UCLA Luskin Center for Innovation | UCLA Sustainable LA Grand Challenge | UNIVERSITY OF CALIFORNIA Agriculture and Natural Resources

Water Supply Systems, Fire, and Finance

WORKSHOP SYNTHESIS REPORT

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REPORT

UCLA Luskin Center for Innovation

Informing effective and equitable environmental policy

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Cover photo: Panel 1 presentation by A.R. El-Khattabi (UNC Chapel Hill Environmental Finance Center). Credit: Sustainable LA Grand Challenge

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We acknowledge the Gabrielino/Tongva peoples as the traditional land caretakers of Tovaangar (the Los Angeles basin and So. Channel Islands). As a land grant institution, we pay our respects to the Honuukvetam (Ancestors), ʻAhiihirom (Elders), and ʻeyoohiinkem (our relatives/relations) past, present, and emerging.

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EXECUTIVE SUMMARY

Water supply systems operate under a persistent set of competing pressures. They must reliably provide clean and safe drinking water and preserve the long-term financial viability of the water system as an enterprise, while also being sensitive to household affordability. Actions taken to advance one objective may undermine the others, forcing water systems to make difficult trade-offs in their day-to-day operations. Aging infrastructure, regulatory mandates, contamination or shortages of water supply, and impacts from increasingly frequent and intense natural disasters add to the challenge of balancing these multiple goals and place many systems in precarious positions.

Against this backdrop, water systems now face an additional and unprecedented expectation: to deliver enormous volumes of water during catastrophic wildfire events. This expectation represents a fundamental expansion beyond traditional system mandates, which were designed to support localized building-level fires rather than large-scale urban or wildland-urban interface conflagrations. Preparing for such extreme events raises difficult questions about feasibility, cost, and responsibility—particularly when events requiring atypical levels of service may never occur.

This report describes findings from the second workshop of the Water Supply + Wildfire Research and Policy Coordination Network, held in January 2026 at the UCLA Luskin Conference Center. Led by the UCLA Luskin Center for Innovation and UC Agriculture and Natural Resources (UC ANR) with support from UCLA's Climate and Wildfire Research Initiative, the workshop focused on financial aspects of water systems' preparation for extreme wildfire events. Consistent with the Network's previous work, the workshop was grounded in an understanding that while water is an important aspect of wildfire-fighting, it is not the most important element in mitigating or fighting major fires. Thus, expanding expectations for water systems' role in wildfire response without first achieving corresponding clarity on the benefits and financing of this new responsibility will only exacerbate affordability, equity, and possibly water quality challenges.

Despite analysis and scrutiny of many aspects of the water–fire relationship in the period following the 2025 Los Angeles fires, the responsibilities and implications of financing fire and water operations remain unexplored in academic scholarship or policy discussions.

To address critical questions of financing fire flow in water systems, the workshop brought 54 representatives from water systems, water industry associations, fire agencies, and nonprofit organizations together with regulators, technical assistance providers, engineering consultants, and researchers from across California and beyond. The workshop's three core sessions were organized around 12 key questions framed by a moderator and expanded upon by panelists.

The three sessions addressed: 1) how fire-flow services are currently paid for; 2) the institutional relationships between water and fire agencies; and 3) the financial implications of building and maintaining new infrastructure. Each session included questions and discussion with workshop participants to investigate and gather diverse expertise. Answers to the questions posed in the workshop form the structure of much of this report.

Workshop discussions highlighted that existing infrastructure and supply constraints limit how much capacity systems can realistically provide in wildfire situations today. Expanding fire-flow capacity or building new wildfire-specific infrastructure would likely come at the expense of affordability, financial stability, or both, and potentially distract from other water system mandates, maintenance, and upgrades. These challenges are exacerbated by uncertainty in external funding. Federal support for disaster preparedness and recovery has become increasingly unreliable, and post-disaster aid—whether through the Federal Emergency Management Agency or other sources—cannot be assumed to arrive in sufficient or timely ways.

Further, once a disaster occurs, financial pressures intensify. Wildfire-driven displacement can significantly erode a system's revenue base at the very moment when operational demands and repair costs increase. Small and medium-sized systems are particularly vulnerable, with limited ability to absorb revenue losses or spread costs across a large customer base. Beyond these pressures, water systems are beginning to face legal and financial liability related to fire events. For many small water systems, a finding of liability could be financially catastrophic.

Workshop participants highlighted misalignment between the costs that water systems would incur to harden or upgrade infrastructure for wildfire-specific events and the constraints on allowable rate increases, which represent the most direct and reliable mechanism for funding utility investments. In California, Proposition 218 requires water rates to reflect the cost of service provided to individual parcels, limiting the ability of utilities to recover costs associated with broader public benefits such as wildfire risk reduction. As a result, investments intended to enhance system resilience for rare but catastrophic events may be difficult to justify within existing rate-setting frameworks, even where such investments are widely viewed as socially beneficial. This disconnect creates significant challenges for utilities seeking to respond to growing wildfire risk without undermining affordability or exposing systems to legal liability. Yet, despite these challenges, there are examples of communities in California that have chosen to invest in water systems capable of higher levels of fire resilience.

More broadly, our workshop surfaced critical issues and insights that had otherwise been unrecognized except by the few people and institutions dealing directly with them. These range from individual water systems making choices about their own investments to regulatory agencies considering how they can support systems in meeting a community's firefighting needs, to the state as a whole considering potential legal standards. This report serves as a call to continue to look at these issues at scale, to assess if there are specific system and system-wide solutions, and to find broader agreement on realistic, productive paths forward.

1. INTRODUCTION

As wildfire risk continues to intensify across the western United States, there is growing pressure to improve preparedness, response, and recovery in the face of increasingly destructive natural disasters. The question is not *if* a catastrophic wildfire will occur, but rather *when* and *where* such an event will strike. In this context, siloed approaches to wildfire preparedness—whether across agencies, sectors, or funding streams—have proven insufficient. Effectively reducing risk and improving outcomes will require coordinated, evidence-based approaches that recognize the interdependence of land use, emergency response, and water systems.

As we have discussed in previous research, water systems remain a critical and often misunderstood component of emergency preparedness in urban and wildland–urban interface contexts. Recent disasters—most notably the January 2025 Los Angeles fires—have fueled unprecedented expectations for water systems' role in fighting large urban wildfires. However, wildfire-fighting is not part of the basic service mandate of water supply systems, and in fact, can conflict with core mandates. Water systems are designed primarily to provide drinking water, domestic supply, and support for routine structure fires. Though standards for water supply availability to combat structure fires are codified in housing codes, no comparable standards exist for water systems to fight large-scale wildfire events, or the urban conflagrations that occur when wildfire reaches into densely populated built environments. This distinction—between fighting routine structure fires and responding to catastrophic wildfires or urban conflagrations[1]—is central to understanding the limits of water system responsibilities. While fire agencies often rely on water systems for suppression activities, wildfire response is not part of most water utilities' basic mandate and may not be feasible to support through infrastructure investments alone.

These realities raise fundamental questions about expectations, accountability, and the financing of wildfire-related services. The financial dimension—including questions of revenue recovery, financing, and external funding—is especially critical as it fundamentally shapes what services can be provided, by whom, and to what extent.

The responsibilities and implications of financing water system involvement in wildfire response remain largely unexplored in both academic scholarship and policy discourse. Discussions following recent wildfire disasters tended to focus on system performance and post-event repair and restoration, rather than on the underlying financial structures that enable—or constrain—preparedness and response. Addressing this gap is increasingly urgent as scrutiny of water utilities and fire agencies continues to grow.

This report builds on the work of the Water Supply + Wildfire Research and Policy Coordination Network, launched in March 2025 by the UCLA Luskin Center for Innovation and UC Agriculture and Natural Resources (UC ANR) with support from UCLA's Climate and Wildfire

1 We use the term "wildfire" throughout this report given its colloquial use, although we acknowledge that more accurate, but less well-known terms outside the scholarly and fire industry communities, such as "urban conflagration," may technically be more appropriate depending on the context.

Research Initiative. It documents the second in a series of four workshops that will be held through fall 2026. The first workshop focused on the capacity of and expectations for water systems to improve wildfire mitigation and resilience, with particular attention to how systems evaluate potential interventions, balance firefighting investments against other critical needs, and engage with statewide guidance and standards. The second workshop shifted the focus to funding and cost allocation. It examined how fire-flow services are currently paid for, the institutional relationships between water and fire agencies, and the financial implications of building and maintaining new infrastructure.

The motivation for the focus of this workshop and follow-on report was threefold. We were motivated to better understand and assess:

- How water systems recover revenue for the services they provide, what implications this has for what services they can realistically offer, who pays for these services, and how costs and benefits are distributed across a service area.
- How water utilities and fire agencies are embedded in a unique institutional relationship. Fire suppression often depends on water system infrastructure, yet governance, funding, and accountability are frequently fragmented across agencies and jurisdictions.
- How, despite heightened scrutiny of water systems following recent wildfire disasters, discussions of finance have largely focused on post-disaster repair and restoration, leaving broader questions of responsibility, cost allocation, and long-term funding largely unexamined.

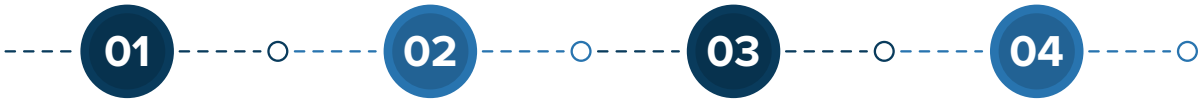
This report summarizes key themes and insights emerging from the workshop discussions, situates them within the broader wildfire and water research and policy landscape, and identifies gaps where further research and policy development are needed to support more effective and equitable wildfire preparedness and response. The report concludes with a discussion of ongoing work the working group is conducting and avenues for future research. We recognize that this field remains highly dynamic, with topics of interest and incremental findings continuing to emerge, and that this effort contributes to a changing landscape of research, policy, and practice.

1.1. Workshop Overview

This report summarizes an in-person, full-day workshop entitled “Financial Impacts of Building and Using Water Supply Systems for Fighting Wildfires” that was held at the UCLA Luskin Conference Center on January 23, 2026. This workshop is the second in a series of four by the UCLA Luskin Center for Innovation and the California Institute for Water Resources at UC ANR, as part of the co-facilitated Urban Water Supply + Fire Research and Policy Coordination Network. The remaining workshops in the initial series will be structured similarly and have a similar mix of participants, although invited participants are not identical across all workshops.

FIGURE 1

Workshop Series Topics and Timeline



WORKSHOP 1
Water Systems' Wildfire Fighting Capacities and Expectations (August 18, 2025)

WORKSHOP 2
The Economics & Affordability of Water System Firefighting (January 23, 2026)

WORKSHOP 3
Drinking Water Quality, Trust, & Communications (May 1, 2026)

WORKSHOP 4
Water, Urban Vegetation, & Wildfire (September 2026)

Our January 2026 workshop had 54 participants (see Figure 2) representing water systems, water industry associations, nonprofit organizations, regulators and legislators, technical assistance providers, fire protection experts, engineering consultants, and researchers from across California and beyond. We aimed to invite and capture wide representation and participation in the workshop from relevant experts and interested parties, but we also acknowledge that the perspectives and insights contained in this report reflect the views of the authors and those of the workshop participants, as synthesized by the authors.

FIGURE 2

Workshop 2 Participating Entities

Arizona State University, Arizona Water Innovation Initiative	Caly Poly, San Luis Obispo	California Association of Mutual Water Companies	California Council on Science and Technology	California Department of Water Resources	California Institute for Water Resources	California Municipal Water Association
California Public Utilities Commission	California State Water Resources Control Board	County of Los Angeles Chief Sustainability Office	Golden State Water Company	LA Waterkeeper	Los Angeles Department of Water and Power	Lake Arrowhead Community Services District
Lake County Fire Protection District	National Water Research Institute	New Deal Advisers	Office of Los Angeles Mayor Karen Bass	Pacific Palisades Community Council	Paradise Irrigation District	Rubio Cañon Land and Water Association
Rural Community Assistance Corporation	Sacramento State University	UCLA JIFRESSE/ NASA JPL	UCLA Luskin Center for Innovation	UCLA Sustainable LA Grand Challenge	UC Agriculture and Natural Resources	UCLA Institute of the Environment and Sustainability
		Water Resources Economics	University of California, Riverside	University of North Carolina		

The organizing UCLA–UC ANR research team made every effort to accurately reflect participants' insights and remain as faithful as possible to their original statements. Notwithstanding, the workshop employed the Chatham House Rule to encourage frank conversation during the discussions. Accordingly, no statements at the workshop are publicly attributed by individual name or organization.

Before the workshop, participants were sent a packet of background materials that included a draft agenda and objectives for the workshop process. The detailed day-of workshop agenda is posted on the website of UCLA's Sustainable LA Grand Challenge. The workshop included three panels with experts, many opportunities for open discussion, and a groupwide end-of-workshop reflection.

Our working group committee of experts from UCLA, UC ANR, and Arizona State University facilitated the workshop. Alex Hall, the faculty director of UCLA's Sustainable LA Grand Challenge and the Director of UCLA's Institute of the Environment and Sustainability opened the day with framing remarks regarding the importance of silo-breaking work at the water–fire nexus to effectively increase resilience. Gregory Pierce then provided an overview of the workshop structure, the Network's work to date, and the rationale for focusing on the financial considerations associated with building, maintaining, and using water supply systems in fighting and recovering from fires.

The bulk of the workshop was structured around three sessions led by Camilo Salcedo, Faith Kearns, and Megan Mullin. The sessions each consisted of three lightning talks from a panel of subject matter experts, followed by audience questions and facilitated discussion based on pre-written prompts posed to both panelists and the broader group. The focus of each session is detailed in Figure 3. We note that the three core sessions were organized and structured around 12 key questions, answers to which form the structure of much of this report.

FIGURE 3

Workshop Session Objectives

Session 1: Water Systems' Fire Flow Infrastructure and its Funding	Session 2: Water System and Fire Agencies - Their Relationship and its Financialization	Session 3: So... how should we pay for new wildfire-fighting water infrastructure?
• Understand "everyday fireflow," its financial implications, and how broader fireflow financing works • Recognize that any discussion of financing "wildfire flow" has to build on this discussion	• Catalogue the responsibility division between water and fire agencies • Document best practices and variation in practice • Explore whether practices are codified or financialized	• Discuss options for funding wildfire recovery and financing mechanisms for "wildfire flow" • Brainstorm intra-system customer equity impacts, legal constraints and opportunities related to financing

To close out the workshop, Edith de Guzman led a group reflection that encouraged participants to share their learnings and key takeaways. Erik Porse then summarized key themes that emerged from the day and outlined priorities for future work. The following sections synthesize these discussions and reflections, highlighting the core findings and identifying areas of convergence, tension, and opportunity.

This report summarizes themes and insights from the workshop and workshop-related activities, and articulates remaining gaps in understanding. In addition to this report, the workshop had two other near-term outputs:

- The workshop facilitated conversations and collaborations among individuals and entities working on the water supply–wildfire-fighting issue.
- It formed the basis of a blog post we published in February with early insights from the workshop (Pierce, Kearns, et al., 2026).

2. WATER SYSTEMS' CURRENT FIRE-FLOW INFRASTRUCTURE AND RATES

The ways in which water systems charge customers for everyday services, such as drinking water supply and outdoor water use, are relatively well established. While they vary across water systems, they are typically grounded in cost-of-service principles that allocate expenses across customer classes based on use, infrastructure requirements, and system operations.

At the same time, water distribution systems are also fundamentally designed—and, in some ways, "overdesigned" when considering the costs and trade-offs with other objectives—to provide water supply for potable use and support routine structure firefighting, a function that is embedded in system design standards but is often not clearly reflected in rates, fees, and other revenue recovery mechanisms. The costs associated with providing this everyday fire protection, and how those costs are recovered, are under-studied and remain opaque to many policymakers and the public.

The first objective of the workshop and, thus, the focus of the first structured discussion session was to develop a clear understanding of how systems are currently physically designed, operated, and financed to support routine fire flow. We thought this understanding was a necessary baseline to establish before evaluating whether, and how, water systems might be expected to fund new infrastructure or services related to wildfire resilience.

We asked and discussed answers to three guiding questions in this session of the workshop. We summarize and supplement this discussion with additional citations below.

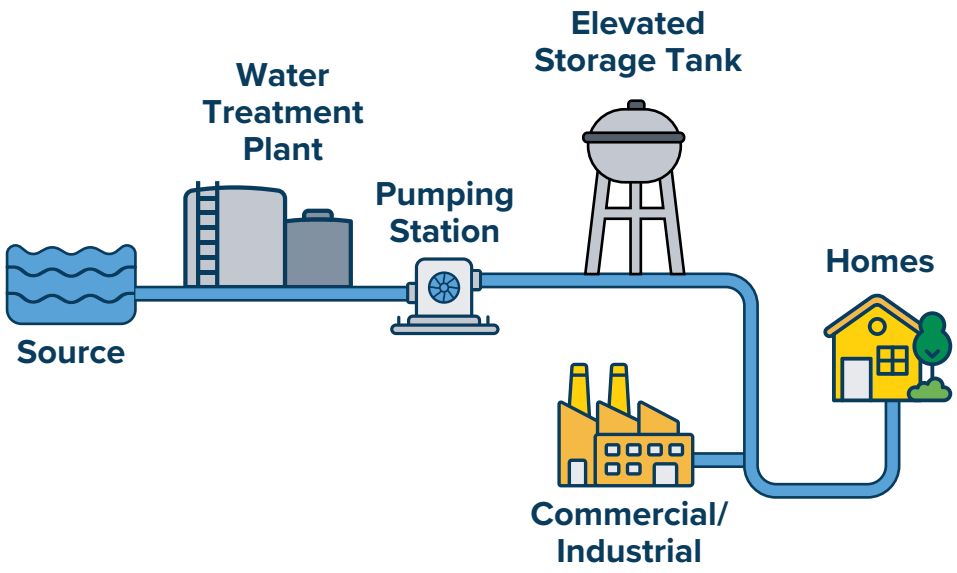
2.1. How do water systems design and maintain their everyday or urban fire-flow supportive infrastructure? How might they be designed differently if they did not need to maintain fire flow?

One of the primary goals, if not the ultimate one, of a water distribution system is to provide enough water at an appropriate quality to end users while maintaining adequate pressure. This focus is broadly driven by a concern for public health protection and functionally ensured via Safe Drinking Water Act regulations. System components such as the water treatment plant, storage tanks, pumping stations, and required piping are all designed with these objectives in mind, with fire-flow requirements often layered onto these baseline design objectives.

Systems are commonly designed to meet the maximum demand in a day for all needs, plus fire flow, with minimum pressure guidance typically on the order of 40–50 psi for maximum day demand conditions (American Water Works Association, 2014). For routine structure fires, minimum fire-flow guidance for one- and two-family dwellings are commonly set at approximately 1,000 gallons per minute (gpm), with hydrants expected to maintain a residual pressure of at least 20 psi during the maximum day demand (National Fire Protection Association, 2023). These are design guidelines, not standards. Hard standards can, and do, vary across systems, counties, and states.

FIGURE 4

Illustration of Key Water System Infrastructure Elements



Workshop participants noted that even though actual consumptive use for firefighting comprises a small share of annual water use, fire-flow requirements often become the dominant influence for decisions on the size of system components. Water systems typically evaluate multiple demand scenarios during master system planning, which may include average day demand, maximum day demand, peak hour demand, and maximum day demand plus fire flow. Among these scenarios, fire flow frequently drives decisions related to pipe diameters, storage capacity, and pumping infrastructure.

However, it is important to note that this process looks quite different based on a system's size and institutional capacity. In practice when developing these scenarios, utilities rarely have precise information from fire departments regarding required fire-flow rates or duration, and instead estimate needs based on the system's pressure zone, land use factors, building type, and local standards. Moreover, as has been analyzed more fully in a UCLA graduate student analysis, which some of the authors of this report supervised, it is an open secret that small water systems have trouble maintaining basic fire flow (Sun et al., 2025). This is why SB 552 (2021) has given small systems in California until 2032 just to demonstrate basic fire-flow capacity, although it remains unclear if they will meet this timeline.

When new buildings are constructed, a water supply must be provided to meet the building's required fire flow (National Fire Protection Association, 2023). This fire flow typically comes from designated hydrants at the end of the distribution system line, which provide a readily available connection for the fire department to access the utility's water supply.

However, in terms of national standards, fire hydrants are not required by law where the water supply cannot deliver 500 gpm of fire flow at 20 psi due to the risk of depressurizing the water system if used. In residential areas with only one- and two-family residences, at least

one hydrant must be within 600 feet of each dwelling, and hydrants must not be spaced more than 800 feet apart. In areas with commercial, industrial, and multifamily dwellings, at least one hydrant must be within 400 feet of each building, and they cannot be more than 500 feet apart (National Fire Protection Association, 2024). In addition, alternative storage reservoirs can serve dual purposes, supporting both routine operations and emergency fire-flow needs, and systems rely on continuous monitoring to manage water quality.

As discussed in our summary of session 2 below, these typically overlooked forms of infrastructure can be the subject of intense scrutiny when they are perceived to underperform. This includes the respective roles of water system and fire agency management in maintaining these infrastructure components.

However, it was emphasized in the workshop discussion that there are hard trade-offs between potable water quality and fire-flow capacity. The larger pipes and increased storage capacity, necessary for increased fire flow, lead to increased water residence times due to a reduction in flow velocities. The latter may then lead to degraded water quality if not carefully managed. As a result, fire-flow capacity needs to be balanced against drinking water quality objectives rather than optimized independently (National Academies of Sciences, Engineering and Medicine, 2006).

The question of how systems might be designed differently absent fire-flow requirements is, of course, a counterfactual exercise, not a policy proposal. In this hypothetical scenario, workshop participants agreed that many infrastructure components could be significantly smaller and simpler and, therefore, less costly and more easily in sync with water quality standards. Without the need to deliver large, short-duration flows at specific locations, systems could rely on smaller pipe diameters, reduced storage capacity, and fewer, if any, hydrants. Water systems could then avoid the ongoing costs associated with installing, inspecting, repairing, and replacing hydrants.

Moving beyond this hypothetical situation, workshop participants emphasized that everyday fire-flow requirements are most efficiently embedded in broader planning frameworks. While redundancy remains a core design principle regardless of fire-flow needs, wildfire-specific resilience investments—such as oversized pipes or dedicated fire-flow facilities—are difficult to fund independently. However, if fire-flow capacity is properly incorporated into growth-related planning for infrastructure buildout, new development can provide a financial justification for upsizing system components over time.

2.2. How do water supply systems fund existing everyday firefighting efforts?

Broadly, the way fire-flow and firefighting-related costs are allocated first depends on how water systems view their own responsibilities related to the balance between drinking water provision and fire protection. Workshop discussions emphasized that there are several schools of thought and practice in these spaces, with little systematic analysis across systems or state guidance frameworks for systems. As the callout box below suggests, Wisconsin is an exception to this rule. We are conducting follow-on research in this space across different geographic and governance contexts.

In cases where a water system sees itself as primarily providing drinking water service with fire flow as an ancillary service, it will typically attempt to recover the majority of its costs through charges on potable water services, and everything in excess would be for fire protection. But if fire-flow and drinking water provisions are seen on equal footing, the water system may apportion costs based on the proportion of water dedicated to each use based on either usage or system design.

However, once fire-related costs are quantified, questions arise of who pays the costs and how is the revenue collected. There are two primary schools of thought on this issue. On the one hand, fire protection exhibits many of the attributes of a public good: the service is largely non-excludable and non-rivalrous in its benefits. Under this view, there is strong justification for financing fire services through broad-based public revenues (i.e., for municipalities, this is often the locality's general fund). In this vein, water systems would charge fire departments or the municipality directly for water used, with the local government then compensating for and recovering those costs through local property taxes.

On the other hand, many of the benefits accrue directly to utility customers, and this may be especially true in the case of wildfires that impact a small portion of a larger utility's service area. As water system customers, they should have direct adequate fire-flow capacity to address household or structure fires. Under this view, utility customers may be charged directly through rates and fees to support fire protection.

CASE STUDY: WISCONSIN IS THE ONLY STATE WE IDENTIFIED WITH EXPLICIT RULES REGARDING FIRE PROTECTION RATES

Wisconsin is the only state in the U.S. we identified that has explicitly prescribed rules governing how water systems must recover the costs associated with routine fire protection. Under state law, regulated water utilities are required to account for public fire protection costs, with oversight and rate approval provided by the Public Service Commission of Wisconsin (n.d.). This framework establishes a standardized approach to recognizing and recovering the costs of maintaining water system capacity for firefighting.

The Public Fire Protection (PFP) charge is designed to recover the costs incurred by water utilities to deliver large volumes of water for firefighting anywhere within their service areas. These costs extend beyond the water used during fire events and include a portion of capital and operational investments such as wells, pumps, storage facilities, water mains, hydrants, and the additional system capacity required to maintain adequate pressure and flow during firefighting while continuing to meet everyday water demands. The framework explicitly recognizes that systems designed to support fire protection are larger and more costly than systems designed solely to provide potable water.

Municipalities in Wisconsin have three legally authorized avenues for recovering PFP costs:

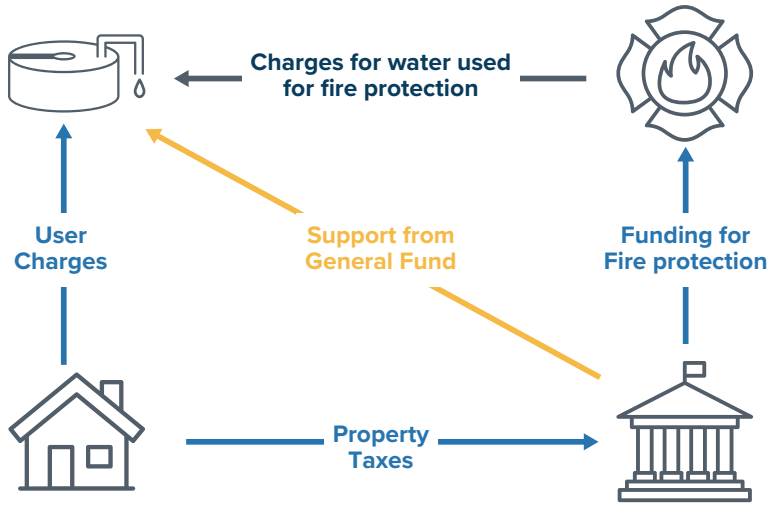
1. **Direct charges on water utility bills**, with the PFP charge appearing as a separate line item,
2. **Property tax–based recovery**, in which municipalities pay the PFP cost and recoup it through property taxes, or
3. **A hybrid approach**, where part of the cost is borne by the municipality and the remainder recovered through direct charges.

In practice, water systems in the state have used each of these approaches, with direct charges being the most popular. When the direct charge approach is used, the Public Service Commission has approved eight methods for calculating the PFP charge. Of these, the most commonly used method is based on ratios of meter size, but some methods base it on property value or the square footage of improvements.

Importantly, the PFP charge is distinct from fire department funding. It does not pay for personnel, equipment, or emergency response operations; those costs are borne through separate municipal budgets or tax levies. The PFP charge is strictly tied to the water utility's costs of maintaining infrastructure and capacity to support firefighting needs. Customers subject to the charge include all water utility users with general service meters, including tax-exempt entities such as schools, churches, and government facilities, with costs allocated equally based on meter size rather than tax status.

FIGURE 5

Financial Flows of Payment for Fire Protection: Direct Customer Charges vs. General Fund



In practice, few examples could be identified outside of Wisconsin where water systems charge fire departments directly for the water used during firefighting. The actual volume of water used for fire suppression is also commonly treated as "non-revenue water," with associated costs embedded within general rate structures and passed on to customers. Workshop participants noted that the volumes of water used in aggregate for everyday fires are unknown, and the less frequent volumes of water used to fight wildfires is large but also rarely quantified, but can be considerable for small systems' overall water supply levels. While this approach supports overall utility financial viability, it obscures part of the true costs of providing fire protection.

Even in instances where water systems attempt to recover costs, fire-related costs are rarely recovered through a single, uniform charge. Water systems employ a diverse, often overlapping set of fire-related rates and fees, which vary in structure, purpose, and applicability. Common examples in California include "fire protection" or "fire service" charges that are typically fixed fees assessed to private residential, commercial, or industrial customers based on meter size, connection size, or building square footage. These charges are generally intended to reflect the standby capacity required to maintain pressure and flow for routine structure fires rather than the volume of water actually used to fight fires during any event.

Other charges include fire sprinkler fees that apply to properties with dedicated sprinkler connections and reflect the presence of on-site fire suppression infrastructure; temporary hydrant meter or temporary fire suppression meter charges, which allow private entities such as construction sites to draw water from hydrants under controlled conditions; and pressure-, power-, or elevation-zone–related rates, which may indirectly reflect the costs of maintaining system capacity necessary for fire flow. In some cases, the fire rate applied only to private actors such as commercial or residential customers, suggesting that fire suppression was treated as an optional, billable service. In other cases, public buildings and even fire departments were subject to private fire service rates.

Thus, the presence of fire-related rates on a utility's rate schedule does not necessarily indicate that the utility is recovering the full costs of providing firefighting capacity, nor does it resolve the underlying question of who does or should bear those costs. Instead, these charges represent a patchwork of approaches that embed fire protection costs within broader rate structures, often without consistency or comparability across systems.

At the state level, there is little formal guidance governing how water systems should allocate or recover costs associated with routine fire protection. A full U.S. state and territory analysis would be useful to understand policies in full. This lack of standardization complicates comparisons across utilities and raises challenges for planning, coordination, and equity as wildfire risk increases. To better understand how systems navigate this gap in practice differently, we highlight a review of fire-related rates across six counties in Southern California. These examples are intended to illuminate the range of approaches currently in use, rather than provide generalizable summary trends, identify best practices, or recommend specific rate designs. More research is needed in this space in order to move to recommendations.

CASE STUDY: MANY WATER SYSTEMS IN SOUTHERN CALIFORNIA HAVE FIRE-RELATED RATES BUT THEY LACK CONSISTENCY

A study completed by the UCLA Luskin Center for Innovation in 2025 provided a deep dive of the comparative water quality, affordability, and governance of over 650 water systems in Southern California, including an analysis of how firefighting costs were reflected in customer bills (de Guzman et al.). Given the January 2025 wildfires in Los Angeles County, we included as a small segment of this work a high-level review of customer rates and charges related to fire.

The most common terms we found for direct customer fees were "Fire Protection" or "Fire Service" charges—fees that apply in addition to a customer's general water rate, typically for services to fire sprinklers, hydrants, or private fire connections. These terms were often used inconsistently across systems. In some cases, the fire rate applied only to private entities such as commercial or residential customers, suggesting that fire suppression was treated as an optional or supplementary billable service.

Some systems applied a single umbrella fire rate, while others split charges across multiple categories, such as separate fees for hydrant installation and sprinkler usage. In instances where no fire-specific rate was found in system rate and charge sheets, our initial review of municipal codes indicated that fire suppression costs were often embedded in property taxes. However, the codes rarely disclosed the amount paid or what specific services and costs were specifically recovered.

	Los Angeles	Kern	Orange	Riverside	San Bernardino	Ventura
Fire Sprinkler Charge	25	13	3	0	10	3
Hydrant Meter Rate	10	3	3	7	12	1
Fire Protection/Fire Service	96	18	17	20	32	17
Temporary Hydrant or Fire Suppression Meter	20	2	1	0	1	0
Pressure/Power/Elevation Zones	7	0	1	7	0	1
Number of Systems with Fire Rates	158	36	25	34	55	22
Percent of Systems with Fire Rates	83.60%	21.95%	65.79%	38.64%	44.00%	37.29%

Source: *The 2025 Southern California Community Water Systems Atlas*

2.3. How might water systems more broadly fund new infrastructure and services, such as wildfire resilience enhancements that haven't been traditionally expected?

The final question we covered in this session prompted participants to think more broadly on a topic also covered expansively in our third session of the workshop. Participants converged on a shared conclusion: Existing funding structures are poorly suited to support new infrastructure or services aimed specifically at wildfire recovery or resilience. While there is broad recognition that wildfire risk is increasing, it remains difficult for water systems to justify capital investments based solely on fire protection needs, particularly where those investments do not clearly advance core utility water service requirements and objectives with established cost recovery mechanisms. In short, any new service that a system provides, such as wildfire protection, imposes costs and, thus, a need for more revenue. The operational and maintenance costs of systems already consume a substantial share of utility budgets, leaving limited flexibility to absorb new obligations without affecting affordability or financial stability.

When considering system rates as a funding mechanism for enhanced wildfire flow, Proposition 218 emerged as a central consideration. In California, Proposition 218 requires water rates and fees to be proportional to the cost of service provided to individual parcels, and charges must be tied to specific, identifiable benefits for publicly owned water systems, which represent the majority of the state's larger water systems. This framework limits utilities' ability to recover costs associated with broadly shared public benefits—including potential wildfire risk reduction—through rates, especially because those benefits are diffuse, probabilistic, and unevenly distributed across a service area. While Proposition 218 does not prohibit fire-related expenditures outright, it complicates efforts to raise rates or establish new charges for wildfire-specific investments that cannot be clearly attributed to parcel-level service. At the same time, if wildfire service is viewed as a private protection that should be paid for by those who specifically benefit from it, Proposition 218 supports this logic.

Development impact fees were also identified as one of the few commonly used mechanisms for funding system expansion. For water systems, development impact fees are one-time, up-front charges imposed on new development to recover the capital costs of infrastructure improvements needed to serve growth. In principle, these fees can help align the costs of system expansion with new demand, reducing the need to raise rates on existing customers. In practice, however, their applicability to wildfire resilience is limited. Development fees are generally constrained to new growth-related capacity and cannot easily be used to fund infrastructure upgrades intended solely to address existing deficiencies or broader public safety objectives, such as wildfire risk reduction.

Municipalities can increase development fees to mitigate rate impacts on current customers. Higher development fees, however, may also raise housing costs and conflict with broader affordability and housing production goals. This tension is particularly acute in high fire-hazard areas, where more robust infrastructure may be warranted but additional development costs risk exacerbating affordability challenges or slowing rebuilding efforts.

While not raised as a concept by workshop participants, special assessments could be levied on existing developments to fund water system-related, wildfire-protective investments. However, we could not find an example of such an assessment currently implemented to invest in water system infrastructure in order to mitigate, as opposed to recover from, wildfire damage.

Given these limitations, participants pointed to regionalization, consolidation, and shared infrastructure as potential strategies for improving affordability and spreading risk, especially for small systems that lack the customer base to justify reserve capacity or resilience investments on their own. The Tahoe Public Utilities District, for instance, has been explicit about undertaking such efforts (*Sierra Sun*, 2026). However, such approaches also raise governance, coordination, and accountability challenges, especially since public funding tends to move slowly and the consolidation process takes half a decade, at best, to finalize.

As workshop participants noted, many of the systems in high-fire risk areas—particularly in Southern California—that face the greatest need to invest in fire-related infrastructure may also be tasked with financing rebuilding of infrastructure after wildfire damage while their customers are displaced and economically distressed. For instance, in Altadena, California, following the Eaton fire, wildfire-related displacement led to significant revenue losses as customers were displaced and unable to pay bills, and damaged infrastructure prevented water delivery (Stone, 2026). This example highlights another broader structural challenge: Existing funding frameworks offer few mechanisms to stabilize or replace lost revenue following disasters, leaving small and medium-sized systems especially exposed in the aftermath of major wildfire events. In fact, available public funds were, at times, denied because systems did not fit traditional definitions of eligible entities. This erosion of the revenue base occurred precisely when system demands and recovery needs increased, threatening overall system viability. In part for this reason, at least two of the smaller systems in Altadena may also be consolidating post-fire (James, 2026).

3. THE RELATIONSHIP BETWEEN LOCAL WATER SYSTEMS AND LOCAL FIRE AGENCIES

Fire suppression depends on the close coordination of two distinct local agency types that are governed, funded, and operated very differently. There are many local water systems and fire agencies, and they exhibit significant diversity in size, governance structure, and service area. Local community water systems may be governed by cities, counties, special districts, large investor-owned utilities, or smaller nonprofits such as mutual water companies, to name the most common types. There are 2,800 community water systems in California and 200 in Los Angeles County alone. Local fire protection, in turn, may be provided by municipal fire departments, county fire departments, independent fire protection districts, or a mix of volunteer and contracted agencies, each operating under different funding mechanisms and statutory authorities. There are hundreds of such agencies in California, in addition to areas that the state directly provides fire protection for ("state responsibility areas").

Funding sources between local water and local fire agencies commonly differ, with fire agencies more volatile than water agencies. Water utilities generally receive minimal funding from federal or state sources and rely primarily on enterprise funds supported by user rates and fees. As a result, cost allocation and revenue recovery are relatively well developed in the water sector, and there is typically a clearer link between service provision, costs incurred, and customer payments. Fire agencies, by contrast, depend heavily on local general funds, often supported by property or sales taxes, making them more vulnerable to fiscal volatility during economic downturns or disaster events. For fire agencies, there is little connection between service use and funding (see Figure 6).

In urbanized areas, water systems provide the infrastructure and operational capacity, as well as the actual water needed to deliver fire flow, while fire agencies are responsible for utilizing that water to protect life and property. Under routine conditions, this division of responsibility is often taken for granted, despite the clearly embedded and contingent nature of reliance by fire agencies on water agencies.

FIGURE 6

Local Water Systems and Fire Agencies Rely on Different Financing and Funding Sources

Water systems	Fire agencies

• Minimal federal or state funding
• Little dependence on local general funds
• Cost allocation and revenue recovery is well studied
  • Majority of funding comes as direct user charges (rates/bills)
  • There is a connection between volume of customer use and payment level
	• Very little documented or generalizable
	• High dependence on local general funds and property taxes
	  • Fiscal and public support volatility in times of austerity or disaster
	• Little connection between volume of customer use and payment
	  • Non-financial public support high

During large wildfire events, however, the assumptions underlying these relationships are stress-tested and can reveal gaps in coordination, accountability, and cost recovery that are less visible in everyday operations. The discussion that follows draws on insights from workshop session 2 to examine how these relationships function in practice, and how responsibilities and financial obligations are defined—or left undefined—under both routine and extreme conditions. Overall, there seem to be few best practices and little sense of industry norms, much less codified rules and procedures, that are based on evidence of effectiveness. The National Special Districts Coalition's 2022 report *Water Infrastructure for Firefighting: Providing Resources to Address Gaps in Public Health and Safety* provides the best national resource on financing firefighting capacity, but is specific to a particular type of water system.

We asked and discussed answers to four guiding questions in this session of the workshop. We summarize and supplement this discussion with additional citations below.

3.1. How do we characterize water system and fire agency relationships and related responsibilities in putting out everyday fires? Wildfires?

Given the diversity and fragmentation noted above in local water but also local fire agencies, single fire agencies frequently overlap with multiple water providers. As a result, no single water agency may be fully responsible for ensuring adequate fire flow across the entire fire protection jurisdiction. (The reverse can also be true, but is less common.) This fragmentation can complicate coordination around infrastructure planning, system pressure, hydrant installation and maintenance, and cost allocation for fire-related capacity.

Fire agencies generally depend on water systems to provide water at the locations needed to suppress fires, particularly for routine structure fires or wildfires that cross from wildland to urban areas. Hydrants are the most common and immediate water source, connected to pressurized water mains. While generally overlooked, the share of relative labor and fiscal responsibility between water systems and fire departments for the inspection and maintenance of fire hydrants emerged as one of many controversies following the Los Angeles fires (Hamilton, 2025a). Alternative water sources—such mobile water tenders, large-diameter hose relays, or static sources such as swimming pools, ponds, or lakes—may also be available in some circumstances, but reliance on water that flows through potable distribution systems remains the norm for everyday firefighting. The empty Santa Ynez reservoir in the Pacific Palisades, which was drained to meet drinking water quality compliance standards, featured heavily in controversies following the Los Angeles fires. Both the fact and the narratives around this reservoir have more broadly reinvigorated conversations about maintaining non-potable reservoirs as alternative firefighting water sources, separate from the system's primary distribution sources for household consumption (Hamilton, 2025b).

For routine structure fires, relationships between water systems and fire agencies generally function as intended: Response is timely, hydrants are accessible, and water systems are able to deliver adequate pressure and flow. Large wildfires, however, fundamentally alter these dynamics. Reading accounts detailing the necessarily frenetic pace and dynamic spatial

movements of firefighters during wildfires alone illustrates challenges to the ideals of perfect information sharing and seamless coordination (Soboroff, 2026).

Beyond this, however, many fire agencies have experienced declining per-capita staffing and reduced operational capacity due to fiscal constraints and rising service demands, even as wildfire frequency and intensity have increased over the past several decades (Dai, 2025). These long-term capacity trends leave fire agencies with limited slack during prolonged, high-intensity incidents, increasing reliance on mutual aid and placing greater strain on supporting infrastructure systems. However, a large number of mutual aid fire agency responders may commonly arrive from outside the area with inherently limited familiarity with local water infrastructure, complicating communication and coordination. The increased synchronicity of extreme fire events also threatens the availability of mutual aid deployment (Yin et al., 2026).

Examples discussed at the workshop illustrate how these dynamics vary in practice in particular local areas. For instance, in Lake County, recurring coordination between fire and water agencies evolved into a monthly forum and a countywide association. This collaboration has integrated water representatives into emergency command, recommissioned intake lines for drafting, and deployed portable raw-water hydrants to strengthen initial attack capacity.

In Altadena, mutual water companies supported by the California Association of Mutual Water Companies mobilized hundreds of operators following the Eaton fire, demonstrating the importance of statewide professional networks and preexisting coordination. At the same time, the asymmetry in size and familiarity between agencies led to outcomes such as fire agencies and emergency operations coordinators not knowing the identity of small water systems before the event, the implications of which are described below.

Further, during large wildfire events, water systems are often pushed to or beyond their design limits. Water agencies are responsible for actively managing system operations under hazardous conditions, including maintaining water pressure, protecting critical infrastructure, and ensuring staff safety. However, workshop participants cited instances in which utility personnel were unable to access critical facilities due to road closures or National Guard blockades, underscoring the need for clearer protocols that recognize water system operations as essential emergency functions. Without such recognition, utilities may be unable to manage pressure or prevent system-wide losses during peak demand. This suboptimal commonality has also helped motivate policy development, such as the proposed California Senate Bill 1001, which would help streamline critical water system staff access to active fire areas (2026). These challenges are compounded by the local nature of both fire and water agencies, as staff themselves may be directly affected by disasters (as in the Paradise and Marshall fires, for instance), reducing available capacity precisely when system demands peak.

3.2. To what extent are relationships and responsibilities codified or *ad hoc*? Who do local entities ultimately answer to?

Across discussions, the importance of preexisting relationships and documented coordination plans emerged as a unifying theme. Informal coordination may be sufficient for everyday structure fires, but wildfire response exposes the limits of *ad hoc* arrangements and underscores the need for more deliberate and durable coordination between water systems and fire agencies. In extreme events, the absence of clearly defined roles and responsibilities can hinder situational awareness and strain systems that are already operating at or beyond their limits.

Formal institutional relationships between water systems and fire agencies are relatively uncommon outside incorporated cities, where both services may be housed within the same municipal government and, thus, operate, to some degree, under shared governance, budgeting, and planning processes. Even in these cases, they may operate as semiautonomous enterprise units.

In other more rural areas, fire protection is more often provided by independent fire protection districts or county fire departments, while water service is supplied by a patchwork of providers including municipal utilities, special districts, mutual water companies, and private water systems. These entities are governed separately, subject to different regulatory frameworks, and funded through distinct revenue streams, limiting the prevalence of standing agreements that clearly define roles, performance standards, and cost responsibilities. In the absence of formal agreements, coordination is frequently informal or *ad hoc*, relying on historical practice, personal relationships, or case-by-case communication rather than codified expectations.

Wildfire events often prompt intensive, on-the-ground coordination among water utilities, fire agencies, and other responders, improving shared situational awareness during the response phase. However, participants noted that coordination frequently diminishes once immediate response and recovery efforts subside, unless it is intentionally maintained. Where coordination remains relationship-based rather than institutionalized, information-sharing can become inconsistent and difficult to sustain over time.

These dynamics illustrate that responsibility for successful coordination is often diffuse, and there is no one way to measure success. Fire agencies ultimately answer to elected boards, city councils, or county governments for public safety outcomes, while water utilities are accountable to separate governing boards, regulators, and ratepayers for system reliability and fiscal stewardship. Because these accountability structures are not aligned, no single entity is clearly responsible for ensuring sustained coordination across agencies.

Leadership continuity also shapes coordination outcomes. Frequent turnover among agency leaders can disrupt relationships and erode institutional knowledge, while longer tenures facilitate familiarity with infrastructure constraints and communication norms. Where coordination depends primarily on individual relationships rather than standing agreements and more deeply embedded institutional knowledge and norms at the staff level, it remains especially vulnerable to personnel changes.

3.3. Do agreements between water supply systems and fire agencies typically have a financial aspect? What are the ideal (and feasible) structures?

Additional responsibilities at the water–fire agency interface—whether related to wildfire preparedness, emergency response, or post-fire recovery—are not cost-neutral. New expectations frequently carry implicit costs, raising concerns about unfunded mandates and the growing gap between responsibilities and available resources. These pressures are exacerbated by existing funding constraints and limited willingness or ability to pay.

Against the backdrop of core revenue recovery differences between most local water and fire agencies and the lack of formalized agreements on responsibilities, participants emphasized that formal financial agreements between water systems and fire agencies are relatively uncommon. Where coordination exists, it is often operational rather than financialized, with limited mechanisms to compensate water systems for costs incurred in supporting fire response. Although essential to public safety, water used for firefighting is generally unmetered and unreimbursed. As in the other sessions of the workshop, Proposition 218 in California was repeatedly cited as a binding constraint for water utilities, as it restricts charges to the cost of providing service to individual parcels and limits cross-subsidization.

Strategies to reduce non-revenue water—such as parcel-level mitigation or rapid shutoff capabilities—were identified as potential resilience measures, though implementation at scale remains challenging. Other potential solutions to coordination problems discussed included establishing dedicated financial reserves, creating reimbursement mechanisms tied to documented fire response activities, or expanding eligibility under existing disaster assistance programs such as Fire Management Assistance Grants and the California Disaster Assistance Act.

Participants discussed technical measures to reduce system vulnerability, including dedicated raw-water hydrants and recommissioned intake lines. Some districts have installed system-wide backflow prevention to mitigate contamination during depressurization events, and remote shutoffs are conducted in Chile during wildfire events, with customers receiving modest compensation for this imposition (Cepeda, F., et al., 2025). Proposals such as using automatic or remotely controlled shutoff valves are in some ways similar to the public safety power shutdown (PSPS) discussion, but in this case may raise rather than limit liability concerns. Ironically, recording the choice raises concerns despite ubiquitous accounts of firefighters needing to make *ad hoc* manual decisions on allocating water to certain structures versus others. Water utilities expressed hesitation about isolating mains or service lines without on-site verification, citing uncertainty about legal exposure if such actions contribute to property loss. The absence of clear liability protections remains a barrier to more proactive controls.

Beyond remote shutoff capacity, advanced technologies did not come up much in the workshop conversation as part of the solution to enhanced water system–firefighting collaborations. However, we note that the potential for more real-time information sharing to fire agencies and emergency operations command centers on water system infrastructure capacity and supply levels using digital twins and AGI has surfaced in other venues (Pierce et al., 2025b). Larger water systems are starting to prototype and use these technologies more, but their usability or cost-benefit value has not been fully proven.

4. PAYING FOR NEW WILDFIRE-FIGHTING INFRASTRUCTURE

As wildfire risk intensifies, questions of existing system capacity increasingly give way to questions of financing new capabilities. Water systems play a well-defined role in delivering fire flow under routine conditions. On the other hand, having sufficient water and infrastructure to fight wildfires that threaten human settlements is not part of basic service mandates and standards for community water systems; in fact, such expectations may not be feasible even if pursued.

Determining who should pay for new wildfire-related infrastructure—and whether it should be funded at all—raises complex legal, financial, and equity considerations. This section draws on the final major session of Workshop 2 to understand whether and how wildfire-related infrastructure and services could be financed, including through rate structures, state funding, and federal funding sources.

Given the topic's novelty, we discussed answers to five guiding questions in this session of the workshop. We summarize and supplement this discussion with additional citations below.

4.1. Can and should new wildfire-related infrastructure or services be financed by water supply systems? Do these answers depend on the type of infrastructure?

At the first workshop hosted by our working group, there was strong consensus that water supply systems should have a very limited role in fighting wildfires—and likely could not have a significantly larger role even with substantial investment. It was emphasized that water systems—even "super-sized" ones—cannot extinguish very large, fast-moving fires. Again, during the second workshop, several discussions questioned whether increasing system capacity alone is the appropriate response. It was noted that given constraints on supply and built infrastructure, it is likely implausible to meet the expectation of providing water for wildfire-fighting.

Against this backdrop, workshop discussions made clear that whether water systems *can* and *should* finance new wildfire-related infrastructure depends heavily on the type of investment and how closely it aligns with the system's traditional mandate. Some wildfire-related investments are relatively low-cost and discrete, such as large-diameter hose connections or specialized fittings that improve fire response without fundamentally altering system design. These types of investments were generally viewed as appropriate for water systems to finance, particularly when they function as incremental enhancements to existing operations.

Investments that would significantly expand system-wide capacity to sustain high flows during prolonged wildfire events (a type of "wildfire flow")—such as upsizing transmission mains, adding storage, or increasing pump capacity—are much more capital intensive. Typically, large capital projects are financed up-front often through bonds or loans and repaid over time through water rates. Workshop participants noted it was likely that wildfire-related capital projects could not be financed through rates under California's Proposition 218 framework, and even if these projects were possible, they are not a viable avenue given the impacts to affordability. Customers are already facing unprecedented rate increases driven by aging

infrastructure, declining per-capita water use, and expanding regulatory requirements. Adding rate-funded wildfire investments would exacerbate the financial burden on customers.

At the same time, examples from the Yorba Linda Water District and the Crescenta Valley Water District illustrate that some utilities are making targeted investments, such as in heli-hydrants, and pairing those investments with proactive community engagement. In these cases, wildfire-related infrastructure was framed as a visible resilience measure that helped build public trust and support for rate increases. These examples suggest that communication and perceived value play a critical role in determining whether such investments are socially and politically viable.

4.2. Can municipal and utility rate structures equitably allocate increased costs if only part of system service areas face increased risks? Can this be compliant with Proposition 218 and similar laws elsewhere?

Embedding wildfire-related capital investments within water rate structures would materially increase customer costs and strain affordability. Participants cautioned against assuming that ratepayers would be an appropriate funding source for infrastructure that may function primarily as a public safety or community resilience measure rather than a core water service.

However, to the extent that wildfire-related costs are considered for recovery through rates, investing heavily in mitigating isolated wildfire risk within larger utility service areas raises equity concerns. When only a subset of customers faces elevated exposure, spreading costs system-wide is inequitable. The case of Pacific Palisades, a relatively small community with high fire risk within the broader city of Los Angeles, all served by the Los Angeles Department of Water and Power with the same rates, is an obvious example here. Its median household income is nearly more than double that of the city's (Pierce et al., 2025b), and its water supply infrastructure was already more costly to maintain the city average.

At the same time, participants noted that wildfire risk is increasingly dynamic and difficult to confine to historically designated high-risk zones, or at least those perceived to be so. The expanding and shifting nature of wildfire risk would complicate any effort to target charges geographically. Attempting to target charges to fire-prone areas introduces both potential legal challenges and opportunities. Under California's Proposition 218 framework, rates must be proportional to the cost of providing parcel-related water service. Charging certain communities for wildfire protections mostly or exclusively benefiting certain communities within larger utilities may thus be allowable or even mandated by the law, but can still create tension when wildfire investments are perceived to deliver broader public safety benefits.

Financial capacity further complicates these questions. Smaller systems, in particular, often lack the customer base and borrowing ability necessary to absorb large capital expenditures. Interest in consolidation and regionalization emerged as a potential strategy to strengthen financial resilience by broadening the rate base and sharing risk across a larger customer population. In theory, larger systems may be better positioned to absorb shocks and finance resilience investments. However, while regionalization may improve fiscal capacity, it does not eliminate the underlying equity and proportionality questions regarding who benefits and who pays.

Rate design tools were discussed as partial—but incomplete—solutions. Fixed charges could help stabilize utility revenues in the face of fluctuating demand, but they do not resolve the fundamental allocation challenge. Moreover, unlike the energy sector—where electricity consumption has been generally increasing over time to support full-cost recovery—water utilities operate within a conservation-oriented framework that limits opportunities to offset rising costs through higher sales. This structural feature constrains revenue flexibility precisely when new resilience investments may be contemplated.

Overall, participants emphasized that financing wildfire resilience solely through water rates is unlikely to be equitable or sustainable. Blended funding approaches—including state and federal grants, tax-based revenues, or dedicated resilience funding mechanisms—would be necessary to address affordability constraints, legal requirements, and the broader public safety dimensions of wildfire risk. In short, affordability and making major wildfire-related investments was seen as a hard trade-off for water systems.

4.3. Can we motivate more state or federal funding for systems to enhance fire flow and enable rebuilding of fire-damaged infrastructure?

Discussions of equity and legal compliance centered on the limits of existing system-level funding mechanisms. Participants discussed state funding mechanisms as one avenue for addressing this challenge. General obligation bonds—often placed on the ballot every few years and typically popular with voters—have historically supported water supply resilience and forest management efforts. However, bond funds are generally limited to capital investments and cannot address operational costs, revenue loss, or long-term recovery, which would all be financial elements of providing wildfire flow. Special state funds, including climate and cap-and-trade programs, offer more flexibility, but are highly competitive and politically contested. Further, general fund allocations fluctuate with economic conditions and legislative priorities and occasionally include line items for hazard mitigation, though systems cannot consistently depend on this.

Federal funding options were viewed as limited and unstable. The Drinking Water State Revolving Fund (in California or elsewhere) does not fund general fire-flow capacity, creating a stark contrast as new state requirements under SB 552 mandate fire-flow provisions for small systems by 2032 in California. Additionally, much federal funding flows through state programs such as Community Development Block Grants, meaning federal uncertainty directly affects state capacity. Increasing politicization and clawbacks related to federal grant or loan funding further undermines confidence in federal funding as a reliable near-term solution.

Across these discussions, budgets reflecting values was a recurring theme. Decisions about how to allocate resources—across communities, risk profiles, and time horizons—are ultimately normative as well as technical. Addressing wildfire risk through water system investments would, therefore, require not only new funding mechanisms, but also clearer public and political alignment around shared responsibility and acceptable trade-offs.

5. FUTURE RESEARCH AND IMPLEMENTATION DIRECTIONS

The findings in this report point to a set of unresolved questions at the intersection of infrastructure design, finance, governance, and wildfire risk. While recent events have intensified scrutiny of water system performance during wildfires, there remains limited empirical evidence to guide decisions about which investments meaningfully improve outcomes and serve to mitigate fire losses, how costs should be allocated, and what institutional arrangements are most effective under extreme conditions.

Several areas merit further research. First, additional work is needed to evaluate the relationship between wildfire-related water infrastructure investments and actual fire suppression outcomes. This includes assessing whether increased fire-flow capacity, alternative system designs, or decentralized infrastructure meaningfully prevent wildfire losses, and how such investments compare—on a cost and effectiveness basis—with prevention-oriented strategies such as vegetation management, structure hardening, and other parcel- and community-level mitigation strategies.

Second, greater attention is needed regarding the relationship between the economics of fire flow and customer affordability. Research that disaggregates the fixed and variable costs associated with firefighting services, examines how those costs are currently embedded in rates or fees, and evaluates the equity implications of different cost-allocation approaches could help inform future rate-setting and policy decisions, and optimally result in a more standardized approach for water systems to pay for fire-flow requirements. Legal constraints on rate design, including those imposed by Proposition 218, further underscore the need for careful analysis of what funding mechanisms are both feasible and equitable, but potentially relevant reforms are being proposed. For instance, the proposed California Assembly Bill 2180, if passed, would allow local government-run water systems more flexibility compared to the current Proposition 218 regime permits, enabling them to demonstrate proportional costs through any method that reasonably allocates the cost of providing service (2026).

Third, institutional and governance dimensions remain largely underexplored. This includes clarifying decision-making authority and accountability across water systems, fire agencies, and other emergency responders, as well as documenting how coordination practices function under both routine and extreme conditions. Greater clarity regarding roles and financial responsibilities may reduce ambiguity during future wildfire events and result in more efficient deployment of shared resources during catastrophic events.

Fourth, research can use risk-based frameworks to evaluate cost-effective investments in water systems to increase fire protection. Doing so would require evaluating the likely future economic damages to infrastructure and buildings from wildfire events in fire-prone urban areas, the costs of potential new investments, and the benefits of reduced economic damages that ensue from those investments. This approach is used in other sectors of infrastructure resilience and disaster risk and provides an established methodology for evaluating the level of investment that society seeks to make for reducing risk to infrastructure and properties.

Fifth, the intersection between infrastructure financing and liability needs more scrutiny. Currently, it is unclear if water systems that make emergency operation decisions during disaster events could face liability for those actions. For instance, if a water system is forced to take a portion of its distribution system offline due to severe outages and depressurization, is it liable for these decisions? How such decisions influence system design is an area where both research and policy development can improve water systems' capacity to make critical decisions during crises.

Given the interdisciplinary and intransigent nature of many of the problems facing water supply systems as they increasingly engage in wildfire-fighting efforts, we welcome further focus and engaged efforts by other scholars and practitioners to explore solutions in this space.

6. DISCUSSION AND CONCLUSION

The UCLA and UC ANR's Water Supply + Wildfire Research and Policy Coordination Network was launched in response to heightened scrutiny of water systems during recent wildfire events. This report presents insights and questions from the second workshop, held in January 2026, and contributes to an evolving body of work examining the role of water systems in wildfire preparedness, response, and recovery. These findings are intended to inform—not resolve—ongoing debates. Through the remainder of this workshop series and related research efforts, the Network will continue to explore these issues and support evidence-based approaches to addressing the growing challenges posed by 21st-century wildfires.

Public debate has often centered on whether systems performed adequately during moments of crisis, but such critiques rarely account for the institutional, financial, and legal constraints that shape what water systems are designed—and able—to provide under existing mandates and funding structures. Expectations for wildfire response are expanding more rapidly than clarity around responsibility and financing. As wildfire risk intensifies, aligning roles, funding mechanisms, and tempering public expectations will be essential to avoid placing untenable demands on water systems while ensuring that resilience efforts remain equitable and sustainable.

Our January 2026 workshop underscored the uneven capacity of water systems to prepare for and respond to wildfire events. Differences in scale, financial resilience, governance structure, and interagency relationships significantly shape performance under stress. The challenges facing small water systems were especially pronounced, as revenue loss following displacement and limited access to recovery funding compounded already narrow fiscal margins.

Workshop discussions pointed to a growing misalignment between expectations for wildfire performance and the legal and financial structures that govern water systems. Water utilities operate within defined mandates and constrained funding mechanisms, yet expectations during extreme events increasingly exceed those parameters. When performance standards, liability frameworks, or resilience requirements evolve without corresponding dedicated funding mechanisms, pressure is placed on affordability and system stability.

Discussions also emphasized dimensions of wildfire response that are often overlooked in policy debates. Fire suppression and water system operations remain highly manual and labor-intensive, relying on staff who may themselves be directly affected by the disaster. Mutual aid responders frequently arrive without familiarity with local systems, and water utility personnel may face barriers to accessing infrastructure during emergencies. These human and operational realities complicate assumptions about redundancy, scalability, and effectiveness of purely technical solutions.

At the same time, the discussions did point to near-term actions that hold promise. Improved communication and coordination between water systems and fire agencies—particularly through real-time data sharing, clearer access protocols, and joint training—were consistently identified as a relatively low-cost opportunity to strengthen preparedness. Workshop participants viewed formalizing relationships and practicing mutual aid arrangements outside of active disasters as practical steps that could be taken within existing institutional constraints.

Looking ahead, participants emphasized that while future disasters may differ in form, continued wildfire impacts are inevitable. The diversity of water systems, governance structures, and risk profiles complicates coordinated planning, yet regional approaches offer one potential pathway where resources could be shared and costs could be spread across a larger population. However, as infrastructure ages and costs continue to rise, difficult questions remain about how wildfire risk reduction should be reflected in rates, taxes, and public investment, and how equity considerations can be addressed within these frameworks.

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