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Appendix

Utility Wildfire Mitigation Vision and Objectives

Utility Wildfire Mitigation Strategy and Roadmap for the Wildfire Safety Division

BCG

DRAFT

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1 Wildfire Safety Division Vision and Objectives

Given the urgency of the issues today, the Wildfire Safety Division (WSD) and utilities have already developed a clear action plan for the coming fire season in their 2020 Wildfire Mitigation Plans (WMPs). However, to fundamentally shift the trajectory of the WSD and utilities, and to ensure efforts build toward a more resilient, safer California, the strategy outlined in this report must sit under a common, long-term vision. Utilities need to plan now for a future with increased wildfire risk, and a cohesive vision can catalyze a mindset shift toward resilience while aligning the WSD and utilities on a shared set of objectives related to utility-related wildfires.

1.1 WSD Vision for Utility Wildfire Mitigation

A well-articulated vision has multiple benefits. First, it provides simple, actionable guidelines for the WSD and utility leaders already involved in wildfire mitigation. It enables existing fragmented, near-term decisions to be made in the context of longer-term planning. It defines common objectives that bring together disparate utility activities to foster collective commitment to meet measurable objectives and goals. It enables the WSD and utilities to effectively prioritize ongoing activities. Finally, it outlines the constraints that inform explicit decision-making and leads to thoughtful trade-offs around competing objectives. The California Public Utilities Commission (CPUC) existing, overall mission is one example of a long-term vision: "We empower California through access to safe, clean, and affordable utility services and infrastructure."[1]

The WSD's and the utilities' roles to directly mitigate catastrophic wildfires is clear: ensure fewer wildfires stem from utility infrastructure. A significant amount of activity today is already underway in pursuit of this goal, including legislation focused on utility wildfire safety adapted by the California legislature in recent years. However, ongoing short-term actions now need to build towards sustained, long-term activities that are required to minimize the impact of wildfires not just during the next fire season, but for many seasons to come.

The vision proposed in this report aims to clearly define this challenge for the WSD and utilities:

A sustainable California, with no catastrophic utility-related wildfires, that has access to safe, affordable, and reliable electricity.

This is a bold and aspirational vision, that is used for the purposes of this strategy and not meant at this time to be used to enforce penalties or interpret statute, but rather to give the WSD and utilities something to strive towards together and to set a high bar for the WSD and utilities to re-imagine a different future for California.

Although it may have different meanings in different contexts, "catastrophic wildfire" has been used in legislation, reports, and action plans in California to refer to wildfires that pose a threat to lives, property, and resources.[2] However, because this definition is so broad, it is difficult to classify fires as "catastrophic," thus making it hard to compare the progress of different regions in California—not to mention around the globe. For families and communities impacted by wildfires, every loss is a personal tragedy and is, in fact, catastrophic. To a person whose home burned down from a fire, it is catastrophic regardless of the size. The California Governor's Office of Emergency Services (Cal OES) leverages the National Response Framework to define

[1] California Public Utilities Commission. *Our Mission, Vision, Values*. https://www.cpuc.ca.gov/general.aspx?id=1034.
[2] Governor Newsom's Strike Force. *Wildfires and Climate Change: California's Energy Future*. April 12, 2019.

a catastrophic incident as one that may result in thousands of casualties, isolate affected areas, cause massive disruption of the area's critical infrastructure, overwhelm the response capabilities of state and local resources, or have long-term economic impacts.[3] In fact, wildfire is one of the three primary hazards that Cal OES plans for.[4]

Aiming for no "catastrophic wildfires" on a population level recognizes the reality of a California that is changing and where wildfires, from all causes, will be more frequent. Research regarding the 'categorization' of fire size suggests it is helpful to differentiate between extreme wildfire events, which are focused on responding to large, rapidly spreading fires, and wildfire disasters which depend on local, socio-economic impacts.[5] The vision and objectives laid out in this report focus on the 'disaster' side of catastrophic wildfire and outlines shared objectives grounded in the environment in the state today.

For the purpose of this strategy only, "catastrophic" refers to any fire in California that meets one or more of following criteria, which are derived from California's historic deadly and destructive fires.[6] The criteria are:

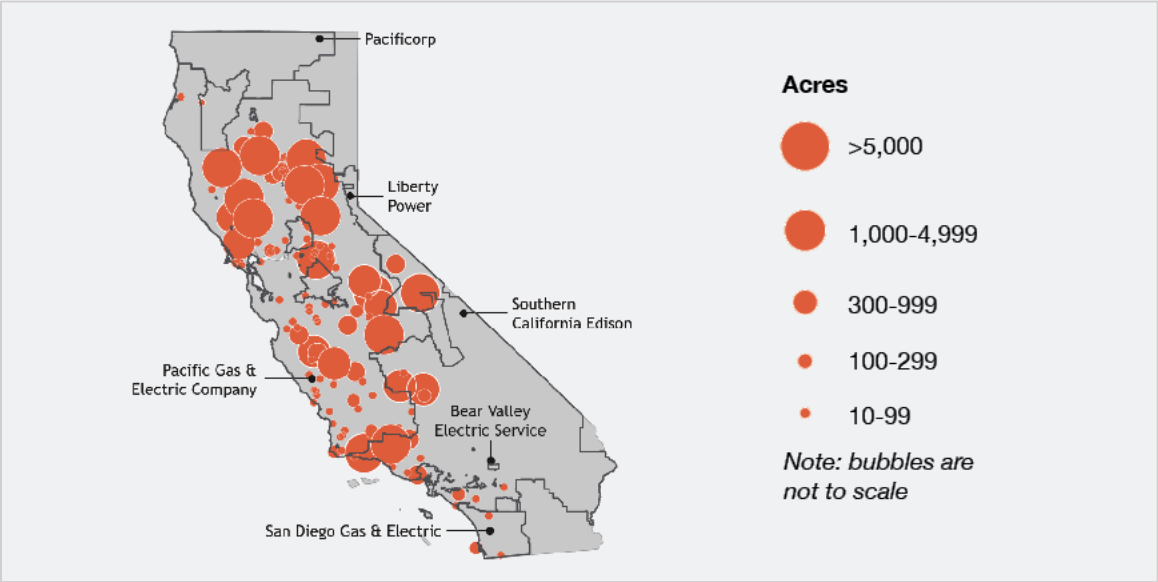
- Public Safety
  - Directly causes one or more deaths
- Property
  - Damages or destroys over 500 structures
- Natural resources
  - Burns over 140,000 acres of land.

The WSD and utilities are aiming to prevent future utility-related fires of this magnitude, and must work closely with others to prevent future harm.

Electric utilities have been at the center of several catastrophic events, as shown in Figure 1, including the Witch Fire in 2007; the Butte Fire in 2015; multiple of the Northern California fires in 2017; and the Camp Fire in 2018. The Camp Fire was the single most deadly wildfire in California's history, killing 85 people and destroying almost nineteen thousand structures.[7] Although 2019 saw fewer catastrophic wildfires, millions were impacted by Public Safety Power Shutoff (PSPS) events executed by utilities to prevent their assets from igniting fires.[8]

[3] Cal OES. California Catastrophic Incident Base Plan: Concept of Operations. September 23, 2008.
[4] California Governor's Office of Emergency Services. *2018 California State Hazard Mitigation Plan*. April 11, 2018.
[5] Tedim, Fantina et al. "Defining Extreme Wildfire Events: Difficulties, Challenges, and Impacts." Concept Paper, *Fire* 2018, *1*(1), 9, https://doi.org/10.3390/fire1010009.
[6] Each of the top twenty deadliest fires in California caused five or more fatalities; however, any fire that causes one or more fatalities is catastrophic. The top twenty most destructive fires also damaged over 500 structures, and the top twenty largest fires burned over 140,000 acres each.
[7] Governor Newsom's Strike Force. Wildfires and Climate Change: California's Energy Future. April 12, 2019.
[8] Batjer, Marybel. *Letter to Telecos for Information and Hearing*. Public Utilities Commission, November 13, 2019.

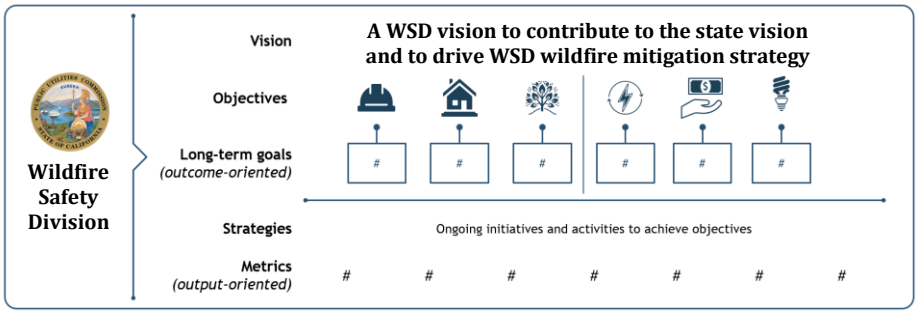
Figure 1: Wildfires ignited from electric utility infrastructure in California over 10 acres (2014-2018)



Note: Includes 1) self-reported IOU ignition data for PG&E, SDG&E and SCE (CPUC Fire Incidents Data 2014-2017) and 2) CAL FIRE data for fires over 1,000 acres with electrical power as cause of fire (CAL FIRE, 2014-2017 Wildfire Activity Statistics, (April 2019))
Sources: CPUC Fire Incidents Data 2014-2018, (2018); CAL FIRE, 2014-2017 Wildfire Activity Statistics, (April 2019)

The vision of a future with no catastrophic wildfires ignitions related to utility infrastructure would not only interrupt recent trends, but reverse them. The framework in Figure 2 below connects the WSD wildfire vision to six objectives, with three focused specifically on the impacts of wildfires and three focused on utility-specific objectives. It then outlines potential outcome-oriented goals that the WSD and utilities could set together. The strategies in the main report ("Reducing Utility-Related Wildfire Risk: Strategy and Roadmap for the Wildfire Safety Division") build towards these six objectives and single vision. The below section delves into each objective, specific to utilities and the WSD.

Figure 2: Framework for the WSD's vision



1.2 WSD Utility Wildfire Mitigation Objectives

The WSD oversees and comprehensively evaluates utilities' wildfire safety, serves as the lead regulator of utilities' wildfire risk mitigation programs, and tracks utilities' compliance with their Wildfire Mitigation Plans in order to assure Californians' access to a safe and reliable electric grid. It is therefore a priority for the WSD to minimize the risk catastrophic utility-related wildfires have on public safety, property and natural resources.65 Furthermore, the WSD must focus on ensuring communities maintain access to reliable, low-cost electric energy that continues to

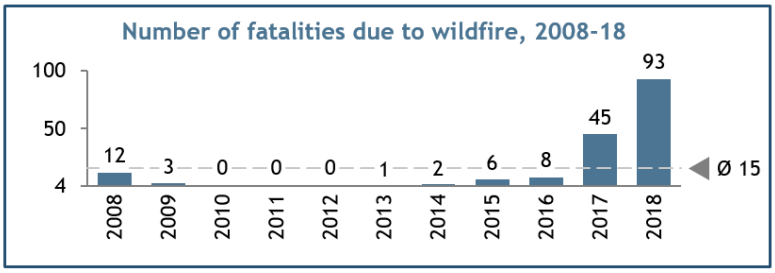
support the state's climate goals, as utility-related wildfires, and utility wildfire mitigation activities should maximize ratepayer benefits. The six objectives below are meant to create safer communities while also encouraging utilities to reduce the most risk with prudent investments while maintaining reliability of the grid.

Public Safety

Goal: strive for 0 deaths due to utility-related wildfires or mitigation activities

In California, in the past ten years, 170 people have died from wildfires, the majority of which have occurred in the past four years as shown in Figure 3. In November 2018 alone, 85 people died during the Camp Fire. In 2017 almost half of the fatalities that occurred were due to IOU electrical-power caused wildfires. The Tubbs fire was the one major exception as it was caused due to a private electrical connection.

Figure 3: Number of fatalities due to wildfire, 2008-18



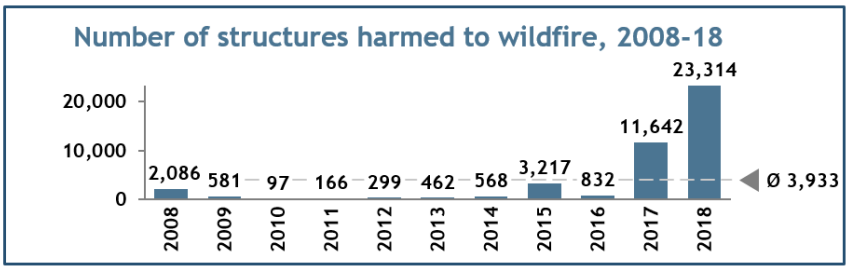
If historic population trends continue, we know that the number of people at-risk and living in the WUI will continue to grow. While a goal of zero deaths may seem ambitious and unachievable, this is core to wildfire mitigation. 2017 and 2018 can (and should) be anomalies not to be repeated. If the Federal Highway Administration aims for zero deaths and serious injuries on the nation's highways (which saw 37,133 fatalities in 2017), the WSD and utilities can aim to minimize harm from utility-related wildfires.

Property

Goal: reduce losses to structures and critical infrastructure from utility-related wildfires

In 2017 and 2018 California saw significant property damage, with over 10,000 structures damaged or destroyed in each year. In 2017 wildfire ignitions stemming from utility infrastructure were the cause of almost 90% of structures damaged or destroyed in a wildfire. Over the past 10 years the number of structures damaged or destroyed averages to approximately 3,900 per year, as shown in Figure 4 below.

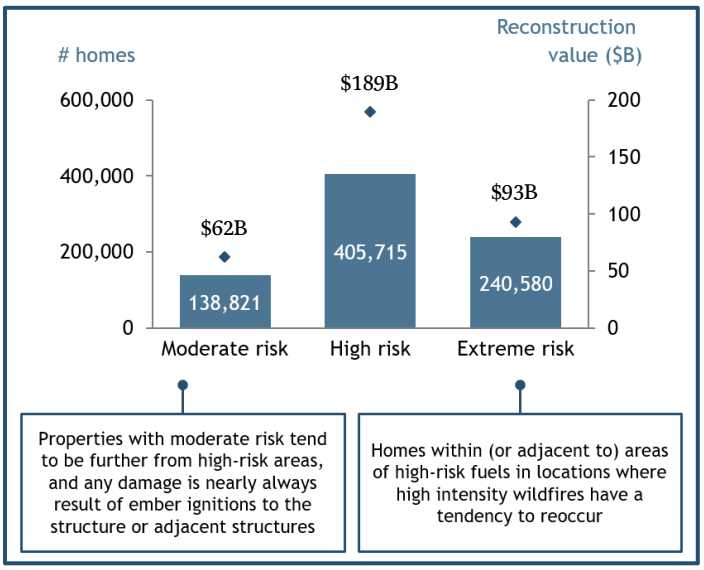
Figure 4: Number of structures damaged or destroyed from wildfire, CAL FIRE estimates



Note: Structures estimates are only for fires 300 acres and greater in 2009-2012

Furthermore, the vast majority of these structures are residential. During the Camp Fire, for example, 50% of structures impacted were homes, while that number is almost 75% when including mobile/motor homes. We also know a significant number of structures are at high risk today, as shown in Figure 5 below, and that this number is likely to increase if historic population trends into the WUI continue, resulting in even more at-risk structures.

Figure 5: Significant number of residential structures in California at risk today



Source: Calgiano, Jeffrey, Moore, Turakhia, Yerkes. "2019 Wildfire Risk Report." *CoreLogic.* September 2019.

Looking back, from 1923 to today, the top twenty most destructive fires in California history have each resulted in over 500 structures being damaged or destroyed. While the WSD and utilities are aiming to minimize damage levels to property, this is not as ambitious as a zero death goal (for example, one alternative property goal could be that no community is caused significant damage from wildfire). However, by setting a more attainable goal, this aligns with CAL FIRE's prioritization of public safety over structures.

Natural Resources

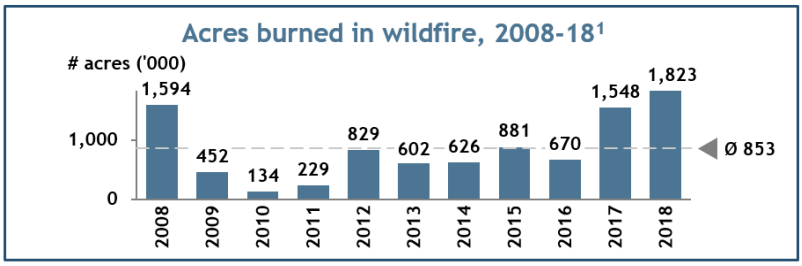
Goal: support efforts in reaching 100% sustainable forests, watersheds, and communities

Public safety and property objectives must be met while also supporting ongoing efforts to ensure resilient, sustainable forests, watersheds, and communities. This means that ongoing utility activity, such as vegetation management work, should support existing efforts like those being led by the Forest Management Task Force.

Sustainable and resilient forests means both supporting ongoing activities to manage forestland, and also eliminating particularly hot and fast-moving fires that cause irreversible harm to landscapes. A total acreage burned goal however, does not differentiate from the positive impact some fires can have from prescribed burn or under a strategy that is outside of a full suppression approach. Because of this we believe actors should work towards a strategy that supports sustainable forests, watersheds, and communities positively, rather than focusing solely on suppression. Thus, while this objective does not set a specific acreage target, a sense of the impact utility-related wildfires have had is still useful. As shown in Figure 6 below from

2014-2017 almost 50% of acreage burned was due to utility-related wildfires which averages to over 800,000 acres per year, over the past ten years.

Figure 6: Number of acres burned due to wildfire, 2008-18



One way for utilities to support ongoing efforts is through forest management practices. In California today it is estimated that 15 million acres of land are in need of restoration to become ecologically healthy. To accomplish this, the Forest Management Task Force has outlined a plan to reach 1 million acres of treated forests per year. This is a collective plan that utility wildfire mitigation efforts should support.

Reliability

Goal: limit planned and unplanned outages due to utility-related wildfires and mitigation activities

Utility reporting today does not give a full picture of the impact that utility-related wildfires and wildfire mitigation measures have on electric reliability. One common measure, the System Average Interruption Duration Index (SAIDI), is helpful but does not necessarily include outages from mitigation activities (such as PSPS, or planned outages due to line hardening or vegetation management) and major event days separate out impact from wildfires. To determine an accurate goal (e.g. limit the increase in SAIDI by a certain percentage), a more comprehensive view of the impact today is needed first.

SAIDI

SAIDI is the sum of all 'sustained' customer interruption durations, divided by total number of customers served for the IOUs. Interruptions in service due to a small ignition, for example, may be included in this number.

Table 1: 2017 SAIDI for PG&E, SCE, and SDG&E compared to the U.S. national average

National	PG&E	SCE	SDG&E
137 minutes	*113 minutes*	*92 minutes*	*65 minutes*

Source: CPUC. "2017 Annual Electric Reliability Report." 2017. https://www.cpuc.ca.gov/2017_aers/.

Major event days

Additional information that must be considered in reliability metrics includes major event days. In 2017, eight major event days were reported by IOUs in California due to wildfires.[9] This information is part of a holistic view of the impact from wildfire mitigation, and must be considered in any reliability metric.

[9] IOU reliability reports

Planned outages
Planned outages from ongoing mitigation activity, such as vegetation management or system hardening, is unknown and not reported by utilities today. Given the amount of ongoing prevention activity by utilities, beginning to gain an understanding of this impact on ratepayers could be helpful.

Combined these metrics provide a much more holistic view of reliability in the face of wildfires, rather than just a focus on SAIDI. Additional focus on outages from PSPS events is also included in the PSPS-specific section later in this paper.

Affordability

Goal: Ensure utilities prioritize and make prudent wildfire mitigation investments

Utilities today are spending significantly on wildfire mitigation activities. The early 2019 Wildfire Mitigation Plan submissions indicated over $3 billion in investment, all of which was planned to be completed within a year. This estimated cost of the initial proposed WMP plans could result in up to 7% increase in monthly bills, for some customers.[10,11] It is expected that continued investment will be required as IOUs execute their approved WMPs.

Table 2: Estimated impact to residential bills, per month, from 2019 WMP submissions

PG&E	SCE	SDG&E
$7.26	*$3.45*	*$0.42*

Source: California Public Utilities Commission. 2019 Senate Bill 695 Report. May 2019.

When looking at total cost, one comparison could be the 2018 RPS compliance cost estimates for IOUs, which was only about 5% of customer bills in 2018 (although this is expected to rise as IOUs continue to meet loftier RPS targets).[12]

To set an affordability goal however, more than only ratepayer costs must be considered. Many investments today are still needed to both prepare for upcoming wildfire seasons and to support longer-term resiliency. Thus, this affordability objective focuses on cost-effectiveness and an assessment of whether utility wildfire mitigation spend is being done in an intelligent, efficient way. When developing and executing their plans, utilities must consider the most reasonable ways to mitigate each driver of risk before selecting initiatives to pursue based on magnitude of risk reduction, cost, and other important factors. The WSD should also consider the efficiency of submitted Wildfire Mitigation Plans during their approval process, although the WSD does not assess appropriate budget size in its WMP evaluation.[13]

[10] California Public Utilities Commission. *2019 Senate Bill 695 Report.* May 2019.
[11] According to the U.S. Energy Information Administration, the average monthly residential bill in California in 2018 was $102.90.
[12] Barbose, Galen. *RPS 2019 Annual Status Update.* Berkeley Lab and U.S. Department of Energy, 2019.
[13] For further detail, see ALJ Thomas' June 2019 Decision 19-05-036, available here

Climate Action

Goal: Ensure utility wildfire mitigation activities also advance climate change goals

This objective is twofold: utilities must support greenhouse gas (GHG) emission targets in the state while also being held accountable to the renewable portfolio standards (RPS). Leveraging wildfire mitigation activities to also support ongoing sustainability goals is essential. As stated in the state's Forest Carbon Plan "Reducing carbon losses from forests, particularly the extensive carbon losses that occur during and after extreme wildfires in forests and through uncharacteristic tree mortality, is essential to meeting the state's long-term climate goals."[14]

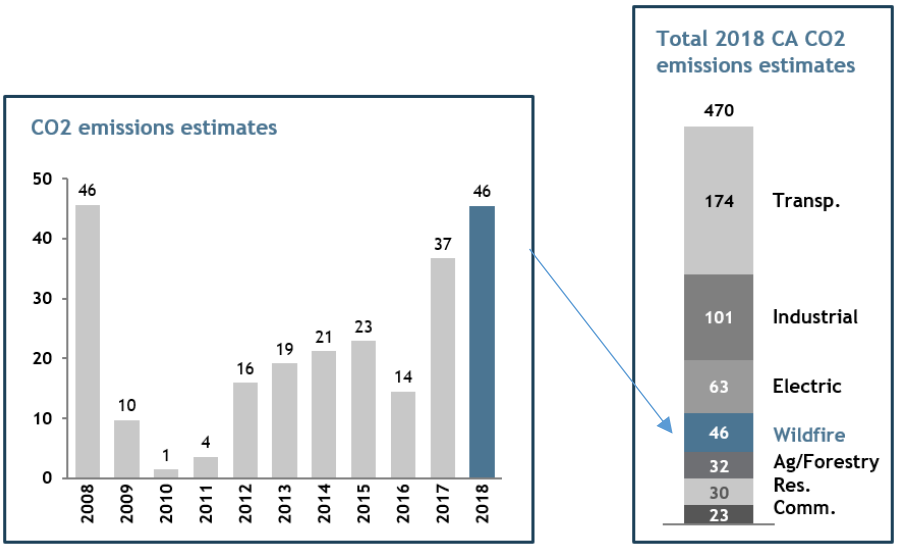
RPS standards

This requires load-serving entities in California to procure 60% of electricity from renewable resources by 2030. In 2017 the three largest IOUs collectively served 36% of their retail electricity sales with renewable power. Utilities must continue to make headway in meeting this goal.

GHG targets

California is targeting reducing GHG emissions to 40% below 1990 levels by 2030. This is particularly relevant here, as CARB estimates showed that 2018 wildfires caused nine times the amount of emissions saved in 2017 across the state.[15] In 2018 CARB estimated that wildfires were the fourth highest GHG emissions source in California as seen in Figure 7. Mitigation efforts are critical to ensure the state can meet its long-term climate goals.

Figure 7: Estimates of CO2 emissions due to wildfire in California, compared to total 2018 California CO2 emission estimates



Source: California Air Resources Board. "California Wildfire Emission Estimates." 2018. https://ww2.arb.ca.gov/wildfire-emissions.

[14] CNRA, Cal EPA, CAL FIRE. *California Forest Carbon Plan.* May 2018.

[15] U.S. Department of the Interior. "New Analysis Shows 2018 California Wildfires Emitted as Much Carbon Dioxide as an Entire Year's Worth of Electricity." November 30, 2018. https://www.doi.gov/pressreleases/new-analysis-shows-2018-california-wildfires-emitted-much-carbon-dioxide-entire-years.

The impact of wildfire mitigation on GHG emission goals is multi-fold:

Positive considerations and impacts from wildfire mitigation tactics include:

- Prevention of GHG emissions (including CO2, carbon monoxide and black carbon)
  - Wildfires are a large cause of particularly harmful black carbon
- Use of fuel management programs to improve forest health and resilience, which continues to be at-risk in the face of ongoing climate change

Potential negative impacts on sustainability goals from wildfire mitigation tactics come from:

- Impact on carbon goals due to increased fuel management programs, however research shows well planned and executed programs result in minimal negative impact, as referenced in the Forest Carbon Plan; vegetation management programs are among the most effective-tools for reducing bark-beetle caused tree mortality
- Additional emissions from controlled and prescribed burn activities, which are estimated to be minimal in comparison to larger, more sever wildfires, as referenced in the Forest Carbon Plan

Public Safety Power Shutoffs (PSPS)

This proposed vision and the six objectives should be achieved while also limiting the use of PSPS to minimize the impact on communities in California. PSPS was used significantly during the 2019 wildfire season, showing its central role in utility wildfire mitigation strategies today. However, the CPUC has explicitly directed utilities to expand their 2020 WMPs to reduce the need for PSPS events [16] and state leadership and residents across California view the magnitude of previous PSPS events as unacceptable. Moreover, the impact PSPS events have on safety and climate change goals today is intolerable, and any actions working towards the overall vision above must also work to minimize the need to use PSPS as a wildfire mitigation tool.

2 Next Steps

The detail in this appendix regarding each objective is intended to provide more specific guidance towards the overall longer-term WSD vision, while also promoting discussions on linkages and tradeoffs between objectives. The WSD vision, and the six objectives supporting that vision, have already helped frame the updated WMP guidelines and tools such as the maturity model to be more comprehensive and long-term focused. Further conversations and alignment between the utilities and the WSD will move everyone toward a combined vision, aligned to agreed-upon levels of risk, and with efforts prioritized accordingly.

[16] CPUC. *CPUC Takes Additional Decisive Actions to Hold Utilities Accountable and Increase Public Safety.* October 28, 2019. http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M318/K885/318885370.PDF.