

OFFICE OF ENERGY INFRASTRUCTURE SAFETY EVALUATION OF THE WILDFIRE SAFETY ADVISORY BOARD RECOMMENDATIONS FOR THE WILDFIRE MITIGATION PLAN GUIDELINES, PERFORMANCE METRICS, AND SAFETY CULTURE ASSESSMENT PROCESS

August 2024

i

TABLE OF CONTENTS

1	Introduction1
2	Evaluation of the WSAB Recommendations for the WMP Guidelines
3	Evaluation of the WSAB Recommendation for Performance Metrics
4	Evaluation of the WSAB Recommendations for the Safety Culture Assessment
	Process
5	Conclusion

LIST OF TABLES

Table 1-1. Summary of Energy Safety Evaluation of the WSAB Recommendations for the WMPGuidelines3
Table 1-2. Summary of Energy Safety Evaluation of the WSAB Recommendations for Performance Metrics
Table 1-3. Summary of Energy Safety Evaluation of the WSAB Recommendations for the SCAProcess
Table 2-1. Energy Safety Evaluation of the WSAB Recommendations for the WMP Guidelines. 9
Table 3-1. Energy Safety Evaluation of the WSAB Recommendations for the WMP PerformanceMetrics19
Table 4-1. Energy Safety Evaluation of the WSAB Recommendations for the Safety CultureAssessment Process22

1 INTRODUCTION

In accordance with Public Utilities Code section 8389(c),¹ this document sets forth the Energy Safety's annual recommendations to the California Public Utilities Commission (Commission or CPUC) following its analysis of recommendations from the Wildfire Safety Advisory Board (WSAB or Board).

Public Utilities Code section 8389(b) directs the WSAB to make recommendations to Energy Safety by June 30, 2020, and annually thereafter regarding:

- Appropriate performance metrics and processes for determining each electrical corporation's compliance with its approved Wildfire Mitigation Plan (WMP).
- Appropriate WMP requirements in addition to the requirements set forth in Public Utilities Code section 8386.²
- The appropriate scope and process for assessing the safety culture of an electrical corporation.

On April 19, 2024, the WSAB issued its "Draft Recommendations to Office of Energy Infrastructure Safety on Additional Wildfire Mitigation Plan Requirements and Performance Metrics, and Safety Culture Assessment" for public comment.³ The WSAB adopted its final "Recommendations to Office of Energy Infrastructure Safety on Additional Wildfire Mitigation Plan Requirements and Performance Metrics, and Safety Culture Assessment" (WSAB Recommendations Report) at its quarterly meeting on June 5, 2024.⁴ The WSAB

¹ Public Utilities Code section 8389

⁽https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=PUC§ionNum=8389, accessed June 19, 2024).

² Public Utilities Code Section 8386

⁽https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=PUC§ionNum=8386, accessed June 19, 2024).

³ <u>Draft Recommendations to the Office of Energy Infrastructure Safety on Additional Wildfire Mitigation Plan</u> <u>Requirements and Performance Metrics, and Safety Culture Assessment (April 2024)</u> (https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=56504&shareable=true, accessed May 2, 2024).

⁴ <u>Recommendations to the Office of Energy Infrastructure Safety on Additional Wildfire Mitigation Plan</u> <u>Requirements and Performance Metrics, and Safety Culture Assessment (June 2024)</u> (https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=56787&shareable=true, accessed June 24, 2024).

Recommendations Report provided recommendations on the WMP Guidelines, performance metrics, and Energy Safety's safety culture assessment (SCA) process.

WMP Guidelines Recommendations

In total, the WSAB Recommendations Report included 15 recommendations in relation to the WMP Guidelines. Energy Safety evaluated each of these recommendations. Energy Safety proposes to:

- Incorporate as proposed: one recommendation
- Incorporate with adjustments: nine recommendations
- Research further for potential future incorporation: two recommendations
- Not to incorporate: three recommendations

Performance Metrics Recommendations

The WSAB issued one recommendation for performance metrics. Energy Safety evaluated this recommendation and proposes to not incorporate this recommendation at this time, but will consider this recommendation in future efforts to study, develop, and improve existing performance metrics (see Tables 1-2 and 3-1 for more details).

Safety Culture Assessment Process Recommendations

The WSAB issued five recommendations in relation to the SCA process. Where Energy Safety sees the merit of a WSAB recommendation, Energy Safety will consider integrating it into future SCA processes. Energy Safety has evaluated each of the recommendations. Energy Safety proposes to:

- Potentially incorporate in future SCA processes: four recommendations
- Not to incorporate: one recommendation

Table 1-1. Summary of Energy Safety Evaluation of the WSAB Recommendations for the WMP Guidelines



Incorporate/Incorporate with Adjustments

- 1 Cost Benefit Analysis calculations should quantify the benefits of avoided Public Safety Power Shutoff (PSPS) events. (Incorporate with adjustments)
- 1a Energy Safety should require the electrical corporations to provide information on areas that have already been hardened that are still subject to PSPS events. (Incorporate with adjustments)
- 1b Energy Safety should require the electrical corporations to collect data and report on how effective the grid hardening work is in terms of estimate outage and PSPS event reduction. (Incorporate with adjustments)
- 2 Energy Safety should require the electrical corporations to report in WMPs their evaluation of the risk of legacy, pre-GO 95 equipment in the electrical

5 – Energy Safety should require the electrical corporations to detail plans to remedy the issues of improperly rated equipment accounting for both current and fault duty.

Potentially incorporate in the future

- 10 Energy Safety should require electrical corporations to report infrastructure component risks of failure against risk of ignition.
- 7 Energy Safety should require the small and multi-jurisdictional utilities (SMJUs) to include a brief narrative in their WMPs about how wildfire mitigation efforts fit within the broader context of its enterprise risk management as part of its risk informed

Do Not Incorporate

 8 – Energy Safety should require the electrical corporations to clearly articulate a strategy in their WMPs for mitigating PSPS vulnerability and enhancing the resiliency of areas of high societal and economic importance.

framework.

 9 – Energy Safety should require the electrical corporations include risk matrices in their WMPs.

3

corporation's service territories in the High Fire Threat District (HFTD). (Incorporate with adjustments)

- 3 Energy Safety should issue guidance to the electrical corporations to prioritize undergrounding of circuits originating from transmission substations for areas where undergrounding is deemed to be the best-suited hardening measure. (Incorporate with adjustments)
- 4 Asset and vegetation management inspection and maintenance. (Incorporate with adjustments)
- 6 Energy Safety should require the electrical corporations to include in the WMPs an evaluation of the risk from the remaining non-exempt equipment from Public Resources Code (PRC) Section 4292 in the HFTD. (Incorporate)
- 11 Energy Safety should require electrical corporations to report infrastructure component risks of failure against risk of ignition. (Incorporate with adjustments)

12 – Energy Safety should require	
electrical corporations to reorganize the	
required Table 6-1 to show the	
relationship between models in a	
hierarchical way to reduce confusion and	
better illuminate the relationships	
between models. (Incorporate with	
adjustments)	
• 13 – Energy Safety should require	
electrical corporations that deployed	
Machine Learning (ML) risk mitigation of	
wildfire to report the following: 1) Data	
collection methods; 2) Data preparation	
and cleaning methods; 3) Machine	
learning model; and 4) Model evaluation.	
(Incorporate with adjustments)	

Table 1-2. Summary of Energy Safety Evaluation of the WSAB Recommendations for Performance Metrics



Table 1-3. Summary of Energy Safety Evaluation of the WSAB Recommendations for the SCA Process



8

2 EVALUATION OF THE WSAB RECOMMENDATIONS FOR THE WMP GUIDELINES

The table below presents the WSAB recommendations for the WMP Guidelines in the lefthand column, Energy Safety's recommendations in the middle column, and Energy Safety's analysis explaining its recommendations in the right-hand column

WSAB Recommendation	Energy Safety Recommendation	Analysis
1. Cost benefit analysis (CBA) calculations should quantify the benefits of avoided PSPS events. Furthermore, Energy Safety should require the electrical corporations to describe how they calculate the benefits from avoided events and include these benefits as part of their CBA calculations.	Incorporate with adjustments.	• Energy Safety plans to incorporate a modified version of this recommendation in its draft WMP Technical Guidelines. The Wildfire Mitigation Strategy section of the draft WMP Technical Guidelines will require electrical corporations to include a breakout of the amount of CBA influenced by PSPS risk, when CBA is required.
1a. Energy Safety should require the electrical corporations to provide information on areas that have already been hardened that are still subject to PSPS events. This data should include relevant metrics on customer outage minutes in hardened areas due to PSPS events.	Incorporate with adjustments.	 The PSPS Event Customer Meter Point feature class collects PSPS event reporting at the customer meter level and includes both predicted and actual duration of the PSPS event in minutes. Since the location is reported, this data can be analyzed against the locations of grid hardening activities. Energy Safety can perform spatial analysis of existing spatial reporting to determine an electrical corporation's customer outage minutes due to PSPS events in hardened areas. However, the above data is not public. Therefore, Energy Safety will require each electrical corporation to provide a narrative describing areas that have been hardened that are still subject to PSPS events and the

Table 2-1. Energy Safety Evaluation of the WSAB Recommendations for the WMP Guidelines

WSAB Recommendation	Energy Safety Recommendation	Analysis
		electrical corporation's plan to mitigate the PSPS events in these hardened areas.
1b. Energy Safety should require the electrical corporations to collect data and report on how effective the grid hardening work is in terms of estimated outage and PSPS event reduction.	Incorporate with adjustments.	 Energy Safety currently requires reporting on wildfire risk reduction efforts and will incorporate this recommendation with adjustments by requiring electrical corporations to report on how effective each grid hardening initiative is in terms of estimated PSPS risk reduction within the Grid Design, Operations, and Maintenance section of the draft WMP Technical Guidelines. For the data collection portion of this recommendation, Energy Safety's Electrical Safety Policy Division and Data Analytics Divisions plan to collaborate to determine the data requirements that would be needed to allow us to analyze grid hardening initiatives.
2. Energy Safety should require the electrical corporations to report in WMPs their evaluation of the risk of legacy, pre- GO 95 equipment in the electrical corporation's service territories in the HFTD, including the methods that they used and assumptions they made in that evaluation, and their plans to mitigate those risks.	Incorporate with adjustments.	• Energy Safety will incorporate this in the Grid Design and Operations section of the draft WMP Technical Guidelines by requiring that each electrical corporation provide information on how it evaluates the risk of legacy, pre-GO 95 equipment in the HFTD, including any maintenance and/or replacement plans for this equipment, and any additional inspection practices.

WSAB Recommendation	Energy Safety Recommendation	Analysis
3. Energy Safety should issue guidance to the electrical corporations to prioritize undergrounding of circuits originating from transmission substations for areas where undergrounding is deemed to be the best-suited hardening measure. Energy Safety should require the electrical corporations to include information in the text or in the appendix of their WMPs regarding how individual undergrounding projects reduce both wildfire and PSPS risk. If the specific undergrounded segments are still at risk of PSPS events, then this needs to be clearly stated and the electrical corporation needs to clearly explain how it intends to virtually eliminate that PSPS risk within 5-10 years.	Incorporate with adjustments.	 Energy Safety does not look at individual undergrounding plans as part of its WMP analysis. Per 8388.5(f)(2), electrical corporations that file an undergrounding plan are required to report on its implementation progress in WMP submissions. However, in the Grid Design, Operations, and Maintenance section of the draft WMP Technical Guidelines, Energy Safety will require electrical corporations to describe their strategy for mitigating undergrounded segments that are still at-risk of PSPS events due to upstream mitigation efforts.
4. Asset and vegetation management inspection and maintenance: In addition to annual targets, Energy Safety should require electrical corporations to include the total number of assets and total circuit miles that need to be inspected system-wide and the cadence of the inspections over the three-year reporting cycle of the WMP.	Incorporate with adjustments.	 Energy Safety requires the electrical corporations to report all inspection targets for each year of the WMP and requires quarterly targets. The information can be calculated from data currently submitted to Energy Safety by the electrical corporations. However, Energy Safety will require that electrical corporations report the percentage of inspections covering the system for each

WSAB Recommendation	Energy Safety Recommendation	Analysis
		year in the Grid Design, Maintenance, and Operations section of the draft WMP Technical Guidelines.
5. Energy Safety should require the electrical corporations to detail plans that remedy issues of improperly rated equipment accounting for both current and fault duty.	Potentially incorporate in the future.	 Energy Safety will not incorporate this recommendation at this time as it would be too prescriptive, and outside the typical scope of the WMP evaluations. However, Energy Safety will further research this concept to determine if this recommendation or something similar could be beneficial to incorporate into future iterations of the WMP Guidelines.
6. Energy Safety should require the electrical corporations to include in the WMPs an evaluation of the risk from the remaining non-exempt equipment from Public Resources Code (PRC) Section 4292 in the HFTD.	Incorporate.	• Energy Safety will incorporate this recommendation in the Grid Design, Operations, and Maintenance section of the draft WMP Technical Guidelines.
7. Energy Safety should require the small and multi-jurisdictional utilities (SMJUs) to include a brief narrative in their WMPs about how wildfire mitigation efforts fit within the broader context of the electrical corporation's enterprise risk management (ERM) as part of its risk	Do not incorporate.	 Energy Safety does not recommend prescribing different requirements for the SMJUs than the large investor-owned utilities. Energy Safety will not incorporate this recommendation into the draft WMP Technical Guidelines, as it is outside of its purview and is not information typically used

WSAB Recommendation	Energy Safety Recommendation	Analysis
informed framework.		to evaluate WMPs.
8. Energy Safety should require the electrical corporations to clearly articulate a strategy in their WMPs for mitigating PSPS vulnerability and enhancing the resiliency of areas of high societal and economic importance, such as central business districts and downtown areas, that are otherwise not required by law to have backup generation. This should include an overview of all of the areas that are currently at risk (i.e. listing all of the areas still at risk), the estimated economic impacts of PSPS events to those areas (if known), and a description of how the electrical corporation will use any combination of grid hardening from the transmission substation to the area, deployment of mobile generation, or installation of a microgrid and over what time frame.	Do not incorporate.	 Energy Safety created a cross-utility area for continued improvement to improve PSPS modeling (wildfire and PSPS tradeoff transparency). Requiring the electrical corporations to include the economic impacts of PSPS without providing a recommended methodology for calculating those impacts may not provide useful results.
9. Energy Safety should require the electrical corporations to report their risk analyses by ecological regions (or pyromes) in addition to their service territory as a whole. Once overall service territory analyses are made, these	Do not incorporate.	• Energy Safety will not incorporate this recommendation into the draft WMP Technical Guidelines at this time, as it could reframe the electrical corporations' service territory by sectionalizing it into ecological regions as opposed to evaluating location-specifics.

WSAB Recommendation	Energy Safety Recommendation	Analysis
existing risk assessments should be refined by ecoregions as well.		• Energy Safety requires weather and location- specific information in electrical corporations' risk models and outputs that provide greater granularity than establishing ecological regions.
10. Energy Safety should require the electrical corporations include risk matrices in their WMPs to depict the relative risks of the issues that they are addressing that relate to the areas of capital upgrades, and operations and maintenance expenditures including, but not limited to, their grid hardening, inspections, and vegetation work.	Potentially incorporate in the future.	 Energy Safety prefers to promote location-specific mitigation implementation and decision-making in order to maintain specificity on addressing location-specific drivers with mitigations tailored to those drivers. However, Energy Safety sees the merit in pursuing risk/safety visual components. Energy Safety will further research this recommendation in the future to determine if it could be beneficial to include risk matrices and/or risk/safety visual components in future iterations of the WMP Guidelines.
11. Energy Safety should require electrical corporations to report infrastructure component risks of failure against risk of ignition. A risk matrix should be included to illuminate the volume of a particular asset type (component) in the service territory. These should include (but not be limited to) different assets such as expulsion fuses, lightning arrestors, and	Incorporate with adjustments.	 Energy Safety is interested in understanding particular ignition risk components. Energy Safety plans to incorporate this recommendation with modifications in the Grid Design and Operations section its draft WMP Technical Guidelines by requiring the electrical corporations to provide a narrative describing CPUC ignitions in the High Fire Risk Area (HFRA) attributed to each

WSAB Recommendation	Energy Safety Recommendation	Analysis
conductors.		 component. Additionally, Energy Safety plans to update the Data Guidelines to require electrical corporations to report their HFRA maps to allow Energy Safety to analyze existing ignitions spatial reporting against each electrical corporations HFRA. Energy Safety requires the above information in the High Fire Threat District (HFTD) to be reported. As in recommendation 10, Energy Safety will further research the potential inclusion of risk matrices in the future to determine if it could be beneficial to include in future iterations of the WMP Technical Guidelines.
12. Energy Safety should require electrical corporations to reorganize the required Table 6-1: Summary of Risk Models to show the relationship between models in a hierarchical way to reduce confusion and better illuminate the relationships between models.	Incorporate with adjustments.	 Energy Safety is currently updating Table 6-1 to include clearer diagrams of how models are interrelated as part of overall updates to the WMP Technical Guidelines. This recommendation will be taken into account while finalizing the updates to Table 6-1.
13. Energy Safety should require electrical corporations that deployed Machine Learning (ML) risk mitigation of wildfire	Incorporate with adjustments.	• Energy Safety agrees that Machine Learning and Artificial Intelligence processes deployed by electrical corporations should be more transparent and, at some point, included within the WMP. Energy Safety is currently

WSAB Recommendation	Energy Safety Recommendation	Analysis
to report the following: I. Data collection methods: a. Describe what data is collected, used to train the model, and methods for collection. Is it global or local data? b. Outline any data transformations performed during preprocessing. c. Explain how data was partitioned. (A model will give overly optimistic results if the using same sample data set for validation as for testing or validation and training.) d. Provide a correlation plot - which describes the correlation between all the variables in the model. These plots are a sanity check for the relationship between the datasets. II. Data Preparation and Cleaning Methods: a. Describe how the electrical corporation cleaned its data. III. Machine Learning Model: a. Describe how the electrical corporation chose Machine Learning. (WSAB recommends that each electrical corporation use more than one model to prove which is better for its data and explain its selection in its WMP. This ensures they are properly evaluating versus using the easiest or most		 developing its capabilities surrounding Machine Learning and integrating requirements into the guidelines is not yet feasible. Energy Safety's Policy Division and Data Analytics Division will continue to develop the capabilities and pursue research related to this recommendation for potential inclusion in future iterations of the WMP Guidelines and other workstreams. Energy Safety plans to incorporate the data and model validation aspects from this recommendation throughout the WMP Technical Guidelines to aid in WMP evaluation.

WSAB Recommendation	Energy Safety Recommendation	Analysis
convenient model.)		
IV. Model Evaluation		
a. Describe the training data. Specify the percentage of data used for training, validation, and testing (e.g., 70% training, 15% validation, 15% testing).		
b. Document validation methods comprehensively.		
c. Describe how features are extracted.		
d. Describe how classification occurs.		
e. Report relative feature importance in the model's results.		
f. Describe when and how revised learning occurs. Specify when new data is collected and how model training is updated.		

3 EVALUATION OF THE WSAB RECOMMENDATION FOR PERFORMANCE METRICS

The table below presents the WSAB recommendation for additional performance metrics in the lefthand column, Energy Safety's recommendation in the middle column, and Energy Safety's analysis explaining its recommendation in the right-hand column.

Further details of Energy Safety's performance metrics reporting requirements can be found in Version 3.2 of Energy Safety's Data Guidelines.⁵

⁵ <u>Office of Energy Infrastructure Safety Data Guidelines (Version 3.2)</u>, Section 4 – Tabular Wildfire Mitigation Data (https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=56226&shareable=true, accessed June 10, 2024)

WSAB Recommendation	Energy Safety Recommendation	Analysis
 1. Energy Safety should require the electrical corporations to provide updated metrics for outages and wires down events to indicate the number of these events that occur during the fire seasons in the electrical corporations' service territories. These can be written as: Number of all events with probability of ignition, including wires down, contacts with objects, line slap, events with evidence of heat generation, and other events that cause sparking or have the potential to cause ignition in the HFTD during fire season; 	Do not incorporate.	 The amount of work required to fulfill this recommendation would not result in significant additional benefit to its evaluations. However, Energy Safety will consider this recommendation in its future efforts to study, develop, and improve upon the existing performance metrics. Although not an exact match for the categories in the non-spatial reporting, risk events of interest are reported in Quarterly Data Reports (QDR) spatial data. Those events include time and location, which Energy Safety could use to aggregate events by a given "fire season" - whether that be defined by electrical corporations, by Energy Safety, or some other authority - with consideration to HFTD as well.
• Number of wires down events in the HFTD during fire season;		
• Number of outage events not caused by contact with vegetation in the HFTD during fire season;		
• Number of outage events caused by contact with vegetation in the HFTD during fire season; and		

Table 3-1. Energy Safety Evaluation of the WSAB Recommendations for the WMP Performance Metrics

WSAB Recommendation	Energy Safety Recommendation	Analysis
• Number of outage events on circuits with adjusted settings for protective devices enabled in the HFTD during fire season.		
In addition, Energy Safety should also require the electrical corporations to provide these metrics broken down by ecological regions if feasible. Energy Safety should further require them to define the ecological region boundaries and fire seasons in the table notes or in a supportive narrative.		

4 EVALUATION OF THE WSAB RECOMMENDATIONS FOR THE SAFETY CULTURE ASSESSMENT PROCESS

The table below presents the WSAB's recommendations for the safety culture assessment (SCA) process in the left-hand column, Energy Safety's recommendations in the middle column, and Energy Safety's analysis explaining its recommendations in the right-hand column.

Where Energy Safety sees the merit of a WSAB recommendation, Energy Safety will consider its potential integration into future SCA iterations.

WSAB Recommendation	Energy Safety Recommendation	Analysis
1. Energy Safety should include a question about management integrity and ethics in the Workforce Survey.	Potentially incorporate in the future.	• The SCA workforce survey currently has four integrity and ethics-related questions; ⁶ however, Energy Safety will keep this in mind during future revisions of the Workforce Survey.
2. Energy Safety should include a question in the Workforce Survey about employee comfort level in reporting safety concerns or safety misconducts that have not been fully addressed.	Potentially incorporate in the future.	• This recommendation is not covered by the current workforce survey. Energy Safety will keep this recommendation in mind during future revisions of the Workforce Survey.
3. Energy Safety should include a question in the Workforce Survey about how frequently the electrical corporation performs workplace hazard assessments.	Potentially incorporate in the future.	• This recommendation is not covered by the current workforce survey. Energy Safety will keep this recommendation in mind during future revisions of the Workforce Survey.
4.	Potentially incorporate in the future.	This recommendation is not covered

Table 4-1. Energy Safety Evaluation of the WSAB Recommendations for the Safety Culture Assessment Process

⁶ The four referenced integrity and ethics ranked response questions on the workforce survey: (1) My supervisor would use whatever power they have to help me out; (2) My supervisor makes sure all employee concerns are heard before job decisions are made; (3) Managers treat workers with respect; and (4) I believe managers apply the same rules for all workers.

WSAB Recommendation	Energy Safety Recommendation	Analysis
Energy Safety should request that each electrical corporation develop or submit details of behavior-based safety programs that are currently driving its safety culture.		by the current management self- assessment. Energy Safety will keep this recommendation in mind during future revisions of the SCA process.
5. Energy Safety should require each electrical corporation to create a required, trackable curriculum of safety culture trainings for their management teams which would include topics such as safety behaviors, regulations, policies, and laws with refresher intervals.	Do not incorporate.	 Energy Safety's SCA produces reports with findings and recommendations that the electrical corporations may agree to implement; it does not issue requirements with consequences for noncompliance. It is a process designed to assess safety culture outcomes over time and foster continuous learning. However, Energy Safety will consider how it may be able to incorporate tracking of safety culture trainings and/or existing mandatory trainings into the SCA process.

5 CONCLUSION

This document contains Energy Safety's analysis and recommendations associated with the WSAB Recommendations Report. Energy Safety submitted its analysis and recommendation to the CPUC on August 22, 2024, pursuant to Public Utilities Code section 8389(c).

DATA DRIVEN FORWARD-THINKING INNOVATIVE SAFETY FOCUSED



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