WILDFIRE: ASSESSING AND QUANTIFYING RISK EXPOSURE AND MITIGATION ACROSS WESTERN UTILITIES

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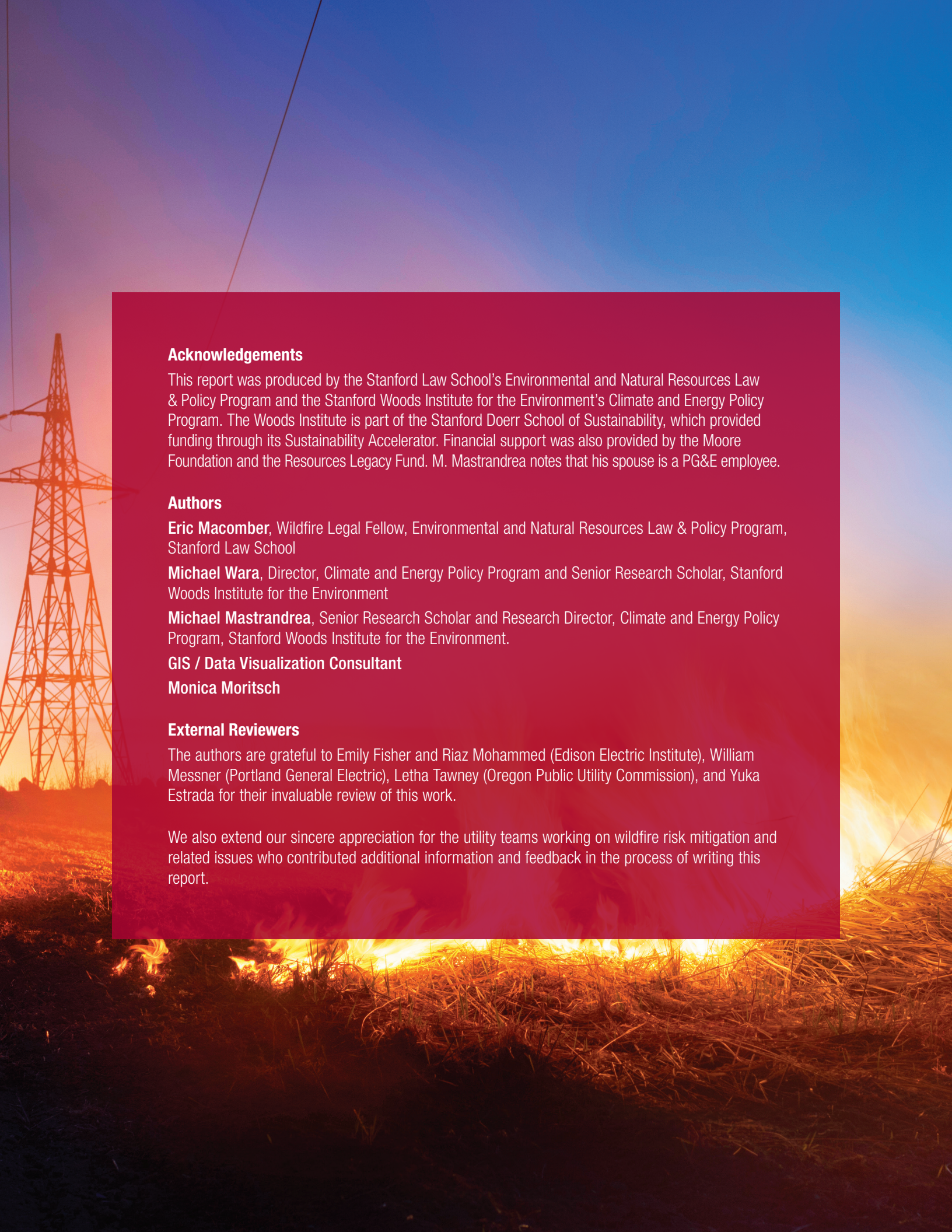

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EXECUTIVE SUMMARY

Wildfire risk is a serious and growing concern for electric utilities. For the increasing number of utilities that are currently exposed to wildfire risk or are likely to be exposed to wildfire risk in the near future, creating and implementing a wildfire mitigation plan is a crucial step toward limiting overall risk. The knowledge of utilities and regulators in regions that have already experienced catastrophic wildfires and developed solutions to reduce the potential harms posed by wildfire is a key information source that can assist in this adaptation and improvement process. Many utilities, particularly in the Western United States, have already developed a robust set of actions and practices to mitigate wildfire risk.

While the need for wildfire risk mitigation on the part of utilities is clear, differences in wildfire risk and approaches to wildfire between utilities operating across diverse geographies and in multiple regulatory jurisdictions make meaningful comparisons of risk exposure and mitigation efforts across utilities difficult. Here, we present a synthesis of Western utility practices that accounts for both the wildfire risk that utilities are exposed to and the specific measures that utilities are implementing to mitigate their wildfire risk. Our intention is that collecting this information in a uniform fashion will facilitate analyses and comparisons across different utilities' approaches to wildfire mitigation and suggest where more work is needed.

To contextualize this information, we explain why it is important for utilities to prepare and release wildfire mitigation plans to the public. We go on to describe the factors our project uses to represent utilities' exposure to wildfire risk and utilities' wildfire mitigation plan maturity levels. By applying the information we have gathered on these subjects to a geospatial representation of utilities' service territories, we then create a descriptive representation of the geographic distribution of wildfire mitigation plan maturity among Western investor-owned utilities. Finally, we set out a series of next steps that we plan to take in future iterations of this project in order to increase the accuracy, transparency, and applicability of our database and expand the scope of our project to other regions and more types of electric utilities.

Although this project is a first attempt at a comprehensive wildfire risk exposure assessment and compilation of a set of industry wildfire mitigation practices, we believe that making comparative information of this type publicly available will help to better inform utility, regulator, and investor decision-making and ultimately lead to more successful and efficient mitigation of wildfire risk across the United States.

BACKGROUND: UTILITY EXPOSURE TO WILDFIRE RISK IS INCREASING, MAKING MITIGATION PLANS NECESSARY

Wildfire Risk is a Significant Concern for Western States, Electric Utilities, and the Renewable Energy Transition

In recent years, catastrophic wildfires have taken a massive toll, measured in the loss of human life, destruction of property and natural resources, and other harms to public health, the environment, and the economy. Particularly due to the increasing impacts of climate change on fire weather, wildfire presents a significant and growing concern.[1] While wildfire poses serious risks nationwide and worldwide, in the recent past, the crisis has been particularly severe in the Western United States, where many communities and natural resources are located in areas that put them at substantial risk of being damaged or destroyed by a catastrophic wildfire.[2]

A diverse group of factors, many of which are largely outside of utilities' control, are increasing the consequences of catastrophic wildfires, including the effects of climate change, the effects of current and historical forest and wildland management practices, and the fact that a large amount of homes and infrastructure have been built in areas known to be at risk of fire. However, one common throughline is that many of the most devastating recent wildfires, including deadly fires in California and Oregon, have been ignited by electric utility infrastructure.[3] Utility-ignited wildfires are particularly dangerous because they are more likely to occur during weather conditions such as high winds, which can cause damage to utility infrastructure and render fire suppression efforts less effective.[4] Liability from a utility-ignited wildfire fire can easily reach into the billions of dollars, an amount sufficient to bankrupt even a large utility: in California, liability for wildfire damages caused Pacific Gas & Electric (PG&E), the state's largest utility, to file for bankruptcy in 2019.[5] In Oregon, potentially large liabilities for PacifiCorp's role in the 2020 Labor Day firestorm have thrown that utility's finances into question.[6] In Hawaii, Hawaiian Electric Company's alleged role in the 2023 Lahaina fire has caused the utility's stock price to collapse and sharply limited its access to capital markets.[7]

The potentially immense damages caused by utility-ignited wildfires are also a growing problem for the future of the overall electric system. The scale of potential liability for wildfire damages can cause third parties to see electric utilities' operations as far riskier than the returns allowed by utility commissions would justify, limiting utilities' ability to form long-term contract relationships and to secure low-cost equity and debt finance for projects to construct new infrastructure.[8] The nation's planned shift away from reliance on fossil fuels and toward greater reliance on zero carbon energy, the transition to electric vehicles, and the electrification of buildings are all strongly supported by

1 https://www.pnas.org/doi/10.1073/pnas.2111875118

2 https://www.cbo.gov/publication/58212#_idTextAnchor012

3 https://energysafety.ca.gov/wp-content/uploads/docs/strategic-roadmap/final_report_wildfiremitigationstrategy_wsd.pdf#page=11

4 https://doi.org/10.1016/j.firesaf.2023.103879

5 https://www.utilitydive.com/news/pge-files-for-2nd-bankruptcy-ignoring-investor-pleas/547036/

6 https://apnews.com/article/oregon-labor-day-wildfire-pacificorp-warren-buffett-berkshire-hathaway-ce220ff7433f979b3b2ffef0e51cb1af

7 https://www.wsj.com/livecoverage/stock-market-today-dow-jones-08-25-2023/card/hawaiian-electric-stock-tumbles-after-lawsuit-ratings-downgrade-M6AIFPQhLcGNhbOd5Yah

8 https://edocs.puc.state.or.us/efdocs/UAA/uaa153525.pdf

the recently enacted Infrastructure Jobs and Reinvestment Act as well as the Inflation Reduction Act.[9] All of these transformational changes will require large amounts of new electrical infrastructure to be financed and constructed.[10] This electric system growth can only occur if utilities can secure needed finance, and will only occur cost-effectively if utilities can secure finance at rates that reflect relatively low investment risks. Therefore, it's essential—not only for the safety of communities and for the financial well-being of individual utilities, but also for the viability of the overall energy transition—that electric utilities successfully reduce their exposure to wildfire risk.

Many Western Utilities are Exposed to Wildfire Risk, Including in Areas Previously Not Considered at High Risk; Further Assessment and Quantification of Risk is Needed

Accurately modeling the risk of high-consequence, low-frequency events like catastrophic wildfires is notoriously difficult, especially in areas with relatively little recent fire history or where potential fire behavior has changed significantly in the recent past.[11] However, events such as California's Napa-Sonoma Fire Siege in 2017, Woolsey and Camp Fires in 2018, Oregon's Labor Day Fires in 2020, Colorado's Marshall Fire in 2021, Hawaii's Lahaina Fire in 2023, and Texas' Smokehouse Creek Fire in 2024 have made it clear that areas across much of the Western United States are exposed to substantial wildfire hazard, potentially to a much greater extent than utilities and their regulators, investors, and customers have understood them to be in the past. This pattern is likely to intensify in the near future. Throughout many parts of the West, conditions that support the rapid growth and intensification of wildfire are projected to become more frequent as drought, high winds, and high temperatures become more common in connection with climate change.[12] At the same time, as urban development in wildfire-prone areas continues to place more valuable assets and infrastructure in the path of wildfires, the consequences of wildfire are likely to increase.[13] As both the frequency and the consequences of wildfire increase, so does overall risk exposure, including risk from the subset of wildfires that are ignited by electric utility infrastructure.

This problem is especially acute for investor-owned utilities. If investors come to see electric utilities across the West as unduly risky due to their potential exposure to wildfire liability relative to allowed rates of return, the result will be that communities, individual utilities, the electrical system, and the energy transition all suffer as a consequence. To address this problem, utilities and third parties like regulators and investors must be able to accurately assess and quantify a utility's exposure to wildfire risk; utilities must be able to implement mitigation measures that reduce their risk exposure; and third parties must be informed of the effects these mitigation measures have on a utility's overall safety and consequent risk profile. Our project seeks to contribute to this process by creating a framework to meaningfully assess, quantify, and compare wildfire risk and wildfire mitigation plans for United States electric utilities.

9 https://www.energy.gov/policy/articles/investing-american-energy-significant-impacts-inflation-reduction-act-and

10 https://www.economicstrategygroup.org/wp-content/uploads/2021/11/7-Borenstein-Kellogg.pdf

11 https://www.milliman.com/en/insight/wildfire-catastrophe-models-california-ratemaking

12 https://www.epa.gov/climate-indicators/climate-change-indicators-wildfires

13 https://www.pnas.org/doi/10.1073/pnas.2315797120

Utilities Should Implement and Publish Plans to Mitigate Wildfire Risk

The massive potential liability presented by catastrophic wildfires makes wildfire mitigation important for utilities exposed to wildfire risk. Wildfires also pose serious challenges for utility customers. In addition to the direct risk of bodily harm and destruction of property due to wildfire, customers may ultimately bear the cost of a utility's wildfire liability through higher rates or a higher cost of capital.[14] Wildfire mitigation is critical to reduce these harms, but mitigation itself comes with potential drawbacks for utility customers. For instance, deenergizing electrical infrastructure in order to prevent ignitions reduces the reliability of energy services.[15] Further, wildfire mitigation costs, which can be substantial, are typically passed on to customers through higher rates. In California, where high utility rates already disproportionately burden the state's low-income households,[16] increased wildfire mitigation spending caused PG&E residential customers' rates to spike by more than 20% in early 2024.[17] Given this context, utilities' and regulators' approaches to wildfire mitigation should aim to reduce exposure to wildfire risk while simultaneously avoiding adverse impacts on reliability and equitable access to affordable electric power.

In California, utilities and regulators have developed an established approach to wildfire mitigation: electrical corporations are mandated to create Wildfire Mitigation Plans (WMPs) according to requirements set out by the state, including the creation of Public Safety Power Shutoff (PSPS) plans to deenergize electrical infrastructure which is at risk of igniting fires during weather conditions that make dangerous fires more likely ("high fire-risk conditions").[18] Similarly, Oregon requires regulated utilities to file WMPs including PSPS plans with the state Public Utility Commission.[19] Not all states in the West mandate the creation of such plans; however, some utilities operating outside of California and Oregon have created plans analogous to WMPs and PSPS plans and made them publicly available even where they are not required by law or regulation to do so.[20] While no WMP can completely eliminate the risk of wildfire, creating and publishing these plans mitigates risk and conveys these mitigation efforts to stakeholders like customers, the government, and investors.

Some mitigation measures, such as the undergrounding of electrical infrastructure, are expensive and can be controversial. However, relatively simple, inexpensive, and low-impact mitigation measures have the potential to substantially reduce a utility's exposure to wildfire risk.[21] In particular, PSPS is an extremely effective tool to prevent utility wildfire ignitions when high fire-risk conditions make utility infrastructure unsafe to operate. Although implementation of PSPS can be challenging, because PSPS events cause adverse effects for customers who lose power when the distribution lines connecting them to the electric grid are deenergized, utilities can limit these impacts by taking additional measures to minimize the scale, duration, and effects on customers caused by shutoffs. When implemented successfully, these measures allow utilities to retain the benefits of PSPS for wildfire mitigation while reducing the disruption that PSPS events cause to retail customers, essential facilities like fire stations and hospitals, and infrastructure such as broadband networks and water suppliers.

14 https://lao.ca.gov/Publications/Report/4079#Allocating_Costs_From_Utility.2011Started_Wildfires

15 https://www.cpuc.ca.gov/industries-and-topics/wildfires/pacific-gas-and-electric-heightened-equipment-sensitivity-wildfire-mitigation-program

16 https://www.next10.org/sites/default/files/2022-09/Next10-paying-for-electricity-final-comp.pdf

17 https://www.sfchronicle.com/climate/article/pge-wildfire-finances-18709786.php

18 https://energysafety.ca.gov/what-we-do/electrical-infrastructure-safety/wildfire-mitigation-and-safety/wildfire-mitigation-plans/

19 https://www.oregon.gov/puc/safety/pages/wildfire-mitigation.aspx

20 For example, Arizona Public Service has released information on their PSPS plan.

21 For example, see the discussion by the California Public Utilities Commission (CPUC) of the cost and effectiveness of undergrounding compared to other system hardening tools like installing insulated conductors and fire-resistant poles on electric infrastructure: https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/infrastructure/electric-reliability/undergrounding-program-description

In addition to mitigating wildfire risk, it is important that utilities convey the costs and benefits of their mitigation efforts to external stakeholders concerned about wildfire risk and potential adverse effects of wildfire mitigation on electricity reliability and affordability. Therefore, utilities exposed to wildfire risk should strongly consider creating and making publicly available wildfire mitigation planning documents analogous to California and Oregon WMPs—including the utility's programs to increase situational awareness and understand wildfire risks specific to their infrastructure, adopt system settings that reduce ignitions during high fire-risk conditions, implement an operational PSPS plan, and limit any adverse effects of these interventions on customers, as described in the "Wildfire Mitigation Plan Development Criteria" section below.

A key reality for utility wildfire response is that the essential service that utilities provide strongly interacts with other essential services supplied by both public and private actors. Without public communication with first responders, water providers, broadband providers, and those that rely on the coordinated operation of all of these services, no utility can be fully prepared for wildfire risk. This coordination cannot be done behind closed doors, because the communities served by all of these services need to understand these plans in order to be prepared for its impacts. As described in the "Assessing Wildfire Mitigation Plan (WMP) Maturity by Utility" section below, utilities that operate in areas which are at greater risk of wildfire should consider continuing to develop and publicly release their mitigation plans through steps analogous to the approach implemented by California electric utilities. At the same time, the specific measures used to mitigate wildfire risk should be balanced to respond to each utility's unique circumstances and service territory. Utilities, regulators, and lawmakers should be mindful of the negative effects on reliability and affordability that California utility customers have faced, and should aim to align utility WMPs with other public and private mitigation programs in order to effectively mitigate wildfire risk while avoiding these adverse outcomes.

Wildfire Mitigation Plans are Needed Even in States with Less Stringent Liability Regimes

Different states' laws hold utilities liable for wildfires in different ways; therefore, the amount of potential wildfire risk exposure for a given utility may depend on the legal liability regime of the particular state in which it operates. In some states, utilities are held liable for wildfires only if the fire was ignited due to negligence on the utility's part. In California, on the other hand, utilities are subject to strict liability for wildfire: this means that utilities are held legally responsible for fires ignited by their infrastructure, whether or not the fire was the result of negligence on the utility's part. Further, under California's "inverse condemnation" framework, utilities are required to compensate owners of property destroyed by utility-ignited fires for the value of the property destroyed.[22]

While these different legal frameworks can lead to different results in terms of liability for an individual fire, recent events indicate that their differential effect on utilities' actual and perceived exposure to wildfire risk may be declining. California's more stringent approach to liability is not the sole reason why California utilities have faced such significant exposure to wildfire risk, and utilities operating in states with less stringent liability standards like negligence cannot assume that their state's legal framework prevents exposure to potentially massive liability in the event that their infrastructure ignites wildfires as devastating as the fires that have recently occurred in California. For instance, in the aftermath of the 2020 Labor Day fires in Oregon, a state with a less stringent standard for wildfire liability than California,[23] PacifiCorp was found negligent and therefore liable for the fires because it did not proactively

22 This is analogous to the manner in which the government compensates the owners of property seized under eminent domain—the reasoning used by California courts is that, because utilities are government-granted monopolies, they should be held accountable under the same framework as the government when they effectively seize property from private owners by damaging or destroying it. For more analysis, see https://www.templelawreview.org/lawreview/assets/uploads/2020/05/Gradwohl_92-Temp.-L.-Rev.-595.pdf

23 https://oregon.public.law/statutes/ors_477.092

deenergize power lines in high fire-risk conditions.[24] While not every suit relating to the fires was fully litigated, PacifiCorp faces billions of dollars in damages as a result.[25] Similarly, although investigations and litigation regarding the Maui wildfires of 2023 are still ongoing, a lawsuit alleging that Hawaiian Electric acted negligently by choosing not to deenergize power lines in Maui during high fire-risk conditions currently opens the utility to billions of dollars in potential liability.[26]

As the actual and perceived risk of wildfire across the West continues to grow, the degree of difference between California's standard for utility wildfire liability and a negligence standard as used by other states may continue to diminish. It may increasingly be seen as negligent for a utility not to take significant efforts to create and implement measures like a WMP and PSPS plan to lower the possibility of utility infrastructure igniting a wildfire. As a result, a less stringent liability standard may not insulate a utility from liability to the same extent it did in the past: because wildfire risk has increased and some utilities have changed their practices in response, expectations for reasonable precautions have arguably shifted. Even utilities with WMPs cannot be confident that implementing any particular mitigation measure will be enough to prevent a finding of negligence in court if their infrastructure is linked to a wildfire ignition.

In addition to this uncertainty, even under a less stringent liability standard, the large scale of potential damages from wildfire can make utilities appear risky to third parties. Because the multi-billion-dollar liability for a single catastrophic wildfire can bankrupt a utility, the probability of a utility being found to have acted negligently in igniting a fire—even if it is much lower than the probability of a finding of liability under California's strict liability standard—can still be high enough to make utilities appear risky as a long-term investment or contract partner, especially given the potential for additional non-economic damages and punitive damages in the event that a utility is found negligent or grossly negligent. For example, the perceived risk of liability caused Xcel Energy's stock to fall sharply after a series of wildfires in Texas in early 2024.[27]

The factors described above indicate that, even in states where they are not currently required to do so by law, utilities operating in areas at risk of wildfire in the present or near future should implement WMPs and PSPS plans in order to reduce their overall exposure to wildfire risk and convey the effects of these mitigation efforts to third parties. Our project aims to compile information relating to Western utilities' relative wildfire risk exposure and mitigation plan maturity, comparing the relevant factors against a "playbook" of utility practices in order to assist utilities, regulators, and stakeholders in the process of WMP and PSPS plan development. In areas where there is perceived risk of consequential wildfires from any cause or where there is historic experience of wildfire, even if wildfires in the recent past have not been catastrophic, utilities that seek to preserve their status as low-risk infrastructure companies which pay reliable dividends to shareholders need to invest in development of appropriate WMPs, including PSPS plans.

24 https://www.opb.org/article/2023/06/12/oregon-wildfire-verdict-pacificorp-labor-day/

25 https://www.oregonlive.com/business/2023/12/299-million-oregon-wildfire-victims-settle-lawsuit-against-pacificorp.html

26 https://edition.cnn.com/2023/08/14/investing/hawaiian-electric-maui-fires-lawsuit/index.html

27 https://www.reuters.com/business/energy/xcel-energy-falls-law-firm-flags-potential-liability-texas-wildfires-2024-02-29/

ASSESSING CURRENT EXPOSURE TO WILDFIRE RISK BY UTILITY

We present a synthesis of two geographic information system (GIS) datasets, respectively serving as indicators of elevated wildfire risk exposure in a given geographic area and the location of electric utility infrastructure within that area, to represent where electric utility service territories include areas at elevated risk of wildfire, potentially exposing the corresponding utility to increased wildfire risk.

As a proxy for the location of electric utility infrastructure, we use the U.S. Energy Information Administration (EIA)'s Electric Retail Service Territories dataset (ERST) from their U.S. Energy Atlas.[28] This dataset includes shape files representing the service territories of utilities which sell electric power to retail customers. As a proxy for elevated wildfire risk within a given area, we use the Federal Emergency Management Agency (FEMA) National Risk Index's geographically specific Wildfire Risk Rating (WRR), which assigns qualitative risk ratings at the county and census tract level based on the area's assessed expected annual loss (EAL) of "building value, population, and/or agriculture value each year" due to wildfire, as well as a Community Risk Factor determined by FEMA that accounts for a community's relative susceptibility or resilience to natural hazards.[29] For the purposes of this phase of the project, a utility whose service territory includes or overlaps with at least one county with a WRR of "relatively moderate" or higher is considered to be exposed to elevated wildfire risk.[30] For utilities whose service territories span multiple states, this threshold for risk exposure is determined at the state level for each state in which the utility operates.

This framework currently indicates whether a utility may be exposed to elevated wildfire risk, but it is important to note that—in addition to the limitations of the datasets it employs—this framework does not represent the geographic areas where risk is highest or distinguish between the relative degree of risk to which different utilities are exposed.[31] In order to have a more complete picture of the extent to which a given utility is exposed to wildfire risk within its service territory and to make comparisons of risk exposure between utilities, more sophisticated geospatial analysis is necessary, which we plan to conduct in further stages of this project.

28 https://atlas.eia.gov/datasets/f4cd55044b924fed9bc8b64022966097/explore

29 https://www.fema.gov/sites/default/files/documents/fema_national-risk-index_technical-documentation.pdf#page=39

30 The choice to use a "relatively moderate" WRR for a single county within a given utility's service territory as the basis for wildfire risk exposure is a deliberately low threshold, intended to compensate for uncertainty about the precise geographic location of wildfire risk, the high potential consequences of catastrophic wildfire, and the likelihood of increasing wildfire risk across much of the Western United States. This context indicates that wildfire mitigation is called for even for utilities operating in areas understood to be at relatively moderate risk of wildfire. For instance, Maui, the location of devastating wildfires in summer 2023, was assigned a "relatively moderate" WRR at the county level in the National Risk Index released in March 2023.

31 These limitations are in part due to the characteristics of the data sets used. WRR serves as a useful indication of an area's exposure to wildfire risk, but it lacks the specificity of proprietary wildfire risk models used by utilities, insurers, and fire management agencies that take factors such as an area's vegetation, topography, and the availability of fire suppression into account in estimating vulnerability. Therefore, for the purposes of this project, the WRR should be understood as a general proxy for a given area's overall wildfire risk rather than an accurate representation. Further, the ERST data represents utilities' entire service territories rather than the locations of their specific infrastructure (or the types of infrastructure at particular risk of igniting wildfires, like overhead distribution lines). As described in the "Next Steps" section below, these data sets serve as a starting point we plan to build on in order to improve the accuracy and specificity of our geospatial analysis in future iterations of this project.

ASSESSING WILDFIRE MITIGATION PLAN (WMP) MATURITY BY UTILITY

Our project currently uses a two-step approach to assess utilities' wildfire mitigation plan maturity. First, we collect publicly available data on a set of five criteria which relate to wildfire mitigation. Based on the extent to which these specific criteria are met by a utility's operation, we then assign each utility a holistic rating for overall WMP maturity along a three-tier scale informed by our participation in and observation of the development and practice of wildfire mitigation planning in California over the past decade. The criteria used to assess mitigation and the tiers chosen to represent overall WMP maturity, along with our reasons for using these criteria and choosing these tiers and the thresholds used to distinguish between tiers, are described below.

Wildfire Mitigation Plan Development Criteria

These criteria are intended to serve as independently verifiable proxies for significant steps in the development of a utility's wildfire mitigation program. For instance, a utility's implementation of weather stations and other meteorological resources is used as a criterion in order to reflect our understanding that these measures are a significant step toward developing situational awareness of wildfire ignition risk specific to that utility's infrastructure, which can inform both grid operations and the prioritization of mitigation measures in the areas at greatest risk. To reflect the high degree of variance across different utilities and their service territories, these criteria are achievable through multiple different means. To increase geographical specificity for utilities whose service territories span multiple states, and because some multi-state utilities have a diversity of approaches in different states (which can be informed by differing state legal and regulatory frameworks), these criteria are determined at the state level for each state in which the utility operates.

1. Wildfire Mitigation Plan (WMP) Created & Released

This criterion is applicable to utilities that have drafted and released information pertaining to a wildfire mitigation plan (WMP) detailing their efforts to mitigate wildfire risk within their service territories, including but not limited to inspections and maintenance of utility infrastructure, vegetation management, and system hardening. This criterion does not require the WMP to be comprehensive or fully operational at the time of our data collection; within our framework, creating a WMP and/or releasing information on mitigation measures is sufficient to meet this criterion. This is an indication that a utility has recognized that wildfires ignited by its infrastructure pose a risk that should be mitigated. We exclude from this category utilities that have yet to release a WMP currently in development and utilities which have prepared a WMP but kept it confidential: only public release of a finalized WMP satisfies this criterion.[32] Additionally, because our framework analyzes WMP maturity at the state level, WMPs that do not describe mitigation within a given state or that are specific to a different state do not meet this requirement for the state which is not included.

32 Our reasoning for setting the threshold for this criterion at the release of a public WMP is that, because an effective WMP requires planning in coordination with multiple government agencies, particularly first responders and local governments, a WMP drafted on a confidential basis cannot be fully comprehensive.

2. Weather Stations / Other Independent Meteorological Resources

This criterion is applicable to utilities that have deployed weather stations or other independent meteorological resources on their infrastructure in order to improve utility-wide situational awareness and risk assessment. It seeks to answer the question of whether a given utility is attempting to determine, on a real-time basis, if and when weather conditions exceed the design basis for safe operation of their systems. Because the weather conditions that make catastrophic wildfires more likely, particularly high wind speed, also increase the risk of utility infrastructure igniting a fire,[33] access to accurate weather information is critical in order for utilities to understand which parts of their infrastructure are exposed to the greatest wildfire risk and when high fire-risk conditions are most likely to exceed reasonably safe limits. In turn, this information can be used to help guide decisions about how to operate the system, which types of mitigation measures to implement, and how to prioritize mitigation work to maximize risk reduction and cost-effectiveness.

Experience in California has shown that government-sourced weather data can lack the accuracy and precision required to adequately understand weather risks specific to utility infrastructure. For instance, if government weather data is collected at ground level, the conditions detected—including crucial data such as wind speed—may be very different from the conditions facing utility infrastructure located at different elevations, including utility poles which are elevated significantly above ground level.[34] Given the spatial and temporal specificity of wildfire risk conditions for utility infrastructure, meeting this criterion within our framework requires meteorological resources to be deployed by the utility itself, as opposed to the use of third-party or public meteorological resources which may not accurately reflect weather conditions for utility infrastructure.

3. Protective Equipment and Device Settings (PEDS) / Fast-Trip

This criterion is applicable to utilities that have implemented device settings to lower the risk of electric infrastructure ignitions occurring during high fire-risk conditions. Settings that meet this criterion include, but are not limited to, “fast-trip” settings which allow for faster deenergization of equipment when a fault is detected and settings which disable automatic reclosing, collectively categorized by the California Public Utilities Commission (CPUC) as Protective Equipment and Device Settings (PEDS).[35] Because these features can significantly reduce the risk of utility infrastructure igniting catastrophic wildfires, a utility having implemented them weighs toward eligibility for this tier. However, to reflect that an initial ignition can occur and result in a wildfire even when automatic reclosing is disabled, settings which only disable automatic reclosing, without additional safety measures to increase sensitivity and deenergize lines more quickly, are not sufficient to meet this condition within our framework.

4. Operational Public Safety Power Shutoff (PSPS) Plan

This criterion is applicable to utilities that have drafted and released information pertaining to a public safety power shutoff (PSPS) plan to deenergize their electric infrastructure in order to prevent ignitions during wildfire risk conditions. This criterion requires the PSPS plan to be operational, here meaning that the utility is prepared to proactively initiate a PSPS if and when conditions call for it; within our framework, plans which state that the utility will not use PSPS or will initiate a PSPS only at the direction of another party do not satisfy this criterion. Generally speaking, in order to meet this criteria, a utility will have developed an operational decision making process informed

33 https://esg.wharton.upenn.edu/wp-content/uploads/2018/08/Wildfire-Cost-in-CA-Role-of-Utilities-1.pdf#page=3

34 https://www.sdgenews.com/article/sdges-weather-station-network-has-expanded

35 https://www.cpuc.ca.gov/industries-and-topics/wildfires/pacific-gas-and-electric-heightened-equipment-sensitivity-wildfire-mitigation-program

by real-time information from weather stations and other meteorological resources capable of determining when the risk of operating overhead lines exceeds tolerable levels (as described in criterion 2 above), and, if needed, will have received permission from its regulator to implement such a program.

5. Shutoff Impact Mitigation (e.g. sectionalization, on-site generation/storage, identification and advanced notification to medical baseline customers)

This criterion is applicable to utilities that have implemented measures to limit either the scope (in terms of geographical size, duration, and number of users affected) or the impact (in terms of disruption of essential services) of shutoffs caused by PEDS implementation and PSPS events. This is an important step in WMP development because, as experience in California has shown, although these mitigation measures significantly reduce the impacts of utility ignitions during high fire-risk conditions, they also have negative impacts on reliability for customers in areas where they are enabled.[36] Measures to limit the scope of shutoffs caused by these measures include, but are not limited to, sectionalization of electric infrastructure and the use of situational awareness tools to improve targeting of PEDS and PSPS. "Sectionalization" here refers to subdividing elements of the electric distribution system into smaller sub-elements that can be deenergized at the sub-element level, mitigating risk where it is highest without unnecessarily impacting customers who happen to be served by circuits that cross high risk areas. Measures to limit the impact of these measures include, but are not limited to, identifying and providing advance notice to medical baseline customers and other essential users who may be affected by PEDS and PSPS shutoff events, providing alternative sources of power such as on-site generation or battery storage for customers or critical infrastructure, and creating community resource centers where affected users can access services that have been interrupted by the disruption of access to electric power.

Tiers and Thresholds Chosen to Represent Utility Wildfire Mitigation Plan Maturity

Our project rates the relative maturity of Western utilities' WMPs. By necessity, this is an approximate judgment of overall mitigation plan maturity rather than a direct comparison of specific mitigation efforts: every utility's service territory is unique, and variations in factors including topography, vegetation, weather, and the different types of infrastructure operated by different utilities call for significant diversity in the types of wildfire mitigation projects that utilities undertake. By creating broad tiers to represent relative degrees of utility plan maturity, but setting thresholds based on specific and independently verifiable criteria, we aim to account for variation across different utilities' respective approaches to mitigation while still allowing for meaningful comparisons regarding the overall maturity level of different utilities' mitigation plans. Currently, the highest tier in our framework is analogous to the level of development for California WMPs. However, it is important to note here that California utilities remain exposed to significant wildfire risk, and that other regions' approaches to utility wildfire mitigation can and should diverge from the specific approach taken in California in order to better suit their own circumstances. The use of California WMPs as a benchmark is not meant to suggest that the California approach to wildfire mitigation should be copied in its entirety for other regions, but instead reflects our understanding that the fundamental elements of the WMP development process identified in our criteria are relatively mature in California.

36 https://haas.berkeley.edu/energy-institute/research/abstracts/wp-347/

Tier 3: No WMP, no PSPS plan, or no public information available

The lowest tier in our maturity analysis applies to utilities that have not created a WMP, lack an operational PSPS program, or have not made information on these plans publicly available. This is a deliberately low threshold, set to reflect the understanding that many Western utilities have not yet taken these initial steps. Distinguishing between utilities on this basis also reflects our understanding that even relatively modest efforts to assess and mitigate wildfire risk can have substantial effects, both on a utility's exposure to wildfire risk and on third parties' ability to accurately assess the utility's wildfire risk.

Tier 2: WMP & PSPS plan, but incomplete PEDS / shutoff mitigation plans

The second threshold in our maturity analysis applies to utilities that have made WMPs publicly available and have implemented operational PSPS plans, but have not implemented further mitigation efforts. The utilities included within this tier have created and released both WMPs and PSPS plans, but either have not begun or have not yet completed the process of implementing additional measures (as described in the section below) to mitigate their wildfire risk and reduce the potential adverse effects of PEDS and PSPS events.

Our decision to require a utility to release not only a WMP, but also a PSPS plan, in order to be included in this tier reflects our understanding that—given the growing risk of catastrophic wildfire—the degree of situational awareness, risk assessment, and public engagement needed to create and implement a PSPS are increasingly becoming the baseline expectation for utilities operating in areas exposed to wildfire. We found any utility that had made wildfire mitigation plans and PSPS plans available met the criteria for inclusion in this tier. However, we chose not to include utilities in this tier whose plans make reference to PSPS, but do not indicate that the utility has a proactive PSPS plan in place, e.g. utilities that state their policy is not to use PSPS or that the utility will only use PSPS at the direction of another party such as state regulators. Our reasoning is that, because the key benefit of PSPS is its ability to anticipate and prevent utility ignitions during high-risk weather conditions, a plan that does not contemplate the proactive use of PSPS by the utility is unlikely to provide a similar mitigation benefit. This is because decisions on whether to take the step of initiating a PSPS must be made very quickly—often on less than 48 hours' notice, which is faster than a utility can realistically ask and receive permission from a third party, even if the utility believes the step is warranted based on a weather forecast.[37] Therefore, our understanding is that PSPS programs that require third parties, including regulators, to decide whether to initiate PSPS events do not indicate an equivalent level of mitigation plan maturity when compared to programs where a utility itself can make the decision to initiate a PSPS event.

Tier 1: WMP & PSPS plan, PEDS & shutoff mitigation in place

The highest threshold in our maturity analysis applies to utilities that have created and published a WMP and PSPS plan, including the implementation of PEDS to further reduce wildfire risk and mitigation efforts to reduce the negative impact on reliability of shutoffs caused by PEDS and PSPS. Utilities included in this tier have met the criteria for Tier 2, and have additionally implemented at least some degree of PEDS and shutoff mitigation efforts.

One key metric used to assess electric utilities' maturity for the purposes of inclusion in this tier is whether, and to what extent, the utility has installed weather stations across its service territory. Given that high fire-risk conditions such as high wind speeds, extreme heat, and drought can also make it more likely for electrical infrastructure to fail, collection and analysis of accurate and targeted weather information is an essential input to electric utilities'

37 https://ieeexplore.ieee.org/document/10154121

situational awareness and operations. Because up-to-date and geographically specific weather information is crucial for determining where fire risk is highest and when the use of PSPS is called for, the installation of weather stations is also an effective and relatively inexpensive means to mitigate wildfire risk and reduce the adverse effects of overly broad or blunt implementation of PSPS. Not all weather station strategies are equally effective at reducing risk: some utilities' plans involve the installation of more weather stations than other utilities', and weather stations located near particularly high-risk areas and sections of infrastructure are generally more useful than stations located near relatively low-risk areas and infrastructure. For example, a weather station installed at a substation is in almost all cases less informative than a network of stations installed on poles in the highest risk line segments. However, for the purposes of determining WMP maturity, we have chosen to treat the installation of any weather station by a utility as a significant factor weighing toward eligibility for this tier.

Additional measures considered to mitigate wildfire risk include, but are not limited to, PEDS which incorporate "fast-trip" settings in addition to disabling of automatic reclosing. As discussed above, experience in California continues to indicate that PEDS can be an important additional layer of protection in high risk wildfire areas. Experience over the past several years indicates that implementation of PEDS in areas determined to be at risk of utility-ignited wildfire has led to significant reductions in the number of ignitions during wildfire season.[38]

Further measures considered to mitigate adverse effects on reliability due to shutoffs caused by PEDS, which deenergizes infrastructure more quickly when a fault is detected, and PSPS, which preemptively deenergizes infrastructure, include, but are not limited to, sectionalization of grid infrastructure to limit the geographic size and number of customers affected by shutoffs, the identification and provision of advance notice to electricity customers who would be particularly affected by shutoffs (such as medical baseline customers), and measures to provide power to customers affected by shutoffs due to PEDS and PSPS events through alternative means—like battery storage, on-site generation, and other distributed energy resources—that can operate even when the distribution infrastructure connecting a customer or community to the larger electric grid has been deenergized. Because these measures limit the adverse impacts of shutoffs and therefore allow for PEDS and PSPS to be used more readily to reduce wildfire risk, a utility having implemented them also weighs toward eligibility for this tier.

We did not consider utilities eligible for inclusion in this tier if they had not actively implemented these strategies—for instance, if a utility has created and published plans for future PEDS or shutoff mitigation efforts, but does not currently have these programs in place, we chose not to include the utility within this tier. However, we chose to include utilities in this tier that had implemented PEDS and shutoff mitigation plans even for relatively minimal and low-impact efforts, like increasing device sensitivity during wildfire risk conditions or preemptive identification and outreach to medical baseline customers. Our reasoning is that having these measures in place indicates a significant degree of mitigation plan maturity on the part of utilities that have implemented them.

For the purposes of this project, the utilities included within this tier can be considered to have made significant steps toward WMP maturity comparable to the early phases of the WMP development approach created in California. However, it is important to note that a utility that has passed all of these thresholds in WMP development may still be far from completing the actual implementation of their wildfire mitigation program; even within California's relatively well-developed WMP framework, significant wildfire risk exists, many California utilities are still in the fairly early stages of implementing their mitigation programs, and major questions about the effectiveness, affordability, and practicality of different utility approaches to wildfire mitigation remain. It is important that utilities operating at a level of WMP maturity comparable to that of California's electric utilities seek to ensure that their mitigation programs will address wildfire risk in a timely and cost-effective manner that minimizes adverse effects on customers; it is also

38 For instance, PG&E found that implementing PEDS on high-risk sections of its distribution infrastructure led to a 68% reduction in ignitions in those sections in 2022. https://www.pge.com/assets/pge/docs/outages-and-safety/outage-preparedness-and-support/pge-wmp-r5-040224.pdf#page=623

important that utilities continue to develop and improve their strategies to mitigate the overall risk of utility-ignited wildfire. Future iterations of this project will seek to collect and present data that can help to inform these planning decisions.

Table 1: Utility WMP Development Criteria & Maturity Tiers

	1: WMP Created?	2: Weather stations / other meteorological resources?	3: Protective Equipment & Device Settings (PEDS) / Fast-Trip?	4: Operational PSPS Plan?	5: Shutoff mitigation?
Tier 3: No WMP, no PSPS plan, or no public information available	Not created or no public plan available	Not created or no public plan available	Not created or no public plan available	Not created or implemented, utility has no operational strategy to implement PSPS, or no public plan available	Not created or no public plan available
Tier 2: WMP & PSPS plan, but incomplete PEDS / shutoff mitigation	WMP created and published	May or may not be implemented	May or may not be implemented	PSPS plan created and implemented	May or may not be implemented
Tier 1: WMP & PSPS plan, PEDS & shutoff mitigation measures in place	WMP created and published	Implemented, including first-party deployment of meteorological resources	Implemented, including settings beyond disabling automatic reclosing	PSPS plan created and implemented	Implemented to some extent (e.g. sectionalization, on-site generation/ storage, identification and advanced notification to medical baseline customers)

APPLYING WMP MATURITY TIERS TO WESTERN INVESTOR-OWNED UTILITIES

Public data reviewed in applying our WMP maturity tiers to Western investor-owned utilities (IOUs) indicated substantial shortcomings in utility WMP maturity. While several Western IOUs outside of California have implemented WMPs comparable in maturity to those implemented by California utilities, many IOUs operating in areas potentially exposed to significant wildfire risk have not created WMPs, PSPS plans, or both. Even IOUs which operate at a high level of WMP maturity in one state may not meet the same level of maturity for their operations in another state, given that utilities are held to different legal and regulatory standards in different states.

Overall, these data indicate that, although the need for WMPs and PSPS plans is becoming more widely acknowledged, among IOUs which have not already faced liability for catastrophic wildfire and are not required to implement WMPs by state law or regulation, a significant number of utilities have not reached a level of WMP maturity that reflects the potential risk of wildfire within their service territory. As described in the "Background: Utility Exposure to Wildfire Risk is Increasing, Making Mitigation Plans Necessary" section above, adequately addressing these discrepancies is essential for the long-term viability and affordability of the Western electric system.

Visualizing Western Investor-Owned Utility Risk Exposure & WMP Maturity

The following figure visually represents the data collected so far regarding Western IOUs' mitigation maturity among utilities exposed to wildfire risk, and is also accessible in ArcGIS format here. However, the limitations described in the "Assessing Current Exposure to Wildfire Risk by Utility" section above apply to this figure as well, which should likewise not be taken as fully accurate or used for planning purposes.

Figure 1: FEMA Wildfire Risk Ratings (County)

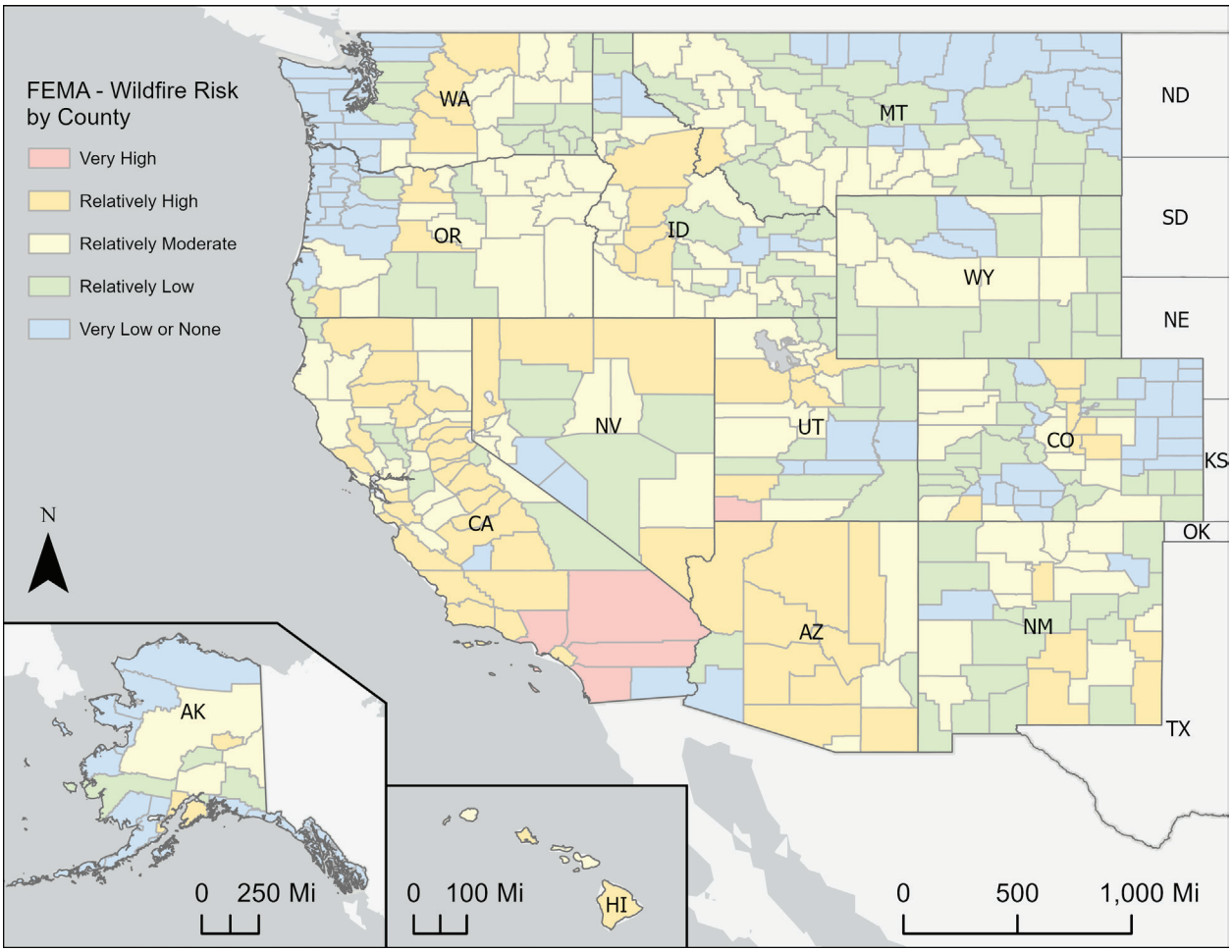


Figure 2: Western Investor-Owned Electric Utilities Exposed to Elevated Wildfire Risk (Utility Service Territory)

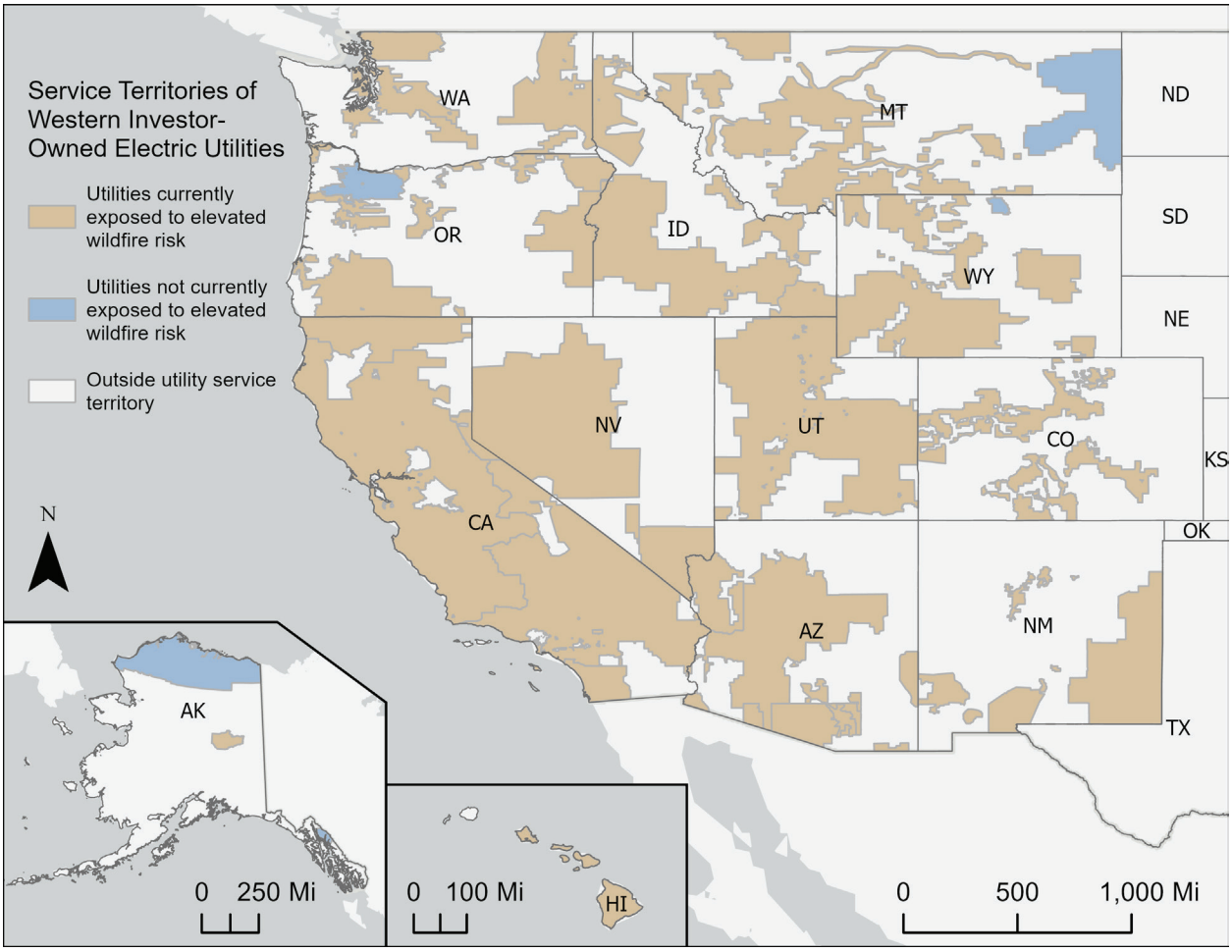
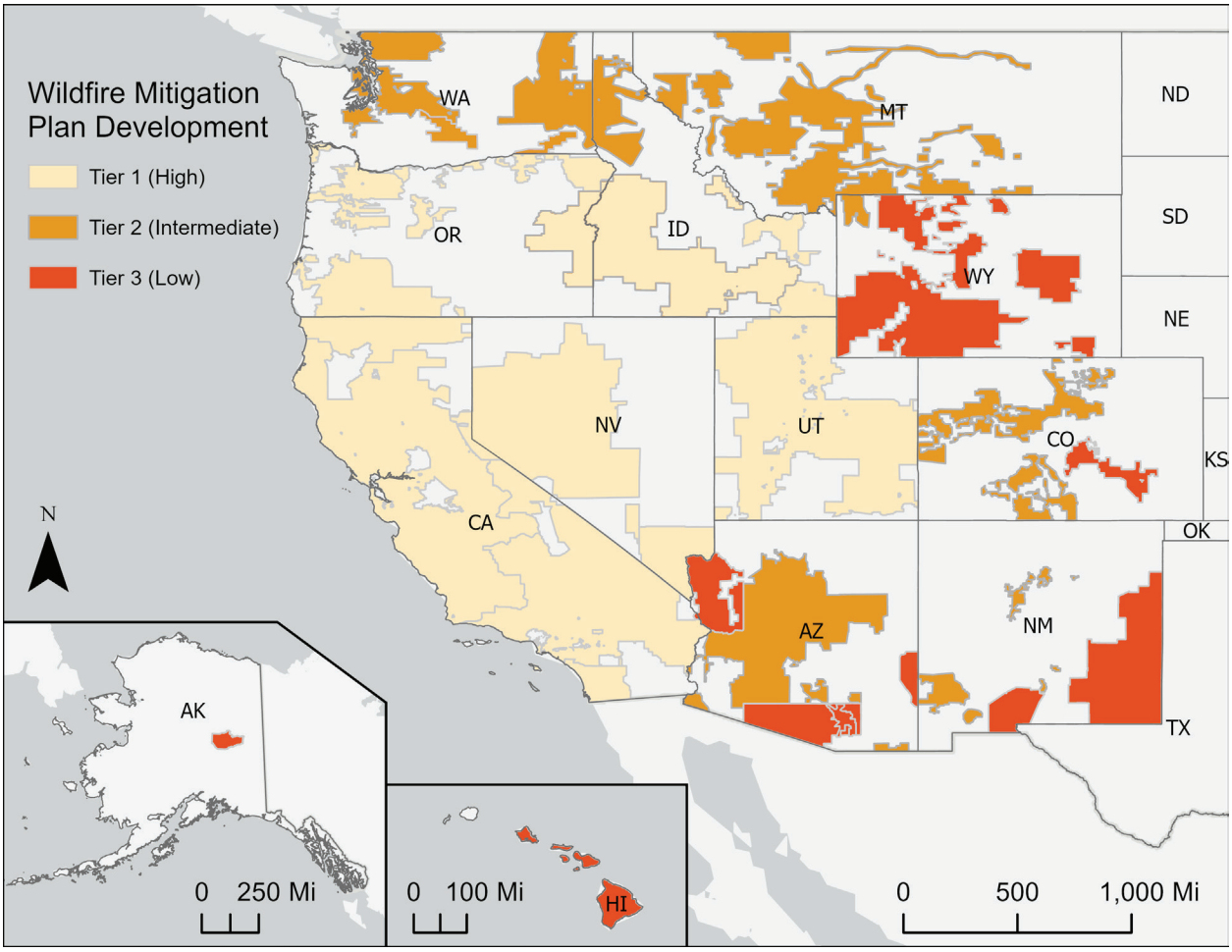


Figure 3: Wildfire Mitigation Plan Development in Western Investor-Owned Electric Utilities Exposed to Wildfire Risk (Utility Service Territory)



NEXT STEPS

Further data collection and analysis is needed to increase this project's accuracy and applicability for utilities, stakeholders, and other parties. Our hope is that further iterations of this project, to include geographically specific projections of wildfire risk and the physical locations of certain types of electrical utility infrastructure, will be useful not only to describe potential risk exposure and existing mitigation efforts, but also as a planning tool that can be used to inform risk assessment, cost-benefit analysis, and the prioritization of future mitigation efforts.

Future iterations of this project will consider not just the geographical extent of a utility's service territory, but the physical location of electrical infrastructure within that service territory. To achieve greater specificity in determining where electrical infrastructure is located, we plan to make use of a range of currently available methods, including machine learning tools that can draw from publicly accessible databases to identify the location of electrical utility infrastructure and distinguish between different types of infrastructure with distinct risk profiles.[39] By accounting more accurately for the location of electrical infrastructure at risk of causing an ignition, as well as the location of potential wildfire risk, we plan to provide a more accurate representation of wildfire risk.

In addition, utility wildfire safety practices are rapidly developing, and many utilities are improving their practices in this area. Our hope is that in future, more utilities will achieve higher degrees of maturity in their wildfire risk mitigation programs in order to ensure that their customers are safer during high fire-risk conditions. We intend to update our presentation of wildfire risk mitigation plan maturity on a regular basis to make these improvements as transparent as possible. We welcome submissions of information from utilities we have included in our database as their mitigation maturity improves.

We also plan to expand the diversity and geographic scope of utilities included in this data set. While this phase of study is limited to Western IOUs, many of the same challenges faced and approaches to wildfire risk developed by these utilities are applicable to other forms of electric utilities, such as municipal utilities and member-owned electric cooperatives, as well as investor-owned utilities operating in regions outside of the Western United States.

We also plan to use this information to model potential utility wildfire risk exposure in a range of future scenarios. These scenarios would include projections of future utility infrastructure development and mitigation implementation, as well as projections of future conditions affecting the degree of potential wildfire risk. By accounting for shifts in the location of electrical infrastructure at risk of causing an ignition, implementation of risk-reducing infrastructure upgrades such as system hardening measures like undergrounding and the installation of covered conductors, and shifts in the location of potential wildfire risk over time, these models could serve as tools to help inform and assess longer-term mitigation planning decisions.

39 https://www.nature.com/articles/s41560-023-01306-8

CONCLUSIONS

The issue of utility-ignited wildfire risk is one that can no longer be ignored by electric utilities, regulators and lawmakers, or the communities they serve. We have presented the first synthesis of the steps taken by Western investor-owned utilities to mitigate this risk. The aim of this survey and synthesis is to better understand where utilities are showing leadership and to make transparent where utilities need to be investing more in better planning and processes. In this case, transparency can hopefully spur actions that allow utilities to take the steps needed to avoid catastrophe before it happens. Such action is in the interests of communities, of the utilities themselves, and of the investors that own shares and bonds issued by them. Hard lived experience in California indicates that addressing the problem of catastrophic wildfire requires a coordinated approach, and that it is far better to make the investments and changes we detail above before a major wildfire than it is to both pay both the losses from a catastrophic fire and the costs of reducing fire risk in the future. Climate change is likely to make the issue of wildfire—including utility-ignited wildfire—more dangerous in areas where it is already a problem, and a problem in areas where it is currently not a recognized concern. Our hope is that this paper provides a basis for getting ahead of these circumstances in a constructive, adaptive, and cost-effective manner.

APPENDIX 1: ACRONYMS

CPUC	California Public Utilities Commission
EAL	Expected Annual Loss
EIA	U.S. Energy Information Administration
ERST	Electric Retail Service Territories
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
IOU	Investor-Owned Utility
PEDS	Protective Equipment & Device Settings
PG&E	Pacific Gas & Electric
PSPS	Public Safety Power Shutoff
WMP	Wildfire Mitigation Plan
WRR	Wildfire Risk Rating

APPENDIX 2: UTILITY WILDFIRE MITIGATION PLAN DEVELOPMENT – CRITERIA AND RATINGS

Investor Owned Utilities

State	IOU	1. WMP created & released?	2. Weather stations / other independent meteorological resources?	3. Protective Equipment & Device Settings (PEDS) / Fast-Trip?	4. Operational PSPS plan?	5. Shutoff impact mitigation?
*Not currently exposed to elevated wildfire risk †Transmission-only utility						
Alaska	Avista Utilities (Alaska) / Alaska Electric Light & Power Company*	No (Operations are separate from other Avista utilties)	Yes - per personal communication, utility owns and maintains 3 weather stations and partners with Alaska DOT on a 4th station	No (per personal communication)	No (per personal communication)	No (per personal communication)
	G & K, Inc.	No public plan available	No public plan available	No public plan available	No public plan available	No public plan available
	TDX Power*	No public plan available	No public plan available	No public plan available	No public plan available	No public plan available
Arizona	Ajo Improvement Company	No public plan available	No public plan available	No public plan available	No public plan available	No public plan available
Arizona	Arizona Public Service	**Yes**	Yes (per personal communication, 15 weather stations planned to be operational by May 1, 2024 - also installing cameras for line inspection and automated smoke detection)	No (per personal communication, reclosing blocked during elevated fire conditions but further PEDS still in development)	**Yes** (per personal communication, PSPS plan in place to be made operational on May 1, 2024)	Yes (per personal communication, collaborating with county emergency managers to provide cooling / charging resources & advanced notification of shutoffs)
	Morenci Water and Electric Company	No public plan available	No public plan available	No public plan available	No public plan available	No public plan available
	UNS Energy / Tucson Electric Power Company	**Yes**	**No** (state and federal wildfire and emergency management websites used to determine areas of elevated wildfire risk - per personal communication, exploring the use of additional local meteorological resources)	No public plan available	No public plan available (but incident command centers established during wildfire risk events and authorized to de-energize lines) - per personal communication, PSPS plan under consideration	No public plan available
	UNS Energy / UniSource Energy Services	**Yes**	No (per personal communication, state and federal wildfire and emergency management websites used to determine areas of elevated wildfire risk - exploring the use of additional local meteorological resources)	No public plan available	No public plan available (per personal communication, incident command centers established during wildfire risk events and authorized to de-energize lines, PSPS plan under consideration)	No public plan available

State	IOU	1. WMP created & released?	2. Weather stations / other independent meteorological resources?	3. Protective Equipment & Device Settings (PEDS) / Fast-Trip?	4. Operational PSPS plan?	5. Shutoff impact mitigation?
California	Bear Valley Electric Service	Yes	Yes (19 weather stations)	Yes (fast trip curve setting used on all devices; automatic reclosing turned off during high-risk periods)	Yes	Yes (sectionalization / fault isolation program, preemptive outreach including identification of medical baseline customers and preparation of community resource centers)
	Horizon West Transmission†	Yes	Yes	No (transmission-only utility; does not own, operate, or maintain electric distribution facilities)	Yes	No (transmission-only utility; no retail customers)
	Liberty Utilities	Yes	Yes	Yes (alternate "Wildfire Mode" recloser settings can be enabled on high fire risk or red flag days)	Yes	Yes (preemptive outreach including identification of medical baseline customers and preparation of community resource centers; one microgrid project installed with another in progress)
	LS Power Grid California†	Yes	No (wildfire risk determined using third-party sources including Western Region Climate Center's (WRCC) data compilation of registered Remote Automated Weather Stations)	No (does not have service territory or any currently operating assets / end users)	No (independent transmission operator without end users; does not currently own transmission lines)	No (does not have service territory or any currently operating assets / end users)
	PacifiCorp (California)	Yes	Yes	Yes (Elevated Fire Risk (EFR) modes of operation for upgraded "intelligent" devices; non-upgraded devices use existing tag and recloser control functions to mitigate fire risk)	Yes	Yes (preemptive outreach including identification of medical baseline customers and preparation of community resource centers; sectionalization to reduce shutoff impact)
	Pacific Gas & Electric	Yes	Yes (per WMP pg. 737)	Yes (per WMP pg. 568, Enhanced Powerline Safety Settings (EPSS) can be enabled on distribution and transmission line protective devices)	Yes (per WMP pg. 913)	Yes (per WMP pg. 948, microgrids, backup generation, and community resource centers; per WMP pg. 858, preemptive outreach including advance notification and identification of medical baseline customers; per MWP pg. 466-68, sectionalization of distribution & transmission lines)

State	IOU	1. WMP created & released?	2. Weather stations / other independent meteorological resources?	3. Protective Equipment & Device Settings (PEDS) / Fast-Trip?	4. Operational PSPS plan?	5. Shutoff impact mitigation?
California	San Diego Gas & Electric	Yes	Yes	Yes (more sensitive relay & recloser settings in high-threat areas depending on wildfire risk levels; installation of automated / advanced protection equipment)	Yes	Yes (preemptive outreach including identification of medical baseline customers and critical facilities in advance; providing portable renewable generators/ batteries to affected critical facilities, tribal communities and medically vulnerable customers; preparation of community resource centers; ongoing sectionalization program; 4 microgrid projects planned to be completed by 2024)
	Southern California Edison	Yes	Yes	Yes ("Fast Curve" settings for faster trip and blocking of automatic reclosing during high risk conditions)	Yes	Yes (preemptive outreach including identification of medical baseline customers and critical facilities in advance; portable renewable generator/ battery programs for qualifying customers; preparation of community resource centers and community crew vehicles; installing sectionalization devices; assessing locations for potential microgrids)
	Trans Bay Cable†	Yes	Yes (1 weather station at Pittsburg converter station)	No (all aboveground transmission infrastructure within the walls of converter stations; no distribution infrastructure)	No (transmission-only utility; does not own, operate, or maintain electric distribution facilities)	No (no end-use customers, service territory or distribution system)
Colorado	Black Hills Energy (Colorado)	Yes (no Colorado plan available)	No	No (automatic reclosing disabled during high-risk conditions; per personal communication, utility operates protection devices that allow for faster de-energization of facilities once a fault is detected, is continuing to evaluate faster tripping times)	No (per personal communication, working with regulators and communities to develop PSPS strategies)	No (per personal communication, working with regulators and communities to develop PSPS strategies)
	Xcel Energy (Colorado) / Public Service Company of Colorado	Yes	No (In progress)	Yes (pilot program in select areas of electric distribution system uses "more sensitive protection settings" during wildfire conditions)	Yes	No (In progress)

State	IOU	1. WMP created & released?	2. Weather stations / other independent meteorological resources?	3. Protective Equipment & Device Settings (PEDS) / Fast-Trip?	4. Operational PSPS plan?	5. Shutoff impact mitigation?
Hawaii	Hawaii Electric / Hawaii Electric Light Company (Hawaii)	Yes (updated with Interim Wildfire Safety Measures)	Yes	Yes (fast-trip settings and recloser blocking)	No (PSPS plan currently in development - per interim wildfire safety measures, PSPS may be used as early as summer 2024)	Yes (per personal communication, advance identification of medical baseline customers)
	Hawaii Electric / Hawaiian Electric Company (Oahu)	Yes (updated with Interim Wildfire Safety Measures)	Yes	Yes (recloser blocking; fast-trip installation in progress in high-risk areas)	No (PSPS plan currently in development - per interim wildfire safety measures, PSPS may be used as early as summer 2024)	Yes (per personal communication, advance identification of medical baseline customers)
	Hawaii Electric / Maui Electric Company (Maui)	Yes (updated with Interim Wildfire Safety Measures)	Yes	Yes (fast-trip settings and recloser blocking)	No (PSPS plan currently in development - per interim wildfire safety measures, PSPS may be used as early as summer 2024)	Yes (per personal communication, advance identification of medical baseline customers)
Idaho	Avista Utilities (Idaho)	Yes (combined Idaho & Washington plan)	No (per WMP pg. 26, uses dashboard based on third-party weather data and contractor input; planning to collect additional weather data with handheld devices)	Yes (per WMP pg. 26, "Dry Land Mode" protocol trips faster and limits reclosing during fire-weather conditions)	Yes (per personal communication, PSPS plan will become operational in May 2024)	Yes (per personal communication, advance identification & notification of medical baseline customers, community resource centers, battery backup program)
	Idaho Power Company (Idaho)	Yes (combined Idaho & Oregon plan)	Yes	Yes (per personal communication, recloser blocking in place and additional PEDS implemented in targeted areas of system for 2024 fire season)	Yes	Yes (proactive communication to affected customers and public safety partners)
	PacifiCorp (Idaho) / Rocky Mountain Power (Idaho)	Yes	Yes	Yes (during high fire-risk conditions, alternative operating modes used to clear detected faults faster, increase the open interval time between trip and reclose operations, and block reclosing)	Yes	Yes (advance identification & notification of medical baseline customers, community resource centers)
Montana	Montana-Dakota Utilities Company (Montana)*	Yes (per personal communication, recloser blocking in place and additional PEDS implemented in	No public plan available	No public plan available	No public plan available	No public plan available
	NorthWestern Energy (Montana)	targeted areas of system for 2024 fire season)	No internal weather monitoring; planning to deploy weather stations	Yes (fast-trip settings used and reclosing blocked on high-risk segments during fire season)	Yes	Yes (on-site generation and community resource centers)

State	IOU	1. WMP created & released?	2. Weather stations / other independent meteorological resources?	3. Protective Equipment & Device Settings (PEDS) / Fast-Trip?	4. Operational PSPS plan?	5. Shutoff impact mitigation?
Nevada	NV Energy	Yes	**Yes** (weather stations and cameras installed)	**Yes** (circuits identified as high-risk operated without reclosing during fire season - per personal communications, Fast Trip Fire Mode (FTFM) deployed in high-risk areas)	**Yes** (as PSOM plan)	**Yes** (advance identification & notification of medical baseline customers, community resource centers, microgrid for Kyle Canyon circuit during shutoff - per personal communication, sectionalization)
New Mexico	El Paso Electric (New Mexico)	Yes (proactive communication to affected customers and public safety partners)	No public plan available	No public plan available	No public plan available	No public plan available
	Public Service Company of New Mexico	**Yes**	**No** (uses existing meteorological services customized for utilities - considering additional camera installation)	No (per personal communication, uses recloser blocking but not fast-trip)	Yes	Yes (per personal communication, sectionalization and community outreach plans in progress)
	Xcel Energy (New Mexico) / Southwestern Public Service Company	**Yes** (no New Mexico plan available)	No New Mexico plan available	No New Mexico plan available	**Yes** (no New Mexico plan available)	No New Mexico plan available
Oregon	Idaho Power Company (Oregon)	**Yes** (combined Idaho & Oregon plan)	**Yes**	Yes (per personal communication, recloser blocking in place and additional PEDS implemented in targeted areas of system for 2024 fire season)	**Yes**	**Yes** (proactive communication to affected customers and public safety partners)
	PacifiCorp (Oregon) / Pacific Power	**Yes**	**Yes**	**Yes** (Elevated Fire Risk (EFR settings) modes of operation for upgraded "intelligent" devices; non-upgraded devices use existing tag and recloser control functions to mitigate fire risk)	**Yes**	**Yes** (advance communication & notification, community resource centers)
	Portland General Electric*	**Yes**	**Yes**	**Yes** (fast-trip and reclosing blocked during fire season & red flag warnings)	**Yes**	**Yes** (advance communication & notification, community resource centers)
Utah	PacifiCorp (Utah) / Rocky Mountain Power (Utah)	**Yes**	**Yes**	**Yes** (Elevated Fire Risk (EFR settings) modes of operation for upgraded "intelligent" devices; non-upgraded devices use existing tag and recloser control functions to mitigate fire risk)	**Yes**	**Yes** (advance communication & notification, community resource centers)

State	IOU	1. WMP created & released?	2. Weather stations / other independent meteorological resources?	3. Protective Equipment & Device Settings (PEDS) / Fast-Trip?	4. Operational PSPS plan?	5. Shutoff impact mitigation?
Washington	Avista Utilities (Washington)	Yes (combined Idaho & Washington plan)	No (per WMP pg. 26, uses dashboard based on third-party weather data and contractor input; planning to collect additional weather data with handheld devices)	Yes (per WMP pg. 26, "Dry Land Mode" protocol trips faster and limits reclosing during fire-weather conditions)	Yes (per personal communication, PSPS plan will become operational in May 2024)	Yes (per personal communication, advance identification & notification of medical baseline customers, community resource centers, battery backup program)
	PacifiCorp (Washington) / Pacific Power	Yes	Yes	No (automatic reclosing disabled)	Yes	Yes (advance communication & notification, community resource centers)
	Puget Sound Energy (Washington)	Yes (as Wildfire Mitigation & Response Plan)	No (per WMP pg. 20, "In 2023, PSE will assess where weather monitoring stations should be installed and continue to evaluate the benefits of utilizing cameras." - per personal communication, planning to install weather stations by the end of 2024)	No (per WMP pg. 27-28, reclosing turned off on higher wildfire risk circuits when high wind thresholds are exceeded along with a corresponding Red Flag Warning)	Yes	Yes (per WMP pg. 23, "PSE has begun to initiate the planning and customer engagement processes necessary to develop a PSPS plan that can be executed in a manner that minimizes impacts to customers and communities in higher wildfire risk areas" - per personal communication, advance identification & notification of medical baseline customers and sectionalization in progress)"
Wyoming	Black Hills Energy (Wyoming)	Yes (no Wyoming plan available)	No	No (automatic reclosing disabled during high-risk conditions; per personal communication, utility operates protection devices that allow for faster de-energization of facilities once a fault is detected, is continuing to evaluate faster tripping times)	No (per personal communication, working with regulators and communities to develop PSPS strategies)	No (per personal communication, working with regulators and communities to develop PSPS strategies)
	Montana-Dakota Utilities Company (Wyoming)*	No public plan available	No public plan available	No public plan available	No public plan available	No public plan available
	PacifiCorp (Wyoming) / Rocky Mountain Power (Wyoming)	Yes (no Wyoming plan available - Wyoming filing scheduled for April 2024, not publicly available as of May 3, 2024)	No Wyoming plan available	No Wyoming plan available	Yes (no Wyoming plan available)	No Wyoming plan available

Mitigation Ratings

Category	Utility	Elevated Wildfire Risk Exposure? (Non-transmission-only utility whose service territory includes or overlaps with at least one county rated "relatively moderate" or higher in FEMA wildfire hazard risk rating)	Mitigation Rating
*Not currently exposed to elevated wildfire risk †Transmission-only utility			
Investor-Owned Utilities	Ajo Improvement Company	Yes	3: No WMP, no PSPS plan, or no public information available
	Arizona Public Service Company	Yes	2: WMP & PSPS plan, but PEDS / PSPS mitigation incomplete
	Avista Utilities (Idaho)	Yes	2: WMP & PSPS plan, but PEDS / PSPS mitigation incomplete
	Avista Utilities (Washington)	Yes	2: WMP & PSPS plan, but PEDS / PSPS mitigation incomplete
	Avista Utilities (Alaska) / Alaska Electric Light & Power Company*	No	3: No WMP, no PSPS plan, or no public information available
	Bear Valley Electric Service	Yes	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	Black Hills Energy (Colorado)	Yes	3: No WMP, no PSPS plan, or no public information available
	Black Hills Energy (Wyoming)	Yes	3: No WMP, no PSPS plan, or no public information available
	El Paso Electric	Yes	3: No WMP, no PSPS plan, or no public information available
	G & K, Inc.	Yes	3: No WMP, no PSPS plan, or no public information available
	Hawaii Electric (Hawaii) / Hawaii Electric Light Company	Yes	3: No WMP, no PSPS plan, or no public information available
	Hawaii Electric (Maui) / Maui Electric Company	Yes	3: No WMP, no PSPS plan, or no public information available
	Hawaii Electric (Oahu) / Hawaiian Electric Company	Yes	3: No WMP, no PSPS plan, or no public information available
	Horizon West Transmission†	N/A	N/A
	Idaho Power Company (Idaho)	Yes	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	Idaho Power Company (Oregon)	Yes	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	Liberty Utilities	Yes	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	LS Power Grid California†	N/A	Not Applicable (Transmission-only utility)
	Montana-Dakota Utilities Company (Montana)*	No	3: No WMP, no PSPS plan, or no public information available
	Montana-Dakota Utilities Company (Wyoming)*	No	3: No WMP, no PSPS plan, or no public information available
	Morenci Water and Electric Company	Yes	3: No WMP, no PSPS plan, or no public information available

Category	Utility	Elevated Wildfire Risk Exposure? (Non-transmission-only utility whose service territory includes or overlaps with at least one county rated "relatively moderate" or higher in FEMA wildfire hazard risk rating)	Mitigation Rating
Investor-Owned Utilities	NorthWestern Energy (Montana)	Yes	2: WMP & PSPS plan, but PEDS / PSPS mitigation incomplete
	NV Energy	Yes	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	Pacific Gas & Electric	Yes	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	PacifiCorp (California)	Yes	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	PacifiCorp (Oregon) / Pacific Power	Yes	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	PacifiCorp (Washington) / Pacific Power	Yes	2: WMP & PSPS plan, but PEDS / PSPS mitigation incomplete
	PacifiCorp (Idaho) / Rocky Mountain Power (Idaho)	Yes	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	PacifiCorp (Utah) / Rocky Mountain Power (Utah)	Yes	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	PacifiCorp (Wyoming) / Rocky Mountain Power (Wyoming)	Yes	3: No WMP, no PSPS plan, or no public information available
	Portland General Electric*	No	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	Public Service Company of New Mexico	Yes	2: WMP & PSPS plan, but PEDS / PSPS mitigation incomplete
	Puget Sound Energy	Yes	2: WMP & PSPS plan, but PEDS / PSPS mitigation incomplete
	San Diego Gas & Electric	Yes	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	Southern California Edison	Yes	1: WMP & PSPS plan, PEDS & PSPS mitigation measures in place
	TDX Power*	No	3: No WMP, no PSPS plan, or no public information available
	Trans Bay Cable†	N/A	Not Applicable (Transmission-only utility)
	UNS Energy / Tucson Electric Power Company	Yes	3: No WMP, no PSPS plan, or no public information available
	UNS Energy / UniSource Energy Services	Yes	3: No WMP, no PSPS plan, or no public information available
	Xcel Energy (Colorado) / Public Service Company of Colorado	Yes	2: WMP & PSPS plan, but PEDS / PSPS mitigation incomplete
	Xcel Energy (New Mexico) / Southwestern Public Service Company	Yes	3: No WMP, no PSPS plan, or no public information available

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