ACHIEVING COST-EFFECTIVE WILDFIRE RISK REDUCTION:

How Integrated Technology Delivers Measurable Results

A Strategic Analysis of Integrated Technology Platforms for Utility Wildfire Mitigation

co-authored by the Prevention-First wildfire partnership

AiDASH BURNBOT DELPHIRE eSmart SYSTEMS INDT Intelligent Network Diagnostic Technology

KPMG OroraTech RHIZOME Schneider Electric technosylva

Table of Contents

Executive Summary

The wildfire crisis has reached unprecedented levels with direct implications for utility costs and customer electricity rates. In 2024 alone, 64,897 wildfires caused $4.8 billion in direct suppression costs and $89.6 billion in broader economic losses.[1] From 2019-2023, California's three largest utilities collected $27 billion in wildfire prevention costs from ratepayers, with wildfire-related expenses now comprising 10-24% of total revenue requirements.[2,3]

The Challenge of Fragmentation

As NARUC emphasizes, wildfires pose unique concerns for utilities: third-party losses "borne almost exclusively by electric companies if their equipment is involved, often regardless of fault, with potential liabilities reaching billions of dollars." [4] The core problem is not a lack of data or tools, but fragmented decision-making (exacerbated by fragmented data and tools) that drives duplicative spending and inconsistent risk reduction. Vegetation management runs on one system, wildfire modeling on another, grid operations on a third, creating "blind spots" that "translate directly into preventable ignitions, unnecessary outages, higher costs, and delayed decisions."[5]

The Prevention First Solution

Leading utilities and technology providers are adopting a "Prevention First" approach built on three principles:

1. **Integration Over Isolation**
2. **Data Into Action, and**
3. **Shared Accountability.**[5]

This framework enables proactive risk management rather than reactive response.

Proven Results

Research demonstrates compelling effectiveness:

- PG&E achieved 99% reduction in acres impacted (2018-2020 baseline to 2022)[6]
- 68% decrease in equipment-related ignitions in one year[6]
- Enhanced Powerline Safety Settings showed 65-74% ignition reduction effectiveness[7]
- Vegetation-related ignitions would have been 4.5 times higher without integrated risk reduction efforts[8]
- Early detection systems contained fires to 3 acres vs. potential large-scale events[9]
- Every $1 invested in resilience saves $13 in economic impact and cleanup costs[6]

These results demonstrate that integrated technology platforms deliver superior cost-effectiveness while reducing wildfire risk more effectively than fragmented approaches.

The Integration Imperative

The Problem with Silos

Traditional wildfire mitigation suffers from fragmented systems that prevent comprehensive risk assessment. When vegetation management, asset inspection, weather monitoring, and fault detection operate independently, utilities cannot identify compound risks where multiple factors converge to create heightened ignition probability.

This fragmentation creates three critical failures:

1. **Missed Correlations**: A circuit with multiple risk factors, aging equipment, approaching vegetation clearance limits, and forecast extreme weather, requires urgent coordinated intervention—but siloed systems don't reveal this compound risk.
2. **Operational Inefficiencies**: Multiple crews visit the same location for different purposes, requiring separate customer notifications and mobilization costs.
3. **Suboptimal Prioritization**: Without integrated risk scoring, utilities either implement uniform programs (inefficient) or rely on simplified prioritization that misses the highest actual risks.

The Integration Advantage

Modern integrated platforms address these limitations through unified data architectures, advanced analytics, and coordinated operational workflows. As one utility leader explained, "By leading with satellites and complementing them with ground-based LiDAR and on-ground patrols, we achieve what no single data source could—and do it more cost-effectively."[10]

Integration delivers quantifiable benefits:

1. **Enhanced Risk Identification:** Models integrating vegetation, weather, and asset data substantially outperform single-factor assessments[8]
2. **Improved Resource Allocation:** Risk-based prioritization maximizes risk reduction per dollar invested
3. **Faster Response:** Automated correlation and workflows reduce response time from hours to minutes
4. **Cost Savings:** The avoided cost of a large-scale wildfire can meaningfully offset platform investment costs.

Integration delivers value only when it produces practical, measurable reductions in wildfire risk and mitigation costs. That value emerges through coordinated action across multiple areas of technology where prioritization materially changes outcomes.

Five Critical Technology Areas

1 Predictive Risk Modeling

Integrating Weather, Asset, and Vegetation Data to Identify High-Risk Conditions Before Wildfire Season

How It Works:

Advanced platforms integrate weather forecasts, asset condition data, vegetation status, and historical fire patterns to produce granular risk scores that identify high-risk conditions before and during wildfire season. PG&E's Wildfire Distribution Risk Model computes risk scores for every circuit segment, updated daily or more frequently during high-risk periods.[11]

Operational Applications:

- **Surgical PSPS Decisions**: By combining continuous vegetation monitoring with localized fire modeling and grid topology data, operators can "de-energize only those sections where fire potential is confirmed," or avoid shutoffs through targeted vegetation or asset augmentation work, or enhanced protection settings.[5] PG&E achieved 56% reduction in average PSPS outage duration through refined targeting.[6]
- **Resource Pre-Positioning**: Forecast-based planning enables utilities to position crews and equipment before high-risk events, dramatically reducing response time.

Measurable Results:

Predictive risk modeling has enabled more precise PSPS decisions by leveraging granular weather and grid data, helping utilities reduce unnecessary outages and the operational costs they impose while protecting reliability.[12]

2 Vegetation Management

Combining Geospatial Intelligence with Inspection Data to Optimize Fuel Reduction Programs

How It Works:

Integration of LiDAR (pinpoint accuracy at 10-50 cm resolution) with satellite imagery (broad, frequent coverage) enables comprehensive vegetation monitoring. Satellite technology can save utilities up to 20% of annual vegetation management budgets.[13] LiDAR costs 4-5 times more but provides essential precision for the highest-risk areas.[14]

Strategic Application:

The Prevention First framework shows how geospatial intelligence, combined with inspection data, transforms vegetation work into strategic prevention. By combining 30-year fire risk modeling with AI-driven growth-rate predictions, utilities can "prioritize areas where ignitions could escalate into significant fires" and "allocate resources based on fire risk rather than solely leveraging conditions or time-based cycles."[5]

Measurable Results:

Analysis of PG&E's enhanced vegetation management found vegetation-contact ignitions would have been 4.5 times higher without these efforts.[8] From a 2020 high of 510 fires, PG&E reported 374 fires in 2023, demonstrating program effectiveness.[2]

3 Fire-Causing Fault Recognition

Correlating Equipment Performance Data with Environmental Conditions to Predict Ignition Vulnerabilities

How It Works:

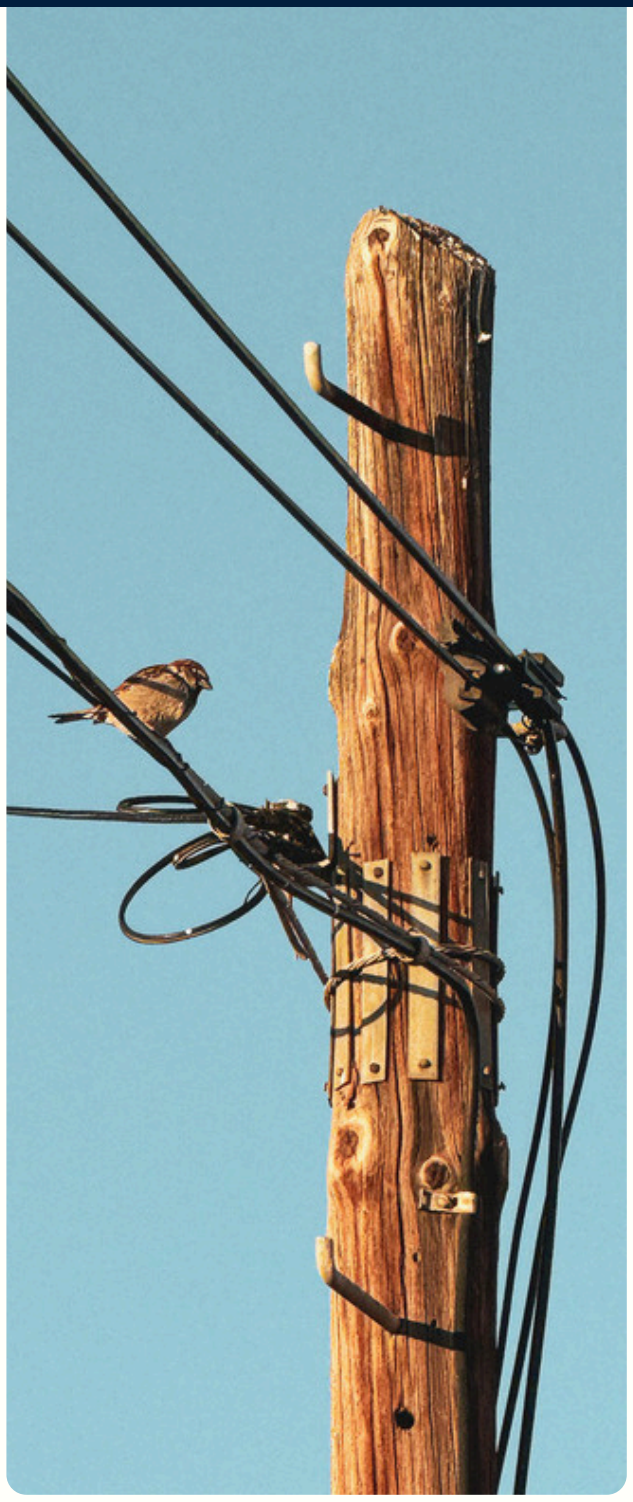
Real-time electrical signature analysis correlates equipment performance with environmental conditions to detect anomalies indicating equipment degradation. As NARUC identifies, wildfires can be sparked through power line contact, equipment failures, vegetation proximity, animal interference, and environmental conditions.[15] Modern sensor networks monitor current/voltage waveforms, harmonics, phase imbalance, and transient events to identify emerging problems before failure.

Predictive Maintenance:

When sensors identify high-risk equipment under vulnerable environmental conditions, utilities can implement accelerated replacement, enhanced inspection, or continuous monitoring. Early Fault Detection programs "detect incipient faults on aging equipment typically long before they fail, sometimes violently."[7]

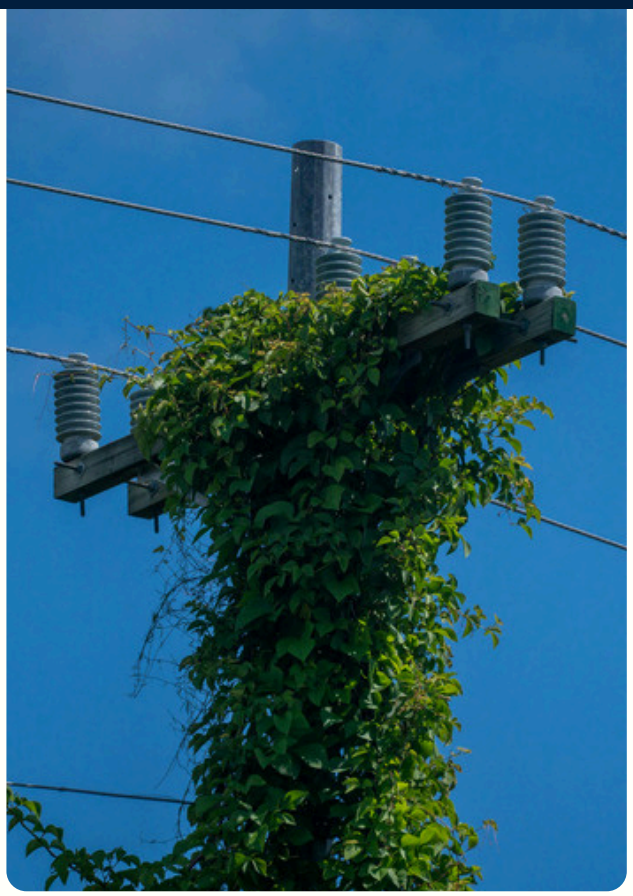
Measurable Results:

PG&E's Enhanced Powerline Safety Settings demonstrated 65-74% ignition reduction effectiveness across multiple years.[7] In July 2024, a sensor alert led to finding vegetation smoldering on an energized line; de-energization averted a possible wildfire.[16]



4 Asset Management

Synthesizing Failure Analysis, Risk Scoring, and Operational Data to Prioritize Maintenance and Replacement



How It Works:

Integrated platforms synthesize failure analysis, risk scoring, and operational data to develop multi-dimensional risk scores for individual assets based on actual component condition, failure probability, ignition probability, and consequence potential. This enables comparison across diverse asset types and informed prioritization of capital investments for maintenance and replacement - optimizing across both traditional reliability and service goals with wildfire risk reduction impact factored in.

Effectiveness Analysis:

Research comparing mitigation strategies found that dynamic grid management technologies achieve substantial risk reduction at approximately one-tenth the cost of undergrounding (which averages $3 million per underground mile).[7,14] However, the optimal mix varies by specific circumstances. PG&E has undergrounded 900+ miles with plans for 1,600 total miles through 2026.[19]

Measurable Results:

Covered conductor programs cost $500,000-$800,000 per circuit mile and provide substantial wildfire risk reduction through contact protection.[11] Fast-trip settings offer even lower-cost alternatives while delivering measurable effectiveness. In one North American utility case study, AI-driven analysis of inspection imagery revealed that roughly 7% of cotter pins on transmission tower insulators were missing or incorrectly installed, a defect that can lead to insulator failure and ignition, enabling targeted remediation of the highest-risk components within existing maintenance programs.[20]

5 Early Detection Systems

Connecting Sensors, Cameras, and Analytics to Enable Rapid Preventive Action

How It Works:

AI-powered camera systems connect sensors, cameras, and analytics to detect wildfires within minutes of ignition, enabling rapid preventive action.

Pano AI uses ultra-high-definition, 360-degree rotating cameras mounted on high vantage points. Each camera performs a complete sweep every minute, capturing video within a 10-mile radius and infrared readings to detect temperature fluctuations even at night or through smoke. When potential fires are detected by AI, human analysts verify them before the system triangulates the location and notifies emergency services.[21,22]

Delphire's Sentinel FD3 takes a different approach with a multi-sensor platform designed to operate below the forest canopy. It combines three detection methods: a visual camera with AI, a thermal infrared camera for heat detection, and a chemical sensor that works like a smoke detector. The system can detect fires in under a minute and operates in remote areas without cell service or power, sending alerts and confirmation images via satellite-based communications through NASA's ODIN-Fire software. [23,24]

Real-World Effectiveness and Deployment:

These systems are seeing rapid adoption across utilities. Austin Energy deployed 13 cameras across its 437-square-mile service territory;[25] Xcel Energy plans 38 cameras in Minnesota;[22] and 15+ utilities now use Pano AI systems.[26] Delphire systems have also been deployed through approximately 10 cameras installed across pilot programs and grant-funded installations, with commercial production capability of roughly 30 units per month.[24] In June 2024, Pano AI cameras demonstrated their value by detecting smoke from a lightning strike in Douglas County, Colorado. The system provided "triangulated coordinates within minutes," enabling rapid helitack response. Helicopters dropped 18,000 gallons of water, containing the fire to just 3 acres.[9] Douglas County's emergency director stated: "That critical lead time helped us contain the Bear Creek Fire before it became a more destructive event."[26] In a separate deployment, Delphire's Sentinel FD3 detected smoke from a fire near Witch Creek, approximately five miles from the device location in San Diego County Estates, transmitting alerts and images within minutes to the Ramona Municipal Water District. [27]

Measurable Results: Detection within minutes vs. hours; fire size at detection measured in acres vs. square miles; dramatic reduction in damage and suppression costs.

Proven Results: Case Studies

Pacific Gas & Electric: Comprehensive Integration

Following the devastating 2018 Camp Fire, PG&E implemented a multi-layered integrated approach:

Technologies Deployed:

- Wildfire Distribution Risk Model (multiple iterations incorporating expert feedback)
- Enhanced Powerline Safety Settings (fast-trip settings)
- Enhanced vegetation management with satellite/LiDAR monitoring
- System hardening (covered conductor, undergrounding, equipment replacement)
- Early Fault Detection system with EFD monitoring devices across 25+ transmission and distribution circuits
- 10,000+ Gridscope sensors across 900 circuit miles [16]

Quantified Results:

- 99% reduction in acres impacted (2018-2020 baseline to 2022)[6]
- 68% decrease in reportable ignitions (2021 to 2022)[6]
- 65-74% EPSS effectiveness across multiple years[7]
- 56% reduction in average PSPS outage duration (2021 to 2022)[6]
- Zero major fires from company equipment in 2023 and 2024 [16]

UC Berkeley research validated that ignitions would have been 4,5 times higher without these efforts, with 80% of reduction attributed to fast-trip settings.[8]

99%

reduction in acres impacted (2018–2020 baseline to 2022)

ZERO MAJOR FIRES

from company equipment in 2023 and 2024

68%

decrease in reportable ignitions (2021 to 2022)

4.5X

higher ignitions were projected without these efforts, according to UC Berkeley research.

56%

reduction in average PSPS outage duration (2021 to 2022)

65–74%

EPSS effectiveness across multiple years

10,000+

Gridscope sensors across

900

circuit miles

Industry Support For An Integrated Approach

Prevention First Ecosystem: Multi-Partner Integration

PLANNING LAYER

- **Strategic Risk Assessment & Investment Planning (Rhizome):** AI-powered long-term wildfire risk modeling at the asset level; prioritizes where and what mitigation investments deliver the greatest risk reduction per dollar over decades
- **Strategic Alignment (KPMG):** Financial validation and regulatory strategy

OPERATIONAL LAYER

- **Early Fault Detection (IND Technology)**: Radio-frequency (RF) sensors and advanced analytics to monitor power lines for potential failures
- **Continuous Monitoring (AiDASH):** Satellite-based vegetation, asset, and ignition intelligence
- **Asset Condition Intelligence (eSmart Systems):** AI-driven analysis of inspection imagery to quantify component condition and defect risk, enabling asset-level wildfire risk prioritization within operational workflows
- **Predictive Modeling (Technosylva):** Granular fire behavior forecasts and spread simulation
- **Early Fire Detection: (Delphire):** AI cameras detecting smoke/heat within seconds, and (**OroraTech**) satellite-detected fires in remote areas
- **Operational Integration (Schneider Electric):** Unified platform for real-time decisions
- **Field Execution (BurnBot):** Autonomous precision fuel treatments

Value Delivered:

"Detection to decision to action" workflows unify multiple data sources in a single operational dashboard. Asset managers gain a clearer prioritization of maintenance and capital investments based on actual asset condition, environmental and community risk factors, and wildfire risk, improving regulatory confidence in investment efficiency and impact. Operators can "**de-energize only those sections where fire potential is confirmed**," making PSPS "surgical, swift, and defensible—minimizing customer disruption, preserving reliability, and demonstrating to regulators that every possible prevention step was taken before the lights went out."[5]

V.

The Utility Value Proposition

NARUC's Comprehensive Guidance

The National Association of Regulatory Utility Commissioners' Wildfire Workbook represents a comprehensive compilation of current wildfire-related policies and practices. The Workbook identifies seven key areas regulators should address:

1. Risk Assessment and Mitigation Planning
2. Mitigation Measures: Hardening, Operational Practices, and Vegetation Management
3. Communication and Community Engagement
4. Wildfire Response and Coordination
5. Cost Recovery Mechanisms
6. Financial Risk Mitigation
7. Evaluation and Continuous Improvement[4]

This resource provides comprehensive information on the current state of utility and regulatory wildfire considerations to inform utility actions and regulator decisionmaking. However, each State and utility system is different and will require a tailored approach to wildfire mitigation, management and funding.

California's Leading Framework

California's regulatory structure provides a national model:

Statutory Basis: SB 901 (2018) mandated annual wildfire mitigation plans; AB 1054 (2019) created the Office of Energy Infrastructure Safety.[28]

Dual Oversight: Energy Safety approves WMPs and oversees compliance; CPUC evaluates cost reasonableness and maintains enforcement authority.[28]

Comprehensive Reporting: Quarterly data reports and annual compliance reports create unprecedented transparency.[29]

Performance Metrics: Focus on outcomes—effectiveness in reducing ignition risk—rather than inputs like tree removal statistics.[30]

Cost-Benefit Challenges

Regulators must balance safety imperatives against their core mandate to provide safe, reliable, affordable electricity. California utilities' wildfire mitigation costs have driven electricity rates to the nation's highest (outside Hawaii), creating political pressure for more cost-effective approaches.[2]

In response, some regulatory decisions have scaled back expensive undergrounding programs, emphasizing need for rigorous cost-benefit analysis.[31] California's framework will continue to evolve as it balances these competing needs.

Implementation Roadmap

READINESS ASSESSMENT

- **Current State**: Inventory existing systems, assess data quality, evaluate technical infrastructure
- **Data Maturity**: Ensure asset data completeness, historical data availability, and governance processes
- **Organizational Readiness**: Secure executive sponsorship, assess cultural factors, ensure resource availability

PHASED DEPLOYMENT

- **Quick Wins**: Target high-value use cases with fast results (e.g., pilot integrated vegetation management on 100 high-risk circuit-miles)
- **Scaling**: Expand based on pilot results, refine processes, build workforce capabilities
- **Deepening**: Add geographic coverage, connect additional data sources, enhance integration

SUCCESS FACTORS

- **Executive Sponsorship**: Cross-functional alignment essential—platforms affect operations, IT, vegetation management, asset management, emergency response, and regulatory functions
- **Clear Metrics**: Quantified risk reduction, cost efficiency, regulatory compliance, customer satisfaction
- **Continuous Improvement**: Systematic review, experimentation, scaling what works, sharing lessons learned
- **Regulatory Alignment**: Regular communication, transparent data sharing, collaborative metric development

Recommendations

For Utilities

1. **Develop Comprehensive Risk Models**: Integrate weather, asset, vegetation, and consequence data to drive all mitigation decisions

2. **Prioritize Cost-Effective** Technologies: Fast-trip settings and advanced analytics offer rapid deployment and substantial risk reduction at modest cost

3. **Implement Integrated Platforms**: Transition from fragmented point solutions to unified systems; prioritize interoperability

4. **Embrace Continuous Improvement**: Systematically evaluate effectiveness, learn from results, and refine approaches based on evidence

For Regulators

1. **Require Integrated Risk Assessment**: Mandate comprehensive modeling as a foundation for mitigation plans

2. **Establish Performance Incentives**: Create financial incentives for superior cost-effective risk reduction

3. **Demand Cost-Benefit Analysis**: Require a transparent analysis comparing alternatives

4. **Enable Innovation**: Provide regulatory pathways for pilots while maintaining oversight

5. **Promote Collaboration**: Encourage utilities to share data, lessons learned, and best practices

6. **Balance Safety and Affordability**: Help utilities and customers make informed decisions about acceptable risk levels and cost trade-offs

For Technology Providers

1. **Develop Interoperable Solutions:** Design with open APIs, standards compliance, integration capabilities
2. **Demonstrate Measurable Value:** Provide a rigorous evaluation with quantified risk reduction and cost savings
3. **Focus on Usability:** Create intuitive interfaces empowering utility personnel
4. **Support Implementation:** Provide comprehensive services, training, ongoing support

Conclusion: The Path Forward

The transformation from reactive to proactive wildfire risk management through integrated technology platforms represents a critical opportunity to enhance public safety and grid resilience while managing costs. As the Prevention First framework emphasizes, "the challenge is not a lack of data or tools—it's turning that data into insights and connecting those tools to improve outcomes."[5]

The Evidence Is Clear:

- PG&E eliminated major fires in 2023-2024 through integrated approaches
- Research demonstrates $13 in benefits per $1 invested in resilience [6]
- Fast-trip settings achieve substantial risk reduction at one-tenth the cost of undergrounding [7(17),14(18)]
- AI early detection systems contain fires at 3 acres vs. potential large-scale events [9]

The Imperative Is Urgent:

Climate change continues to intensify wildfire risk while utility liability exposure threatens financial stability. Fragmented approaches have proven inadequate; integration is not optional but essential.

The Path Is Proven:

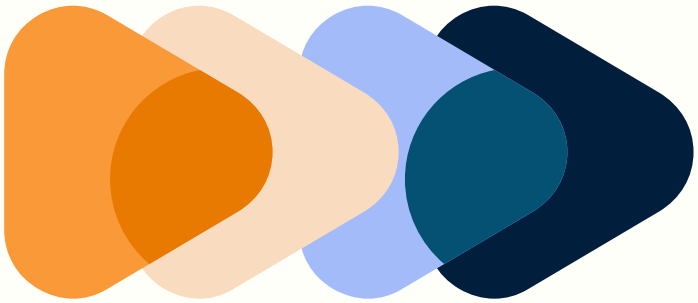
Leading utilities demonstrate measurable success. NARUC's comprehensive seven-area framework provides a regulatory structure. The Prevention First philosophy offers implementation guidance. Technology solutions exist and deliver results.

The Choice Is Clear:

Utilities and regulators who embrace integrated platforms and demonstrate both risk reduction effectiveness and cost efficiency will lead the industry forward. Those who resist change or pursue expensive approaches without demonstrated value will face increasing regulatory scrutiny, customer resistance, and continued wildfire risk.

The technology exists.

The frameworks are established. The results are proven. The question is not whether to act, but how quickly the industry will move from fragmentation to integration, from reaction to prevention, from hope to certainty.



Key References

[1] AspenTech. (2024). "Wildfire Response through Advanced Utility Control Room Technology." https://www.aspentech.com/en/resources/blog/wildfire-response-through-advanced-utility-control-room-technology

[2] CalMatters. (2024). "Californians Pay Billions for Power Companies' Wildfire Prevention Efforts." https://calmatters.org/environment/2024/12/pge-utilities-wildfire-prevention-customer-bills-california/

[3] California Public Advocates Office. (2024). "2023-2024 Wildfire-Related Cost Increases." https://www.publicadvocates.cpuc.ca.gov/press-room/reports-and-analyses/wildfire-cost-increases-of-california-electric-ious

[4] National Association of Regulatory Utility Commissioners (NARUC). (2025). "Wildfire Workbook: Guidance for Utility Regulators - Introduction." November 2025.

[5] AiDASH, Technosylva, Schneider Electric, et al. (2025). "Prevention First Wildfire Mitigation: A Unified Approach to Grid Resilience."

[6] Technosylva. (2024). "Wildfire Mitigation and Management Solutions." https://technosylva.com/

[7] PG&E. (2024). "Joint IOU Grid Hardening Working Group Report." https://www.pge.com/assets/pge/docs/outages-and-safety/outage-preparedness-and-support/aci-25u-03-continuation-of-grid-hardening-joint-studies.pdf

[8] UC Berkeley Energy Institute. (2024). "Dynamic Grid Management Technologies Reduce Wildfire Risk." Working Paper 347R. https://haas.berkeley.edu/wp-content/uploads/WP347.pdf

[9] Renewable Energy World. (2025). "Utilities Lining Up with AI-Powered Wildfire Detection Startup." https://www.renewableenergyworld.com/news/15-utilities-are-already-using-an-ai-powered-wildfire-detection-startup-that-just-raised-another-44m/

[10] AiDASH. (2024). "Full Stack Platform for Grid Inspection and Monitoring." https://www.aidash.com/news/aidash-launches-first-of-its-kind-full-stack-platform-for-grid-inspection-and-monitoring/

[11] PG&E. (2024). "2025 Wildfire Mitigation Plan Update." https://www.pge.com/assets/pge/docs/outages-and-safety/outage-preparedness-and-support/pge-wmp-r0-update-040224.pdf

[12] The Mosaic Company. (2025). From Reaction to Resilience: How Utilities Are Reinventing Wildfire Strategy. https://themosaiccompany.com/our-thinking/from-reaction-to-resilience-how-utilities-are-reinventing-wildfire-strategy

[13] UP42. (2024). "LiDAR, Drones, and Satellites: What Technology Works Best for Vegetation Management?" https://up42.com/blog/lidar-drones-and-satellites-what-technology-works-best-for-your-vegetation

[14] Overstory. (2024). "Choosing the Best Remote Sensing Tool for Vegetation Management." https://www.overstory.com/blog/comparing-remote-sensing-tools

[15] National Association of Regulatory Utility Commissioners (NARUC). (2025). "Wildfire Workbook Chapter Two: Mitigation Measures." November 2025.

[16] The Plumas Sun. (2025). "PG&E Wildfire Mitigation Plan Builds Layers of Protection." https://plumassun.org/2025/04/16/pge-wildfire-mitigation-plan-builds-layers-of-protection/

[17] UC Berkeley Energy Institute Blog. (2024). "Your Electricity Bill on (Wild)Fire." https://energyathaas.wordpress.com/2024/08/26/your-electricity-bill-on-wildfire/

[18] UC Berkeley Energy Institute Blog. (2024). "Your Electricity Bill on (Wild)Fire." https://energyathaas.wordpress.com/2024/08/26/your-electricity-bill-on-wildfire/

[19] Scenic America. (2025). "Undergrounding Case Study: Pacific Gas & Electric." https://www.scenic.org/take-action/resources/undergrounding-resources/undergrounding-resources-and-white-papers/undergrounding-case-study-pacific-gas-electric-pge/

[20] eSmart Systems. (2025). How utilities can reduce grid-related wildfires with AI-powered proactive insights. https://www.esmartsystems.com/news-and-resources/how-utilities-can-reduce-grid-related-wildfires-with-ai-powered-proactive-insights-2/

[21] MIT Technology Review. (2024). "2024 Climate Tech Companies: Pano AI." https://www.technologyreview.com/2024/10/01/1104375/2024-climate-tech-companies-pano-ai-fire-detecting-ai/

[22] Xcel Energy. (2025). "Xcel Energy Brings AI-Driven Wildfire Detection to Minnesota." https://newsroom.xcelenergy.com/news/xcel-energy-brings-ai-driven-wildfire-detection-to-minnesota

[23] NASA. (2024). "Ames Partnerships Office Annual Report 2024." https://www.nasa.gov/ames-partnerships-office-annual-report-2024/

[24] Electric Power Research Institute (EPRI). (2023). Smoke Detection Cameras, Wildfire Mitigation Technologies Database, Environmental Monitoring. https://distribution.epri.com/wildfire/public/wildfire-tech-database/environmental-monitoring/smoke-detection-cameras/

[25] Austin Energy. (2024). "Austin Energy Announces 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

[26] Renewable Energy World. (2025). "Utilities Lining Up with AI-Powered Wildfire Detection Startup." https://www.renewableenergyworld.com/news/15-utilities-are-already-using-an-ai-powered-wildfire-detection-startup-that-just-raised-another-44m/

[27] San Diego Union-Tribune. (2024). Ramona news briefs: Delphire fire detection device saw action for the first time. January 9, 2024. https://www.sandiegouniontribune.com/2024/01/09/ramona-news-briefs-delphire-fire-detection-device-saw-action-for-the-first-time/

[28] California Public Utilities Commission. (2024). "Wildfire and Wildfire Safety Overview." https://www.cpuc.ca.gov/industries-and-topics/wildfires

[29] California Public Utilities Commission. (2024). "Implementation of Wildfire Mitigation Plans Dashboard." https://www.cpuc.ca.gov/about-cpuc/divisions/safety-policy-division/wildfire-and-safety-performance/implementation-of-wildfire-mitigation-plans

[30] National Association of Regulatory Utility Commissioners (NARUC). (2025). "Wildfire Workbook Chapter One: Risk Assessment and Mitigation Planning." November 2025.

[31] Canary Media. (2024)."California Lawmakers Punt on Utility Bill Crisis." https://www.canarymedia.com/articles/utilities/california-lawmakers-punt-on-chances-to-deal-with-utility-bill-crisis

co-authored by the Prevention-First wildfire partnership