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 (Issued October 25, 2018)

REPLY COMMENTS ON THE 2021 WILDFIRE MITIGATION PLAN OF PACIFIC GAS AND ELECTRIC COMPANY (U 39 E)

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I. INTRODUCTION

On February 5, 2021, Pacific Gas and Electric Company (PG&E) submitted our 2021 Wildfire Mitigation Plan (WMP), which included a comprehensive plan document, extensive and detailed supporting materials and spreadsheets, and our responses to the Utility Wildfire Mitigation Maturity Survey. Our 2021 WMP focuses on three overarching goals: (1) reducing wildfire ignition risk; (2) enhancing wildfire risk situational awareness; and (3) reducing the impact of Public Safety Power Shutoff (PSPS) events for our customers and communities. In the 2021 WMP, we described outcomes from 2020, lessons learned, new approaches to risk modeling and prioritization, our commitments and targets for 2021, and extensive details concerning 124 initiatives all designed to reduce the potential of catastrophic wildfires from electric facilities. As a number of parties commented, the Wildfire Safety Division's (WSD) 2021 WMP outline helped facilitate a thorough and comprehensive view of how we plan to address wildfire risk in 2021 and beyond. Since the 2021 WMP was submitted, PG&E has responded to well over 1,000 data requests (counting subparts) on an expedited schedule, produced thousands of megabytes of electronic materials and information, and participated in two full days of workshops hosted by WSD. On March 29, 2021, thirteen parties filed comments

on the 2021 WMPs submitted by PG&E, Southern California Edison Company (SCE) and San Diego Gas & Electric Company (SDG&E).[1]

Parties' comments covered a wide range of issues. At a high level, a number of parties noted how much the WMP process has evolved and credited WSD for developing a comprehensive WMP outline.[2] For example, MGRA notes that "[t]here has been significant progress made toward the quality and breadth of utility WMP submissions since last year, due largely to guidance provided by WSD . . .."[3] We share these views as to the significant and important work that WSD has done creating a comprehensive WMP outline and structure. We also appreciate comments from parties about the progress made in our 2021 WMP. As William Abrams observes, PG&E's 2021 WMP "is particularly weighty at nearly 1,000 pages and shows some marked improvements over prior years."[4]

Other parties describe the positive impact of wildfire mitigation efforts to date. For example, Santa Clara notes that "[a]s demonstrated by a recent experience in Santa Clara County, where a PG&E-installed camera was used to actively monitor an emerging wildfire, these cameras provide valuable information to assist fire monitoring and suppression, protection of utility assets and other critical infrastructure, and public safety and emergency response efforts."[5] These comments are encouraging and we believe that, working together, the California

[1] William Abrams; Acton Town Council (Acton); California Farm Bureau Federation (CFBF); Kevin Collins; County of Santa Clara (Santa Clara); Green Power Institute (GPI); Joint Local Governments; Los Angeles County Department of Regional Planning (LA County); Mussey Grade Road Alliance (MGRA); Protect Our Communities Foundation (POC); Public Advocates Office of the California Public Utilities Commission (Cal Advocates); Small Business Utility Advocates; and The Utility Reform Network (TURN).

[2] Although parties such as MGRA expressed appreciation for the detail in the utilities' 2021 WMPs, several other parties expressed some concern about the length of the 2021 WMPs. *See e.g.* GPI at pp. 2-3. The length of the WMPs reflects the complexity of the issues involved, the significant number of initiatives being undertaken by the utilities, and the need for WSD and stakeholders to have detailed information to analyze and consider when reviewing the WMPs. Given the importance of addressing wildfire risk in California, a more comprehensive approach is prudent and reasonable.

[3] MGRA at p. 10.

[4] Abrams at p. 2.

[5] Santa Clara at p. 3.

Public Utilities Commission (Commission), WSD, utilities, and stakeholders will continue to make progress in addressing the climate-driven wildfire risk that increasingly threatens California.

There were a number of areas where parties provided helpful feedback and input on our 2021 WMP. In other areas, parties critiqued PG&E's approach and aspects of our 2021 WMP. We welcome this feedback and have carefully considered all the comments that were submitted. These reply comments are not intended to address point-by-point every issue raised or rebut every statement made. Instead, in these reply comments we are seeking to summarize the feedback that we heard, respond to issues as needed, and clarify and correct any misunderstandings of what PG&E is proposing to do to help mitigate wildfires in California. We are also pointing out areas where issues have been raised that are more appropriately addressed in other proceedings or venues.

In the remainder of these reply comments, we first address general arguments raised by Cal Advocates and TURN as to whether the 2021 WMP should be approved and the appropriate meaning and scope of approval. We then follow the WSD outline for the WMP by going through each section of the 2021 WMP and discussing issues raised by parties in their comments.[6] In the subsection headers, we identify the parties we are responding to in that subsection for ease of reference. Finally, these reply comments conclude by addressing miscellaneous issues that were raised by parties that did not fit within WSD's WMP outline.

We agree with the statements from a number of parties that, in the future, a schedule for the WMP should be developed to provide more time for all parties to fully investigate and discuss issues. For example, in its comments, Cal Advocates provides thoughtful proposals for

[6] We have tried in these reply comments to organize the parties' comments using the 2021 WMP outline. In some cases, the reply comments indicate that no issues were raised regarding a certain portion of the 2021 WMP because it was not clear from a party's comments that the specific portion of the 2021 WMP was being addressed. We apologize in advance if we missed a party's comments on a certain subject or misunderstood the subject being addressed and thus placed the issue in a different part of these reply comments. In Section X.H below, we have included a proposal for a more structured comment process going forward so that it is clear which portions of the WMP parties are addressing.

technical working groups that can address issues such as risk-modeling and the efficacy of certain inspection methods such as transmission tower climbing. We believe that using working groups to address certain key technical issues would be very useful. The process of submitting written comments and reply comments can be frustrating as parties often talk past each other, may not fully understand an issue or another parties' perspective, or can easily miss the point being made. We believe, as do many other parties, that a substantial amount of progress can be made during the year in working groups and other avenues to address specific complex aspects of wildfire mitigation, such as risk modeling, through collaboration and discussion, rather than formal comments and reply comments. While the discovery, comments, and reply comments framework may be comfortable for many of us who have long been involved in the regulatory process, it may be time to establish a new paradigm that is more conducive to collaboratively tackling climate-driven wildfire risk.

We look forward to using the remainder of 2021 as an opportunity to explore new avenues for information sharing, improvement, and feedback. For now, however, we are grateful for the feedback we have received in comments, and we are providing a response to as many issues as we can given the short response time. We look forward to working with the Commission, WSD, and stakeholders on continuing to refine and improve wildfire mitigation activities to protect our customers and our communities.

II. ISSUES REGARDING APPROVAL OF THE 2021 WMP

The only parties recommending that PG&E's 2021 WMP be denied or, alternatively, conditionally approved, are Cal Advocates and TURN. TURN also raises several other issues regarding the meaning and scope of approval. These parties' recommendations are addressed below.

A. Cal Advocates' Recommendation to Deny the 2021 WMP

Cal Advocates argues that PG&E's implementation of our 2020 WMP is a basis for

denying the 2021 WMP.[7] As a preliminary matter, in our 2021 WMP we openly and transparently discussed some of the lessons learned and operational shortcomings in 2020, and how we are addressing these issues going forward and improving our performance.[8] No large organization or utility will be able to perfectly execute every program and initiative and there should always be lessons learned along the way. However, Cal Advocates ignores the substantial progress, work on wildfire mitigation initiatives, and successes that occurred in 2020, narrowly focusing on areas for improvement. Cal Advocates' recommendation to deny PG&E's 2021 WMP should be rejected for at least four reasons.

First, Cal Advocates appears to misinterpret the statutory framework for the WMP, which expressly separates WMP review and approval from an evaluation of performance. California Public Utilities Code section 8386 addresses WMP submission and review and requires that WMPs include 22 specific elements (which include subparts) and that WSD review and "verify that the plan complies with all applicable rules, regulations, and standards, as appropriate."[9] Thus, approval or denial of a proposed WMP is based on whether the WMP complies with the statutory and regulatory requirements and rules, not on past performance. Whether a utility complied with its WMP is addressed separately in the statute.

Following approval, WSD oversees compliance and an Independent Evaluator is engaged to review a utility's compliance with its approved WMP.[10] The Independent Evaluator reviews a utility's performance in the prior year and prepares a report, which WSD then reviews to determine whether a utility has complied with its WMP.[11] The process for review of the utilities'

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[7] Cal Advocates at p. 6. Cal Advocates filed two sets of comments, one set that were PG&E specific and the second set that included comments for SCE and SDG&E, as well as general utility comments. For clarity in footnotes, PG&E will refer to the general utility comments as "Cal Advocates General Utility Comments" and the PG&E-specific comments as "Cal Advocates."

[8] 2021 WMP at pp. 6-7, 46-50.

[9] Cal. Pub. Util. Code § 8386(d). Statutory references in these reply comments are to the California Public Utilities Code unless otherwise noted.

[10] Cal. Pub. Util. Code § 8386.3(c).

[11] Cal. Pub. Util. Code § 8386.3(c)(2).

compliance with their 2020 WMPs has already begun. Independent Evaluators have been identified, and WSD has established the requirements and timing for this review process to be completed. If Cal Advocates has concerns about PG&E's implementation of our 2020 WMP, the review process is the appropriate place to raise those concerns. However, operational gaps identified in 2020 are not a basis for denying the 2021 WMP. Instead, PG&E's 2021 WMP should be evaluated in its own right, and WSD and the Commission should evaluate whether it meets the applicable statutory and regulatory requirements. Notably, in Section 2 of the WMP, PG&E provided a detailed list of how the 2021 WMP satisfied each of the statutory requirements.[12] Cal Advocates did not dispute this portion of the 2021 WMP.

Second, Cal Advocates points to five specific issues to support its recommendation to deny PG&E's 2021 WMP. While these issues are important, and will be addressed below, they are not the sum total of our performance under the 2020 WMP. There is no dispute that PG&E made substantial progress in our wildfire mitigation efforts in 2020 including substantial Enhanced Vegetation Management (EVM) work clearing vegetation that could potentially cause a wildfire ignition, enhanced inspections on thousands of assets, hardening 342 line miles of distribution facilities, undergrounding 30 miles of distribution lines in Butte County, installing 404 weather stations and 216 high definition cameras, installing 603 sectionalizing devices and 54 transmission line switches, and significantly reducing the scope and impact of PSPS events.[13] These are just a few of the substantial areas of wildfire mitigation work performed by PG&E employees during 2020. The 2021 WMP is filled with numerous other examples of the successful implementation in 2020 of numerous commitments and initiatives laid out in the 2020 WMP. This is not to say that there are not areas to improve nor to imply that there is not a substantial amount of work to deliver on going forward, but simply to recognize that substantial progress was made in 2020 in reducing wildfire risk.

[12] 2021 WMP at pp. 31-35.

[13] 2021 WMP at pp. 3-4, 9-10.

Third, with regard to the five issues identified by Cal Advocates, three of these issues—vegetation management, asset inspections, and risk modeling—were already identified as gaps in our 2021 WMP, and we have provided detailed proposals as to how we are addressing these issues in 2021.[14] Vegetation management is also an issue that was addressed in PG&E's response to WSD's 2020 EVM Audit and will be addressed in the Enhanced Oversight and Enforcement process if the Commission adopts Draft Resolution M-4852.[15] Cal Advocates' comments do not indicate that PG&E's proposals to address these three issues in 2021 are inadequate. Cal Advocates identifies two other issues that it believes support denying PG&E's 2021 WMP—costs and contractor management. These two issues are addressed in detail below in Sections IV and X.C, respectively. While we are very focused on these topics, and take seriously the concerns raised by Cal Advocates, they are issues that can and should be addressed going forward as PG&E implements its wildfire mitigation initiatives. The need to address these issues does not, however, justify denying the entire 2021 WMP which includes more than 120 initiatives and programs intended to reduce the risk of wildfire.

It is also notable that many of the situations that Cal Advocates refers to were self-identified by PG&E and either have been or currently are being addressed.[16] As Cal Advocates notes, other issues were identified by the Federal Monitor.[17] However, recent statements made by the Federal Monitor demonstrate the significant progress that PG&E has made since some of the issues referenced by Cal Advocates occurred. For example, in a December 16, 2020 letter to Judge Alsup, the Federal Monitor noted:

> To its credit, PG&E has recently made significant progress down this path.

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[14] 2021 WMP at pp. 4-7 (summarizing gaps).

[15] *See* PG&E's *Response to Audit of Implementation of Enhanced Vegetation Management Program in 2020* submitted on February 23, 2021 and updated on March 2, 2021; *Draft Resolution M-4852: Placing Pacific Gas and Electric Company Into Step 1 of the Enhanced Oversight and Enforcement Process Adopted in Decision 20-05-053* issued February 25, 2021.

[16] *See e.g.* Cal Advocates at p. 8 (PG&E identified pole test and treat issues), p. 10 (PG&E identified hydroelectric switchyards), and p. 10 (PG&E identified issues with risk modeling).

[17] Cal Advocates at p. 11.

> Under the leadership of its new Chief Risk Officer, PG&E has brought rigor and discipline to the prioritization of wildfire risk reduction in its wildfire mitigation work planning for 2021. There is now a direct link between the work planned to be done and the risk model's ranking of high-risk circuits. PG&E described some of these measures in its response to the October 16 Letter, including a weekly meeting chaired by the Chief Risk Officer in which the Company's leaders in various areas responsible for wildfire mitigation efforts convene to discuss risk models, work planning, and risk prioritization for 2021. The Monitor team observes these meetings and views this deliberative process for the selection of wildfire mitigation work—where risk is ***the*** predominant factor, not ***a*** factor among many—as a significant, positive development over the work planning and execution in 2019 and 2020. In fact, planning thus far has revolved around the concept that 80% of the wildfire mitigation work planned for 2021 will occur in the applicable top 20% of riskiest areas and is focused on employing the greatest practical risk reduction measures within those areas. We will continue to observe, evaluate, and assess PG&E's planning and execution of work in 2021, including whether PG&E adheres to its stated plans and representations. The Monitor team is encouraged by the 2021 planning process thus far and the leadership of PG&E's Chief Risk Officer.[18]

Finally, Cal Advocates acknowledges that the 2021 WMP identified a number of the gaps that Cal Advocates cites but argues that "PG&E's WMP does not meaningfully address the severity of the utility's failures in 2020."[19] Here we must disagree. PG&E's 2021 WMP includes detailed discussions of issues such as vegetation management (Section 7.3.5), asset inspections (Section 7.3.4), risk modeling (Sections 4.2, 4.5 and 7.3.1), employee and contractor training (Section 5.4), and costs (Section 3). While Cal Advocates may disagree with specific aspects of PG&E's approach in these areas, it is clear that the 2021 WMP meaningfully addresses each issue, often in great detail. Cal Advocates concludes with a number of recommendations for further improving PG&E's implementation including "focus[ing] on the highest-risk circuits first and in improving management oversight."[20] PG&E completely agrees with those recommendations, and those steps are precisely some of the improvements addressed

[18] Letter from Mark Filip to Judge William Alsup dated December 16, 2020 at p. 2 (footnotes omitted) (emphasis in original).

[19] Cal Advocates at p. 11.

[20] Cal Advocates at p. 12.

in the 2021 WMP. While Cal Advocates' comments may merit further discussion regarding aspects of PG&E's WMP implementation, they certainly do not merit denial of the 2021 WMP.

B. Issues Raised By TURN

TURN raises three issues regarding approval of the 2021 WMP: (1) approval with conditions; (2) the scope of WMP approval for cost recovery purposes; and (3) rejection of the 2021 WMP based on PG&E's risk analysis. These issues are addressed below.

1. Approval with Conditions

TURN argues that WSD and the Commission must either approve or deny the utilities' respective 2021 WMPs; it cannot approve them with conditions as it did in 2020.[21] TURN's arguments add requirements into Section 8386.3 that do not exist in the statutory language. As TURN indicates, Section 8386.3 provides that WSD shall approve or deny each WMP. However, this language does not limit the authority of WSD to require, as a part of approval, that a utility satisfy certain additional requirements. TURN suggests limiting WSD's broad statutory authority to review and approve WMPs be restricted to a simple "yes" or "no". Nothing in the statutory language supports this restrictive approach or limits WSD from approving a WMP subject to conditions.

Nor does TURN provide a well-reasoned basis for eliminating the option of a conditional approval. While a utility's WMP may satisfy all the statutory and regulatory requirements, during its review WSD may identify follow-up items or additional information that would be helpful to WSD and stakeholders to provide additional granularity, information, or compliance requirements. Approving a WMP with conditions allows the WMP to be implemented with these additional conditions. The alternative is a denial, which means the initial WMP is effectively moot, is not in effect, and a new WMP must be prepared and drafted during fire season. On a practical level, this leaves enhanced utility wildfire mitigation initiatives in limbo while the last approved WMP remains in effect and a new WMP is being prepared and reviewed.

[21] TURN at pp. 4-7.

The better and more reasonable approach where a WMP is not patently defective (*i.e.*, fails to include the 22 statutory requirements) is to approve it with conditions, which provides a clear path forward for implementing the WMP.

TURN argues in the alternative that if a utility's 2021 WMP is approved with conditions, WSD should clarify that this does not constitute approval.[22] This is not the first time that TURN has raised this issue. In opposing PG&E's 2020 safety certification, TURN argued that "conditional approval" was not "approval." WSD rejected that argument explaining that conditional approval satisfied the requirements for approval regarding a safety certification.[23] The result here should be no different. If there are conditions associated with the approval of a 2021 WMP, that would not mean that the WMP is denied. Instead, the WMP would be approved, but there are implementation conditions that WSD will continue to monitor.

Finally, TURN points to PG&E's 2020 WMP as an example of "the potential problems" with conditional approval.[24] Rather than supporting its point, however, PG&E's 2020 WMP demonstrates quite the opposite. When it approved PG&E's 2020 WMP, WSD identified Class A, Class B, and Class C conditions that needed to be satisfied. PG&E was not alone in this. The other utilities also had conditions that needed to be satisfied associated with their 2020 WMPs. PG&E submitted a Remedial Compliance Plan in July 2020, and Quarterly Reports in September 2020, December 2020, and February 2021 in compliance with these conditions. These submissions included hundreds of pages of information and materials. WSD determined that some of the 2020 WMP conditional requirements had been satisfied and other requirements needed additional detail. WSD directed PG&E, as well as the other utilities, to address specific Action Items in their respective 2021 WMPs or in a subsequent February 26, 2021 submission, which PG&E has done.

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[22] TURN at p. 5.

[23] *Wildfire Safety Division Issuance of Pacific Gas and Electric Company's 2020 Safety Certification*, dated January 14, 2021 at p. 3.

[24] TURN at p. 6.

Notably, TURN does not assert that any of the Action Item responses in PG&E's 2021 WMP were inadequate or incomplete. In fact, TURN does not even mention the Action Items in its comments. All of this demonstrates that, contrary to TURN's assertions, the conditional approval process works. The utilities have all submitted additional materials and information to WSD and stakeholders. These submissions have been adequate in some cases and required additional information in others, but the overall process of approving a WMP with a requirement for further information and detail has worked.

2. Scope of WMP Approval with Regard to Cost Recovery

TURN maintains that approval of a WMP does not constitute approval for cost recovery. Instead, cost recovery approval occurs in the General Rate Case (GRC) or other rate application proceeding.[25] Here, we agree with TURN. The demarcation between WMP review and approval and cost recovery proceedings has already been addressed in prior Commission decisions and does not need to be revisited here.[26]

3. Rejection of PG&E's 2021 WMP

TURN argues that PG&E's 2021 WMP should be rejected because of alleged deficiencies in our risk analysis, including the lack of granularity.[27] PG&E addresses the substantive issues raised by TURN regarding our Risk Spend Efficiencies (RSE) calculations and risk analysis in Section V.G and TURN's arguments regarding the System Hardening Program in Section VII.F. As demonstrated below, TURN's concerns on these issues are not well-founded and certainly do not justify rejection of the 2021 WMP.

III. STATUTORY REQUIREMENTS (SECTION 2)

In our 2021 WMP, PG&E included a table of the 22 statutory requirements for utility WMPs established in Section 8386(c) and identified how and where in the 2021 WMP each of

[25] TURN at pp. 7-9.

[26] *See* Decision (D.) 19-05-036 at p. 20; Resolution WSD-002 at p. 4.

[27] TURN at pp. 27-29.

these statutory requirements was satisfied.[28] None of the parties' comments addressed this aspect of PG&E's 2021 WMP, nor did any party assert that PG&E had not satisfied the statutory requirements.

IV. SPENDING (SECTION 3)

In Section 3 of the 2021 WMP, PG&E provided a summary of WMP expenditures by category and a discussion of customer impacts as a result of these expenditures.[29] SBUA notes that the detailed information provided by PG&E was helpful in understanding how customer cost impacts were calculated.[30] SBUA also requests that bill impacts for specific customer groups be included in future WMPs.[31] While PG&E notes that the focus of the WMP is, and should remain, on wildfire risk reduction and not cost recovery or rate structures, PG&E does not oppose SBUA's suggestion to include more customer group specific bill impact information in the 2022 WMP if that is deemed appropriate.

We also included detailed financial information regarding each initiative in Table 12, including actual spending in 2020 and forecasted spending for 2021 and 2022. Parties conducted extensive discovery concerning this financial information and WMP costs. While no party disputed PG&E's actual and forecast cost information, several parties did raise issues regarding WMP-related costs. These issues are addressed below.

A. General Concerns About Costs (TURN and Cal Advocates)

TURN starts its comments by expressing a general concern for all of the utilities regarding affordability and rates in California.[32] PG&E shares this concern. However, it is important to put this concern in context. Increasing costs in California are not attributable to utilities desiring greater profits or pursuing unvetted programs and initiatives. Instead, as the

[28] 2021 WMP at pp. 31-35.

[29] 2021 WMP at pp. 37-44.

[30] SBUA at p. 8.

[31] SBUA at p. 9.

[32] TURN at pp. 1-4.

Commission noted in its *Utility Costs and Affordability of the Grid of the Future* report issued in February 2021, increasing costs are being driven by a number of factors including policy mandates, electrification goals, needed capital investment to mitigate wildfire risks, and climate policy.[33] For our part, we are working to effectively manage our wildfire-related costs and programs, but the reality is that with climate-driven wildfire risk increasing, it is essential that PG&E and the other utilities make investments now to mitigate future catastrophic wildfires, as much as possible. PG&E also agrees with TURN that affordability must be a "guiding" principle for wildfire mitigation initiatives.[34] But this principle needs to be balanced with the safety of Californians in preventing wildfires. These types of decisions, considering safety and affordability, are exactly the kind of "delicate balance" that the Commission recognized it will need to undertake immediately and well into the future.[35]

In addition to general cost issues, TURN expresses concern about the amount that PG&E proposes to spend on our WMP programs as compared to the other utilities.[36] TURN asserts that PG&E's wildfire spending is substantially higher than the costs forecasted by SCE and SDG&E. There may be a number of reasons for this including the well-documented differences in service territories and asset bases. For example, over 50% of PG&E's service area is in High Fire Threat District (HFTD) Tier 2 and Tier 3 areas, and approximately 65% of the total California utilities' overhead distribution circuit miles located in Tier 2 and Tier 3 HFTD areas are in PG&E's service area.

In the end, this is exactly why TURN's earlier point, that cost issues should be addressed in GRCs, is correct. The GRC proceeding gives parties an opportunity to do a detailed review of proposed utility spending and challenge whether certain programs and expenditures are

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[33] *Utility Costs and Affordability of the Grid of the Future: An Evaluation of Electric Costs, Rates, and Equity Issues Pursuant to P.U. Code Section 913.1*, issued in February 2021 (Utility Cost Report) at p. 3.

[34] TURN at p. 4.

[35] Utility Cost Report at p. 3.

[36] TURN at pp. 12-13.

reasonable. PG&E just recently completed its 2020 GRC in which the cost of wildfire mitigation initiatives was a major issue.[37] In that proceeding, in which TURN was an active party, there was an extensive review of PG&E's system hardening and EVM programs, as well as other WMP-related programs. After a lengthy and extensive proceeding, including tens of thousands of pages of testimony and weeks of hearings, parties, including TURN, were able to reach a settlement that was approved by the Commission in December 2020.[38] The Commission approved the settlement, and concluded:

> PG&E's forecast includes incremental funding for many new or enhanced initiatives and activities related to its [Community Wildfire Safety Program (CWSP)]. These include costs for the WSOC, PSPS community outreach, wildfire detection meteorology projects, wildfire cameras, enhanced wire down detection, and safety and infrastructure teams. The WSOC aims to monitor wildfire risks in real time and coordinate prevention and response efforts with first responders. PSPS-related costs include the establishment of PSPS protocols and community outreach regarding these. Wildfire detection meteorology project costs aims to improve wildfire prediction using computer models and GIS. Wildfire cameras are for the installation of additional cameras throughout PG&E's service territory to improve monitoring and detection. PG&E began installing wildfire cameras in 2018 and plans to install approximately 180 each year in this GRC cycle. Enhanced wire down detection is for enhancement of PG&E's current system. Finally, safety infrastructure team costs are for the additional personnel needed for the increased activities relating to CWSP.
>
> We find the above activities reasonable and necessary measures to enhance PG&E's wildfire mitigation efforts as detailed in its testimony. PG&E also provided support for its cost estimates. In addition, PG&E explained that many of the above activities were just being initiated in 2018 and so comparative expenditures in 2018 for the above activities are significantly less than the forecasts for TY2020.[39]

If TURN now believes that PG&E's forecasted wildfire-related costs are too high, the appropriate place to challenge future (*i.e.*, 2023 GRC rate period) costs is in the next GRC or

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[37] PG&E's 2020 GRC was Application (A.) 18-12-009. The Commission issued a decision in December 2020 approving a comprehensive settlement in that proceeding. *See* D.20-12-005.

[38] *See* D.20-12-005.

[39] D.20-12-005 at pp. 63-64.

other rate proceedings, not here.

TURN also points to shortcomings and gaps in 2020 wildfire mitigation implementation as a basis to questions program costs.[40] PG&E addressed these shortcomings above in Section II.A by responding to Cal Advocates' arguments, as well as in the 2021 WMP.[41] Notably, TURN does not point to any specific information demonstrating that the situations it refers to have resulted in substantially higher costs for PG&E customers or that the wildfire-related work performed by PG&E to date has not been reasonable or prudent. TURN only cites a *San Francisco Chronicle* editorial which TURN indicates suggests that PG&E should do no more than maintain our assets and clear vegetation, and that system hardening, camera installations, sectionalizing devices, and the myriad of other wildfire mitigations should not occur until PG&E makes a "compelling showing" that these are cost effective.[42] This kind of delay in implementing needed wildfire mitigation programs is unnecessary and will only exacerbate wildfire risk. More importantly, these kinds of cost arguments are exactly the kind of arguments that TURN states earlier in its comments should be addressed in the GRC, not in review of the WMPs.[43]

Cal Advocates also raises some concerns about the forecasted costs of PG&E's wildfire mitigation efforts, including covered conductor and information technology (IT) project costs. Inasmuch as these concerns relate to more specific initiatives, PG&E addresses them in Sections VIII.F.3 and VIII.J of these reply comments below.

As with TURN, we agree generally with Cal Advocates that the costs associated with providing safe and reliable electric service are important to consider. For this reason, PG&E has used updated risk modeling and analyses to identify the main drivers of wildfires from utility equipment to make informed, targeted decisions to pursue programs that will address these

[40] TURN at pp. 13-15.

[41] 2021 WMP at pp. 4-7 (summarizing gaps).

[42] TURN at p. 15.

[43] TURN at pp. 7-9.

drivers. To the extent Cal Advocates believes a specific program is not cost-effective, the GRC is the appropriate venue to raise these concerns.

B. Issues Regarding Double Recovery (TURN)

TURN expresses concern that PG&E may be "double recovering" costs through both the GRC and other, Commission approved, rate related memorandum accounts such as the Fire Risk Mitigation Memorandum Account (FRMMA) and the Wildfire Mitigation Plan Memorandum Account (WMPMA).[44] To recover costs included in the FRRMA and WMPMA, PG&E will need to file an application with the Commission, and a transparent, public review by numerous parties of that application will be conducted. While PG&E is not "double recovering" any costs, this is a rate and cost recovery issue that is appropriately addressed in either the GRC or other application proceeding where PG&E seeks cost recovery of recorded costs, not here. This is consistent with TURN's earlier comments. If TURN believes that the costs in the FRMMA and WMPMA are not appropriate, or are not incremental to GRC revenues, it can raise those arguments in the appropriate cost recovery proceeding(s).

Regarding TURN's statement that a utility seeking to recover incremental costs in a rate proceeding should have a "heavy burden"[45], the burden of proof for cost recovery at the Commission is well-established and will be addressed in those proceedings. It does not need to be addressed here.

Finally, TURN's recommendation that the Commission order the utilities to consolidate requests for WMP-related cost recovery[46] is out of scope of this proceeding. The Commission has authority to consolidate proceedings and TURN can make those requests outside of this proceeding.

V. LESSONS LEARNED AND RISKS (SECTION 4)

Section 4 in the WMP covers a variety of issues including lessons learned, trends

[44] TURN at pp. 9-11.

[45] TURN at p. 11.

[46] TURN at p. 11.

impacting ignition probability and consequence, changes in ignition probability drivers, research proposals and findings, wildfire risk modeling, and responses to many of the Action Items identified by WSD. For many parts of Section 4, such as the detailed discussion of research proposals and the responses to WSD Action items, there were no substantive comments from parties. Other parts of Section 4, such as risk modeling and RSE calculations, were the subject of extensive discussion. This section of our reply comments does not address every aspect of Section 4, but instead focuses on the specific areas parties addressed in their comments.

A. Risk Modeling Generally and Validation (Cal Advocates and GPI)

GPI expresses concerns about the changes in PG&E's risk modeling between 2020 and 2021 and the potential impact on workplans.[47] Cal Advocates raises similar concerns.[48] The development of robust risk models since the utilities' first WMPs in 2019 has been an ongoing effort. We recognize that the 2021 Wildfire Distribution Risk Model is substantially different than the 2019-2020 Wildfire Risk Model; and we believe it is a significantly better approach to wildfire risk modeling. As we explained in the 2021 WMP:

> Bringing the improvements to both the Ignition Probability and Wildfire Consequence portions of the model together, the 2021 Wildfire Distribution Risk Model now provides an improved measure of wildfire risk. The 2019-2020 Wildfire Risk Model provided a relativistic measure that was instructive for prioritizing circuits and circuit segments, but it did not allow for measuring the degree of risk between those segments. The 2021 Wildfire Distribution Risk Model provides this capability as the risk scores are absolute scaled units. Furthermore, these wildfire risk scores are calibrated to the system and tranche risk scores for wildfire risk event[s] as described and modeled in PG&E's 2020 RAMP Report. As a result, risk values can now identify how much riskier a location is compared to another, risk can be more accurately compared across wildfire and PG&E's other risk events, and the actual value of risk reduction is now more easily computed.[49]

GPI and Cal Advocates are correct that the new 2021 Wildfire Distribution Risk Model

[47] GPI at pp. 4-7.

[48] Cal Advocates at p. 10.

[49] 2021 WMP at p. 131.

has resulted in a revised and refined prioritization of where EVM and system hardening work should be completed. This does not mean that the EVM and system hardening work done in 2019 and 2020 was performed at the wrong locations or does not have value. To the contrary, all the EVM and system hardening work in 2019 and 2020 was done in Tier 2 and Tier 3 HFTD areas which are, by definition, elevated and extreme fire threat areas. All of this work has helped and will help mitigate wildfires in these areas. What it does mean, however, is that PG&E is revising which areas will receive EVM and system hardening work next. Since our ultimate goal is to perform system hardening and EVM on the thousands of miles of distribution lines in Tier 2 and Tier 3 areas, the work performed to date is entirely consistent with that goal.

GPI also recommends that PG&E seek validation of our risk models.[50] We agree and, as we indicate in our 2021 WMP, we have been actively working internally and with third parties to validate, and further refine, our risk models, where necessary.[51] Later in its comments, GPI recommends that the utilities provide more detail about validation and vetting results.[52] PG&E supports this recommendation. This is information that can be provided through the discovery process or, if WSD believes it is appropriate, can be included in the 2022 WMP template.

B. Use of Average Wind Speeds in Modeling and Other Modeling Issues (MGRA)

MGRA's comments include an extended discussion concerning the importance of considering windspeeds when modeling catastrophic wildfire ignitions.[53] MGRA criticizes SCE and PG&E for not including wind speeds in their respective risk modeling.[54] With regard to PG&E specifically, MGRA notes that our 2021 Wildfire Distribution Risk Model does not include peak wind value at the time of ignition as a model covariate and uses average wind

[50] GPI at p. 6.

[51] 2021 WMP at p. 139.

[52] GPI at pp. 11-12.

[53] MGRA at pp. 14-32.

[54] MGRA at pp. 14-15.

speeds.[55] We appreciate MGRA's thoughtful comments and have several observations.

We recognize that elevated winds cause and spread fires and are linked to many of the worst historical fires. PG&E has documented and studied those relationships. However, it is important to understand the context and purpose of PG&E's risk modeling to understand the use and challenge of wind data in developing wildfire risk models. Our risk-modeling task was to differentiate multi-year wildfire risk in support of the planning and prioritization of mitigation work. That task focuses on assigning multi-year (or typical annual) spatial ignition probabilities and simulating spatially differentiated ignition consequences based on historical "fire weather" conditions. The training data selected for the ignition probability modeling was all ignitions of a given type (*i.e.*, vegetation-caused and conductor-involved were the two types studied) during the June – November fire season in HFTD Tier 2 and Tier 3 areas. There are too few ignitions under immediately dangerous conditions (*i.e.*, extreme winds) to fit statistical models, and outages, which are far more numerous, do not share the same characteristics (including the same spatial/temporal distribution) as ignitions.[56] There is already a precedent of accounting for all ignitions in the Multi-Attribute Variable Function (MAVF) risk calculations, and we were focused on producing results that covered all ignitions as well.

To be clear, nowhere do we assert or conclude that ignitions are independent of wind data. What we do assert is that multi-year models trained on all ignitions of a given type, during fire season within Tier 2 and Tier 3 HFTD areas, are empirically less sensitive to metrics of wind derived over similar time frames than other weather and environmental conditions. In a model designed to label the presence or absence of ignition locations over several years in comparison to the background conditions over the same timeframe, there is no role for the "right now"

[55] MGRA at pp. 32-36, 39.

[56] The study and estimation of the relationship between outages and ignitions, which is conditional on outage and location characteristics, is part of our ongoing work that is expected to inform future risk modeling results. Absent a detailed model of ignition probability conditional on outage characteristics, directly modeling ignitions, which controls for all factors that influence the "transition" from outage to ignition, is the best way to quantify wildfire risk without diluting it with data from outages that were not viable to become ignitions.

conditions of each ignition. The main question we are focused on is spatial (i.e., where an ignition may occur), and the strength of the model chosen is its ability to integrate occurrences over time to provide a spatial probability of occurrence. Still, we developed and tested average and 99th percentile hourly wind metrics as well as counts and percentages of days with elevated sustained winds and gusts.[57]

MGRA raised other issues as well, including how to incorporate PSPS damage data into the ignition data, how to divide ignition data into learning and testing samples, and how to incorporate peak winds.[58] In Appendix A to these reply comments, PG&E provides some additional information responding to specific statements in MGRA's comments regarding wind speeds and these additional issues. Appendix A also addresses the recommendations made by MGRA on page 39 of its comments. Given the complexity and technical nature of these issues, PG&E recommends that WSD convene a technical working group with the utilities and interested stakeholders, such as MGRA, to review and evaluate these issues more intensively and help test and improve the wildfire risk modeling approaches of PG&E and other utilities going forward.

C. Use of Ignition Data and Random Training Set (GPI)

GPI expresses concern that PG&E is using ignition data for our 2021 Wildfire Distribution Risk Model rather than using outage data, noting that ignitions occur less frequently than outages.[59] However, as GPI acknowledges, we have explained that the use of ignition data has allowed PG&E to develop more granular, asset-level modeling. GPI recommends validation of this approach by a third-party, which PG&E supports and, in fact, has currently retained an

[57] The percentage of days considered gusty at a given location (gusty-summer-day-pct) is the 4th ranked covariate (after the presence of trees tall enough to hit the lines and two metrics of dryness), in terms of model sensitivity to random perturbations in data values, of the vegetation-caused model. That model also has non-trivial responses to 99th percentile hourly wind (wind-max), the percentage of days with sustained winds (windy-summer-day-pct) and even average long-term wind speed (wind-avg).

[58] MGRA at pp. 37-39.

[59] GPI at pp. 7-9.

outside expert to perform.[60]

GPI also recommends that PG&E select a random training dataset from the total training-testing data set for our models.[61] PG&E has done something similar: to train our models, we used only 75% of ignitions. After seeing that the model had nearly identical performance in and out of sample, we were confident enough to train the official model run on all available 2015-2018 ignition data. Also, it should be noted that a completely random split between training and testing samples causes information leakage.[62] Finally, we also conducted a study leaving out an entire year of events as the test set (when this is the most recent year in the dataset, information leakage is avoided). We found similar performance during this study to the random split. In sum, this analysis gave us the confidence that our model training was appropriate, not overfitting, and can predict future probabilities of ignition.

D. Use of Technosylva (MGRA)

PG&E's 2021 Wildfire Distribution Risk Model includes two components – the probability of ignition and the consequences of a wildfire.[63] With regard to the second component, the consequences of a wildfire, PG&E has started using a tool created by Technosylva. As the 2021 WMP explains:

> The "Wildfire Consequence" portion of the 2021 Wildfire Distribution Risk Model focuses on impact measures such as acres, number of structures, and variables describing the nature of the fire such as flame length and rate of spread. The key improvement for the 2021 Wildfire Distribution Risk Model is tied to the advanced modeling capabilities of the Technosylva fire simulation tools. In the 2019-2020 Wildfire Risk Model, REAX Engineering provided simulations that relied heavily on the concentration of fuels to determine the potential for an ignition to propagate to a wildfire. While informative, the Technosylva simulation tool improves on this capability by modeling what fire science refers to as ladder fuels whereby an ignition will propagate from low fuels such as

[60] GPI at p. 8; 2021 WMP at p. 139.

[61] GPI at p. 9.

[62] https://en.wikipedia.org/wiki/Leakage_(machine_learning) (as of April 9, 2021)

[63] 2021 WMP at p. 130.

> grass and brush to increasingly denser fuels leading to treetop, as well as updated ground fuels, buildings and population data layers. The result is a more accurate representation of the potential consequences of wildfire in the wildland urban interface and the broader Tier 2 and Tier 3 HFTD areas modeled. Future model versions will model the entire PG&E distribution system.[64]

MGRA expresses concern with how the utilities are utilizing the Technosylva platform, specifically by limiting the fire spread modeling to 8 hours.[65] There are computational and "state of the science" reasons not to run simulations beyond the initial, 8-hour phase of the fire that is dominated by the exogenous factors of wind, fuels, and topography. Historically damaging fires typically originate in locations where simulations show a fire will spread and burn intensely during eight (8) hour simulations.

MGRA also suggests that if Technosylva is being used to model PSPS events, "the duration of the model run should match the duration of the forecasted fire weather event."[66] PG&E is currently evaluating Technosylva for use in PSPS events but we have not determined yet if we will do so. The fire spread simulations are run for 8 hours to represent the initial burning period and to represent those fires that spread rapidly and create community evacuation problems. PG&E has not implemented Technosylva as the main consequence engine for PSPS because it is also aware of the limitations of an 8-hour fire spread simulation. In addition, the fire spread modeling can show considerably high consequences on typical hot and dry (non-windy) days, which should be expected in California but may not warrant implementing PSPS. Thus, establishing PSPS criteria with fire spread outputs needs to be very well thought out before implementing.

Currently, PG&E is evaluating supplementing the existing PSPS modeling framework with Technosylva by incorporating fire spread consequence simulations into the Black Swan Criteria. The main PSPS engine would continue to remain the Large Fire Probability, which is

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[64] 2021 WMP at p. 131.

[65] MGRA at pp. 46-47, 49-50, 55.

[66] MGRA at p. 55.

driven by Outage Producing Wind (OPW) and Fire Potential Index (FPI) models. The adoption of Technosylva through Black Swan would highlight those locations that may have a low probability of an outage (a surrogate for ignition in the modeling), but potentially high consequences.

Finally, MGRA suggests a working group to analyze Technosylva use and assumptions.[67] PG&E supports this proposal. In the interim, PG&E is currently pursuing several methods to validate Technosylva's fire spread analysis. The first is through access to FireGuard data, which is being used to validate the fire spread model output for CAL FIRE. This data set uses Department of Defense infrared satellite data to validate the fire spread in the first burning period, or 8 hours. However, to benefit from the work that Technosylva has performed in this space, PG&E would need to be granted access to the FireGuard dataset, which it currently does not have access to. The second is utilizing other sources of satellite information (such as MODIS and VIIRS) to validate the fire spread modeling efforts.

E. Risk Metrics (MGRA)

MGRA suggests that the utilities divide risk metrics, such as near miss and wires down, into HFTD tiers and classify whether these events occurred during Red Flag Warnings (RFW) or High Wind Warning (HWW) events.[68] PG&E does not oppose this proposal, but does note that it will require additional time and resources to further divide risk metric information. WSD should consider whether this further division of information will be useful for it and the parties in reviewing the utilities' WMPs and would, therefore, justify the increased allocation of resources to this task.

F. Risk Drivers (TURN)

TURN maintains that PG&E should consider operational failure as a risk driver in our risk analysis.[69] As TURN indicates, this issue is currently being considered and addressed in

[67] MGRA at p. 54.

[68] MGRA at p. 58.

[69] TURN at pp. 15-18.

PG&E's Risk Assessment Mitigation Phase proceeding in A.20-06-012 (2020 RAMP proceeding).[70] In that proceeding, PG&E has not opposed the idea of including operational failure as a risk driver, but has indicated that additional detail regarding this driver needs to be developed before it can be included in risk modeling:

> TURN supported the SPD Report's conclusion that PG&E needed to model Operational Failure as a Risk Driver. PG&E notes that prior to including it in its modeling, a consistent definition of Operation Failure needs to be developed so that the driver can be used across all risks, particularly for Wildfire. To implement this, PG&E will need to create criteria for determining operational failures, data-gathering and review, audit and investigation procedures. The new driver will have to be included in Operational and Enterprise models, which might require extensive development. PG&E appreciates this feedback and will explore ways to incorporate this into our risk analysis.[71]

PG&E continues to evaluate incorporating an operational failure into its risk analysis and will provide an update as part of the 2023 GRC.

G. RSE Calculations (Cal Advocates and TURN)

In Section 4.2 of the 2021 WMP, PG&E provided a detailed discussion of our implementation of the Safety Model and Assessment (S-MAP) Settlement Agreement approved in D.18-12-014 and how we use our MAVF and Multi-Attribute Risk Score (MARS).[72] We also described our Enterprise Risk Model and how this model develops MAVF scoring and ultimately RSEs for specific WMP initiatives in Section 4.5.1.[73] RSE scores for specific initiatives were provided in Table 12 which accompanied the 2021 WMP.[74] In addition to these materials, PG&E provided a reference to details from the 2020 RAMP Report addressing the

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[70] TURN at pp. 16-17.

[71] A.20-06-012, *Pacific Gas and Electric Company's Reply Comments in Response to Comments on PG&E's Risk Assessment and Mitigation Phase Report and Safety Policy Division's* Evaluation, submitted on January 29, 2021 at p. 7 (footnotes omitted) (PG&E RAMP Reply Comments).

[72] 2021 WMP at pp. 51-63.

[73] 2021 WMP at p. 121 (describing Enterprise Risk Model) and p. 205.

[74] Some of the RSE scores were corrected in PG&E's errata. *See* 2021 Wildfire Mitigation Plan Errata submitted on March 17, 2021 at pp. 19-22 (2021 WMP Errata).

methodologies and algorithms used to calculate RSEs, as well as two additional files that include the calculation and inputs to the calculation of RSEs with the 2021 WMP submission.[75]

Cal Advocates expresses concern about the accuracy of PG&E's RSE calculations, pointing to the correction of twelve RSE calculations in the 2021 WMP Errata.[76] In the errata, PG&E explained the reason for each of these corrections. In some cases, the corrections were relatively small, in other cases they were more significant. Other than noting that PG&E updated our calculations to correct errors, Cal Advocates does not point to any specific, additional calculations that require correction or any additional errors associated with the 2021 WMP Errata.

Cal Advocates also suggests that some of PG&E's RSE calculations may be based on flawed assumptions, specifically pointing to how the discovery and remediation of maintenance tags is accounted for in evaluating the effectiveness of inspection programs.[77] PG&E developed estimates of equipment failure rates based on established timing for tag repairs, and adjusted these estimates based on subject matter expert input.[78] Estimating failure rates for equipment is particularly challenging given the many variables involved in failure and thus the estimation approach that we developed is a reasonable approximation. This same approach was also used for vegetation management inspections. While we believe that the estimation approach we developed is reasonable, we welcome feedback or alternate approaches from Cal Advocates and others as to how to better calculate effectiveness estimates.

Cal Advocates notes that for several RSEs, the "exposure" is not consistent with the inspection cycle for assets. Cal Advocates cites PG&E's data response on this issue but does not quote it in full. PG&E's response explained:

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[75] 2021 WMP at p. 205 (referencing Attachments 2021WMP_ClassA_Action-PGE-23_Atch02 and 2021WMP_ClassA_Action-PGE-23_Atch03).

[76] Cal Advocates at p. 46.

[77] Cal Advocates at pp. 46-47.

[78] Cal Advocates at p. 47.

> The exposure of cross-arm maintenance, repair, and replacement of 100% points to the maintenance program covering the entire territory, regardless of patrol frequency. For example, a crossarm could be identified for maintenance or replacement through an overhead bi-annual patrol in rural area in 2019. However, the repair/replacement program is based off the priority level of EC tags generated, regardless of when the patrol happened. Because of this, exposure is not based on inspection cycles, but based on the ratio of ignition count targeted by the initiative over the inherent risk (i.e. ignition count absent of this initiative). This in combination of the program effectiveness, will determine the percent of inherent risk that is being addressed by the asset replacement initiative.[79]

The programs identified by Cal Advocates were repair and replacement programs. While it is entirely reasonable to conduct more frequent inspections in Tier 2 and Tier 3 HFTD areas, where wildfire risk is greater, the repair or replacement may not occur on the same pace as the inspection. Thus, PG&E's approach to calculating these RSEs is reasonable.

Cal Advocates notes that for a small group of initiatives, PG&E did not calculate RSEs. This observation is correct and something that we are working on. However, it is important to note the substantial increase in RSE calculations since the 2020 WMP. As we explained in the 2021 WMP:

> PG&E has also expanded our programmatic- and portfolio-level risk assessments through the calculation of a Risk Spend Efficiency (RSE) for an increased number of programs and wildfire risk mitigation activities. In the 2021 WMP, PG&E has provided RSEs for more than 10 times as many initiatives as we were able to in the 2020 WMP. PG&E and other parties continue to refine these portfolio-level and programmatic risk assessments through PG&E's 2020 Risk Assessment Mitigation Phase (RAMP) Report and other risk-focused proceedings before the CPUC.[80]

PG&E also agrees with Cal Advocates' conclusion that an RSE is not required for every WMP initiative or for programs with a smaller amount of expenditures.[81]

Finally, Cal Advocates concludes that PG&E's RSEs cannot be relied on because of potential errors and lack of detail on assumptions. This conclusion simply ignores, however, the

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[79] *See* PG&E's response to Data Request CalAdvocates_040-Q01 dated March 1, 2021.

[80] 2021 WMP at p. 5 (emphasis added).

[81] Cal Advocates at p. 51.

detailed workpapers we provided with our 2021 WMP explaining our RSE methodologies, inputs and assumptions, and calculations. Cal Advocates does not even mention these materials in its comments. While we are more than willing to provide additional information if needed, as we did in response to Cal Advocates discovery requests regarding RSEs, and to update RSEs when parties point out errors, as we did for a limited number of RSEs in the errata, it certainly is not the case that PG&E has failed to justify or update our RSEs.

TURN also comments on RSEs, asserting that the RSE analysis performed by PG&E was not sufficiently granular.[82] There are several responses to this concern. First, this is an issue that has been discussed in the 2020 RAMP proceeding.[83] Part of the challenge there, however, has been developing consensus among the parties as to what granularity means. For example, TURN has one vision of granularity and MGRA has another vision.[84] Granularity issues were not fully resolved prior to the February 5 submission of the 2021 WMP, and thus the 2021 WMP does not include more granular RSE analysis. This is, however, the subject of the 2020 RAMP proceeding and will be addressed, as appropriate, in PG&E's 2023 GRC which will be filed at the end of June 2021.[85]

Second, TURN is incorrect that the 2021 Wildfire Distribution Risk Model does not include additional granularity.[86] While the 2021 Wildfire Distribution Risk Model does not calculate RSE scores, it does include a great deal of granularity, breaking out distribution lines in HFTD Tier 2 and 3 areas into 3,600+ Circuit Segments or Circuit Protection Zones (CPZs) at a 100 meter (m) x 100m resolution to represent the tranches of homogenous risk profiles. This development represents granularity in tranching consistent with D.18-12-014. PG&E also notes that our next version of the Wildfire Distribution Risk Model will calculate wildfire risk across

[82] TURN at pp. 18-20.

[83] PG&E RAMP Reply Comments at pp. 2-3.

[84] PG&E RAMP Reply Comments at p. 2.

[85] PG&E RAMP Reply Comments at p. 3.

[86] TURN at p. 20.

our HFTD areas in the units of MAVF and move towards risk reduction and RSE at this level of granularity.

Finally, TURN argues that the RSEs for PG&E's System Hardening and EVM programs do not justify continued investment.[87] These issues are addressed in Section VIII.F (System Hardening) and VIII.H (EVM) below.

H. Suggestions Regarding Specific RSE Calculations (MGRA)

MGRA expresses concern about PG&E's RSE calculations for our SmartMeter™ Partial Voltage Detection initiative.[88] For the SmartMeter Program, as described in Section 7.3.2.2.2 of the 2021 WMP, the RSE was corrected in PG&E's errata to reduce the RSE from 5,732 to 364.[89] The crux of this RSE calculation is based on the estimate that this technology can reduce the notification time of a potential signification ignition by 24 minutes. As such, this technology can reduce the likelihood of potential large, destructive, and/or catastrophic fire. As with any monitoring and detection system, this initiative can potentially have a high RSE if able to be acted upon. PG&E notes, however, that because this is still a new program, the risk reduction can be more accurately determined in the future based on on-the-ground use and as the technology is implemented and data is gathered on its performance.

MGRA suggests that PG&E be required to develop RSEs for separate components of our System Hardening Program.[90] This suggestion indicates a misunderstanding of the nature of the System Hardening Program. PG&E's System Hardening Program is inclusive of determining the most suitable type of hardening technology at each location assessed, as we explained in the 2021 WMP.[91] This is dependent on a variety of reasons and the miles that will be addressed through each hardening approach will therefore vary depending on each location's specific

[87] TURN at pp. 20-27.

[88] MGRA at pp. 67, 69

[89] 2021 WMP Errata at p. 19.

[90] MGRA at p. 69.

[91] 2021 WMP at pp. 553-555.

assessment. For these reasons, it is not appropriate to try to develop RSEs for specific components of this program.

MGRA recommends that PG&E's RSE calculations for vegetation management be more closely examined because PG&E, SCE and SDG&E had different approaches to calculating RSEs.[92] While PG&E does not oppose WSD examining how all three utilities calculated their RSEs for vegetation management, we note that while the concepts and framework of MAVF and RSE is the same across the utilities, each aspect of MAVF is unique to a utility, and it may not be appropriate to directly compare across the utilities.

MGRA also suggests that the utilities "should use uncapped losses, incorporate high-end losses to properly weight the contribution of catastrophic events, and use linear scales to properly represent all risks" for RSE calculations.[93] Consistent with D.18-12-014, PG&E's MAVF reflects our focus on low-frequency/high consequence (LFHC) risk events without neglecting operational risks (high probability/low-consequence events). MAVF principles require each attribute have its own range (minimum and maximum) that is observable. It also indicates the scaling function can be linear or non-linear. To reflect this objective, PG&E uses a non-linear scaling function that captures an aversion to extreme outcomes.

I. RSE and Risk Models to Address PSPS (Acton, GPI, and MGRA)

MGRA suggests that WSD should review the utilities' methodology for estimating PSPS RSEs and should develop RSEs for PSPS.[94] In Resolution WSD-002, Guidance-1, the Commission explained:

> Further, RSE is not an appropriate tool for justifying the use of PSPS. When calculating RSE for PSPS, electrical corporations generally assume 100% wildfire risk mitigation and very low implementation costs because societal costs and impact are not included. When calculated this way, PSPS will always rise to the top as a wildfire mitigation tool, but it will always fail to account for its true costs to customers. Therefore, electrical

[92] MGRA at p. 70.

[93] MGRA at p. 70.

[94] MGRA at p. 70.

> corporations shall not rely on RSE calculations as a tool to justify the use of PSPS.[95]

Consistent with this direction, PG&E has not calculated an RSE for PSPS and has removed PSPS from the calculation of RSEs for other wildfire mitigations. However, PG&E will calculate RSEs for mitigations that are intended to reduce impacts of PSPS.

GPI advocates that each of the utilities develop risk models to evaluate PSPS at a circuit level to inform wildfire mitigation initiative selection and prioritization.[96] Acton expresses concern about the efficacy and accuracy of PSPS models and the lack of detailed description in the 2021 WMP.[97] For PG&E, the models that we utilize for PSPS decision making are more granular than at the circuit level. On transmission, these decisions are made at a tower-by-tower resolution informed by the condition of the components on the respective tower.[98] On distribution, these decisions are primarily determined at the resolution of PG&E's OPW and FPI Models, which is at a 2 x 2 km resolution.[99] As PG&E explained, the OPW Model, which is also used for PSPS events, has been reviewed with third parties and is subject to an internal and external expert review and validation process.[100] While we welcome continued review, validation, and refinement, we believe that our models have already undergone substantial review which, in part, allowed us to limit the impact of PSPS events in 2020.

VI. INPUTS TO THE PLAN AND DIRECTIONAL VISION FOR WILDFIRE RISK EXPOSURE (SECTION 5)

Section 5 of the 2021 WMP provides a detailed discussion of our 2021, medium-, and long-term goals for wildfire mitigation. Section 5 also includes a review of 2019 and 2020 WMP performance, as well as detailed information about planning for PG&E's workforce (both

[95] Resolution WSD-002 at p. 20, Guidance-1.

[96] GPI at pp. 27-30.

[97] Acton at pp. 18-19.

[98] 2021 WMP at p. 137.

[99] *See generally* 2021 WMP at pp. 69-77, 140.

[100] 2021 WMP at p. 139.

employee and contractor) to perform inspections, vegetation management, and system hardening. The comments on this section of the 2021 WMP were limited.

GPI recommends "continued pressure" on the utilities to establish more mid- to long-term goals and planning strategies.[101] We agree with GPI that medium- and long-term planning is important for wildfire mitigation initiatives, both separately and together. This is exactly why, consistent with WSD's WMP outline, PG&E provided approximately 15 pages of material in the 2021 WMP describing its 2021, medium-, and long-term goals.[102] In addition, for each initiative, consistent with Action PGE-25, we provided a discussion of the long-term planning for that initiative.

MGRA recommends that the utilities be directed to prioritize mitigation measures that target ignitions that are "likely to lead to catastrophic fires . . .."[103] PG&E agrees with this goal and our risk modeling considers this factor (through the consequence factor). However, the challenge with this approach is in confidently determining when or where an ignition will be inconsequential or lead to a catastrophic wildfire. There are a number of variables and circumstances which may cause a single ignition to have a limited impact or to turn into a catastrophic wildfire. Thus, PG&E has focused our efforts on reducing ignitions which can ultimately lead to catastrophic wildfires by using tools that help recognize the conditions that are more likely to lead to a catastrophic wildfire than others. For example, as discussed above in Section V.B, we recognize that wind can have a substantial impact on and increase the likelihood of a catastrophic wildfire. This is exactly why our PSPS modeling takes into account wind conditions and other risk factors that can lead to catastrophic wildfires.[104] Moreover, as we explained in the 2021 WMP, the risk analysis underlying our initiatives is based in part on

[101] GPI at p. 10.

[102] 2021 WMP at pp. 218-232.

[103] MGRA at p. 60.

[104] 2021 WMP at pp. 70-72.

considerations of the size and destructiveness of fires.[105]

William Abrams asserts that PG&E is over-using Black Swan criteria in our 2021 WMP.[106] This concern is not well founded. As discussed in detail in Section 4.2.A(c) of the 2021 WMP, PG&E evaluates the risk for a catastrophic fire caused by equipment as the probability of an outage leading to an ignition combined with the consequence or growth potential of a resulting fire. Therefore, our PSPS framework will look to deenergize those locations where there is a relatively high and unacceptable risk when combining the probability of an outage or failure due to the wind speed and the probability of a large fire should an ignition occur. However, there are some outage and ignition pathways that are difficult, if not impossible, to model on the temporal and geographic scale needed for PSPS decision making. These involve animal contacts and foreign object contacts, such as metallic balloons. Therefore, PG&E attempts to capture these very low probabilities and difficult to model, but potentially high consequence, situations through its PSPS Black Swan criteria. This is a reasonable approach given the limitations on the ability to model some unpredictable events that could lead to a catastrophic wildfire.

VII. PERFORMANCE METRICS AND UNDERLYING DATA (SECTION 6)

Section 6 of the 2021 WMP includes performance metrics and underlying data. The underlying data is primarily included in Tables 1-12 that were provided in Excel files submitted with our 2021 WMP. This section of the 2021 WMP also includes further explanation of the underlying data. William Abrams was the only party that directly addressed this Section.

Mr. Abrams states that the utilities are conflating activity metrics with performance metrics.[107] However, the tables including metrics information were developed by WSD, not the utilities, and gather information on a number of different types of metrics, not just activities. For example, Table 4 includes fatalities, Table 5 includes injuries, and Table 7.1 includes ignitions.

[105] 2021 WMP at pp. 58-59.

[106] Abrams at pp. 5-7.

[107] Abrams at p. 7.

These are not activities, but they reflect actual events such as ignitions that occurred and thus reflect performance.

Mr. Abrams also expresses concern that the utilities are using linear relationships between specific initiatives and risk reduction rather than compound relationships.[108] As a preliminary matter, it is not correct that all of the relationships in PG&E's risk modeling are linear. For example, the 2021 Wildfire Distribution Risk Model accounts for the consequence of wildfires given the likelihood of fire spread. In addition, the Large Fire Probability model that PG&E utilizes for PSPS decision making is non-linear. While some of PG&E's other modeling may be linear, given the relatively early stage of wildfire model development, this is to be expected. The type of compound relationship risk modeling that Mr. Abrams describes is certainly helpful, but it is complex and challenging to develop. PG&E is continuing to work on upgrading our models to ultimately develop models that can compare wildfire risks for additional risk drivers as well as measure the risk reduction for specific mitigations.[109]

VIII. INITIATIVES (SECTION 7)

A. Mitigation Strategy (Section 7.1)

Section 7.1 provides an overview of PG&E's 2021 WMP commitments and medium- and long-term goals. Section 7.1 also addresses PG&E's approach to managing wildfire risk (Section 7.1.A), major investments and implementation of wildfire mitigations (Section 7.1.B), challenges associated with limited resources (Section 7.1.C), and new and emerging technologies (Section 7.1.D). While specific initiatives and programs have been addressed by parties and are responded to in other sections of these reply comments, parties did not directly address the items described in Section 7.1.[110]

B. WMP Implementation (Section 7.2)

Section 7.2 provides information about our processes to monitor and audit WMP

[108] Abrams at pp. 7-9.

[109] 2021 WMP at p. 131.

[110] *See* footnote 6.

implementation (Section 7.2.A) as well as deficiencies in WMP performance in 2020 (Section 7.2.B). Section 7.2 also addresses our process for monitoring and auditing inspection effectiveness (Section 7.2.D) and a summary of WMP reporting (Section 7.2.D). No party directly comments on these portions of the 2021 WMP, although some auditing issues were raised with regard to specific initiatives such as inspections. These issues are addressed in more detail below in the initiative specific sections.

C. Financial Data (Section 7.3)

Section 7.3 provides a summary of how PG&E is reporting financial data for wildfire mitigation activities (Section 7.3.a) and how specific information is being provided on mitigation initiatives (Section 7.3.b). No party directly comments on these portions of the 2021 WMP.[111]

D. Risk Assessment and Mapping (Section 7.3.1)

Section 7.3.1 of the 2021 WMP describes a number of initiatives regarding risk assessment and risk mapping. Issues regarding risk modeling, RSEs and other risk mapping issues were discussed above in Section V.

E. Situational Awareness (Section 7.3.2)

Section 7.3.2 of the 2021 WMP addresses situational awareness initiatives and forecasting, including advanced weather and fire potential forecasting (Section 7.3.2.1) and continuous monitoring sensors (Section 7.3.2.2). MGRA was the only party to comment on this section of the 2021 WMP.

MGRA suggests that PG&E develop a metric for satellite fire alert quality to ensure that alerts being sent to first responders are high quality and the system may be improved over time.[112] While we have not yet developed a quantitative metric for satellite fire alert quality, PG&E's meteorologists and Wildfire Safety Operations Center analysts have found the fire detection and alert system useful through several years of operations and more useful and much

[111] *See* footnote 6.

[112] MGRA at p. 64.

more inexpensive than the fixed wing "smoke patrol" program that it replaced. We also agree that quality information should be sent to first responders as part of our satellite detection system. Over the last few years, PG&E Meteorologists have verified detections as they come in and have noted some false detections near solar arrays and multiple detections in the Central Valley during the agricultural burning period. To prevent this from becoming a recurring problem, PG&E's data scientists have masked those areas out to prevent "over alerting." We have also communicated with the California National Guard about the quality of detections and received feedback that they found them useful for helping verify their own system, FireGuard. Thus, although efforts have not been focused on creating quantitative metrics for tracking purposes, the system is performing well qualitatively from meteorology and WSOC perspectives.

F. Grid Design and System Hardening (Section 7.3.3)

Section 7.3.3 of the 2021 WMP discusses grid design and system hardening including maintenance and repair programs, covered conductor, non-exempt fuse replacement, sectionalizing devices, system automation equipment, microgrids and remote grids, and PG&E's System Hardening Program. This section of the 2021 WMP produced a substantial number of comments from multiple parties. These comments are addressed below.

1. Pace and Scope of System Hardening Program (Joint Local Governments)

Joint Local Governments suggest that PG&E could accelerate the pace of our system hardening efforts.[113] Kevin Collins also appears to indicate that PG&E could be performing more system hardening work.[114] We agree that expanding the scope and accelerating the pace of our System Hardening Program is important. At the same time, System Hardening Program work requires a substantial amount of scoping and engineering before construction can begin, and we need to be mindful that we are prioritizing work based on highest risk.[115] As a result of

[113] Joint Local Governments at pp. 3-4.

[114] Collins at p. 9.

[115] 2021 WMP at pp. 553-555.

significant revisions and updates to our risk modeling, we are re-evaluating System Hardening Program work in 2021 which will slow the pace of actual work in 2021. However, we plan to significantly expand the pace of System Hardening Program work in 2022 and 2023 (to between 450 and 500 miles per year).[116]

At the same time, the realities of funding this resource intensive work must be considered. In PG&E's 2020 GRC, a number of parties including Cal Advocates and TURN argued for less forecasted spending on system hardening.[117] The parties were ultimately able to reach a settlement on this issue that reduced the amount that PG&E allocated for system hardening, but allowed for some additional cost recovery through a balancing account.[118] The cost of system hardening has been, and will continue to be, a challenge given the substantial work required to perform a system hardening project, especially if the project involves undergrounding. While PG&E is fully committed to continuing and expanding the System Hardening Program between 2021 and 2023, from 180 miles in 2021 to 450-500 miles per year in 2022 and subsequent years[119], providing the necessary funding for this program will be critical. This is a decision that all parties will need to carefully consider in future rate cases and other Commission proceedings.

2. PG&E's 2021 System Hardening Program Workplan (Cal Advocates)

Cal Advocates argues that PG&E's System Hardening Program for 2021 is not targeting the highest risk CPZs.[120] There are several problems with Cal Advocates' arguments. First, it is not clear how Cal Advocates did the analysis to support its conclusions, and Cal Advocates did not provide any workpapers to support their claims. Thus, it is difficult to determine how Cal Advocates arrives at its conclusions. PG&E did not have sufficient time between comments and

[116] 2021 WMP at pp. 557-559.

[117] D.20-12-005 at pp. 101-102.

[118] D.20-12-005 at p. 103.

[119] 2021 WMP at p. 558.

[120] Cal Advocates at pp. 16-18. Cal Advocates makes a similar argument regarding PG&E's 2021 EVM program, which is addressed in Section VIII.H below.

reply comments to conduct discovery on this issue.

Second, Cal Advocates does not address, or discuss, the explanation in the 2021 WMP of how the 2021 System Hardening Program is designed to address risk. Specifically, as we explained:

> Under the new risk model the 301 miles of potential system hardening work originally planned for 2021 equated to 125 risk units in PG&E's multi-attribute value function (MAVF) calculation. The 180 miles now targeted for completion in 2021 are worth 198 risk units, a 58% increase in quantifiable risk reduction even though the mileage number is reduced. With the significant pivot in the program this target for 2021 is still aggressive because the cycle time for a system hardening project generally exceeds 12 months, as of late January PG&E is moving aggressively to design and execute the 2021 plan as 60 percent of the planned work is still in first project phase (scoping).[121]

Finally, PG&E expressly noted when it provided our draft 2021 System Hardening Program workplan to Cal Advocates that it was continuing to be revised and subject to change. In PG&E's data response, we explained:

> We are providing the latest version of our covered conductor workplan for 2021 in attachment "WildfireMitigationPlans_DR_CalAdvocates_044-Q06-Atch01". The workplan is as of 3/1/2021. PG&E's 2021 System Hardening Program workplan is under development and it is reviewed on a weekly basis by the Wildfire Risk Governance Steering Committee (WRGSC). The WRGSC meets weekly and adds to and updates the workplan as needed as more information becomes available.[122]

The System Hardening Program workplan continues to be developed, as we indicated in our data response. We would be happy to meet with Cal Advocates and WSD to discuss the most current version of the plan, explain how the workplan significantly reduces risk, and receive feedback on our approach.

3. Covered Conductor Costs (Cal Advocates)

Cal Advocates argues that PG&E's covered conductor costs are substantially higher than SCE's costs and requests that PG&E be required to investigate why our costs are higher and

[121] 2021 WMP at p. 558.

[122] PG&E response to Data Request CalAdvocates_044-Q06, dated March 3, 2021.

ways to reduce costs.[123] This argument is misplaced for several reasons.

First, as TURN argues in its comments, this is not a rate recovery proceeding.[124] To the extent Cal Advocates believes that PG&E's covered conductor costs are unreasonable, the proper place to address this issue is in the GRC where the actual and forecasted costs are litigated and approved, not here.

Second, these exact same issues were raised in PG&E's 2020 GRC where Cal Advocates asserted that PG&E's System Hardening Program costs should be similar to SCE's costs.[125] In both discovery and rebuttal testimony, PG&E explained in detail the reasons for the costs differences between PG&E's program and SCE's program. Ultimately, the parties were able to reach a settlement which was approved by the Commission in December finding that:

> The Settlement Agreement adopts PG&E's adjusted forecasts for 2019 and 2020 which we find reasonable. We find that PG&E's concession of reducing its requested amount for 2020 by around $236 million balances the concerns raised by various parties and the need for expanded system hardening measures and programs for added wildfire mitigation and employee and public safety. Intervenors generally do not object to the need to expand PG&E's system hardening programs but expressed concerns about PG&E's ability to conduct the work being proposed. We find that the adjusted forecast reasonably addresses these concerns.
>
> In addition, the settlement also adopts revenue requirement true-ups, reasonableness thresholds, reporting, and other requirements affecting overhead system hardening through CWSP guidelines. These are discussed in the CWSP section and in the discussion concerning the WMBA.[126]

WSD should not relitigate cost issues that were already extensively litigated in PG&E's 2020 GRC and were resolved through a settlement that was recently approved by the Commission. To the extent Cal Advocates continues to have concerns regarding the unit costs of PG&E's System Hardening Program, those concerns are best addressed in the 2023 GRC which will be filed at

[123] Cal Advocates at pp. 42-43.

[124] TURN at pp. 7-9.

[125] *See* A.18-12-009, Hearing Exhibit (HE)-128: CalAdvocates_09 (June 28, 2019) at p. 37.

[126] D.20-12-005 at pp. 101-102.

the end of June 2021.

Third, as Cal Advocates acknowledges in its second set of comments, "utility representatives" (presumably PG&E) have already explained some of the reason for the disparity between PG&E's and SCE's covered conductor costs. As Cal Advocates explains, "[w]hen asked about the cause of this disparity in workshops, utility representatives stated that there were likely multiple contributing factors, including differences in terrain and the number of poles that were being replaced during covered conductor installation."[127] The contributing factors to the cost differences have already been explained to Cal Advocates in workshops and were explained in substantially more detail in the 2020 GRC proceeding.

Finally, in addition to its general costs arguments, Cal Advocates also argues that PG&E should be required to break down our System Hardening Program costs for specific activities. This information was already provided for 2020 actual costs in response to a TURN data request.[128]

4. Replacing Non-Exempt Fuses and Small Copper Conductor and the Use of Non-Composite Poles (Cal Advocates)

Cal Advocates notes that PG&E plans to replace 1,200 non-exempt fuses in 2021 but expresses some concern that as of March 9, 2021, PG&E did not have all of the locations identified.[129] We are currently working on reviewing and finalizing our 2021 workplans including the replacement of non-exempt fuses, which is typical given the need to scope and plan project work. We agree with Cal Advocates that non-exempt fuse replacement should target replacements that maximize ignition risk reduction. We have been using the Wildfire Consequence Model to determine the appropriate locations for non-exempt fuse replacement to maximize consequence reduction associated with a potential non-exempt fuse ignition. The workplan for the 2021 non-exempt fuse replacement should be available later in April 2021 if

[127] Cal Advocates General Utility Comments at p. 39.

[128] *See* PG&E's response to Data Request TURN_016-Q1Supp01, dated March 5, 2021.

[129] Cal Advocates at pp. 36-37.

Cal Advocates would like to review it at that time. Moreover, as the year progresses, PG&E will begin fuse replacements and progress can be tracked in our Quarterly Initiative Updates which we will be submitting throughout the year.

Cal Advocates also expresses concern that PG&E has installed non-exempt fuses in HFTD areas, relying on a data request that PG&E indicated we would supplement on March 31, 2021.[130] As described above, PG&E has a program to replace non-exempt expulsion fuses in HFTD areas, and we are actively working to mitigate all of these known non-exempt fuses. In emergency situations where deploying an exempt fuse would not permit safe and timely electricity restoration, non-exempt fuses are utilized to restore electricity. In all cases where non-exempt fuses are located, vegetation clearing at the base of the pole is performed to deter ignitions as an added precaution from ignition hazards. Finally, the number of non-exempt fuses replaced is substantially lower than is reflected in Cal Advocates' comments because PG&E's supplemental data response was not available when Cal Advocates submitted its comments. To clarify, PG&E provided the following additional information in our supplemental response on March 31:

> Upon completing our assessment of non-exempt fuses installed in HFTD, PG&E has determined that approximately 71 fuses in 2019 and 44 fuses in 2020 were installed. Installing non-exempt fuses is acceptable in several different scenarios. For example, in 'emergency work' PG&E may need to quickly restore power where replacing a like-for-like fuse would be acceptable since a formal fuse assessment to change fuse types would not be feasible given the urgency to conduct the work and restore power in a timely manner.
>
> Additionally, compliance, new business, poles replacements, and other work identified by these locations were designed to the standard that was in place when designed/estimated. The new Fire Rebuild Standard (TD 9001B-009, Rev 2) was published on 11/15/2019 utilizing statutes and regulations from Cal Fire's Public Resources Code (PRC) 4292 as guidance for this current standard.

[130] Cal Advocates at pp. 35-36; *see* PG&E response to Data Request CalAdvocates_054-Q02, dated March 16, 2021 (stating that PG&E would provide supplemental information on March 31, 2021).

> In 2019, PG&E initiated a fuse replacement program that focuses on replacement of non-exempt fuses for exempt fuses. The program specifically focuses on Tier 2 and 3 HFTD areas and is coordinated with other projects on these highest risk circuits such as fire resiliency and pole replacement to avoid duplication of work. Replacement of non-exempt fuses with exempt fuses requires planning and evaluation of the new fuses to make sure that they will coordinate to preventing nuisance tripping. PG&E committed to replace 625 non-exempt fuses each year as part of this program and has thus far exceeded this commitment in both 2019 and 2020.[131]

Cal Advocates also recommends that PG&E be required to develop a workplan for small copper conductor replacement.[132] PG&E's 2021 Wildfire Distribution Risk Model targets conductor related issues for the probability of contribution to an ignition, not specifically just small copper conductor. PG&E is targeting the highest risk segments, of which small copper conductor is a part of ignition risk, but it is not the only driver. Cal Advocates also appears to be misunderstanding the information provided by PG&E in our First Quarterly Report submitted on September 9, 2020.[133] There we explained that small copper conductor is a leading factor for equipment failure. We also explained, however:

> In rural areas that are **not** at an elevated (Tier 2) or extreme (Tier 3) risk of wildfire, according to the CPUC HFTD Map, the most prevalent type of conductor found are small copper conductor (#6 and #4), which have elevated equipment failure rates relative to other types of conductor (see PG&E's response to Condition PGE-3 for additional insight into the small conductor failure rates). There are approximately 19,300 circuit miles of small copper conductor (#6 and #4) in the PG&E service territory that were installed before 2015, when PG&E stopped using this conductor; this represents 24 percent of the system total.[134]

Thus, while addressing small copper conductor is important, the greatest impact currently is in non-HFTD areas where this kind of conductor is more prevalent. PG&E will, however, replace small copper conductor in HFTD areas as a part of our overall System Hardening Program.

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[131] *See* PG&E response to Data Request CalAdvocates_054-Q2Supp01, dated March 31, 2021.

[132] Cal Advocates at pp. 37-38.

[133] *Pacific Gas and Electric Company Quarterly Report on 2020 Wildfire Mitigation Plan for May to July 2020*, submitted on September 9, 2020 (First Quarterly Report).

[134] First Quarterly Report at pp. 98-99 (emphasis added).

Finally, Cal Advocates raises questions regarding the types of poles that PG&E is installing to replace existing wood poles.[135] As Cal Advocates indicates, PG&E provided in discovery a 2018 third-party study analyzing the costs and benefits of steel, wood, and composite transmission structures and distribution poles.[136] PG&E believes our current approach to pole replacements in HFTD is prudent and is more than happy to provide this study to WSD and continue to discuss our approach to the types of poles to use in replacement with Cal Advocates and WSD.

5. Microgrids (SBUA)

SBUA supports the use of transmission sectionalizing but recommends that PG&E provide a cost-benefit analysis between sectionalizing and microgrids.[137] As a preliminary matter, microgrids provide energy to a portion of the electrical grid that has been separated through sectionalizing. Thus, microgrids and sectionalizing devices are not alternatives. Moreover, SBUA does not explain in detail why this comparison is necessary or how WSD or parties will benefit from this particular comparison. Nonetheless, PG&E notes that the Commission recently issued a decision in the Microgrid and Resiliency proceeding (R.19-09-009) requiring PG&E to file a separate application by June 30, 2021 providing a framework for evaluating when substation-level microgrids are the preferred alternative for mitigating likely PSPS outages due to transmission-level de-energization.[138] That application must identify, among other requirements, "where other alternatives including but not limited to hardening, reconstruction, or undergrounding of utility infrastructure to eliminate, mitigate, or reduce incidences of PSPS are shown to be uneconomic over any timeframe."[139] In accordance with these requirements, PG&E intends to provide a framework for evaluating various alternatives for

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[135] Cal Advocates at pp. 38-39.

[136] *See* PG&E's response to Data Request CalAdvocates_047-Q3Atch01_CONF, dated March 9, 2021.

[137] SBUA at p. 9.

[138] D.21-01-018, App. A, p. A-6 to p. A-8.

[139] *Id.*, p. A-6.

PSPS mitigation in high-priority substation service areas, including both sectionalizing and microgrids, as part of this upcoming separate application. PG&E further anticipates applying any methodologies and frameworks approved as part of that separate application and incorporating the resulting plans into future WMP updates.

6. Remote Grid (GPI)

PG&E's remote grid program is intended to remove long feeder lines that transverse HFTD areas where the customers served by the line can be served from a local and decentralized energy source.[140] GPI notes that customer support is critical for remote grids and that PG&E should provide evidence of customer support.[141] We agree and thus one of the criteria for consideration of a remote grid site is that "[t]he majority of customers to date have voiced positive initial interest in pursuit of service conversation from overhead line to Remote Grid."[142] In addition, current projects are undergoing "scoping and feasibility assessment to verify customer interest, environmental requirements, solar access, civil constructability, and site accessibility."[143]

Given that the remote grid initiative is in its infancy, PG&E is still gathering information from customers about this proposal. To date, we have customer contact feedback indicating that 34 out of 39 customers contacted would accept a PG&E-provided remote grid at the initial conceptual level. PG&E expects that more representative evidence will be forthcoming as we execute Supplemental Provision agreements for the PG&E-provided remote grid service option or execute Discontinuance of Service agreements for the non-PG&E option. This will occur once projects are found viable and both parties agree to deploy a PG&E remote grid.[144] PG&E

[140] 2021 WMP at p. 573.

[141] GPI at p. 31.

[142] 2021 WMP at p. 575.

[143] 2021 WMP at p. 576.

[144] It is important to note that, in this initial phase of the remote grid program, the supplemental tariff provisions approved recently by the Commission to facilitate remote grids are subject to the mutual, voluntary agreement of the customer and PG&E to install a remote grid. *See* Advice Letter 6017-E,

can make customer response information available to WSD and/or other stakeholders if needed, subject to appropriate customer confidentiality protections.

7. Transmission Substation Defensible Space Costs (GPI)

GPI express concerns about the costs of PG&E's defensible space program for transmission substations citing increases in costs between 2020 and 2021.[145] The increase in costs of approximately $800,000 between 2020 and 2021 is primarily driven by the fact that PG&E was performing less non-HFTD defensible substation work in 2020 as this work was just getting ramped up. Increased spending in non-HFTD defensible space work is expected in 2021, which was reflected in the cost information that PG&E provided. Spending for defensible space around transmission substations in HFTD areas is similar between 2020 and 2021. While PG&E has focused most of our defensible space work on HFTD areas, as is appropriate to mitigate wildfire risk, it is also important to continue to maintain defensible space around non-HFTD area transmission substations.

8. RSEs for the System Hardening Program (MGRA and TURN)

MGRA proposes that WSD gather information from the utilities to determine the effectiveness of covered conductor in mitigating wildfire risk.[146] PG&E does not oppose this recommendation, but some caution is required. PG&E's System Hardening Program does not solely replace covered conductor. Instead, as explained above, the System Hardening Program is comprehensive and intended to strengthen different types of distribution assets such as poles, non-exempt equipment, overhead distribution line transformers, and conductor.[147] Narrowly focusing on RSEs for covered conductors would ignore these other aspects of PG&E's System Hardening Program and thus may impact the calculation of the true risk-spend efficiency for the

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Attachment 1 (Supplemental Provisions Agreement), p. 1, Para. 1 (noting that the customer is electing to be served by a remote grid, subject to mutual agreement by PG&E) (approved by Resolution E-5132).

[145] GPI at p. 27.

[146] MGRA at p. 65.

[147] 2021 WMP at pp. 551-552.

System Hardening Program.

TURN argues that PG&E did not provide RSEs for incremental portions of the System Hardening Program.[148] PG&E calculates RSEs for a program, not for incremental parts of the program. TURN is effectively asking that for each System Hardening Program project that PG&E calculate an individual RSE to determine if that project adds incremental benefit. This type of analysis would be burdensome to create and would constantly change as projects and conditions change. This type of incremental RSE approach should not be adopted.

TURN also notes that the Rapid Earth Fault Current Limiter (REFCL) has a high RSE and that new technology may allow PG&E to avoid system hardening.[149] There are several problems with TURN's assertions. First, the RSE of 126 cited by TURN from the 2020 RAMP Report was a preliminary number. As indicated during the 2020 RAMP proceeding workshops, the RSE of 126 was provided based on the information available at the time of the workshop. Due to the characteristics of the technology itself, the effectiveness of REFCL is also dependent on the circuit the program is applied on. After further review of the circuit miles in HFTD, as well as the potential locations of installation, the new estimated RSE is 36. This difference was explained in the summary of the program in comments, as well as the program exposure notes.

Second, REFCL is still a new and emerging technology. While this technology shows promise, PG&E should not, as TURN implies, put our System Hardening Program on hold while we wait to see if REFCL lives up to early, promising indications. Moreover, while REFCL may be effective at mitigating a potential phase-ground fault, it may not be as effective mitigating other types of faults such as phase-phase faults or high impedance faults. Rather than adopting TURN's suggestion, the more prudent approach is to continue with system hardening, which is a well proven approach to significantly mitigate wildfire risks while continuing to explore and evaluate REFCL.

[148] TURN at p. 25.

[149] TURN at pp. 25-27.

Finally, TURN expresses concern that the RSEs for system hardening are different among the utilities and suggests that WSD work during 2021 to standardize and improve the risk analysis. While we believe that the RSEs we provided are robust and well supported, we welcome the opportunity to work with WSD and other parties on developing and improving the RSE analyses for specific programs, such as system hardening.[150]

9. Additional System Hardening Issues (TURN)

TURN raises a number of other issues related to system hardening that require some context and clarification.

First, TURN expresses concern that PG&E has substantial repair costs that may be recorded in memorandum accounts.[151] Following the 2019 Wildfire Safety Inspection Program (WSIP) in which we performed enhanced inspections in HFTD areas, PG&E identified hundreds of thousands of Electric Corrective (EC) and Line Corrective maintenance tags. Where PG&E can bundle the EC tags with its system hardening work, it is doing so. Given that it will take many years to complete system hardening work, in the meantime, individual component repair or replacement is needed to reduce wildfire risk. The repair costs reflect in large part this additional work identified during the 2019 WSIP effort. As to whether these costs are incremental to existing repair work and thus should be recovered through a memorandum account, that is an issue that is appropriately addressed in a cost recovery proceeding, not here.

Second, TURN argues that PG&E's system hardening program is costly and that there may be less costly alternatives such as REFCL.[152] PG&E addressed REFCL in Section VII.F.8 above. As to the costs of the System Hardening Program, we recognize that this safety work is more expansive and expensive than some other forms of traditional utility work. In part, this reflects the need to take comprehensive action in the face of increasing wildfire safety risks associated with climate change. As TURN indicates in its comments, it has reviewed this work

[150] TURN at pp. 34-37.

[151] TURN at pp. 31-32.

[152] TURN at pp. 33-34.

in three separate proceedings[153], including the 2020 GRC in which the parties' settlement was recently approved. In PG&E's 2020 GRC decision, the Commission recognized the costs of the System Hardening Program and PG&E's reduction of our forecast and found that this forecast "balances the concerns raised by various parties and the need for expanded system hardening measures and programs for added wildfire mitigation and public and employee safety."[154] WSD and the Commission should not now re-visit the recent decision in PG&E's GRC that our System Hardening Program was reasonable, prudent, and that costs associated with the program could be recovered through an approved balancing account.

Third, TURN expresses concerns about tracking and recording PG&E's System Hardening Program costs.[155] TURN specifically singles out concerns about pole replacements as a part of system hardening.[156] This issue was also addressed in the 2020 GRC where System Hardening Program costs, as well as other wildfire mitigation costs, will be tracked in a new Wildfire Mitigation Balancing Account. Moreover, there are specific requirements in the 2020 GRC settlement for tracking costs and units related to the System Hardening Program, including the tracking of poles at TURN's request. As the Commission explained:

> In addition, the settlement also adopts revenue requirement true-ups, reasonableness thresholds, reporting, and other requirements affecting overhead system hardening through CWSP guidelines. These are discussed in the CWSP section and in the discussion concerning the WMBA.
>
> Specific to system hardening, PG&E is required to provide an annual report of the number of circuit miles completed for both overhead system hardening and undergrounding, the location of the work performed, and the cost of the work broken down by project. To address TURN's concerns that PG&E has over-forecast the number of poles it will need to replace as part of the overhead system hardening, PG&E will maintain data regarding the reason for every pole replaced as part of the system

[153] TURN at p. 38.

[154] D.20-12-005 at p. 102.

[155] TURN at pp. 38-41.

[156] TURN at pp. 39-40.

> hardening program and will develop a means to report on this data. PG&E will also indicate whether a pole-loading calculation was performed for the pole and provide, upon request, the results of such calculation with respect to supporting covered conductor.[157]

TURN also raises concerns about PG&E replacing equipment such as fuses, switches and crossarms as a part of our System Hardening Program.[158] PG&E disagrees with the premise that covered conductor could be installed on the existing infrastructure without incurring replacement costs for associated equipment. We believe the replacement of other at-risk equipment simultaneously is a prudent and efficient use of resources. More importantly, however, this is another issue that was raised by TURN during the 2020 GRC proceeding and presumably was addressed through the Commission-approved settlement in that proceeding. There is no need to re-litigate that issue in this proceeding.

G. Asset Management and Inspections (Section 7.3.4)

Section 7.3.4 provides an overview of PG&E's 2021 inspection program including enhanced inspections, the use of infrared technology, intrusive pole inspections, the use of Light Detection and Ranging (LiDAR), pole loading assessments, substation inspections and Quality Assurance and Quality Control. Two parties commented on this portion of our 2021 WMP. Below, we address issues raised by GPI and Cal Advocates.

1. Scope and Results of Enhanced Inspections (GPI)

GPI expresses concern about the number of Level 1 findings from PG&E inspections in 2020 and the potential for additional findings that have not yet been identified.[159] We share GPI's focus on identifying and mitigating wildfire risk from equipment failure, which is why we started enhanced inspections in late 2018. As a result of these inspections, there has been a significant increase in the number of repair tags which we have identified. This is exactly the purpose of the enhanced inspection program, to more rigorously evaluate and inspect PG&E's

[157] D.20-12-005 at p. 103 (footnotes omitted).

[158] TURN at pp. 41-43.

[159] GPI at pp. 13-15.

assets, especially in HFTD areas.[160]

GPI also requests clarification as to why PG&E is conducting enhanced inspections in non-HFTD areas.[161] In this case, GPI may be misunderstanding the enhanced inspection program approach. As we explained in our 2021 WMP, PG&E is now using the same enhanced inspection approach for non-HFTD and HFTD areas. However, the frequency of inspections for HFTD and non-HFTD areas is different.[162]

GPI expresses concern about PG&E's re-assessment approach for certain EC tags.[163] In the 2021 WMP, we provided a summary of how the reassessment process is conducted and used to prioritize the highest risk repair work.[164] If WSD believes that additional information about the reassessment process would be helpful, we can certainly include that information in our 2022 WMP or provide it in response to data requests.

2. Monitoring and Auditing Enhanced Inspections (Cal Advocates)

Cal Advocates propose that WSD direct PG&E to hire a consultant to audit our enhanced inspection program, citing several instances related to prior inspections raised by the Federal Monitor, the Pole Test & Treat Program, and inspections of hydroelectric switchyards.[165] As a preliminary matter, it is important to note that two of the three examples cited by Cal Advocates were situations where PG&E self-identified an issue and brought it to the Commission's and other parties' attention. This demonstrates that PG&E's internal processes are in fact working to identify shortcomings and gaps, and that PG&E is transparently identifying these issues and addressing them.

More importantly, in our 2021 WMP we recognized the shortcomings in our 2020

[160] 2021 WMP at pp. 583-593.

[161] GPI at pp. 14-15.

[162] 2021 WMP at pp. 583-584.

[163] GPI at pp. 17-18.

[164] 2021 WMP at pp. 533-534.

[165] Cal Advocates at pp. 27-29.

inspection program and explained that in 2021 there will be increased program oversight and accountability.[166] Specifically, the 2021 WMP outlines a detailed program for monitoring and auditing inspections in 2021.[167] Cal Advocates is noticeably silent about these parts of the 2021 WMP, instead focusing on situations which occurred in the past. If Cal Advocates believes that PG&E's 2021 monitoring and auditing program needs additional elements, we welcome that feedback from Cal Advocates.

Cal Advocates' proposed solution—the retention of a consultant to perform a full audit of the enhanced inspection processes and scope—is duplicative, potentially costly, and will result in the diversion of resources and time from performing or leading actual inspection work. PG&E has already established an internal team to provide auditing and quality assurance for inspections.[168] More generally, wildfire mitigation work is reviewed by both the Federal Monitor and WSD inspectors.[169] Adding yet another entity to review and audit the inspection process is not necessary and would divert resources from the actual work to participate in another audit process.

Cal Advocates also proposes regular reporting regarding PG&E's QA/QC processes for inspections, including any changes to those processes.[170] PG&E would support this proposal, but given the amount of work required, we believe that Cal Advocates' suggestion of semi-annual, rather than quarterly, reporting makes sense. We also support Cal Advocates' proposal for a utility and stakeholder working group to develop best practices for QA and QC.[171]

Finally, we agree that a self-audit is necessary to confirm that PG&E has accounted for every asset within our service area, its compliance requirements, and confirmation that all are

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[166] 2021 WMP at pp. 5-6.

[167] 2021 WMP at pp. 364, 618-620.

[168] 2021 WMP at p. 364.

[169] 2021 WMP at pp. 348-349.

[170] Cal Advocates at pp. 31-32.

[171] Cal Advocates at p. 32.

actually linked/associated with maintenance plans for all required inspection activities. There are multiple efforts underway within PG&E looking at inspection processes and controls, as well as work being done by Asset Strategy and the GIS team to validate GIS data discrepancies. There are also improvement projects underway to address control issues related to asset inspections and recordkeeping from prior Internal Audits. In summary, PG&E is working diligently to identify any further gaps in our asset information and inspection processes and close them.

3. Further Review of Transmission Tower and Aerial Inspections (Cal Advocates)

Cal Advocates proposes that PG&E conduct evaluations of the "efficacy of performing detailed climbing inspections of all transmission structures in HFTDs on a regular schedule"[172] and the efficacy of "augmenting [] detailed distribution inspections with aerial inspections."[173] PG&E is open to both of these proposals. However, Cal Advocates suggests that the transmission tower evaluation be completed and submitted by September 2021 and the aerial inspection evaluation be submitted with the 2022 WMP. Given the likelihood that a final decision on the 2021 WMP will be issued around June, and the need to focus our resources on wildfire season preparation, PG&E recommends that if these evaluations are determined to be necessary that they be submitted with the 2022 WMP, rather than having one submitted in September.

H. Vegetation Management and Inspections (Section 7.3.5)

Section 7.3.5 of the 2021 WMP addresses vegetation management initiatives including vegetation management-related inspections, fuel management and reduction, use of LiDAR, patrol and other inspections, quality assurance and quality control of inspections, recruiting and training of vegetation management personnel, vegetation inventories, and PG&E's routine vegetation management and EVM programs. This section covers a lot of material and received a

[172] Cal Advocates at p. 40.

[173] Cal Advocates at p. 42.

significant number of comments. We address these comments below.

1. EVM Risk Prioritization (Cal Advocates, CFBF, and GPI)

Cal Advocates argues that most of the risk associated with circuit-miles in HFTD areas is in the top 1/5 of circuit miles and thus WSD and PG&E should re-evaluate the scope of the EVM program.[174] Cal Advocates does not argue that the EVM program is not effective and, in fact, based on its comments appears to recognize EVM's benefits. This is consistent with the Commission's recent PG&E GRC decision in which, after carefully reviewing arguments, forecasts and workpapers, it determined with regard to the EVM program that "[t]he recent wildfires of 2018 onwards also indicate that incremental [vegetation] mitigation activities are needed to further mitigate wildfire risk."[175] As to the scope of the program, PG&E provided WSD with our 2021 EVM workplan on February 23, 2021 (as updated on March 2, 2021) and is continuing to provide WSD with updated information during the year. EVM workplan updates are reviewed by the Wildfire Risk Governance Steering Committee (WRGSC), which is attended by PG&E management, the Federal Monitor, and the Governor's Operational Observer.[176] Thus, the scope and focus of the 2021 EVM workplan is not only consistently updated and reviewed internally, but it is also transparent and visible to outside entities.

Cal Advocates also asserts that PG&E's 2021 EVM program does not appropriately prioritize risk and instead is focused on relatively "low-risk miles."[177] Cal Advocates' comments include a number of calculations related to an analysis of PG&E's 2021 EVM workplan, but it is unclear how Cal Advocates arrived at the numbers that it is providing or if Cal Advocates' conclusion is based on a misunderstanding of the data. Because of the short time between comments and reply comments, PG&E did not have an opportunity to conduct any discovery on Cal Advocates' statements to understand the basis for these comments. Nor did Cal Advocates

[174] Cal Advocates at p. 13.

[175] D.20-12-005 at p. 77.

[176] 2021 WMP at pp. 5-6.

[177] Cal Advocates at p. 13-15.

provide its workpapers to justify its conclusions. PG&E's 2021-2023 EVM workplan is intended to perform at least 80% of the work on the top 20% of the highest risk circuit protection zones in HFTD areas. The risk curve included in the discovery response provided to Cal Advocates demonstrates how that will occur and the 2021 EVM workplan (2/19/2021 version), which was also included in the discovery response, identifies the specific circuit protection zones where the work will occur.[178] It may be that Cal Advocates did not completely understand all of the information provided and did not have an opportunity to initiate a follow-up discussion with PG&E to understand how the 2021 EVM workplan aligns with the goals that we have laid out. PG&E would be more than happy to meet with Cal Advocates and walk through the details of the most current version of the 2021 EVM workplan so that there can be common understanding how it meets the EVM goals.

Finally, it is important to note that in the discovery responses relied on by Cal Advocates, PG&E explained:

> The 2021 EVM workplan is subject to revisions and updates as additional data and information becomes available. The 2021 EVM workplan is approved by the Wildfire Risk Governance Steering Committee (WRGSC). *See* 2021 WMP at pp. 5-6. The 2021 EVM workplan that is attached was approved by the WRGSC on February 19, 2021. PG&E's 2021 EVM workplan addresses the locations that EVM will be performed, but does not identify specific times the work will be done given the nature of the work and availability of resources, as well as other constraints.[179]

Thus, Cal Advocates is aware of the fact that the February 19, 2021 version of the 2021 EVM workplan that it relied on will continue to change throughout 2021.

PG&E disagrees with CFBF's assertion that PG&E previously used efforts in non-HFTD areas to bolster our overall vegetation management performance.[180] As indicated above and in the 2021 WMP, we acknowledge that in 2020 we did not prioritize EVM work based solely on

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[178] *See* PG&E response to Data Request CalAdvocates_044-Q5-Atch01, dated February 19, 2021.

[179] *See* PG&E response to Data Request CalAdvocates_044-Q5, dated March 3, 2021.

[180] CFBF at p. 5.

risk rankings of the highest risk circuits. As a result, only a percentage of the 2020 work was performed on the highest risk circuits. However, as our 2021 WMP explains, PG&E is resolving this gap through increased control and validation of our EVM workplan. First, we have implemented the updated 2021 Wildfire Distribution Risk Model, and we are targeting the highest risk circuit segments. Second, we have increased the controls around the actual circuit segments that will be completed. The newly formed WRGSC is responsible for approving the selection of EVM work locations using the new risk model that prioritizes high risk circuits/segments and monitoring regular reporting of work completed. Third, we have aligned our incentives on this work so that achieving target performance will require that 80 percent of the work completed over the next three years be performed on circuit segments that are among the top 20 percent highest risk.

GPI asks how the WRGSC directs EVM work prioritization.[181] As explained in the 2021 WMP, to ensure alignment, governance, accountability, and support of the implementation of PG&E's updated wildfire risk model, the WRGSC was established in late 2020.[182] This committee is chaired by PG&E's Chief Risk Officer and incorporates leaders from Electric Operations, Risk and Internal Audit, and other teams. Representatives from PG&E's Federal Monitor as well as the Operational Observers from the Governor's office also attend these meetings. The WRGSC reviews and approves the workplans for EVM and other critical wildfire risk mitigation programs to ensure they are in alignment with the new risk model and monitors regular reporting of work completed and quality results so that we are accountable and effective in reducing the most risk through these workstreams.

2. EVM RSE (TURN)

TURN expresses concern regarding the RSE calculated for EVM as compared to other PG&E vegetation management programs and whether it makes sense to continue the EVM

[181] GPI at pp. 25-26.

[182] 2021 WMP at pp. 5-6.

program given the RSE.[183] PG&E continues to perform EVM work because we are committed to the prevention of wildfires caused by vegetation striking electric equipment, which is the leading cause of ignitions in PG&E's HFTD areas. To continue to drive down vegetation risks, PG&E must address or remove more trees around our facilities and some of those trees will inevitably have lower risk scores. This can result in a lower RSE. While PG&E acknowledges that RSE evaluation is important, it is not the only decision mechanism for determining a mitigation program. Compared to the impact of a large-scale wildfire, PG&E believes the risk reduction benefits of EVM are worth the anticipated costs.

Regarding the RSE scores specifically, routine vegetation management and Catastrophic Emergency Memorandum Account (CEMA) tree work are control programs and represent our current level of risk. In the absence of these programs, PG&E would expect significantly more vegetation incidents that lead to ignitions than what PG&E currently experiences. This is why the RSE for these control programs are relatively high. EVM further reduces the vegetation caused risk in PG&E's system, which is the highest driver of ignitions in HFTD areas. Given the fact that we do a significant amount of tree work already through the routine and CEMA programs and vegetation is still the highest driver of ignitions in HFTD areas, it is clear that more can and should be done to further reduce vegetation contact risk. Not doing EVM and pursuing other initiatives such as the System Hardening Program would require substantially longer lead time to reduce risk and our customers and communities would bear this risk in the meantime – a risk that PG&E does not consider acceptable.

TURN also references the issue of EVM risk prioritization in 2020 as a reason to call into question the EVM program.[184] The issue of risk prioritization is addressed in Section V.H.I above. In short, PG&E is addressing the gap identified regarding EVM risk prioritization in 2020. Our 2021 EVM workplan, informed by our updated modeling, is focused on performing

[183] TURN at pp. 21-22.

[184] TURN at pp. 22-23.

80% of the work in the top 20% of the highest risk CPZs. Thus, TURN's argument that the EVM program is addressing "lower priority areas" is not well founded.

3. Scope of EVM Work (Cal Advocates and TURN)

Cal Advocates questions how we justify the scope of our EVM program and why addressing the highest-risk circuit miles over the course of 14 years is a reasonable and effective mitigation measure.[185] The overwhelming majority of PG&E's EVM program work involves removing entire trees and removing all overhanging branches regardless of the distance above the primary conductor. Once this enhanced level of work is performed, the routine vegetation management program is designed to maintain the system, on an annual basis, to this enhanced scope in the HFTD areas. This routine vegetation management maintenance is possible on an annual basis because most trees that require work under the EVM scope will have been removed under the EVM program. The volume of tree removal work, and the impact of performing the tree removal work in communities, necessitates that the scope of EVM work be performed over a longer period of time.

TURN challenges the scope of the EVM program, arguing that certain parts of the program such as overhang trimming are more effective than addressing at-risk trees based on the RSE scores.[186] This argument assumes that, simply through RSE scores, parties can determine how a tree may fail and cause a wildfire. However, this is not the case. It is unknown whether a branch, overhang, or at-risk tree could potentially start the next dangerous wildfire. In fact, ignitions have been caused by all of these factors, and any one of these ignitions may lead to a catastrophic wildfire. Therefore, PG&E continues to believe that addressing each of these risks is best done through a comprehensive EVM program. PG&E is continuously looking for ways to be more efficient and more tactical in the work we do, with the goal of improving the RSE value. Notably, in the 2020 GRC, TURN partially opposed the portion of the EVM program focused on

[185] Cal Advocates at p. 13

[186] TURN at pp. 23-24.

removing at-risk trees[187], but ultimately that position was not part of the settlement adopted by the Commission.

4. EVM and Routine VM Auditing (Cal Advocates)

Cal Advocates recommends that WSD require PG&E to perform annual internal audits to identify all process breakdowns within our routine vegetation management and EVM programs and to report the audit findings to relevant stakeholders.[188] PG&E recognizes the importance of vegetation management activity to mitigate against wildfires and our Internal Audit (IA) Department regularly performs audits over components of the PG&E's vegetation management program. Recently, these audits have included various components of the EVM program, along with other audits that focused on routine and CEMA vegetation management, and the use of LiDAR as part of the vegetation management program. IA has also performed other audits over wildfire results reporting that included vegetation management.

PG&E also assesses vegetation management work performance with QA and Work Verification (WV) processes. The QA effort is designed to validate vegetation management program effectiveness and to provide confidence that the desired outcomes, including regulatory goals, are met. PG&E's WV program validates that 100 percent of vegetation work in EVM was completed to scope through an audit of all work performed. Given the number of audits and review of vegetation management processes currently being performed by PG&E, we do not believe that an additional, annual audit is necessary at this time.

5. Vegetation Clearance Under Transmission Lines (CFBF)

CFBF expresses some concern about our efforts to clear vegetation under transmission lines in orchards located in non-HFTD areas because the orchard trees allegedly "do not create a wildfire risk."[189] CFBF suggests that the resources required to do this work would be better

[187] A.18-12-009, HE-288: TURN-01 (Errata) (Rev. October 15, 2019) at pp. 13-18.

[188] Cal Advocates at p. 27.

[189] CFBF at p. 2.

spent in HFTD areas.[190] However, wildfires do not only occur in HFTD areas. Furthermore, PG&E's program to establish or improve transmission clearances in orchards was not initiated and is not primarily operated to mitigate wildfire risk. Rather, it was federally mandated in 2005 after the 2003 North East blackout relating, in part, to overgrown tree contact, and after a 2004 outage on a PG&E 230kV transmission line caused by a commercial orchard tree. The primary intent of ongoing vegetation management of orchards focuses on establishment and maintenance of required clearances and prevention of tree contact with lines that can cause outages and, potentially, fires. Because most orchard vegetation management occurs under PG&E's high-voltage transmission lines, this work is required by the North American Electric Reliability Corporation (NERC) and it is also frequently performed in compliance with PG&E's transmission maintenance agreement with the California Independent System Operator (CAISO). Therefore, because PG&E's vegetation management program for orchards is an independent and federally required program, CFBF's concerns regarding this work are not relevant to the 2021 WMP.

6. Transmission Right of Ways (Joint Local Governments)

The Joint Local Governments question why PG&E plans to continue with Transmission ROW expansion by removing approximately 270,000 trees if vegetation causes only a small percentage of transmission ignitions.[191] There are two further considerations that PG&E looks into when evaluating vegetation management work apart from basic risk calculations. Are resources constrained such that the transmission work is pulling from more important work? And are there other drivers for doing this work? We address these considerations in the paragraph below.

First, much of the transmission right of way clearing is a different type of work than vegetation management and is performed by work forces with different skill sets and different

[190] CFBF at p. 3.

[191] Joint Local Governments at p. 2.

equipment. Second, system reliability, grid stability, and reducing customer impact during PSPS events are also meaningful considerations for doing this work. A tree contacting a line can also cause a regional power outage or Western grid instability depending on the conditions of the broader electrical system, not to mention the potential wildfire risk. Allowing at-risk trees to remain standing near PG&E transmission lines may also mean that certain lines need to be deenergized if severe winds impact the area. PG&E has previously been able to de-scope certain lines from PSPS events by removing similar trees in prior years.

7. Vegetation Debris Management (GPI and Joint Local Governments)

The Joint Local Governments and GPI express concern regarding woody debris left on site following VM activities.[192] PG&E is currently working to develop alternatives, especially as it relates to our Transmission Expansion Program. When practical, PG&E delivers woody biomass of acceptable conditions to generating facilities that use these materials as fuel. We are also exploring emergent technologies that may offer additional pathways to sustainable end-use.

8. Tree Assessment Tool and Vegetation Information (GPI)

GPI suggests that PG&E has not fully vetted the Tree Assessment Tool (TAT) and that we do not know the accuracy outcome of the "species risk rating" tool compared to traditional or certified arborist assessments.[193] PG&E disagrees with an implication that the TAT was not properly evaluated before its implementation. PG&E received arborist input when creating the tool. In addition to this arborist input, PG&E applied predictive analytics to our extensive vegetation-caused outage dataset to craft the tool and to gauge its anticipated effectiveness. The Targeted Tree Study will also serve to enhance effectiveness measures by quantifying actual results from failed trees not abated by the TAT.[194] PG&E hopes that the results of the study will provide insights that may further enhance the TAT, but performing the study does not imply that the TAT was not properly vetted prior to implementation. Finally, we worked with several

[192] Joint Local Governments at pp. 4, 6-7; GPI at pp. 19-23.

[193] GPI at pp. 18-19.

[194] 2021 WMP at p. 108.

outside experts and university programs who contributed to and reviewed the TAT.[195] This rigorous internal and external review process has contributed to improving the TAT and helping verify its results.

GPI also requests additional information regarding PG&E's Integrated Vegetation Management (IVM) program.[196] PG&E's IVM program is an ongoing maintenance program designed to maintain cleared rights-of-way in a sustainable and compatible condition by eliminating tall-growing and fire-prone vegetation and promoting low-growing, fire-resistant vegetation.[197] The 2021 WMP does not have significant details regarding the IVM program because PG&E's Transmission vegetation management group is currently assessing consultants to review and revise our IVM program to help develop our long-term IVM plan. The current target is to have a final and approved plan in Q4 of 2021 for implementation in 2022. Therefore, PG&E anticipates providing more details about this program in our 2022 WMP.

9. Use of Fire Retardants (Joint Local Governments and Santa Clara)

Both the Joint Local Governments and Santa Clara express concerns regarding the potential environmental impacts of PG&E's proposal to use fire retardant to mitigate the hazards of vegetation fuels underneath powerlines during fire season.[198] PG&E understands and shares the concerns of the intervenors regarding potential environmental impacts of using fire retardant to prevent wildfires. Traditionally, the use of fire-retardant chemicals has been limited to firefighting operations during active wildfires. However, PG&E is interested in land application of fire-retardant chemicals as a preventative measure to reduce potential ignitions related to utility infrastructure during extreme weather events in HFTDs. In the United States, there is currently no single regulatory framework for the production, authorization, and use of fire retardants.

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[195] 2021 WMP at p. 669.

[196] GPI at p. 24.

[197] 2021 WMP at p. 634.

[198] Joint Local Governments at pp. 8-9; Santa Clara at pp. 7-8.

To address concerns about potential environmental impacts of fire-retardant application, PG&E is conducting a review of commercially available fire-retardant products. This review will consist of the following:

- Product toxicological and environmental analysis
- Efficacy analysis
- Environmental planning and permitting initial assessment
- Scope of use including asset protection and proactive application

PG&E's review of fire-retardant chemicals will take place by the end of June 2021. As indicated by the Joint Local Governments, PG&E has agreed to share the results of this review with the Commission and stakeholders when they are obtained.[199]

10. Additional Vegetation Related Issues (Kevin Collins)

Kevin Collins' comments discuss PG&E's vegetation management work in Santa Cruz, and he claims that PG&E damaged homeowners' land beyond the Commission's standards for vegetation clearance.[200] As an initial matter, PG&E notes that this is not a criticism of the content of our 2021 WMP. Mr. Collins criticizes prior work performed in a specific area of our service area. We disagree with Mr. Collins's opinion that PG&E vegetation management crews damaged homeowner land by violating Commission standards. There may be occasional differences in opinion between PG&E and homeowners regarding the necessary scope of vegetation management work to prevent wildfires or in response to an emergency. However, PG&E attempts to reach out to property owners prior to conducting vegetation management work to mitigate against wildfires. PG&E also partners with local communities to find ways to minimize the impact on communities and complying with applicable laws and requirements while completing this important work to reduce wildfire risk from vegetation risks. In fact, PG&E vegetation management personnel recently met with an arborist hired by Santa Cruz

[199] Joint Local Governments at p. 9.

[200] Collins at p. 2.

County to discuss trees identified for removal following the 2020 lightning-ignited fires in that area.

I. Grid Operations and Protocols (Section 7.3.6)

Section 7.3.6 of the 2021 WMP addresses grid operation initiatives including automatic recloser operations, fire prevention and suppression for PG&E crews, personnel training, re-energizing circuits after a PSPS event, aviation support, and fire suppression resources and services. No party submitted comments on this section of PG&E's 2021 WMP.[201]

J. Data Governance (Section 7.3.7)

Section 7.3.7 of the 2021 WMP describes PG&E's data governance efforts including a central data repository, collaborative research, documentation and disclosure for wildfire-related data, tracking near miss data, and IT projects.

Cal Advocates notes that PG&E has reported significant capital and operating expenditures for Data Governance/IT projects associated with wildfire mitigation in 2020 and 2021 in Table 12 of the 2021 WMP and ask why our reported capital and operating expenditures are greater than those of the other utilities and why we project that costs will increase approximately $30 million in 2021.[202] The reported capital and operating expenditures of $113 million (2020) and $143 million (2021) referenced in Table 12, Section 7.3.7.5, include all Electric Operations technology related expenditures that support WMP objectives. These include Operational and Maintenance (O&M) costs and Operational Technology (OT) project costs, as well as the IT project costs summarized in Section 7.3.7.5 of the 2021 WMP narrative ($79.4 million). Section 7.3.7.5 of the 2021 WMP describes all technology projects that PG&E IT is delivering that are in direct support of WMP commitments. These projects cover the full spectrum of technologies required to meet WMP objectives. The projected sum costs of PG&E's other "Data Governance" projects identified in Sections 7.3.7.1-4 of the 2021 WMP are $4.6

[201] *See* footnote 6.

[202] Cal Advocates at p. 44.

million.

A major reason for the overall increase in IT expenditures from 2020 to 2021 is due to the operationalization of projects initiated in the 2019-2020 timeframe, which is reflected in increased O&M costs. Also, based on the value realized by implementing an enhanced data management and analytics platform (which was a key factor in reducing the customer impact of 2020 PSPS events), PG&E is continuing to invest in this platform in support of advanced risk analytics and work execution visibility. This work also contributes to the higher projected costs in 2021.

K. Resource Allocation (Section 7.3.8)

Section 7.3.8 of the 2021 WMP addresses allocation methodologies, risk reduction scenarios, and RSE analysis. Comments from parties regarding PG&E's RSE methodology and other risk issues are addressed in Section V above.

L. Emergency Planning and Preparedness (Section 7.3.9)

Section 7.3.9 of the 2021 WMP describes PG&E's planning and preparation for emergencies including training our workforce for restoration, community outreach, customer support during emergencies, disaster and emergency planning, mutual assistance from other utilities, and protocols to learn from wildfire events. Only one party commented on this section of the 2021 WMP.

SBUA applauds PG&E's programs to provide financial assistance to residential customers impacted by emergencies and recommends that the WSD require all utilities to expand their financial support services to include small commercial customers because many of these customers also have limited expendable income.[203] PG&E offers these protections via the decision in the Emergency Protections Proceeding (D.19-07-015) and Advice Letter 4145-G/5643-E. PG&E does not charge interest or late fees on payment plans for customers. In addition, PG&E offers payment plans for small business customers impacted by wildfire

[203] SBUA at p. 10.

emergencies. Impacted small business customers evacuated within a fire perimeter whose businesses are not destroyed may receive an 8-month payment plan with no more than 20% down. Small business customers whose businesses are destroyed in an emergency are eligible for a 12-month payment plan with no more than 20% down.

M. Stakeholder Cooperation and Community Engagement (Section 7.3.10)

Section 7.3.10 addresses initiatives designed to cooperate and communicate with stakeholders and communities including sharing best practices, cooperation with suppression agencies, fuel reduction cooperation, and other wildfire support efforts. None of the parties commented on this portion of our 2021 WMP.

IX. PUBLIC SAFETY POWER SHUTOFFS (SECTION 8)

Section 8 was a new section developed for the 2021 WMP by WSD to separately address PSPS issues. In this section we describe our protocols for PSPS events, our vision for PSPS going forward, anticipated changes in PSPS impacts, how we engage vulnerable communities and PSPS metrics. This section of the 2021 WMP produced a significant number of comments, which we address below.

A. De-energization Decisions (Acton and Joint Local Governments)

Joint Local Governments question PG&E's general statement from the 2021 WMP that we are assessing how to incorporate the presence of known, high-risk vegetation conditions adjacent to powerlines into de-energization decision making, which could result in de-energization of power lines that do not otherwise meet de-energization event criteria.[204] They argue that PG&E should have updated the language of the 2021 WMP to more fully address this issue.[205]

PG&E was not able to discuss the possible impact of known, high-risk vegetation conditions adjacent to powerlines, and their potential effect on de-energization decision making

[204] Joint Local Governments at pp. 11-12.

[205] Joint Local Governments at pp. 11-12.

in more detail in the 2021 WMP because the issue was still under consideration in early February and, in fact, remains under consideration as of early April. Two days before the filing of the 2021 WMP, PG&E's federal probation judge, Judge Alsup, held a hearing to discuss a proposed condition requiring PG&E to consider the existence of outstanding VM work tagged Priority 1 and Priority 2 within PG&E's service area subject to potential de-energizations. The following day (the day before PG&E's 2021 WMP was filed), Judge Alsup recommended that PG&E also be required to consider in our PSPS decision making protocol the approximate number of trees tall enough to fall on a line irrespective of the health of the tree and whether the tree stands outside or inside prescribed clearances.[206] With these discussions ongoing and not finalized in the days leading up to the filing of our 2021 WMP, PG&E could not have incorporated the details and projected impact of these possible conditions in our 2021 WMP.

PG&E has not updated the 2021 WMP to address these issues because no final decision has been made by Judge Alsup regarding our PSPS protocols. As noted by the Joint Local Governments, the Commission has objected to the proposed conditions set forth by PG&E's federal probation judge without first undergoing a state regulatory review. The Commission has also directed PG&E to work with Commission staff to initiate an expedited process for review of the proposed conditions prior to the 2021 wildfire season. In light of this directive, PG&E will be engaging with the Commission to initiate that process, and PG&E will keep the federal probation judge apprised of how that process proceeds.[207] A Commission workshop will be held on April 20, 2021 for PG&E to explain how it proposes to include the risk of trees falling into powerlines in determining the scope of PSPS in accordance with the conditions of our probation.

The Joint Local Governments also question whether PG&E's increased PSPS event information in the errata to Table 11 of the 2021 WMP is connected with the federal probation and the potential for including known, high-risk vegetation conditions adjacent to powerlines in

[206] *See USA v. PG&E*, Case 3:14-cr-00175-WHA, Document 1294.

[207] *USA v. PG&E*, Case 3:14-cr-00175-WHA, Document 1369.

PSPS decision making protocol.[208] PG&E can confirm that the changes made to Table 11 of the 2021 WMP are unrelated to the proposed probation conditions. The PSPS Table 11 Errata numbers increased from the original 2021 WMP submission because of some mathematical corrections and the removal of the whole number rounding for PSPS event forecasts. As the 'projected data' is simply the average of the past 11 years' performance, PG&E has removed whole number rounding to provide more specific data.

Acton argues that the models PG&E uses for making PSPS decisions should not include outages that were caused by equipment failure because it may bias the models toward a PSPS event at lower wind speeds.[209] However, Acton's proposal is an oversimplification of a complex issue. The physical process of an electric outage is complex and occurs due to vegetation causes, structural failures, electrical failures, third party causes, and animal causes. Outage rates increase in likelihood as wind speed increases for many outage causes (such as healthy tree failure or conductor failure). Further, the relationship between wind and outages is not binary, where wind is either the only cause or there is no outage. In other words, wind is a common driver of outages but is only one of multiple causal factors for an outage. The OPW Model learns the historical outage patterns (when outages have and have not occurred given wind speed) for each outage node across the service area.

The OPW Model is not biased towards low wind speeds as it is trained on wind speeds from all hours in each location, learning whether there was an outage or not given the wind speed. These learned outage patterns are heterogeneous, with some areas having higher outage activity at moderate windspeeds, and other areas having a steeper "curve" of outage likelihoods as windspeed increases with higher outage activity only at high windspeeds. The OPW Model learns these heterogeneous outage patterns which allows PG&E to understand outage probabilities and associated ignition risk with respect to wind speed for each location across

[208] Joint Local Governments at p. 12.

[209] Acton at pp. 10-11.

PG&E's service area.

B. Accounting for Safety Risks That Occur During PSPS Events (Acton)

Acton maintains that the utilities must balance risks associated with de-energization with wildfire risks, and describe their respective methodologies for assessing both sets of risks.[210] The use of PSPS events serves to minimize the risk of a potential catastrophic wildfire during peak fire conditions. PG&E understands the negative impact PSPS events have and the risks associated with these events. For this reason, we have developed a detailed decision making process used before a PSPS event is called[211] and protocols for mitigating the public safety impacts during PSPS events.[212] With regard to the risk assessment that Acton proposes, in the risk modeling and planning stage, PG&E assesses the safety, reliability, and financial consequences of both PSPS and wildfire through the MAVF, consistent with Commission's defined methodology through the S-MAP Settlement Agreement. In assessing wildfire risk, PG&E considers the consequences of wildfire from 2015-2019 (and 2020 for the 2023 GRC). In assessing PSPS consequence, PG&E considers the results of the 2019 and 2020 PSPS events, as well as other large-scale blackouts across the United States. In that calculation of MAVF risk score, the risk of wildfire scores about ~25,000 MAVF risk points, while PSPS scores about ~2,000-3,000. This risk score comparison does not determine PG&E's decision to call a PSPS event, but it does provide some context on the difference in the level of risk between wildfire and PSPS.

With regard to actual operational decisions to call a PSPS event, as described in more detail in Section 8.2.2 of the 2021 WMP, the purpose of a PSPS de-energization is to reduce the threat of wildfire ignition based on the estimated condition and performance of our assets in a wind event using the OPW Model and FPI criteria. However, we acknowledge and appreciate Acton's comments and recognize the importance of addressing safety issues that may arise

[210] Acton at pp. 14-18.

[211] 2021 WMP at pp. 879-885.

[212] 2021 WMP at pp. 868-878, 904.

during a PSPS event itself. PG&E seeks to mitigate the impact of PSPS events by providing our customers and communities with education, notification and resources that could help address safety issues arising from the actual PSPS event. However, given the potentially devastating impact of a catastrophic wildfire, the primary consideration for deciding whether to call a PSPS event is the impact of a specific weather event on public safety. As we explained in the 2021 WMP:

> A PSPS cannot eliminate all wildfire risks and is utilized as a last resort measure to reduce the risk of catastrophic fires and maintain public safety. At this time, there is no singular algorithm for criteria that yields an objective result. Thus, PG&E evaluates PSPS decision-making criteria on an ongoing basis. This ongoing evaluation may result in changes to PG&E's PSPS criteria and decision-making process in 2021 and beyond.
>
> PG&E initiates a PSPS when the weather forecast is for such severe weather that people's safety, homes and businesses may be in danger of wildfires. As each weather situation is unique, PG&E carefully reviews a combination of factors when deciding if power must be turned off.
>
> Key factors that determine PSPS is weather and the fuel moisture in living and dead vegetation. Weather models inform many operational decisions throughout PG&E to prepare for forecast conditions and to mitigate fire risk, including PSPS. PG&E has tested and deployed high-resolution weather models and built high-resolution historical datasets by partnering with external experts. These high-resolution historical datasets and forecasts drive the what is known as the Large Fire Probability (LFP) model. The LFP model (Distribution), represented as LFPD, is the product of our Outage Producing Winds (OPW) and Utility FPI Models, which are the main inputs into the framework PG&E utilizes to make the decision to execute a PSPS event.[213]

We look forward to continued work with Acton and other stakeholders in the Commission's ongoing rulemaking (R.18-12-005) to consider PSPS criteria.

C. Use of Post-PSPS Damage Data (GPI)

GPI recommends that all utilities explain if and how they are using post-PSPS inspection data to inform risk incurred during PSPS events with the end goal of evaluating PSPS thresholds

[213] 2021 WMP at p. 879.

and/or exploring alternative solutions.[214] As explained in the 2021 WMP, following a PSPS event, all impacted transmission and distribution overhead lines that are identified as "event-specific assets at risk" in High Fire Risk Areas (HFRA), as directed by PG&E's Emergency Operations Center, must be patrolled in their entirety. In addition, all hazards must be cleared and/or damages repaired prior to re-energization. Hazards include tree branches entangled in the conductor; damages include fallen lines or poles.[215] PG&E has periodically gathered post-PSPS patrol/inspection data (damages and hazards) and factors it into our risk assessment in the overall Enterprise Risk Model. In the future, PG&E intends to also include this dataset to inform locations for potential ignitions as part of the 2022 Wildfire Distribution Risk Model. PG&E does not currently use post-PSPS patrol/inspection data to inform PSPS de-energization thresholds.

D. Efforts to Reduce PSPS Events (Kevin Collins and Santa Clara)

Santa Clara suggests that PG&E has not sufficiently described our short, medium, and long-term efforts to reduce the need for PSPS events to mitigate wildfire risk.[216] As detailed in the 2021 WMP, PG&E cannot forecast a reduction in the number of PSPS events in the coming years because long-term climate models point to a higher probability of more frequent fire weather conditions. The actual number of PSPS events in any given year is dependent on the weather patterns and severe weather events experienced in that year. Additionally, PG&E is assessing how to incorporate the presence of known, high-risk vegetation conditions adjacent to powerlines into PSPS decision making, which may ultimately result in increased PSPS events. While PSPS is an important last resort wildfire safety tool, we know that losing power disrupts lives, especially for those with medical needs, customers working from home, and students engaged in distance learning in response to the pandemic. We only use PSPS events as a last resort to reduce the risk of major wildfires during severe weather. Given this, we are focused on

[214] GPI at p. 31.

[215] 2021 WMP at p. 887.

[216] Santa Clara at p. 4.

building upon our 2020 PSPS improvements and making the PSPS program better for our customers without compromising safety. PG&E continues to focus in 2021 and beyond on further improving PSPS events for the customers we are privileged to serve while continuing to reduce the risk of catastrophic wildfires. .

Mr. Collins notes that PG&E references PSPS over 1,800 times in the 2021 WMP and that by "designing a circuit fire-safety strategy around power shut downs, PG&E is transferring its cost to build safe reliable circuits onto its customers."[217] PG&E disagrees with the statement that we use PSPS events to avoid building safe, reliable circuits and that is why we have placed an emphasis on PSPS events in our 2021 WMP. Resolution WSD-011 set forth the guidance for the 2021 WMP update to be submitted by the utilities. In that guidance, the WSD created a new section specifically for PSPS, which included five subsections. In those subsections, as well as in other summary areas of the 2021 WMP, PG&E fully describes our short, mid, and long-term goals for PSPS events, as required. More importantly, we are obligated to protect our customers from the risk of wildfire. We do not take the decision to de-energize lightly, and we recognize that de-energization comes with its own risks and hardships. Therefore, as indicated in the 2021 WMP, PSPS is used as a mitigation measure of last resort to prevent the potential for catastrophic wildfires.

E. Community Resource Centers (SBUA and William Abrams)

SBUA proposes that the WSD require the utilities to explore the need for 24/7 Community Resource Centers (CRC) during PSPS events and how they can be safely operated.[218] However, this issue has already been addressed by PG&E and the other utilities in the PSPS proceeding (*i.e.*, Rulemaking 18-12-005). Operating CRCs for 24 hours a day can pose significant safety concerns for utility employees and members of the public. In addition, CRCs do not provide housing during PSPS events. Accordingly, in D.20-05-051, the Commission

[217] Collins at p. 6.

[218] SBUA at p. 11.

determined that "[w]e understand that there are concerns for employee safety during late-night operations, and further it is not the intent of the Commission for these CRCs to function as shelters during de-energization event. . . . Considering this, we determine that the appropriate hours of operation shall be 8:00 a.m. to 10:00 p.m. during de-energization events."[219]

Mr. Abrams requests that CRC locations rarely change and that both outdoor and indoor alternatives be communicated to residential customers prior to the wildfire season.[220] PG&E has the ability to publish the full list of potential indoor and outdoor CRC sites to our webpage prior to PSPS events. However, in any given event, all possible CRC locations in a community may or may not be activated. In addition, local conditions and coordination with local emergency management can lead to changes in CRC locations from pre-season or initial event planning. The Joint Local Governments emphasized in their Opening Comments to Phase 3 Scoping Memo and Ruling in R.18-12-005 that they expect the utilities to consult with local Offices of Emergency Management and public health officials when deciding on CRC locations and types, just as the utilities did during 2020 and early 2021 de-energization events.[221] Therefore, PG&E continues to recommend not publishing a complete list because it may create confusion for customers if they look at the complete list of sites prior to a PSPS event but actual conditions and CRC availability differ from what they reviewed in advance. Which CRCs are opened during an event depends on: (1) the scope of the PSPS event; (2) county and tribal government feedback during an event around location preferences; (3) landowner responsiveness and site availability; and, (4) COVID-19 considerations.

F. Providing Sectionalizing Device Information (William Abrams)

Mr. Abrams suggests that the utilities should provide local agencies with maps of weather stations and sectionalization devices prior to each fire season.[222] All of PG&E's weather stations

[219] D.20-05-051 at pp. 39-40.

[220] Abrams at p. 12.

[221] R.18-12-005, Joint Local Government Opening Comments on Phase 3 (March 19, 2021) at pp. 6-7.

[222] Abrams at p. 13.

are on the pge.com/weather website and are available with real-time weather readings (https://www.pge.com/en_US/safety/emergency-preparedness/natural-disaster/wildfires/psps-weather-map.page). As for sectionalization devices, PG&E cannot provide a public map with the latitude/longitude of these devices because of issues relating to public safety and protection of critical infrastructure information for our facilities. However, PG&E agrees that communication with local leaders may be helpful to understand the scope of potential PSPS events. PG&E has previously provided both high level maps indicating the approximate location of sectionalizing devices and maps indicating the likely in-scope and out-of-scope areas for potential PSPS events. We will continue to provide this information as we coordinate with our community partners and prepare for the 2021 wildfire and PSPS seasons.

G. Providing Wind Speed Information After PSPS Events (MGRA)

MGRA suggests that the utilities be required to provide forecasted and measured wind speed data following PSPS events.[223] Much of this information, including actual wind speeds experienced at specific PG&E weather stations during a PSPS event is provided in the post-PSPS report to the CPUC.[224] In addition, PG&E already provides measured wind speed data to the public through Mesowest, or the National Weather Service Weather Data, and Hazards Viewer. PG&E, other utilities, the National Weather Service, and numerous academic and private institutions use the Weather Research and Forecast (WRF) model to provide high resolution forecast data. WRF was developed by the National Center for Atmospheric Research (NCAR) and is the gold standard of high-resolution weather models[225]. PG&E has two experts in numerical weather prediction with advanced degrees in Atmospheric Science and has also worked with two external experts in numerical weather prediction (DTN and Atmospheric Data

[223] MGRA at p. 82.

[224] PG&E's post-PSPS event reports to the CPUC are available on our website at: https://www.pge.com/en_US/residential/outages/public-safety-power-shuttoff/psps-reports.page (as of April 9, 2021).

[225] More information about WRF can be found here: https://ncar.ucar.edu/what-we-offer/models/weather-research-and-forecasting-model-wrf (as of April 9, 2021).

Solutions). Over the course of half a year, internal and external experts tested the WRF model at 2 km resolution before deploying the model operationally. This included extensive back-testing and validation of past PSPS events. The WRF model was recommended for deployment by these two external experts and that recommendation was approved by the internal PG&E team before it was deployed.

X. ADDITIONAL ISSUES RAISED BY PARTIES

A. Ignition Investigation Issues (Cal Advocates)

In our First Quarterly Report, submitted on September 9, 2020, in response to Condition PGE-2, we explained that one of the potential reasons for the higher failure rate of PG&E equipment was how ignitions are categorized by first responders including a default for ignition causes to equipment failure.[226] In its evaluation of the First Quarterly Report, WSD asked for more information regarding the default issue.[227] On further review, we determined that the statement regarding defaulting to equipment failures for ignitions was incorrect and so we corrected it in our supplemental February 26, 2021 submission when we addressed WSD's request for additional information.[228]

Cal Advocates asked discovery requests concerning this correction which we responded to by explaining that the employees who drafted the First Quarterly Report response had misunderstood the ignitions investigation process and thus mistakenly included the statement regarding defaults.[229] In that same discovery response, PG&E also provided a detailed explanation how our ignitions investigation process works.[230]

The information included in the First Quarterly Report, which is more than 200 pages

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[226] First Quarterly Report at p. 98.

[227] *Wildfire Safety Division Evaluation of Pacific Gas and Electric Company's First Quarterly Report* dated January 8, 2021 at p. 20.

[228] *Supplemental Filing Addressing Remedial Compliance Plan and First Quarterly Report Action Items* submitted February 26, 2021 at p. 34.

[229] Cal Advocates at p. 45.

[230] *See* PG&E response to Data Request CalAdvocates_050-Q01, dated March 10, 2021.

long, was a simple error and while PG&E apologizes for this mistake, it does not warrant the investigation that Cal Advocates now proposes. Cal Advocates asserts that WSD should investigate differences between PG&E's statements in our First Quarterly Compliance Report and the 2021 WMP by requiring PG&E to explain the differences in the responses, conduct an investigation as to how field personnel have recorded ignitions in the past three years, require PG&E to review the accuracy of every statement in the First Quarterly Report, and require PG&E to submit an affidavit as to the accuracy of each statement.[231] This is an overly punitive and time consuming recommendation for a mistake that PG&E has already corrected. Moreover, given all the important work that needs to be done to mitigate wildfires, this type of additional work is both unnecessary and imprudent.

B. Providing Ignition and Fire Data (MGRA)

MGRA suggests that utilities should publicly report all wildfires for which investigation is underway, including the wildfire name and its start date to allow stakeholders to obtain data from public sources.[232] This proposal should not be adopted. Extensive reporting requirements already exist to report Electric Incident ignitions under investigation. For example, on April 1, 2021, PG&E submitted a Fire Incident Collection Report for the 2020 calendar year to the Safety Enforcement Division. The report included information for Electric Incident ignitions under investigation. Also, PG&E's latest GIS submission to the WSD on February 5, 2021 included ignition event data associated with Electric Incident ignitions under investigation. Creating and maintaining a separate, public disclosure form listing all ignitions resulting in a fire greater than 10 acres in size currently under investigation would require significant work and oversight. More importantly, it would inevitably implicate issues of confidentiality, work product, and attorney-client privilege because fires are often connected with potential litigation.

[231] Cal Advocates at pp. 44-46.

[232] MGRA at p. 90.

C. Contractor Management (Cal Advocates and Joint Local Governments)

Cal Advocates suggests that the WSD require PG&E to submit a corrective action plan, and perform an internal audit, to address the number of worker injuries related to wildfire mitigation efforts.[233] This suggestion is a response to the fact that in Table 6 of the 2020 WMP and Table 5 of the 2021 WMP, PG&E provided data for OSHA-*recordable* injuries to employees, contractors, and members of the public due to wildfire mitigation activities rather than OSHA-*reportable* injuries. As noted by Cal Advocates, OSHA-*recordable* injuries encompass a much broader range of injuries than OSHA-*reportable* injuries.[234] Therefore, the number of contractor injuries included in PG&E's Table 5 have been higher than those reported by the other large utilities.

In response to the concerns raised by Cal Advocates, and in order to align with the WSD template, we re-reviewed our records regarding injuries to employees, contractors, and members of the public to determine which injuries may be classified as OSHA-*reportable* injuries due to wildfire mitigation initiatives from 2018-2020. On April 12, 2021, we amended Table 5 of the 2021 WMP to identify six relevant OSHA-*reportable* injuries and provided the amended table to Cal Advocates as a supplemental discovery response to Data Request 41, Question 12. Only three of the six OSHA-*reportable* injuries identified in the amended Table 5 involved contractors working for PG&E during wildfire mitigation activities from 2018-2020. Given the limited number of OSHA-*reportable* injuries to PG&E contractors during wildfire mitigation work, PG&E does not believe that a corrective action plan is needed at this time.

In addition, PG&E is actively working to improve both our record keeping and our efforts to prevent serious injuries and fatalities (SIFs). PG&E currently performs an investigation of all contractor SIF incidents. Investigation results are communicated across the enterprise as Safety Advisories, Daily Digest articles, and in the enterprise Corrective Action Plan system. All corrective actions are tracked to closure. Recently, PG&E has initiated the

[233] Cal Advocates at pp. 32-35.

[234] Cal Advocates at p. 33.

following, actions to address contractor SIFs:

- Creation of a strategic safety plan by the VM department that includes proper contractor selection;
- Work to establish consistent VM worker training and competency requirements; and
- Safe work practices to ensure proper oversight of work by an experienced supervisor to help reduce serious incidents.

Given these process improvements, PG&E does not believe that a separate, internal audit regarding worker injuries during wildfire mitigation activities should be initiated at this time.

Cal Advocates and the Joint Local Governments also suggest that the WSD should require PG&E to improve our oversight of contractors, including tracking the quality of work of individual contractors and developing specific action plans to address underperforming contractors.[235] PG&E is currently working to address these issues. The Contractor Safety Standard SAFE-3001S requires the lines of business (LOB) to perform safety observations of their contractors. Additionally, the Corporate Contractor Safety team conducts LOB compliance assessments regarding adherence to approved contractor oversight procedures. As of early 2020, PG&E's Contractor Safety Program also requires that field safety observations are performed and documented to verify contractor compliance with PG&E and regulatory standards, rules, and codes. Field safety observation frequencies are based on the risks associated with the contractor scope of work. Results are communicated to the organization on a weekly basis.

In addition, the vegetation management team is adding 75 Vegetation Management Inspectors (VMI) to provide field oversight and real time feedback to the tree crews. With 75 VMIs and approximately 1,500 tree crews, this provides a ratio of 20:1 crew to VMI. PG&E worked with the International Brotherhood of Electrical Workers (IBEW) to create the VMI position. The IBEW is involved with the recruitment of employees with tree crew experience. The VMIs will be focused on safety and quality of the tree crews. Results will be communicated

[235] Cal Advocates at p. 24; Joint Local Governments at pp. 5-6.

to PG&E on a weekly basis. Given these new controls, PG&E disagrees with the need for a separate, semi-annual internal audit to address contractor oversight.

Cal Advocates argues that PG&E does not properly vet contractors for ethical violations and cites to the hiring of a single contractor, Bay Area Concrete (BAC), as evidence for this claim.[236] This is incorrect. PG&E performs a third-party risk screening to assess the cybersecurity, privacy, operational, or financial risks of hiring contractors and suppliers to perform work for our company. This third-party risk screening is a joint effort with various roles and responsibilities outlined for lines of business, risk subject matter experts, Sourcing and Third-Party Risk Management team. Suppliers are also required to be familiar with PG&E's Supplier Code of Conduct, which sets forth the principles and standards of conduct that PG&E expects suppliers, their employees, subcontractors, and sub-suppliers to meet during the provision of materials and services. PG&E also selects suppliers via competitive processes using a bid scorecard to assess supplier competitiveness and qualifications. Contracts are established and Purchase Order(s) issued because of these competitive events.

Regarding BAC, PG&E's prior dealings with this contractor do not demonstrate a flaw in our contractor evaluation procedures. In fact, contrary to Cal Advocates' argument, the situation with BAC demonstrates that PG&E's internal investigation processes work. Our initial evaluation of BAC did not reveal any ethical concerns, therefore, we entered into a written contract with the supplier for spoils hauling in 2016. After receiving complaints about BAC, we initiated a detailed investigation into the company and its personnel and subsidiaries. The investigation led to the discovery of ethical concerns relating to BAC's work for PG&E and, as a result, we ceased to do business with BAC and its subsidiaries. In addition, two PG&E employees that worked extensively with BAC no longer work for our company. Thus, PG&E's investigation into BAC resulted in a corrective action taken by the company.

Following the BAC investigation, PG&E has implemented an even more rigorous process

[236] Cal Advocates at pp. 21-22.

for new vendor screening and screening of new contracts with existing vendors. This includes a deeper review of the ownership structure of all new vendors to identify and prevent potential conflicts of interest. In addition, PG&E has enhanced our process for contract risk assessments, including expanding our team of risk specialists who evaluate the risk and adequacy of the vendor controls. These enhancements are aimed at improving our robust efforts to evaluate the contractors needed to perform work on projects throughout the company.

D. GIS Data (MGRA)

MGRA suggests that the WSD should require all utilities to provide historical event data back to 2015 in the format specified in its GIS Template so that the WSD can analyze trend data and verify utility claims.[237] Further, MGRA suggests that WSD should work with utilities to identify non-confidential data in their GIS Data Standard submissions and require that this data be made available to stakeholders.[238] The *Wildfire Safety Division (WSD) Geographic Information System (GIS) Data Reporting Requirements and Schema for California Electrical Corporations* (GIS Data Standard) prescribe a detailed and complex data schema for which electrical corporations are required to provide quarterly submissions. Included in the requirements are prescribed timelines for which data is requested for feature classes or related tables. Providing historical event data back to 2015 is out of scope with WSD's requirements (which focus on tracking progress towards WMP objectives as opposed to historical data trends) and is not feasible for the reasons described below.[239]

Event data collection, storage, and processing has changed over time as risk drivers and operational needs have evolved. This has contributed to changes in the types of data collected, source systems used, and data architecture. These variations introduce significant complexity for collecting, consolidating, and transforming historical data into the GDB schema. Performing this

[237] MGRA at p. 101.

[238] MGRA at p. 85.

[239] In its GIS Data Standard (V2), WSD notes that, 'consistent, high quality, and standardized data are fundamental to the WSD's ability to evaluate and monitor the implementation of electrical corporations' WMPs effectively.'

transformation would be overly burdensome and require significant time, IT resourcing, technology platform investment, and manual labor requirements from subject matter experts involved in core wildfire mitigation related work. Looking ahead, PG&E plans to coordinate system or architectural data changes in alignment with the WSD GIS Data Standard, where possible. As additional submissions are delivered, the ability for additional trend analysis will be enabled.

In addition, creation of a public, or non-confidential, version of the quarterly GIS deliverable is not practicable in the near term and would require significant collaboration between WSD and the utilities given the amount of confidential data and complexities involved. The data schema provided through the WSD's GIS Data Standard structures data with geospatial identifiers in a connected architecture. PG&E has identified confidential data on a field basis through the Status Report that accompanies each quarterly submission. When viewed comprehensively, data inputs that may not be labeled confidential on their own may become confidential when combined with geospatial features or connections to other feature classes. Identifying these instances is highly complex, as the Data Standard itself provides 1,057 fields, many of which have various correlations with data inside and outside of their given feature classes or related tables. Examples of some elements of confidential data include substation information, critical infrastructure, ignition data, and customer information. To provide a non-confidential version of the WSD GIS Data Standard would necessarily require omitting both the entirety of various feature classes as well as additional fields in which these confidential data appear throughout the FGDB.[240]

E. Utility Wildfire Mitigation Maturity Survey (GPI and MGRA)

MGRA recommends that for future WMPs, the utilities should provide summary tables

[240] For example, in addition to the Substation feature class, the attributes [Substation ID, Substation Name, Substation Type, and Terminal(n)] appear 37 times throughout 17 other feature classes of the WSD GIS Data Standard.

concerning their respective Maturity Model Survey results.[241] The Wildfire Mitigation Maturity Survey has been designed by WSD. PG&E would support this proposal if WSD and stakeholders would find summary tables useful. MGRA also recommends that WSD audit Wildfire Mitigation Maturity Surveys results.[242] Again, if WSD and stakeholders would find this useful, PG&E does not oppose this kind of an audit being undertaken by WSD. MGRA also suggests that WSD optimize the survey.[243] While PG&E disagrees with MGRA's assertion, offered without any specific detail, that there are inaccuracies in the Wildfire Mitigation Maturity Survey data, PG&E does not oppose WSD continuing to improve the survey process.

GPI proposes a new set of maturity model questioning regarding vegetation removal programs for utilities.[244] PG&E's concern with creating additional questions for the Maturity Model is that it could divert attention away from the current key areas of focus to reduce wildfire risk and impacts. PG&E agrees that all of the utilities have areas for improvement and that wildfire mitigation programs, including disposal of slash and woody debris, must be continually enhanced over time. However, vegetation management should continue to have a resolute focus on the current maturity model items for improvement to ensure safe and reliable service while mitigating wildfire risk now and into the future.

F. General Recommendations on Technical Issues (Cal Advocates)

In addition to its PG&E-specific comments, Cal Advocates includes a number of recommendations on technical issues that are applicable to all three utilities. First, Cal Advocates recommends that the utilities provide specific workplans for wildfire mitigation work.[245] PG&E does not oppose providing workplans to WSD and stakeholders but cautions that workplans can and should change during a year. As conditions changes, including

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[241] MGRA at p. 83.

[242] MGRA at p. 84.

[243] MGRA at p. 84.

[244] GPI at p. 22.

[245] Cal Advocates General Utility Comments at pp. 27-29.

permitting delays, ability to access sites, weather, etc., workplans will necessarily need to change as well. Thus, while PG&E can provide workplans once they are available for a calendar year, it is important to note that these plans will change as events occur during the year.

Second, Cal Advocates proposes that WSD convene a technical working group to examine risk-modeling practices among the utilities.[246] PG&E supports this proposal. This may help stakeholders better understand how some of the utility modeling works and allow a venue where parties can provide feedback and input.

Third, Cal Advocates proposes a working group to discuss RSE calculations and methodology.[247] PG&E does not oppose this proposal, but we do caution that a substantial amount of work has been, and is being, undertaken in the 2020 RAMP proceeding, the Risk-Based Decision Making Framework OIR (R.20-07-013) and other venues at the Commission. Before WSD initiates a technical working group to address RSE methodologies, it should first confirm that the scope of what will be considered by the technical working group is not duplicative of other efforts.

Fourth, Cal Advocates proposes a working group to examine covered conductor cost issues.[248] PG&E does not oppose this proposal, but notes that there may be some confidentiality issues related to specific utility cost data and contracts that will need to be addressed before the technical working group can share detailed cost information.

Fifth, Cal Advocates proposes a technical working group to evaluate the efficacy of climbing inspections of transmission structures.[249] PG&E supports this proposal.

While PG&E agrees with many of Cal Advocates' proposals for technical working groups, it is important to keep in mind that WSD, the utilities, Cal Advocates and all the other potential stakeholders have finite resources and time. Thus, while convening various working

[246] Cal Advocates General Utility Comments at pp. 29-35.

[247] Cal Advocates General Utility Comments at pp. 38-39.

[248] Cal Advocates General Utility Comments at pp. 39-40.

[249] Cal Advocates General Utility Comments at pp. 40-42.

groups on a myriad of topics may be helpful, WSD should prioritize which issues are critical in 2021 for mitigating wildfires. Some working groups, although helpful, may not be as necessary to accomplish this goal.

G. Recommendations for Future WMP Guidelines (Cal Advocates)

Cal Advocates includes more than 20 pages of detailed proposals regarding future WMP Guidelines and process. These comments are out of scope for this part of the WMP proceeding. Here, WSD is considering the 2021 WMPs proposed by the utilities, not the appropriate guidelines for the 2022 and beyond WMPs. While we appreciate Cal Advocates' proposals, they would seem to be better raised and addressed after the 2021 WMPs have been evaluated given the substantial number of issues and short time for the 2021 WMP review. WSD and the parties can use time after June 2021 to discuss ways to improve the process for the 2022 WMP, as Cal Advocates suggests.[250] Thus, in these reply comments, we will not address every proposal made by Cal Advocates regarding future WMP guidelines. We do, however, have a few initial observations.

First, PG&E agrees with Cal Advocates that WSD should re-examine the WMP schedule. We recognize that the statutory framework creating the WMP includes an expedited review process.[251] This aspect of the WMP schedule cannot be changed. But there are other aspects of the WMP schedule that WSD may want to revisit. Revisiting the schedule could include consideration of Cal Advocates' proposal to stagger WMP submissions.[252] While PG&E does not yet have a position on this issue, staggering submissions is something that should at least be considered further.

Second, we agree with Cal Advocates that more guidance is needed as to whether a WMP only needs to be updated each year or whether an entirely new WMP should be submitted.[253]

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[250] Cal Advocates General Utility Comments at pp. 46-49.

[251] Cal Advocates General Utility Comments at pp. 42-44.

[252] Cal Advocates General Utility Comments at pp. 45-46.

[253] Cal Advocates General Utility Comments at pp. 44-45.

Third, Cal Advocates offers a number of suggestions for how information in the WMPs should be presented.[254] While we have not had time to thoroughly review and consider Cal Advocates' suggestions, these ideas and other suggestions regarding the presentation of WMP information could be considered in discussions about the WMP process going forward.

Fourth, Cal Advocates suggests that utilities include additional information regarding fires and ignitions caused by their equipment.[255] PG&E does not oppose this proposal, but we do caution that this may take more time than Cal Advocates anticipates. In some situations, CAL FIRE has retained equipment that is located near the ignition point for a fire. The utilities may not be able to conduct a complete root cause analysis until information and equipment retained by CAL FIRE is made available to the utility to conduct the utility's own review.

Finally, Cal Advocates proposes changes to the Change Order process to make it more streamlined and efficient.[256] Again, PG&E has not had time to consider Cal Advocates' specific proposals but agrees that discussing the Change Order process would be useful.

H. Improvement for Stakeholder Comments

Finally, to the extent WSD continues to use a comment and reply comment approach on WMPs in the future, we would like to provide one item of feedback for WSD and parties regarding the structure of comments. While parties' comments on the 2021 WMPs were helpful, at times it was difficult to determine which specific portions of the WMP parties were addressing, and some portions of comments addressed a variety of different portions of the WMP. In other Commission proceedings that involve numerous and complex issues, the Commission has required the use of a common briefing outline to line up parties' comments on specific issues to allow for easier comparison of party positions. PG&E recommends that for comments on future WMPs, the parties be instructed to use WSD's WMP outline for their comments so that they follow the outline in making their comments. This is how MGRA and

[254] Cal Advocates General Utility Comments at pp. 49-56, 57-62.

[255] Cal Advocates General Utility Comments at pp. 62-64.

[256] Cal Advocates General Utility Comments at pp. 64-65.

William Abrams structured their respective comments, for example, which was very helpful during the review process.

XI. CONCLUSION

PG&E appreciates the comments and feedback of parties on our 2021 WMP. Parties have provided some helpful suggestions for the WMP process going forward and feedback on PG&E's 2021 WMP. Our reply comments address these suggestions and feedback. In some cases, parties have made well-reasoned recommendations that should be adopted going forward, which we note in these comments. In other cases, recommendations may have been based on misunderstandings of the WMP requirements and/or the information in the 2021 WMP. In these circumstances, we have provided information, citations to the 2021 WMP, and other materials. We have also provided explanations as to why we believe the recommendations should not be adopted.

In addition to 2021 WMP-specific comments, Cal Advocates and TURN make general proposals regarding approval of the 2021 WMP. As explained in Section II, Cal Advocates' proposal that our 2021 WMP should be denied is contrary to the law and the facts and thus this proposal should be rejected. TURN's proposals regarding the meaning of approval and the alternative of denying the 2021 WMP are also flawed and should be rejected for the reasons explained in Section II.

Respectfully Submitted,

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Appendix A
Additional Responses to Specific Portions of MGRA's Comments

MGRA Comment	PG&E Response
The analysis presented in these comments demonstrates that PG&E's ignition probability model, in particular, makes some dubious assumptions and produces a result that strongly conflicts with data and analysis from numerous sources: specifically, it concludes that ignition probability is not wind dependent, or at the least that winds during fire weather events have no predictable geographic dependency. (p. 11)	The winds during fire weather are the focus of the fire simulation not the ignition probability portion of the 2021 Wildfire Distribution Risk Model. Nowhere do we conclude there is no geographic dependency.
All three major IOUs run into a significant issue with this modeling, however: the fires being simulated are smaller than typical "catastrophic" wildfires that cause damage. One reason is that the duration of the simulation is limited to 8 hours, a choice made by all three major IOUs. The net effect of smaller simulated fires is to artificially shift the calculated risk towards utility infrastructure proximate to population centers, and to downplay the risk of ignitions in remote areas that grow into major fires before descending as a broad front into wildland urban interface areas. (p. 12)	There are computational and "state of the science" reasons not to run simulations beyond the phase of the fire that is dominated by the exogenous factors of wind, fuels, and topography. Historically damaging fires typically come from locations that simulate with fires that spread and burn intensely according to the 8-hour simulations. That correlation is evidence, but not proof, that the hypothesized "shift" did not occur, but it is an assertion not backed by any evaluable metric or evidence, so we cannot address it head on. Having said that, fires that become crown fires start on the ground and there appears to be evidence in simulation data as well as more anecdotal analysis of historical fire ignition locations that the worst fires tend to start outside of heavy forest cover and spread into the canopy of more dense forests – recall that our analysis is of ignition locations.
Specifically, PG&E's Wildfire Distribution Risk Model finds that wind speed is a poor predictor of ignitions. (p. 14)	Ignition probabilities over long periods of time are less sensitive to prevailing wind conditions than other prevailing environmental factors, especially tall trees and dryness. Those are "but for" conditions of fire. Again, we advise looking to the weather data fed to the fire simulations for the patterns of wind correlated with "fire weather."
What is being put forward is effectively an alternative model of catastrophic power line wildfire ignition. In the model without wind-driven ignitions, ignitions occur at a certain rate. Should an ignition happen to occur during critical fire weather in a location subject to rapid fire growth, it is much	This comment conflates risk and ignition probability. The metric being managed by mitigation (*i.e.*, the main metric form modeling used to inform planning) is risk, not expected count/probability of ignitions. The fire simulation consequence data is much more highly correlated with risk than ignition probability and is also much more correlated with locations that experience wind during "fire weather."

MGRA Comment	PG&E Response
more likely to blow up into a major fire. So, this argument would go, by lowering the overall ignition rate, particularly where ignitions occur more often, we can lower the probability of catastrophic wildfires. (p. 15)	
PG&E does not incorporate wind associated with ignitions as an explanatory variable (model covariate), or peak wind value at the time of ignition, but rather annual average wind speed. Catastrophic fires generally do not start under "average" conditions. (p. 33)	For a model that labels locations with ignition probability that you need to integrate ignitions over several seasons to get a decent model fit with predictive power and that the "right now" conditions of each potential ignition are modeled via consequence simulations. It is also a requirement of the WMP that we model all ignitions. MGRA appears to be assuming a different model structure which would be tuned to a different, more narrow, set of questions – one that appears to be in closer alignment with the operational short term ignition forecasts used to call PSPS events.
PGE uses 2016-2018 as the training set for its model and 2019 for its test set. PG&E began using PSPS as its go-to wildfire mitigation tool in 2019, which leads to significant bias in the data since the data set no longer contains samples containing potentially catastrophic conditions. (p. 33)	Internally when evaluating model fitness, we trained on 75% of data from 2015-2018 and withheld 25% at random for testing, just as you suggest. For the officially reported runs, we trusted the model structure/methods to not over fit (given those train/test runs) and maximized the available training data to 2015-2018. We also predicted 2019 events and compared to actual outcomes because we were asked repeatedly to do so for both outside and internal purposes. We note that it is still a legitimate question to ask how well the model performed at predicting the known ignitions of 2019 and given that there are elevated likelihood of ignitions during PSPS events, the resulting metrics most likely under-perform compared to testing against the unknowable 2019 "true PSPS ignitions" would have. We also ran jackknifed runs leaving each covariate out sequentially and modeling on only each single covariate to measure isolated covariate performance. All these results inform our confidence in the model's predictive performance. And on the question of bias, we agree that training on 2019 would have been biasing, so we did not do it. Since comments indicate familiarity with the available testing options, we suggest focusing on the randomly withheld test set results.
It might be expected that 99% annual peak winds would provide a better description of weather conditions likely to cause catastrophic fire, but in fact PG&E evaluated this possibility and "the 'wind max' variable was removed from the input variables as it did not	You might have expected that max mind would perform well, but it empirically did not. The 99th percentile value for wind is quite volatile and entangled with all the difficulties (some of which you've documented in your own work) of course vs. fine scale wind patterns (in both time and space). It is an empirical fact that "wind max" did not significantly add to the multi-seasonal spatially differentiated model

MGRA Comment	PG&E Response
contribute performance gain during out of sample testing…", a result that they found surprising enough that it was "questioned by our modeling team." (p. 35)	predictive power for the conductor-involved work, given all the other spatially differentiated environmental data. PG&E evaluated the relatively flat performance of wind in predicting ignitions.
This means that if a means can be determined to identify potential outages that are more likely to occur on NE wind days, mitigation to prevent these ignitions would be 20 times more efficient than a shotgun approach does not prioritize based on appropriate drivers. As a result of this error, PG&E's ignition model will not capture increased ignition risk in geographic areas that are particularly subject to high winds during red flag warning events. This error needs to be corrected. (p. 36)	This point appears to conflate ignition probability and risk. The risk is highly correlated with the consequence results, which use nothing but historical/observed "fire weather" data in their simulations. We did not make this assumed error.
PG&E should also incorporate PSPS damage into its Wildfire Distribution Risk Model if it is not doing so already. … However, in the longer term, PG&E (and in fact all utilities) are faced with the problem of how to assess risk in areas where de-energization is a frequent mitigation. Even if post-PSPS damage is included as a "ignition-equivalent" event, there will be some uncertainty as to what the calibration between these events and actual ignition events is. This will require further study on the part of the WSD and utility data science teams. (pp. 37-38)	The underlying data sets are just reaching the level of maturity to tackle this challenge, but we agree that it is a requirement of modeling with training data beyond 2018 and that by definition, effective PSPS events will cloud our ability to see what would have otherwise happened under the riskiest conditions. We also agree that this will be a matter that requires plenty of "further study" by all interested parties over time.
The concern is not that PG&E's selection of model is incorrect, but rather that its choice of explanatory variables was not suited to identifying the source of catastrophic fires, and that it has not compensated for the biases introduced by the introduction of PSPS in 2018. PG&E's model is not able to adequately account for ignitions occurring during the "anomalous	We hope it is clear at this point that models of all Tier 2 and Tier 3 HFTD area fire season ignitions over multiple seasons are empirically less sensitive to metrics related to prevailing wind conditions than a handful of other environmental factors, like the presence of tall trees and prevailing dryness, even though the impact of wind remains statistically significant. We hope it is also clear that such models are appropriate with the questions posed related to multi-year planning and prioritization of work and that the spatial patterns in "fire weather" winds (temporal and spatial) are handled primarily by the consequence simulations for these

MGRA Comment	PG&E Response
conditions" (p. 38)	models, but that those patterns actually dominate the risk metric used for planning. Finally, we hope it is clear that we are aware of the potential bias from training on 2019 data (*i.e.*, after the advent of PSPS events) and that we avoided biasing our model accordingly even though we did calculate and report our predictive performance on 2019 ignitions as one among several diagnostics of model performance.
PG&E should incorporate PSPS damage data into its ignition data sample to compensate for loss of ignition data due to PSPS. PG&E should calibrate ignition probabilities from PSPS damage data based on damage using historical outage and ignition data. (p. 39)	We agree and are underway with this year's modeling effort, which will incorporate "near miss" data from PSPS events, as suggested. The modeling critiqued, the 2021 Wildfire Distribution Risk Model, trained on 2015-2018 data specifically to avoid mixing the 2019 data (with its suppressed PSPS ignitions) into the training data without adequate data on (the encoding of the inspection findings into well labeled data was not complete at the time of our "2021" modeling efforts) or study of the "near miss" events from 2019 PSPS events. As the comments call out, there is no concrete way of knowing which instances of damage would have caused ignitions or larger fires, so their treatment as "presumed ignitions" does require careful thought and analysis.
After incorporating PSPS damage data into its ignition sample, PG&E should divide its ignition data into learning and testing samples based on randomized sampling and not calendar years. (p. 39)	We agree that models should be tested with random hold out data and regret that it was not clearer that we did run the models (one for vegetation-caused ignitions and one for conductor-involved ignitions) using a 25% hold out sample for testing and observed that those results affirmed that the model (which uses a loss function to regularize the fit) retained similar out of sample performance as in-sample performance (see figure below from the model documentation for an example from the vegetation-caused model). However, once we observed the soundness of the predictions, we opted to train the official runs on all available data from 2015-2018, since ignition data is already sparse. It is also important to note, that using a purely randomized split to training and testing data suffers from information leakage (https://en.wikipedia.org/wiki/Leakage_(machine_learning)). Consequently we will not be relying solely on a randomized test/train split to evaluate our models.
WSD should require PG&E to recalculate its risk rankings to incorporate peak winds and PSPS damage, and to account for the bias in data collection caused by the introduction of PSPS in 2018. (p. 39)	As we have noted, the consequence simulations were based on 400+ historical days of dangerous fire weather at 200-meter intervals along the entirety of the distribution grid in Tier 2 and Tier 3 HFTD areas. Technosylva fire simulation, like all current generation simulations, boils down to wind, fuels, and topography. Locations along the grid that have systematically elevated winds during Red Flag and similar

MGRA Comment	PG&E Response
	conditions simulate with more intense fires that spread more quickly due to those winds. Thus, the risk (which is the ignition probability times the simulated consequence) does already account for locations where elevated winds are associated with heat, dryness, and other fire conducive conditions. The bias from PSPS events enters the data in 2019, and that data was not used to train the model, so the model fit cannot be biased by PSPS events.