Ignitions in HFTD Areas;
- Vegetation Caused Outages in HFTD Areas;
 - The number of vegetation caused outages within HFTD areas, when the FPI is rated as very-high or higher.
- Vegetation Caused Ignitions in HFTD Areas ;
- Faults on Circuits in HFTD;
 - Counts of all faults on HFTD circuits associated with contact from object or equipment failures.
- Number of Conventional Blown Fuse Events.

- Number of National Fire Danger Rating System (NFDRS)¹⁶ “Very Dry” and “Dry” Days.

12 Should PG&E’s 2019 Wildfire Mitigation Plan Be Approved

PG&E’s WMP contains each of the elements required by Pub. Util. Code Section 8386(c). PG&E shall comply with the reporting, metrics, advice letter, and other follow-up requirements set forth in this decision in order to address concerns with its existing WMP and improve its next WMP filings.

In response to an ALJ Ruling requesting risk spend efficiencies (RSEs) for all its proposed WMP mitigations, PG&E points to workpapers in its 2020 GRC.¹⁷ We note, however, that PG&E did not prepare a risk spend efficiency (RSE) analysis for WMP mitigations that are not in its 2020 GRC.

It is not clear what level of detail PG&E’s 2020 WMP should contain regarding its quantitative risk analyses and we will not decide that here in this decision. We intend to review this further before the 2020 WMP is filed early next year. To the extent the utilities want Commission approval of a WMP to mean that the Commission has found PG&E’s mitigation measures just and reasonable, then PG&E must provide much more quantitative risk analysis in their next WMP. This will require much thought to determine whether this is consistent with SB 901, which contemplates a separate Section 451 reasonableness review of the mitigation measures.

TURN’s comments on the level of risk analysis needed in a WMP is useful. PG&E’s WMP does not discuss how the company analyzed and prioritized risks,

¹⁶ NFDRS is used in the United States to provide a measure of the relative seriousness of burning conditions and threat of fire.

¹⁷ PG&E February 26, 2019 Response to February 21, 2019 ALJ Ruling, at 7.

for example, through the use of a Multi-Attribute Value Function (MAVF). A MAVF is a key tool for combining all possible consequences of a risk event in a single measure and is critical to a quantitative risk analysis.¹⁸ TURN notes that in the recent S-MAP settlement, the utilities have agreed to principles for properly constructing a MAVF and that the RAMP and rate case provide the opportunities to determine whether the utility's proposed programs are supported by a reasonable quantitative risk assessment. Because the WMPs do not include these key details, it is not possible to determine whether the portfolio of mitigations PG&E has selected for its WMP are optimal.

We expect that PG&E, in its future WMPs, will analyze the effectiveness of all its wildfire prevention measures, and in doing so will not rely solely on activity-based performance metrics such as the number of trees cleared or the miles of powerline inspected and/or hardened to evaluate the merit of their targets. Performance-based metrics such as those advocated by consumer groups, such as deaths, injuries and property damage sustained in wildfire events have a role in measuring the efficacy of PG&E's catastrophic wildfire prevention measures, although we recognize that certain wildfires may be based on factors beyond a utility's control.

13 Comments on Proposed Decision

The proposed decision of ALJ Sarah R. Thomas and ALJ Peter V. Allen in this matter was mailed to the parties in accordance with Section 311 of the Public

¹⁸ With a well-constructed MAVF, a utility can capture in one measure all of the trade-offs with a mitigation measure, such as de-energization, which can prevent the consequences of a catastrophic wildfire but has its own adverse consequences including harm to health and safety from extended blackouts, the financial harm to businesses and individuals experiencing lengthy outages, and environmental harm from use of back-up power such as diesel generators.

Utilities Code and comments were allowed under Rule 14.3 of the Commission's Rules of Practice and Procedure. Comments were filed _____ by _____.

Reply comments were filed on _____ by _____.

14 Assignment of Proceeding

Michael Picker is the assigned Commissioner and Sarah R. Thomas and Peter V. Allen are the assigned ALJs in this proceeding.

Findings of Fact

1. PG&E's WMP includes all of the elements listed in SB 901, Pub. Util. Code Section 8386(c).
2. Some of the elements PG&E includes in its WMP require reporting, data gathering or other follow-up to ensure PG&E's actions contribute to lowering the risk of catastrophic wildfire.

Conclusions of Law

1. An electrical corporation's WMP is required to include all 19 elements listed in SB 901, Pub. Util. Code Section 8386(c), as well as any material required by the Commission.
2. PG&E WMP contains the elements required by Pub. Util. Code Section 8386(d). Subject to the reporting, metrics, data and advice letter requirements set forth below, PG&E's WMP should be approved.
3. PG&E should conduct reporting, data gathering and other follow-up information on mitigations proposed in its WMP to ensure those mitigations contribute to lowering the risk of catastrophic wildfire.
4. PG&E should provide a summary in future WMPs of its inspections in HFTD areas to inform decisionmakers about whether the fire mitigation measures proposed in its WMP are properly directed or need adjustment.

5. PG&E should be required to include in its future WMPs the metrics it intends to use to determine the quality and the effectiveness of the WSIP in preventing catastrophic wildfires started by utility ignitions.

6. In future WMPs, PG&E should analyze the effectiveness of all of its wildfire prevention measures, and in doing so should not rely only on activity-based metrics.

7. In future WMPs, PG&E should provide more information on the efficacy and cost-effectiveness of its proposed system hardening activities, along with more information on the costs and benefits of alternative options.

8. PG&E should include in future WMPs analysis of how recloser disabling, combined with other system protection strategies that can minimize the risk of ignitions, could reduce the need for circuit reconductoring or PSPS events.

9. In future WMPs, PG&E should analyze available data to determine the degree to which the new minimum clearance requirements and recommended clearance at time of trim in HFTD have contributed to a reduced incidence of ignitions, especially during critical weather conditions.

10. In future WMPs, PG&E should explain how it will take advantage of skilled labor and other resources from state and local government departments to support the company's inspection work and other aspects of its Plan.

11. In future WMPs, PG&E should provide more detailed risk analysis that weighs the potential benefits of undergrounding versus covered conductor in HFTD and along the roads that provide ingress and egress for communities.

12. PG&E should, as soon as possible, but no later than its next WMP, make its internal data and modeling results available to State and local governments and first responders through a web portal or other access point.

13. No later than its 2020 WMP, PG&E should provide specific information regarding how PG&E will provide access to situational awareness data in real time by critical service providers (*e.g.*, first responders and other local entities).

14. No later than its 2020 WMP, PG&E must include specific procedures it will use to notify critical service providers (through the WSOC or otherwise) of situational awareness information, alerts, incident reports, models for assessing fire risk, and other risk analysis. The procedures will likely be different depending on whether the information will be shared ahead of time, or in real time, during a potential or actual emergency

15. PG&E must explain no later than its 2020 WMP how it intends to communicate effectively the fire and weather data and modeling information from its WSOC in real time during potential or actual emergency events with affected agencies, governments, or first responders.

16. PG&E's future WMPs should address how PG&E has disseminated this information to governments and first responders during the previous planning year, how effective the communications and information-sharing has been, and what measures PG&E will take in the upcoming planning year to address any unanswered questions about PG&E's information-sharing process.

17. PG&E should provide evaluation of alternatives or comparison studies to evaluate whether all circuit miles of conductor in the HFTD should be covered. PG&E's 2020 WMP should consider alternatives to system hardening such as high impedance fault detectors, disabling reclosers and increased protection sensitivity.

18. PG&E's 2020 WMP should provide analyses regarding pole materials, including fire resiliency and impacts on strength characteristics following a fire, that can inform PG&E's recommendation as to different non-wood materials for

distribution versus transmission structures, and why and in what circumstances these materials are superior to wood poles.

19. PG&E's 2020 WMP should identify the number of miles that will be addressed through system hardening in 2020 and by 2024, as well as to identify if the proposed system hardening work is redundant with other risk reduction programs.

20. PG&E's 2020 WMP should analyze the relationship between enhanced vegetation management and system hardening. In particular, PG&E should propose a means to measure how various mitigation measures reduce risk of catastrophic wildfires, and whether system hardening will achieve the same efficiencies used alone as when used in combination with other mitigation measures.

21. PG&E's 2020 WMP should consider whether the scope of enhanced vegetation management (EVM) can be reduced in areas when PG&E has hardened the system.

22. PG&E's 2020 WMP should include the results of PG&E's investigations into those areas in their service territory most susceptible to increased wind risk, causing or exacerbating catastrophic wildfires, and showing the results of inspections and possible prioritization of those areas for targeting system hardening.

23. PG&E's 2020 WMP should report on the results of its topographical investigation, developing targeted enhanced inspections (of both overhead distribution and transmission facilities) and whether structural improvements are necessary for its most vulnerable assets in these areas.

24. PG&E's 2020 WMP should consider prioritizing the replacement of PG&E's existing small #6 copper conductor located within Tiers 2 and 3 with the

highest ranking available in their circuit hardening prioritization methodology and provide appropriate analysis supporting its determination.

25. PG&E's 2020 WMP should provide analyses evaluating the efficacy of past operational practices and investments in limiting ignitions, especially in HFTD and during high risk weather conditions.

26. PG&E's 2020 WMP should discuss whether PG&E has used Multiple Attribute Value Framework (MAVF) in its analysis of mitigation measures and, if so, how it was constructed.

27. PG&E should consider Office of Safety Advocates' (OSA) points related to unique topography as it conducts its topographical investigation and reports those results in the 2020 WMP.

28. If recloser disabling, perhaps combined with other system protection strategies, can eliminate the risk of ignitions, those strategies could reduce the need for circuit reconductoring or power shutoffs. This analysis should be included in PG&E's next WMP.

29. All critical service providers shall have a direct contact with PG&E within its Emergency Operations Team structure. PG&E should consider in future Wildfire Mitigation Plans whether certain small businesses qualify as critical services and thus should have a direct contact with PG&E's Emergency Operations Team structure.

30. In future WMPs, PG&E's metrics should measure how the programs and strategies in the Plan effectively minimize the risk of catastrophic wildfire posed by utility assets, without redundancy among programs.

31. PG&E's future WMPs should include metrics regarding customer outreach.

32. PG&E should extend bill payment arrangements to PG&E customers whose employment is impacted by wildfires.

33. PG&E should be required to work with the Commission's Safety and Enforcement Division on a template for reporting each of these data points in a format that is consistent with other WMP filers.

O R D E R

IT IS ORDERED that:

1. Pacific Gas and Electric Company's (PG&E's) Wildfire Mitigation Plan contains the elements required by Public Utilities Code Section 8386(c). Subject to the reporting, metrics, data and advice letter requirements set forth below, PG&E's Wildfire Mitigation Plan is approved.

2. Pacific Gas and Electric Company shall comply with the reporting, metrics, advice letter, and other follow-up information requirements set forth in this decision.

3. Pacific Gas and Electric Company shall include in its future Wildfire Mitigation Plans a summary of the results of the detailed inspections it conducts in the High Fire-Threat District Tier 2 and 3 area of its service territory to allow assessment of whether the fire mitigation measures proposed in the Wildfire Mitigation Plan are properly directed or need adjustment.

4. Pacific Gas and Electric Company shall in its future Wildfire Mitigation Plans include the results of its topographical investigations into those areas most susceptible to increased wind risk, causing or exacerbating catastrophic wildfires. It shall also show the results of targeted enhanced inspections (of both overhead distribution and transmission facilities), whether structural improvements are necessary for its most vulnerable assets in these areas, and prioritization of such areas for targeting system hardening.

5. Pacific Gas and Electric Company shall in future Wildfire Mitigation Plans provide analyses regarding pole materials, including fire resiliency and impacts on strength characteristics following a fire, which can inform why the utility recommends non-wood materials for distribution versus transmission structures, and why and in what circumstances these materials are superior to wood poles.

6. No later than its 2020 Wildfire Mitigation Plan (WMP), Pacific Gas and Electric Company (PG&E) shall include specific procedures it will use to notify state and local governments and first responders of situational awareness information, alerts, incident reports, models for assessing fire risk, and other risk analysis, including providing information in real time during potential or actual emergency events. PG&E's future WMPs shall also address how the utility disseminated this information the previous WMP cycle, the effectiveness of the communications and information-sharing, complaints or concerns expressed about the utility's communication and information-sharing, and what measures PG&E will take in the upcoming planning year to address any unanswered questions.

7. Due to the level of concern over whether the proposed system hardening work is redundant to other risk reduction programs, Pacific Gas and Electric Company (PG&E) shall in its 2020 Wildfire Mitigation Plan (WMP) analyze the relationship between enhanced vegetation management and system hardening, and whether the scope of enhanced vegetation management can be reduced in areas where PG&E has hardened its system. In particular, PG&E shall develop metrics to measure how various mitigation measures reduce risk of catastrophic wildfires, and whether system hardening will achieve the same efficiencies used alone as when used in combination with other mitigation measures. PG&E's metrics in future WMPs shall explain how the programs and strategies in the

Plans effectively minimize the risk of catastrophic wildfire posed by utility assets, without redundancy among programs. In future WMPs, PG&E shall provide more information on the efficacy and cost-effectiveness of its proposed system hardening activities, along with more information on the costs and benefits of alternative options. PG&E shall include in its future WMPs the metrics to determine the quality and the effectiveness of its Wildfire Safety Inspection Program in preventing catastrophic wildfires started by utility ignitions, especially in High Fire Threat District and during high-risk weather conditions.

8. Pacific Gas and Electric Company shall discuss in its 2020 Wildfire Mitigation Plan whether it has used Multi-Attribute Value Framework in its analysis of mitigation measures and, if so, how it was constructed.

9. Pacific Gas and Electric Company shall in its 2020 Wildfire Mitigation Plan include metrics regarding customer outreach.

10. In a Tier 1 Advice Letter filing due no later than 30 days after the Commission issues this decision, Pacific Gas and Electric Company (PG&E) shall articulate a plan for communicating the fire and weather data and modeling information from its Wildfire Safety Operations Center in real time during potential or actual emergency events to affected agencies, governments, and first responders. All such critical service providers shall have a direct contact with PG&E within its Emergency Operations Team structure. The Tier 1 Advice Letter must contain PG&E's situational awareness plans, including information on how it intends to share the information and analysis with first responders and others. As part of this filing, PG&E shall explain fully the Wildfire Safety Operations Center's decision-making criteria, the point(s) at which fire-related information will be communicated, and what mediums PG&E plans to use to

communicate this information to first responders and local government agencies and other critical service providers and its timeline for developing the process for disseminating this information.

11. Pacific Gas and Electric Company shall in its next Wildfire Mitigation Plan follow up on the Tier 1 Advice Letter by providing specific information regarding access to situational awareness data in real time to critical service providers (*e.g.*, first responders and other local entities), including how it will make its internal data and modeling results available to State and local governments and first responders through a web portal or other access point.

12. Pacific Gas and Electric Company shall in its next Wildfire Mitigation Plan include the specific procedures it intends to use to notify critical service providers through the Wildfire Safety Operations Center or otherwise of situational awareness information, alerts, incident reports, modeling information and risk analysis in real time.

13. Pacific Gas and Electric Company shall explain in its next Wildfire Mitigation Plan how it intends to communicate effectively the fire and weather data from its Wildfire Safety Operations Center during potential or actual emergency events with affected agencies, governments, or first responders.

14. Future Wildfire Mitigation Plans shall describe how Pacific Gas and Electric Company (PG&E) has disseminated this fire and weather data and modeling information to governments and first responders during the previous planning year, how effective the communications and information-sharing has been, and what measures PG&E will take in the year covered by the relevant Wildfire Mitigation Plan to improve communications with local governmental entities, providers of critical services, and first responders.

15. Pacific Gas and Electric Company shall work with the Commission's Safety and Enforcement Division on a template for reporting each of the data points required in this decision in a format that is consistent with the other respondent electrical corporations.

16. Pacific Gas and Electric Company shall in future Wildfire Mitigation Plans explicitly identify any mitigation that uses new or untested technologies.

17. Pacific Gas and Electric Company (PG&E) shall in future Wildfire Mitigation Plans include the fire incident data required by Decision 14-12-015, and data on "wire down" and fault events. PG&E shall include the following data in this reporting: (1) date and time of the wire-down event or fault; (2) location information with latitude and longitude coordinates, pole number, and location in the High Fire-Threat District areas; (3) circuit name and operating voltage; (4) type of conductor; (5) installation date; (6) number of splices in span; (7) type of each splice identified; (8) identification of failure point; (9) cause of failure; and (10) magnitude and duration of fault current. In all future ignition report filings, we direct PG&E to include all ignition data for previously unreported ignitions, and if applicable, where the investigating fire agency determined utility facilities to be the cause of ignition.

18. Pacific Gas and Electric Company may open the memorandum account described in Public Utilities Code Section 8386(e), which provides: "At the time it approves each plan, the commission shall authorize the utility to establish a memorandum account to track costs incurred to implement the plan."

19. Pacific Gas and Electric Company may not seek or obtain double recovery of the costs tracked in the Section 8386(e) account authorized in the previous paragraph, and the costs tracked in the memorandum account described in Public Utilities Code Section 8386(j), which the utility established with

Energy Division's approval. The Section 8386(j) account is described in Senate Bill 901 as follows: "(j) Each electrical corporation shall establish a memorandum account to track costs incurred for fire risk mitigation that are not otherwise covered in the electrical corporation's revenue requirements.

20. In future Wildfire Mitigation Plans, Pacific Gas and Electric Company shall explain how it will take advantage of skilled labor and other resources from state and local government departments to support the company's inspection work and other aspects of its Wildfire Mitigation Plan.

21. Pacific Gas and Electric Company shall extend bill payment arrangements for customers whose employment is impacted by wildfires.

22. Nothing in this decision relieves Pacific Gas and Electric Company of the requirement to conform all of the activities described in its Wildfire Mitigation Plan to existing law, regulation and Commission General Orders.

23. Nothing in this decision changes the notice, communication, outreach or other requirements of the Commission's concurrent de-energization decision issued in Rulemaking 18-12-005.

24. Rulemaking 18-10-007 remains open.

This order is effective today.

Dated _____, at San Francisco, California.

**Appendix A -
List of Requirements in SB 901 for WMPs**

8386.

(c) The wildfire mitigation plan shall include:

(1) An accounting of the responsibilities of persons responsible for executing the plan.

(2) The objectives of the plan.

(3) A description of the preventive strategies and programs to be adopted by the electrical corporation to minimize the risk of its electrical lines and equipment causing catastrophic wildfires, including consideration of dynamic climate change risks.

(4) A description of the metrics the electrical corporation plans to use to evaluate the plan's performance and the assumptions that underlie the use of those metrics.

(5) A discussion of how the application of previously identified metrics to previous plan performances has informed the plan.

(6) Protocols for disabling reclosers and deenergizing portions of the electrical distribution system that consider the associated impacts on public safety, as well as protocols related to mitigating the public safety impacts of those protocols, including impacts on critical first responders and on health and communication infrastructure.

(7) Appropriate and feasible procedures for notifying a customer who may be impacted by the deenergizing of electrical lines. The procedures shall consider the need to notify, as a priority, critical first responders, health care facilities, and operators of telecommunications infrastructure.

(8) Plans for vegetation management.

(9) Plans for inspections of the electrical corporation's electrical infrastructure.

(10) A list that identifies, describes, and prioritizes all wildfire risks, and drivers for those risks, throughout the electrical corporation's service territory, including all relevant wildfire risk and risk mitigation information that is part of Safety Model Assessment Proceeding and Risk Assessment Mitigation Phase filings. The list shall include, but not be limited to, both of the following:

(A) Risks and risk drivers associated with design, construction, operations, and maintenance of the electrical corporation's equipment and facilities.

(B) Particular risks and risk drivers associated with topographic and climatological risk factors throughout the different parts of the electrical corporation's service territory.

(11) A description of how the plan accounts for the wildfire risk identified in the electrical corporation's Risk Assessment Mitigation Phase filing.

(12) A description of the actions the electrical corporation will take to ensure its system will achieve the highest level of safety, reliability, and resiliency, and to ensure that its system is prepared for a major event, including hardening and modernizing its infrastructure with improved engineering, system design, standards, equipment, and facilities, such as undergrounding, insulation of distribution wires, and pole replacement.

(13) A showing that the utility has an adequate sized and trained workforce to promptly restore service after a major event, taking into account employees of other utilities pursuant to mutual aid agreements and employees of entities that have entered into contracts with the utility.

(14) Identification of any geographic area in the electrical corporation's service territory that is a higher wildfire threat than is currently identified in a commission fire threat map, and where the commission should consider expanding the high fire threat district based on new information or changes in the environment.

(15) A methodology for identifying and presenting enterprise-wide safety risk and wildfire-related risk that is consistent with the methodology used by other electrical corporations unless the commission determines otherwise.

(16) A description of how the plan is consistent with the electrical corporation's disaster and emergency preparedness plan prepared pursuant to Section 768.6, including both of the following:

(A) Plans to prepare for, and to restore service after, a wildfire, including workforce mobilization and prepositioning equipment and employees.

(B) Plans for community outreach and public awareness before, during, and after a wildfire, including language notification in English, Spanish, and the top three primary languages used in the state other than English or Spanish, as determined by the commission based on the United States Census data.

(17) A statement of how the electrical corporation will restore service after a wildfire.

(18) Protocols for compliance with requirements adopted by the commission regarding activities to support customers during and after a wildfire, outage reporting, support for low-income customers, billing adjustments, deposit waivers, extended payment plans, suspension of disconnection and nonpayment fees, repair processing and timing, access to utility representatives, and emergency communications.

(19) A description of the processes and procedures the electrical corporation will use to do all of the following:

(A) Monitor and audit the implementation of the plan.

(B) Identify any deficiencies in the plan or the plan's implementation and correct those deficiencies.

(C) Monitor and audit the effectiveness of electrical line and equipment inspections, including inspections performed by contractors, carried out under the plan and other applicable statutes and commission rules.

(20) Any other information that the commission may require.

(END OF APPENDIX A)

**Appendix B –
Cross Reference SB 901-Wildfire Mitigation Plans**

CROSS REFERENCE TABLE 1
Using SB 901 Organization

Code Reference §8386(c)	Wildfire Mitigation Plan section
(1) An accounting of the responsibilities of persons responsible for executing the plan.	VI.A.
(2) The objectives of the plan.	I.
(3) A description of the preventive strategies and programs to be adopted by the electrical corporation to minimize the risk of its electrical lines and equipment causing catastrophic wildfires, including consideration of dynamic climate change risks.	II.
(4) A description of the metrics the electrical corporation plans to use to evaluate the plan’s performance and the assumptions that underlie the use of those metrics.	VI.B.
(5) A discussion of how the application of previously identified metrics to previous plan performances has informed the plan.	VI.C.
(6) Protocols for disabling reclosers and deenergizing portions of the electrical distribution system that consider the associated impacts on public safety, as well as protocols related to mitigating the public safety impacts of those protocols, including impacts on critical first responders and on health and communication infrastructure.	IV.A.
(7) Appropriate and feasible procedures for notifying a customer who may be impacted by the deenergizing of electrical lines. The procedures shall consider th need the notify, as a priority, critical first responders, health care facilities, and operators of telecommunications infrastructure.	IV.F.
(8) Plans for vegetation management.	IV.D.
(9) Plans for inspections of the electrical corporation’s electrical infrastructure.	IV.B.

Code Reference §8386(c)	Wildfire Mitigation Plan section
<p>(10) A list that identifies, describes, and prioritizes all wildfire risks, and drivers for those risks, throughout the electrical corporation’s service territory, including all relevant wildfire risk and risk mitigation information that is part of Safety Model Assessment Proceeding and Risk Assessment Mitigation Phase filings. The list shall include, but not be limited to, both of the following:</p> <p>(A) Risks and risk drivers associated with design, construction, operations, and maintenance of the electrical corporation’s equipment and facilities.</p> <p>(B) Particular risks and risk drivers associated with topographic and climatological risk factors throughout the different parts of the electrical corporation’s service territory.</p>	III.B.(1-5)
<p>(11) A description of how the plan accounts for the wildfire risk identified in the electrical corporation’s Risk Assessment Mitigation Phase filing.</p>	III.B.6.
<p>(12) A description of the actions the electrical corporation will take to ensure its system will achieve the highest level of safety, reliability, and resiliency, and to ensure that its system is prepared for a major event, including hardening and modernizing its infrastructure with improved engineering, system design, standards, equipment, and facilities, such as undergrounding, insulation of distribution wires, and pole replacement.</p>	IV. (whole section)
<p>(13) A showing that the utility has an adequate sized and trained workforce to promptly restore service after a major event, taking into account employees of other utilities pursuant to mutual aid agreements and employees of entities that have entered into contracts with the utility.</p>	V.B.3.
<p>(14) Identification of any geographic area in the electrical corporation’s service territory that is a higher wildfire threat than is currently identified in a commission fire threat map, and where the commission should consider expanding the high fire threat district based on new information or changes in the environment.</p>	III.D.
<p>(15) A methodology for identifying and presenting enterprise-wide safety risk and wildfire-related risk that is consistent with the methodology used by other electrical corporations unless the commission determines otherwise.</p>	III.A.

Code Reference §8386(c)	Wildfire Mitigation Plan section
<p>(16) A description of how the plan is consistent with the electrical corporation’s disaster and emergency preparedness plan prepared pursuant to Section 768.6, including both of the following:</p> <p>(A) Plans to prepare for, and to restore service after, a wildfire, including workforce mobilization and repositioning equipment and employees.</p> <p>(B) Plans for community outreach and public awareness before, during, and after a wildfire, including language notification in English, Spanish, and the top three primary languages used in the state other than English or Spanish, as determined by the commission based on the United States Census data.</p>	<p>V.A. V.B.</p>
<p>(17) A statement of how the electrical corporation will restore service after a wildfire.</p>	<p>V.B.1.</p>
<p>(18) Protocols for compliance with requirements adopted by the commission regarding activities to support customers during and after a wildfire, outage reporting, support for low-income customers, billing adjustments, deposit waivers, extended payment plans, suspension of disconnection and nonpayment fees, repair processing and timing, access to utility representatives, and emergency communications.</p>	<p>V.C.</p>
<p>(19) A description of the processes and procedures the electrical corporation will use to do all of the following:</p> <p>(A) Monitor and audit the implementation of the plan.</p> <p>(B) Identify any deficiencies in the plan or the plan’s implementation and correct those deficiencies.</p> <p>(C) Monitor and audit the effectiveness of electrical line and equipment inspections, including inspections performed by contractors, carried out under the plan and other applicable statutes and commission rules.</p>	<p>VI.D.</p>
<p>(20) Any other information that the commission may require.</p>	<p>VII.A.</p>

CROSS REFERENCE TABLE 2

Using Wildfire Mitigation Plan Organization

Wildfire Mitigation Plan section	Code Reference §8386(c)	
I. Objectives consistent with §8386(a) A. Categorized by following timeframes: A. Before upcoming wildfire season B. Before next Plan filing C. Within next 5 years	2	
II. Description of preventive strategies and programs B. Categorized by following timeframes: A. Before upcoming wildfire season B. Before next Plan filing C. Within next 5 years	3	
III. Risk Analysis and Risk Drivers A. Safety and wildfire risk identification and assessment methodology	15	
B. Wildfire risks and drivers list C. Listed in the following categories: 1. Design and Construction 2. Inspection and Maintenance 3. Operational Practices 4. Situational/Conditional Awareness 5. Response and Recovery	10	
C. Description of how plan accounts for wildfire risk identified in RAMP	11	
D. Service territory fire-threat evaluation	14	
IV. Wildfire Prevention Strategies and Programs D. Operational practices	6	12

Wildfire Mitigation Plan section	Code Reference §8386(c)	
E. Inspection and maintenance plans	9	
F. System hardening to achieve highest level of safety, reliability, and resiliency		
G. Vegetation management plan	8	
H. Situational awareness protocols and determination of local conditions		
I. De-energization protocol	7	
J. Alternative technologies		
K. Post-incident recovery, restoration, and remediation activities		
V. Emergency Preparedness and Response		16
A. General description of overall plan		
B. Description of consistency with emergency preparedness and response plan		
1. Service restoration plan	17	
2. Emergency communications		
3. Workforce adequacy showing		13
C. Customer support in emergencies		18
1.1.1. Protocols for compliance with CPUC requirements		

Wildfire Mitigation Plan section	Code Reference §8386(c)
VI. Performance Metrics and Monitoring	
A. Accounting of responsibilities	1
B. Description of metrics and assumptions	4
C. Discussion on how previous metrics performance has informed current plan	5
D. Processes and procedures for:	
1. Plan monitoring and auditing	
2. Identifying and correcting Plan deficiencies	
3. Monitoring and auditing effectiveness of equipment and line inspections	19
VII. Any other information the CPUC may require	
A. Cost information	20
(END OF APPENDIX B)	

Appendix C – List of Acronyms

A.	Application
AT&T	AT&T Mobility Wireless Operations Holdings, Inc., Pacific Bell Telephone Company, and AT&T Corp.
AB	Assembly Bill
Abrams	William B. Abrams
ACS	Arc Suppression Coils
AGP	Annual Grid Patrol
Air Operations	SCE's Air Operations Department
ANSI	American National Standards Institute
AR	automatic reclosers
Bear Valley or BVES	Bear Valley Electric Service, a division of Golden State Water Company
BLF	Branch Line Fuses
BVLOS	Beyond Visual Line of Sight
C3	Customer Crew Communications
Cal Advocates	Public Advocates Office fka Office of Ratepayer Advocates
CAISO	California Independent System Operator
CAL FIRE	California Department of Forestry and Fire Protection

Cal OES	California Office of Emergency Services
CARE	California Alternate Rates for Energy
CEJA	California Environmental Justice Alliance
CB	Circuit Breaker
CCC	Customer Contact Center
CCSF	The City and County of San Francisco
CCUE	Coalition of California Utility Employees
CCTA	California Cable and Telecommunications Association
CCWD	Contra Costa Water District
Cell	Critical Energy Infrastructure Information
CEMA	Catastrophic Event Memorandum Account
CEQA	California Environmental Quality Act
CERP	Company Emergency Response Plan
CFBF	California Farm Bureau Federation
CIRT	Centralized Inspection Review Team
Citizens	Citizens Sunrise Transmission LLC
CLF	current-limiting fuses
CMUA	California Municipal Utilities Association

CPUC	California Public Utilities Commission or Commission
CSWC	California State Warning Center
CUEA	California Utilities Emergency Association
CWSP	Community Wildfire Safety Program
D.	Decision
DATC	Duke American Transmission Company
DATC Path 15	Trans-Elect NTD Path 15, LLC
DDS	Distribution Design Standards
DFA	Distribution Fault Anticipation
DFM	Dead Fuel Moisture
DIIP	Distribution Infrared Inspection Program
DIMP	Distribution Inspection and Maintenance Program
DOH	Distribution Overhead Construction Standards
DRI	Drought Relief Initiative
EBMUD	East Bay Municipal Utility District
Eel	Edison Electric Institute
EOC	Emergency Operations Center

EOI	enhanced overhead inspections
EONS	Emergency Outage Notification System
EPIC	Electric Program Investment Charge
EP&R	Emergency Preparedness and Response
EPUC/IS	Energy Producers and Users Coalition and Indicated Shippers
ERO	Emergency Response Organization
ESA	Energy Savings Assistance
ETOR	Estimated Time of Restoration
EVM	enhanced vegetation management
FEMA	Federal Emergency Management Agency
FERA	Family Electric Rate Assistance
FERC	Federal Energy Regulatory Commission
FHPMA	Fire Hazard Prevention Memorandum Account
FHSZ	Fire Hazard Severity Zone
FIA	Fire Index Area
FiRM	Fire Risk Mitigation

FMEA	Failure Modes and Effects Analysis
FPI	Fire Potential Index
FPP	Fire Prevention Plan
FRP	fiber reinforced polymer
GIS	Geographic and Information System
GO	General Order
GPI	Green Power Institute
GRC	General Rate Case
GSRP	Grid Safety and Resiliency Program
GSW	Golden State Water Company
HD	high definition
Henricks	Ruth Henricks
HFRA	High Fire Risk Areas
HFTD	High Fire Threat District
HHZ	High Hazard Zones
HPCC	High Performance Computing Cluster
HTMP	Hazard Tree Management Program

I.	Investigation
ICS	Incident Command System
IMT	Incident Management Team
IOUs	Investor-Owned Utilities
IPI	Intrusive Pole Inspection program
IR	Infrared
ISA	International Society of Arboriculture
ITO	Independent Transmission Owners
IVR	Integrated Voice Recording
km	Kilometer
kV	Kilovolt
LAC	Local Assistance Center
LA County	Los Angeles County
LADWP	Los Angeles Department of Water and Power
Laguna Beach	The City of Laguna Beach
Liberty	Liberty Utilities (CALPECO Electric) LLC
LiDAR	light detection and ranging technology
Malibu	The County of Los Angeles, City of Malibu

MA	Memorandum Account
MAA	Mutual Assistance Agreements
MADEC	meter alarming for downed energy conductor
MAVF	Multi-Attribute Value Framework
Mendocino	The County of Mendocino
MGRA	Mussey Grade Road Alliance or Mussey Grade
Mph	Miles per hour
MVCD	Minimum Violation Clearance Distance
Napa	The County of Napa
NIMS	National Incident Management System
NEET-West	Next Era Energy Transmission West LLC
NERC	North American Reliability Corporation
NFDRS	National Fire Danger Rating System
NFPA	National Fire Protection Association
NIFC	National Interagency Fire Center
NIMS	National Incident Management System
NWS	National Weather Service

OA	Operability Assessment
OCP	Overhead Conductor Program
ODI	Overhead Detail Inspection
ODRM	Outage Database and Reliability Metrics
OEM	Offices of Emergency Management
OES	Office of Emergency Services
OIR	Order Instituting Rulemaking
OMS	Outage Management System
OSA	The Commission's Office of Safety Advocates
PacifiCorp	Pacific Power, a division of PacifiCorp
Paradise	Town of Paradise
PCB	polychlorinated biphenyls
PCEA	Peninsula Clean Energy Authority
PEV	Post Enrollment Verification
PG&E	Pacific Gas and Electric Company
PI	Pole Inspections
PIH	Pre-installed Interconnection Hubs

PLP	Pole Loading Program
PMO	Program Management Office
POC	Protect Our Communities
POMMS	PG&E Operational Mesoscale Modeling System
PRC	Public Resources Code
PSPS	Public Safety Power Shut-Off or De-Energization
PTZ	pan-tilt-zoom
PUC	Public Utilities Code
QA	Quality Assurance
QC	Quality Control
QCG	Quality Control Group
AM	Quality Management
QO	Quality Oversight
R.	Rulemaking
RAMP	Risk Assessment Mitigation Phase
RAR	remote-controlled automatic reclosers
RAWS	Remote Automated Weather Stations

RCRC	Rural County Representatives of California
REACH	Relief for Energy Assistance through Community Help
REFCL	Rapid Earth Fault Current Limiter
RFW	Red Flag Warnings
ROW	Right-of-Way
Santa Rosa	The City of Santa Rosa
SAWTI	Santa Ana Wildfire Threat Index
SB901	Senate Bill 901
SBUA	Small Business Utility Advocates
SCADA	Supervisory Control and Data Acquisition
SCE	Southern California Edison Company
SDG&E	San Diego Gas & Electric Company
SE D	Commission's Safety and Enforcement Division
SIMP	Substation Inspection and Maintenance Program
SIPT	Safety and Infrastructure Protection Teams
S-MAP	Safety Model Assessment Proceedings

SOB	Standard Operating Bulletin
Sonoma	County of Sonoma
SOPP	Storm Outage Prediction Model
SoCalGas	Southern California Gas Company
SmartMeter	Brand Name for Automated Metering Initiative
SME	Subject MaTTER Experts
Sunrun	Sunrun Inc.
Startrans	Startrans IO, LLC
T&D	SCE's Transmission and Distribution business unit
TBC	Trans Bay Cable LLC
TICII	Transmission Infrared and Corona Inspection Initiative
TIMP	Transmission Inspection and Maintenance Program
TURN	The Utility Reform Network
UAS	Advanced Unmanned Aerial Systems
UAV	unmanned aerial vehicle
UDI	Underground Inspection Program
USFS	U.S. Forest Service

USGS	United States Geological Survey
VM	Vegetation Management
WAPA	Western Area Power Administration
WCCP	Wildfire Covered Conductor Program
WEIMAR	Western Energy Institute Mutual Assistance Roster
WECC	Western Electricity Coordinating Council
WMP or Plan	Wildfire Mitigation Plan
WRF	Weather Research and Forecasting
WRMAG	Western Region Mutual Assistance Agreement for Electric Utilities
WSIP	Wildfire Safety Inspection Program
WSOC	Wildfire Safety Operations Center
WSP	Wildfire Safety Plan
Zuma Beach	Hans Laetz on behalf of Zuma Beach FM Broadcasters

(END OF APPENDIX C)