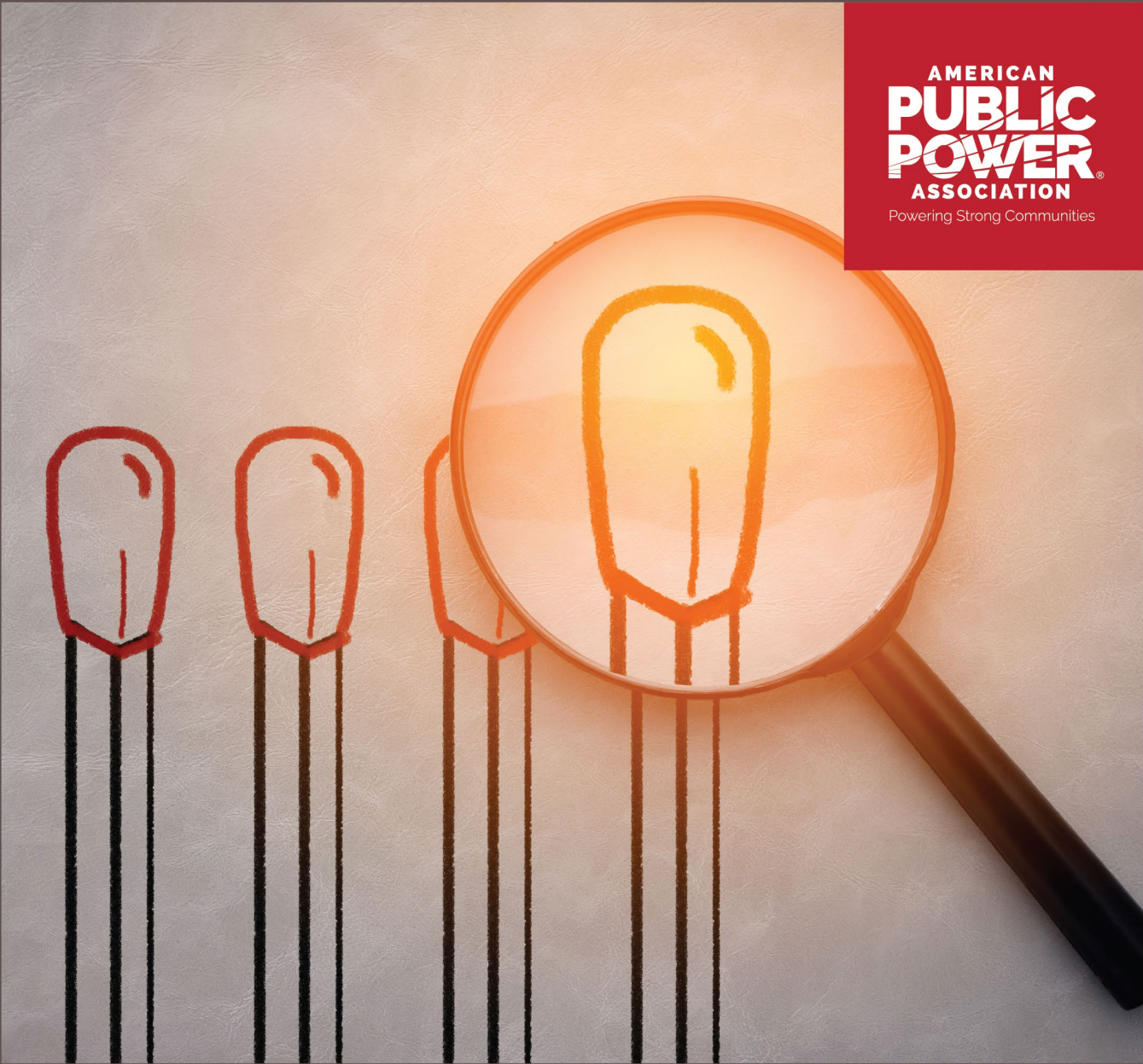




WILDFIRE MITIGATION STRATEGIES AND RESOURCES FOR PUBLIC POWER UTILITIES

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I. Purpose

This resource supports public power utilities in identifying and implementing wildfire mitigation strategies. Developed in collaboration with the American Public Power Association's Risk Management Working Group, Argonne National Laboratory (ANL), and other APPA member utilities, it provides a categorized list of tools and approaches to guide utilities in reducing wildfire risk and enhancing system resilience.

II. Introduction

Wildfires are becoming more frequent, intense, and unpredictable, posing a growing threat to communities and the electric grid. For public power utilities, this challenge is especially difficult. These locally governed entities often serve rural or geographically diverse areas with limited staff and resources. Despite these constraints, they are expected to maintain reliable service, protect infrastructure, and ensure public safety during increasingly volatile fire seasons.

Recent wildfire events have highlighted the urgency of this issue. In 2023 and 2024, utilities in Oregon, Hawaii, and parts of the Southwest experienced devastating impacts, including infrastructure damage, service disruptions, and legal and financial consequences. In several cases, utilities faced delays in securing federal permits for vegetation management and hazard tree removal, leaving critical assets exposed during peak fire conditions. These delays, combined with rising liability risks, have made wildfire mitigation not just a technical issue, but also a matter of governance and resource allocation.

One of the biggest challenges utilities face is navigating the overwhelming number of tools, datasets, and guidance documents available. From satellite imagery and fire modeling software to vegetation management platforms and risk assessment frameworks, the landscape of wildfire mitigation resources is vast. For utilities just beginning to assess their wildfire risk, it can be difficult to know where to start, which tools are most relevant, and how to prioritize actions.

To help address this challenge, APPA, in partnership with ANL and the APPA Risk Management Working Group, developed this resource. It offers a categorized list of wildfire mitigation strategies and tools, grounded in real-world utility experience and designed to be scalable and adaptable. Whether a utility is launching its first wildfire mitigation program or refining an existing plan, this guide provides a starting point for informed decision-making and collaborative learning.

III. Wildfire Mitigation Strategies

Wildfire mitigation strategies are proactive measures that utilities take to reduce the likelihood of wildfire ignition, minimize the impact of fires on electric infrastructure, and protect public safety. These strategies span operational, technical, and community-focused efforts, and are tailored to the unique risks and capacities of each utility.

For public power utilities, wildfire mitigation is not a one-size-fits-all approach. It involves evaluating local conditions, identifying vulnerabilities, and selecting tools and practices that are both effective and feasible. The following categories represent core areas of wildfire mitigation, each supported by real-world examples from public power utilities working to address this growing risk.

a. Vegetation Management

Vegetation management is one of the most foundational wildfire mitigation strategies. It involves identifying and removing trees, brush, and other vegetation that could come into contact with power lines or equipment and ignite a fire. Utilities often face challenges with permitting, access, and coordination with landowners and agencies.

Case Study: Snohomish County PUD, Washington

Snohomish PUD uses satellite imagery and GIS mapping to monitor vegetation encroachment across its service territory. The utility prioritizes trimming and removal based on proximity to critical infrastructure and fire-prone zones. It also works closely with federal land managers to expedite vegetation clearance permits, especially in areas near national forests.¹

Case Study: Placer County Water Agency, California

PCWA has implemented a proactive vegetation management program that includes routine inspections, hazard tree removal, and coordination with CAL FIRE. The agency uses drone technology to assess remote areas and collaborates with local fire safe councils to align utility efforts with broader community fuel reduction projects.²

b. Grid Hardening

Grid hardening involves upgrading infrastructure to reduce the likelihood of ignition and improve system resilience during fire events. This includes replacing aging equipment, installing fire-resistant materials, and undergrounding lines where feasible.

Case Study: Truckee Donner PUD, California

Truckee Donner PUD has invested in covered conductors and fire-resistant composite poles in high-risk zones. These upgrades are part of a multi-year capital improvement plan aimed at reducing ignition potential. The utility also uses fault detection technology to monitor line performance and prevent equipment-related ignitions.³

¹ Snohomish County Public Utility District. (2024). *Wildfire Mitigation Plan*. Snohomish County PUD. www.snopud.com/wp-content/uploads/2024/11/2024-Wildfire-Mitigation-Plan.pdf

² Placer County Water Agency. (n.d.). *Fire & Water*. PCWA. www.pcwa.net/fire-and-water

³ Truckee Donner Public Utility District. (n.d.). *Wildfire mitigation, safety & emergency preparedness*. www.tdpud.org/departments/wildfire-emergency-preparedness

Case Study: Electrical District No. 3, Arizona

ED3 has focused on reinforcing substations and upgrading overhead lines with insulated conductors. In desert regions where vegetation is sparse but wind and heat are extreme, ED3's grid hardening efforts are tailored to reduce arc flash risk and improve system reliability during fire weather events.⁴

c. Situational Awareness and Monitoring

Situational awareness refers to a utility's ability to monitor environmental conditions and system performance in real time. This includes using weather stations, fire detection sensors, and modeling tools to anticipate and respond to wildfire threats.

Case Study: Western Area Power Administration, Colorado

WAPA integrates wildfire modeling with its enterprise risk management system to assess how fire conditions could impact its 17,000-mile transmission network. The utility uses real-time weather data and fire behavior models to inform operational decisions and coordinate with federal emergency agencies.⁵

Case Study: Seattle City Light, Washington

Seattle City Light has deployed remote cameras and weather sensors in forested areas near its transmission lines. These tools feed into a centralized dashboard that helps operators monitor fire risk and respond quickly to changing conditions. The utility also collaborates with regional emergency managers to share situational data.⁶

d. Operational Practices

Operational practices include protocols and procedures that reduce wildfire risk through changes in how the system is operated, especially during high-risk periods. These may include public safety power shutoffs, inspection routines, and switching configurations.

Case Study: Salt River Project, Arizona

SRP has developed seasonal operational protocols that include enhanced inspections, switching restrictions, and coordination with fire agencies during red flag warnings. The utility uses infrared imaging to detect equipment faults and conducts pre-season patrols to identify vulnerabilities.⁷

Case Study: Austin Energy, Texas

Austin Energy has implemented a wildfire operations protocol that includes temporary switching configurations and maintenance restrictions during high-risk

⁴ Electrical District No. 3. (n.d.). *News: Substation infrastructure modernization*.

www.ed3online.org/Home/Components/News/News/148/74

⁵ Western Area Power Administration. (n.d.). *Transmission Infrastructure Program*.

www.wapa.gov/transmission/TIP/Pages/default.aspx

⁶ Seattle City Light. (2023, August 8). *How City Light's Vegetation Management Team uses LiDAR to keep the grid safe*. <https://powerlines.seattle.gov/2025/08/08/how-city-lights-vegetation-management-team-uses-lidar-to-keep-the-grid-safe/>

⁷ Salt River Project. (2023, May 9). *SRP takes steps to proactively mitigate wildfire risk*. <https://media.srpnet.com/srp-takes-efforts-to-proactively-mitigate-wildfire-risk/>

weather. The utility also uses predictive analytics to determine when and where to deploy field crews for inspections and repairs.⁸

e. Community Engagement

Community engagement involves educating and collaborating with the public to raise awareness of wildfire risks and promote preparedness. Utilities play a key role in helping residents understand defensible space, emergency alerts, and outage planning.

Case Study: Loveland Water & Power, Colorado

Loveland Water & Power partners with local fire departments to host wildfire safety workshops and distribute preparedness materials. The utility also uses social media and local radio to communicate fire weather alerts and outage updates to residents in high-risk zones.⁹

Case Study: Eugene Water & Electric Board, Oregon

EWEB runs a community wildfire awareness campaign that includes educational mailers, public meetings, and school outreach. The utility also collaborates with neighborhood associations to promote defensible space and emergency planning, especially in the wildland-urban interface.¹⁰

f. Workforce Training

Workforce training ensures that utility staff are equipped with the knowledge and skills to safely operate in fire-prone environments and respond effectively to wildfire events. This includes safety protocols, evacuation procedures, and coordination with emergency services.

Case Study: Truckee Donner PUD, California

Truckee Donner PUD conducts annual wildfire safety training for all field staff, including evacuation protocols, fire behavior awareness, and equipment handling during fire conditions. The training is tailored to the utility's mountainous service territory and includes joint exercises with CAL FIRE.¹¹

Case Study: Western Area Power Administration, Colorado

WAPA has developed internal training programs for field crews and risk managers to improve wildfire response readiness. These programs include scenario-based exercises, tabletop drills, and cross-training with federal emergency responders.¹²

⁸ Austin Energy. (2024, August 29). *Austin Energy announces full deployment of AI-driven Early Wildfire Detection System*. <https://austinenergy.com/about/news/news-releases/2024/austin-energy-announces-full-deployment-of-ai-driven-early-wildfire-detection-system>

⁹ City of Loveland Utilities. (n.d.). *Wildfire mitigation and emergency preparedness*. www.lovelandwaterandpower.org/Home/Components/News/News/7730/3220

¹⁰ Eugene Water & Electric Board. (2025, June 27). *EWEB prepares for wildfire season with risk mitigation measures*. www.eweb.org/your-public-utility/news/eweb-prepares-for-wildfire-season-with-risk-mitigation-measures

¹¹ Truckee Donner Public Utility District. (n.d.). *Wildfire mitigation, safety & emergency preparedness*. www.tdpud.org/departments/wildfire-emergency-preparedness

¹² Western Area Power Administration. (2023, August 8). *Safeguarding the grid through vegetation management*. www.wapa.gov/safeguarding-the-grid-through-vegetation-management/

g. Planning and Coordination

Planning and coordination involve integrating wildfire mitigation into broader utility planning efforts and collaborating with external partners to align strategies. This includes asset management, emergency response, and mutual aid.

Case Study: Snohomish County PUD, Washington

Snohomish PUD incorporates wildfire risk into its asset management and emergency response plans. The utility participates in regional working groups and collaborates with federal land managers to align mitigation efforts across jurisdictions.¹³

Case Study: Austin Energy, Texas

Austin Energy uses a wildfire risk assessment framework to guide capital planning, vegetation management, and operational protocols. The utility also coordinates with local governments, mutual aid partners, and emergency managers to ensure alignment across response and recovery efforts.¹⁴

IV. Implementation Considerations

Putting wildfire mitigation strategies into action takes more than just choosing the right tools. It requires thoughtful planning, collaboration, and a clear understanding of each utility's unique circumstances. Public power utilities vary widely in size, geography, and available resources, so implementation needs to be flexible and grounded in local realities. Below are three key areas to consider when moving from strategy to execution.

a. Tailoring Strategies to Utility Size, Geography, and Risk Profile

Every utility operates in a different environment. Some serve large urban populations, while others cover remote, rural areas. Some face frequent wildfire threats, while others are just beginning to see fire risk emerge. That's why wildfire mitigation efforts need to be scaled and adapted to fit each utility's situation.

- Smaller utilities may focus on practical, lower-cost actions like improving vegetation patrols, training field crews, and using basic weather monitoring tools.
- Larger utilities or those in high-risk areas might invest in covered conductors, advanced fire modeling, or real-time monitoring platforms.
- Geography matters. Terrain, vegetation type, and proximity to wildland-urban interfaces all influence what strategies make sense.
- Risk assessments help utilities prioritize actions based on local fire history, asset vulnerability, and community exposure.

¹³ Snohomish County Public Utility District. (2024). *2024 Wildfire Mitigation Plan*. www.snopud.com/wp-content/uploads/2024/11/2024-Wildfire-Mitigation-Plan.pdf

¹⁴ Austin Energy. (2024, August 29). *Austin Energy announces full deployment of AI-driven early wildfire detection system*. <https://austinenenergy.com/about/news/news-releases/2024/austin-energy-announces-full-deployment-of-ai-driven-early-wildfire-detection-system>

b. Leveraging Mutual Aid and Peer Learning

One of the strengths of public power is the willingness to share knowledge and support each other. Wildfire mitigation is no exception. Utilities can learn a lot from their peers such as what's worked, what hasn't, and how to adapt strategies to local conditions.

- Peer exchanges through APPA working groups and webinars allow utilities to share lessons learned and practical tools.
- Mutual aid agreements can be critical during active fire events or recovery, especially for smaller utilities with limited staff.
- Mentorship and collaboration help utilities that are just starting out learn from those with more experience.

c. Funding and Regulatory Alignment

Even the best strategies can stall without the right funding or regulatory support. Utilities need to navigate grant opportunities, permitting processes, and compliance requirements to keep mitigation efforts moving forward.

- Federal and state grants can help cover the cost of infrastructure upgrades, planning, and community outreach.
- Permitting coordination, especially with federal land agencies, is essential for vegetation management and access to remote assets.
- Internal planning should align wildfire mitigation with broader capital improvement plans, emergency protocols, and asset management systems.

V. Resource List

Below is a curated list of wildfire mitigation tools, guidance documents, and technical resources from federal agencies, national laboratories, APPA, and affiliated organizations. These materials are grouped by source and topic to help utilities quickly find what's most relevant to their planning and implementation efforts.

Strategy Category	Resource	Description	Source
Vegetation Management	Collaborative Wildfire Risk Reduction Program	Supports forest restoration, hazardous fuels reduction, and public engagement in high-risk areas.	USDA Forest Service
Grid Hardening	Wildfire Risk to Energy Infrastructure Report	A technical report assessing wildfire risk to energy infrastructure and outlining mitigation strategies.	National Renewable Energy Laboratory
	Sandia Wildfire Grid Resilience Program	Tools for wildfire modeling, grid vulnerability monitoring, and post-fire recovery planning.	Sandia National Laboratories
Situational Awareness	Wildfire Risk to Communities	Interactive maps, charts, and resources to help communities understand and reduce wildfire risk.	USDA Forest Service
	ClimRR Portal	Dynamically downscaled hazard projections for future wildfire and environmental risks, useful for planning and infrastructure design.	Argonne National Laboratory
	Wildfire Risk Modeling Tools	Includes fire behavior forecasting, asset vulnerability analysis, and scenario planning tools developed by Argonne, Sandia, and SLAC.	DOE National Laboratories
Operational Practices	DOE Wildfire Mitigation Webinar Series	A four-part series featuring technologies and approaches from national labs, including fire modeling, sensing, and post-fire analysis.	DOE Office of Electricity
	PNNL Wildfire Risk & Resilience Program	Research and tools for early warning, fire-weather modeling, smoke impact forecasting, and infrastructure protection.	Pacific Northwest National Laboratory
	WildfireGPT	A prototype AI tool for wildfire analysis using retrieval-augmented generation to support decision-making.	Argonne National Laboratory
Community Engagement	APPA Wildfire Mitigation Webinars	Peer-led sessions featuring utility strategies and lessons learned.	American Public Power Association
Workforce Training	Utility Resilience Planning for Wildfires	Highlights current practices in utility workforce preparedness and resilience.	DOE
Planning & Coordination	Wildfire Mitigation Plans Database	A searchable database of over 400 wildfire mitigation plans from utilities across the U.S.	Pacific Northwest National Laboratory
	BLM Fire Program	National policy and coordination for wildfire response and mitigation across public lands.	Bureau of Land Management