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Pacific Northwest NATIONAL LABORATORY

PROVING IT WORKS

Building the Multi-Technology Framework and Evidence Base for Grid-Induced Wildfire Ignition Reduction and Hazard Resilience

IN COLLABORATION WITH THE GRID RESILIENCE NETWORK

AiDASH · BURNBOT · eSmart SYSTEMS · FNN · Gridware · OroraTech USA · PANO · Schneider Electric · technosylva



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01

The Technology Evaluation Imperative

Over the past decade, the electric power sector has been navigating an unprecedented operational, financial, and regulatory transformation driven by the escalating threat of wildfires. Electrical grids present a bidirectional risk profile where utility assets are highly vulnerable to destruction from advancing fire fronts, yet they are also a primary ignition source during periods of elevated fire weather. Under an evolving risk environment, utilities increasingly face regulatory mandates, financial liabilities, insurability challenges, reliability performance impacts, infrastructure damage, investor and customer demands, community safety considerations, and beyond. In response, grid operators and planners have implemented numerous types of advanced technologies to reduce the probability of a grid-caused ignition, minimize the potential impact in the event of an ignition, and increase the resilience of utility infrastructure to wildfires and other hazards. An analysis of major utility Wildfire Mitigation Plans (WMPs) reveals millions to billions of dollars per utility in committed spending on hazard reduction and infrastructure protection, with capital expenditures representing 55–86% of mitigation spending.[1]

[1] Kincaid, J.B., D.S. Boff, D.W. Powell, K.G. Abernethy-Cannella, S. Nagaraja Sudhakar, and R.S. O'Neil. (2026a). *The Burn Rate: How Wildfire Impacts Energy Affordability.* PNNL-SA-223453, Richland, WA, USA, Pacific Northwest National Laboratory. Available online, https://www.pnnl.gov/sites/default/files/media/file/Burn%20Rate%20Full%20Analysis.pdf



As the first major wave of wildfire risk mitigation technology deployments matures, all utility types are approaching a critical inflection point. The foundational thesis of a contemporary electric grid wildfire strategy has shifted—the primary challenge is less about establishing the baseline case for technology integration and more about quantifying the effectiveness of single and multiple combinations of integrated technologies, particularly with respect to risk reduction, system resilience, and affordability.

Utilities, regulators, governing bodies, and ratepayer advocates need evidence of which technologies work, under what conditions, and whether their benefits justify their lifecycle costs. The central question is: *For a given utility, which technology portfolio delivers the greatest measurable reduction in wildfire ignition likelihood and consequences within lifecycle budget and operational constraints, while meeting safety, reliability, resilience, and regulatory or governance requirements?* Answering this question requires evaluating the incremental and combined benefits of technologies, the risk remaining after mitigation, and tradeoffs among protection, service continuity, and affordability. This paper examines the available evidence, identifies gaps requiring further validation, and proposes a multi-technology effectiveness framework tailored to diverse utility risk profiles. It also examines how data interoperability and secure, governed data sharing through federated systems can support consistent analysis and ongoing performance verification.

The presented multi-technology wildfire risk mitigation framework is a preliminary analytical and testing approach. While the framework will mature, it does not provide a universal technology ranking or demonstrate the effectiveness of every proposed combination across different geographies and utility types. Its value is to make the investment logic explicit, identify evidence gaps, and connect each spending decision to measurable changes in risk and service outcomes. Success is a portfolio that delivers sustained protection within the utility's financial, operational, and governance constraints. Generally, leaders in this space should consider the following:

01

A defined baseline and an estimate of the risk remaining after mitigation, using comparable weather, asset, and operating conditions.

02

Evidence of the value a given technology contributes to the existing risk mitigation portfolio, including dependencies, synergies, overlaps, and everyday service benefits.

03

Separate utility, customer, and societal evaluations, supported by lifecycle costs, annual financial impacts to the utility and customer, and the distribution of benefits and burdens.

04

Progressive testing, interoperable data, and ongoing performance reviews that support decisions to expand, modify, replace, or retire investments.

02

Wildfire Risk Intelligence Ecosystem

The framework treats wildfire risk mitigation technologies as components of a *Wildfire Risk Intelligence Ecosystem*. This ecosystem aims to connect, interface, and exchange information amongst major risk mitigation technology classes, such as physical grid operations, asset health, grid hardening measures, weather and environmental conditions, vegetation and fuel conditions, fire behavior, risk models, consequence analysis, situational awareness, operational decisions, field actions, and continuous performance verification across multiple technology platforms, utility systems, field technologies, government data sources, and partner organizations. The fundamental notion is that the components in the wildfire risk intelligence ecosystem can move beyond the benefit of their individual functions to enable a greater risk mitigation, situational awareness, and resilience by existing in an integrated system.While this doesn't necessarily require a single software platform, it does require an interoperable data standard, consistent governance, documented workflows, and transparent methods for evaluating benefits, such that implemented technologies do not exist in isolation. A general classification of technologies operating within this space falls into six classes designed to characterize hazards, reduce vulnerabilities, and provide situational awareness (Figure 1).

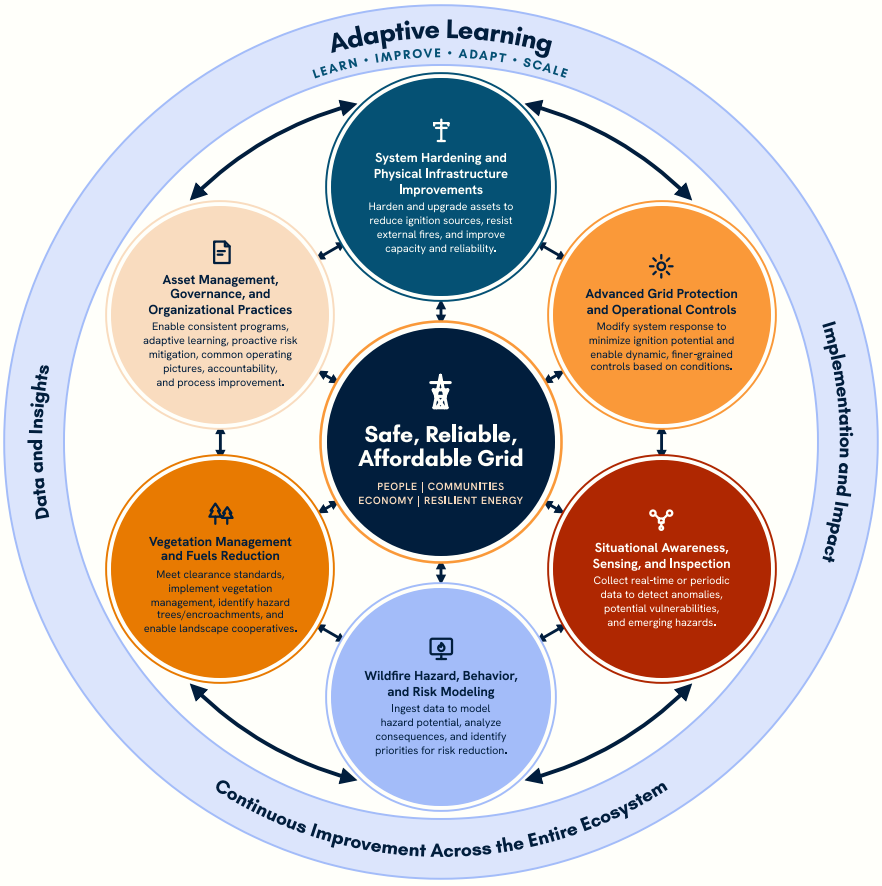


Figure 1. Six major technology classes of the wildfire risk intelligence ecosystem, where interoperability and data integration between technologies are key objectives for improved wildfire risk reduction under continually changing conditions.

03

Establishing a Multi-Technology Effectiveness Framework

While the integration of multiple risk mitigation technology classes into a wildfire risk intelligence ecosystem is theorized to provide a greater benefit, numerous individual technologies are included in each class, and each of these technologies will have its own quantifiable effectiveness for risk mitigation. The challenge is to establish an evaluation framework where measures of effectiveness goes beyond that of an individual technology, but to understand how and what technologies work best together to achieve a greater level of mitigation with an explicit consideration of the costs to implement.

Further, to quantify multi-technology wildfire risk reduction effectively, evaluation frameworks cannot assume a monolithic utility structure. The electric utility sector is highly diverse, encompassing transmission-only or investor-owned utilities (IOUs) that manage tens of thousands of transmission miles, alongside small municipal operations and rural cooperatives with strictly constrained investment capabilities.

Consequently, evaluating single and multiple technology mixes requires an approach that accounts for utility size and operating structure, operational risk environment, risk tolerance, regulatory controls, insurance requirements, investment capacity, and more. The fundamental notion is that utilities differ across many dimensions; therefore, the technology implementations that maximize risk reduction and minimize cost will also comprise unique solutions.

Establishing a transparent technology effectiveness pathway enables utilities, regulators, policymakers, and stakeholders to comprehensively evaluate grid-focused wildfire-mitigation technologies.

There are a series of requirements needed to structure the process (Figure 2):

01 Technology Portfolio Definition
The outcome should quantify the incremental and cumulative effects of technology combinations.

02 Utility-Specific Conditions
Utilities are unique in many dimensions; therefore, the framework needs to leverage utility-specific conditions for technology portfolio optimization.

03 Effectiveness Modeling and Analysis
The framework requires a design life per technology for comparison of lifecycle costs to expected wildfire-risk reduction. This comparison of lifecycle costs can be considered under dynamic projected risk conditions mapped to the technology design life, rather than based solely on historical-to-current conditions.

04 Lifecycle Cost Evaluation
System resilience, reliability, affordability, and utility, customer, and societal equity impacts need to be assessed under a set of common and accessible metrics.

05 Multi-Dimensional Impact Assessment
In the context of technology combinations, interoperability requirements and standards need to be established among data, modeling, operational systems, and financial outcomes.

06 Testing and Deployment Pathway
Individual and combinations of technologies (i.e., technology portfolios) need to be tested through virtual, controlled physical, pilot, regional, and utility-wide deployment stages.



Figure 2. Parameters for establishing a multi-technology effectiveness pathway to reduce wildfire risk on the electric grid.

To meet these requirements and develop a repeatable technology effectiveness process, linkages between investments and measurable changes in risk need to be established. Given the number of technology classes and the array of technologies available for each, this process quickly becomes complex, especially when technologies are implemented in collaboration. For example, implementing technologies for fire detection and response time alongside fire spread analysis and vegetation management requires common metrics and evaluation of the combined outcomes of multiple technologies against risk, which are likely nonlinear in combination. Further, the deployment of wildfire mitigation technologies depends on both their demonstrated effectiveness and a utility's ability to finance, implement, and sustain them. Regulatory and other governing bodies must balance timely risk reduction, reliable service, utility financial stability, and customer affordability. For investor-owned utilities, this includes determining which expenditures may be recovered through rates and the authorized return on eligible capital investments. Municipal utilities and cooperatives face related investment and affordability decisions through their applicable regulatory, governing-board, and financing arrangements.

04

Defensibility of Risk Spending

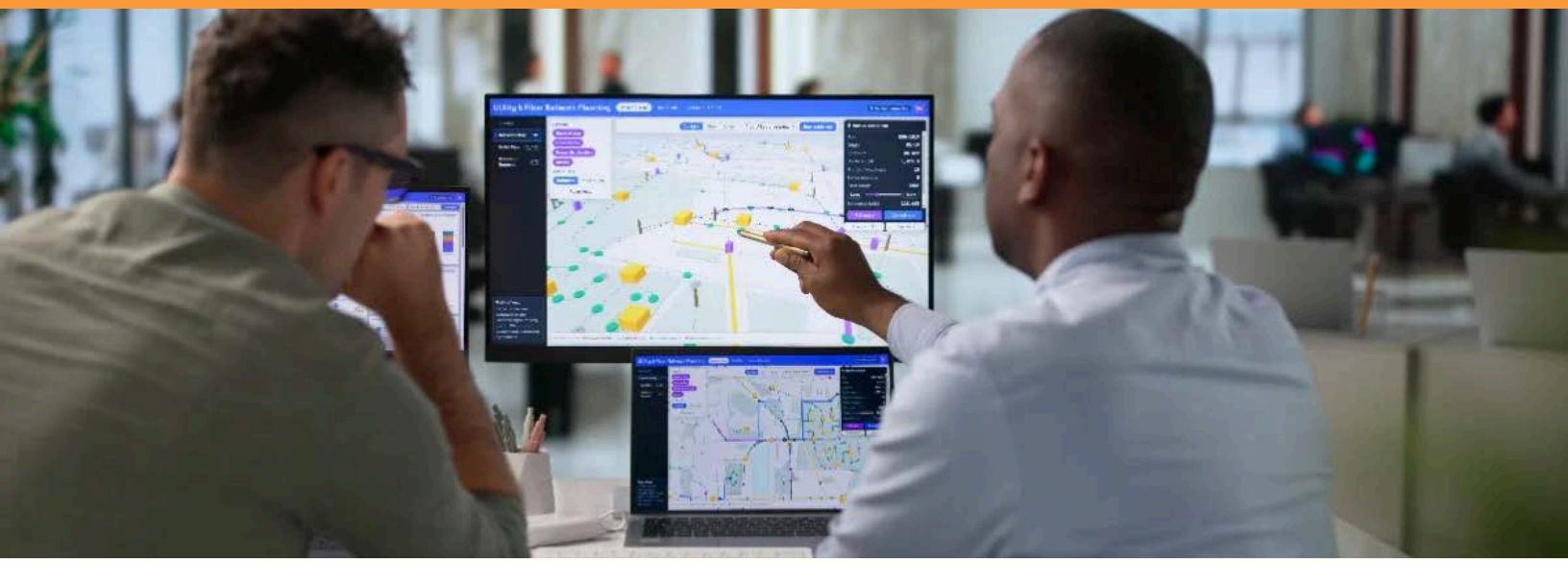
A defensible wildfire risk mitigation investment connects an identified risk to a selected intervention, explains why that intervention is appropriate relative to feasible alternatives, and provides a process for verifying its costs and outcomes (see Figure 2, 'Lifecycle Cost Evaluation' and 'Multi-Dimensional Impact Assessment'). For example, if a utility overspends on inefficient mitigations, relies on biased risk-spend efficiency models, or fails to select the least-cost alternative for achieving a mandated safety threshold, regulators, insurers, and others may deem those expenditures imprudent and disallow rate recovery or exert external pressure, forcing adjustments to absorb and defend the financial loss. Evaluating a wildfire mitigation technology portfolio requires explicitly defining whose costs, benefits, and risks are being assessed. Wildfire-related costs extend beyond technology acquisition and operation to include insurance, financing, customer interruptions, public expenditures, and broader community losses. A technology portfolio may 1) reduce expected wildfire losses while increasing near-term electricity bills, or 2) improve utility financial stability while leaving substantial risks to customers and communities. Therefore, the proposed framework evaluates technology portfolios through three complementary perspectives: utility, customer, and society, in part to avoid double-counting benefits or consequences and to understand equitable investments (Table 1). Together, these three evaluation perspectives drive towards a more complete investment decision. The utility perspective establishes the ability to deliver and sustain the mitigation, the customer perspective evaluates affordability and service outcomes, and the societal perspective assesses the broader reduction in harm. A technology portfolio selection can then account for these findings alongside mandatory safety requirements, acceptable residual risk, implementation constraints, and community priorities.



Table 1. Three technology and investment evaluation perspectives to consider for costs, benefits, and measures.

EVALUATION PERSPECTIVE	PRIMARY EVALUATION QUESTION	POSSIBLE COSTS, BENEFITS, AND MEASURES
Utility	Can the utility finance, implement, and sustain the portfolio while reducing its operational and financial exposure?	Capital and operating expenditures; implementation, integration, and replacement costs; avoided asset damage and restoration expenses; retained wildfire liability; insurance costs and coverage; financing requirements; and liquidity. Supporting measures include lifecycle cost, utility financial benefits, residual exposure, and annual cash requirements.
Customer	How does the portfolio affect the affordability, reliability, and resilience of electric service for different customers?	Changes in electricity bills; customer expenditures for backup power or other protective measures; avoided or additional interruption losses; continuity of critical services; and access to mitigation benefits. Supporting measures include annual bill changes by customer class, interruption frequency and duration, critical-load hours served, and the distribution of benefits and burdens across customer groups.
Societal	Does the portfolio reduce total wildfire-related harm and resource costs across the affected population and environment?	Mitigation resource costs; avoided fatalities, injuries, property losses, smoke-related health impacts, environmental damage, and business disruption; and changes in emergency response and recovery resource needs. Supporting measures include total net economic benefit, residual wildfire consequences, community resilience, and outcomes that cannot be monetized reliably.





05

A Multi-Technology Effectiveness Model

Building on established methods, we outline a multi-scale (spatial and temporal) single- and multi-technology effectiveness model. An individual technology may offer a substantial benefit, but its value within a portfolio depends on where it is deployed, which part of the wildfire sequence it addresses, and how it interacts with other investments. We propose a preliminary model for evaluating these relationships across geographic areas and planning periods. The model connects the likelihood and consequences of a utility-related wildfire with the costs and benefits of mitigation. It considers both individual technologies and combinations of technologies across prevention, detection, response, and service continuity. Economic measures support the comparison, while safety, reliability, implementation requirements, and other utility priorities help determine which portfolios are suitable for deployment. The goal then is to understand the cumulative benefits of multiple technology integrations across the wildfire lifecycle, for example, as shown through limited subset of possible technology combinations illustrated in Table 2.

Further, the implementation of combined wildfire risk mitigation technologies may also realize benefits for other types of hazards (i.e., wind and ice storms) as well as benefits in everyday reliability and performance. The multi-technology effectiveness model consists of eight elements including baseline wildfire risk, portfolio risk reduction, lifecycle cost, benefit-cost ratio, incremental technology benefit, technology interactions, portfolio optimization, and multi-criteria evaluation (Figure 3). Together, they connect the physical effects of mitigation to the cost, feasibility, and broader consequences of an investment decision. The approach builds on risk-spend efficiency, which relates risk reduction to spending, and established benefit-cost practices.

Table 2. An example subset of technology interactions where synergies and overlaps may be identified to maximize risk mitigation effectiveness in concert with benefit-cost ratios. Note that benefits are theorized outcomes to test, not established effectiveness claims.

TECHNOLOGY COMBINATION	BENEFIT TO INVESTIGATE	EVIDENCE REQUIRED
Weather stations + wildfire risk model + adaptive protection	Improved local observations and risk forecasts support more targeted protection settings. Potential synergy includes reduced ignition exposure while limiting unnecessary customer interruptions.	Weather-data accuracy and availability; forecast performance; protection-setting and fault-clearing records; and ignition exposure and interruption outcomes under comparable weather and operating conditions.
LiDAR + remote sensing vegetation analytics + asset management	Integrated detection, prioritization, work execution, and verification to improve vegetation-management spend efficiency. Potential benefits include fewer vegetation-related faults, outages, and ignition opportunities with the best use of available resources.	Vegetation-detection accuracy; clearance and hazard-tree assessments; integration of completed and verified work orders; maintenance costs; and changes in vegetation-related faults and outages relative to a comparable baseline.
Asset health monitoring + risk-based maintenance + system hardening	Asset health information improves maintenance and strategic capital-investment targeting. Potential synergy includes preventing equipment failures, reducing ignition exposure, and improving service reliability.	Detection accuracy and warning time; documented maintenance responses; asset-condition changes; failure and outage rates; and incremental risk reduction and lifecycle costs compared with existing maintenance and hardening practices.
Covered conductor + remote sensing vegetation analytics + vegetation management	For distribution systems, complementary and overlapping reductions in vegetation-contact ignition risk. Vegetation analytics identifies areas of risk and management reduces contact opportunities, while covered conductor may reduce the likelihood that certain contacts produce faults or ignitions. Covered conductors are valuable for areas in which vegetation risk is outside of the right-of-way and unable to be managed.	Contact and fault records; conductor condition and installation characteristics; vegetation-treatment effectiveness; and estimates of residual risk with each measure separately and both together, accounting for shared benefits.
Smoke detection cameras + satellite hot spot or smoke detection + system fault detection	Complementary oblique and overhead coverage may improve detection speed and reliability across terrain, viewing conditions, and observation intervals, particularly when coupled with system-fault location. Overlapping coverage may provide confirmation, but its incremental value depends on the response workflow.	Detection latency; coverage gaps; false-alarm and missed-detection rates; day/night and adverse-condition performance; communications availability; and time from detection through verification, notification, and response.
PSPS + EPSS + sectionalization + microgrids + weather forecasting + wildfire risk model	Coordinated de-energization and local service continuity may reduce ignition exposure while limiting the number of customers interrupted and maintaining critical services. Layering in weather forecasting and associated daily wildfire risk models enables data-informed decision-making for de-energization.	De-energization boundaries and timing; residual ignition exposure; cost of avoided ignition; successful electrical isolation and islanding; customer interruption hours; critical-load hours served; restoration performance; and total portfolio cost.

Table 2 (continued)

TECHNOLOGY COMBINATION	BENEFIT TO INVESTIGATE	EVIDENCE REQUIRED
Dynamic line ratings + conductor monitoring + wildfire-aware operating controls	Improved utilization during ordinary conditions and better management of thermal or clearance risks during hazardous conditions. Benefits depend on how monitoring information changes operating decisions.	Conductor temperature and clearance; monitoring accuracy and availability; operating limits and dispatch actions; and thermal, clearance, and modeled ignition exposure under comparable loading and environmental conditions.
Power-flow controls + topology optimization + wildfire risk model	Coordinated operating decisions may redirect flows away from exposed corridors, reduce operating stress, and maintain service during protective actions. Everyday benefits may include improved grid utilization and reduced congestion.	System-wide power-flow and contingency analysis; forecast performance under specific wildfire risk conditions; control and switching records; changes in corridor loading and residual risk; congestion costs; and unserved energy, including effects on alternative power-flow paths.
Sectionalization + mobile storage or microgrids	Local supply may maintain critical services while hazardous upstream equipment remains de-energized. Where operationally feasible, shared use of these resources may also support routine grid services.	Islanding and black-start performance; critical-load hours served; storage power, energy, and state of charge; deployment and connection time; availability during simultaneous events; and lifecycle costs across intended uses.
Utility vegetation management + adjoining-landowner fuel treatments + wildfire risk model	Coordinated treatments may reduce vegetation hazards and fire-spread exposure beyond the right-of-way, improving protection of utility assets and surrounding communities. Shared planning and execution may reduce delivery costs.	Treatment location, condition, and maintenance requirements; landowner participation; modeled or observed fire behavior; changes in asset and community exposure; implementation costs; and attribution of benefits across participating entities.
Energy-efficiency programs + targeted building resilience measures	Coordinated measures may lower energy use and customer bills while reducing selected consequences of smoke exposure or outages. Benefits depend on the specific building measures and participating customer needs.	Measure-specific energy savings; indoor-air-quality or thermal-performance data where relevant; performance during outages; participation and benefit distribution; incremental program costs; and allocation of benefits across programs.

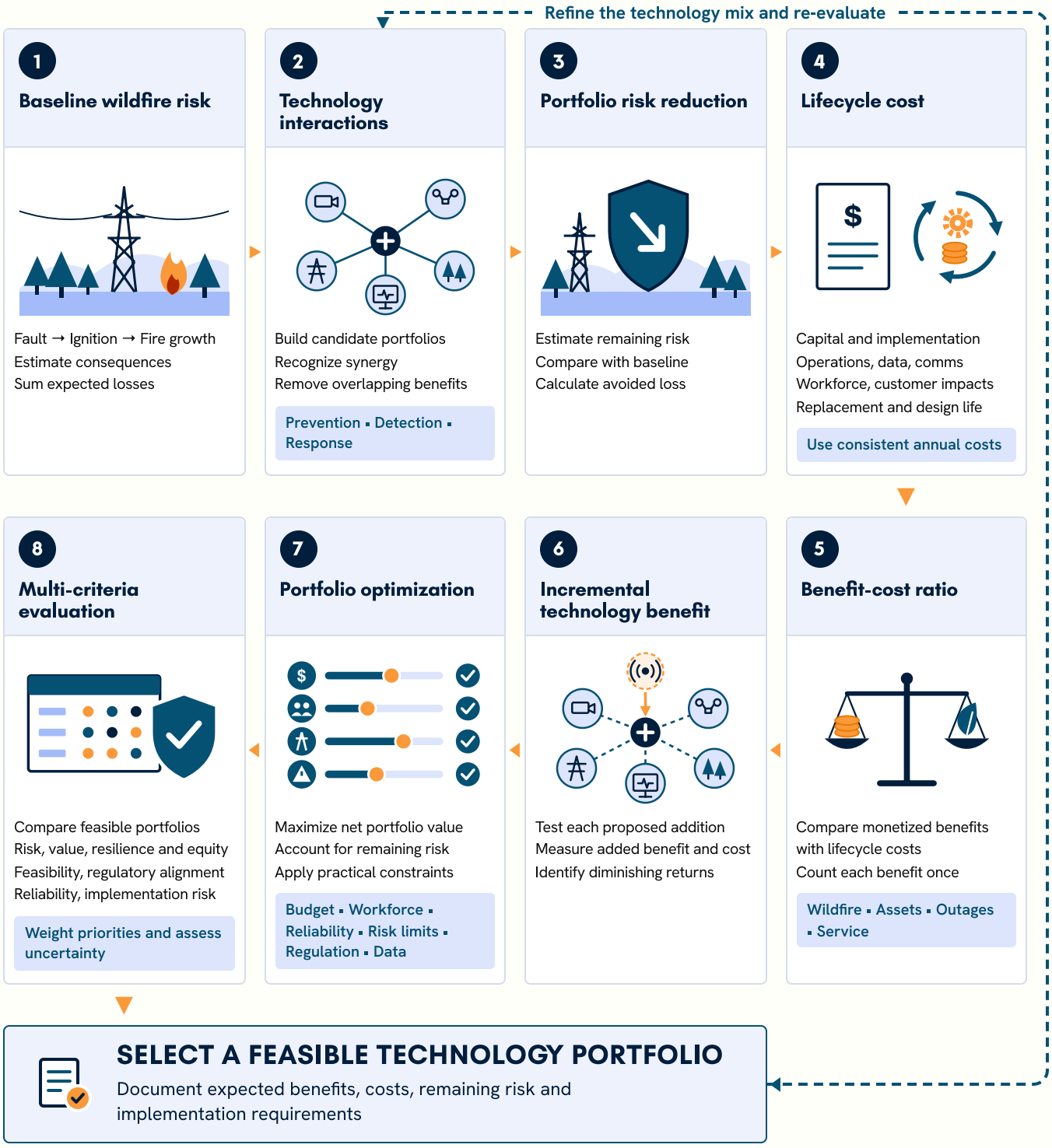
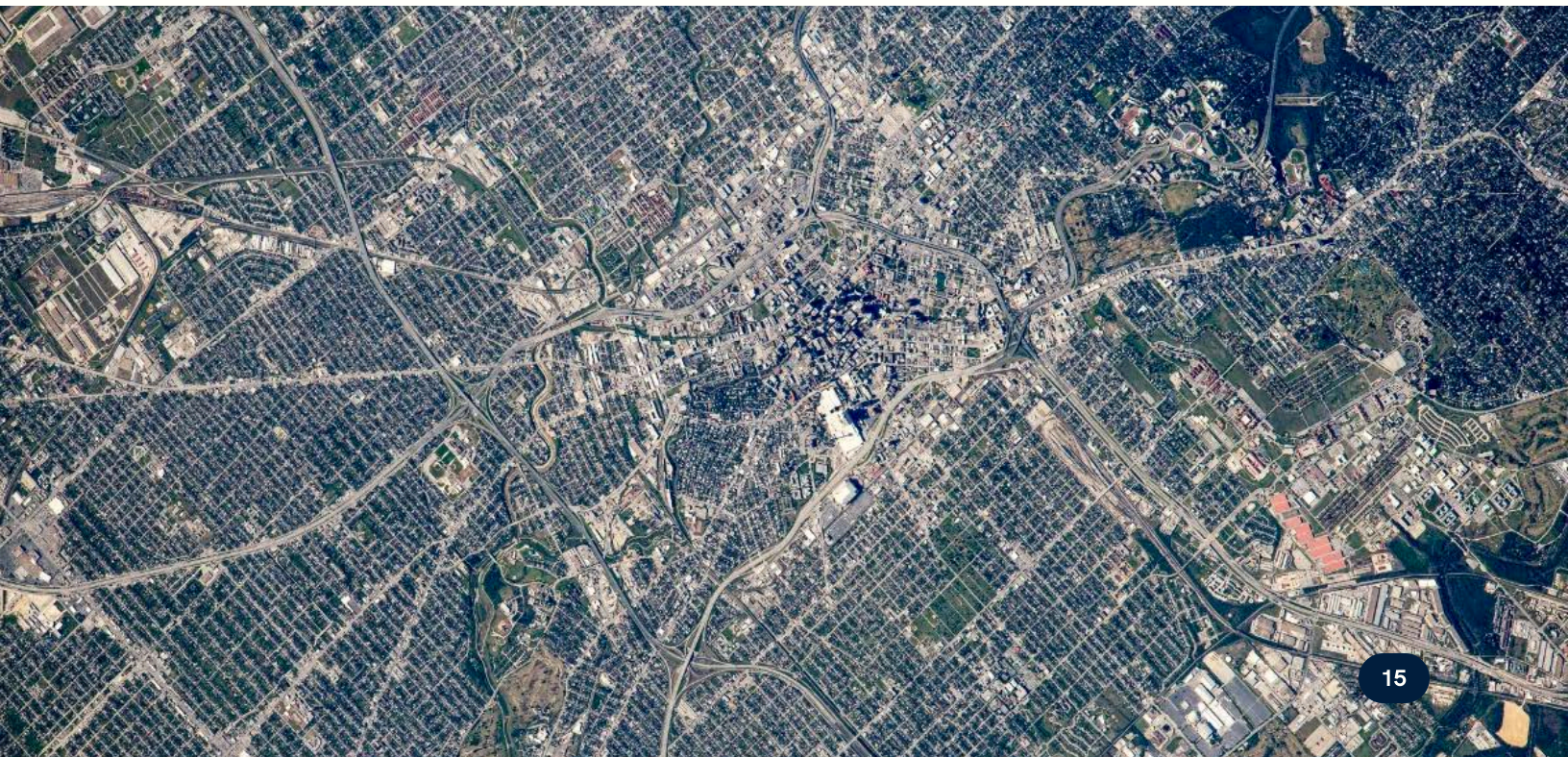


Figure 3. Eight elements of the multi-technology effectiveness model.

06

Interoperability and Semantic Standards

Beyond an optimized selection of technologies for a given utility to achieve a maximum risk reduction for the cost, there is an imperative around system and data integration to drive towards the wildfire risk intelligence ecosystem. Data fragmentation, rather than a lack of data, is a key hurdle in quantifying risk reduction. Translating diverse technical data into actual risk reduction requires synthesizing these fragmented streams into a unified picture that drives executive decision-making under a common operating picture. Accurately developing risk profiles and calculating metrics like benefit-cost ratio means breaking down historical software and technology silos—including Geographic Information Systems (GIS), Outage Management Systems (OMS), and Supervisory Control and Data Acquisition (SCADA), Advanced Distribution Management System (ADMS), Advanced Metering Infrastructure (AMI), enterprise resource planning (ERP) systems—and then incorporating the additional technology layers that are viable for the utility to meet safety, reliability, and resilience objectives. This requires strict data interoperability via a system-of-systems architecture built on a federated system using a Common Information Model (CIM). By leveraging CIM-compliant architectures and secure protocols, utilities have the opportunity to prevent catastrophic data bottlenecks during active wildfire or other hazard events. This integration ensures that, for example, an anomaly detected by a remote line sensor can be mapped to its exact location, evaluated against current satellite-derived vegetation, asset health, and current wildfire risk profiles, and immediately presented to an operator with a data-informed recommendation for line de-energization.



07

Building Evidence Through Five Stages of Deployment

Considering the last stage of the multi-technology effectiveness pathway (see Figure 2, 'Testing and Deployment Pathway'), we propose a five-stage pathway that progressively tests the technical, economic, and operational case for a portfolio (Table 3). Each stage addresses a different uncertainty: whether the concept is promising, whether its components work, whether it performs in service, whether results transfer, and whether benefits persist at scale. Findings should feed back into the model and the next investment decision. As utilities navigate the complex intersection of engineering physics, safety and protection, regulatory economics, insurability requirements, credit ratings, ratepayer demands, and legal liability, building a comprehensive and defensible evidence map is paramount. The current technological landscape varies widely in empirical maturity. A robust evaluation process must be implemented to regularly evaluate technologies across scales, from their theoretical capabilities, pilot-scale success, and at-scale capacity, so as to improve information around the inputs of an ignition risk equation, minimize impacts in the event of a positive ignition, and refine quantified metrics within a risk-based framework. The evidence base is reasonably robust for physical hardening and growing for advanced grid protection and operational controls, but more nascent for situational awareness, sensing and inspection, wildfire hazard, behavior and risk modeling, and vegetation management and fuels reduction. Utilities struggle to quantify the specific ignition reductions generated by risk-mitigation approaches beyond regulatory minimums, where they apply, and industry-accepted practices, which complicates the more rigorous cost-benefit ratio justifications required for investments.



Table 3. The five-stage scale-up of a multi-technology effectiveness framework for wildfire risk mitigation.

STAGE	CORE EVALUATION	DECISION SUPPORTED
1 **Virtual test bed**	Model representative assets, circuits, vegetation, fuels, weather, costs, and customer consequences. Test faults and operating scenarios using probabilistic and sensitivity analyses.	Identify promising portfolios, residual risk, dependencies, and evidence gaps.
2 **Controlled physical test bed**	Test protection response, sensors, communications, inspection workflows, data exchange, cybersecurity, and field verification under managed conditions.	Determine whether technical performance and interoperability support an operational pilot.
3 **Limited operational pilot**	Deploy in selected areas with clear hypotheses, baseline and post-deployment metrics, comparison groups where feasible, cost tracking, and independent review.	Modify, expand, or terminate the pilot based on risk, service, cost, and readiness evidence.
4 **Regional or programmatic scale-up**	Evaluate repeatability across asset types, terrain, weather, workforce conditions, and customer populations.	Confirm that incremental benefits and economics remain acceptable beyond the original pilot.
5 **Utility-wide deployment and evaluation**	Integrate into capital and operating plans, report realized benefits annually, review data quality, recalibrate models, and reassess portfolios every one to three years.	Continue, refine, replace, redesign, or retire technologies as performance and conditions change.



08

Conclusion and Path Forward

The objective of wildfire risk mitigation for the electric utility sector should be the deployment of an optimized, interoperable, utility-specific technology portfolio that produces demonstrable reductions in ignition probability, wildfire consequence, and system vulnerability. Technology effectiveness should be evaluated through the relationship between measurable wildfire risk reduction, service continuity, and the total cost borne by utilities, customers, and communities. A technology portfolio may reduce ignition probability while increasing interruption burdens or near-term electricity bills; another may provide both wildfire protection and benefits during normal operations. The evaluation framework should therefore report residual risk, lifecycle economic value, customer bill impacts, and the distribution of benefits and burdens separately. Financial mechanisms that redistribute losses should be distinguished from technologies and operational practices that reduce the underlying likelihood or consequences of wildfire.

A preliminary model formulation has been established, building upon the merits of risk-spend efficiency, benefit-cost ratios, and others. The formulation expands upon the role of different technology interactions and their integrated multi-technology effectiveness; multi-criteria optimization with real-world constraints to help understand technology synergies, overlaps, shared costs, and diminishing returns; evaluation perspectives across varying utility archetypes, their customers, and broader society to avoid double-counting of benefits or consequences; and connections across physical, economics/affordability, and system reliability and resilience.

As the industry moves forward, establishing, testing, accepting, and adhering to standardized data frameworks, interoperability standards, and transparent benefit-cost evaluations will be the dividing line between imprudent spending and defensible, rate-recoverable resilience. By evaluating solutions across utility, customer, and societal perspectives, stakeholders can forge a grid capable of withstanding the escalating extremes of the wildfire threat. This, however, requires the cooperation of technology providers, utilities, and researchers alike to set up and provide the evidence required to build, interoperate, mature, validate, and scale a next-generation evaluation of integrated multi-technology effectiveness.

Grid Resilience Network



AiDASH

AiDASH is the company leading the PreventionFirst movement for electric utilities and transforming grid resilience through its pioneering platform that unifies vegetation, asset, wildfire, and storm intelligence.

Powered by SatelliteFirst Inspection & Monitoring, AiDASH delivers comprehensive visibility across the entire grid at the right frequency and budget, using the right data modality. More than 200 customers trust AiDASH to keep the lights on, spend where it counts, and defend every decision, Securing Tomorrow across every mile of the grid.

BurnBot

BurnBot delivers scalable, precision fuels management to protect homes, infrastructure, and landscapes—before disaster strikes. Its remote-operated RX system applies prescribed fire inside an enclosed chamber with minimal smoke and escape risk, widening the windows when treatment can safely happen, including near power lines and communities.

Together with remote mastication and timber services and real-time mapping and telemetry, BurnBot gives utilities and land managers end-to-end fuel treatment at the pace wildfire risk demands.

eSmart Systems

eSmart Systems helps utilities transform visual inspection data into actionable grid intelligence. Through its Grid Vision platform, the company combines computer vision, AI, and utility expertise to deliver insights on asset condition, vegetation risk, and network health at scale.

By creating a digital representation of the grid from imagery, eSmart Systems enables more informed resilience planning, investment prioritization, and operational decision-making. Utilities across North America and Europe use eSmart Systems to measure risk, target interventions, improve reliability, and maximize the value of infrastructure investments while building a stronger, more resilient grid.

FNN

Fire Neural Network™ (FNN™) delivers patented, proprietary AI-powered High-Risk-Lightning™ intelligence that helps utilities identify lightning events capable of damaging power infrastructure, disrupting grid operations, and igniting wildfires.

With detection times reduced from more than 24 hours to just 40 seconds and pinpoint accuracy, FNN™ provides real-time situational awareness, impact analysis, fire mapping, and incident reporting that enable utilities to quickly assess potential threats, prioritize field response, protect critical assets, and mitigate wildfire risk.

Gridware

Gridware's Active Grid Response platform uses pole-mounted Gridscope sensors to monitor electrical, mechanical, and environmental conditions in real time, even during outages. On-device AI detects, locates, and classifies hazards such as equipment faults and vegetation contact so crews can act before problems escalate.

OroraTech

OroraTech is a global leader in space-based thermal intelligence, providing continuous wildfire detection, monitoring, and operational response capabilities. Powered by a proprietary satellite constellation and advanced thermal imaging technology, the company delivers real-time situational awareness, predictive fire-spread modeling, and actionable decision-ready intelligence across the full wildfire lifecycle.

Its operational platform integrates multiple data sources to empower civil protection agencies, forestry managers, utilities, and emergency responders. Looking ahead, OroraTech is building a constellation with hundreds of thermal payloads to achieve 15-minute global revisit times, powering a fire digital twin to protect communities and critical infrastructure worldwide.

Pano AI

Pano AI is the leader in early wildfire detection. Launched in 2020, the company provides advanced AI-powered detection and situational awareness solutions to fire agencies, utilities, governments, and private landholders to help protect people, property, and infrastructure from catastrophic wildfires. With deployments across the U.S., Canada, and Australia, Pano is building a new standard for real-time wildfire intelligence.

Schneider Electric

Schneider Electric is a global energy technology leader, driving efficiency and sustainability by electrifying, automating, and digitalizing industries, businesses, and homes. Our technologies enable buildings, data centers, factories, infrastructure, and grids to operate as open, interconnected ecosystems, enhancing performance, resilience, and sustainability.

Technosylva

Technosylva is the leading provider of wildfire and extreme weather modeling, risk mitigation, and operational response software. Technosylva's market-leading solutions, enhanced by AI and machine learning capabilities, provide real-time and predictive insights into developing wildfire and extreme weather risks to support electric utility, insurance, and government agency customers. Founded in 1997, Technosylva has offices in La Jolla, CA, León, Spain, and Calgary, Canada. Learn more at www.Technosylva.com.

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