Responding to Natural Catastrophes – New Models and Approaches

March 18, 2026

Dan Nuñez
Senior Director
Filsinger Energy Partners
501 S Cherry St
Suite 500
Denver, CO 80246
DanN@filsingerenergy.com

TO: California Earthquake Authority (CEA)

Filsinger Energy Partners (FEP) submitted a white paper in December 2025 pertaining to CEA's Natural Catastrophe Resiliency Study ("the Study"). Since that time, FEP has further articulated additional considerations and refined critical themes on the issue and is submitting this revision as a replacement of our original submission.

The following white paper details the practical efficiency and modernization of wildfire mitigation and resilience frameworks with the following sections:

Section 1 (UPDATED): Clarifying the scope of the Wildfire Fund vs. an all-hazards approach

Section 2 (UPDATED): Elevating the critical role of the Statewide Operational Observer (SOO) as foundational for success

Section 3 (NEW): Advancing the regulatory framework and structure for risk reduction

Section 4 (NEW): Modernizing safety standards by leveraging innovation and technology

California faces a convergence of escalating wildfire risk, rising insurance premiums, expanding utility liability exposure, and growing pressure on ratepayers and local governments. While significant progress has been made in utility mitigation, fuels management, and adoption of new detection technologies, the state's current wildfire-financing structure remains misaligned with the physical and financial risks of climate-driven disasters, including both ignition risk and the accelerating consequences of fire spread. To meet this challenge, California must adopt a more cohesive and risk-responsive catastrophe framework that elevates mitigation, improves transparency, strengthens affordability, and enhances operational coordination across agencies and sectors.

Drawing from FEP' extensive experience supporting utilities in wildfire risk modeling, infrastructure assessment, vegetation inspections, and mitigation planning, this paper outlines a

forward-looking model for California's next generation of catastrophe strategy. Central to this proposal is the creation of a SOO, an independent oversight function designed to ensure that the recommendations emerging from the Study translate into consistent statewide implementation and measurable risk reduction.

1. ***Reimagining the Catastrophe Financing Framework: "Wildfire Fund" to "Holistic Wildfire Fund" (UPDATED)***

   The existing Wildfire Fund was developed to stabilize the utility sector and support victim compensation following utility-caused ignitions. While effective in certain respects, it is not aligned with the broader and evolving landscape of catastrophic risk. Under changing climate conditions, wildfire increasingly produces compounding, multi-hazard impacts that extend beyond direct fire damage. For example, atmospheric river events over wildfire burn scars can significantly increase the likelihood of landslides – impacts that are not currently captured in existing wildfire risk models.

   FEP supports modifying the existing Wildfire Fund to more comprehensively account for the full range of wildfire-related consequences. These include both cascading physical impacts and secondary financial effects, such as smoke damage claims, which are often not reflected in current risk models One example is the financial impact of smoke damage claims. These impacts are often not reflected in current risk models but can have material liability and insurance implications. Even where structures are not directly damaged by fire, prolonged smoke exposure can render properties uninhabitable for extended periods during restoration.

   Expanding the scope of the Wildfire Fund to reflect these broader impacts would enable a more holistic and resilient approach to wildfire risk management through the following approaches:

   1) Improving response and compensation for wildfire-related damages
   2) Diversifying funding sources beyond utilities and ratepayers
   3) Increasing the size of the fund to strengthen response capability
   4) Lowering insurance costs by functioning as a form of reinsurance

   This structure better reflects the interconnected nature of wildfire risk and would enable California to shift from reactive to proactive resiliency planning. Funding could be supported by a broader set of stakeholders, including the state, federal government, utilities, and insurance providers.

2. ***Establishing a Statewide Operational Observer (UPDATED)***

   Implementing these recommendations requires a dedicated entity responsible for overseeing operational deployment, aligning agency efforts, and maintaining statewide situational awareness. The proposed SOO would serve as a neutral, independent function ensuring consistent implementation of the Study recommendations and related catastrophe-resilience initiatives. FEP believes this is critical to enable access to learnings, including new innovations,

standards, processes and procedures from which all of California can benefit. For example, an independent entity could coordinate the sharing of high-resolution forecast models across overlapping public utility districts (PUD) and investor-owned utility (IOU) territories, helping resource-constrained agencies access and benefit from tools they might not otherwise be able to implement.

The SOO's core functions would be to monitor, evaluate, coordinate, and provide necessary transparency and reporting. Large IOUs[1] and publicly-owned utilities (POUs) operate under distinct regulatory structures, governance models, and cost-recovery mechanisms, resulting in uneven risk-mitigation capacity and significant variation in risk exposure across the state. An independent observer would help identify critical gaps, elevate best practices, and provide operational support to utilities whose resources or governance structures limit their ability to implement IOU-level mitigation programs.

IOUs operate under a California Public Utility Commission (CPUC)- and Office of Energy Infrastructure Safety (OEIS)-regulated framework with prescriptive wildfire-mitigation requirements and mandatory Wildfire Fund participation.[2] By contrast, POUs operate under local-governance authority that provides self-certification pathways and distinct statutory responsibilities not subject to CPUC approval.[3] These structural differences shape operational practices and risk-mitigation strategies across the state, influencing resource deployment, inspection cycles, technology adoption, and vegetation management practices.
The SOO's role, therefore, is not to impose a single uniform standard across all utility types but to provide a differentiated yet actionable operational lens – one that recognizes regulatory asymmetry while still enabling statewide coordination where it meaningfully improves resilience. In practice, this means the SOO would calibrate expectations and evaluation criteria by utility category, apply consistent methodologies to align with existing statutory authority, and facilitate structured data and knowledge exchange that enhances visibility without undermining local governance prerogatives.

By identifying implementation gaps within and across both POUs and IOUs, and by clarifying where targeted support, guidance, or alignment is needed, the SOO would help California translate policy direction into real-world performance. It would also provide decisionmakers

---

[1] California's three large IOUs subject to this regulatory framework are Pacific Gas & Electric Company (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E).

[2] IOU wildfire mitigation plan requirements and CPUC/OEIS oversight are established in Cal. Pub. Util. Code § 8386 (as amended by SB 254, Chapter 119, Statutes of 2025), Senate Bill 901 (2018), and Assembly Bill 1054 (2019). The California Wildfire Fund structure and IOU participation requirements are set forth in Cal. Pub. Util. Code Part 6 (commencing with § 3280).

[3] POU wildfire mitigation plan requirements and self-certification processes are governed by Cal. Pub. Util. Code § 8387. POUs operate under local-governance authority established by the California Constitution, which grants them autonomy over municipal affairs including utility operations.

with clear, independent insight into how the state's diverse utility ecosystem contributes to, or is constrained within, the broader catastrophe-readiness posture.

3. ***Advancing the Regulatory Framework and Structure for Risk Reduction (NEW)***
Wildfire mitigation planning, operational execution, regulatory oversight, emergency response, and financial stabilization in California are distributed across multiple agencies and regulatory processes. Utilities must navigate oversight across several institutions, including the OEIS for Wildfire Mitigation Plan (WMP) approval and monitoring, CPUC for safety enforcement and ratemaking, and coordination with the California Department of Forestry and Fire Protection ("CAL FIRE") and the California Governor's Office of Emergency Services ("Cal OES") for fire and emergency response. Financial stabilization mechanisms, including the Wildfire Fund, introduce an additional governance dimension linking safety certification and liability exposure, to which only a subset of utilities currently have access.

While each institution performs a defined statutory role, the distribution of responsibilities across multiple agencies can create fragmentation across policy development, operational oversight, implementation, financial recovery, thereby slowing the pace of risk reduction. As wildfire mitigation programs have expanded in scale and complexity, utilities increasingly face overlapping reporting requirements and regulatory review processes. This increases administrative burden and compliance costs, while complicating the alignment between safety objectives and financial recovery mechanisms. In today's reality of climate change, these regulatory processes must evolve to match the pace at which risk is increasing.

In addition, permitting processes present an opportunity for improvement. With greater transparency and standardized coordination, mitigation activities could be more clearly defined and more efficiently navigated across jurisdictions. For example, if 100 miles of undergrounding are planned, that information could be shared concurrently with counties and agencies like the California Department of Transportation (Caltrans), enabling parallel coordination and appropriate resource planning. Leveraging transparency and technology in this way would help align risk-reduction efforts with a regulatory framework that supports more efficient, optimized permitting.

4. ***Modernize Safety Standards for Utility Operations (NEW)***
A modernized safety execution framework would promote continuous improvement by enabling utilities to operate with greater agility and adaptability as more effective mitigation practices and tools emerge. Such a framework would support real-time operational adjustments during high-risk periods, while incorporating insight gained from benchmarking and field experience into established operational protocols. This would allow utilities to respond more effectively to dynamic and evolving conditions.

Improving implementation effectiveness requires regulatory and safety frameworks to evolve alongside operational practices in the field. Several elements of California's wildfire safety framework were developed under conditions and operational practices that predate today's

wildfire risk environment. These include CPUC General Orders (GOs), the Public Resources Code (PRC), and the Public Utilities Code (PUC), among other requirements. As a result, strict adherence to legacy prescriptive standards, without consideration of modern technologies and system capabilities, may limit the ability to deploy resources where risk-reduction benefits are greatest.

Drawing on nearly a decade of evolving mitigation practices and advancing technologies, a modernized safety standards framework can better align existing prescriptive requirements with innovative analytical approaches.

Updating these standards in a deliberate and technically informed manner would help ensure that California's safety framework evolves alongside emerging technologies, operational practices, and risk-management approaches. A phased modernization of safety, operational, and engineering standards would allow regulators to update legacy requirements while providing sufficient time to adapt procedures and integrate advanced capabilities, ultimately improving efficiency for both regulators and utilities.

5. ***Building a Holistic Statewide Vegetation Management (VM) Strategy***

Increasing wildfire consequences are driven by high fuel loads, reduced clearing and controlled burns, vegetation drying under climate change, and expanding housing in Wildland Urban Interfaces (WUI) and High Fire Threat Districts (HFTD). A statewide strategy can leverage utility, state, and federal resources to better address these conditions.

Tree mortality illustrates this urgency. Some of California's largest and deadliest fires occurred in areas of high tree mortality[4], and projected climate change impacts will further elevate fuel-driven fire behavior. The southwestern U.S., now in the second driest megadrought since 800 CE[5], underscores the need for integrated fuel-treatment and hardening strategies. Elevated mortality also increases vulnerability to storms, windthrow, and post-fire flooding, reinforcing the need for an all-hazards approach. This would allow for fuel treatment to minimize consequence in the form of fire spread versus only treating ignition likelihood.

6. ***Advancing Technology-Enabled Infrastructure Monitoring***

Preventing ignitions and limiting spread requires rapid detection and response, underscoring the importance of continued investment in advanced monitoring technologies. Continuous monitoring, real-time sensors, and supporting telecommunications infrastructure allow utilities to proactively identify equipment anomalies and detect ignitions within seconds.

---

[4] For example, the 2018 Camp Fire and the 2021 Dixie Fire, both of which burned in regions with extensive tree mortality and accumulated fuels.

[5] H. Eagleston et al., Systemic Drivers of Electric-Grid-Caused Catastrophic Wildfires: Implications for Resilience in the United States, *Challenges* 16, no. 1, Feb. 2025, at 13, https://doi.org/10.3390/challe16010013.

Early situational awareness narrows the response window, reducing fire growth rates and substantially lowering downstream consequences, making systemwide monitoring an effective way to reduce both ignition frequency and the consequences of undetected equipment degradation.

7. ***Strengthening Emergency Response & Situational Awareness***
   Artificial intelligence (AI) camera networks have significantly improved CAL FIRE's ability to rapidly detect and respond to ignitions. Coverage, however, remains inconsistent across utilities, creating avoidable visibility gaps. Expanding AI camera deployment statewide, perhaps operated by the Cal OES, can reduce response time, lower consequence and suppression costs, and improve coordination across agencies during high-risk conditions.

8. ***Modernizing Building Codes & Community-Level Mitigation***
   California's long-term resilience depends on strengthening building codes and expanding access to wildfire-hardened home and community designs, particularly in high-risk areas where dense housing enables rapid structure-to-structure fire spread. Modernized building codes and practical retrofit options can significantly reduce wildfire-related structural losses while preserving curb appeal and property value. The state, utilities, and local partners can jointly produce and distribute design templates that incorporate ember-resistant materials, ignition-resistant landscaping, and defensible-space principles. Providing these resources together with accessible retrofit support would reduce damage risk and strengthen insurance affordability through measurable vulnerability reductions.

9. ***Enhancing Natural Catastrophe Modeling Across Hazards***
   California would benefit from a coordinated, statewide effort to advance urban conflagration modeling and integrate wildfire models into a broader multi-hazard framework that includes wind, flood, extreme heat, seismic hazards, and cascading climate impacts. As these hazards intensify and interact, siloed modeling approaches limit the state's ability to understand compound risk or design future-proof standards for infrastructure and communities.

   A multi-hazard framework should incorporate scenario-based projections under multiple climate pathways[6] to evaluate how emissions trajectories influence hazard frequency, severity, and exposure. Modeling hazards holistically within a consistent risk architecture would help the state evaluate cumulative consequences and make transparent tradeoff decisions. This proposed framework should leverage advanced methodologies used by utilities, land-management agencies, public safety partners, and research institutions to create an ensemble modeling approach capable of capturing wildfire tail-risk behavior alongside flood, storm, seismic, heat and other climate-driven consequences.

---

[6] For example, Shared Socioeconomic Pathways (SSP) and Representative Concentration Pathways (RCP), which model alternative climate and emissions futures commonly used in global and state-level risk assessments.

Advancing this multi-hazard modeling capability requires transparent, interpretable tools that allow utilities and agencies to understand, test, and validate assumptions driving risk outputs rather than relying on opaque black-box solutions. Transparency enables cross-utility comparability, strengthens regulatory defensibility, and helps stakeholders identify the drivers of risk – whether ignition likelihood, exposure conditions, or consequence scaling. Robust catastrophe modeling must integrate data-science with physical, fire, hydrological, and meteorological sciences; without the ability to test assumptions in each domain, models risk producing misleading outputs with operational consequences.

Transparent, multi-hazard modeling architecture is therefore essential for building a statewide risk framework that is credible, repeatable, and aligned with scientific realities shaping California's evolving hazard environment.

Sincerely,

Dan Nuñez

DAN NUNEZ
Filsinger Energy Partners
CELL 971.666.0645
OFFICE 303.974.5884
DanN@filsingerenergy.com
THE BUSINESS, THE SCIENCE, THE EXPERTS – IN ENERGY