

Portland General Electric

# 2021 Wildfire Mitigation Plan





This Wildfire Mitigation Plan contains statements that relate to future plans, objectives, expectations, performance, and events. These forward-looking statements represent our estimates and assumptions as of August 17, 2021. The Company assumes no obligation to update or revise any forward-looking statement as a result of new information, future events or other factors.

These forward-looking statements are not a guarantee of future performance and any such forward-looking statements are subject to risks and uncertainties which may be difficult to predict or are beyond our control. As a result, actual results may differ materially from those projected in the forward-looking statements.

# Wildfire Mitigation Program & Contact Information

**TABLE 1: LIST OF EXTERNAL-FACING CONTACTS**

Department	Persons
Government Affairs	Manager, Local Government Affairs Director, Government Affairs
Public Information Officers Communications Spokespeople	Media Relations Line
IMT Resource	Manager, Business Continuity and Emergency Management
Emergency Management	Manager, Business Continuity and Emergency Management
Key Customer Management	Manager, Key Customer Management
Customer Service	Manager, Customer Service

**TABLE 2: LIST OF INTERNAL-FACING CONTACTS**

Department	Persons
Wildfire Mitigation & Resiliency	Director, Wildfire Mitigation and Resiliency
Operations	Director, Operations
Legal	Wildfire Attorney
Communications	Senior Manager, Corporate Communications
Business Continuity & Emergency Management	Manager, Business Continuity and Emergency Management
Wildfire Mitigation Program Management	Manager, Wildfire Program Management
Strategic Asset Management, Wildfire Mitigation	Senior Manager, Strategic Asset Management, Wildfire Mitigation

The 2021 Wildfire Mitigation Plan has been approved by the Senior VP, Advanced Energy Delivery, Vice President Utility Operations, and Director Wildfire Mitigation & Resiliency.

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## Section 1. Introduction

This Wildfire Mitigation Plan outlines PGE's wildfire prevention and mitigations efforts and provides guidance regarding PGE's response efforts in the event of a wildfire. This Plan describes specific preparedness and response responsibilities, by organization, to guide an integrated approach to achieving PGE's wildfire-related safety goals.

PGE will review its fire season operations and wildfire mitigation preparedness and response actions on annual basis and update this plan as needed. PGE will also update the plan as required to comply with applicable regulatory requirements or changes in law.

## Section 2. Persons Responsible for Preparation & Execution of the Wildfire Mitigation Plan

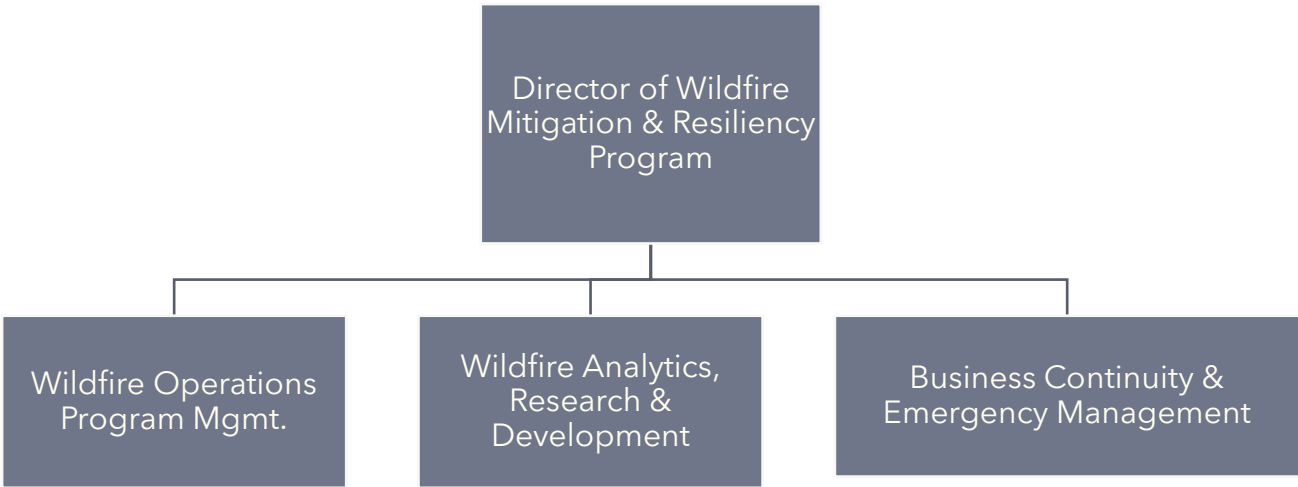
In 2020, PGE established the Wildfire Mitigation & Resiliency (WM&R) organization. PGE's WM&R and Business Continuity & Emergency Management (BCEM) organizations are primarily responsible for coordinating PGE's wildfire-related strategic planning, preparedness and engagement across multiple internal and external organizations. WM&R's internal partners, which include Vegetation Management, Strategic Asset Management and Utility Asset Management, Operations, Customer Service and Brand Marketing and Communications, have responsibility for wildfire-related preparedness, operational, incident response, communications and outreach and recovery activities.

To ensure a comprehensive and integrated approach to wildfire prevention and management, PGE has organized its wildfire mitigation strategy around six program areas:

- Vegetation Management
- Asset Management & Inspections
- Risk Management
- Operating Protocols
- Stakeholder Engagement
- Research & Development

Each program "track" addresses a key aspect of wildfire risk assessment, preparedness, prevention, mitigation, response or training. This comprehensive and interconnected approach allows for internal coordination and response.

**FIGURE 1: WILDFIRE MITIGATION & RESILIENCY ORGANIZATIONAL CHART**



**Wildfire Mitigation Programs and Activities Responsibilities**

The following table provides an overview of the organizations and individuals responsible for the implementation of various aspects of PGE’s wildfire preparedness, mitigation, and response program:

**TABLE 3: PGE WILDFIRE MITIGATION ROLES AND RESPONSIBILITIES**

Program	Responsible Group	Responsible Position
Vegetation Management	<ul style="list-style-type: none"><li>Vegetation Management</li></ul>	<ul style="list-style-type: none"><li>Manager, Vegetation Management</li><li>Manager, Forestry</li></ul>
Asset Management & Inspections	<ul style="list-style-type: none"><li>Strategic Asset Management</li><li>Utility Asset Management</li><li>System Health &amp; Maintenance</li></ul>	<ul style="list-style-type: none"><li>Senior Director, Utility Ops</li><li>Senior Director, Engineering Services</li></ul>
Risk Management	<ul style="list-style-type: none"><li>Wildfire Analytics Research &amp; Development</li><li>Strategic Asset Management</li></ul>	<ul style="list-style-type: none"><li>Senior Manager, Wildfire Analytics Research &amp; Development</li><li>Senior Director, Engineering Services</li></ul>



Operating Protocols	<ul style="list-style-type: none"> <li>• Wildfire Mitigation &amp; Resiliency</li> <li>• Utility Operations</li> <li>• Grid Operations</li> <li>• Safety</li> <li>• Generation, Transmission &amp; Distribution Project Management Office</li> <li>• Corporate Communications</li> <li>• Engineering</li> <li>• Environmental, Health &amp; Safety</li> </ul>	<ul style="list-style-type: none"> <li>• Director, WM&amp;R</li> <li>• Senior Director, T&amp;D Operations</li> <li>• Director, Grid Operations</li> <li>• Senior Director, Program Operations Support, Construction Management</li> <li>• Senior Director, Corporate Communications</li> <li>• Senior Director, Engineering Services</li> <li>• Senior Director, Environmental , Health &amp; Safety</li> </ul>
Stakeholder Engagement	<ul style="list-style-type: none"> <li>• Wildfire Mitigation &amp; Resiliency</li> <li>• Corporate Communications</li> <li>• Government Affairs</li> <li>• Key Customer Management</li> </ul>	<ul style="list-style-type: none"> <li>• Director, WM&amp;R</li> <li>• Senior Director, Corporate Communications</li> <li>• Manager, Government Affairs</li> <li>• Manager, Local Government Affairs</li> <li>• Outreach Director</li> </ul>
Research & Development	<ul style="list-style-type: none"> <li>• Wildfire Analytics Research &amp; Development</li> </ul>	<ul style="list-style-type: none"> <li>• Senior Manager, Wildfire Analytics Research &amp; Development</li> </ul>

## Section 3. Purpose and Scope

This Wildfire Mitigation Plan was developed to provide strategic direction to the programs and activities that minimize the potential for PGE equipment, facilities or activities to become wildfire ignition sources. It includes key principles guiding the implementation of PGE's wildfire prevention and mitigation program, including:

- Ensure public and employee safety
- Act with urgency to reduce the risk of wildfire ignitions, to respond to wildfire events, and to recover from incidents
- Communicate and collaborate effectively with energy partners, agencies, counties, federal, state and local governments, communities, and customers
- Maintain reliable electric service
- Utilize a systematic, risk-based approach to identify and prioritize system hardening and resiliency efforts

## Section 4. Wildfire Risk Mitigation Objectives

The objective of PGE's Wildfire Mitigation Plan is to reduce wildfire risk for PGE customers, communities and PGE, while limiting the impacts of specific mitigation activities, such as Public Safety Power Shutoffs (PSPS), on customers. Other objectives of this Plan include:

- Document PGE strategies and activities that support public and employee safety through mitigation actions.
- Mitigate risk of wildfire ignition, prepare to respond to wildfire events, and plan for recovery from incidents.
- Collaborate with energy partners, first responders, agencies, counties, federal, state and local governments, communities, and customers to prevent, respond, and recover from wildfire events.
- Prepare external communications for use before, during and after wildfire events impacting PGE and its customers.
- Implement a systematic, risk-based approach to identify and prioritize system hardening and resiliency measures.
- Strengthen internal and external organizational partnerships to facilitate coordination of emergency response activities, and situational and conditional awareness.
- Improve wildfire planning, prevention and response through coordination, communication, and collaboration with external stakeholders.
- Improve guidance on operational activities related to wildfire prevention, response and critical infrastructure security and resilience.
- Continuous improvement of PGE's wildfire-related risk management and situational awareness capabilities.
- Pre-planning of effective, mutually beneficial, coordinated responses to prevent incidents, save lives and facilitate rapid recovery from wildfire events.
- Promote learning and adaptation during and after wildfire-related exercises and incidents.

## Section 5. Strategic Alignment / Risk Management Approach

In 2019, PGE embarked on a multi-faceted wildfire risk assessment and modeling approach, developed in two phases:

- **Phase 1:** Evaluated industry best practices, using publicly available information to assess the in-situ risk of Transmission & Distribution (T&D) assets potentially causing wildfire ignition, and defined Tier 2 (Elevated) and Tier 3 (Extreme) wildfire risk areas within PGE's service territory, using the analytical methodology developed by the U.S. Forest Service and California Department of Forestry and Fire Protection.
- **Phase 2:** Increased the granularity of the Phase 1 risk assessment by factoring in the likelihood of individual PGE facilities potentially causing wildfire ignition and incorporated a consequences model that identifies where a PGE-caused wildfire ignition would be most impactful (>100 hectares). Developed a statistical model integrating ignition probability and consequences data to produce a cost/benefit analysis of specific wildfire mitigation actions.

Model results were one of the factors used in the development of PGE's 2021 wildfire mitigation program.

The purpose of this analysis is to analyze PGE's susceptibility to the natural and human factors that contribute to utility-caused wildfire ignition, and to provide data-driven guidance for PGE's wildfire mitigation program. PGE's goal is to make our communities, customers, employees and facilities safer by measurably reducing the probability of wildfires ignited by electric utility equipment or activities.

To evaluate engineering, construction and operational strategies to reduce the risk of wildfires associated with electrical facilities, PGE leveraged model data, as well as lessons learned from previous fire seasons, recommendations from regional wildfire stakeholders and partners, and the Oregon Public Utility Commission guidance and rulemaking. The following core concepts were used to guide this evaluation:

- Frequency of ignition events attributable to electric facilities can be reduced through effective vegetation management, inspection and maintenance of poles and equipment, and by engineering more resilient systems that experience fewer fault events.
- When a fault event does occur, the impact of the event can be minimized through effective use of equipment and personnel to swiftly isolate and correct the fault.
- Systems that maximize situational awareness and operational readiness are crucial to mitigating wildfire risk and its impacts.

In 2021, PGE utilized the results of its Phase 2 wildfire risk assessment to implement the following mitigation measures:

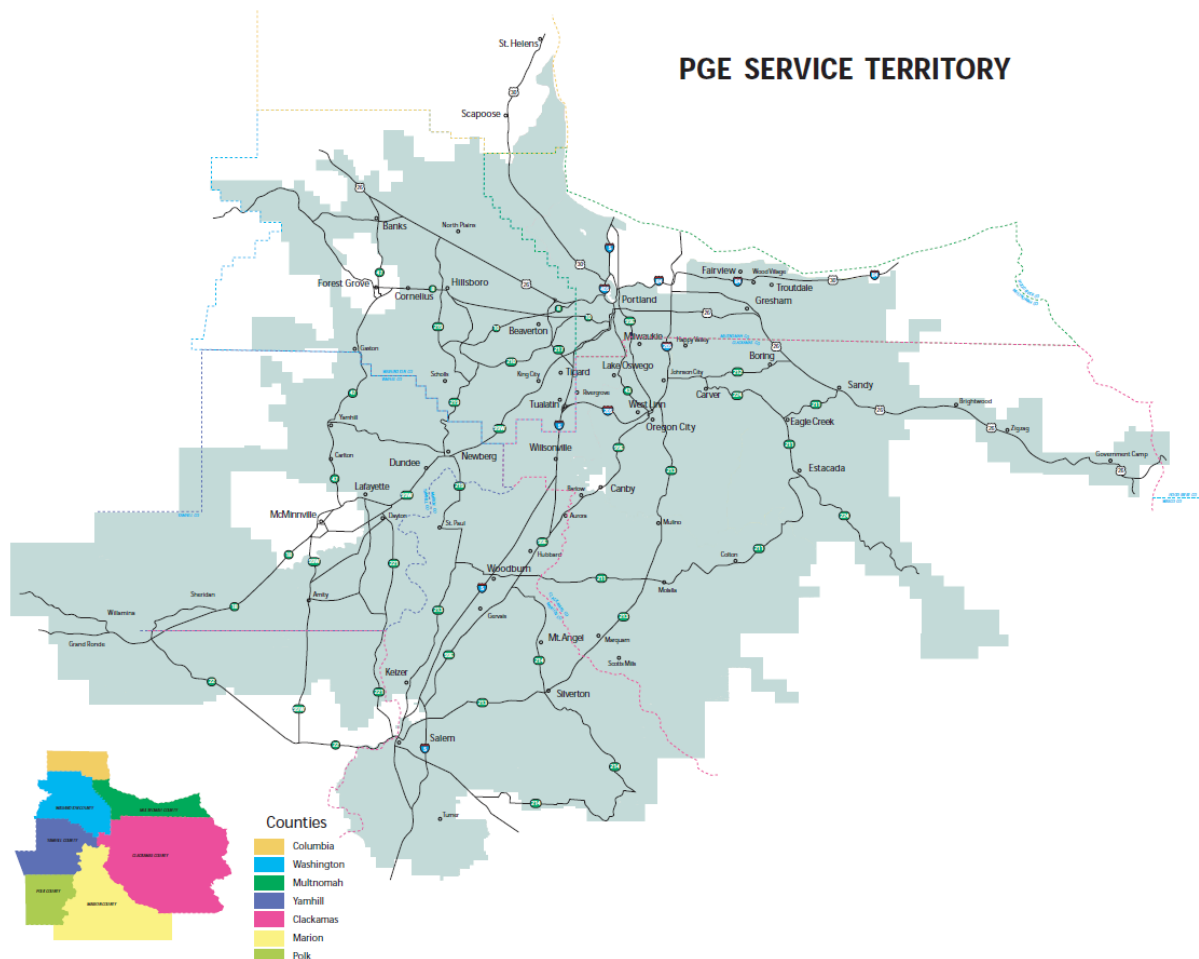
- Expansion of our PGE PSPS Zones from one to seven.
- PGE is deploying enhanced wildfire risk inspection and Advanced Wildfire Risk Reduction (AWRR) vegetation management programs in all seven PSPS Zones, significantly expanding the footprint of PGE's 2020 vegetation management program.
- Installation of additional weather stations to increase PGE situational awareness.
- Implementation of new technology, including early fault detection systems, advanced reclosers and protection schemes, and smart faulted circuit indicators (FCIs) on PSPS feeders.
- Installation of additional non-expulsion fuses on feeders in PSPS Zones
- Strategic use of ductile iron poles on PSPS feeders: when poles are replaced or added in high-risk areas, PGE will replace them with ductile iron poles unless the material is unavailable, in which case PGE will use wood poles. Secondary wood poles will continue to be replaced with wood on an as-needed basis.

Due to the significant increase in PSPS Zones, enhanced work in these areas will not be complete pre-fire season and will continue beyond the 2021 fire season.

## Section 6. Operating Environment

For more than 130 years, PGE has empowered the pioneering spirit of our region, generating and distributing energy safely, reliably and responsibly. Our service area covers 51 cities, six counties and approximately 4,000 square miles. PGE interconnects with multiple neighboring utilities, including the Bonneville Power Administration (BPA), PacifiCorp, West Oregon Electric Cooperative, Wasco Electric Cooperative, and Consumers Power, Inc. Much of the eastern portion of PGE's service area is forested, particularly in the Mt. Hood corridor along Highway 26, and south toward Estacada along Highway 212. In all, PGE's operating environment contains more than 2 million trees to be managed directly in PGE's right-of-way (ROW), with significantly more immediately adjacent to PGE's ROW.

**FIGURE 2: PGE SERVICE TERRITORY**



### 6.1. Risk Zones (High Fire Threat)

For the purposes of this Plan, PGE Wildfire Mitigation, Operations and field staff consider the PSPS Zones to be areas of the PGE service territory where vegetation, terrain, and wildland-urban



interface (WUI) infiltration increase the potential risk of utility-caused wildfire ignition. In 2021, PGE has identified seven potential PSPS Zones:

**Zone 1:** Mt. Hood Corridor/Foothills

**Zone 2:** Columbia River Gorge

**Zone 3:** Oregon City - S. Redland

**Zone 4:** Estacada - Faraday

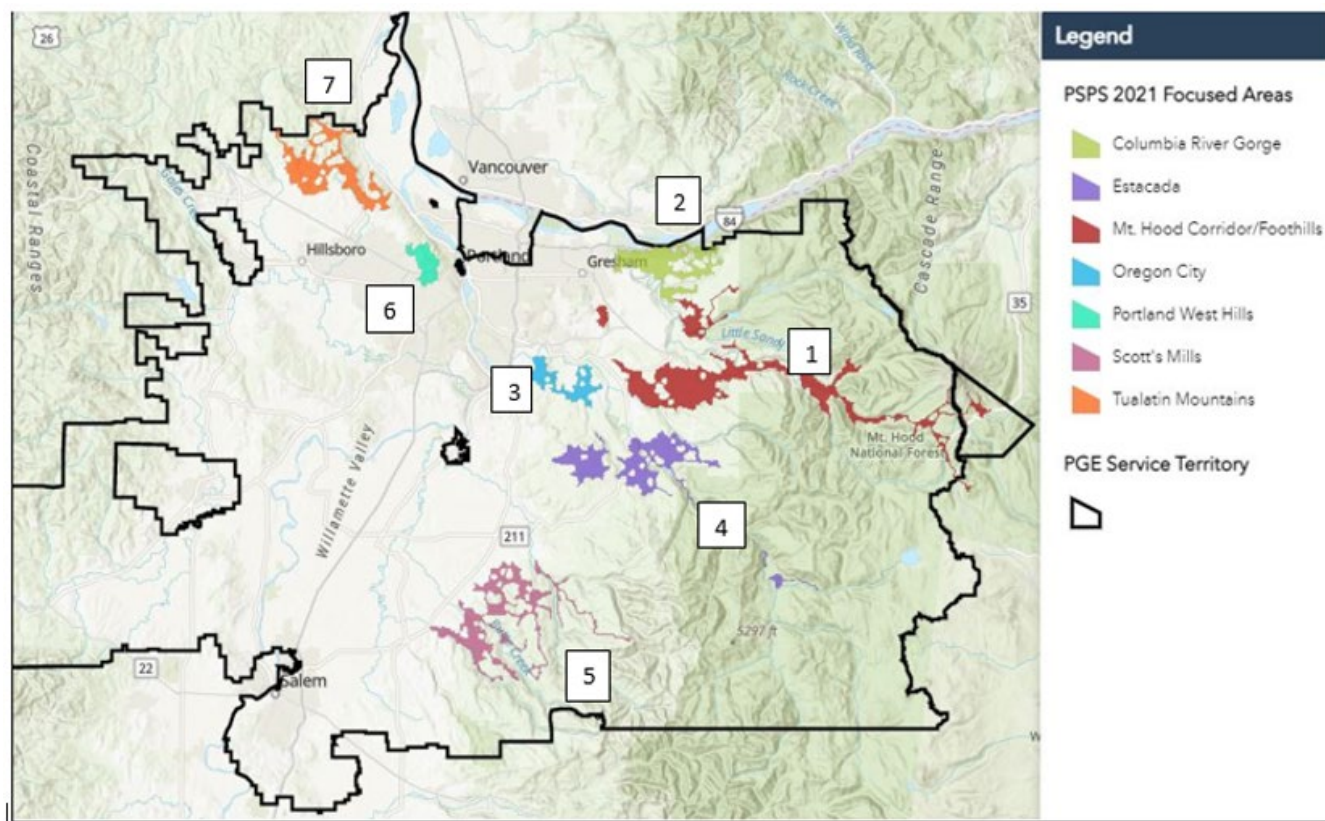
**Zone 5:** Scott's Mills

**Zone 6:** Portland West Hills

**Zone 7:** Tualatin Mountains

When the National Weather Service declares a Red Flag Warning (a period of elevated wildfire risk due to forecasted high winds, high temperatures, and low relative humidity) within PGE's service territory, PGE may de-energize portions of its electrical system within the PSPS Zones to mitigate the risk of a potential utility-caused ignition. During a PSPS event, distribution in the PSPS Zones will be de-energized. Transmission systems that pass through a PSPS Zone may be de-energized based upon wildfire risk analysis and existing conditions.

**FIGURE 3: 2021 PGE'S SEVEN PSPS ZONES**



## Section 7. Wildfire Risk Mitigation Programs & Activities

To prepare for the 2021 fire season, PGE identified high-risk areas that may be impacted by wildfires. This resulted in the expansion of PGE's Public Safety Power Shutoff (PSPS) Zones from one to seven. These zones were identified prior to the issuance of the State of Oregon's fire map and may be impacted or change once the fire map is issued. The PGE PSPS Zones will be evaluated on an ongoing basis due to changing conditions and will likely change over time.

Due to the significant expansion of the PSPS Zones and the extensive time and effort required to prepare for fire season, not all work identified in this Plan will be completed in advance of fire season. Our enhanced vegetation management and inspection work is on-going. To implement the enhanced vegetation, inspection, and system resiliency updates planned in the seven PSPS Zones, PGE is taking a phased approach that includes:

- Securing additional funding to support the cost of completing the mitigation work.
- Once funded, operationalizing the enhanced wildfire mitigation work plans, which includes increasing labor resources to perform the work in the expanded coverage area.
- Developing a schedule to complete the work in future years.

The following identifies work PGE's Vegetation Management plans to complete in 2021:

- P1 (trees that present an imminent risk to either nearby power lines, or to the work area being used to repair lines) inspection and mitigation by July 1 (all PSPS overhead line mileage).
- Mt Hood PSPS Zone 1:
  - P1 Inspection: During June 1/June 2 patrol.
    - P1 vegetation will be addressed within 24 hours of identification.
    - Hotspot trimming (vegetation within 5 feet of PGE facilities): completed within two weeks of patrol.
- 275 miles of additional P2 (trees that are damaged or diseased and could fall into nearby power lines, but do not pose an imminent risk) scoping (full AWRR scope in PSPS Zones 1,4,5).
  - Starting in July, PGE will work through the year and through 2022.

PGE plans to complete its enhanced inspection work for the seven PSPS Zones by the end of 2021. This timeline may change upon the issuance of the State of Oregon's fire map.

In addition to AWRR, inspection, and system resiliency updates, PGE also plans to:

- Utilize light detection and ranging (LiDAR) and hyperspectral imaging (a technology that uses a wider color spectrum to provide more information on what is imaged) results from a 2019 survey project across our service territory to identify areas where risk is concentrated due to vegetation proximity to transmission and distribution infrastructure.
- Install ductile iron poles and initiate a fire-retardant pole wrap pilot program, to replace and protect flammable wood poles in key portions of its PSPS Zones.

- Add avian protection covers (non-conductive covers that prevent birds from contacting energized equipment, which research has shown could be an ignition source) in PSPS Zones.
- Install advanced reclosers and protection schemes to prevent wildfire ignition following fault events, as well as additional non-expulsion fuses, on high-risk feeders.
- Test new fire detection and prevention technology, such as high-impedance fault detection, downed conductor detection, early fault detection systems, and “smart” faulted circuit interrupters.

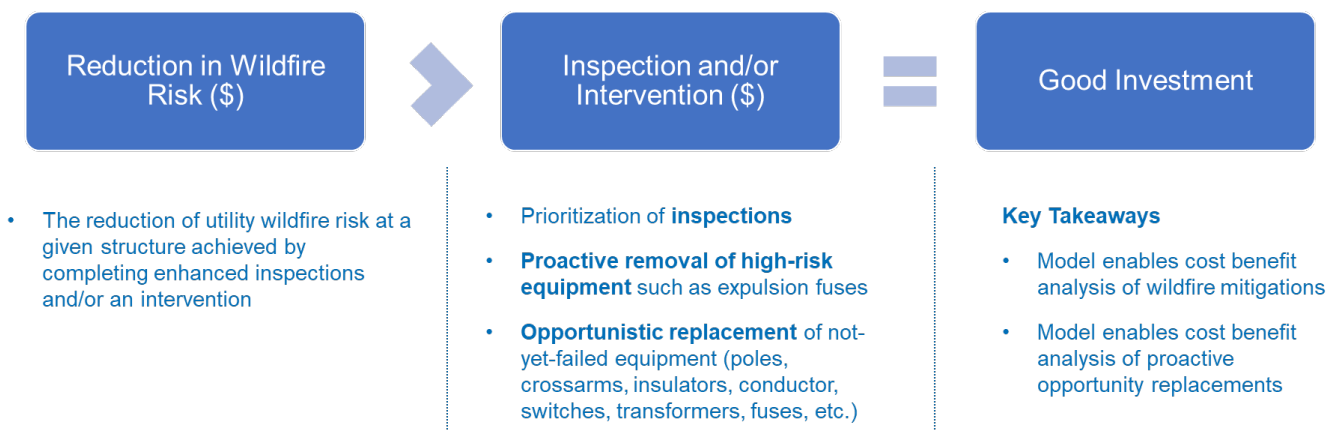
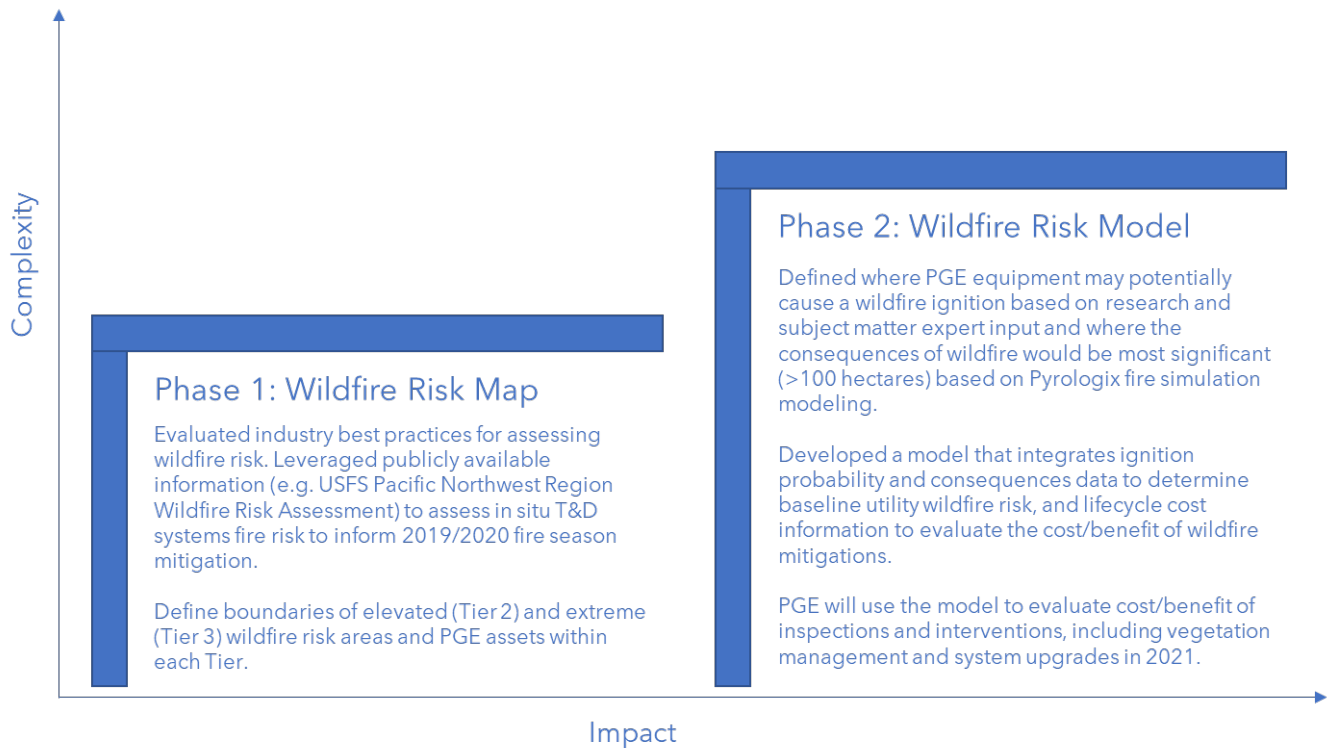
## 7.1. Risk Management

In 2019, PGE embarked on a multi-phase risk assessment and modeling program to evaluate industry best practices, identify the highest wildfire risk areas within the PGE service territory, quantify the likelihood that individual PGE assets could contribute to wildfire ignition, map their location, and apply a consequences model to determine where a potential wildfire ignition would be most significant (>100 hectares, >400 hectares). This statistical model integrating ignition probability and consequences data enabled a cost/benefit analysis to help prioritize specific wildfire mitigation actions. These model results were a key input to the development of PGE’s 2021 wildfire mitigation program.

## 7.1(a) Risk Assessment Approach & Current Understanding

### 1. Risk Overview

**FIGURE 4: OVERVIEW OF PGE'S PHASED APPROACH TO WILDFIRE RISK ASSESSMENT**





## (ii) Baseline Utility Wildfire Risk

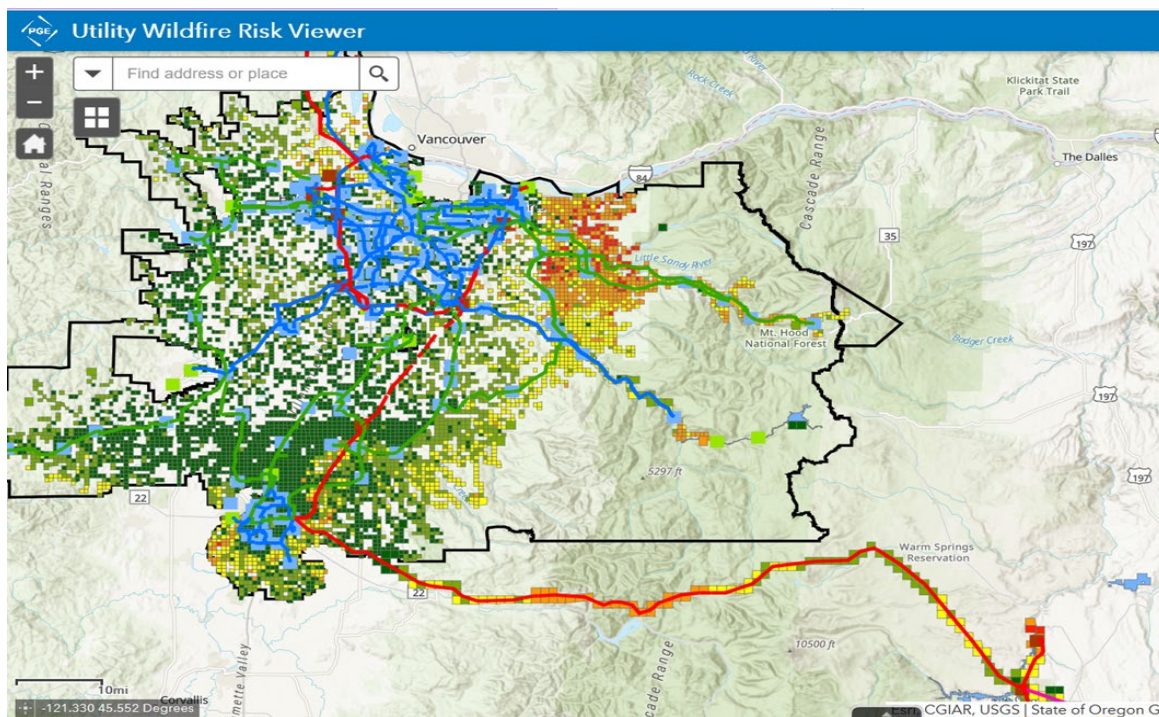
### *Probability*

Ignition probability is the annual likelihood that a given piece of equipment could cause a wildfire ignition given its type, age, condition, and location. In most cases, probability varies with age, increasing as equipment ages and is more likely to fail. The values shown in Table are for 40-year-old equipment. The higher the Ignition Probability value, the more likely that Source of Ignition is to become a wildfire ignition source.

**TABLE 4: SUMMARY OF ANNUAL IGNITION PROBABILITY**

Source of Ignition	Ignition Probability ( $K_{SP}$ )	Probability Varies with Age?	Probability if Damaged	Multiplier if Damaged
<b>Vegetation</b>	7.4	No	1.3%	4.4
<b>Animal</b>	5.9	No	NA	NA
<b>Fuse</b>	4.6	Yes	small	NA
<b>Lightning arrestor</b>	2.8	Yes	5.0%	2.5
<b>Secondary</b>	2.1	Yes	1.2%	2.8
<b>Crossarm</b>	1.5	Yes	5.1%	5.6
<b>Conductor</b>	1.3	Yes	0.4%	1.9
<b>Switch</b>	1.3	Yes	10.0%	3.0
<b>TX Switch</b>	1.3	Yes	10.0%	3
<b>Recloser</b>	0.87	Yes	10.0%	11.4
<b>Structure</b>	0.86	Yes	2.0%	4.3
<b>Capacitor</b>	0.79	Yes	10.0%	11.4
<b>XFMR</b>	0.74	Yes	small	11.4
<b>Insulators</b>	0.52	Yes	2.9%	3.2

Figure 5 illustrates potential equipment-specific wildfire ignition risk within PGE's geographic footprint. Yellow, orange, and red dots indicate elevated risk.



**FIGURE 5: AVERAGE ANNUAL UTILITY WILDFIRE RISK FOR ALL T&D STRUCTURES, POLES BY GRID**

### *Modeling Georisk*

In 2021, PGE's Baseline Utility Wildfire Risk model was enhanced to assist in the identification of potential PSPS Zones. The modelers leveraged data from the remote sensing project to quantify the potential threat of wildfire ignition due to vegetation impingement and weather-caused outages. Modelers predicted the probability of vegetation-caused outages using a statistical model built on historical outage data, characteristics of each distribution circuit, and detailed information about the quantity, density, and types of threats vegetation could pose to each geographic sector.

Modelers converted the expected number of outages to the probability of a potential vegetation-caused wildfire for each protected section. Average annual utility wildfire risk was calculated as it was in the baseline risk model. Lastly, the model considered the fact that utility-caused wildfires are more likely to occur during dry, windy conditions, and weighted the risk by protected section to address the conditions when shutoffs are most likely to be initiated.

This georisk model allows PGE to evaluate wildfire risk at a more granular level to identify the specific areas of the PGE service territory where a PSPS is more likely to occur.

### **Prioritized Opportunistic Interventions**

Generally, when repairs are needed on an asset and the cost of the repair is higher than the value of the asset, the asset should be replaced. Once crews are mobilized, there may also be reliability and economic benefits to proactive asset replacement. This application of the model can help PGE

assess the cost/benefit of proactive asset replacement during planned maintenance activities on other assets, enhancing reliability and system hardening. This has the added benefit of better protecting utility infrastructure against non-utility-caused wildfires and other events, helping PGE maintain critically important electric service and supporting public safety.

### **Justified Enhanced Inspections**

Inspections are most beneficial in cases where wildfire consequence is high, and additional inspections can assist in the assessment of equipment condition. PGE's risk assessment model calculates the value of enhanced inspections using data on asset demographics and condition, as well as length of time since the equipment was last inspected. In addition to this work, PGE plans to annually inspect these assets in its identified PSPS areas.

In addition to work performed by the Strategic Asset Management (SAM) team, PGE work is evaluated and approved through corporate governance committees informed by an annual enterprise risk assessment that evaluates the likelihood of threats (e.g. cyberattacks, natural disasters) and their potential impacts (e.g. financial and reputational outcomes, public and employee safety, environmental impacts). PGE also conducts periodic Hazard Vulnerability Assessment (HVA) and Enterprise Risk Management (ERM) processes to provide broader-scale, enterprise-level assessments of the various risks PGE faces.

### **7.1(b) Targeted Interventions to Reduce Wildfire Risk**

#### **1. *Preparedness, Situational/Conditional Awareness, Vegetation Management, System Hardening***

Before and during fire season, PGE's WM&R staff and meteorologists review regional National Weather Service forecasts, fire activity briefings, fire potential forecasts, and readings from strategically located PGE weather stations on a daily basis. In 2021, PGE is deploying additional weather stations to increase situational and conditional awareness.

PGE continues to leverage its SAM utility wildfire risk methodology and Fire Safe Construction Standards to harden the T&D system in the PSPS Zones. System hardening activities are designed to accomplish three goals:

- Reduce the risk of potential wildfire ignition caused by PGE facilities
- Reduce the impacts of a wildfire on PGE's assets
- Protect utility infrastructure during potentially-disruptive natural and human-caused disasters (not only potential utility-caused wildfires), supporting PGE's ability to maintain and quickly restore reliable electrical service to support disaster relief and public safety.

In working towards these goals, PGE will support communities in areas threatened by elevated wildfire risk and will also implement reliability improvements for these customers. As outlined in PGE's Fire Safe Construction Standards, the following assets will be evaluated for replacement when warranted under the SAM methodology:

- Identifying wood poles within PSPS Zones that should be targeted for replacement with fire-resistant recycled ductile iron poles.
- Selectively replacing existing expulsion fuses with non-expulsion fuses.

- Replacing undersized/aging conductors as needed and considering use of tree wire. Tree wire is an insulated overhead conductor designed to reduce service interruptions, which also limits the conductor being a source of ignition.
- Selectively replacing wooden crossarms with fiberglass arms.
- Selectively replacing porcelain cutouts with polymer cutouts.
- In 2021, PGE plans to:
  - Install faulted circuit interrupters (FCIs) in the Mt Hood PSPS zone.
  - Install Viper reclosers in all PSPS Zones.
  - Install an early fault detection system pilot in the Mt Hood PSPS zone.

Efforts to evaluate and prioritize these system hardening initiatives began in 2020 and will continue into subsequent fiscal years, as PGE's SAM team continues to refine the utility wildfire risk model.

## 7.2. Vegetation Management

PGE manages more than 2 million trees within the ROW of 12,000 miles of overhead power lines and has expanded its vegetation management program to trim and remove more trees and shrubs that are overgrown, dead, dying or showing growth defects that could impact overhead power lines within the ROW and easement.

Due to the expansion of PGE's vegetation management work at the core of this Wildfire Mitigation Plan, PGE is taking a phased approach to implementation of our enhanced work in areas identified as high-risk.

### 7.2(a) Overview of PGE Vegetation Management Strategy

PGE's vegetation management strategy is managed by the Vegetation Management division of PGE's Forestry department, with input from the WM&R organization. It has two major components: PGE's Routine Vegetation Management program, and the AWRR program.

**Routine Vegetation Management:** About 10,000 line-miles of PGE's 12,000-mile overhead network require regular vegetation management inspection; the other 2,000 miles passes over areas with no potentially hazardous vegetation (such as water). Under PGE's Routine Vegetation Management program, we inspect about one-third of our overhead transmission assets annually. Depending on location, assets are inspected either every two or every three years. Routine inspection timing may change as PGE continually evaluates the effectiveness of our Vegetation Management cycles. Routine inspections are ongoing throughout the year, rather than pre-season only. Routine Vegetation Management inspections identify both P1 and P2 trees.

**AWRR Program:** PGE's goal is to annually inspect 100 percent of the overhead assets within our identified PSPS Zones for condition and vegetation impingement prior to the start of PGE's Fire Season. PGE implemented the AWRR program to target the most pressing utility wildfire risk factors, including off-ROW and grow-in threats. In addition to P1 and P2 trees, AWRR inspectors look for "cycle busters" (vegetation outside of the five-foot State of Oregon line clearance corridor, including otherwise-healthy trees that could pose a future grow-in/fall-in threat to PGE infrastructure).



Primarily focused on inspection and maintenance activities in the high wildfire risk portions of PGE's service territory, as identified through PGE's PSPS assessment process, PGE's Vegetation Management strategy includes both cyclical, routine inspections and maintenance of the entire PGE transmission system, and AWRR activities driven by PGE's wildfire risk analytics. Specific, year-to-year vegetation management activities are guided by PGE's Risk Assessment Program and annual vegetation surveys. The AWRR program includes enhanced trim specifications, increased removal rates of prioritized species, and enhanced vegetation control techniques, discussed in more detail below.

## **7.2(b) Routine Inspection & Maintenance Strategies - Vegetation Management**

PGE contractors, supervised by the Vegetation Management organization, annually inspect about 10,000 line miles of PGE's 12,000 miles of overhead assets through the Routine Maintenance Program. PGE coordinates its vegetation management activities closely with external stakeholders, including the US Forest Service (USFS), Oregon Department of Forestry (ODF) and private landowners, to maximize the reach and effectiveness of its annual vegetation management program.

PGE conducts its routine vegetation management activities year-round throughout the PGE overhead system to identify and mitigate both P1 and P2 trees. P1 trees are mitigated pre-fire season; P2 trees are marked for removal/remediation throughout the year. PGE trims marked trees to our specifications during the two- to three-year Routine Maintenance cycle, to comply with state standards and Oregon Administrative Rules (OAR) [Division 24 Safety Standards](#) (Division 24).

PGE subjects its vegetation management activities to a QA/QC process to double-check that vegetation management tasks have been completed to specification, and tasks are tracked through PGE's vegetation management technology platform, ArcGIS Collector. In addition, this work is field-validated by PGE managers, who work closely with the crews to confirm completion; crews also document completion through time- and date-stamped photos, in some cases, of individual trees.

## **7.2(c) Advanced Wildfire Risk Reduction (AWRR) Vegetation Management Program for High-Risk Areas**

Division 24 outlines the minimum vegetation clearances required throughout the State of Oregon, at least 5 feet from vegetation to conductors energized from 600 to 50,000 volts. This section also establishes common definitions of "hazard" and "climbable" trees. These requirements are in place as a public safety measure. Division 24 Safety Standards and the National Electrical Safety Code (NESC) provide the foundation of PGE's overhead maintenance program. While Division 24 standards guide PGE's routine overhead maintenance programs, Division 24 does not specifically address mitigation strategies.

Division 24 goes beyond mandatory minimum clearances to mandate other considerations in determining the extent of work required to maintain safety and reliability – sag and sway under wind and ice loading, configuration of construction, growth habit, strength and health of vegetation adjacent to the conductor – allowing PGE to go beyond mandatory minimum clearances to execute our Vegetation Management strategy. PGE routinely uses this guidance to conduct vegetation management activities beyond the ROW; property owner consent is not required if PGE deems the

work necessary. PGE's annual vegetation management workflow is prioritized based on results from the Phase 2 risk assessment model, concentrating on the priority feeders within each PSPS Zone.

PGE's AWRR program has multiple components, providing annually occurring inspections/work templates of all designated overhead (OH) line mileage, as well as ongoing cyclical work aimed at providing more robust hardening of specific segments or spans of designated overhead line.

PGE Vegetation Management follows [ORS 758.280-758.286](#) to provide much of the operational framework for AWRR-related activities, as most of this work is occurring outside of designated PGE ROW, utility easements and annual maintenance schedules.

The AWRR program is managed in-house through PGE's Vegetation Management department. Internal staff manages the AWRR program, from work schedule to QA/QC of completed work. AWRR activities are independent of PGE's annual vegetation management cycle; its vegetation prescriptions exceed our internal maintenance trimming specifications and the minimum clearances outlined in Division 24. Tree removal practices associated with AWRR are applicable to any tree within striking distance, regardless of current tree health conditions. AWRR crews utilize equipment and tooling that has traditionally been non-standard within PGE Vegetation Management such as the 105-foot lift, Jaraff all-terrain tree trimmer, and the Slashbuster/Forestry Mower heavy-duty brush cutter. AWRR operations fall outside of PGE's routine maintenance and trimming operations as the scope, operational practices, inspection schedule and cadence are on escalated cycles. The AWRR program complements PGE's Routine Maintenance Program by focusing on results from PGE's Phase 2 risk assessment program.



**FIGURE 6: HEAVY-DUTY FORESTRY MOWER**





**FIGURE 7: FORESTRY BUCKET AND TREE-TRIMMING CREW ON AWRR DEPLOYMENT**



## 7.2(d) Inspection & Maintenance Frequencies- AWRR Vegetation Management

### 1. Annual: Prior to Fire Season

#### a. Vegetation Inspection

Off-cycle inspections of vegetation ensure ongoing vegetation clearance compliance and identification of any vegetation that has become a risk since the prior inspections. These inspections occur annually, outside of PGE's standard 2-3-year vegetation maintenance cycle.

#### b. Hotspot Tree Trimming

As PGE Vegetation Management inspectors identify "cycle-buster" vegetation, off-cycle tree crews are dispatched to trim the vegetation back to specification.

- Trees and other vegetation will be removed should the vegetation pose grow-in/fall-in risk, as identified by PGE Vegetation Management employees performing the off-cycle annual inspection.

### 2. Annual: Cyclical

#### a. Enhanced Vegetation Management (EVM) Techniques

PGE Vegetation Management often prescribes vegetation control techniques for AWRR projects that exceed standard line-clearance specifications. These prescriptions include greater side-clearance, overhang removal, selective removal of tree parts, and whole tree removal.

- A significant majority of the EVM techniques are being executed outside of ROW or utility easement, through agreements with the USFS and individual property owners.
- Mowing / herbicide / tree growth regulator.
- PGE has increased the use of ROW-specific mowers, aimed at eliminating small-diameter trees within ROW<sup>1</sup>. These efforts reduce ground fuels, eliminate small-diameter trees that could pose risk to PGE infrastructure, and significantly improve crew access.
- Improving firefighter and maintenance access is a significant secondary benefit of this effort, reducing response time to outages and emergencies for PGE, USFS, and other emergency management agencies.
- PGE has increased the use of ROW-specific herbicides and tree growth regulator to promote desirable species and reduce wildfire risk associated with invasive species. PGE will comply with all [ORS 758.280-758.286](#) landowner notification requirements prior to deployment of any chemically-based vegetation control measures.

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<sup>1</sup> Because lightning is a more common source of ignition resulting in destructive wildfires than utility infrastructure, PGE must also continue to harden its system against other types of fires caused by nature. Many of PGE's system hardening measures, such as replacement of wood poles with ductile iron poles and removal of small-diameter trees within the ROW, provide this double benefit.

### 7.3. Asset Management, Inspections & Capital Investment

Inspections of PGE transmission and distribution assets in high wildfire risk areas are conducted through PGE's Asset Management & Inspections program. Program managers also implement strategic replacement projects in accordance with the annual Wildfire Mitigation Plan to reduce wildfire ignition risk along PGE transmission and distribution pathways. PGE Transmission Patrolmen also inspect all transmission circuits in its Central Oregon High Wildfire Risk area.

The Utility Asset Management group (Distribution) and Grid Maintenance Engineering (Transmission)'s annual inspection cycle for PGE-identified PSPS areas combine with PGE's annual Facilities Inspection and Treatment to the National Electrical Safety Code (FITNES) inspection cycle to annually survey assets within PGE's PSPS Zones. PGE performs additional inspections on its transmission assets.

The goal of PGE's Inspection, Maintenance and Capital Investment programs is to maintain and enhance both the reliability and the wildfire resistance of PGE's transmission and distribution systems through maintenance, asset replacement and upgrades informed by research and development and industry best practices, and strategic capital investment in situational awareness and system hardening technologies.

#### 7.3(a) Equipment & Design Standards

This section focuses on the standards for designing and building overhead distribution and transmission lines in PSPS Zones. The Design Construction and Standards groups have responsibility for most of the activities in this track.

PGE's Utility Standards Engineering organization will conduct an annual review of its T&D Standards library to document and implement any wildfire-related changes identified during the post-season After-Action Review (AAR) process. For example, this process resulted in changes to the PGE equipment and design Standards governing the use of ductile iron poles, wood pole fire protection wrap, and tree wire in 2021.

PGE's [Fire Safe Construction Standard](#) (updated for 2021) describes the current PGE-standard methods and materials for poles, conductor, crossarms, insulators and cutouts in PSPS Zones. In addition, PGE's [Weather Monitoring Station Installation, Clearance and Maintenance Requirements](#) Standard provides guidance on the installation and maintenance of weather stations mounted on wood and ductile iron transmission and distribution poles.

#### 7.3(b) Routine Inspections & Maintenance

PGE operates periodic and time-based inspection programs and a preventative maintenance program to meet compliance requirements and address emerging issues identified throughout the year. PGE's Distribution Line Operations organization has developed a Transmission Line Inspection Methodology document to guide the routine inspection process.

During a typical calendar year, PGE performs routine inspection and maintenance activities such as:

### *1. PGE FITNES OH Inspection Program and Safety Patrols*

PGE's longstanding FITNES program is designed to meet the requirements of [OAR 860-024-0011\(1\)\(b\)](#). FITNES inspects approximately 10 percent of PGE's poles and related overhead facilities each year. FITNES inspectors use a detailed visual inspection of structure and support systems (poles, crossarms, insulators, guys, anchors, etc.), grounding, conductor clearances and conditions, etc., as well as hammer sounding or measurement of remaining pole shell from grade to six feet above grade. Poles older than five years also receive remedial internal treatment. The FITNES inspection is performed by contract inspection personnel who walk PGE's overhead electric supply lines.

PGE performs an annual safety patrol of 50% of the entire PGE system to meet requirements of [OAR 860-024-0011\(2\)\(c\)](#). The safety patrol is performed by PGE inspectors who observe overhead supply lines and related accessible facilities and inspect for conditions that may pose a hazard to the public. These conditions include, but are not limited to, broken poles, structures with extreme external decay, broken or severely split cross arms, broken-down guys, vegetation such as ivy growing more than halfway up poles, low conductors, conductors off insulator, broken insulators, broken conduits, and anchors pulled out of ground.

### *2. Enhanced FITNES Wildfire Mitigation Inspections for High Fire Risk Areas*

PGE's Wildfire Mitigation Inspections began in 2019 and now cover Phase 1 Risk Areas identified by PGE's Risk Assessment program on an annual basis (about 4,200 structures in all). In 2021, PGE plans to inspect the circuits and facilities in the PSPS Zones.

### *3. Inspection Process*

PGE's Wildfire Mitigation inspectors visually inspect structures, lines, and equipment from the ground using binoculars or a spotting scope mounted on a tripod. In addition, transmission patrolmen from PGE's Grid Maintenance organization patrol and inspect the transmission lines in the Central Oregon High Wildfire Risk area to identify potential vegetation management, structural or maintenance issues.

Once fire season has been declared and PGE's wildfire system protection measures are operational, if a feeder breaker opens, recloses, and holds, all subsequent reclosing on the feeder breaker is blocked until PGE inspection crews can be mobilized to patrol and inspect the entire feeder and identify the cause of the original fault. If a feeder breaker or recloser opens, an inspection crew must inspect the circuit "downstream" of the open device before re-energizing.

## **7.3(c) Asset Lifecycles & Replacement Criteria**

### *1. Standard lifecycle*

PGE's Strategic Asset Management (SAM) program uses a data-driven, customer-focused approach to quantify the costs and benefits of asset replacement, the basis for PGE's standard lifecycle decision-making. This approach provides PGE an analytical basis for identifying, evaluating, & prioritizing system investments. SAM's risk-based approach to asset management allows PGE to understand asset risk or criticality relative to other assets, aggregate risk in the system based on a program/project scope, and quantitatively define benefits.

Asset lifecycle decisions are based on asset health, generally assessed using PGE’s annual inspection data, component age and failure trends for a given distribution system component or class. The following table illustrates the average service lifecycle of certain classes of key distribution assets:

Item	Depreciation Group (FERC Acct)	Average Service Life (yrs)
Distribution Poles & Crossarms	364 - Poles, Towers and Fixtures	48
Overhead conductor - Distribution Trip savers and other reclosers Switches Fuses	365 - Overhead Conductors and Devices	50
Distribution Transformers	368 - Line Transformers	50

## 2. Wildfire Correction Criteria

PGE categorizes wildfire corrections as follows:

- An asset that poses an imminent danger to life or property will be repaired, disconnected, or isolated by the operator immediately after discovery.
- An asset that poses a hazard will be corrected as soon as practicable but no later than 30 days after discovery.
- All other assets are addressed in accordance with OAR 860-028-0012.

Notwithstanding these categorizations, should a contractor identify a condition that poses an imminent danger to life or property, the contractor shall immediately notify PGE Repair Dispatch and stand by onsite until PGE crews respond.

## 7.4. Operating Protocols

At the start of each fire season, PGE identifies a date and time when the primary fire season activities will begin. Declaring the start of PGE fire season initiates the process to shift work practices, grid operating procedures and communications to fire season mode in critical areas.

Once approved, the declaration of fire season:

- Initiates changes to how the company operates the PGE network, initiating fire-season-specific settings on parts of the grid, including disabling reclosing/testing capabilities, where applicable.
- Initiates fire season operational work practices in the field.
- Increases monitoring and communication requirements and use of other technologies for near real-time fire-related situational awareness (e.g., GIS Alerts and Kestrel field weather monitor readings).

PGE also separately declares the start and end of fire season east and west of the Cascade Crest. This approach allows PGE to address the different needs of our service territory. As a result, PGE

declared the start of fire season east of the Cascade Crest on May 14, 2021 before other portions of PGE service territory.

When in fire season, PGE's System Control Center (SCC) operates under the Fire Risk Mitigation procedure to reduce the risk of potential fire ignition by changing system settings to manually block non-remote controlled (non-SCADA) distribution reclosing devices in the PSPS Zones from automatically test-energizing circuits following temporary faults, such as momentary tree branch contacts and lightning strikes with no damage. Prior to re-energizing, the SCC will request patrol of the downstream circuit.

The SCC also monitors grid status and adjusts system settings based on forecasted, current or unexpected changes in atmospheric conditions. During this time, the SCC coordinates with PGE's WM&R department who provides daily fire weather forecasts and weekly/seasonal outlooks.

The Fire Risk Mitigation procedure may also be used outside of fire season when the risk of wildfire danger is elevated, or a Red Flag Warning is in effect. In these instances, PGE system operators will proactively block automatic reclosing on SCADA-controlled devices in PGE's PSPS Zones.

**Protection and Control Devices:** PGE engineers annually review and update settings for protection and control devices in PSPS Zones. In 2021, PGE plans to implement circuit breaker and recloser protections to minimize fault energy and effectively reduce the risk of ignition during wildfire season.

Additionally, the 13 kV feeders servicing PGE's PSPS Zones (with SEL relays and SCADA), as well as the Pelton and Round Butte transmission lines, can be set to operate in a specialized wildfire protective mode. Most can be set to one of three modes: Normal, Wildfire or Red Flag. In Normal mode, the feeder will have two shots of reclosing and instantaneous -- no deliberate time delay to trip when a fault is detected by the relay -- (if enabled). In Wildfire mode the feeder will have one shot of reclosing and trip on definite time instantaneous (a programmed delay before the relay trips). In Red Flag mode the feeder trips on definite time instantaneous and reclosing is blocked. PGE system operators can select these modes via SCADA. Normal and Wildfire modes can also be selected via pushbutton on the front of the relay (SEL-751/SEL-751A relays only.) Pelton has an additional pushbutton for Red Flag mode. This capability helps prevent wildfire ignition if the cause of the original fault (e.g., a tree branch) is still in contact with the circuit.

13 kV feeders, without SEL relays, rely on intelligent reclosers, installed near the beginning of the feeder to provide the necessary protection settings for Normal, Wildfire and Red Flag mode.

Electronic reclosers servicing PGE's PSPS Zones can be set to operate in a specialized wildfire protective mode. Like the 13kV feeders, these reclosers can also be set to operate in Normal, Wildfire or Red Flag modes. In Normal mode the reclosers have three shots of reclosing typically operating on two fast curves and two slow curves. In Wildfire mode the recloser will have one shot of reclosing and operate on definite time instantaneous. In Red Flag mode the recloser operates on definite time instantaneous and reclosing is blocked. PGE system operators can select these modes via SCADA; Wildfire mode is selected by putting the recloser in Alternate settings and Red Flag mode is selected by blocking reclosing while in Wildfire mode. This capability helps prevent wildfire ignition if the cause of the original fault (e.g., a tree branch) is still in contact with the circuit.



Hydraulic reclosers and Trip Savers are adjusted manually by pulling their handles down at the beginning of fire season. This places the devices into one-shot (no reclosing) on their fast curve and they are kept in this protection mode for the duration of fire season.

PGE has implemented additional wildfire-related operational changes. For example, if a feeder breaker opens, recloses, and holds, the system operator will block reclosing on the feeder breaker until line crews can patrol the entire feeder to clear whatever caused the original fault. Subsequently, if a recloser opens, line crews will patrol the circuit downstream of the recloser, prior to closing the recloser back in.

At specific locations, PGE is replacing expulsion fuses with non-expulsion Energy-Limiting fuses (ELF), and overhead expulsion tap line fuses with CMU mountings with E-style fuses. Additional protection actions will be coordinated as PGE's system protection capabilities change over time.

**External Notification of Fire Season:** The following table describes key tasks associated with notifying external stakeholders of PGE's fire season start and demobilization. All activities will be completed in coordination with PGE Brand, Marketing & Communications.

**TABLE 5: EXTERNAL NOTIFICATION TASKS AND RESPONSIBILITIES**

Product or Task	Description	Frequency	Responsible
<b>Fire Season Start - City of Portland, County Emergency Management, and ESF-12</b>	Email notification to affected county and city emergency managers that PGE has declared the start of fire season. Email should include updates to key contact information for PGE emergency management personnel.	Annual	BCEM
<b>Fire Season Start - OPUC</b>	Email notification to the OPUC/ESF 12 that PGE has declared the start of fire season. Email should note any changes in PGE operating practices and emergency communications.	Annual	Rates and Regulatory Affairs
<b>Fire Season Start - Governmental Entities</b>	Email notification to key governmental stakeholders in high-impact areas that PGE has declared the start of fire season.	Annual	Government Affairs Key Customer Management
<b>Fire Season Start - Key Customers</b>	Email notification to key customers in high-risk areas that PGE has declared the start of fire season.	Annual	Key Customer Management

<b>End of Fire Season - All entities</b>	Email notification to all of the entities listed above that PGE has declared the end of fire season, that the company is demobilizing and transitioning to winter storm preparedness activities. Annual Start and End of Fire Season declarations are documented in the Vital Records for Start and End of Fire Season SharePoint site, including supporting decision rationale documentation from WOPM and PGE Meteorologist.	Annual	WM&R
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## Emergency Planning

PGE's BCEM organization is responsible for maintaining PGE's Corporate Emergency Operations Plan (CEOP) and associated plans.

### *1. Fire Season Preparedness Exercise*

PGE conducts exercises in accordance with Homeland Security Exercise and Evaluation Program (HSEEP) principles and guidelines. Each fire season, WM&R will take the lead in developing an exercise that evaluates PGE Wildfire Mitigation Plan viability and facilitates stakeholders understanding of the plan.

When possible, PGE will engage in exercises developed by external stakeholders to improve interoperability during an actual event. Prior to each fire season, PGE will also engage with municipal emergency managers to identify opportunities for public/private sector coordinated exercises, including (but not limited to) incident communications and safety (e.g., evacuation exercises).

Each exercise will be followed by implementation of the after-action review (AAR) process described in the PGE Resiliency Framework.

## Event Response & Management

Following wildfire incidents, PGE will implement response operations to address the physical, psychological, social, and economic effects of the incident. Response planning provides rapid and disciplined incident assessment to support a quickly scalable and adaptable response.

### *2. Emergent Events and Active Incidents*

PGE has established communications processes and plans for incident communications, both internally and externally. The CEOP, its various subsidiary plans, and the Communications Playbook are PGE's primary resources for incident response and management.

During wildfire incidents, BCEM is the process owner for activation of PGE's CIMT and/or Emergency Operations Center. BCEM is also responsible for maintaining PGE's library of interdepartmental incident response plans.

During fire season, PGE's WM&R organization monitors local, statewide, regional and national fire and weather conditions around the clock and assesses fire potential based on a variety of situational awareness factors: active fire incidents, wind, fuels, humidity and National Weather Service forecasts. This ongoing assessment drives decisions about operational and system changes, as well as operational efficiency. During fire season, PGE's Wildfire Operations Program Management (WOPM) team meets daily and communicates its findings and recommendations to PGE Operations staff and management.

During fire season, at 7 am daily (Monday-Friday), T&D and Dispatch hosts a Daily Operations Call. During Red Flag Warnings and other severe weather events, Utility Operations may decide to convene the Daily Operations Call on weekends and will resource this effort appropriately.

The call begins with a detailed weather briefing. During fire season, the weather briefing is followed by wildfire situational briefing. BCEM follows the wildfire situational briefing with operational situational awareness items such as security threats. Utility Operations leaders are responsible for disseminating that intelligence from the Daily Operations Call up and down the chain of command. PGE uses multiple checks and balances to ensure that fire weather is known, and on-the-ground conditions are verified, from the top down. This information is disseminated through the following processes:

- **Stand-Ups:** Pre-work briefings in the yards at service and line centers.
- **Tailboards:** Pre-work briefings on the job site.
- **Crew Board Communicators:** Big-screen monitors that display crew jobs, as well as the fire weather and current Industrial Fire Precaution Level (IFPL).
- **Kestrel Fire Weather Handheld Meters:** Field personnel receive training on how to measure temperature, relative humidity and wind speed at the job site using Kestrel weather meters.
- **2x Radio Blasts:** Radio briefings are used to reach resources who dispatch from home (Eagles, Reliability Techs). These briefings provide information regarding watches, warnings and critical fire danger information, and also repeatedly announce that a de-energized feeder or feeder section is about to be re-energized. PGE does not re-energize a tripped feeder without making this radio announcement twice.

PGE field employees are responsible for knowing current fire weather and danger conditions, the IFPL in their work area, and how that impacts them (safety protocols, approved operations, required PPE and other supplemental equipment).

### *3. Ignition Reporting Requirements*

For the 2021 fire season, PGE developed a mobile application to enable personnel to report data - related to ignitions that occur in the field. This is consistent with the OPUC's Incident Reporting

Requirements (860-024-0050). After an ignition event, the Sr Manager of Wildfire Analytics, Research & Development is responsible for submitting the ignition report to the OPUC in accordance with the rule.

#### *4. Work Schedule Adjustments & Crew Notifications*

During fire season, fire danger levels may impact operational activities and schedules. Fire danger is geographically specific -- danger levels and associated environmental precautions fluctuate depending on the crew's work location within PGE's service territory. Fire danger levels are communicated in a variety of ways (please refer to the previous section, "Emergent Events and Active Incidents," for a list of communications channels).

##### *a. Response – Active Event*

Crews working in areas with an active fire are to follow all applicable rules, processes, and procedures as outlined in this Wildfire Mitigation Plan, CEOP, and the Wildfire Pocket Guide. PGE will defer to first responder agencies when there is an active fire, and will not send crews into an active fire zone unless approved by the lead first responder agency.

For larger events, a Fire Coordinator may deploy to the Incident Command Post (ICP) to provide real-time situational awareness to PGE. The Fire Coordinator serves as the primary point of contact between first responder agencies and the PGE Incident Commander. Field Operations is responsible for scene safety, along with command and control of the incident to recover the system and restore customers. The EOC's focus is on the big picture of the incident, which involves managing and deconflicting critical information, communicating to customers and key external stakeholders, and providing operational support and strategic and policy-level decision-making. Demobilization planning remains a focus during the response phase to ensure adequate recovery of the system.

A wildfire may require de-energization of electrical distribution circuit(s) and transmission tie line(s) for public or first responder safety. The Incident Commander will carefully examine whether de-energization is required based on input from field response and first responders. This type of de-energization for public or first responder safety is not considered a PSPS as it may not be triggered by a wind or Red Flag event. Rather, it is in response to unsafe conditions due to wildfire activity and therefore does not follow PSPS protocols.

Public-sector fire agencies are deployed to new ignitions and localized, low-complexity fires to protect life safety and prevent fire spread. For new ignitions or localized, low-complexity fires, a command post is unlikely to be established immediately (or easy to locate once established), nor is it likely that it will be necessary to activate a CIMT to assist in communications and logistics.

For high-complexity events and for large fires – any wildland fire in timber 100 acres or greater, or 300 acres or greater in grasslands/rangelands (as defined by the National Wildland Coordinating Group) -- a public-sector Incident Management Team (IMT) will be assigned to establish a multi-agency command post at safe proximity to the fire event. For events that may impact PGE assets and services, PGE representatives from multiple lines of business may be embedded into the public-sector IMT to coordinate situational awareness with local staff and CIMT resources.

## Post-Fire Season Review

WM&R will conduct a review of this plan with internal and external stakeholders prior to year-end, as part of its formal post-fire season review process. The objectives of this review process include:

- Identifying aspects of the program (e.g., training, preparedness measures, operational strategies and documentation) that worked well.
- Identifying opportunities to improve preparedness, operational strategies, training, work instructions, communication and other program elements.
- Evaluating new ideas, improvements and observations identified by the team for future implementation.
- Assigning task owners and target completion dates for corrective actions.
- Identifying “next season” opportunities to improve collaboration with external stakeholders -- planning, training and exercises.
- Establishing baseline goals and objectives for the next fire season.

When an AAR is conducted due to the occurrence of a wildfire event, PGE will integrate any outstanding corrective actions into its post-fire season lessons learned review.

### *5. Damage Assessment*

PGE’s T&D Operations organization is developing a Damage Assessment Plan, which will be used to guide future wildfire (and other events impacting PGE infrastructure, such as high winds, ice storms, earthquakes) damage assessment activities. For additional information on damage assessment procedures, please refer to the [FEMA Preliminary Damage Assessment Guide](#).

### *6. Recovery*

PGE will follow CEOP guidance during the post-incident recovery period:

“There are two forms of recovery: short- and long-term. Short-term recovery includes temporary repairs and recovery of critical operations. Long-term recovery focuses on resuming all operations and rebuilding, which can potentially last years. During recovery, it is important to capture lessons learned and act to prevent or mitigate impacts from future incidents.” (PGE Corporate Emergency Operations Plan Base Plan).

For the purposes of wildfire management, PGE will treat its End of Fire Season declaration as an event and will perform whatever recovery activities are required to bring the company back to non-fire season readiness. Any operational changes implemented for fire season shall be transitioned back to their non-fire season state.

In addition, PGE will follow all relevant OPUC protocols in submitting a post-event PSPS report within 10 days of the conclusion of the PSPS event.



## Fire Danger

WM&R's role is to provide situational and conditional awareness throughout wildfire season. PGE closely monitors confirmed fire events within proximity to PGE infrastructure, as well as available firefighting resources on a local, statewide, regional and national level. That information drives local and regional Preparedness Levels (PL), which range from 1 (ample resources available) to 5 (significantly limited resources). WM&R summarizes this information in the daily wildfire operations briefing: active Northwest fires, significant fire potential, fire weather forecasts across T&D service territory, fuel conditions and other links to publicly available data, such as <https://gacc.nifc.gov/nwcc/content/products/intelligence/MORNINGBRIEF.pdf>.

### *7. Situational and Conditional Awareness*

PGE relies on real-time situational and conditional awareness information and forecasts to develop its daily fire potential assessment. In 2021, it is improving its situational awareness through the installation of new automated weather stations along with four mobile weather stations to be deployed in PSPS areas. In addition, PGE is continuously enhancing these capabilities through partnerships with first responders, municipal emergency planners, state agencies and industry partners.

#### **a. Methodology for Identifying Fire Season and Evaluating Wildfire Related Risk**

To determine the start or end of fire season, PGE's WM&R organization, with input from BCEM, Line Operations and the SCC, will monitor current weather conditions, fire weather forecasts and other information. WM&R utilizes wildfire risk assessment tools to obtain an overview of PGE's current fire risk environment, including:

**Wildfire Notification Tool:** A GIS-based, real-time analytical tool that emails PGE wildfire managers directly (with attached pdf map and link to an online AGOL map) whenever a threat is detected within five miles of any PGE infrastructure. The tool tracks threats in the following four categories:

- a. Red Flag Warnings as designated by the National Weather Service.
- b. Moderate Resolution Imaging Spectroradiometer (MODIS) thermal anomaly (hot spot) with confidence rating above 50.
- c. Integrated Reporting of Wildland Fire Information (IRWIN) wildfire location.
- d. IRWIN-established wildfire perimeter.

**Comprehensive Wildfire/Hazard Map:** An interactive, web-based map that includes wildfire locations, Red Flag Warnings, lightning strikes, high-risk areas, and other data.

**Other sources** of conditional awareness data used by PGE in the Fire Season Declaration process include:

- a. <https://www.weather.gov/fire/>
- b. <https://www.oregon.gov/ODF/Fire/Pages/Weather.aspx#NOAA>
- c. <https://www.oregon.gov/ODF/Fire/Pages/Restrictions.aspx>
- d. <https://gacc.nifc.gov/nwcc/>
- e. <https://weccgeo.maps.arcgis.com/apps/dashboards/0577a7b0ae3f495492f0b478a63c70ca>

#### **b. Early Wildfire Detection**

PGE participates in the ALERTWildfire Early Fire Detection program. The ALERTwildfire camera network is a situational awareness tool built by the University of Nevada, Reno (UNR), University of California San Diego (UCSD), and University of Oregon (UO). The high-definition, pan-tilt-zoom cameras allow PGE as well as firefighters and first responders to confirm and monitor potential wildfires via the ALERTWildfire network.

The cameras allow PGE and its partners to:

- Discover, locate, and confirm fire ignition.
- Quickly scale fire resources up or down in response.
- Monitor fire behavior from ignition through containment.
- Precisely target evacuation efforts during firestorms, through enhanced situational awareness.
- Verify that contained fires are monitored appropriately until fully extinguished.

The UO Oregon Hazards Lab uses a hardened telemetry system for the data communications links used to operate the ALERTWildfire cameras, extending the reach of the fiber-optic network LinkOregon has deployed and operates across the state.

PGE installed two ALERTWildfire cameras in 2020, both overlooking PGE's Mt. Hood Corridor PSPS Zone in Clackamas County -- one at Brightwood and the other at Timberline. Future sites will be identified based upon PGE's experience in recent and upcoming fire seasons, and its evaluation of the current camera network.

#### **c. Remote Automated Weather Stations (RAWS)**

PGE installed two weather stations in PGE's Mt Hood PSPS Zone in Clackamas County. The weather stations, installed on existing PGE infrastructure by Western Weather Group, are equipped with temperature, relative humidity, fuel moisture, rain and wind speed/direction sensors. The stations can transmit the collected data via cellular or satellite service, depending on availability. The data is hosted externally and available for review by PGE's meteorologists on demand. In 2021, PGE is planning to install additional remote weather stations in its PSPS Zones.

### **Public Safety Power Shutoffs**

During extreme weather, PGE may initiate a temporary Public Safety Power Shutoff (PSPS). The purpose of a PSPS is to reduce the risks of wildfires within PGE's service territory and in areas adjacent to PGE critical infrastructure throughout the Northwest through proactive de-energization. Due to the disruptive nature of a power outage, PGE will execute PSPS events only when necessary.

PGE maintains current contact lists for the public safety partners, critical facilities, and vulnerable populations within each PSPS Zone, and will follow the relevant OPUC notification protocols in communicating with stakeholders, public safety partners, emergency response centers, and incident command centers before, during and after PSPS events.

## 7.5. Stakeholder Engagement

The term “stakeholder” indicates both key internal and external resources needed to help ensure preparedness for each fire season. Where possible, PGE will assist in the coordination of efforts between public and private sector entities to improve collaboration before, during and after fire season.

Goals and objectives of PGE’s public and agency outreach and engagement activities include:

- Enhanced public/private partnerships to facilitate life safety, identifying vulnerable populations, property conservation, incident stabilization and continuity of agency services.
- Improved critical infrastructure resilience through planning and coordination with external agencies.
- Improve coordination of emergency response, situational and conditional awareness.
- Enhance PGE’s wildfire planning, prevention and response through coordination, communication, and collaboration with external partners.
- Improve understanding of external stakeholder vulnerabilities and values-at-risk (economic, social, and ecological resources that could be damaged because of a wildfire).
- Educate external stakeholders on PGE’s risk management activities and potential consequences to critical infrastructure from wildfires.
- Promote learning and adaptation during and after exercises and incidents.
- Facilitate the continuity of emergency services during gray and blue-sky events.

### Public Awareness

Prior to and during fire season, PGE will communicate with customers and the public to share wildfire preparedness information and situational updates, as well as PSPS announcements, via mass channels, including text, email, telephone, internet and media statements. Wildfire-related public communication is a team effort, primarily the responsibility of PGE’s Brand, Marketing & Communications, Government Affairs, Key Customer Management and Corporate Communications organizations.

PGE will proactively use the full range of paid, earned and owned channels to communicate key wildfire-related information to customers impacted by wildfire activity. As needed, PGE will disseminate wildfire-related information through local and state community partners.

### Customer Support & Communications

#### 1. *Customer Outreach*

PGE will work with community partners prior to and throughout wildfire season to keep customers informed on PGE’s fire season activities. The following table provides a high-level overview of key PGE customer outreach activities.

**TABLE 6: CUSTOMER OUTREACH ACTIVITIES**

Product or Task	Description	Frequency	Responsible
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<b>Customer Communication</b>	Notifications to customers of the potential for increased tree trimming and other preparedness activities in their area.	As needed	Brand, Marketing and Communications
<b>Customer Communication</b>	For customers in high-risk areas, communications regarding potential for proactive de-energization of lines (PSPS event) in the event of an RFW or fire in close proximity.	As needed	Brand, Marketing and Communications, Government Affairs, Key Customer Management
<b>Customer Communication</b>	Outreach to inform customers of risks during fire season and work being undertaken by PGE to help ensure uninterrupted delivery of electrical service during fire season.	As needed	Brand, Marketing and Communications

## Working with Federal, Tribal, State & Local Agencies

PGE's Wildfire Agency Engagement Plan outlines a systematic, risk-based approach to directing and prioritizing PGE's interactions with outside agency stakeholders both during and outside of fire season. To maximize the effectiveness of its wildfire preparation and mitigation efforts, PGE collaborates with a variety of external stakeholders such as state regulators, interconnected electric utilities, first responders and emergency managers. Agency partnerships are crucial to maximizing the effectiveness of PGE's wildfire preparation and response. Close collaboration with agency partners helps all participants optimize use of available resources and avoid duplication of effort.

The purpose of the Wildfire Agency Engagement Plan is to provide a framework and process for PGE's annual wildfire-related engagement activities, including PSPS and reactive de-energization requests, involving external agency stakeholders: government agencies, state cooperators, Tribes and authorities having jurisdiction (AHJ). The plan describes which agencies PGE engages with, the annual schedule for strategic meetings, and the key activities requiring agency engagement and coordination.

These coordinated key activities include:

- Collaboration with agency stakeholders to effectively prepare for, respond to and recover from wildfire threats and events.
- Coordination of in-season public safety actions.
- Actions to reduce the potential risk of utility-caused wildfire ignitions.

PGE's specific pre-season activities include participation in or hosting of:

- Fire season kickoff meeting.
- Municipality Emergency Management forums.

- Northwest Interagency Coordination Center (NWCC) Annual Meeting.
- United States Forest Service and Oregon Department of Forestry coordination meetings.
- Annual Critical Infrastructure Meeting.

In addition to these activities, PGE also attends agency-hosted review and planning events, host agencies for tours, open houses and workshops, provide access to PGE wildfire cameras and weather data, provide utility safety training, and educate stakeholders on PGE resource capabilities, limitations and best practices.

## 2. *Pre-Fire Season Agency Outreach Activities*

**TABLE 7: PRE-FIRE SEASON AGENCY OUTREACH ACTIVITIES**

Pre-Fire Season PGE / Agency Annual Engagement and Outreach Schedule			
Tactic / Deliverable	Process Owner	Contributors (as needed)	Timing
Participating in agency-facilitated field, virtual or blended exercises, trainings, and meetings, as requested	WM&R	TBD, based on event	As requested and available
Conducting pre-fire season planning and preparedness workshops with agency stakeholders	WM&R	WOPM, BCEM, Government Affairs (GA), Local Government Affairs (LGA), Key Customer Management (KCM), Utility Operations, Environmental, Geographic Information System (GIS), Legal, Parks	April
Creating an action register to ensure that all pre-fire season agency questions, concerns and suggestions raised in planning and preparedness workshops are addressed internally and reviewed with the requesting agency in a timely manner	WM&R	WOPM, BCEM, GA, LGA, KCM, Rates and Regulatory Affairs (RaRA), Brand, Marketing and Communications (BMC), Security, Legal, Utility Operations, Environmental, GIS, Information Technology (IT)	April
Facilitating PGE-led virtual or blended exercises and training with internal and external stakeholders	BCEM	WOPM, GA, LGA, KCM, RaRA, BMC, Security, Legal, Utility Operations, Environmental, GIS, IT, Parks	May
Participating in wildfire preparedness meetings with County emergency managers	BCEM	WOPM, GA, LGA, KCM, Legal, GIS, Parks	April – PGE Fire Season Declaration

## 3. *Fire Season Agency Outreach Activities*

**TABLE 8: FIRE SEASON AGENCY OUTREACH ACTIVITIES**



Fire Season PGE / Agency Engagements			
Tactic / Deliverable	Process Owner	Contributors (as needed)	Timing
Participating in agency meetings, trainings, and site visit requests	WM&R	WOPM, BCEM, GA, LGA, KCM, RaRA, BMC, Security, Legal, Utility Operations, Environmental, GIS, IT, Parks	As needed and available
Wildfire response	WM&R	WOPM, BCEM, GA, LGA, KCM, RaRA, BMC, Security, Legal, Utility Operations, Environmental, GIS, IT, Parks	Per incident
PSPS	WOPM	BCEM, GA, LGA, KCM, RaRA, BMC, Security, Legal, Utility Operations, Environmental, GIS, IT, Parks	Per event
Agency led-After-Action Reviews (AAR)	WM&R	WOPM, BCEM, GA, LGA, KCM, Security, Legal, Utility Operations, GIS, Generation Operations, Parks	As requested and available

#### 4. *Post-Fire Season Outreach Activities*

**TABLE 9: POST-FIRE SEASON AGENCY OUTREACH ACTIVITIES**

Tactic / Deliverable	Process Owner	Contributors (as needed)	Timing
Developing annual agenda for agency engagement and outreach meetings	WM&R	WOPM, BCEM, GA, LGA, KCM, RaRA, BMC, Security, Legal, Utility Operations, Environmental, GIS, IT, Parks	End of PGE Fire Season - EOY
Participating in agency-facilitated after-action reviews (AAR), as requested	WM&R	WOPM, BCEM, GA, LGA, KCM, Security, Legal, Utility Operations, Environmental, GIS, Parks	As requested
Participating in agency-facilitated field, virtual or blended exercises, trainings, and meetings, as requested	WM&R	TBD, based on event	As requested and available
Conducting post-season review workshops with agency stakeholders	WM&R	WOPM, BCEM, GA, LGA, KCM, Utility Operations, Environmental, Legal, GIS, Parks	February
Creating an action register to address post-season questions, concerns and suggestions	WM&R	WOPM, BCEM, GA, LGA, KCM, RaRA, BMC, Security, Legal, Utility Operations, Environmental, GIS, IT, Parks	February

## First Responder Support

PGE strives to participate in all Incident Management Team (IMT) and CIMT meetings to support Oregon first responders. First responder dispatch centers may contact PGE Dispatch or System Control Center to provide:

- Notification of a wire down or, low-line (sagging wire).
- Notification of fire crews working near power lines, natural gas facilities or energy communication equipment.
- Request de-energization of facilities.
- Request PGE representation at an Incident Command Post/IMT.
- Notification of firefighting tactics that may impact electrical facilities and services.
- Notification of new ignitions that are impacting or may impact energy facilities.

## Industry Engagement

Emergency managers from PGE, PacifiCorp, Northwest Natural Gas, and BPA collaborate throughout the year as part of an Energy Emergency Management Team (EEMT). Annually, EEMT exchanges contact information with the Northwest Interagency Coordination Center (NWCC) for emergency communications during fire season. Dispatch/Control Center numbers provided by the energy companies are for dispatch-to-dispatch communications. Emergency management contacts are provided for both NWCC and fire dispatch center personnel to assist with strategic decision-making and incident coordination.

In addition, PGE annually participates in a variety of industry forums that may discuss wildfire-related topics, including

- **International Wildfire Mitigation & Resiliency Consortium:** PGE participates with utilities from across the Western U.S., South America and Australia to benchmark and share best practices for wildfire mitigation.
- **Electric Power Research Institute (EPRI):** PGE engages with its research partners at EPRI through multiple programs to address wildfire mitigation research and is leveraging EPRI-led programs such as the Incubatenergy Network to gain knowledge of new technologies and start-ups in wildfire-related disciplines. As a result of its collaboration with EPRI, PGE is deploying an Early Fault Detection pilot project in 2021.
- **Other Forums:** PGE is also actively engaged with industry research partners at the Western Energy Institute, Edison Energy Institute, and the U.S. Department of Energy.

## 7.6. Research & Development

PGE is undertaking wildfire-related research projects with public and private research institutes and industry partners. Thanks to earlier R&D efforts, PGE's Remote Sensing project has now captured LiDAR and Hyperspectral imaging across our entire service territory. This detailed picture of vegetation proximity, tree species and health helps PGE to understand precisely where risk is

concentrated near our transmission and distribution infrastructure, so that we can optimally direct vegetation management activities.

PGE is also working with a consortium of industry partners in EPRI's Incubatenergy Network to explore deployment of artificial intelligence and imaging technology to automatically detect wildfires through video imaging.

## Technologies Under Evaluation

### 1. *Early Fault Detection*

In 2021, PGE is deploying an Early Fault Detection system that uses radio frequency signals to detect and pinpoint potential failures on our distribution system in high wildfire risk areas. This technology, if proven successful, will pinpoint potential failure before traditional methods such as physical inspection.

### 2. *Remote Sensing Project*

Remote sensing information, such as LiDAR, is a tool that can assist in the assessment of infrastructure, facilities, and vegetation to better understand wildfire risk and inform mitigation strategy. After a comprehensive evaluation of the impacts and benefits of high-fidelity data captured via remote sensing technology, PGE launched a project to capture and operationalize data from three such technologies:

- Aerial LiDAR
- Hyperspectral imaging
- High-resolution orthoimagery

PGE's Remote Sensing Project, completed in 2020, captured detailed topographical and measurement data for PGE's entire distribution service territory, as well as the full length of the transmission lines owned and operated by PGE both within and outside PGE's service territory.

The data and analysis produced by this project is impacting PGE's fire risk assessment capabilities in the following key areas:

- Empirical assessment of vegetation clearance risk across the T&D infrastructure enables vegetation management practices that accurately prioritize high-risk areas.
- Data about vegetation species, density, and health is enhancing fire risk assessment.
- Accurate data about the location and condition of T&D infrastructure is improving planning and remediation activities for assets targeted for system hardening improvements or other wildfire risk mitigation efforts.

## Section 8. Quality Control & Continuous Improvement

The core of PGE's continuous improvement effort is a formal year-end program review/lessons learned process, involving both internal and external stakeholders. PGE's WOPM organization facilitates the review process, collecting and analyzing findings, producing the year-end report, and tracking action items.

The findings from these analyses are the basis for PGE's annual wildfire program and documentation update processes. PGE's WOPM organization is responsible for assigning action items to the appropriate task owner, tracking action item progress through to completion, and reporting progress to PGE's Executive Operations and Executive Risk Steering Committees. Examples of action items assigned following the 2020 wildfire season AAR process include:

- Stationary staging areas operations and setup
- Damage assessment improvements
- Mobile capabilities operations and setup

## **8.1. Monitoring & Audit**

PGE's Wildfire Mitigation & Resiliency, Vegetation Management, BCEM and Utility Asset Management organizations will collaborate in the development of Wildfire Program performance metrics and the completion of an annual performance audit. In addition, these organizations will review current OPUC and other regulatory requirements, assess PGE's ongoing compliance with applicable requirements, and update plans, procedures, engineering standards and facilities as needed to maintain compliance.

## **8.2. Employee & Contractor Training**

### ***1. Training***

Prior to the start of fire season, WM&R will conduct annual computer-based Wildfire Awareness Training for PGE employees and those acting on behalf of PGE, to ensure that PGE personnel who could encounter or contribute to wildfire-related risk are adequately trained and equipped. Training topics and objectives include:

- Wildfire prevention
- Wildfire preparedness
- Hazard identification, mitigation, and avoidance
- Wildfire operational safety
- Environmental factors
- Fire suppression tools and equipment
- Lookouts
- Communications
- Escape routes
- Safety zones (LCES)
- Fire weather forecasts
- Field fire weather measurements.

### ***2. Fire Season Safety Work Instruction for Field Personnel***

As part of its CEOP, PGE developed a Wildfire Pocket Guide that provides work guidelines for field crews during fire season. The purpose of this guide is to enhance worker safety during fire season by:

- Creating a standard wildfire communications process.



- Preventing wildfire ignition.
- Ensuring that, if a fire begins, employees are trained and equipped to extinguish the fire or escape (and guide others) to safety.

### 8.3. Lessons Learned Process

At the end of each year, PGE's WM&R organization conducts a wildfire review/lessons learned process that includes:

- Annual post-fire season review workshop involving both internal and external stakeholders.
- Documentation and distribution of lessons learned and AAR findings – identification of comments and recommendations to improve PGE's wildfire preparedness, system hardening and operational readiness.
- Annual post-season review of PGE's wildfire mitigation performance metrics and targets.
- Incorporation of lessons learned findings into the annual report, used to update PGE's wildfire mitigation program and documentation.
- Documentation of each year's lessons learned and year-end review findings, as well as performance metric outcomes, in PGE's Wildfire Program SharePoint library, for future reference.

## Section 9. Wildfire Risk Mitigation Performance Measures

PGE's wildfire risk mitigation performance measures include three categories of metrics:

- **Program Measures:** Capture the tasks PGE plans to perform to improve wildfire mitigation, as identified in the annual Wildfire Mitigation Plan.
- **Progress Measures:** Milestones capturing PGE's progress towards completion of performance metrics identified in the annual Wildfire Mitigation Plan.
- **Outcome Measures:** Estimate the amount of wildfire risk PGE has mitigated through achievement of each performance metric.