

ISSUE BRIEF

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WILDFIRE COSTS IN CALIFORNIA: THE ROLE OF ELECTRIC UTILITIES¹

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CONTEXT: A GROWING RISK

Wildfires are currently raging across the west, once again devastating families and communities. The California legislature is considering a range of policies to improve wildfire risk management in the state. While the current fires were not started by an electric utility, one aspect under consideration is how the costs of utility-started wildfires are distributed. This Issue Brief takes up this topic.

It is clear that wildfire risk is increasing.² Development has pushed into the wildland-urban interface (WUI), where structures intermingle with fire-prone vegetation, leading to greater property damage from blazes and a greater risk of fire. Decades of fire suppression³ has led to a buildup of fuel, leading to worse conflagrations. Climate change is causing longer fire seasons due to increased drought and heat.⁴ Invasive species and insect and disease infestations are

KEY FINDINGS

- The current legal regime in California creates poor incentives for reducing wildfire risk.
- Suggested policy reforms:
 - Define proper mitigation levels before wildfires occur.
 - Reform strict liability for utility-started wildfires.
 - Create a ratepayer class for WUI residents to reflect the higher risks of their location choice.
 - Develop tools that better incorporate current and future wildfire risk into land use decisions.
 - Use insurance to promote greater hazard mitigation.

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² Schoennagel, T., J. K. Balch, H. Brenkert-Smith, P. E. Dennison, B. J. Harvey, M. A. Krawchuk, N. Mietkiewicz, P. Morgan, M. A. Moritz, R. Rasker, M. G. Turner and C. Whitlock (2017). "Adapt to more wildfire in western North American forests as climate changes." *Proceedings of the National Academy of Sciences* **114**(18): 4582-4590.

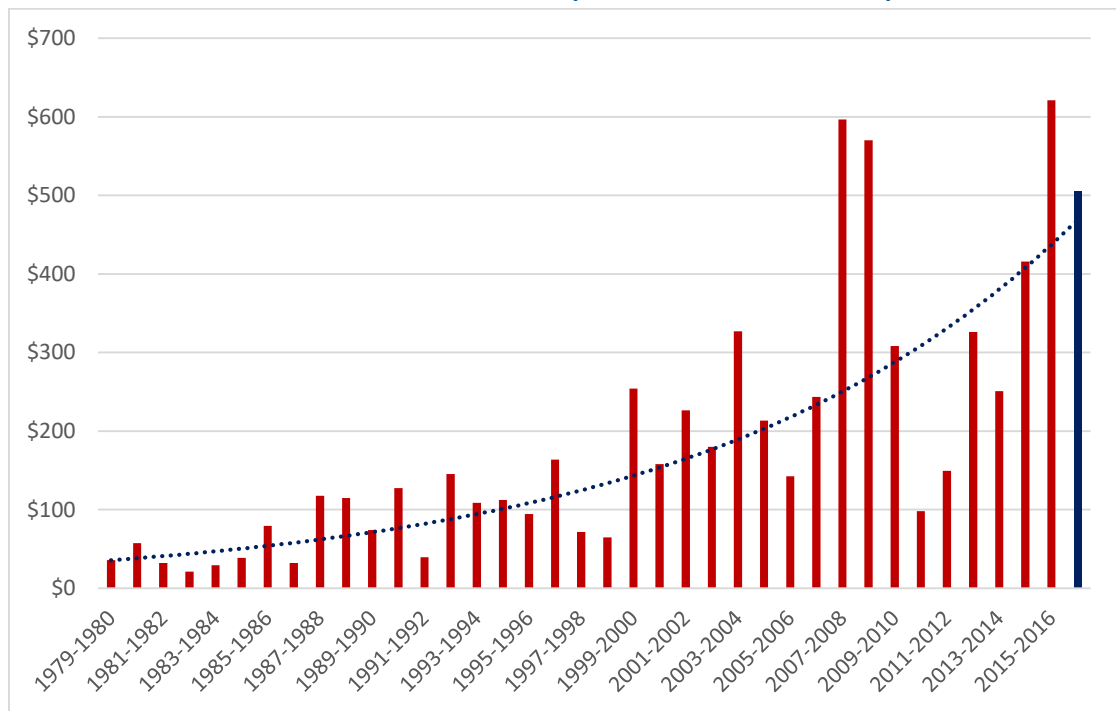
³ Fire suppression is a wildfire response strategy that involves detecting, containing, and extinguishing an unwanted fire.

⁴ See California's Fourth Climate Change Assessment, available at www.climateassessment.ca.gov expected to be posted August 21, 2018.

contributing to the higher risk, as well. **All these factors are leading to an increasing number of large wildfires⁵ and commensurately higher costs of fighting them.⁶**

This trend is particularly apparent in California, where firefighting costs have escalated significantly over the last four decades (Figure 1) and wildfire related losses are predicted to grow.⁷ **In 2017, wildfires in California destroyed more structures – at least 9,300 – than in any other previous year** (Figure 2). As of 2010, California had more than 4.4 million homes in the wildland-urban interface, the largest number of any other state, representing an increase of 36 percent since 1990.⁸ Nationwide, the WUI is less than one tenth of land area in the conterminous United States, yet recent research finds that 43 percent of all new homes were built in the WUI.⁹

FIGURE I. CAL FIRE SUPPRESSION COSTS (MILLIONS OF 2017 USD) BY FISCAL YEAR



Source: Cal Fire. Note: 2016-2017 data reflect only expenditures made through the third quarter, final numbers are pending.

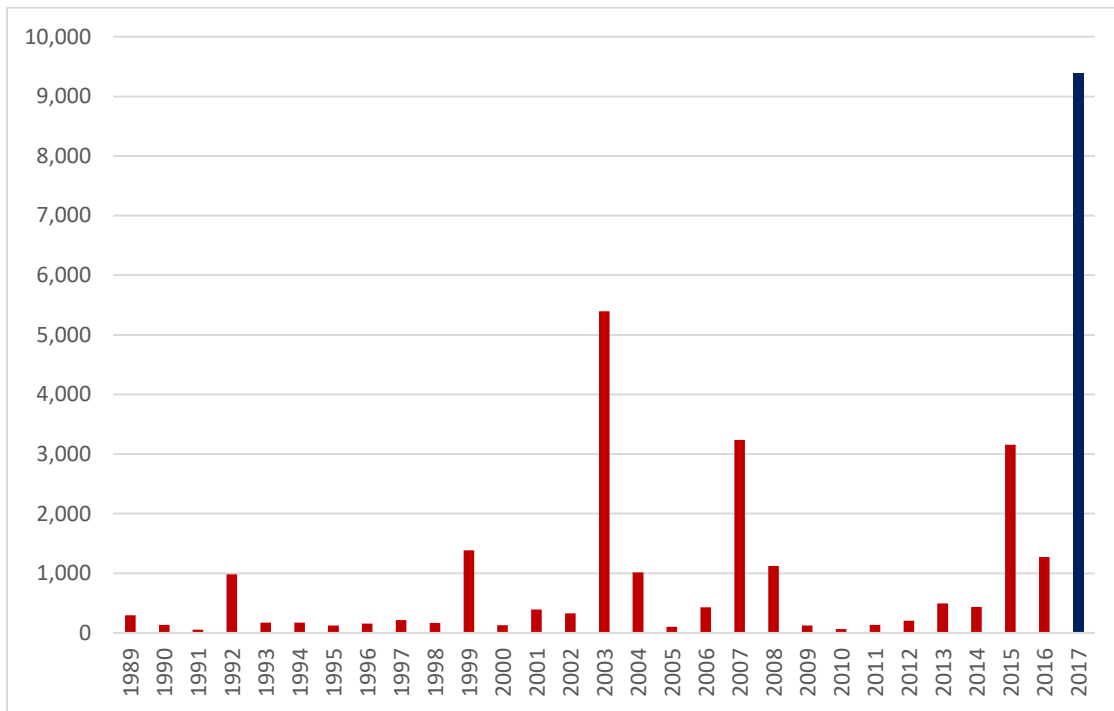
⁵ Dennison, P. E., S. C. Brewer, J. D. Arnold and M. A. Moritz (2014). "Large wildfire trends in the western United States, 1984-2011." *Geophysical Research Letters* **41**: 2928-2933.

⁶ Gorte, R. W. (2013). *The Rising Costs of Wildfire Protection*. Bozeman, MT, Headwaters Economics.

⁷ Diffenbaugh, N. S., D. L. Swain and D. Touma (2015). "Anthropogenic warming has increased drought risk in California." *Proceedings of the National Academy of Sciences* **112**(13): 3931-3936.; Bryant, B. P. and A. L. Westerling (2014). "Scenarios for future wildfire risk in California: Links between changing demography, land use, climate, and wildfire." *Environmetrics* **25**(6): 10.1002/env.2280.

⁸ Radeloff, V. M. Mockrin, and D. Helmers (2018). "Mapping Change in the Wildland Urban Interface (WUI) 1990-2010: State Summary Statistics." Online at http://silvis.forest.wisc.edu/GeoData/WUI_cp12/WUI_change_1990_2010_State_Stats_Report.pdf.

⁹ Radeloff, V. C., D. P. Helmers, H. A. Kramer, M. H. Mockrin, P. M. Alexandre, A. Bar-Massada, V. Butsic, T. J. Hawbaker, S. Martinuzzi, A. D. Syphard and S. I. Stewart (2018). "Rapid growth of the US wildland-urban interface raises wildfire risk." *Proceedings of the National Academy of Sciences* <https://doi.org/10.1073/pnas.1718850115>.

FIGURE 2. STRUCTURES DESTROYED BY CALIFORNIA WILDFIRES, 1987-2017

Source: Cal Fire. Note: Cal Fire has not yet finalized their 2017 data and the numbers shown here reflect only structures destroyed by five of the 2017 fires (Tubbs, Nuns, Thomas, Atlas, and Redwood Valley).

ELECTRIC UTILITIES AND WILDFIRE RISK

Wildfires start for a number of reasons. Some are ignited naturally by lightning. Most are started by people.¹⁰ Escaped campfires, debris burning, vehicle sparks, and intentional acts of arson are some of the main human causes. Electric utilities may also cause wildfires when high winds bring down power lines or conductors or when animals, trees, or other vegetation make contact with power lines.

Only 5 percent of wildfire ignitions in California are from power lines,¹¹ but when these fires start, they are larger, accounting for just under 11 percent of acres burned. This is because the probability of ignition from a power line increases with wind speed. Greater wind speed means conditions more favorable to the spread of wildfire, conditions where suppression is less effective, and conditions in which firefighters are likely to be spread thin.¹² Put simply: the conditions that cause power lines to start wildfires are the exact same conditions that make them spread rapidly and make them hard to contain. In Southern California, data on ignition source and acreage burned shows that utility-started fires cluster in the autumn months and are associated with Santa Ana wind conditions.¹³ Data from the California

¹⁰ Balch, J. K., B. A. Bradley, J. T. Abatzoglou, R. C. Nagy, E. J. Fusco and A. L. Mahood (2017). "Human-started wildfires expand the fire niche across the United States." *Proceedings of the National Academy of Sciences* **114**(11): 2946-2951.

¹¹ This figure is based on analysis of Cal Fire data from 2007 to 2016, see http://www.fire.ca.gov/fire_protection/fire_protection_fire_info_redbooks.

¹² Mitchell, J. W. (2013). "Power line failures and catastrophic wildfires under extreme weather conditions." *Engineering Failure Analysis* **35**: 726-735.

¹³ Syphard, A. D. and J. E. Keeley (2015). "Location, timing and extent of wildfire vary by cause of ignition." *International Journal of Wildland Fire* <http://dx.doi.org/10.1071/WF14024>.

Department of Forestry and Fire Protection (Cal Fire), the agency responsible for fire protection in California, indicates that power lines caused 3 of the 20 largest wildfires in the state's history.¹⁴

THE COSTS OF WILDFIRE

Wildfires cause extensive damages. Scholars of disasters often divide impacts into direct costs—those that result as a direct cause of the fire—and indirect costs—follow-on costs from the immediate destruction. The direct costs can stem from burning, heat, firebrands (burning or glowing pieces of material carried beyond the fire by wind), or smoke. A list of the potential direct and indirect costs from wildfires is detailed in Table 1.

Wildfire costs are borne by a number of different parties, including residents of impacted areas, property owners, insurance companies, electric utilities, and taxpayers at all levels of government. The costs emanating from a wildfire can be broad and impact many sectors. Depending on legal and regulatory regimes, costs can shift across different groups. In this brief, we focus on electric utilities and the share of wildfire costs that they pay in California for utility-ignited wildfires.¹⁵

TABLE I. WILDFIRE COSTS

Direct Costs	Indirect Costs
Fire-fighting expenditures	Business interruption
Emergency response expenditures	Temporary housing costs
Damage to residential structures and contents	Lost tax revenue
Damage to commercial and industrial structures, inventories, equipment burned (including utilities)	Increased risks of landslides and floods
Damage to agricultural crops, buildings, or equipment (including timber)	Lost recreational opportunities and aesthetic impacts
Damage to infrastructure	Transportation interruption
Injury and mortality (including health impacts from smoke)	Long-term health impacts from smoke
	Mental health impacts/psychological stress
	Lower property values
	Loss of ecosystem services, including habitat degradation, reduced air and water quality, and reduced carbon sequestration

WHAT WILDFIRE COSTS DO UTILITIES PAY?

This section focuses exclusively on wildfires in California that are started by power lines or other electric utility equipment. After a wildfire, Cal Fire conducts an investigation to determine the origin of the fire and determines

¹⁴ See http://www.fire.ca.gov/communications/downloads/fact_sheets/Top20_Acres.pdf.

¹⁵ There has also been research on the potential increases in damages to electric infrastructure if the frequency or severity of wildfires increases in the coming years.

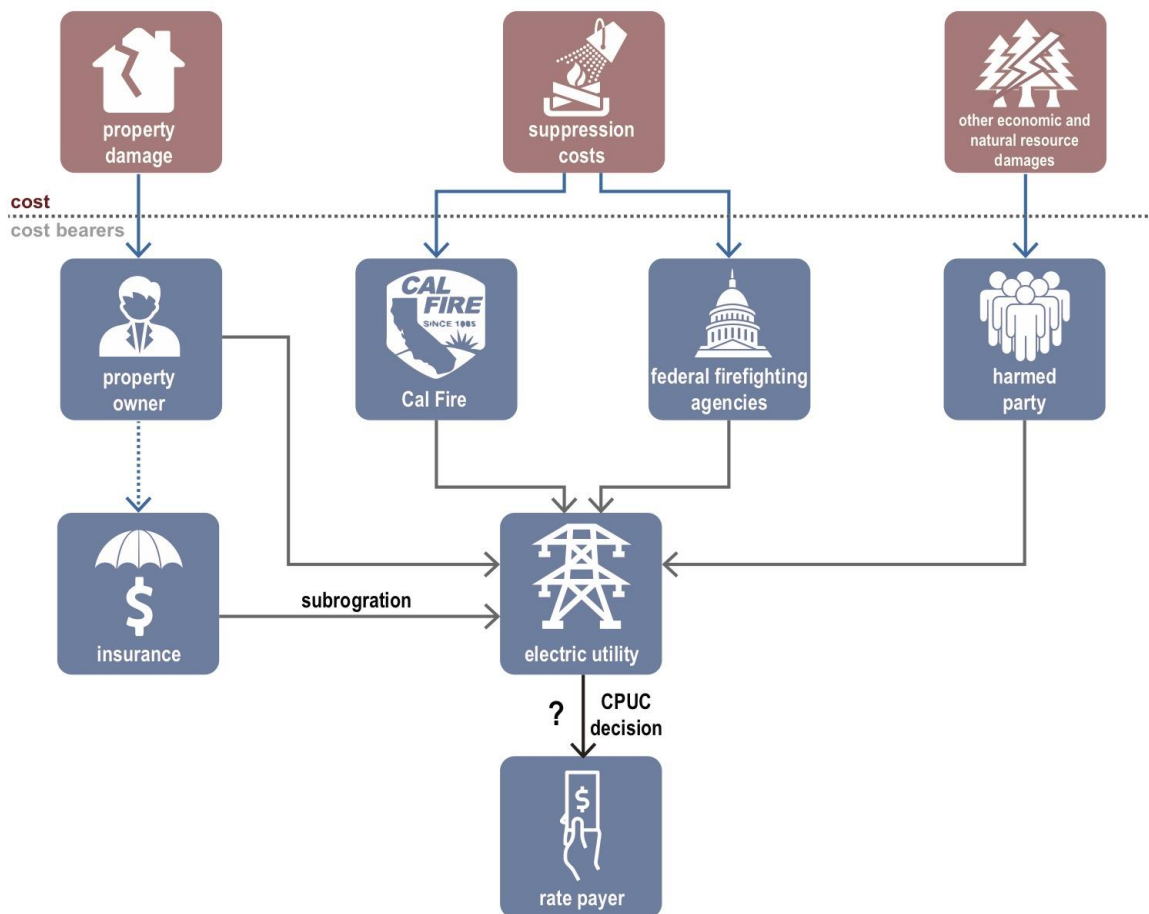
whether the utility’s lines or equipment were involved in igniting the blaze. When utilities are found to be a cause of the fire, they can be required to pay for three primary types of losses: (1) property damage; (2) suppression expenditures incurred by government entities, including Cal Fire and the United States Forest Service (USFS); and (3) other economic and natural resource damages. The first two are direct costs and are well defined. As we discuss, however, possible cost recoupment could be broader and include direct and indirect damages in the third category. These three categories are shown in the top row of Figure 3.¹⁶

For fires in which utility equipment played a role, utilities may be required to pay for the damages through one of three legal mechanisms:

- (1) inverse condemnation lawsuits brought by property owners or insurance companies through subrogation,
- (2) tort lawsuits by a harmed party, and/or
- (3) recovery of fire suppression costs from negligent third parties under California Health and Safety Code 13009.

We discuss each of these in more detail below.

FIGURE 3. COSTS PAID BY ELECTRIC UTILITY FROM WILDFIRES IGNITED BY LINES OR EQUIPMENT



¹⁶ Thanks to Xiao Wu for her assistance in developing Figure 3.

The ability of another party to recoup wildfire costs from an electric utility is governed by two different legal regimes. The first is *strict liability*, which requires entities to pay for all property damages (and attorney's fees) caused by their activity, whether or not what they did was negligent. The second is *negligence*, which makes entities pay for damages only when they failed to take appropriate risk management measures. The legal regime in place impacts the incentives of the utility, as well as other parties, to incur costs for reducing wildfire risk. It also impacts on who bears the costs of wildfires. Before evaluating the current regime in California, we first present a basic overview of the compensation mechanisms surrounding wildfire damages from utility-ignited fires and when utilities face strict liability for wildfire damage.

Inverse condemnation

In California, property owners can seek compensation for property damage through the application of inverse condemnation when it is determined that the utility's equipment is the cause of ignition, regardless of whether the utility was negligent or at fault. The California state constitution says that private property may be "taken" or damaged for public use only when just compensation is provided.¹⁷ If a public entity damages private property in pursuit of a public purpose without first compensating the property owner, a property owner can bring an *inverse condemnation* suit to seek compensation. As several courts have explained, the policy underlying inverse condemnation is "that individual property owners should not have to contribute disproportionately to the risks [or costs] from public improvements made to benefit the community as a whole."¹⁸ Rather, such costs should be "distribute[d] throughout the community...to socialize the burden...that should be assumed by society."¹⁹

Typically, such cases have been brought against public entities that can then raise funds through taxation. Although private utilities are not government entities, several courts in California have held investor-owned utilities liable under this doctrine, arguing that they should be treated as public entities because they have a state-granted monopoly, provide a public service, and can raise rates to spread the costs associated with that service among all beneficiaries.²⁰ **In California, inverse condemnation operates as a strict liability regime: the utility pays even if not negligent.** With possibly one exception, no other state allows for inverse condemnation with strict liability.²¹ Property owners can use inverse condemnation to recover property damages.

Property owners' insurance companies can also use inverse condemnation to recoup their claims payments through subrogation. Generally, wildfire damage to someone's home is covered through standard homeowners insurance policies. Since homeowners insurance is required by lenders for mortgagees, such coverage is common. The Insurance Information Institute estimates that 95 percent of homeowners in the United States have such coverage.²² In high-risk areas of California, if homeowners cannot find adequate wildfire coverage in the private market, they can purchase fire insurance through California's Fair Access to Insurance Requirement (FAIR) plan.

¹⁷ Cal. Const., art. I, § 19(a) ("Private property may be taken or damaged for a public use and only when just compensation...has first been paid to, or into the court for, the owner.").

¹⁸ *Pacific Bell v. Southern California Edison Co.*, 208 Cal.App.4th 1400, 1407 (2012).

¹⁹ *Holtz v. Super. Ct.*, 3 Cal.3d.296, 303 (1970).

²⁰ *Pacific Bell*, 208 Cal. App.4th at 1406-07; *Barham v. Southern Cal, Edison Co.*, 74 Cal.App.4th 744, 753-54 (1999); see also Peloso, M. and K. Miller (2018). "Unnatural Disaster" *The Environmental Forum*, **May-June**

²¹ Alabama may also use inverse condemnation with strict liability, but the exposure and risk is substantially different from California.

²² See <https://www.iii.org/fact-statistic/facts-statistics-renters-insurance>.

In a subrogation lawsuit, an insurance company attempts to recover the company's claims payments to property owners under the same mechanism that the insured would use to sue a third-party responsible for damage, had they not had damages covered by insurance (i.e., the insurer "stands in the shoes" of the insured vis-à-vis the third party). As such, insurance companies can use inverse condemnation to recover the claims payments they make to their policyholders for wildfire damages.

Under the inverse condemnation regime, utilities must pay for all property damages—whether paid to the property owner or the insurance company—even if they adhere to rules and requirements to mitigate wildfire risk. This is controversial. Utilities must provide power, even in high-risk areas. If they operate their system according to the highest safety standards, but a prolonged drought, a heat wave, and high wind conditions combine to blow debris into a line and it sparks a conflagration, should they be required to pay all property damage associated with that fire? What are the impacts of strict liability versus negligence on utility investments?

The growing wildfire risk in the state means that these costs can sometimes be substantial. For fires in 2007, San Diego Gas and Electric had to pay \$2.4 billion in wildfire costs.²³ For wildfires in 2017, PG&E is expected to have to pay at least \$2.5 billion and possibly much more. The company's quarterly filing with the SEC from July 26, 2018 speculated potential liabilities for the Northern California wildfires could exceed the estimated \$10 billion in estimated insured property losses. Both utilities carry liability insurance, which pays for a portion, but not all, of these costs. PG&E's insurance, for example, will cover only approximately \$840 million in wildfire costs.²⁴

Tort liability

Harmed parties can recoup damages from the electric utility through a tort case only when the utility is negligent. These suits must show there was a duty of care owed to the plaintiff, that the duty was breached, that the actions of the defendant caused the harm, that this was foreseeable, and that it resulted in damages. In plain language, the person bringing the suit must show that the plaintiff should have taken actions (e.g. wildfire mitigation) to avoid harm and they did not. Of note, many tort cases concerning wildfire damage are settled out of court, limiting the amount of case law. Tort cases may be brought by insurance companies through subrogation when inverse condemnation is not applicable. An insurer who provides fire protection to a home is responsible for losses whether the fire originated in the home or elsewhere. If damage was attributable to negligence or intentional behavior, many insurance contracts let the insurance company seek compensation from the negligent party.

Recouping suppression expenditures

For the recoupment of suppression costs by public entities, such as Cal Fire, California has a state law allowing cost recovery, including from an electric utility if they are responsible for the ignition.²⁵ Under Cal Fire's Civil Cost Recovery Program, the agency has authority to pursue civil actions to recover fire suppression costs from a person or organization that causes a fire negligently or in violation of a law to address a fire hazard. The United States Forest Service can similarly seek recoupment of suppression costs.

²³ See <https://www.sdbj.com/news/2017/nov/30/cpuc-turns-down-san-diego-gas-electrics-2007-wildf/>.

²⁴ See page 40 of [http://s1.q4cdn.com/880135780/files/doc_financials/2018/07/Form-10-Q-Q2-2018-\(Final\).pdf](http://s1.q4cdn.com/880135780/files/doc_financials/2018/07/Form-10-Q-Q2-2018-(Final).pdf).

²⁵ See California Civil Code § 13009(a) and § 13009(b).

RATEPAYERS AND THE CPUC

The courts determine whether a utility is required to pay damages. Once the court's finding is made, it is the California Public Utilities Commission (CPUC) that makes a decision as to whether the investor owned utility can pass these costs on to ratepayers. The CPUC regulates the price that investor owned utilities charge customers to ensure they are "just and reasonable."²⁶ Every three years, the CPUC reviews detailed information on the costs of operating and maintaining utility services and infrastructure and determines how much revenue and profit the utility may collect.

Since rates are fixed, investor owned utilities cannot increase prices on their own to cover unexpected costs, such as those arising from wildfire liability. Instead, the CPUC must approve the utility's request to recover costs from ratepayers. In making decisions, the CPUC adheres to a standard of evaluating whether the utility acted "reasonably and prudently" in operating and managing its system.²⁷

To help track unexpected disaster costs, such as repairing, restoring, or replacing damaged facilities, an investor owned utility may apply to the CPUC for recovery of the costs recorded in a Catastrophic Event Memorandum Account (CEMA). CEMAs may be established for disasters declared by the Governor or President and allow the utility to record disaster costs and later request permission from the CPUC to recover those costs from ratepayers. Importantly, CEMA's cannot be used for upfront mitigation costs nor for wildfire liability.

The CPUC may deny requests for cost recovery of wildfire damages. For example, the CPUC recently denied a request (different process than a CEMA) from San Diego Gas & Electric to pass \$379 million in wildfire costs in excess of their insurance on to ratepayers. The Commission decided that the utility did not "reasonably and prudently operate its facilities" linked to three 2007 fires. In their decision, however, the CPUC explained that "[i]f the preponderance of the evidence shows that the utility acted prudently, the Commission will allow the utility to recover costs from the ratepayers."²⁸ **What constitutes ex-ante prudent behavior thus becomes a central question concerning who ultimately covers wildfire costs.**

When the CPUC does not allow for any cost recovery, the utility will be financially impacted. Some utilities have insurance to cover wildfire damages, including legal claims, but this is unlikely to fully cover losses. When the utility does not have sufficient insurance and the damages cannot be passed on in rate increases, the costs will impact the financial health of the utility. In the extreme, if costs are large enough, the utility could face bankruptcy, leaving many property owners and insurers without recourse and shifting many costs to taxpayers. Indeed, utilities are already becoming less attractive for investors as evidenced by the 40 percent stock price decline of PG&E and 20 percent decline of Edison International following the 2017 wildfires.²⁹ Further, Fitch and Moody's last spring announced credit downgrades for PG&E, Edison International, and its subsidiary, Southern California Edison Company, citing California's application of strict liability for wildfire damages.³⁰ Should investors shy away from supporting utilities, this will limit their ability to

²⁶ See California Public Utilities Code, section 451, available here:

https://leginfo.ca.gov/faces/codes_displayText.xhtml?lawCode=PUC&division=1.&title=&part=1.&chapter=3.&article=1.

²⁷ For more on this in relation to recent CPUC findings, see

<http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M218/K019/218019946.PDF>.

²⁸ See <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M202/K420/202420814.PDF>.

²⁹ Stock price calculations were determined based on the October 11, 2017 close compared to July 20, 2018.

³⁰ See https://www.moody.com/research/Moodys-downgrades-PGE-to-A3-and-PGE-Corp-to-Baa1--PR_380253 and https://www.moody.com/research/Moodys-Changes-Edison-International-and-Southern-California-Edisons-Rating-Outlooks--PR_380780.

raise capital for important projects, such as the construction of new renewable generation infrastructure that will be necessary to meet the state of California's climate goals.

EVALUATING THE CALIFORNIA REGIME

There are three concerns with the current legal regime in California surrounding utility-ignited wildfires:

- (1) there is little justification for use of inverse condemnation in these cases,**
- (2) rate payers in the WUI are not receiving appropriate price signals, and**
- (3) there is not enough agreement ex-ante on what actions electric utilities should take to lower wildfire risk.**

(1) Inverse Condemnation: An Appropriate Regime for Wildfires?

There are three arguments that could be made in favor of strict liability. None of them, however, are applicable in the case of property damage from utility-ignited wildfires.

First, strict liability may be used to govern extremely hazardous activities, such as nuclear power production, that justify *expansive* risk reduction investments on the part of the entity engaging in the activity. Providing electric power does not usually fall into this category.³¹ If the utility is held liable for damages beyond those that occur from negligence, they may overinvest in risk reduction or insurance—beyond what is economically optimal, driving electricity costs up. Taken to its extreme, this regime may cause the utility to be overly focused on fire detection and firefighting. Further, if all the mitigation expenses are passed on to ratepayers, there becomes a tension between the extent of risk reduction and affordable electricity.

Second, strict liability may be considered appropriate when it is effective in incentivizing how frequently such an activity occurs, as well as the nature of the activity.³² That is, certain harms (for example, car accidents) can be controlled not only by investing in risk reduction measures (for example, back-up cameras in cars), but also by reducing the activity (for example, driving less and using other forms of transportation instead). This is not applicable here, however, because utilities provide electric service to homes irrespective of whether they are in high-risk areas of the WUI or not. Utilities may de-energize conductors and electrical lines, but this is only used in extreme circumstances and, given the hot conditions that accompany wildfires and re-energization timeframes, applying the rationale of activity reduction to support the application of strict liability would seem controversial.³³

A third argument for inverse condemnation is that it allows the costs of an activity benefiting the public to be spread across all beneficiaries. For public entities, as mentioned earlier, the costs can be spread through taxation. California courts have assumed that privately-owned utilities can reliably raise electricity rates to spread the costs of wildfire damage across ratepayers. The problem here is that it is not certain the CPUC will always allow utilities to pass costs on to ratepayers.

³¹ Riordan, C. (2015). "Calming the fire: How a negligence standard and broad cost-recovery can help restore national forests after wildfires." *Boston College Environmental Affairs Law Review* 41(1): Article 7.

³² Shavell, S. (1980). "Strict liability versus negligence." *Journal of Legal Studies* 1: 1-25

³³ Utilities must carefully balance the risks and benefits and their decision will be subject to post de-energization review by the CPUC. Utilities may not have the information needed to evaluate when the risks of cutting power exceed the risks of igniting a wildfire and once de-energized, depending on the extent of the outage, it can take more than a week to restore power as all the lines must first be monitored.

It is worth emphasizing that **managing wildfire risk requires measures by many entities beyond utilities, including local and state government, as well as property owners.** The utility does not have control over many important drivers of wildfire risk, such as weather conditions, land use decisions, and building codes. **So, while it is essential that utilities bear some wildfire costs in order to have an incentive to undertake cost-effective precautions under their control, given the reasons above, it is difficult to justify this to be done under a strict liability regime.** If the utility has to pay for damages significantly beyond their control, constrained returns and reduced credit ratings will increase their cost of capital, thus making financing difficult.

(2) How Much Should Ratepayers Pay?

Once a utility is faced with paying wildfire costs, how much should be passed on to the ratepayer? If the utility engages in reckless behavior, then ratepayers should not bear that cost. **The cost of prudent risk reduction and management could be borne by ratepayers—but possibly not all ratepayers.** Ratepayers located in the WUI create the highest wildfire risk. To ensure that wildfire risk is considered by municipalities and in homeowner location and hazard mitigation decisions, one policy option is to pass these costs specifically to these ratepayers. **As such, a new class of ratepayer in the WUI that are charged a higher cost for their electricity to cover the increased cost of mitigation and recovery in those areas seems worthy of investigation. Means-tested exceptions could be made for lower-income families in high-risk areas.** This class of ratepayers could also be made aware that their service reliability will be lower due to the need to de-energize lines, for example, in high wind conditions. In addition, there are multiple methods of cost recovery beyond ex-post increases in rates that could be explored in future work, including utility insurance pools and customer fees deposited into designated wildfire accounts, among others.

(3) What determines a negligence court finding and what is considered prudent by the CPUC?

For utilities to be liable under a tort claim, they must be found negligent. To disallow recovery of wildfire costs from ratepayers, the CPUC must find utilities to have acted imprudently. Disputes over both these types of decisions make clear that there is disagreement regarding what utilities should be doing *before* a wildfire to manage the risk such that they meet ex-post standards.

One part of wildfire mitigation is clearly defined: vegetation management. As stated California Public Resources Code 4293, a utility must clear vegetation in all directions a certain number of feet depending on the voltage of the line.³⁴ Clearing vegetation is only one possible mitigation measure. Utilities could also harden poles, raise poles, separate lines, bury lines, and invest in new technologies that can help de-energize lines before they hit the ground. Utilities can also invest in better early detection monitors and contribute to initial suppression efforts.

All these initiatives cost money (some, such as burying lines, are incredibly expensive) and, if pursued, will either require higher rates or divert company resources away from other possible investments. How much wildfire mitigation should utilities be doing? Which measures are cost-effective? Which, when undertaken, would demonstrate prudence for purposes of cost recovery? **What is needed is a clear articulation of appropriate utility wildfire mitigation before wildfires occur.**

³⁴ Specifically, the code states that vegetation should be cleared four feet for any line operating at 2,400 – 72,000 volts; six feet for any line operating at 72,000 to 110,000 volts; and 10 feet for any line operating at 110,000 or more volts. See California Public Resources Code 4293: <https://codes.findlaw.com/ca/public-resources-code/prc-sect-4293.html>.

IMPROVING WILDFIRE RISK MANAGEMENT

Reducing future losses from wildfires through cost-effective mitigation measures and providing financial assistance to those harmed from these disasters presents challenges to the different interested parties including utilities, insurers, property owners, communities, Cal Fire, the California state legislature, and the federal firefighting agencies. All these stakeholders have a role to play in managing this risk.

When a wildfire has many possible causes, it can be characterized as an interdependent security problem.³⁵ Multiple actors contributing to a risk characterize such problems.³⁶ The decisions of one stakeholder can impact the harm experienced by another and influence their economic incentives for undertaking protective measures to reduce future risks. The increase in wildfire risk observed recently and projected for the future, as we have stated earlier, stems from climate change and decades of land management decisions. Local and state governments make decisions about building codes and zoning that determine the number of structures in high-risk areas and their susceptibility to wildfire. Property owners make decisions about defensible space and fire-resistant building. All these actions could lower the risk of property damage from wildfires but are beyond the control of the electric utility. More generally, all of these actors need to own a share of the wildfire risk so they undertake cost-effective measures under their control to limit the risk.

POLICY REFORMS

We suggest the following policy reforms that will be examined in more detail in future work:

Define proper mitigation levels ahead of wildfires. An economic analysis of the costs and benefits of various mitigation measures should be undertaken. Each utility should have an approved wildfire mitigation plan that is agreed upon by all stakeholders in advance of any fire. If the utility demonstrates continued compliance with the agreed upon wildfire mitigation plan, its actions should be deemed prudent for cost recovery proceedings.

Reform inverse condemnation by eliminating strict liability for wildfires. The application of inverse condemnation to wildfires ignited by power lines or electric utility equipment is ill-founded. Requiring utilities to pay for wildfire property damages should require a finding of negligence.

Ratepayers contributing a greater share to the risk should pay a higher cost. A case could be made that utilities be allowed to recover wildfire mitigation costs that are found to be reasonable and prudent.³⁷ Utilities should be permitted to create a separate class of ratepayers in the WUI and charge them higher fees due to the higher contribution to wildfire risk of their location choice. This will help send appropriate price signals about the riskiness of development in the WUI.

³⁵ More details on the interdependent security problem can be found in: Kunreuther, H. and Heal, G. (2003) "Interdependent security," *Journal of Risk and Uncertainty* **26**: 231–249.

³⁶ This is the case for wildfire. See: Bradshaw, K. M. (2010). "A modern overview of wildfire law." *Fordham Environmental Law Review* **21**: 445-478.

³⁷ California is currently considering legislation (SB 1088) that would allow utilities to recover wildfire mitigation costs from ratepayers as long as the costs are associated with actions described in a CPUC-approved wildfire mitigation plan. For example, utilities would be able to charge ratepayers for actions such as vegetation management and developing protocols for disabling reclosers and de-energizing power lines – two activities SB 1088 would require utilities to include in their resiliency plans.

Develop tools that better incorporate current and future risk into land use decisions. One significant driver of escalating wildfire damages is the increasing number of structures in the WUI. As risk increases, land use planners need tools to understand and incorporate current and future risks to minimize the threats of wildfire to property, and, more importantly, human lives. CPUC and Cal Fire could work together to develop risk maps.

Harness insurance programs to promote risk reduction. Several models from other perils are available to link insurance to risk reduction through community and landowner mitigation measures. For instance, regulations and incentive programs developed under the National Flood Insurance Program might hold lessons for California's FAIR plan. They suggest approaches for incentivizing communities to take more proactive measures to lower risk and in return receive lower insurance premiums.

ABOUT THE WHARTON RISK CENTER

Established in 1985, the **Wharton Risk Management and Decision Processes Center** develops and promotes effective corporate and public policies for dealing with catastrophic events including natural disasters, technological hazards, terrorism, pandemics and other crises. The Risk Center research team – over 70 faculty, fellows and doctoral students – investigate how individuals and organizations make choices under conditions of risk and uncertainty under various regulatory and market conditions, and the effectiveness of strategies such as alternative risk financing, incentive systems, insurance, regulation, and public-private collaborations at a national and international scale. The Center actively engages multiple viewpoints, including top representatives from industry, government, international organizations, interest groups and academia.

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