BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Office of Energy Infrastructure Safety
Natural Resources Agency

COMMENTS OF THE GREEN POWER INSTITUTE

ON THE 2022 WMP UPDATES OF THE SMJUS

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The Green Power Institute (GPI), the renewable energy program of the Pacific Institute for Studies in Development, Environment, and Security, provides these *Comments of the Green Power Institute on the 2022 WMP Updates of the SMJUs.*

Introduction

The GPI performed a review of the SMJUs' 2022 WMP Updates with a general focus on risk modeling and the reduction of green waste from vegetation management mitigations. Our comments focus on PacifiCorp and Liberty's 2022 WMPs, and secondarily address issues in the Bear Valley Electric Service (BVES) WMP. This is not, however, a reflection on the importance of holding BVES and their Wildfire Mitigation Plan to equally high standards. Based on our review we have substantial concerns regarding PacifiCorp's 2020–2021 performance and 2022 work plan and associated costs. We recommend issuing PacifiCorp a revision notice that addresses the disconnect between past versus proposed performance and costs. We provide further comments on the following topics:

- Equivocating language is a persistent issue in the SMJU WMPs.
- PacifiCorp expenditures in 2021 and 2022 do not correlate well with work completed or planned.
- Liberty and BVES spending stabilized along with program targets.
- SMJU's WMP-associated electric bill increases are much higher than IOU WMP customer increases.
- BVES does not distinguish between top-risk circuits and percent of work completed therein in their Program Targets tables.
- SMJU lessons learned assessments are a plan weakness that suggests high-level directional planning for the WMP is somewhat uncertain.

- SMJUs should clearly describe how they are working with other utilities to leverage existing data and ongoing studies relevant to their WMP research efforts.

- PacifiCorp's completed pilot project descriptions are inadequate.

- The SMJUs are relying heavily on the HFTD maps to guide risk mitigation planning efforts. They are also failing to analyze more granular risk and/or to use more granular risk findings to inform updates to the HFTD.

- SMJUs may be oversimplifying their assessment of climate change effects on granular wildfire risk.

- SMJUs fail to include tree species data in their risk modeling or vegetation management considerations.

- SMJUs have not yet developed comprehensive or transparent quantification methods for wildfire consequence and should be required to do so in the next 3-year WMP cycle.

- Comments on PacifiCorp's wildfire risk modeling.

- Comments on Liberty's wildfire risk modeling.

- Comments on BVES's wildfire risk modeling.

- Risk modeling and assessments do not include tree species.

- A standard fire spread model duration should be set for wildfire consequence modeling and quantification. GPI supports a 24 h duration to encompass a full diurnal cycle.

- PacifiCorp should be required to provide RSE for all wildfire mitigation activities in their 2023 WMP filing.

- PacifiCorp does not describe what near-miss data they are collecting.

- BVES should explore opportunities to contract with SCE for wildfire planning and/or mitigation services.

- PacifiCorp's additional PSPS impact reduction initiatives are reactive versus proactive risk reduction measures.

- Liberty's QA/QC inspection rate of 0.5 percent, is one tenth of the QA/QC performed by PacifiCorp and BVES (5 percent).

- Liberty should accelerate their expulsion fuse replacement program and improve the prioritization method.
- Liberty should explain whether and how it considers alternate pole materials or protections in high fire risk locations.
- Liberty and PacifiCorp do not adequately take into account ingress or egress routes in their risk modeling or Grid Design and System Hardening plan.
- PacifiCorp should assemble and store wildfire suppression equipment in their California territory.
- PacifiCorp rolls many mitigations into its line rebuild program. It should describe how it addresses specific equipment risk outside of the Line Rebuild program.
- All SMJUs should have a specific CC maintenance program that takes into consideration CC specific failure modes.
- Liberty should provide transparency in their WMP regarding whether Rule 20 undergrounding projects are funded by local citizens or ratepayers at large.
- Liberty's fuels management tables should be adopted by all utilities as the first-step and current best practice for reporting on vegetation residues produced during vegetation management work.
- PacifiCorp's 2022 WMP does not address the fuels/slash end uses discussed and VM replacement programs mentioned in the workshop.
- SMJUs should explain how they schedule and perform additional inspections and vegetation management in wildfire impacted areas.

Equivocating language is a persistent issue in SMJU WMPs.

Numerous instances in the SMJUs' 2022 WMP Updates feature equivocating language such as the modal verbs "can," "could," and "may," which indicate future possibilities but lack certainty. For example, Liberty states:

> The fire risk map and circuit risk analysis can be utilized as the baseline for Liberty's wildfire risk assessment. The designated high Reax wildfire areas can be used by operations and engineering for planning of wildfire mitigation work (Liberty 2022 WMP Update, p. 26).

PacifiCorp appears to describe a possible pilot study use-case, stating:

> These pilot studies could include identification of high- risk trees, including tree species, within strike distance to develop a future program incremental to the existing program to address fall-in risk (PacifiCorp 2022 WMP Update, p. 201).

In both of these instances it is unclear whether the utilities have already or actually will implement these activities. Subjective language use in the annual WMP filings over the course of the 3-year 2020–2022 WMP cycle has been an ongoing issue called out numerous times by stakeholders and the OEIS. The persistence of relatively uncertain forward-looking planning descriptions suggests the SMJUs may lack substantial forward planning frameworks with concrete program goals, objectives, outcomes, outputs and implementation timelines. GPI recommends requiring SMJUs to reduce the amount of equivocating language in the next 3-year WMP cycle, or provide an explanation of the implied uncertainty. For example, if a project or sub-project is deemed a lower priority compared to other planned work or is currently under development, the SMJUs could provide this more functional explanation in place of simply stating "may" or "can."

PacifiCorp expenditures in 2021 and 2022 do not correlate well with work completed or planned.

Despite exceeding their planned Situational Awareness budget by 159 percent (Table 1), PacifiCorp only installed 2 of 22 planned Continuous Monitoring Sensors (PacifiCorp 2022 WMP, p. 115), and did not exceed the target for weather station installation and monitoring (21 of 21 installed in 2021). Similarly, while expensing 95 percent of their Grid Design and System Hardening budget (Table 1), they only completed approximately 25 percent of planned covered conductor installation and 68 percent of planned pole replacements/reinforcements. Their 2021 program targets do not indicate any additional, substantive Grid Design or System Hardening work (31 of 27 planned system automation installations; 0 expulsion fuse replacements) that would account for the full expenditure of planned costs despite major program shortfalls.

Despite these shortfalls, PacifiCorp has increased their Covered Conductor installation program target from 81.22 miles in 2021 to 112 miles in 2022. Pole replacement/

reinforcement program targets were increased from 128 poles in 2021 to 2020 poles in 2022. They are also launching a dedicated expulsion fuse replacement program with a target of 2269 fuse replacements in 2022. These Grid Design and System Hardening program expansions are behind a 3.2-fold increase in program costs from 2021 to 2022, and are the driving force behind an overall 2.9-fold increase in total annual WMP cost (2021 to 2022, Figure 1).

GPI is concerned that PacifiCorp Grid Hardening and System Design expenditures are not accompanied by adequate gains in grid design and system hardening improvements that make up a substantial proportion of proactive mitigations intended to reduce wildfire risk. The implications are that PacifiCorp's Grid Design and System Hardening program is highly inefficient at reducing wildfire risk possibly due to excessive costs and/or programmatic inefficiencies. We are also concerned that PacifiCorp is increasing the program targets for 2022 without an adequate track record of program success, or updated plan for how they will reverse the inefficiencies and shortfalls experienced in 2021. It should be noted that outsourcing to contractors and/or rushed outside or in-house work could lead to quality control issues. GPI recommends conducting a thorough assessment of PacifiCorp's Grid Design and System Hardening program, including program costs to the extent practical in the WMP, with a goal of determining whether PacifiCorp's plan is feasible, their costs are reasonable, and the final product is sound.

PacifiCorp is projecting an approximately 10 percent increase in their Asset management and Inspections program from 2021 to 2022. However, their distribution inspection targets for 2022 are all decreased relative to 2021 targets, while transmission inspection and intrusive pole inspection targets are generally increased. GPI questions this reallocation of inspection efforts in the HFTD given that the majority of risk events occur on the distribution system, which has a much larger footprint. PacifiCorp's decision to increasing program costs while decreasing distribution inspection goals requires additional justification.

Despite PacifiCorp's 2021 expenses being on target for planned Vegetation Management costs (table 1), they are electing a 1.9-fold increase in the planned cost of 2022 Vegetation

Management activities (Figure 1). This increase in cost is not supported by their 2022 Vegetation Management program targets (PacifiCorp 2022 WMP, p. 119), which are on par with planned targets and/or work completed in 2021. The largest planned increase in 2022 work relative to 2021 planned and/or completed work is in VM activities around transmission lines. However, the majority of wildfire risk exposure, including for vegetation risk drivers is located on the distribution system. PacifiCorp should justify this cost increase relative to their VM program targets.

Table 1. PacifiCorp 2021 WMP costs

Mitigation Costs (x 1,000)	Planned	Actual	Delta	Percent change
Risk and Mapping	$ 186	$ 188	$ 2	1%
Situational Awareness	$ 462	$ 1,197	$ 735	159%
Grid Design and System Hardening	$ 25,035	$ 23,882	$ (1,153)	-5%
Asset Management and Inspections	$ 848	$ 919	$ 71	8%
Vegetation Management	$ 6,561	$ 6,639	$ 78	1%
Grid Operations	$ -	$ -	$ -	0%
Data Governance	$ 210	$ 215	$ 5	2%
Resource Allocation	$ -	$ -	$ -	0%
Emergency Planning	$ -	$ -	$ -	0%
Stakeholder Cooperation and Commu	$ 73	$ 58	$ (15)	-21%
Total	$ 33,375	$ 33,098	$ (277)	-1%

Figure 1. PacifiCorp 2020-2022 Planned WMP cost
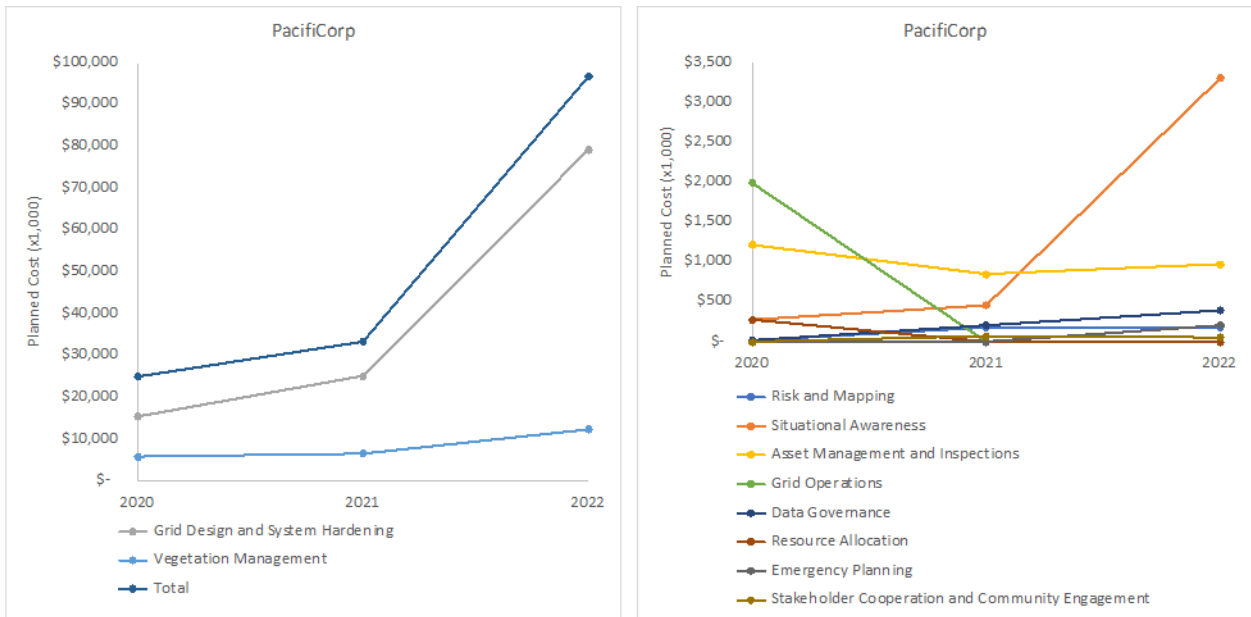
**Liberty and BVES spending stabilize along with program targets.**

Liberty noted setbacks in their 2021 WMP program targets due to the Tamarack and Caldor fires. This included shortfalls in their Grid Design and System Hardening program, such as covered conductor installations (3.75 miles of 9.1 miles planned), distribution pole replacement (211 of 400 poles planned), expulsion fuse replacement (867 of 1,500 planned), and tree attachments (37 of 60 planned, Liberty 2022 WMP Update, p. 82). These implementation shortfalls are reflected in similarly lower expenditures (40 percent of planned, Table 1). In general, Liberty costs for 2022 work are relatively consistent with 2021 costs (Figure 2), though some program targets have decreased, for example distribution pole replacements (400 in 2021 down to 231 in 2022) and tree attachment removal.

Liberty should provide a plan for how it will make up for program target shortfalls in 2021 and in future years with wildfire impacts. While wildfire may have impeded progress towards wildfire mitigation targets, these same challenges should be anticipated in the future. Progress towards wildfire risk mitigation should not be delayed year-over-year, thereby reducing the rate of risk buydown over the long-term.

Table 2. Liberty 2021 WMP costs

Mitigation Costs (x 1,000)	Planned	Actual	Delta	Percent change
Risk and Mapping	$ 10	$ 53	$ 43	430%
Situational Awareness	$ 295	$ 282	$ (13)	-4%
Grid Design and System Hardening	$ 32,905	$ 19,642	$ (13,263)	-40%
Asset Management and Inspections	$ 2,977	$ 1,643	$ (1,334)	-45%
Vegetation Management	$ 13,580	$ 10,567	$ (3,013)	-22%
Grid Operations	$ 548	$ 398	$ (150)	-27%
Data Governance	$ 418	$ 111	$ (307)	-73%
Resource Allocation	$ 124	$ 311	$ 187	151%
Emergency Planning	$ 900	$ 460	$ (440)	-49%
Stakeholder Cooperation and Community Engagement	$ 251	$ 102	$ (149)	-59%
Total	$ 52,008	$ 33,569	$ (18,439)	-35%

Figure 2. Liberty 2020-2022 Planned WMP cost
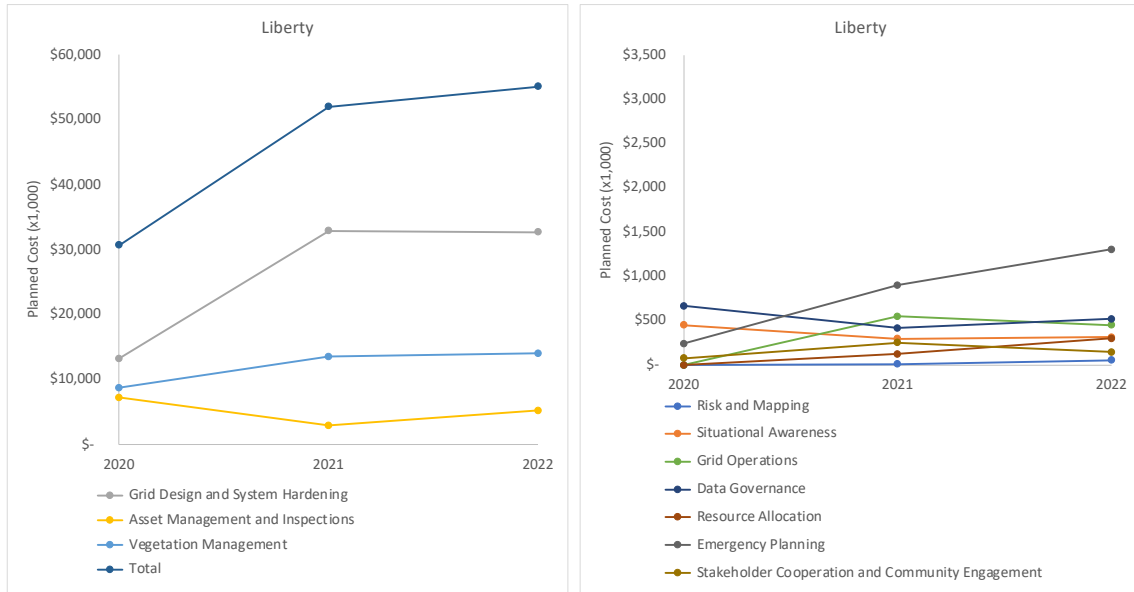
Planned WMP costs for Bear Valley Electric Services (BVES) remained relatively stable over the 2020 through 2022 planning horizon with the largest proportional change in situational awareness cost. Similarly, program targets are relatively consistent from 2021 to 2022. Marginal increases in risk and mapping, grid operations, and resource allocation should link to program improvements. However, additional investments may be required to advance these capabilities in the future, especially risk quantification.

Figure 3. BVES 2020-2022 Planned WMP cost
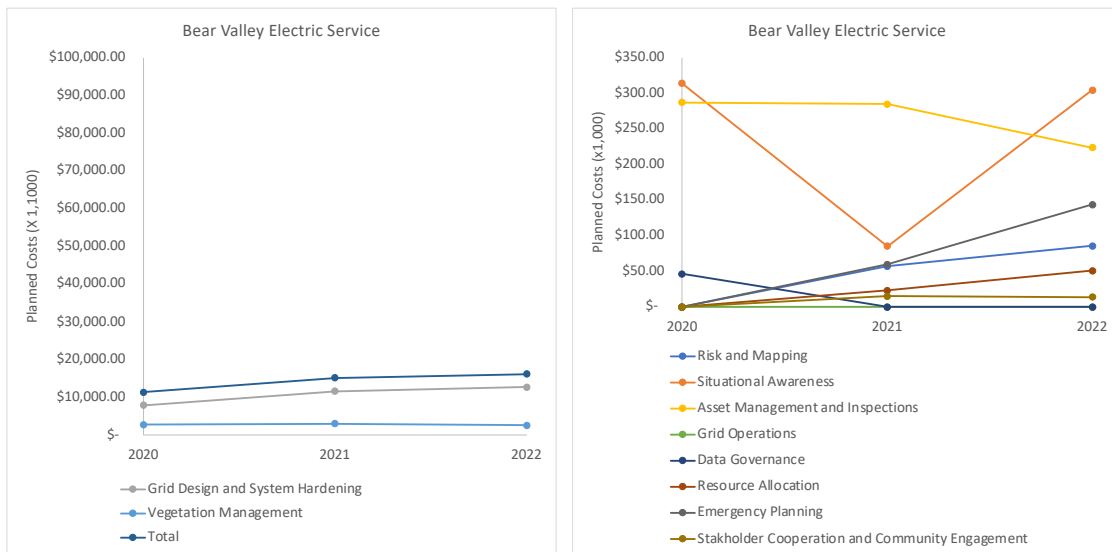
SMJU's WMP associated electric bill increases are much higher than IOU WMP customer increases.

However, Liberty projects an $18.35, or 17 percent increase in ratepayer costs due to wildfire mitigation activities. PacifiCorp does not provide a cost-increase metric since their GRC is scheduled for 2023. Given their relatively small customer base and high wildfire mitigation plan costs we are concerned that these costs may be quite large.

Bear Valley Electric Service projects a 0.03367/kWh increase. Assuming 500 kWh per residential house per month this would equate to $16.84 monthly bill increase. BVES should update this table to reflect customer's average *monthly* rate increase.

Liberty, BVES, and probably PacifiCorp's WMP activity effects on average monthly ratepayer costs significantly exceed those of the IOUs. PG&E, SCE, and SDG&E anticipate monthly customer bills to increase by $6.13, $6.90, and $1.92, respectively. While we understand that WMP cost review and approval is under the jurisdiction of the CPUC GRC, approving these WMP plans should be expected to support cost approvals. Furthermore, since the work is completed concurrent with plan evaluation there is no opportunity to evaluate or refute proposed costs before the majority of expenditures and work is completed. GPI recommends a deep dive into SMJU WMP program efficiencies as well as efficacy as a gauge of whether program costs are reasonable, and an evaluation of how SMJUs can reduce the associated cost impacts on ratepayers.

BVES does not distinguish between top risk circuits and percent of work completed therein in their Program Targets tables.

In their program target table column for "Target %/Top-risk %" they list 100/100 for all program targets (BVES 2022 WMP Update, p. 89). The table Notes section states:

> BVES's service area is nearly entirely Tier 2 with a small portion in Tier 3. BVES measures the Target%/Top-Risk% for grid hardening, asset and vegetation inspection and management activities as 100% of the performance within 100% of the top risk area.

It is now well established that the wildfire risk, both probability of ignition and wildfire consequence, is variable within HFTD Tier 2 and Tier 3 zones. Further it is known that

adjustments to the HFTD tier man be warranted. It is also a clear objective of WMP risk assessment and modeling to determine more granular risk within the HFTD and to use those more nuanced risk assessments to help maximized risk spend efficiency and inform work prioritization that results in rapid and cost-effective risk reduction. BVES does have a circuit-granularity wildfire risk-ranking method, as well as Reax wildfire spread and consequence insights. Furthermore, granular risk-informed mitigation prioritization remains important given BVESs relatively limited resources and projected high customer rate increases. GPI recommends requiring that BVES improve their "Target %/Top-risk %" metric to provide transparency into how they are prioritizing wildfire mitigation work within their territory.

SMJU lessons learned assessments are a plan weakness that suggests high-level directional planning for the WMP is somewhat uncertain.

The Lessons Learned and Risk Trends included in the SMJU 2022 WMPs are relatively vague and do not clearly connect program shortfalls with concrete planned improvements.

PacifiCorp provides Lesson Learned examples for each mitigation program. Some examples are general descriptions of basic WMP principles. For example:

> Risk-modeling automation can enable more real-time updates and facilitates what-if scenario planning.

And,

> Clear identification of fire risk conditions can facilitate prioritization and accelerated correction, consistent with or ahead of General Order timeline requirements (PacifiCorp 2022 WMP Update, Section 4.1).

WMP guidelines even require utilities to "Focus on how utility performance against the metrics used has informed the 2022 WMP Update." Given PacifiCorp's substantial program target shortfalls in 2021 this would be an appropriate place to address the root cause of those shortfalls and how lessons learned are informing and insuring success for their 2022 WMP. However, their Lessons Learned regarding Grid Design and System Hardening fail to address the fact that they only completed approximately 25 percent of

planned covered conductor installation and 68 percent of planned pole replacements/ reinforcements. PacifiCorp also failed to provide an overview map of the service territory as per the 2022 WMP Guidelines. GPI recommends requiring that PacifiCorp update their 2022 WMP to include Lessons Learned regarding their program target shortfalls and apparent inefficiencies. The updated WMP should also include an overview map of their service territory.

Liberty's Lessons Learned are similarly generalized and fail to address how they will ensure progress towards wildfire risk mitigation in the face of future wildfire events. While their program shortfalls were linked to the Tamarack and Caldor fires, they still mark setbacks toward near and long-term wildfire risk reduction. The occurrence of future fires within utility territories is a given over the next decade and should not become a risk multiplier due to delayed utility wildfire risk mitigations. Liberty also states that:

> Risk Spend Efficiency ("RSE") calculations are a useful tool to inform the decision-making process when evaluating initiatives or alternative mitigations. RSEs are only one factor in developing Liberty's wildfire risk mitigation strategies.

And

> Liberty will utilize RSE calculations as one component in overall WMP planning and long-term decision-making (Liberty 2022 WMP Update).

These are blanket statements that were established years ago in the WMP process. These statements do not elucidate any practical lessons learned that Liberty is applying to advance the quantification of RSE values and how they are using them in mitigation planning and prioritization.

SMJUs should clearly describe how they are working with other utilities to leverage existing data and ongoing studies relevant to their WMP research efforts.

Several pilot studies in the SMJU 2022 WMP Updates overlap or are tangential to other utility studies and current practices. We list some of these studies here and recommend that SMJUs be required to provide a plan for or summary of existing efforts to leverage existing data and research efforts from other utilities.

- Distribution Fault Anticipation (DFA) – DFA is a widely discussed tool in the WMPs. Both Liberty and PacifiCorp are conducting DFA pilot studies with Texas A&M. PacifiCorp's study began in 2021; in their 2022 plan they note that "Currently, there are too few results to make a recommendation about the DFA technology (PacifiCorp 2022 WMP, p. 52)." SCE performed a DFA pilot in 2019–2020 and began expanding its use in 2021. PG&E also implemented a DFA pilot in 2020 and continues to deploy DFA. DFA was also mentioned in the Covered Conductor Benchmarking survey. Liberty and PacifiCorp should provide a summary of how they will leverage pilot study overlap with Texas A&M and with the IOUs. Including whether they can and will use this data to allow each utility to accelerate the pilot phase and begin deployment for more impactful risk reduction gains.

- PacifiCorp Vegetation Management Data Analytics Pilot – PacifiCorp reported "Comparison of vegetation area to outages and vegetation maintenance costs showed weak correlations (PacifiCorp 2022 WMP Updates, p. 54)." PacifiCorp should leverage existing IOU knowledge of risk event predictor variables (e.g. tree species, wind) that can improve on the data analytics pilot assessment of vegetation coverage on outages and vegetation maintenance. For example, multi-variate and more nuanced assessments of predictor variables.

- PacifiCorp Enhanced Overhang Reduction Pilot – PG&E implements line-to-sky VM clearances. PacifiCorp noted that they were in contact with PG&E regarding their practices. PacifiCorp should provide a plan for how they will coordinate with utilities that are currently implementing line-to-sky VM to leverage existing data and/or collect additional data that will accelerate this pilot study and reduce costs. This should include an expansion of the ongoing Enhanced Vegetation Management study.

- Wildfire Detection Pilot – PacifiCorp discusses a wildfire detection pilot launched in their Utah territory and a related partnership in Oregon, stating:

  PacifiCorp plans to expand on this experience and initiate a pilot to its California service territory, using the lessons learned from the 2021 Alert Wildfire Camera

installations in Utah. This pilot seeks to identify technology that can reliably and cost-effectively be used for wildfire detection (PacifiCorp 2022 WMP Update, p. 48).

PacifiCorp should provide a plan for either shortening or eliminating this pilot project. Wildfire Detection is currently in use by IOUs in similar terrain. PacifiCorp's own Utah and Oregon pilot programs should be leveraged to substantially reduce or eliminate this pilot and move directly to implementing Wildfire Detection capabilities based on their RSE.

- Liberty Outage Rate Study – Liberty should provide a plan to expand on the drivers explored in their outage rate study such as tree density, species, and co-located wind patterns. This should include leveraging findings from IOU Machine Learning models regarding the variables with the most predictive power for outages and outage rates. This can provide a starting point for bolstering their outage rate research to include more variables and multi-variate considerations.

BVES explains that they do not maintain any research proposals or sponsored studies. BVES should be required to report on how they request access to other utility studies and use these studies to inform their wildfire mitigation planning, risk assessment and mitigation selection.

PacifiCorp's completed pilot project descriptions are inadequate.

PacifiCorp stated that the completed Advanced Weather Station Modeling and Weather Stations Pilot:

> …sought to create a methodology to systematically identify areas with limited data in our weather station network and in the National Interagency Fire Center's (NIFC) datasets (PacifiCorp 2022 MWP update, p. 58)

The completed pilot summary does not clarify whether the above objective was achieved. PacifiCorp should provide the relevant pilot study outputs or outcomes that identified areas with limited data and the timeline over which they plan to deploy weather stations to those specific areas.

In their completed Sophisticated Program Control Settings Pilot, PacifiCorp does not provide any quantitative data to detail their results and discussion, which only states:

> Based on field reports during the 2021 fire season, PacifiCorp observed benefits in the use of EFR settings on reclosers including a reduction of ignition potential through operation (PacifiCorp 2022 WMP, p. 64).

PacifiCorp should provide quantitative results for this and other completed pilot studies.

The SMJUs are relying heavily on the HFTD maps to guide risk mitigation planning efforts. They are also failing to analyze more granular risk and/or to use more granular risk findings to inform updates to the HFTD.

Despite advances in POI and wildfire spread modeling, the SMJUs are still relying heavily on HFTD Tiers to direct wildfire mitigation prioritization and selection. The CPUC HFTD map was finalized in January 2018 as a deliverable of proceeding R.15.05-006. These maps are therefore a product of environmental data that predates 2018 and will be at least 5 years old in 2023. Furthermore, these maps do not include the more granular inputs or detailed assessments of wildfire risk that fire spread models, higher resolution weather forecasting, and asset level PoI models are capable of. At this stage it is well known that these tools can reveal variability in wildfire risk within the Tier 2 and Tier 3 HFTD. Furthermore, the 2022 WMP Guidelines require:

> If the utility believes there are areas in its service territory that are not currently included in the HFTD but require prioritization for mitigation efforts, then the utility is required to provide a process outlining the formal steps necessary to have those areas considered for recognition in the CPUC-defined HFTD. Include a discussion of any fire threat assessment of its service territory performed by the electrical corporation, highlighting any changes since prior WMP submissions. In the event that the utility's assessment determines the fire threat rating for any part of its service territory is insufficient (i.e., the actual fire threat is greater than what is indicated by the CPUC's Fire Threat Map and High Fire Threat District designations), the utility is required to identify those areas for potential HFTD modification, based on the new information or environmental changes, showing the differences on a map in the WMP. To the extent this identification relies upon a meteorological or climatological study, a thorough explanation and copy of the study must be included as an Appendix to the WMP.

And

Section 7.3.1 Risk Assessment and Mapping, subsection 3.3.1.1 A summarized risk map that shows the overall ignition probability and estimated wildfire consequence along the electric lines and equipment.

Liberty has produced more granular fire risk maps based on Reax data that subsections HFTD 2 and 3 Tiers into low, moderate, high and very high-risk zones. Interestingly, the Reax identified very high-risk zones overlap with, and extend beyond Liberty's HFTD Tier 3 region in the southern part of Tahoe Basin. This overlap provides supporting evidence for designation as an HFTD Tier 3 region. However, it also provides insight that may warrant expansion of the Tier 3 region or at a minimum, risk mitigation prioritization in the "very high risk" portion of the HFTD Tier 2 region (Liberty 2022 WMP Update Attachment C and pp 34-35). However, in the May 18, 2022, SMJU 2022 WMP Update workshop Liberty stated that they prioritize work in the HFTD Tier 3, followed by Tier 2 and lastly, higher risk zones identified within Tier 2 such as the southern reaches of the Lake Tahoe Basin Meyers circuits.

Liberty appears to have more granular wildfire risk insights that could warrant an expansion of the HFTD Tier 3 zone in their territory. This being the case, Liberty should be required to propose an expansion of the Tier 3 zone in their 2023 WMP at the latest. If this expansion is not warranted based on Liberty's available data, then Liberty should be required to provide a risk mitigation prioritization plan that takes into account their more granular Reax risk maps such that very high-risk zones within the HFTD Tier 2 are not unduly ranked last for mitigation prioritization.

PacifiCorp does not provide wildfire risk maps other than the CPUC HFTD maps:

PacifiCorp is constantly monitoring areas for significant change in ignition risk drivers that may result in a change to fire threat for a specified area. At this time, PacifiCorp has not identified any areas where an HFTD expansion is warranted and maintains the previously established HFTD map (PacifiCorp 2022 WMP Update, p. 39)

In regards to their Mitigation Activity Decision Making Process, PacifiCorp states:

Step 4: Scoping and Implementation

> Program scoping can vary greatly depending on the type of program. Generally, PacifiCorp reviews the type of ignition risk factor the program is planned to address, reviews other simultaneous programs and prioritizes how the work is sequenced to address higher risk locations first. Addressing wildfire risks in PacifiCorp's Tier 3 and Tier 2 areas is a higher priority than addressing the risk in non-HFTD areas (PacifiCorp 2022 WMP Update, p. 141).

They have, however, developed a combined risk score for Zones of Protection (ZOP), retained Reax for fire spread modeling in the past, and now contract with Technosylva which provides fire spread modeling (FireSim) as well as weather forecasting (FireCast) and risk assessment platforms (WRRM). PacifiCorp also presents their combined LRAM risk scores for ZOPs in a histogram figure where they establish risk boundaries roughly based on the coincidence of HFTD Tier 2 and Tier 3 regions (PacifiCorp 2022 WMP Update, p. 93). Notably, these selected risk boundaries include carry over of Tier 2 and Tier 3 regions into all three of the risk "zones" subset by PacifiCorp's selected "risk boundaries" (Figure 4).

PacifiCorp clearly has the data necessary to produce more granular wildfire risk maps of their territory based on wildfire spread (i.e. consequence), weather, and some gauge of probability of ignition (PoI). These data are products of their previous contract with Reax, current contract with Technosylva, and other in-house risk models (e.g. LRAM). In their Maturity survey, PacifiCorp also reports relatively high self-rankings for A. Capability 5: Risk mapping and simulation algorithms, including maturity levels that include "independent evaluations and historical data (A.V.d [iii of iii])" and "current and historic ignition and propagation data; near-miss data (A.V.e [iii of iv])." Given clear risk map reporting requirements and the high Maturity Survey self-scores it is unacceptable for PacifiCorp to not provide their detailed, granular risk maps in the WMP. GPI recommends requiring that PacifiCorp provide their more granular wildfire consequence and PoI risk maps for the 2022 WMP filing prior to plan approval. They should also be required to propose HFTD expansions if warranted by these data in their 2023 WMP Update.

Figure 4. Reproduction of Figure 4.20 from PacifiCorp's 2022 WMP Update.
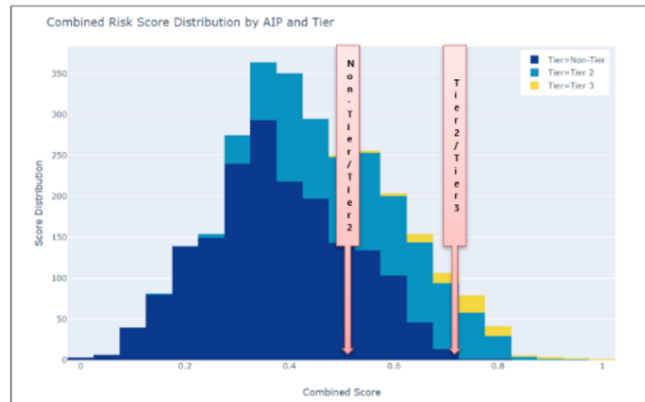

Figure 4.20   Distribution of the Combined Risk Score among the ZOP in California
The two arrows demonstrate where we see choose risk boundaries between Non-Tier/Tier 1
and Tier 1/Tier 2

BVES also has more granular wildfire risk maps and ranked circuits based on both Reax
fire spread simulations and their in-house circuit risk ranking workbook. The majority of
BVES is located in Tier 2, with small portions of their grid located in Tier 3. Their newly
added Reax fire spread model data show variability in wildfire consequence risk within
their territory. However, they also continue to report percent program targets and work
completed based on HFTD zone, versus applying their more granular risk assessment to
inform mitigation prioritization.

All SMJUs have a responsibility to internally evaluate and update wildfire risk
classifications, including conducting sub-HFTD Tier risk assessments and using those
results to: (i) inform updates to the HFTD as needed; and (ii) inform wildfire risk
mitigation prioritization. GPI further recommends requiring all SMJUs to report on how
they are and will use these mode granular risk maps to inform mitigation selection and
prioritization in their 2023 WMP.

**SMJUs may be oversimplifying their assessment of climate change impacts on
granular wildfire risk.**

We understand that forward climate modeling, especially on a granular scale, includes
output uncertainty. However, developing a general understanding of near- and long-term

wildfire risk trends driven by climate change can help inform more forward mitigation planning, versus the current model of reactive and "catch-up" risk reduction.

With respect to climate change impacts on wildfire risk over time, PacifiCorp states:

> In 2021, PacifiCorp focused on developing a quantifiable consideration of climate change to address short-term planning gaps. Through this effort, the company engaged climate change experts through the California Energy Commission's Pyregence Project and used materials prepared by the Fourth Climate Change Assessment through CalAdapt to assess climate change. Through this research, PacifiCorp found that fire-affecting climate change — particularly the effect of drying — impacts the company's service territory evenly. Therefore, areas that are higher risk today, such as the HFTD, would continue to be higher risk. Climate models also suggest there may be some decreases in fire weather (e.g., wind gusts). The company will continue analyzing this information and incorporating it into company models (PacifiCorp 2022 WMP Update, p. 42).

The statement that "areas that are higher risk today, such as the HFTD, would continue to be higher risk" is overly broad. This implies that they expect no expansion of the HFTD, nor changes to Tier 2 and Tier 3 zones. There is also no clear indication of whether they have taken into account topography or other local/regional factors. Furthermore, the above description is the only content in their WMP on which to evaluate the Maturity Survey response to:

> A.I.f To what extent is future change in climate taken into account for future risk estimation?
>
> Response:
>
> Present iii. Basic Temperature modeling used to estimate effects on a changing climate on future weather and risk, taking into account difference in geography and vegetation.
>
> By January 1, 2023 iv.…scenarios used to estimate effects of a changing climate on future weather and risk, taking into account difference in geography and vegetation, and considering increase in extreme weather event frequency.

PacifiCorp has not provided a sufficient response in their WMP to support this self-score. PacifiCorp should provide the complete report of work completed by the CEC Pyregence Project for their territory along with any additional considerations generated from external resources.

Liberty also provides a very general description of climate change considerations:

> Reduction in live and dead fuel moisture values relative to the historical baseline correlate with increased fire severity. Tree mortality induced by climate change may increase ignitions associated with trees contacting power lines. Hotter summers with drought conditions and more extremes in the winter may also contribute to change in ignition probability (Liberty 2022 WMP Update, p. 36).

They list a maturity model self-ranking (A.I.f) of iii: Basic temperature modeling used to estimate effects of a changing climate on future weather and risk, taking into account difference in geography and vegetation.

Based on both Liberty and PacifiCorp's summaries of climate change impacts to wildfire risk, they both appear to qualify for a Maturity Survey A.I.f score of ii: Future risk estimates take into account generally higher risk across entire service territory due to changing climate. GPI strongly recommends assessing the accuracy of this and other SMJU Maturity Model self-scores.

SMJUs fail to include tree species data in their risk modeling or vegetation management considerations.

SMJUs do not appear to be collecting or using tree species data in their probability of ignition models or broad risk assessments. With respect to its Enhanced Overhang Reduction Pilot, PacifiCorp states: "Data elements may include… species (PacifiCorp 2022 WMP Update, p. 49)." Additional pilot study selection notes include deployment in locations with "coniferous and hardwood species." Other mention of tree species are in respect to "incompatible," "compatible," and "at-risk" species, with no mention of specific species (at p. 182, 191, 199). With respect to at-risk species:

> PacifiCorp has established post-work clearance specifications categorized by tree growth rates (see Section 7.3.5.19) to prevent vegetation-to-conductor contacts. Vegetation inspections categorize growth by species as: slow, moderate, fast (cycle-buster) (PacifiCorp 2022 WMP Update, p. 200)…

> Species prone to limb failure would be targeted for enhanced overhang clearances (at p. 206).

However, there is no mention of which tree species are considered at-risk, or prone to limb failure, or their respective relative growth rates. There is also no mention of whether tree species and species-specific risks (e.g. fall-in, limb failure) are included in risk modeling and mitigation selection and prioritization.

Liberty includes a program target for "remediation of at-risk species" (Liberty 2022 WMP Update, p. 83)." They also refer to "incompatible," "fire-wise," "adapted," and "compatible" species. Based on the "predominant species and growth rates" they are electing a 3-year cycle for remote sensing vegetation inspections of the distribution system (Liberty 2022 WMP Update, p. 142). With respect to their VM QA/QC process they do note that QC Inspections include a "Complete and accurate inventory (e.g. species, location, all other attributes required [Liberty 2022 WMP Update, p. 147, 148])." However, QC work is only conducted on a 0.5 percent subset of VM work. Liberty does provide a list of the four most common species in their territory, making up 90 percent of the trees along their grid (Liberty 2022 WMP Update). They then list these as "at-risk" trees. This treatment essentially implies that all trees in the territory are "at-risk trees." There is also no indication the tree species is considered in risk modeling or mitigation prioritization.

SMJUs should be required to provide an assessment of tree species, the growth rate they attribute to each species, and how they take tree species into account regarding risk and risk mitigation.

SMJUs have not yet developed comprehensive or transparent quantification methods for wildfire consequence and should be required to do so in the next 3-year WMP cycle.

The SMJUs have not developed methods for quantifying wildfire consequence, or have not provided them in their 2022 WMPs. The IOUs utilize MAVF and MARS tools developed in the CPUC S-MAP and RAMP proceeding to convert wildfire consequence into a single measurement or value.

PacifiCorp states that:

Where possible, the intended approach and underlying rationale for the incorporation into future decision- making will be outlined, furthering the company's development toward the longer-term RAMP/S-MAP structure which is anticipated to be addressed in the future proceeding R.20- 07-013.

PacifiCorp does not yet have a quantitative risk methodology adopted in the S-MAP and is continuing to review the IOU risk-modeling progress for the future development of RAMP and S-MAP (PacifiCorp 2022 WMP Update, p. 36).

A. PacifiCorp monitors and accounts for the contribution of weather and ignition probability an estimated wildfire consequence…

And

The company has previously reminded OEIS that its obligations through S-MAP and RAMP are still in development in R.18-10-007 (PacifiCorp 2022 WMP Update, p. 150).

GPI notes that R.20-07-013 is no longer a "future proceeding" and R.18-10-007 is closed. As previously noted, PacifiCorp failed to provide a map of wildfire consequence as required by the 2022 WMP Guidelines (PC p. 150). However, PacifiCorp previously retained Reax and now contracts with Technosylva, both of which provide fire spread modeling – indicating that PacifiCorp does in fact have the potential to quantify wildfire consequence. In the quote above, PacifiCorp suggests that they estimate wildfire consequence. They later refer to "consequence metrics" in Section 4.5.1.1 detailing the Wildfire Analyst-Enterprise (WFA-E) model (PacifiCorp 2022 WMP Update, p. 70). They also mention steps for evaluation "Source Data" and "Process and Combine" that include consequence in their Initiative Selection and Decision-Making flow chart (PacifiCorp 2022 WMP Update, p. 139).

Both Liberty and PacifiCorp's Maturity Survey response to query:

A.III.b What metrics are used to estimate the consequence of ignition risks?

Present: ii. As a function of at least potential fatalities, and one or both of structures burned, or area burned.

By January 1, 2022: ii.

This response indicates that potential fatalities are included in their consequence scores. However, there is no mention of whether or how potential fatalities are considered in their 2022 WMP. The only mention of the keywork "fatality" or "fatalities" in PacifiCorp's 2022 WMP are in the WMP guidelines sections and definitions appendix. Liberty does list a value for fatalities used in RSE, but the units and use of these values is not clear.

Liberty also states that they "estimate" wildfire consequence using qualifying language such as "higher" consequence (Lib p. 31, 35). Section 4.5.1.2. Model: Consequence Modeling from Wildfire Risk Model regarding their fire spread modeling notes that fire size, timber, and number of impacted structures are recorded (Lib p. 66).

> Liberty incorporates the results of Reax's analysis into its consequence modeling for utility wildfire risk. Consequences that will utilize the outputs from Reax's models will include safety, financial, and environmental consequences. All potential factors were considered in assigning an overall wildfire risk rating to the various polygons in Liberty's service territory (Lib p. 66).

However, it is unclear whether and to what extent this quantification has been done, or "will" be done at a future date. Liberty also states that they use MARS and MAVF methods:

> Liberty utilizes the Multi-Attribute Risk Score ("MARS") and Multi-Attribute Value Function ("MAVF") methodologies in its wildfire risk modeling. Each of these methods properly converts natural units of risk reduced to standardized risk units reduced, allowing a direct comparison of controls and/or mitigations. Liberty's models align with the larger IOUs' RBDM frameworks, as these frameworks put Liberty in a better position to leverage the improvements the Commission and the larger IOUs make in evaluating and benchmarking modeling frameworks (Lib p. 30).

Yet it is important to note that the IOU MARS and MAVF methods are not exactly the same. Liberty should detail their MARS/MAVF methods. At current, Liberty maps showing wildfire risk based on Reax fire spread simulations do not detail how they arrive at their low, medium, high, and very-high risk designations from the simulation output.

BVES's Reax heat maps show individual-consequence attributes (i.e. modeled structure impacts and acres burned), but do not provide a holistic risk value that includes factors such as safety, reliability, financial, or environmental impacts.

SMJU reporting on whether or how they quantify wildfire consequence is vague at best. While SMJUs may not be required in the S-MAP and RAMP proceeding to develop a MAVF and MARS tool, all SMJUs should be required to develop a transparent, well defined, quantitative valuation of wildfire consequence. This should include a description of inputs, functions, and/or tools used to quantify consequence, how the consequence values are used in other wildfire risk modeling and quantification within their WMP, and a map of the quantified wildfire consequence. If enforcing this requirement meets a roadblock due to the CPUC S-MAP/RAMP proceeding requirements, we recommend coordinating with the CPUC and requesting that the process be accelerated for the purpose of advancing SMJU wildfire consequence quantification. Otherwise, GPI supports requiring the SMJUs to present and apply a method for quantifying wildfire consequence risk in their 2023 WMP that can either serve as a WMP specific method, or as interim prior to development in the S-MAP/RAMP proceeding.

Comments on PacifiCorp's wildfire risk modeling

We reviewed SMJU modeling approaches to assess the status of planning and operations models for both probability of ignition (PoI) and wildfire consequence quantification. PacifiCorp has adopted the Technosylva Wildfire Analyst Enterprise (WFA-E) model collection for operations applications. This WFA-E models appear to provide wildfire consequence risk insights but do not yet supply PoI risk insights and will likely not until 2023+. The LRAM is PacifiCorp's planning risk model which uses a different fire spread model than the WFA-E, and produces a combined risk score that includes PoI as well as consequence. It is not transparent how each is quantified and combined into a single score.

Wildfire Analyst Enterprise (WFA-E) – PacifiCorp has merged over to using Technosylva's Wildfire Analyst Enterprise (WFA-E [PC Section 4.5.1.1]). This includes the suite of modeling tools for fire spread (FireSim), risk forecasting (FireCast), and the

Wildfire Risk Reduction Model (WRRM). PacifiCorp already has access to FireSim and FireCast and anticipates WRRM procurement in 2022.

FireSim produces fire spread simulations while FireCast combines those simulations with weather forecasts to provide "daily territory wide and utility asset wildfire risk ratings." FireCast constitutes an operations/consequence model for current, or near-term decision making such as PSPS enactment.

PacifiCorp also discusses the WRRM in this section alongside the FireSim and FireCast models. They describe the WRRM as combining Utility asset data with fire spread modeling. SDG&E's original WRRM model developed in collaboration with Technosylva was a wildfire risk planning model which they adapted to also produce WRRM-ops or the operations version. This model combines wildfire PoI and consequence inputs to develop a complete risk model where:

$$Risk = PoI \times Consequence$$

PacifiCorp appears to be describing the WRRM-Ops model, since this section of their risk modeling focuses on near-term risk forecasting (e.g. 96-h forecasts). GPI is concerned regarding the following aspects of this risk modeling component:

- The Data Element "PacifiCorp Distribution and Transmission assets" does not provide any clarifying metadata entries. PacifiCorp should explain the date-range over which this data was collected and/or ground-truthed since they have not performed a system wide asset survey.
- PacifiCorp states:

  > The WRRM model does not include system information such as outages, equipment failures, electric system conditions, or wildfire mitigation initiatives. PacifiCorp plans to incorporate the dynamic outage data as a separate model evolution after the 2023 Risk Modeling Guidelines are updated. P. 69.

  We interpret this to mean that the WRRM will not include PoI values until sometime after Risk Modeling Guidelines are released in 2023. Nor will it include at risk asset tags (e.g. electric system conditions) or other system condition or

mitigation updates. This also means that PacifiCorp's WRRM will only be able to output wildfire consequence from simulated ignitions with an asset origin, or one half the wildfire risk equation. It will also be unable to support RSE calculation until these data are integrated in or after 2023. GPI is concerned that at this late-stage PacifiCorp's investment in the WFA-E will only provide operations - consequence modeling capabilities and their progress towards comprehensive and granular risk metrics will remain limited through the next WMP cycle.

- Regarding Model method, PacifiCorp states:

  > The user defines the time and length of each simulation (PC 2022 WMP, p. 70).

  PacifiCorp should establish and report a specific fire spread simulation duration. The duration of fire spread simulations should be updated as need to align with forthcoming OEIS approved guidelines.

- PacifiCorp described their consequence value as:

  > This mean value of impacted structure damage generates the conditional impact value for that given location (PC 2022 WMP, p. 71).

  PacifiCorp should clarify if the "conditional impact value" is the quantitative wildfire consequence metric, and whether they will include any other factors (e.g. safety, reliability, financial etc.) in the metric.

- Regarding the PoI element of the WRRM, PacifiCorp states

  > Once the conditional impact is determined, assets associated with the area are assigned an ignition likelihood. This ignition likelihood is the combination of asset failure rate and the ratio for when those failures might result in an ignition (see Figure 4.10). As an initial step to demonstrate value, PacifiCorp provided some asset data to Technosylva, who, using a framework similar to that used by other utilities, modeled the number of historic failures and equipment ignitions (PC 2022 WMP, pp 72-73).

  PacifiCorp should detail the framework, inputs, methods, and results of this "initial" PoI integration step, and whether they will use these interim PoI data and

the associated WRRM outputs to guide operational decision making prior to integrating robust, utility specific data in future years (i.e. 2023+). If PacifiCorp intends to use WRRM outputs to guide risk-informed operations decisions using the interim data they must provide evidence that it appropriately reflects Utility PoI.

- The WFA-E Model uncertainty is described accordingly

> The GIS data used in this model is captured via as-built drawings and reviewed according to set protocols according to the electric GIS production team standards. This data does not reflect ongoing switching or temporary configurations (PC 2022 WMP, p. 74).

This description is inadequate and fails to mention the uncertainty in input data. For example, FuelMoisture data error, forecast uncertainty, fire spread uncertainty, asset location and condition uncertainty, and uncertainty in "subjective 'values at risk' parameters." This section should also describe how uncertainty compounds based on each sub-model and the final model output, including sensitivity testing and which input(s) the output is most sensitive to.

- Model verification and validation

> Once implemented, WRRM data delivery will include GIS feature classes, which are visually inspected in a map environment when they are received to ensure the data results coincide with known conditions around the service territory (PC 2022 WMP, p. 74).

The model verification and validation work is inadequate. This description only provides one verification component for a suite of three models, each with many data inputs and multiple sub-models. All SMJUs must provide comprehensive verification and validation plans for each risk model.

- In regards to WFA-E "Application and Results", PacifiCorp states:

> The WRRM and subsequent data tables are useful in identifying and prioritizing operational programs such as recloser settings and alternative work protocols (PC 2022 WMP, p. 74).

This is an inadequate description of model application and results given that the WFA-E is a suite of complex models that can collectively output granular wildfire risk scores that include both PoI and consequence. The proposed application and results are extremely narrow even for wildfire risk operations models. Based on this description we suspect that PacifiCorp has not made substantial progress towards developing the link between how wildfire risk operations models can inform current and near-term wildfire mitigation activities.

We are also concerned by the focus of the entire WFA-E section on operational risk modeling and applications, especially consequence modeling. SDG&E's WRRM and WRRM-OPS risk models inform wildfire mitigation planning and operations, respectively. PacifiCorp should clarify if they are using the "WRRM-Ops" version or if they will also use the WRRM as a risk mitigation planning tool. PacifiCorp should also provide a clearer and more comprehensive plan and timeline for how they will buildout the WFA-E suite and integrate it into their wildfire risk mitigation planning and operations, including all the anticipated use cases within a risk-informed decision-making approach.

Contemporary fire weather risk model and the Available probabilistic arc energy risk model – These two models are effectively sub-models of the LRAM. The model uncertainty and verification and validation sections are inadequate and do not provide any assurances regarding input data quality, model fit or uncertainty metrics, or other key factors for model substantiation. PacifiCorp should improve on these reporting standards in their 2023 WMP and going forward.

Localized Risk Assessment Model (LRAM) – The LRAM model is presented as PacifiCorp's wildfire risk planning model that combines both PoI and consequence risk elements for wildfire and PSPS via multiple sub-models and data inputs. The model includes 6 output layers: Historic fire spread weather fire spread risk; Tree canopy risk; Available arc energy and short circuit ignition likelihood; Utility ignition fault risk; Utility fires and equipment; and Fire weather risk. The output of each element is collated into a

"combined score" for which only the Probabilistic Arc Energy output is weighted at a lower value. GPI raises the following concerns:

- PacifiCorp presents the LRAM model as their wildfire risk mitigation planning model, including the platform through which they will determine RSE (PC 2022 WMP, p. 92). PacifiCorp should provide an explanation for why they are not considering using the Technosylva fire risk modeling suite for wildfire mitigation planning as well as operations purposes. Maintaining and building out the LRAM model as well as the WFA-E suite may not prove an efficient use of modeling investment. Differences between WFA-E and LRAM outputs may also result in a disconnect between PacifiCorps wildfire mitigation operations and planning efforts.

- PacifiCorp should provide additional transparency into each sub-model, how the sub-model outputs are converted into units that can be combined (e.g. MAVF), and how each of the converted sub-model outputs are subsequently combined (e.g. summation, multiplied, etc.). They should also detail how wildfire consequence is quantified.

- In regards to the Data element Utility Fault Rate Ignition Risk, PacifiCorp states:

  > Changes in circuit topology and environmental impacts can yield substantially
  > different incident rates. Submodule changes can result in substantial variations in
  > ignition risk over time and may not be easily back-cast for comparison purposes, see
  > Figure 4.17 (PC 2022 WMP, p. 87).

  We appreciate this transparency into model uncertainty and sensitivity. PacifiCorp should explain how they reduce model uncertainty due to its sensitivity to circuit topology.

- PacifiCorp states that "The model is not dynamic, it's static and continuously being updated (PC 2022 WMP, p. 89)." While they have provided update frequencies for individual data elements, PacifiCorp should describe how frequently the LRAM as a whole is updated and re-run.

- The LRAM uses the following inputs and assumptions:

  > Historic climate/ probabilistic fire spread (iUTI) — Locations where climate has
  > favored fire spread will continue to favor fire spread (PC 2022 WMP Update, p. 90).

Past data may not accurately reflect recent or near-term wildfire risk. PacifiCorp should detail how they will account for near-term change in wildfire risk that may not be captured by historic data. This capability is important for enabling preemptive wildfire risk mitigation planning, versus reactive planning after the risk has fully manifested.

▪ The LRAM uses the NLCD Canopy Cover Layer which is updated on a 3 to 5 year cycle. In the LRAM description PacifiCorp states that "Higher tree canopy density correlates to more trees and more risk (PC 2022 WMP Update, p. 90)." However, in the Vegetation Management Data Analytics Pilot section regarding the NLCD data set for risk assessment they note that

> Comparison of vegetation area to outages and vegetation maintenance costs showed weak correlations. The dataset was somewhat predictive of vegetation trimming costs, but with large margins of error…However, satellite imagery was found to produce very usable data. Such data, however, need to be evaluated against two different use cases. First, in evaluating canopy density (to recognize proximity of vegetation to ZOPs for risk estimation), high confidence in canopy density was achieved, radically improving on publicly available data sources, but without the high costs associated with LiDAR. Second, when determining strike tree risk, results very similar to LiDAR were achieved at substantially lower cost and faster delivery (PC 2022 WMP Update, p. 54).

And

> Layer validation efforts compared coverage to historic vegetation outages and historic vegetation maintenance records. These showed weak, but non-negligible, correlations. Limitations from the NLCD data resolution and techniques result in lower accuracies in developed areas (PC 2022 WMP Update, p. 99).

The NLCD dataset appears to have substantial limitations for predicting PoI correlated to vegetation caused outages in general, but perhaps some success for determining PoI associated with strike-trees. GPI is concerned about the reliance of the LRAM on the NLCD, including the predictive power of this data set for vegetation risk drivers and associated PoI. Vegetation is a major ignition risk driver for all utilities, especially in the forested regions of northern California. PacifiCorp must substantiate the use of the NLCD data set in the LRAM and whether it is able to predict granular vegetation caused PoI risk that support VM

and system hardening mitigation efforts. This should include a metrics on predicted versus actual outages and ignitions.

- ▪ Regarding the statement:

> Should any model elements fail their quality tests (each of which is separately identified), they would be appraised for alternate methods to incorporate the fundamental attributes they provide to the model output, and any substitution will be reported in future WMPs (PC 2022 WMP Update, p. 90).

PacifiCorp should detail what is meant by "quality test" and the thresholds for passing each quality test.

- ▪ The section detailing LRAM uncertainty is inadequate. PacifiCorp fails to mention uncertainty and model error associated with individual data elements such as the NLCD Canopy Layer, changes in circuit topology, and outage and ignition location/rate precision. Each of these uncertainties and error sources are mentioned elsewhere in PacifiCorp's WMP. Their impact on the LRAM output should be evaluated and described along with other sources of model uncertainty.

- ▪ The section detailing LRAM verification and validation is inadequate. PacifiCorp mentions some stress testing but does not provide how they conducted this test and the outcomes. They also mention choosing "risk boundaries" but don't detail the quantitative reason for selecting these boundaries (Figure 4). They appear to count this histogram as a model validation element. However, there is substantial carry over of ZOPs classified as Tier 3 and Tier 2 outside of PacifiCorp's Tier 2/3 and Tier1/Non-Tier selected risk boundaries. While this does not necessarily indicate that the selected boundaries are problematic, PacifiCorp should justify the effective downgrade of many Tier 2 and Tier 3 ZOPs for purposes of mitigation selection and prioritization. Other elements in the LRAM verification and validation section describe model application. PacifiCorp also fails to report on PoI model fit and predictive power or the robustness of the ELMFire fire spread model – which we assume is the basis for the LRAM wildfire consequence component. We note that model-fit reporting is generally an issue for all SMJUs and therefore support the proposed updates to 2023 WMP guidelines regarding separate and more comprehensive, version controlled model documentation requirements.

- It is unclear whether the LRAM outputs and combined score can inform specific wildfire risk mitigations such as pre-emptive asset replacement or targeted vegetation management. PacifiCorp Tables 4.4 through 4.6 link mitigations to risk drivers, however discussions regarding the application of the LRAM refer to using the combined score as a metric for granular prioritization. PacifiCorp should describe whether the data layers that contribute to the combined score can be used to inform specific mitigations. For example, a location with a high combined risk score that is driven in large part by vegetation risk informs enhanced vegetation and fuels management or other vegetation/equipment failure mitigations.
- PacifiCorp should explain why it only provides a "pre-LRAM" risk prioritization figure and what model or vintage of LRAM was used to inform the data (PacifiCorp 2022 WMP, p. 63).
- PacifiCorp should provide their ignition probability, wildfire consequence, and climate change impacted risk maps in static form in their WMP.

Maturity Model – In their Maturity Survey, PacifiCorp provided the following response:

> A.II.e What confidence interval, in percent, does the utility use in its wildfire risk assessments (PC 2022 Maturity Survey, p.5).
> Last year, Present: iii. > 90%
> Last year, As of January 1, 2023: iii. > 90%
> Present: iii. > 90%
> As of January 1, 2023: iii. > 90%

PacifiCorp should provide data that corroborates a 90 percent confidence interval for their wildfire risk assessments.

Comments on Liberty's wildfire risk modeling

Liberty describes three models: Ignition Rate Model (IRM), Consequence Modeling from Wildfire Risk Model, and Fire Potential Index (FPI). These first two models touch on the two major risk components, PoI and consequence, and appear to inform risk mitigation planning. The FPI is Liberty's operations model.

Ignition Rate Model (IRM) – The IRM feeds into fire spread models, "to estimate consequences" and is focused on assessing outage ignition rate. The IRM incudes asset, outage rate data (forced outages correlated with weather), and ignition probability based on fuel temperature and moisture content. Liberty acknowledges at least two of the largest uncertainties for their IRM model:

> Individual outage types were not identified or analyzed separately in this analysis and each outage is given equal weighting. Canopy layer over lines at the time and date of each outage is unknown and is not factored in the analysis.

The model also does not include surface fuels associated with ignition potential (e.g. grasses, slash). Liberty did not perform model verification or validation and did not provide a plan for improving the IRM. Liberty should establish and implement a verification and validation method for the IRM. They should also provide a plan and timeline for how they will expand the model to include ignition rates for different outage types, and incorporate vegetation data such as fuel type. They should also provide a map of their PoI risk model.

Consequence Modeling from Wildfire Risk Model – Liberty inputs the IRM model results into the consequence model as the basis for determining the number of ignitions simulated in an area. Ignitions per line mile per hour are integrated to output ignitions per area per hour that are scaled up by a large factor. Liberty does not detail the area over which ignitions are integrated. The result is ignition rates based on wind gusts, dead fuel moisture and temperature, independent of outage type and vegetation/fuels, that are aggregated over an unknown area size.

This "ignition density surface" was used to determine the number of match-drop fire spread simulations in an area. While the number of modeled ignitions was large (4.5 million under 2021 conditions) we interpret Liberty's approach to mean that fewer match-drop fire simulations were conducted in locations predicted to have fewer ignition events, meaning that the fire spread simulation sample size is different in each rasterized area along Liberty's grid. We query the impacts of performing variable fire-spread simulation sample sizes based on granular ignition rate versus conducting a consistent fire-spread

simulation sample size either within each area grid or at the asset granularity. This would provide statistically comparable wildfire consequence values across Liberty's territory, subsequently multiplied by granular PoI values.

Fire size, timber impacts, and impacted structures were weighted inputs into granular consequence. Liberty later explains that these values will contribute to wildfire consequence risk that includes safety, financial, and environmental consequences. Liberty should provide a timeline for when they will develop and present a method for quantifying wildfire consequence.

Liberty's consequence model uncertainty description reports

> Fire spread through urban/built up areas that are marked as non-burnable in underlying fuel inputs is not modeled. Impacted structure values were tallied as the number of structures within a modeled fire perimeter and do not necessarily correspond to damaged or destroyed structures. Factors that affect structure vulnerability (e.g., roof and exterior wall construction, defensible space, etc.) were not addressed.

This model uncertainty and limitation suggest that wildfire consequence may be systematically underestimated in urban/developed environments. GPI appreciates this acknowledgement of wildfire spread modeling limitations. Limitations such as these are important "known unknowns," particularly when using wildfire risk models as planning and operations tools. All utilities should provide a method for how they take into account any systematic under-estimations of wildfire consequence in urban environments identified as "non-burnable." We further recommend that all utilities include in their wildfire risk modeling descriptions a summary of other known-unknowns or model biases and how they take these types of uncertainty into account in their risk-informed decision making. GPI also recommends that all utilities report on the uncertainty or error of each input dataset. Liberty must also provide a model verification and validation method for their consequence model.

Fire Potential Index (FPI) – The FPI is Liberty's operations model. This model uses Burn Index and Energy Release Component to generate a fire forecast classification of low, medium, high, very high, and extreme. Liberty should provide model uncertainty and a

verification and validation description for their FPI. Validation could include taking fires over time since the 2019 UFSF study and using those data to validate and strengthen the model.

Comments on BVES's wildfire risk modeling

BVES is using three model approaches to rank PoI and consequence: risk-based decision-making (RBDM) model; the fire safety circuit matrix, and ignition probability risk model/ mapping. The risk-based decision-making model and fire safety circuit matrix remain highly subjective tools based on staff brainstorming sessions.

The Risk-register Risk Events inputs table and its application in the RBDM is unclear and appears incomplete, as it does not include loss of customer property and quality of service outcomes only include the need for an outreach program. For the risk identification the method states: "Review and categorize brainstormed risk events (e.g., link risk events to asset classes)." It is not clear how risk is associated with specific assets. In the RBDM Modeling Assumptions and Limitations section BVES describes brainstorming the "worst reasonable case" – this is highly subjective and the specifics of what BVES is defining as the worst reasonable case for distribution lines is not provided. BVES should explain if a study of utility-caused wildfires and/or Reax data is informing this determination. They also define three tiers of events 1-3 that are ranked based in "processes" impacts, risk velocity, and company operations. Only Tier 1 includes events that include 4 or more impact categories. It's not readily apparent how these tiers are used in the RBDM or what they equate to in terms of wildfire consequence scores.

Impact Categories include Environmental, Safety, Quality of Service, Compliance, and Reliability and are defined by a 1–7 rubric. This rubric does not include customer property loss and the rubric format ranks loss of life (6–7) on par with loss of service and company reputation. The rubric provided also appears to have components that are not relevant to wildfires such as "(… Improper hazardous waste disposal that is not reportable.) (e.g., minor event like putting a paint can in the wrong bin.)." The risk rubric is then set against a 1–7 frequency rubric. Category scores are scaled up by an order of magnitude equal to

the impact rubric (1–7), summed and multiplied by the frequency rubric in order to score event risk. This process also includes taking into consideration "mitigations and effect on frequency and impact scores." This method is highly subjective. BVES should make progress towards substantiating their methods and removing subjectivity by including data from the Reax fire spread models and utility PoI data.

The Fire Safety Circuit matrix includes an equation that combines risk exposure factors (e.g. bare wire, "worst performing circuit rating," tree attachments, conventional fuses, and level 2 deficiencies) and subtracts risk mitigation efforts (e.g. pole replacements, EVM, inspections etc.). Each element is amplified by a multiplier without clear justification for the selected weight. For example, bare wire circuit miles in HFTD Tier 3 is multiplied by 10,000, while Tier 2 is multiplied by 50, "bare wire circuit mile" is multiplied by 200, and other multipliers are applied for high, medium, and low density, though it is unclear if density is referring to population, structures, vegetation, or line density. It's unclear if the Fire Safety Circuit Matrix equation is appropriately quantifying and ranking circuit risk. BVES should develop a way to validate this model. If it cannot be validated, they should shift to an established risk-ranking model that **can** be validated.

BVES recently contracted Reax to perform match-drop simulations across their territory. This is an important step forward for BVES to integrate more objective wildfire consequence modeling into their risk assessment. We are concerned with BVES's statement that:

> All modeling of this type is inherently uncertain. BVES understands this, but can still determine relative risks from the models, prioritize those risks more likely to occur or cause catastrophic outcomes, and work to reduce and mitigate those risks.

While all models have uncertainty and limitations, they provide a quantitative metric based on many years of fire science and fire spread research. BVES should substantially advance their risk modeling in 2023 by shifting their risk modeling and ranking to incorporate the Reax outputs in a way that allows them to phase out or substantially improve their RBDM.

Risk modeling and assessments do not include tree species.

Liberty provides a list of the most common species in their territory and lists them as "at-risk" species. However, they do not provide corroborating data regarding species incidence rate in vegetation-caused outages from limb breakage and fall-in. PacifiCorp only mentions "coniferous and hardwood species," and does not report on tree species in its territory or associated outage rates. BVES also does not provide any tree species specific considerations. The SMJUs should leverage IOU at-risk tree species data to advance their understanding of whether tree species are an important consideration in their risk modeling, mitigation prioritization, and inspection schedules.

A standard fire spread model duration should be set for wildfire consequence modeling and quantification. GPI supports a 24 h duration to encompass a full diurnal cycle.

The SMJUs use a wide range of wildfire spread durations in their Reax and Technosylva fire spread models. BVES reports simulations spanning 24 hours to 1 week. In reference to Technosylva's FireSim, PacifiCorp states: "The user defines the time and length of each simulation (PC 2022 WMP Update, p. 70)." They further state that future FireCast wildfire simulations will be analyzed over a 96-hour forecast horizon. Liberty models fire spread over a 24-h timespan.

The OEIS should establish a standard duration for fire spread simulations. This will facilitate comparisons between utility fire-spread risk maps and wildfire consequence metrics. We also agree with past comments from MGRA and OEIS that call for simulations that run beyond the 8 h timeframe used by the IOUs. On the other hand, GPI is concerned that long fire spread simulations (e.g. 96-h) are more likely to include increasing uncertainty that is then captured in consequence risk. GPI supports a 24-hour wildfire simulation that reflects a diurnal cycle, including the drop in temperatures and rise in relative humidity at night. All utilities should also report on whether and how the wildfire spread simulations account for daytime and nighttime conditions.

PacifiCorp should be required to provide RSE for all wildfire mitigation activities in their 2023 WMP filing.

By June 1 PacifiCorp's current year wildfire mitigation strategy included:

> Complete initial RSE evaluation at the initiative level.

> Continue participating in OEIS led workshops and utility working groups to evolve RSE calculations.

PacifiCorp did not provide any RSE values in their 2022 Q1 QDR or 2022 WMP Update. They are the only utility to fail to generate any RSE values. Reporting on RSE values within QDR Table 12 is a requirement of the WMP and developing mitigation specific RSEs has been a long-standing expectation for utility wildfire mitigation planning. PacifiCorp should be required to provide a comprehensive summary of their current status in developing RSE values as well as an RSE valuation progress to date that includes any and all initial RSE calculations. PacifiCorp should also be required to submit RSE values for all wildfire mitigation activities in their 2023 WMP filing.

PacifiCorp does not describe what near-miss data they are collecting

PacifiCorp includes a near-miss data collection mitigation initiative (PacifiCorp 2022 WMP Update, p. 213). The description is vague and fails to detail when and what types of data PacifiCorp is collecting. PacifiCorp should provide additional detail on their near-miss data collection in their 2023 WMP.

BVES should explore opportunities to contract with SCE for wildfire planning and/or mitigation services.

BVES reports very high costs to ratepayers in order to account for WMP implementation. We understand that BVES experiences challenges associated with their small territory, including asset management and efficient mitigation deployment. Given their small territory and the fact that they are completely encompassed by SCE, GPI recommends that BVES explore and discuss with SCE ways in which they could contract with SCE to reduce costs by leveraging SCE WMP programs. For example, can SCE's territory-wide situation awareness programs such as weather monitoring and remote sensing initiatives

expand to include the BVES territory and exchange of information to BVES without the need for significant programmatic and cost increases? If so, this could elevate BVES maturity in these areas while potentially reducing costs by leveraging SCEs existing systems. In the case of weather systems, could mapping weather across BVES' territory leverage existing forecasting software, meteorological staff, weather station network, and SCE reporting methods in a way that reduces costs for both BVES and SCE while elevating BVES capabilities?

PacifiCorp's additional PSPS impact reduction initiatives are reactive versus proactive risk reduction measures.

In their Action Statement Progress report PacifiCorp states that they will make an effort to provide more detailed explanations regarding how initiative affect PSPS programs (November 1, 2021 PacifiCorp Progress Report, p. 9). They also cite the development of a more robust decision-making model that supports a more targeted PSPS approach, improvements to situational awareness, and development of the LRAM. However, they do not detail how many of these activities will reduce future PSPS impacts. For example, are there updated PSPS decisions making thresholds that reduce impacts suggested in the Action statement? PacifiCorp's 2022 WMP does mention using LRAM outputs to inform Covered Conductor installations and shown in their 2022 WMP Figure 7.6 (Figure not reproduced here); however, Figure 7.6 is labeled "Pre-LRAM priority…" In PacifiCorp 2022 WMP Section 7.3.8.2 Risk reduction scenario development and analysis, they general note plans to evolve the LRAM and use it to evaluate risk reduction in its next phase of development (PacifiCorp 2022 WMP Update, p. 215-216).

In response to PC-7 issue in their 2022 WMP, PacifiCorp states:

> In addition to the response provided in the Action Statement Progress Report submitted on November 1, 2021, PacifiCorp has included two new initiatives in the 2021 Change Order to further reduce the impact of PSPS impacts. The two new initiatives in the change order directly reduce PSPS impacts by providing free portable batteries to Medical Baseline Customers and providing a generator rebate program (PacifiCorp 2022 WMP Update, p. 107).

We note that while backup generator and battery programs are important, these are also reactive, versus pro-active, PSPS impact mitigation efforts that do not themselves reduce the duration, frequency, or extent of PSPS events.

Based on these refences it's not clear whether PacifiCorp has substantially advanced its ability to gauge whether and how its initiatives can and will reduce the impacts of PSPS.

Liberty's QA/QC inspection rate of 0.5 percent, is one tenth of the QA/QC performed by PacifiCorp and BVES (5 percent).

Liberty plans to conduct QA/QC of detailed inspections at a rate of 0.5 percent. For their Detailed inspections of distribution electric lines and equipment program target of 308 circuit miles inspected in 2022, the QA/QC would total 1.54 circuit miles. This inspection rate is 10 times lower than PacifiCorp and BVES. Liberty should increase their QA/QC of detailed inspections to 5 percent to provide a more reliable assessment of inspection quality.

Liberty should accelerate their expulsion fuse replacement program and improve the prioritization method.

Liberty has a dedicated Expulsion Fuse Replacement program with targets to replace 1,500 expulsion fuses per year. This plan is anticipated to take 6 years to complete all replacements. The completed 867 of 1,500 planned replacements in 2021 was reported delayed due to supply-chain issues and wildfires. Liberty reports having solved the supply-chain issues. However, much of their completed and planned 2022 fuse replacements are located in their Reax wildfire low-risk Tier 2 region in South Lake Tahoe. A smaller proportion of replacements are planned in the Tier 3 HFTD, with very few planed for surrounding very-high, high, and moderate risk Tier 2 regions (Liberty 2022 WMP Update, p. 278). In the workshop Liberty detailed that replacement efforts were based on ease of replacement as well as HFTD tier. We are concerned with this approach, since it appears to equate to risk buydown in lower-risk regions of the HFTD Tier 2, presumably due to ease of replacement within more urban environments. This leaves other higher risk regions more exposed to wildfire risk from expulsion fuses. It will

also result in the deferral and aggregation of more challenging fuse replacements in later years that could effect Liberty's ability to complete their program targets in later years, especially considering the shortfalls they experienced in 2021 despite focusing efforts on easier replacement locations. Liberty should expand their plan for how they will stay on track to complete fuse replacements in the highest risk regions first, and ideally in less than 6 years.

Liberty should explain whether and how it considers alternate pole materials or protections in high fire risk locations.

In Liberty's "Distribution pole replacement and reinforcement program, including with composite poles," they do not discuss how or when they consider the use of, and install non-wood poles. Stating only:

> Liberty has tried intumescent wrapped poles and ductile-iron poles. Further study is planned to determine if alternative pole types such as these are appropriate cost-effective solutions for various situations (Liberty 2022 WMP, p. 114).

Liberty should clarify the percent of composite poles installed and planned, their locations, and the conditions under which they select composite poles or other alternatives over wood poles. They should also detail when the proposed further study will begin, what it entails, and how they can use other utility data and experienced to reduce the need to pilot programs or independent studies regarding pole material selection.

Liberty and PacifiCorp do not adequately take into account ingress or egress routes in their risk modeling or Grid Design and System Hardening plan.

Liberty mentions ingress/egress considerations as a Lesson Learned, and a covered conductor selection and locational prioritization input. However, they do not detail where or how they determine important wildfire-related ingress/egress routes, and which of these locations are scheduled for Covered Conductor installation or other wildfire mitigations. PacifiCorp's 2022 WMP Update has no mention of either ingress or egress routes in any context. Liberty and PacifiCorp should detail how and where they determine important wildfire ingress and egress routes, and how they will take these locations into account in

their wildfire mitigation efforts beginning in 2023. GPI further recommends connecting with cities and tribes within their territories to leverage and align with local wildfire risk and evacuation plans.

PacifiCorp should acquire wildfire suppression equipment in their California territory.

In their mitigation section 7.3.6.3, titled "Crew-accompanying ignition prevention and suppression resources and services," PacifiCorp lists the fire suppression equipment it owns (e.g. water tankers). None of the listed equipment is located inside of California. The closest equipment to their HFTD Tier 3 region (Mt Shasta, CA) is located in Klamath Falls, OR and Medford, OR, both deemed high fire risk locations in Oregon's wildfire risk maps, 1.5 hours from Mt Shasta. PacifiCorp should describe their equipment deployment strategy and how they will address ignition or wildfire events in their California territory if their equipment is deployed in Oregon.

PacifiCorp rolls many mitigations into its line rebuild program. It should describe how it addresses specific equipment risk outside of the Line Rebuild program.

PacifiCorp conducted a LiDAR Pole Loading Assessment pilot project that identified 187 poles for replacement that did not meet current design standards. PacifiCorp passes the LiDAR program and findings off on account that these poles were lower risk than other identified poles and that they are slated for replacement in planned covered-conductor projects. This decision making suffers from multiple logical issues. First, the pilot program appeared to be successful since it was able to identify a large number of poles that do not meet design standards within the HFTD, and are therefore at heightened wildfire risk. Second, since it appears that the pilot was only deployed in locations where covered conductor replacement was planned, it is entirely possible and likely that this program could add inspection value and risk insight in locations where the line-rebuild program is not currently planned. In order to assess whether this remote sensing inspection program is valuable, PacifiCorp must conduct a risk identification and cost analysis compared to its other inspection programs, including considering factors such as efficiency and backcountry access. Third, since PacifiCorp has not even come close to completing its

planned covered conductor program targets in either 2021 or 2022, the LiDAR identified poles and the associated risk likely remain largely unmitigated.

PacifiCorp's "line rebuild program" is essentially its Covered Conductor Installation initiative (PacifiCorp 2022 WMP Update, Section 7.3.3.3, p. 161). This line rebuild program is the same covered conductor installation work where PacifiCorp has failed to achieve their program targets in 2020 (1.4 of 38 planned miles) and 2021 (20 of 81.2 miles). Components of their line rebuild include reconductoring, pole replacement, small diameter copper replacement, and undergrounding. However, PacifiCorp states that they track targets and progress each of these components under separate initiative names while spending is rolled into the Line Rebuild Program. These separate tracking sections include: Section 7.3.3.6 Distribution pole replacement and reinforcement, including with composite poles; 7.3.3.10 Maintenance, repair, and replacement of connectors, including hotline clamps; 7.3.3.12 Other corrective action; and 7.3.3.16 Undergrounding of electric lines and/or equipment.

GPI is concerned that rolling all of these mitigations into their stunted covered-conductor, line-rebuild program is negatively affecting the rate of risk buydown. PacifiCorp should either justify their current line-rebuild plan by presenting a thorough assessment of risk buydown rate and cost effectiveness relative to deploying a combination of complete line-rebuild as well as deployment of standalone pole and small copper wire replacement programs, or develop separate deployment programs to improved risk reduction rates while they improve the efficiency of their line-rebuild program.

All SMJUs should have a specific CC maintenance program that takes into consideration CC specific failure modes.

The IOUs identified wear-and-tear and failure modes specific to covered conductor. The SMJUs should detail how they are establishing covered conductor installation, inspections, and maintenance standards specific to covered conductor.

Liberty should provide transparency in their WMP regarding whether Rule 20 undergrounding projects are funded by local citizens or ratepayers at large.

Liberty includes undergrounding projects in the north Tahoe basin that are predicated on Rule 20, which calls for undergrounding for the purpose of city beautification, not wildfire reduction. While located in HFTD Tier 2 they are coincident with a Reax-determined, low-wildfire risk area. PacifiCorp should state in their WMP that while this project may reduce wildfire risk, the costs only apply to local customers on account of Rule 20, and not to all ratepayers. The WMP is a public document available to ratepayers and should provide clarification in this instance, because undergrounding is typically one of the most expensive wildfire mitigation options.

Liberty's fuels management tables should be adopted by all utilities as the first-step and current best practice for reporting on vegetation residues produced during vegetation management work.

Liberty provides a series of tables that document vegetation removed during fuels management work per Section 7.3.5.5. Fuel management (including all wood management) and reduction of "slash" from vegetation management activities (Liberty 2022 WMP Update, p. 134 - 140). Liberty has updated their wood and slash treatment methods to include more opportunities for off-site removal, landowner use (e.g. firewood), or chip and broadcast versus lop and scatter. Liberty appears to apply VM slash and fuel removal methods somewhat selectively via a separate fuels management program based on fire risk, WUI designation, landowner cooperation, alignment with environmental protections, etc. stating:

> The Fuel Reduction and Wood Management Program was implemented through special projects in locations where Routine Work VM activities created slash and woody material build-up, causing customer complaints and reduction of tree removal agreements (Liberty 2022 WMP Update, p. 138).

And

> Liberty's local, state, and federal agency partners (CAL FIRE, Tahoe Regional Planning Agency, California Tahoe Conservancy, Tahoe Fire and Fuels Team, U.S. Forest Service, and local fire agencies) continue to be highly supportive partners and have increased their

emphasis on the need to reduce forest fuel load that results from power line vegetation management (Liberty 2022 WMP Update, p. 140).

In Table 7.3.5-3 Liberty details the number of trees removed in each project site (partially reproduced below, Table 3). The format of the biomass is provided along with the facility where the material was deposited and the tonnage was provided in Liberty 2022 WMP Table 7.3.5-4 (Partially reproduced below, Table 4).

Table 3. Partial reproduction of Liberty 2022 WMP Table 7.3.5-3

Table 7.3.5- 3: Liberty Fuel Management Projects

Initiative Name	Project Category	Project Name	Line Miles	Acres Treated	Trees Removed	Landowner Participation	Tons of Biomass Removed
FUEL MANAGEMENT	COMMUNITY FUEL REDUCTION	TOWN OF TRUCKEE - GLENSHIRE	11	13.3	48	1	N/A
FUEL MANAGEMENT	COMMUNITY FUEL REDUCTION	SUNRISE CREEK	0.27	1.09	96	5	N/A
FUEL MANAGEMENT	COMMUNITY FUEL REDUCTION	RAINBOW TRACT	0.1	0.89	12	1	6.38
FUEL MANAGEMENT	LANDOWNER PARTNERSHIPS	TC 5201 CALTRANS	0.56	2.03	55.75	1	5.29
FUEL MANAGEMENT	SUBSTATION DEFENSIBLE SPACE	MEYERS SUBSTATION	0.56	9.59	320	N/A	140.49
FUEL MANAGEMENT	LANDOWNER PARTNERSHIPS	HAWKINS RANCH RD	0.18	0.36	10	1	N/A
FUEL MANAGEMENT	COMMUNITY FUEL REDUCTION	HIGHLANDS HOA	3	5.45	339.97	106	168.08

Table 4. Partial reproduction of Liberty 2022 WMP Table 7.3.5-4

Table 7.3.5- 4: Biomass Removed

Project	Contractor	Tons	Facility	End Use	Date
CUSTOMER FUEL TREATMENT	RK	50.5	Eastern Regional Landfill	Wood chips	5/13/2021
CUSTOMER FUEL TREATMENT	RK	19.07	Full Circle Compost	Wood chips	5/19/2021
RAINBOW TRACT	MFE	3.93	South Tahoe Refuse	Compost/ mulch	6/2/2021
RAINBOW TRACT	MFE	2.45	South Tahoe Refuse	Compost/ mulch	6/4/2021
TC 5201 CALTRANS	MFE	5.29	Eastern Regional Landfill	Wood chips	6/16/2021
CUSTOMER FUEL TREATMENT	RK	12.66	Eastern Regional Landfill	Wood chips	6/21/2021
CUSTOMER FUEL TREATMENT	MFE	12.85	Eastern Regional Landfill	Wood chips	6/28/2021

Notably, Liberty's 2021 fuels management program removed 2,119 tons of biomass. This constitutes the biomass from only a portion of the vegetation management work of a relatively small utility. The amount of woody vegetation material generated from dead and dying tree removal, strike-tree removal, and maintaining line clearances by utilities across California must therefore equate to many thousands of tons of material.

A Wildfire Treatment and Waste Biomass webinar[1] put on by UCLA School of Law, Emmitt Institute on Climate Change and the Environment, and UC Berkley Law School, Center for Law Energy and Environment discusses the need for a market that can utilize biomass produced from vegetation management activities that in turn provide revenue streams to reduce VM costs. They discuss top barriers to developing the necessary market and key solutions to help overcome those barriers. One of the key solutions includes increased transparency via data and mapping initiatives that match demand with woody residues from vegetation-management projects. Current work includes a partnership between California and the Forest Service to treat 1 million acres per year. An initial project to treat 275,000 acres is underway in the Yuba/North Tahoe area. The project began with 15,000 acres in 2018 and expanded to 48,000 acres in 2021, with another 50,000 acres planned for 2023, demonstrating scalability coupled with proactive efforts towards market-supported sustainability.

Utility Vegetation Management biomass cannot and should not increase probability of ignition or exacerbate wildfire consequence started by utility or non-utility ignitions. If left in place the forest and slash from VM efforts by utilities and forest management agencies may contribute to ignition potential as well as fire intensity. Workshop speakers recounted how 40 fire trucks had to guard slash piles during the Caldor Fire in order to prevent ignition that could exacerbate the wildfire.

Parallel wildfire-risk-driven vegetation management activities and efforts toward creating market-based solutions for VM biomass across California can help create pathways for

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[1] Wildfire Treatments & Waste Biomass: Policy Options to Boost New End Uses. https://www.kaltura.com/index.php/extwidget/preview/partner_id/1368891/uiconf_id/41443412/entry_id/1_39uym7f9/embed/iframe? (Accessed on May 9, 2022)

utility VM biomass disposal that is sustainable, and even generates revenue. The WMP has an opportunity to support this market development process through increased data and mapping. GPI urges the OEIS to require fuels management tables in the 2023 WMP Guidelines similar to those provided by Liberty for their fuels-management program. Tables should include data elements such as estimated fuel tonnage both left on-site and removed, the format of that material (e.g slash, wood, lop and scatter, chipped), and location. These data will elucidate both the amount of fuels left in place, as well as the market potential of utility VM biomass.

PacifiCorp's 2022 WMP does not address the fuels/slash end uses discussed and VM replacement programs mentioned in the workshop.

In the May 18, 2022, workshop on SMJU 2022 WMP Update PacifiCorp mentioned fuel and slash management efforts that removed vegetation management biomass as well as a tree planting program. However, these efforts are not described in their WMP. PacifiCorp should include any fuels and slash management and other VM removal or replacement activities in their 2023 WMP. Including this information is important for understanding the current state of efforts towards more sustainable vegetation management practices, developing standards to method best-practices and maturity metrics.

SMJUs should explain how they schedule and perform additional inspections and vegetation management in wildfire impacted areas.

Vegetation in burned regions can include many new hazard trees, widowmakers, and rapid grow-in of invasives and/or ignition-prone vegetation. As wildfires have and will continue to burn through California annually the SMJUs must include a post-fire approach to vegetation inspections and management. SMJUs should detail how they schedule and prioritize vegetation management and inspections in wildfire-affected regions. This work should entail either a separate program, or be included as part of their existing programs in a way that does not defer or supplant VM and inspection work in unburned regions of their territory. Plans should include a prioritization plan, how they will staff the work such that it does not occur at the expense of pre-fire VM and inspections, and the timeline for work (e.g. complete inspections and necessary VM within 1 year of the fire and monitor

regrowth). We also strongly support the development of sustainable integrated vegetation management approaches for post-fire management with a focus on native species with a naturally low propensity for requiring substantial vegetation management. These plans should be detailed in the 2023 WMP. It may be prudent to include a new initiative in the 2023 WMP guidelines that prompts the development of post-fire work.

Conclusions

GPI urges the OEIS to develop new requirements for VM biomass reporting that increase transparency into the amounts of vegetation residues produced and the proportions left on-site versus removed. This information will support market-based solutions that are already underway to address buildup of VM residues from statewide fuel management programs, and that can improve utility VM sustainability, reduce wildfire risk, and provide cost-reducing revenues.

For the reasons stated above, we urge the OEIS to adopt our recommendations herein.

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Respectfully Submitted,

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