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WILDFIRE RISK & RESILIENCE
@PNNL

The Burn Rate: How Wildfire Impacts Energy Affordability

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The descriptions are general summaries and may not reflect the full detail or latest information.

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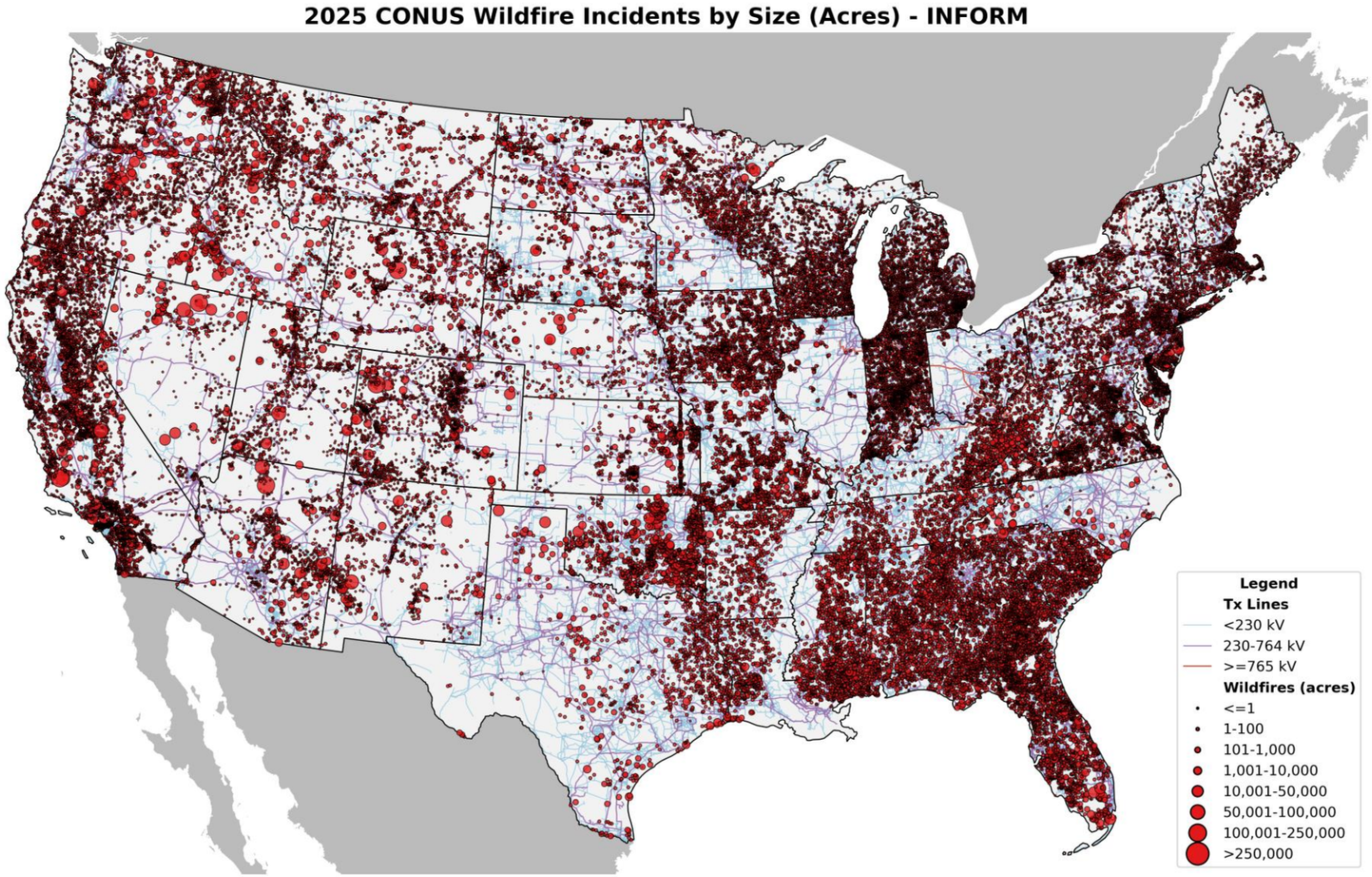
Wildfire poses reliability risks for electric utilities

2025	
Fires	97,722
Acres	4,272,252
Ignitions within 10 miles of transmission	93,923 (95.77%)
Proportion of total acres burned within 10 miles of transmission lines	70%

- January-December
- National-scale challenge
- Implications for bulk grid reliability with common proximity to transmission
- 2025 was a relatively low fire year (~30% below annual averages)

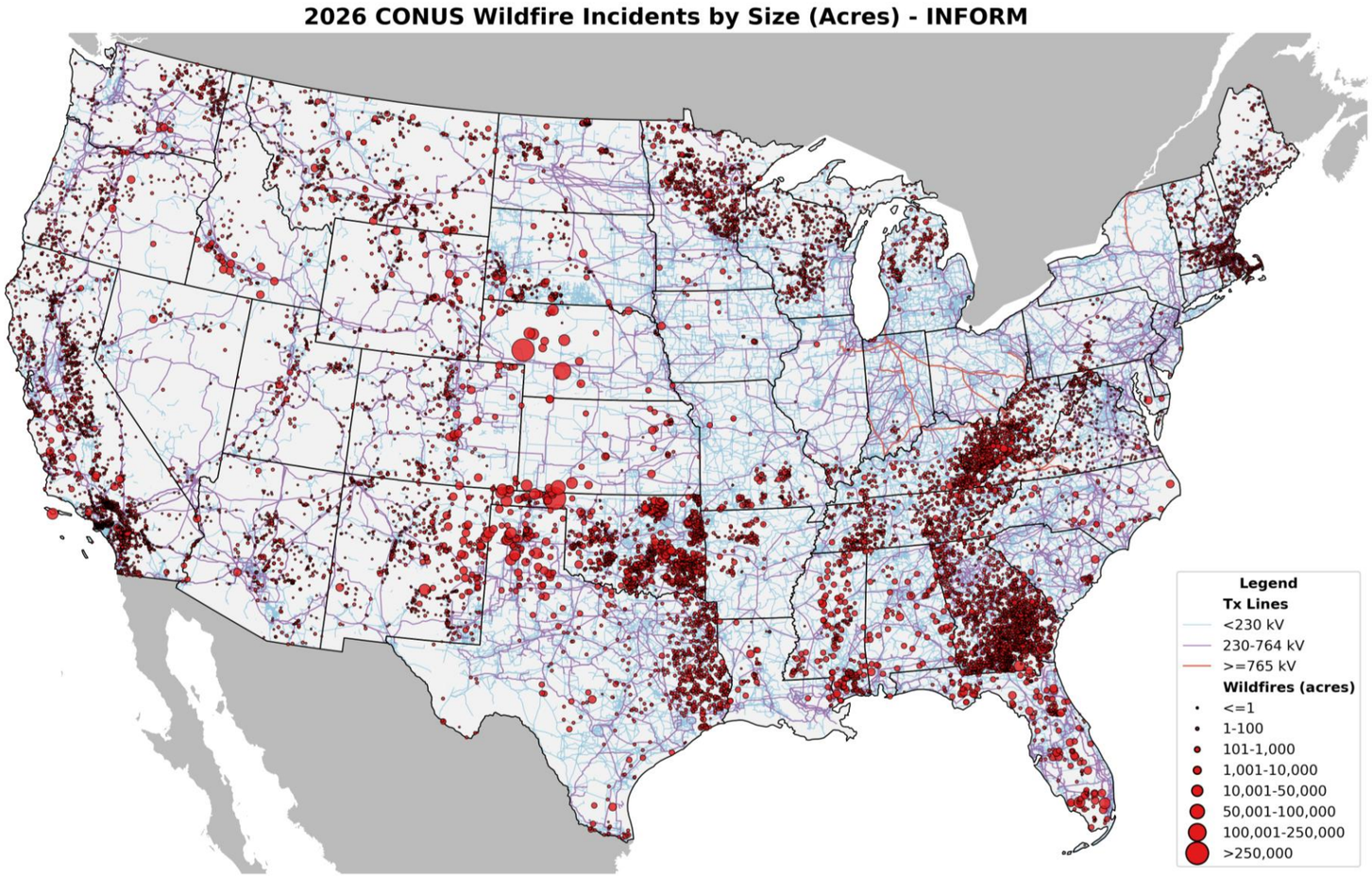


Source: NIFC InFORM; data filters and map by PNNL; prescribed burns excluded.
Note: Certain states (e.g., Illinois, North Carolina) are underrepresented in InFORM data.

Wildfire risks change year to year

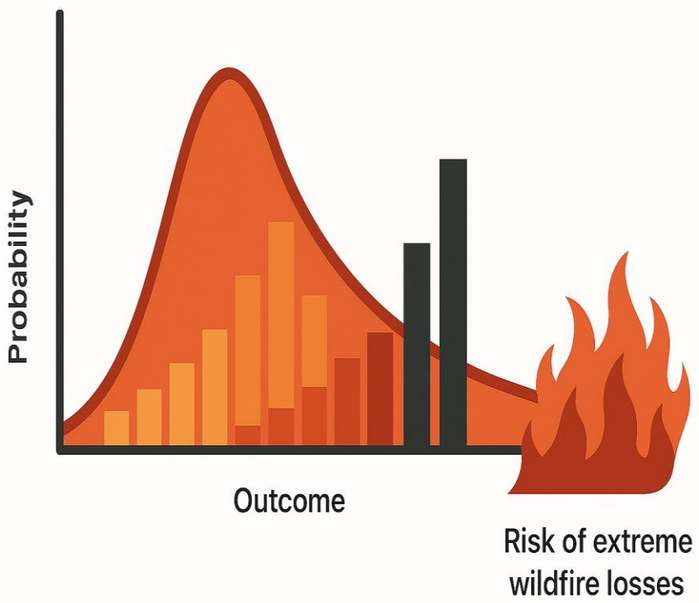
2026 (January-May)	
Fires	18,038
Acres	2,591,684
Proportion of 10-year average annual burn	42%
Proportion of 20-year average annual burn	47%
Ignitions within 10 miles of transmission lines	17,304 (95.9%)
% of total acres burned within 10 miles of tx	59%

- YTD January-May, already at 47% of long-term burn area average over one year, yet the traditional peak wildfire season in the West has not yet started
- May be exacerbated by El Nino year



Source: NIFC InFORM; data filters and map by PNNL; prescribed burns excluded.
Note: Certain states (e.g., Illinois, North Carolina) are underrepresented in InFORM data.

Why wildfire is different than other hazards



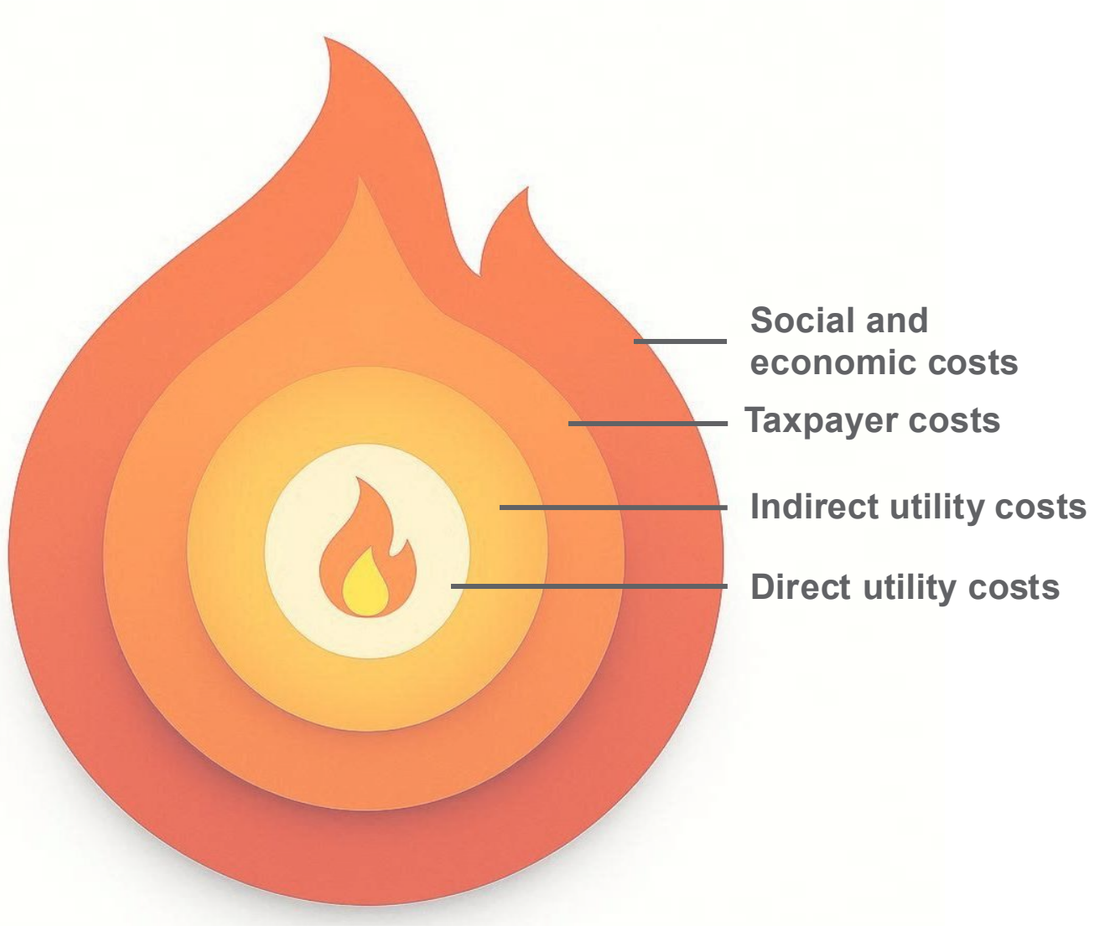
Visualization of probability versus risk

- **Ignition**. Wildfire stands out from other hazards, because electric utilities are at risk of igniting a fire in addition to responding to events.
- **Asymmetrical risk.** Potential for catastrophic liability due to damages from utility-ignited wildfire is greater than the upside to the utility under the existing utility regulation and business model.
- **Geographic shifts.** The risk is moving west to east, and what was once a regional issue is becoming a national one.
- **State leadership.** Federal and state authorities have blended oversight of the grid. States are currently leading on wildfire oversight and response. Emerging federal role in information broker and technical standards.
- **Costs.** Wildfire is a major cost driver for retail rates, but cost controls will set precedent for balancing resilience and affordability.

There are several types of wildfire costs

Wildfire and wildfire risk costs can include:

- **Direct costs**, such as the cost of mitigation and restoration.
- **Indirect costs**, such as increased insurance and borrowing costs.
- **Taxpayer costs**, such as government backstop funds and compensation.
- **Social and economic costs**, such as loss of power during de-energization events, or loss of homes and businesses due to wildfire.

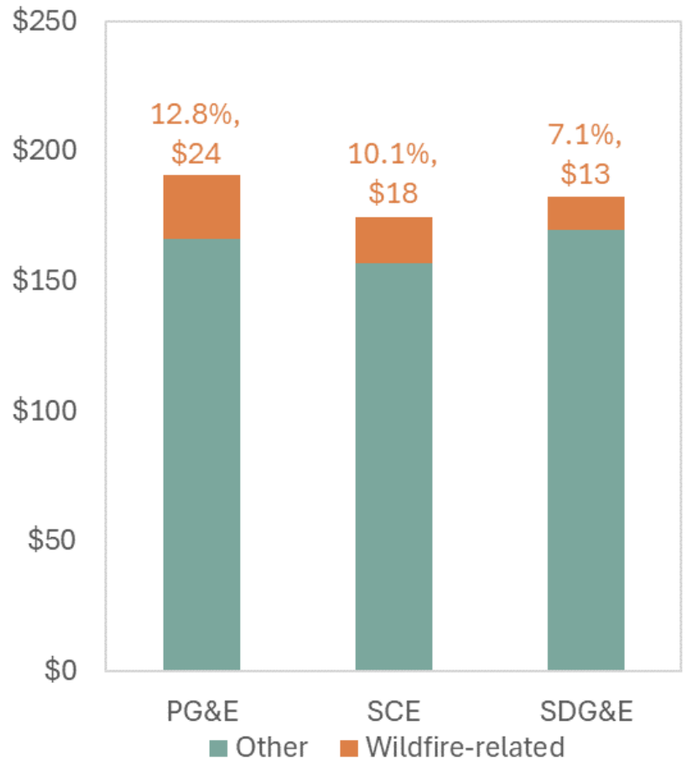


Direct and indirect wildfire costs are increasing electricity customer rates

- **Wildfire risk leads to increased direct and indirect costs for electric utilities and ratepayers:**
  - Utility direct spend on mitigation to protect infrastructure *from* wildfire (heat, wind, smoke).
  - Utility direct spend on mitigation to prevent ignition (grid hardening, vegetation management).
  - Utility direct spend on increased costs for risk coverage instruments (e.g. insurance).
  - Downgraded credit ratings and increased utility cost of capital, which translates to higher ratepayer costs.
- Among utilities with explicit wildfire mitigation charges, impacts vary by customer class, at **~0.11¢–0.60¢/kWh**, with an average near **0.30¢/kWh.**

For detailed information see: PNNL, Cost Recovery Mechanisms for Utility Wildfire Mitigation, 2026.

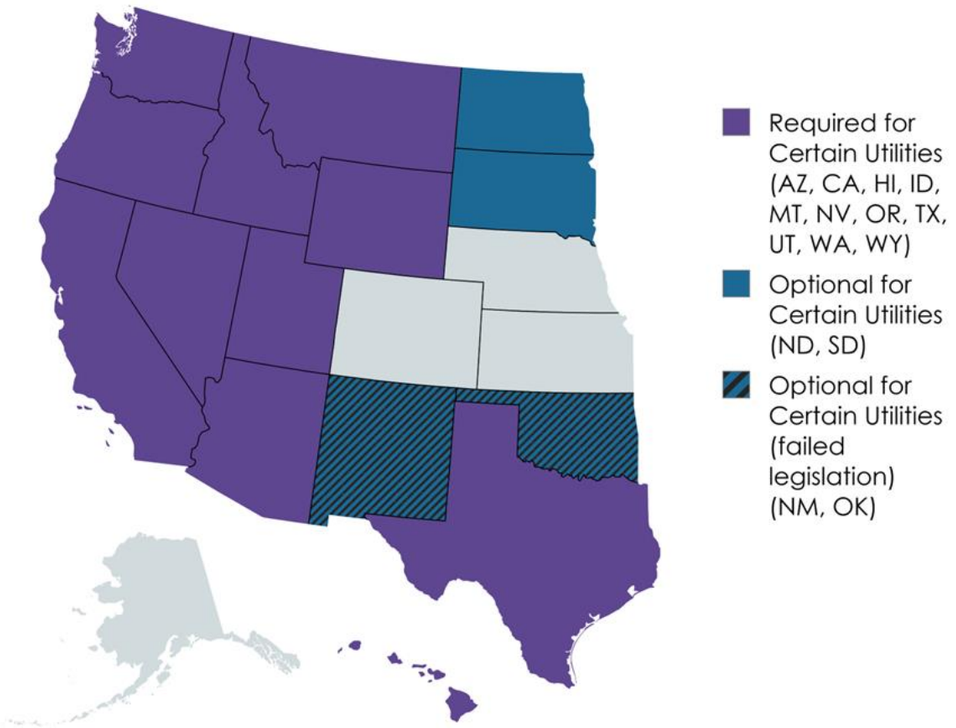
Utility wildfire-related spending (including insurance and mitigation) accounted for ~7-13% of an average residential customer's monthly electricity bill in 2023 across California's investor-owned utilities.



Data from California Public Utilities Commission 2024

Wildfire Mitigation Plans (WMPs)

Wildfire Mitigation Plan Requirements, by State



- Wildfire Mitigation Plans are intended to be the **primary document that describes utility risk and planned investment in risk mitigation**.
- WMPs are submitted to state commissions or an assigned governing body such as the utility board.
- During this process regulators (or other designated reviewers) review and acknowledge documents through a public proceeding that allows for public input.
- Approval provides a pathway for rate recovery.
- States use varying rate recovery mechanisms.

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Overview of Direct Costs

Example Direct Costs:

- Asset hardening
- Vegetation management
- Post-event restoration

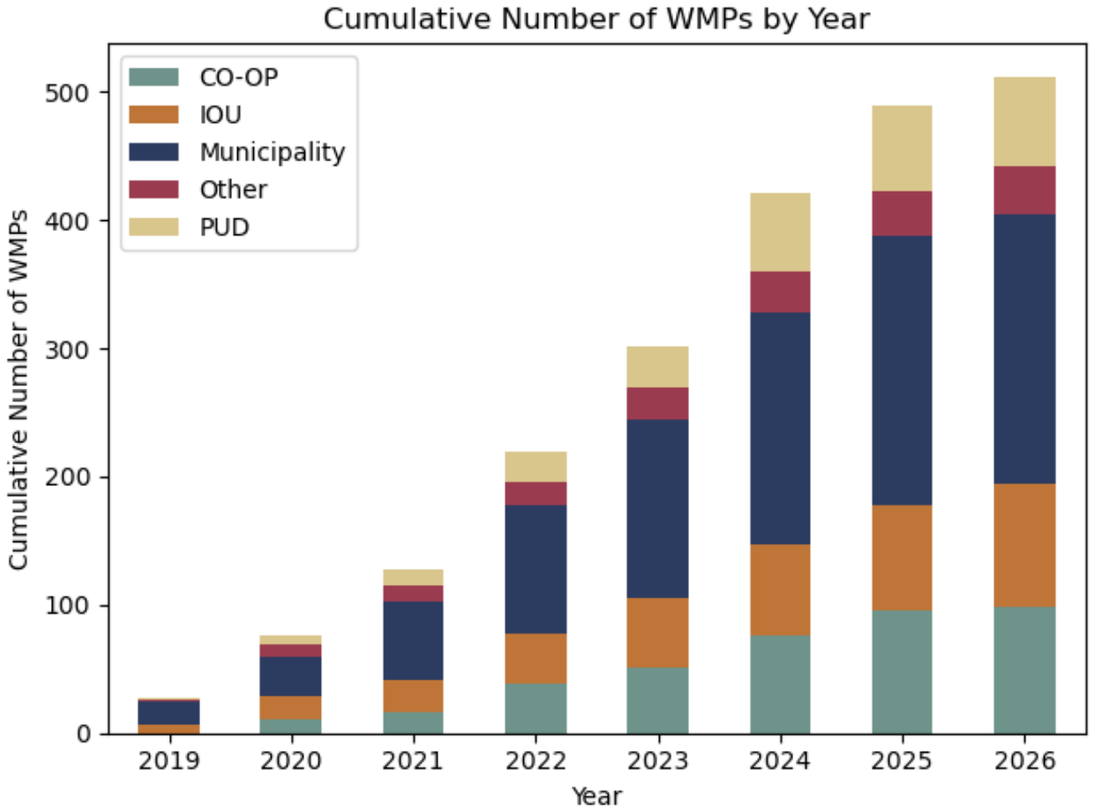
Utility costs related to wildfire and wildfire mitigation can be categorized as ***direct* costs or *indirect* costs**.

Direct costs can be predictable, such as the cost of hardening utility equipment against wildfire. Wildfire mitigation plans provide anticipated costs, but there is commonly deviance from projected and spent. Expanded planning horizons and learning curves are also improving cost forecasts.

Direct utility costs become less predictable in the event of a wildfire, if utility equipment must be repaired or replaced. Where the *cause* of a wildfire is linked to utility equipment, costs such as compensation to third-parties for fire damage can become entirely unpredictable.

Wildfire mitigation plans are increasingly common

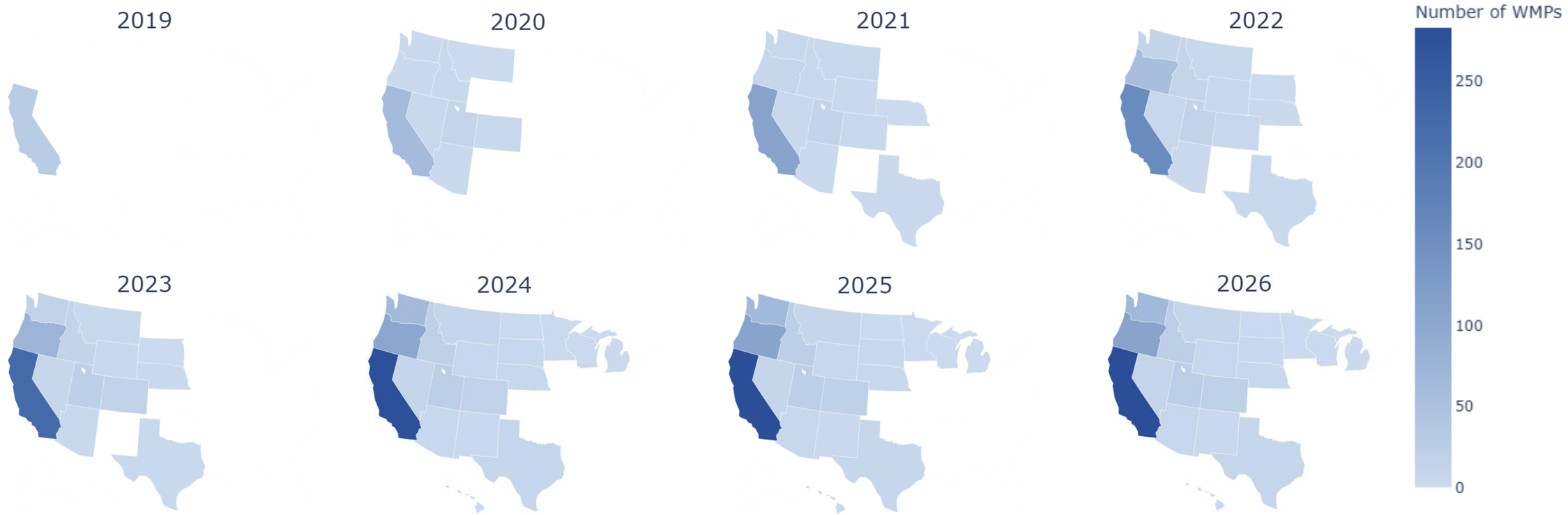
- **Wildfire Mitigation Plans (WMPs)** are utility-prepared documents identifying strategies and measures to mitigate risk, including:
  - Capital improvements like undergrounding and pole and conductor upgrades
  - Operational improvements like vegetation management and situational awareness
- WMPs are being prepared by **all utility ownership types, including merchant facilities.**
- Regular documentation of wildfire mitigation through WMPs may become a new norm due to **business pressures.**
- Implementation of an approved WMP can also **support utility credit ratings** (S&P Global 2024, Fitch 2023).



Count of WMPs catalogued in the PNNL database

Access the PNNL Utility Wildfire Mitigation Plan Database

Cumulative Wildfire Mitigation Plans by state, by year

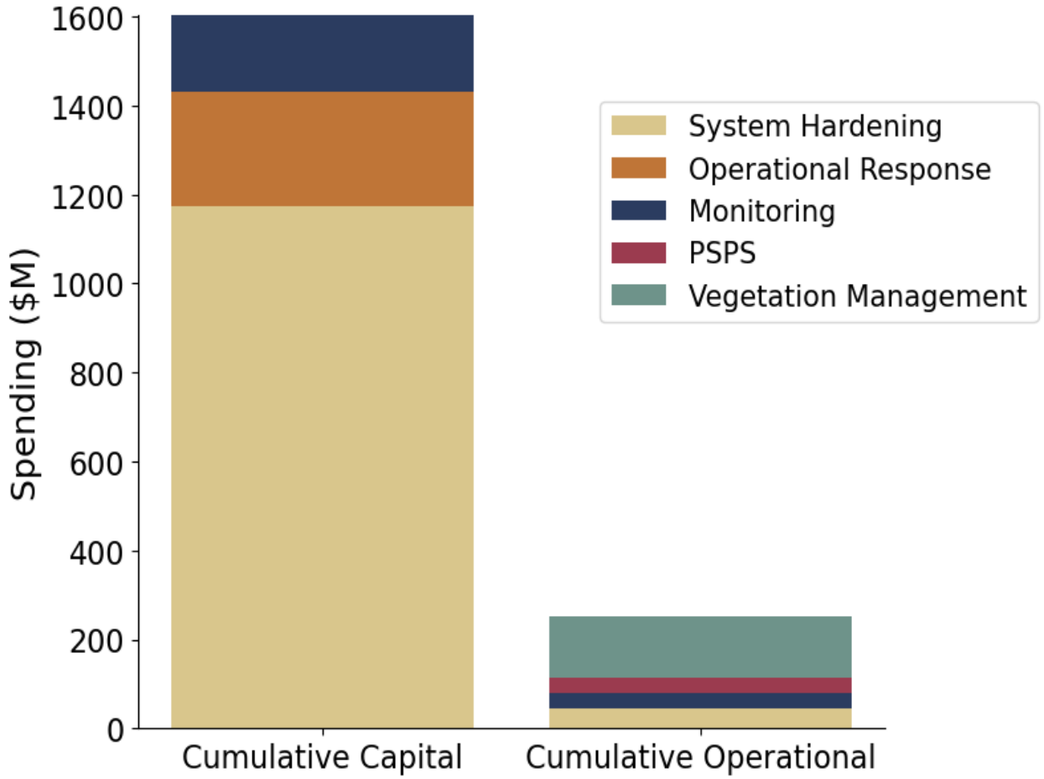


- The practice of creating WMPs started in California in 2019 and has become practice in other states in the coastal and interior West in the years since.
- The shading in each state represents the cumulative total number of WMPs, including any WMPs for that year plus all the years prior going back to 2019, when the first WMPs were published in California.

PNNL Utility Wildfire Mitigation Plan Database

Wildfire mitigation spending can take many forms

For example, Xcel Energy's 2025-2027 proposed wildfire mitigation plan in Colorado includes $1.6B in capital expenditures and $250M in operations and maintenance.

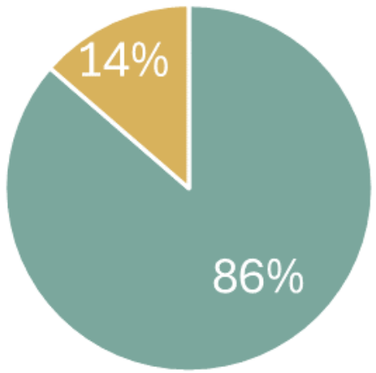


Total proposed spending for 2025-2027: $1.9 billion
Data from Xcel Energy 2024b

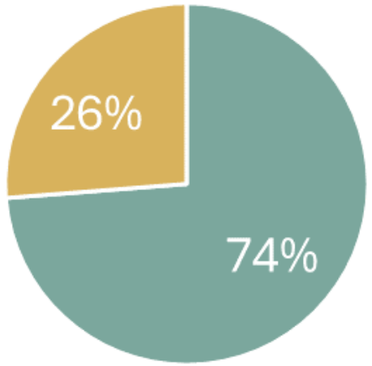
- **Grid Design and System Hardening**: Pole replacement and reinforcements, installation of automation equipment and covered conductor installations.
- **Vegetation Management**: Inspection schedules, application of herbicides, pruning, tree removal procedures, and more advanced methods.
- **Wildfire Condition Monitoring**: Situational awareness (aerial surveillance data) and forecasting modeling to predict wildfire conditions.
- **Operational Response**: Tracking wildfires, immediate reactive de-energizing, new technologies.
- **Public Safety Power Shutoff (PSPS) and related enhancements**: Selective de-energization of power lines to avoid igniting wildfire. (Wildfire Mitigation Plans Analysis View *see trackers at link*)

Capital spending makes up most of wildfire mitigation spending for many utilities

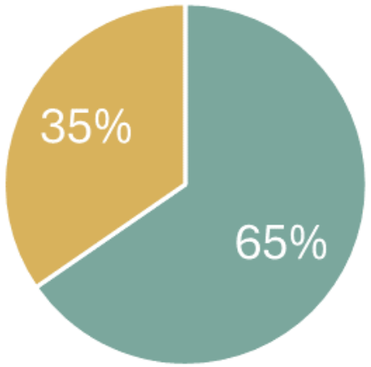
- Capital spending represents 55-86% of total wildfire mitigation spending across four utilities where the split between capital and operational spending was reported.
- For investor-owned utilities, prudently-incurred capital spending can become part of regulated rate base, meaning costs are recovered through ratepayers with a potential return on investment for the utility.



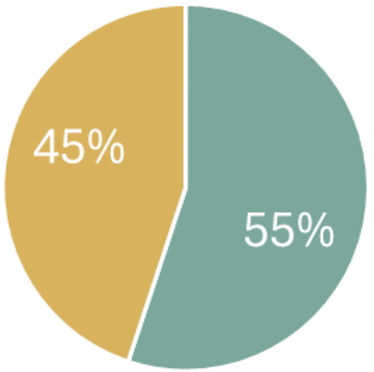
Xcel Energy
$1.9 billion proposed wildfire mitigation spending 2025-2027 (Xcel Energy 2025)



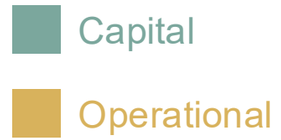
Rocky Mountain Power
$64.8 million in wildfire mitigation spending 2024-2026 (Rocky Mountain Power 2024)



Avista
$52 million in wildfire mitigation spending 2024 (Avista Corporation 2025)

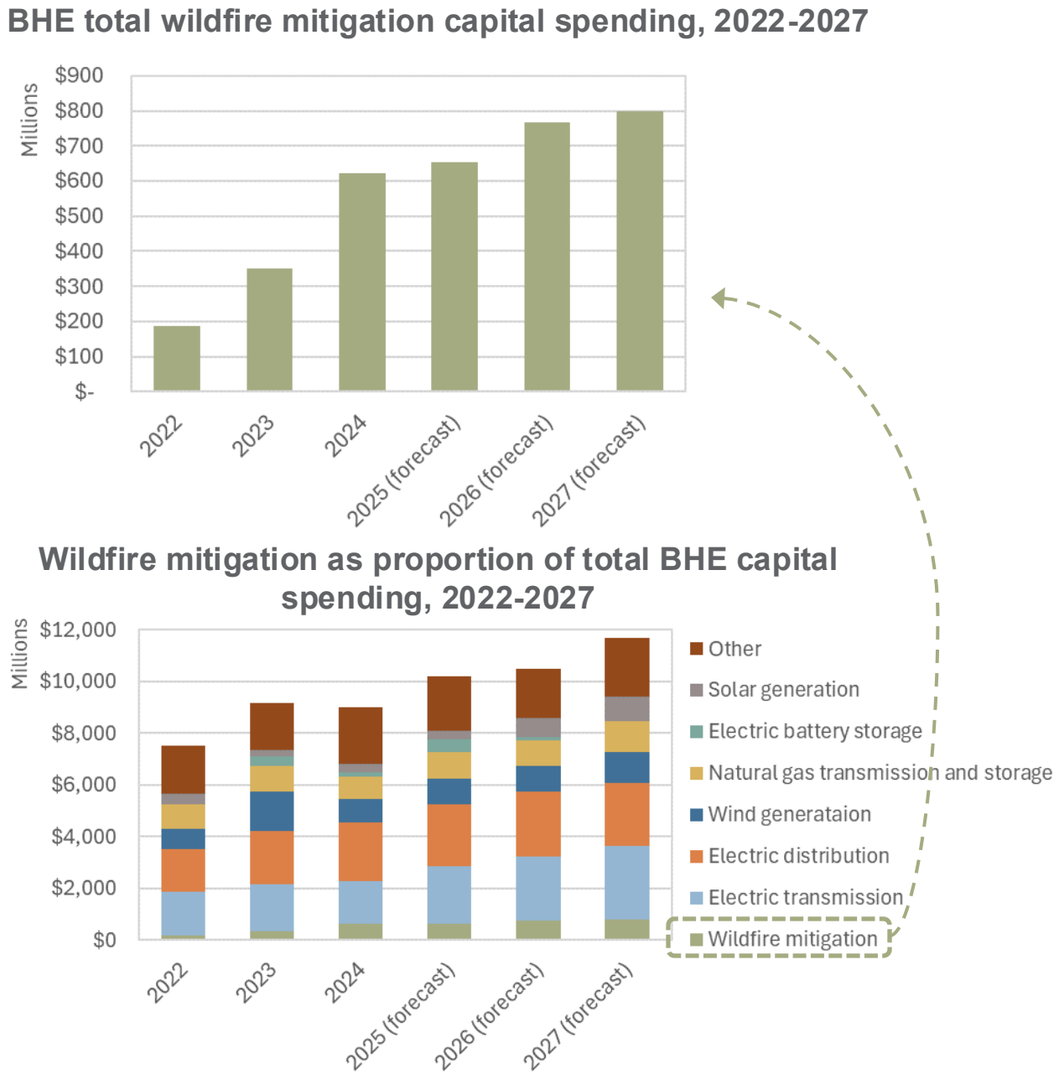


Portland General Electric
$110 million - $135 million in wildfire mitigation spending forecast for 2025 (PGE 2025)
*graph shows average of reported ranges

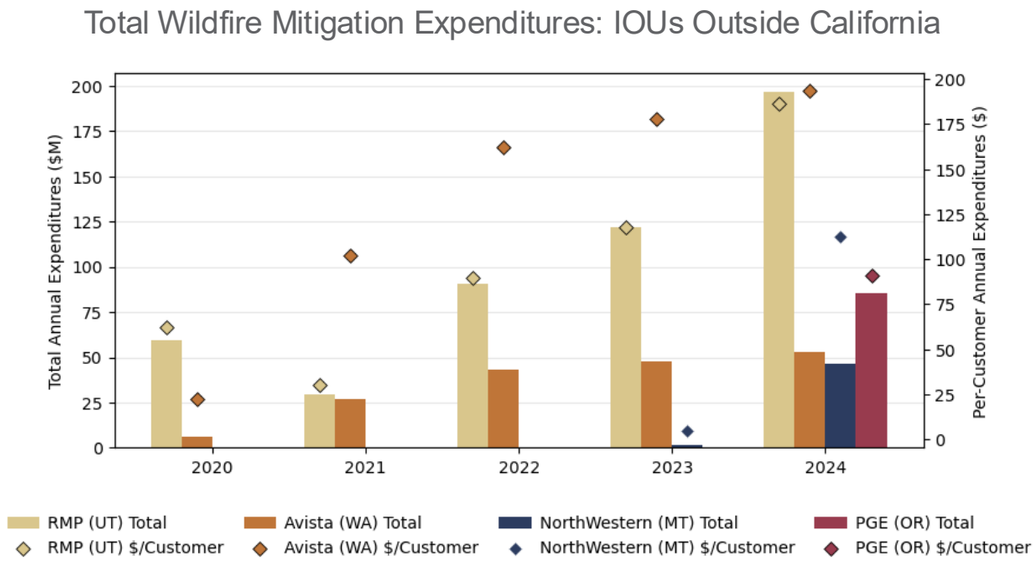


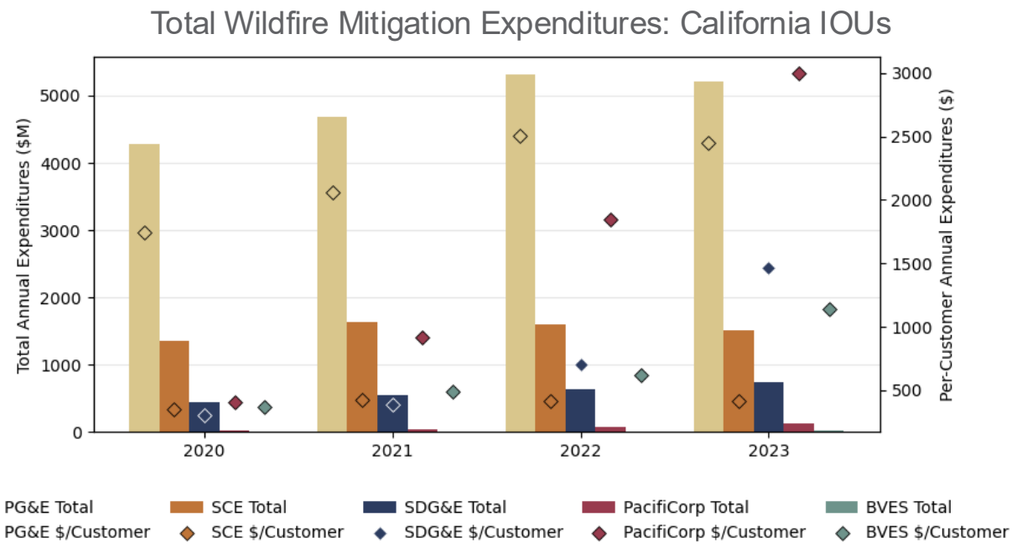
Wildfire mitigation spending can be significant and is generally increasing

- **Direct spending on wildfire mitigation currently is a small share of utility spending but is rapidly increasing**. Additionally, as emphasized throughout this report, direct spending represents a portion of the wildfire-related costs utilities (and shareholders) must bear, which can include insurance costs and other costs associated with capital cost increases and credit downgrades.
- In California, PG&E's spending on wildfire mitigation is expected to increase at a compound annual growth rate of approximately 8% from 2020-2025, with spending in 2025 estimated to **exceed $6 billion** (PG&E 2025b).
- Berkshire Hathaway Energy (BHE), which operates utilities in multiple states, estimates that wildfire mitigation capital spending will increase from $188 million in 2022 to $797 million in 2027, **a compound annual growth rate of approximately 33%** (Berkshire Hathaway Energy 2025).
- Wildfire mitigation capital spending is a relatively small share of BHE's overall capital spending (2.5% in 2022), but is **the fastest growing category,** estimated to reach 6.8% in 2027 (Berkshire Hathaway Energy 2025).



Analysis of Western utilities shows total wildfire mitigation direct expenditures





- **Average annual wildfire mitigation spending per utility during the normalized period is approximately $1.87 billion, driven primarily by three California utilities**. Excluding California, the average annual spending per utility is approximately $85 million across the remaining states.
- Within California, PG&E is the highest spending utility in total and on a per-customer basis during all sample years until 2023, when PacifiCorp passed PG&E in per-customer spending. Within the sample of utilities outside California, Rocky Mountain Power leads in total spending, while Avista leads in per-customer spending for every year since 2021.
- **Compared to IOUs in California, wildfire mitigation spending is less but increasing rapidly. IOUs outside California saw greater year-over-year spending growth during the 2020-2023 period.**

For a detailed cost breakout see: PNNL, Cost Recovery Mechanisms for Utility Wildfire Mitigation, 2026.

We observe variation between proposed wildfire mitigation costs and actual costs

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Proposed, Actual, and Variance in cost in $ Million

Utility	Cost Type	2020	2021	2022	2023	2024	2025
BVES	Proposed	$11.4	$15.2	$16.1	$25.8	$23.1	$38.8
BVES	Actual	$9.1	$12.1	$15.2	$28.2	*	*
BVES	**Variance**	**−$2.3**	**−$3.1**	**−$22.2**	**+$2.4**	*	*
NWE	Proposed	N/A	N/A	N/A	N/A	$41.63	$63.43
NWE	Actual	N/A	N/A	N/A	$1.91	$46.67	*
NWE	**Variance**	**N/A**	**N/A**	**N/A**	**N/A**	**+$5.04**	*
PacifiCorp	Proposed	$25.0	$33.3	$91.9	$128.0	$92.4	$148.2
PacifiCorp	Actual	$18.5	$42.1	$84.6	$137.1	$165.7	*
PacifiCorp	**Variance**	**−$6.5**	**+$8.8**	**−$7.3**	**+$9.1**	**+$73.3**	**N/A**
PG&E	Proposed	$3,224.2	$4,898.6	$5,963.8	$5,499.5	$4,985.8	$6,556.7
PG&E	Actual	$4,287.1	$4,673.6	$5,310.3	$5,205.2	*	*
PG&E	**Variance**	**+$1,062.9**	**−$225.0**	**−$653.5**	**−$294.3**	*	*
RMP	Proposed	$41.8	$55.7	$74.16	$72.5	$139.4	185.3
RMP	Actual	$29.69	$29.42	$90.6	$131.7	$197.1	*
RMP	**Variance**	**-$12.11**	**-$26.28**	**+$16.44**	**+$49.2**	**+$57.4**	*
SCE	Proposed	$1,308.2	$1,629.3	$1,619.2	$1,875.3	$1,825.5	$1,867.9
SCE	Actual	$1,356.9	$1,642.9	$1,599.9	$1,513.1	*	*
SCE	**Variance**	**+$48.7**	**+$13.6**	**−$19.3**	**−$362.2**	*	*
SDG&E	Proposed	$569.2	$646.6	$770.3	$769.7	$760.6	$811.3
SDG&E	Actual	$444.5	$543.9	$639.4	$749.5	*	
SDG&E	**Variance**	**−$124.7**	**−$102.7**	**−$130.9**	**−$20.2**	*	*

*As of January 22, 2026, costs were not yet available.

PG&E refers to Pacific Gas and Electric Company; SDG&E, San Diego Gas & Electric Company; SCE , Southern California Edison; BVES, Bear Valley Electric Service; NWE, NorthWestern Energy; RMP, Rocky Mountain Power

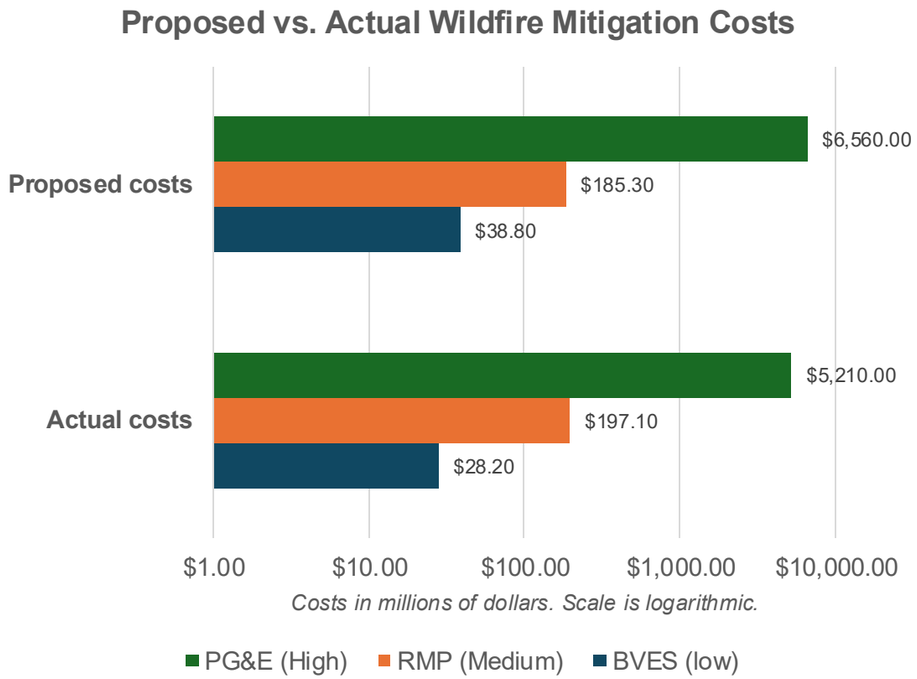
- **The accuracy of cost projections vary across utilities and states.**
- California and Washington show spending in close alignment with their forecasts, whereas Utah and Montana exhibit upward cost pressure and Oregon spends less than forecasted.
- **Variances between projected and actual range from +$1.062 billion to -$653 million.**

For a detailed cost breakout see: PNNL, Cost Recovery Mechanisms for Utility Wildfire Mitigation, 2026.

Direct costs from wildfire mitigation summary

Of the 10 utilities in 7 states that were surveyed:

- The proposed direct costs of wildfire mitigation spending by a single utility ranged from $38 million (for a small utility) to $6.5 billion (for a very large utility) in a single year.
- The majority of these direct costs are capital expenditures, which are included in the rate base.
  - Capital spending was **55-86%** of total wildfire mitigation spending for the four surveyed utilities that reported this split.
- As more wildfire mitigation plans with forecasted and recorded costs are available, PNNL will expand the survey with more data.
- Comprehensive future analysis should include public utilities.



For a detailed cost breakout see: PNNL, Cost Recovery Mechanisms for Utility Wildfire Mitigation, 2026.

Another direct cost trend: “non-bypassable” wildfire charge on ratepayer bills

- **California established a wildfire fund via legislation** (AB 1054, 2019) to provide a “source of funding to reimburse eligible claims arising from a covered wildfire caused by a utility company that participates in the funds.”
- **Customers pay an additional charge to cover future claims.**
- The 2025 amount is .595 ¢/kWh, which amounts to an average of $2.50 per customer per month* (CA PUC 2024c).
- Total annual collections for the wildfire fund non-bypassable charge were $902.4 million for calendar year 2025. The charge is paid by customers of San Diego Gas & Electric, Pacific Gas and Electric, and Southern California Edison Company.

*Based on an estimate of 420 kWh/month for residential household

Assembly Bill No. 1054

CHAPTER 79

An act to amend Sections 311, 850, 850.1, 854, 854.2, 1701.1, 1701.3, 8386, and 8387 of, to amend the heading of Article 5.8 (commencing with Section 850) of Chapter 4 of Part 1 of Division 1 of, to amend and repeal Section 451.1 of, to add Sections 326.1, 326.2, 451.3, 1701.8, 8386.3, 8386.4, and 8389 to, to add Part 6 (commencing with Section 3280) to Division 1 of, and to repeal Sections 3291 and 3292 of, the Public Utilities Code, and to add Division 28 (commencing with Section 80500) to the Water Code, relating to public utilities, making an appropriation therefor, and declaring the urgency thereof, to take effect immediately.

[Approved by Governor July 12, 2019. Filed with Secretary of State July 12, 2019.]

LEGISLATIVE COUNSEL'S DIGEST

AB 1054, Holden. Public utilities: wildfires and employee protection.

The California Constitution establishes the Public Utilities Commission and authorizes the commission to exercise ratemaking and rulemaking authority over all public utilities, as defined, subject to control by the Legislature. The Public Utilities Act authorizes the commission to supervise and regulate every public utility, including electrical corporations, and to do all things that are necessary and convenient in the exercise of such power and jurisdiction. Existing law authorizes the commission to fix the rates and charges for every public utility and requires that those rates and charges be just and reasonable. Existing law authorizes the commission, in a proceeding on an application by an electrical corporation to recover costs and expenses arising from a catastrophic wildfire occurring on or after January 1, 2019, to allow cost recovery if the costs and expenses are just and reasonable, after consideration of the conduct of the utility, including consideration of specified factors.

This bill would establish the California Wildfire Safety Advisory Board consisting of 7 members appointed by the Governor, Speaker of the Assembly, and Senate Committee on Rules, as provided, who would serve 4-year staggered terms. The bill would require the board, among other actions, to advise and make recommendations related to wildfire safety to the Wildfire Safety Division or, on and after July 1, 2021, the Office of Energy Infrastructure Safety, as established pursuant to AB 111 or SB 111 of the 2019–20 Regular Session.

This bill would require the commission and the Office of Energy Infrastructure Safety to enter into a memorandum of understanding with the commission to cooperatively develop consistent approaches and share data related to electric infrastructure safety, and to share results from various safety activities, including relevant inspections and regulatory development.

This bill would require the commission, when determining an application by an electrical corporation to recover costs and expenses arising from a covered wildfire, as defined, to allow cost recovery if the costs and expenses are determined just and reasonable based on reasonable conduct by the electrical corporation. The bill would require the commission to find that an electrical corporation's conduct was reasonable if that conduct, related to the ignition, was consistent with actions that a reasonable utility would have undertaken in good faith under similar circumstances, at the relevant point in time, and based on the information available to the electrical corporation at the time, as provided. The bill would provide that an electrical corporation bears the burden to demonstrate, based on a preponderance of the evidence, that its conduct was reasonable, unless it has a valid safety certification for the time period in which the covered wildfire that is the subject of the application ignited. If the electrical corporation has that valid safety certification, the bill would provide that the electrical corporation's conduct would be deemed reasonable unless a party to the proceeding creates a serious doubt as to the reasonableness of the electrical corporation's conduct. Once serious doubt has been raised, the electrical corporation would have the burden of dispelling the doubt and proving the conduct to have been reasonable. If the commission finds that an electrical corporation has requested recovery of costs for which the commission had previously authorized cost recovery, the bill would authorize the commission to assess a penalty in an amount up to 3 times the penalty authorized by law for certain utility-related violations.

Existing law authorizes an electrical corporation to file an application requesting the commission to issue a financing order to authorize the recovery of costs and expenses related to a catastrophic wildfire through the issuance of bonds by the electrical corporation that are secured by a rate component, as provided.

This bill would additionally authorize an electrical corporation to file an application requesting the commission to issue a financing order to authorize the recovery of costs and expenses related to catastrophic wildfires under specified conditions through the issuance of bonds by the electrical corporation that are secured by a rate component.

This bill would establish the Wildfire Fund to pay eligible claims arising from a covered wildfire, as provided. The bill would continuously appropriate moneys in the fund to the Wildfire Fund Administrator for that purpose, thereby making an appropriation. The bill would require the commission to initiate a rulemaking proceeding to consider using its existing authority to require certain electrical corporations to collect a nonbypassable charge from its ratepayers to support the Wildfire Fund, and would require the commission to direct each electrical corporation to collect that charge if the commission determines that the imposition of the charge is just and reasonable and that it is an appropriate exercise of its authority, as specified. The bill would specify the funding sources for the fund, which include, among other sources, contributions from electrical corporations and revenues generated from the charge.

The Public Utilities Act contains procedural requirements that are applicable to all commission hearings, investigations, and proceedings and provides that the technical rules of evidence are not applicable to those hearings, investigations, and proceedings, which are governed by the rules of practice and procedure adopted by the commission.

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Overview of Indirect Costs

Example Indirect Costs:

- Insurance Rates
- Cost of Capital Acquisition

Utility costs related to wildfire and wildfire mitigation can be categorized as ***direct*** **costs or** ***indirect*** **costs.**

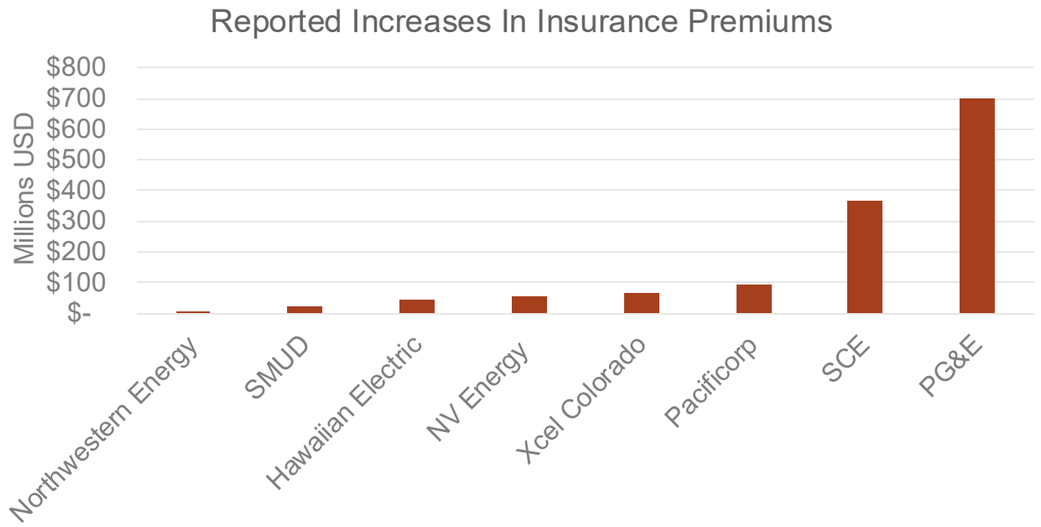
Indirect costs are those that are influenced by wildfire, but do not represent spending explicitly designated for wildfire mitigation or recovery.

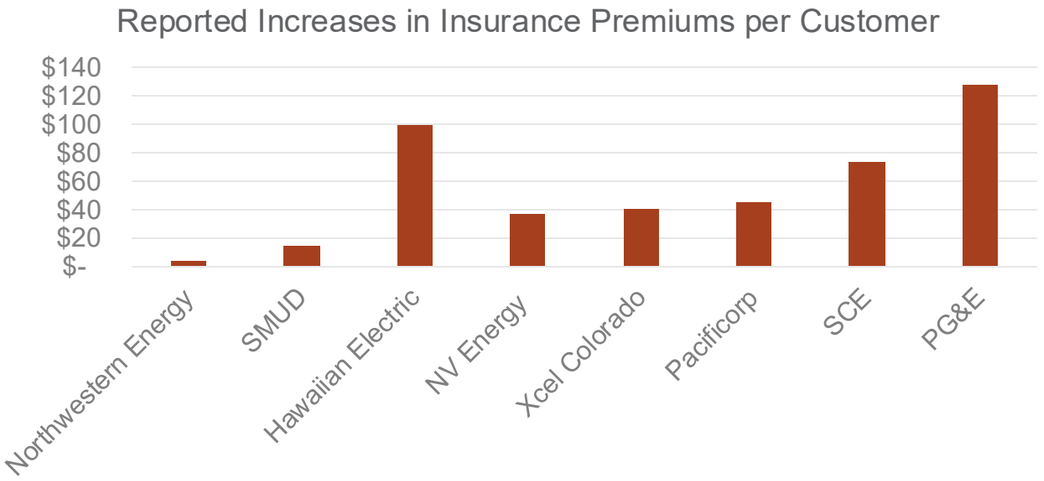
Indirect costs are often representative of the risk borne by the utility as a result of liability from wildfire.

The cost of capital is a significant indirect cost. If investors think utilities are bearing additional risk, their debt and equity could become more expensive.

Utilities could also require additional overhead or administrative costs for compliance, management, or support operations.

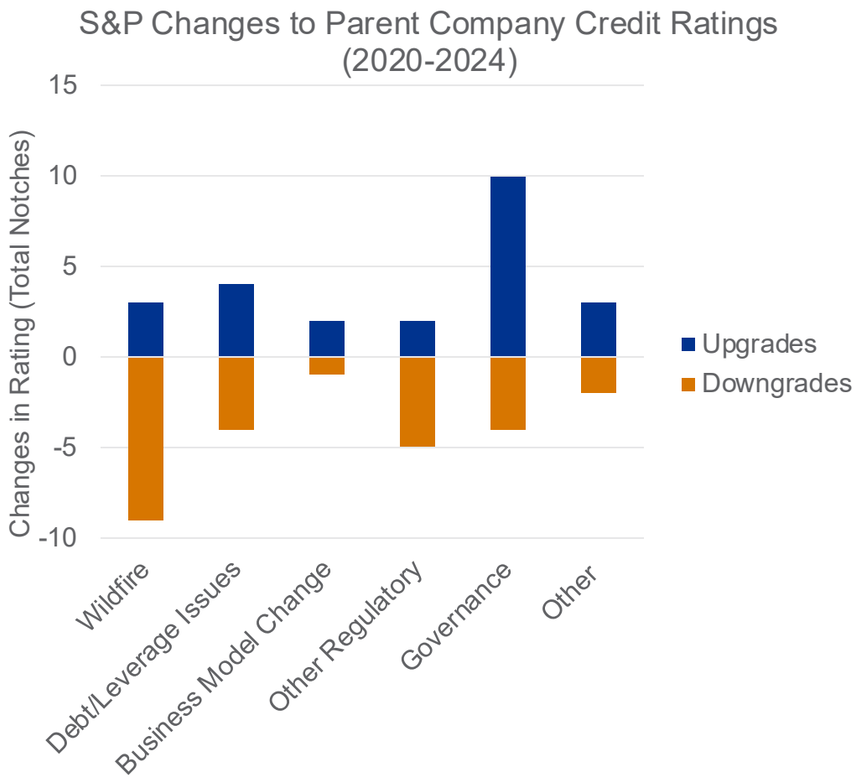
Utility insurance rates are increasing due to wildfire





- Western utilities have reported **dramatic increases in liability insurance premiums** along with lower coverage limits and reduced availability. Some utilities have reported liability premiums increasing nearly 20-fold over a handful of years. Others report an inability to obtain insurance at all.
- On a per customer basis, **these translate to as much as $128 per customer account** (over one to multiple years).
- Even companies in states with more lenient liability standards report increases in cost.
- Policymakers and companies are exploring alternative insurance mechanisms to reduce costs.

Wildfire risks can lead to utility credit rating downgrades

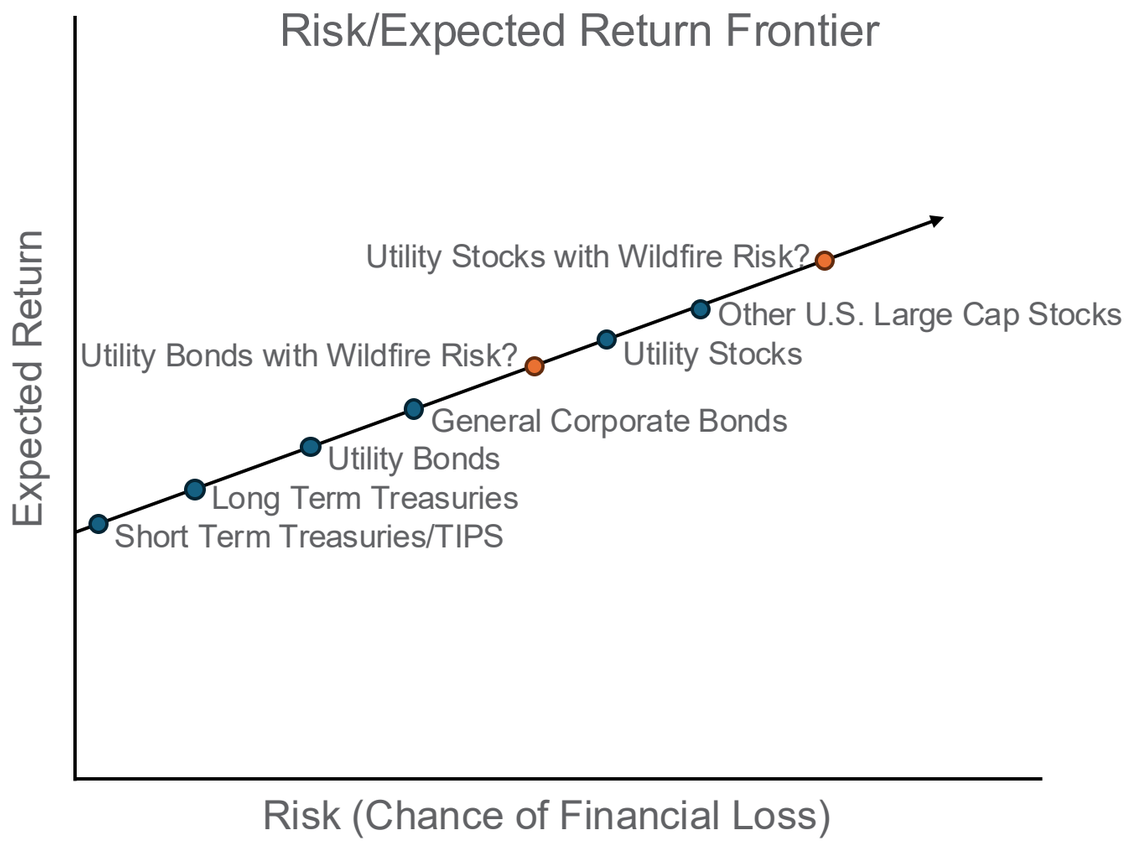


Source: EEI, Credit Ratings Summary (2020-2025)

Note: notch refers to a single level change in credit score

- **Credit rating actions can affect investor-owned utilities, municipal utilities, and cooperatives.** The industry average credit rating for investor-owned utilities is BBB+, generally considered to be "investment grade" and corresponding with consistent returns on investment and a relatively low cost of capital (Edison Electric Institute 2024).
- **Wildfire-related losses and liabilities can materially affect a utility's ability to meet financial commitments** and can therefore result in a credit rating downgrade or negative outlook. From 2020 through 2023, credit rating downgrades of North American regulated utilities outpaced upgrades by more than 3-to-1, in part due to increasing physical risk like wildfire (S&P Global 2024).
- A credit rating downgrade due to wildfire risk can **compound a utility's financial stress** by increasing the cost of borrowing and reducing access to capital (Kousky et al. 2019).
- A rating action for a subsidiary can also affect the parent company and other subsidiaries (S&P Global 2023).
- **Credit rating downgrades to utilities can occur relatively quickly after a wildfire, even before determination of liability.**
- **There are also examples of agencies raising utility credit rates by addressing wildfire risk through WMPs, or by settling outstanding wildfire cases.**

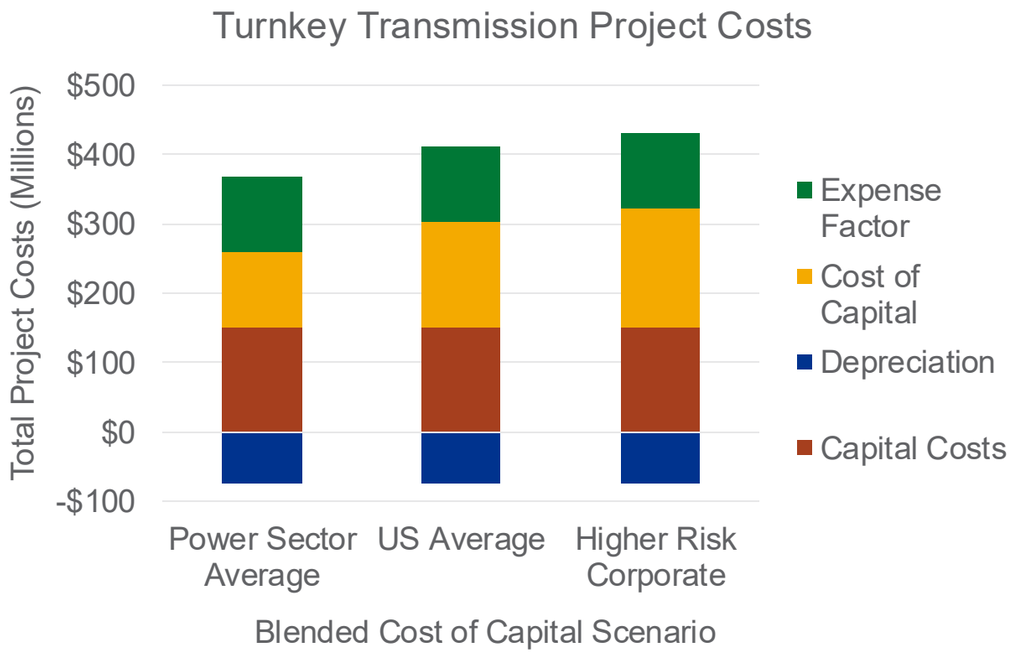
Will wildfire risk affect utility financial returns?



Adapted from: Yiu, 2019

- There are broad **relationships between the return of an asset and its underlying risk.**
- Investors will demand a greater rate of return as their risk of loss increases.
- **The electric utility sector has historically been marked by low risk and (lower) returns.** This has allowed utilities to finance infrastructure build out at a relatively low rate.
- **Wildfire may be increasing risk and therefore required returns for utilities**, making infrastructure build more costly and potentially investors will need even higher or faster returns.

Clear impact on project costs from variation in cost of capital

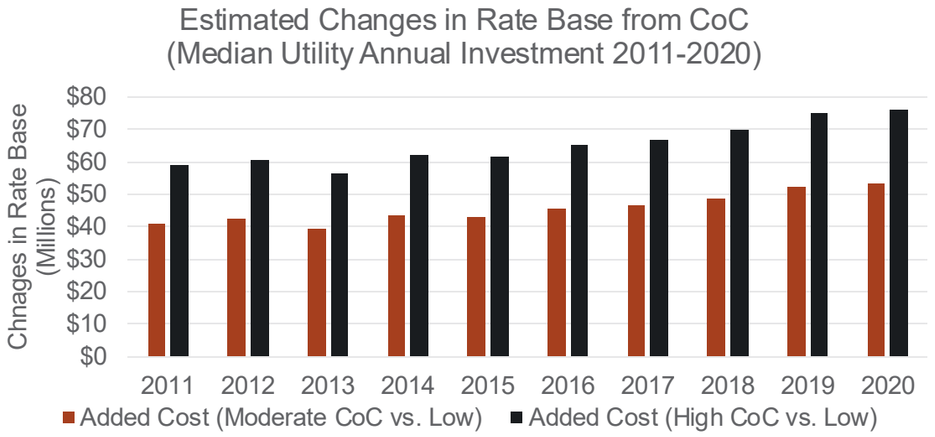


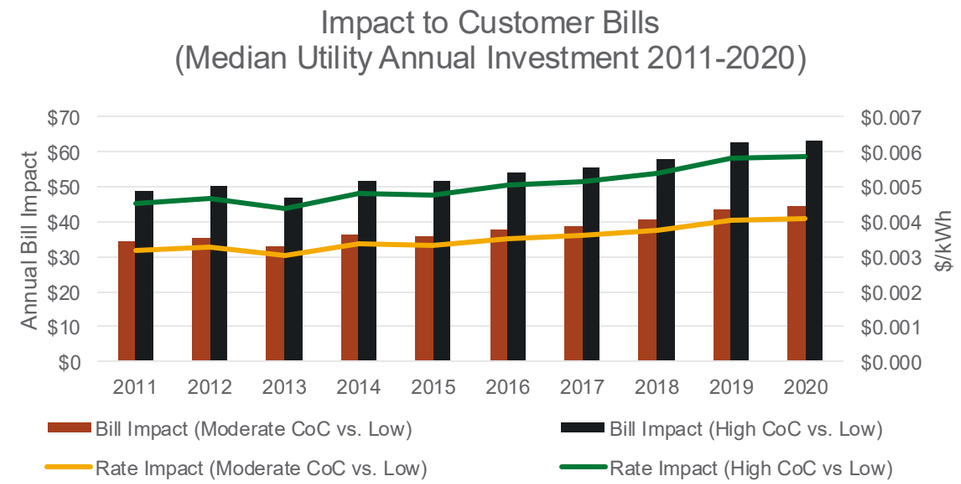
Sector	Average Blended Cost of Capital
Power	5.01%
US Average	6.96%
Higher Risk Corporate*	7.8%

*75th Percentile Cost of Capital for US Industry Sectors
Source: Damodaran 2026

- **Cost of capital has a significant impact on the cost of infrastructure build.**
- This chart shows the total turnkey costs (including depreciation) of a 50-mile transmission project in the Midwest.
  - If costs of capital were to increase from utility sector average blended cost of capital to US industry average, turnkey project costs would increase by **$43 million, a 15% increase.**
  - If utilities become riskier than the US average costs would rise by **$61 million, a 21% increase.**
- **Utilities recover cost of capital through their return on equity**, which is recovered through ratepayers.
  - Cost of capital is a floor for return on equity, actual impacts to affordability will vary based on the rate of return approved by regulators.

Customer impacts from variation in cost of capital





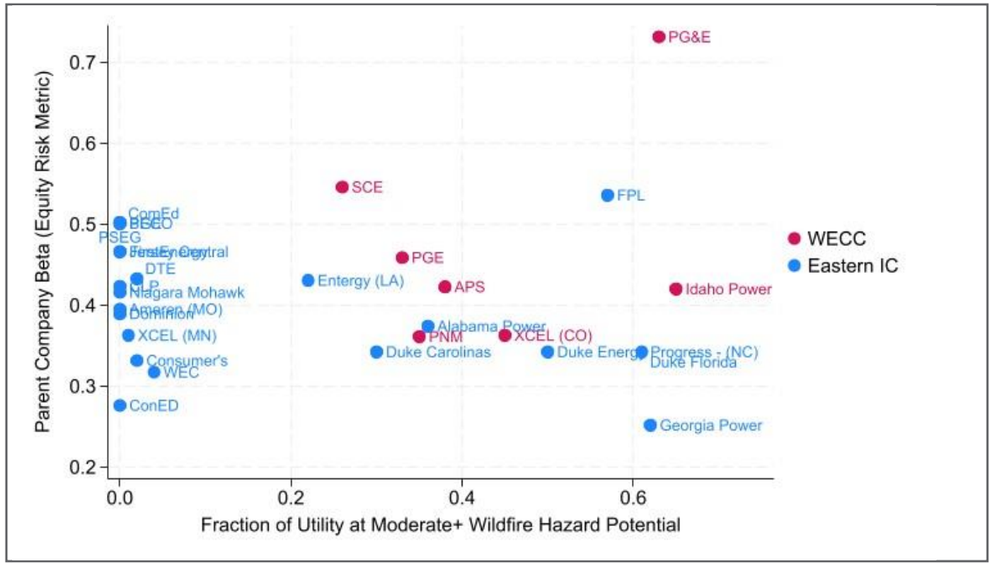
Source: Pearl Street Station Finance Lab, EIA RECS, EIA 861

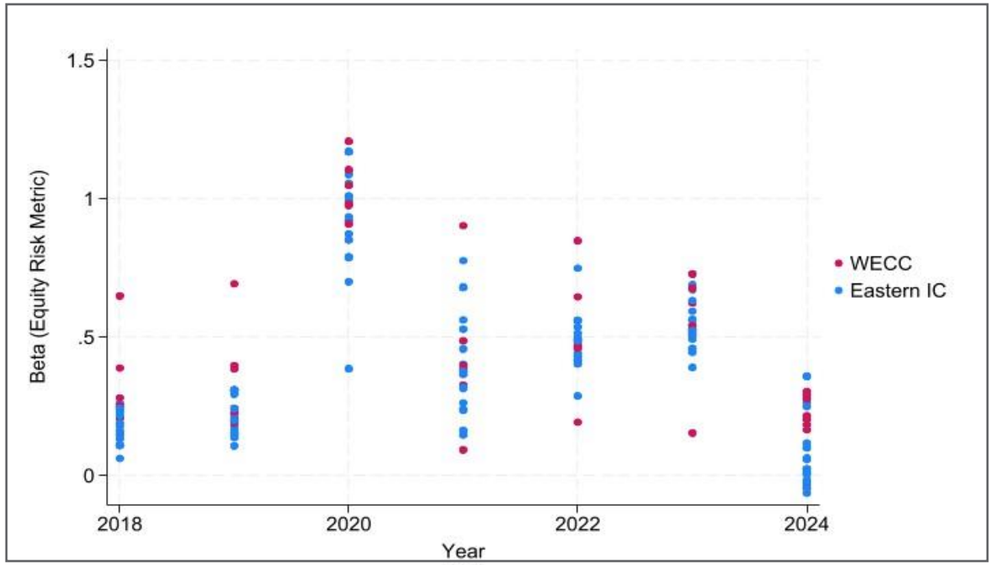
- **Cost of Capital (CoC) impacts IOU customer rates indirectly through a utility's authorized Rate of Return (RoR).** RoR is determined by regulators, whereas CoC is determined by financial markets. However, CoC is a major component to a utility's RoR, and regulators often passthrough changes to cost of capital directly.
- Increases to RoR are recovered from customers and increase rates.
- Here we illustrate the differences in potential recovered costs under current and high-risk costs of capital, using typical utility investment from 2011-2020.
- **Increasing CoC from low to high-risk rate may increases the median utility's rate base by roughly $65 million/year.**
- **Spread over typical generation, and customer consumption patterns, this results in rate increases of up to $0.006/kWh, and annual bill increases of $50 - $60.**

Note: Estimates based on median utility rate bases (debt and equity) adjusted for customer populations and data availability by Werner & Jarvis, 2024, average utility sales EIA-861, size of ratebase and quantity of sales may not be an exact match. Annual estimates based on U.S. average of 900 kWh/month.

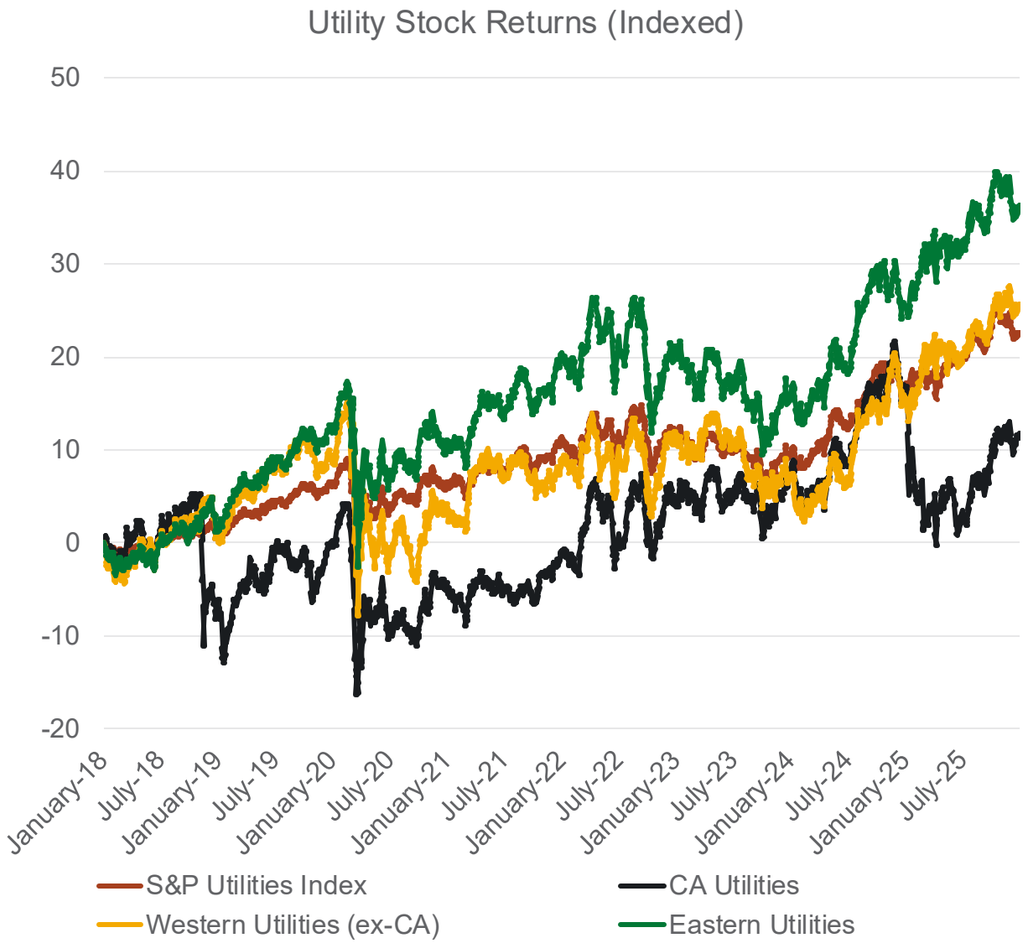
Investigating the impacts of wildfire risk on costs of utility equity

- **PNNL found statistically significant differences in risk profiles between large electric utilities in the U.S. West and the U.S. East.**
  - Initial analysis shows utilities in the WECC carry 25% risk premium to utilities in the Eastern Interconnection.
  - Risk premiums for utilities in general rose by ~20% in 2019, 2021, 2022, and 2023.
- Despite evident difference, PNNL was unable to use wildfire risk metrics to find a specific variable. Preliminary analysis finds a statistically significant relationship between increasing number of fires, and investor risk perception of utilities.





Regionality and equity returns



Simple average of company return based on geography. Parent companies with utilities than span WECC and Eastern IC are excluded. Includes component companies of the S&P 500 utilities index.

- PNNL also examined **how utility equity returns vary in most wildfire prone areas.** We find sharp divergences in returns between eastern and western utilities.
- **Western utilities outside of California had substantially lower returns than eastern utilities from 2020-2024.** California utilities saw sharply negative returns, with considerable volatility. Large dips following the Camp and Palisades fires are visible.
- PNNL is also expanding analysis to capture impacts to public utilities and currently collecting data on bond yields for municipal utilities.
- Other factors like utility business model will also impact returns.

Wildfire indirect cost summary

- **Utilities are facing higher insurance costs and less availability.**
  - For utilities reporting increases in premiums, additional insurance costs range from $4 to $128 per customer per year.
  - New policy and financial mechanisms may be needed to limit customer rate impacts.
- **Wildfire is changing the risk profile of certain electric utilities.**
  - Increased risk profiles generally result in higher costs of borrowing and equity.
  - There is evidence to support the idea that utilities in the Western Electricity Coordinating Council (WECC) service area are viewed as riskier than those in the east by investors.
- **Financing costs impact customers through regulated rates of return.**
  - Rates of return are heavily influenced by, but are not equivalent, to the cost of capital.
  - Based on historical spend rates, increasing the cost of capital by ~200 basis points could increase typical customer bills by $50-$60/year. Higher risk scenarios indicate bill impacts could exceed $75/year, with 2020 levels of infrastructure spending.

State laws on liability standards are significant for wildfire mitigation

Liability standards vary by state. However, establishing liability of a utility for a wildfire is typically based in either state negligence law or state strict liability law.

Negligence on the part of the utility is proven by establishing:

1. The utility owed a duty of care
2. The utility breached the duty of care
3. The utility breach caused damage, and
4. The person bringing a claim can prove damages

Strict liability merely requires proving that the utility caused the fire.

In practice, strict liability requires proving that the utility caused the fire, while negligence requires proving that the utility caused the fire and that the fire was the result of their failure to behave with a reasonable level of care in their actions. Therefore, **in states with strict liability law, such as California, it is more likely that utilities will be held liable for damages that result from utility ignited wildfires.**

Term	Definition
Negligence	The failure to behave with the level of care that a reasonable person would have exercised under the same circumstances. Either a person's actions or omissions of actions can be found negligent. [Definition available here.]
Strict Liability	Liability for committing an action regardless of intent or standard of care. [Definition available here.]

Liability standards impact wildfire costs

- **Indirect costs can be heavily influenced by differences in state liability standards**. For example: California's strict liability approach, which does not require a utility to be found negligent to be held liable for wildfire damages, has contributed to significant cost (and rate) increases (CPUC 2026).
- **Some wildfire liability costs can be recovered from ratepayers** (including via dedicated surcharges or contributions to a state wildfire fund), which can impact affordability (Wiser et al. 2025, Aldern 2026).
- **Liability standards also impact other indirect costs, such as insurance cost and availability**.
- A state's liability approach can impact insurers' perception of risk (CPUC 2024b, WA OIC 2023).

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How Direct and Indirect Costs Appear in Rates

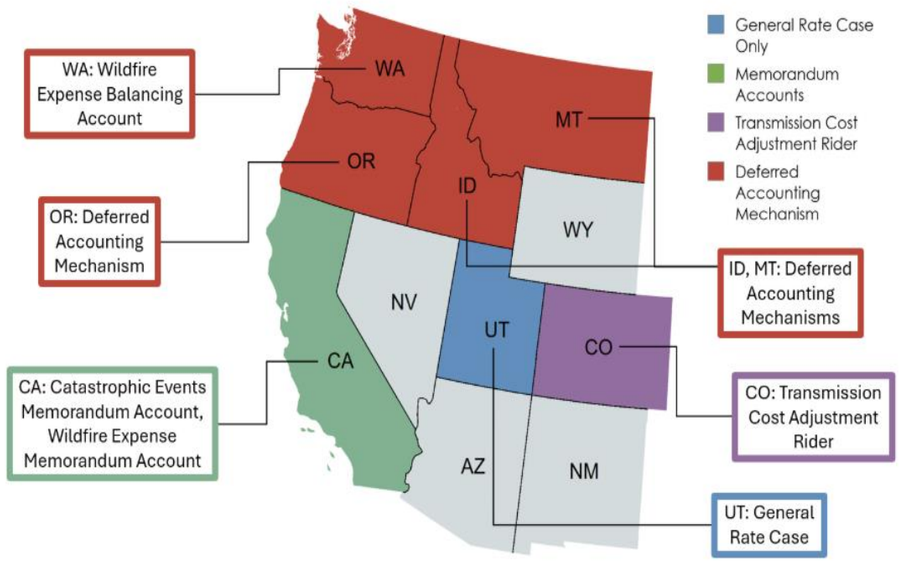
Direct and indirect wildfire costs can show up in rates in a variety of ways. They can also impact customer classes differently.

In addition, harder to quantify economic costs such as Public Safety Power Shutoff (PSPS) events can create economic costs as the result of power outages.

There are tradeoffs in determining how costs are allocated and through which mechanism.

States vary in how they track wildfire costs, making simple cost comparisons impossible

Tracking Type Used by Regulated Utilities by State



For detailed information see: PNNL, Cost Recovery Mechanisms for Utility Wildfire Mitigation, 2026.

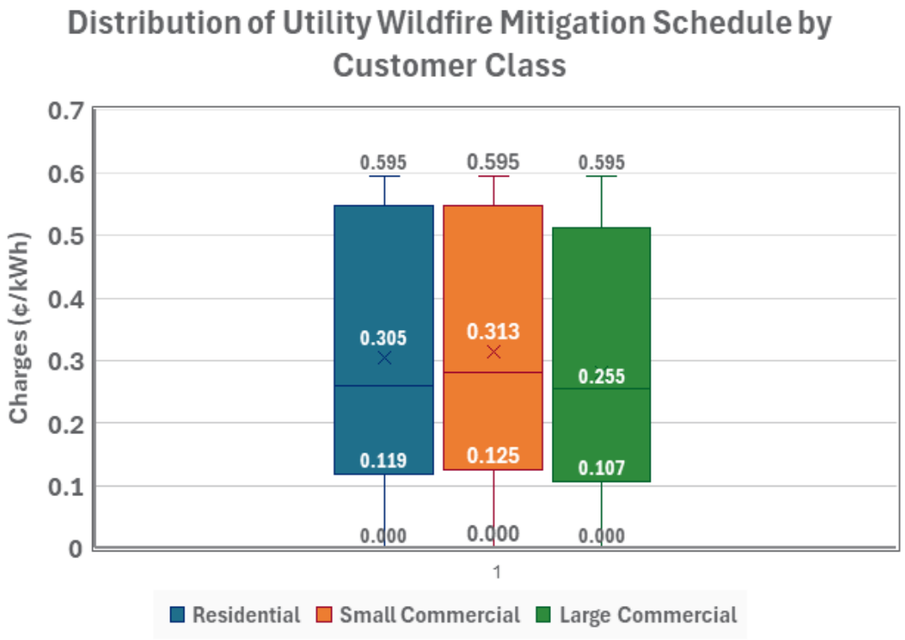
- **General Rate Case:** the standard utility mechanism for cost recovery, which is initiated through formal proceedings.
- **Explicit Tariffs and Schedules:** explicit schedules for wildfire mitigation costs assignments.
- **Deferred Accounting and Balancing Accounts:** track the difference between projected and actual expenditures.
- **Memo Accounts:** track costs incurred outside of previous rate cases.
- **Transmission Cost Adjustment Riders:** a Colorado mechanism that incentivizes transmission investment.

Wildfire Balancing Accounts (WBA) detail

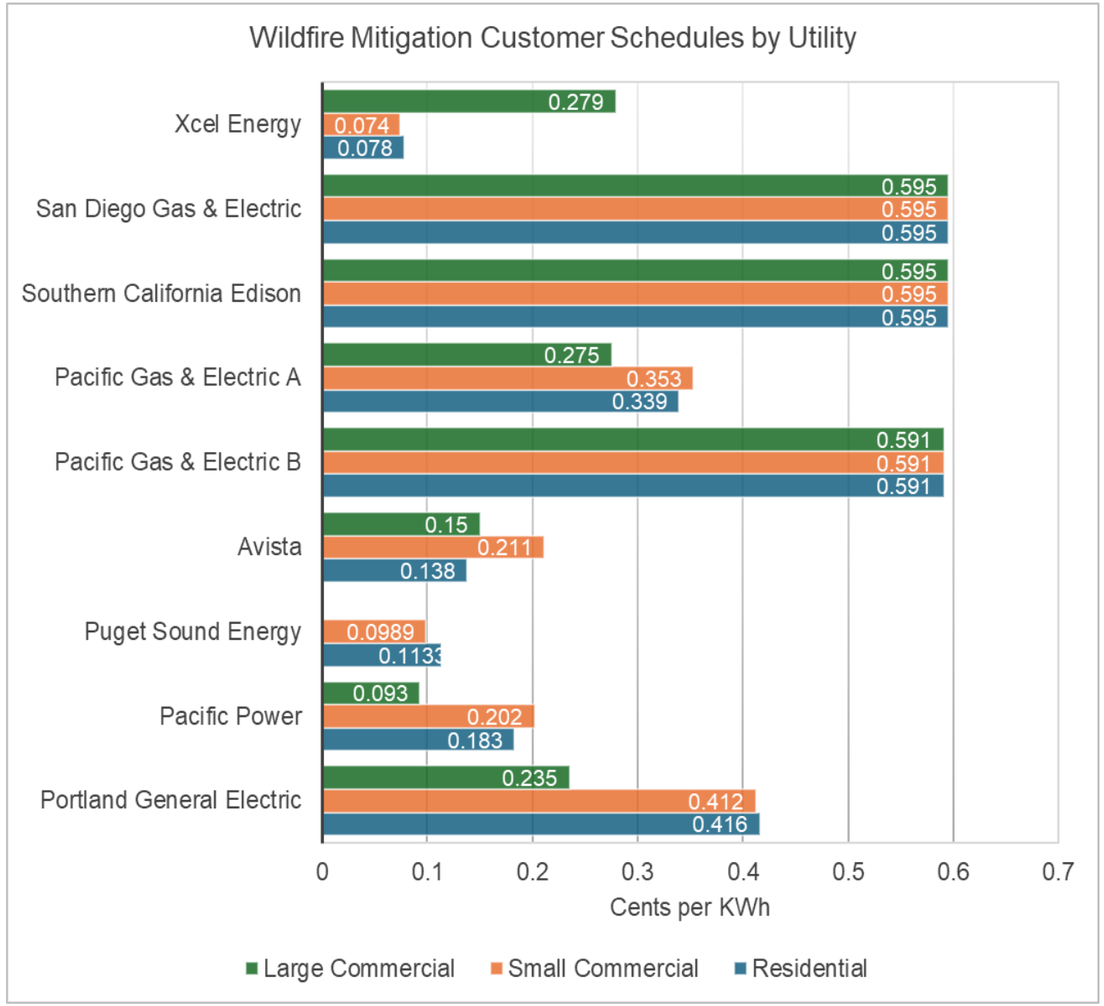
- **Some Western utilities have established wildfire balancing accounts to track wildfire costs, allowing some recovery from ratepayers for higher-than-anticipated mitigation spending.** Tariffs for planned wildfire mitigation costs are included in customer rates. Balancing accounts keep track of differences between planned and actual wildfire mitigation expenses. This practice has existed for decades in California (Paugh & Raftery 2022, CPUC 2009) and has more recently been adopted in Oregon and Washington.
- **A two-way account allows a utility to refund customers if actual expenses are lower than planned, or to recover additional expenses if they are higher**. E.g., Avista's 2023 rate increase for customers in Washington and Idaho included recovery of additional wildfire expenses based on balancing account tracking (Avista 2023, Avista 2025).
- **Some regulators have measures to safeguard customers from excessive rate impacts, such as:**
  - Require justification for and approval of proposed expenses.
  - Require an application if extra expenses will go above a certain percentage of the planned expenses.
  - Require performance-based metrics report of mitigation measures completed.
  - Offer monetary reward or charge penalty based on percentage of completed mitigation measures.

Example Metrics Required in Washington for WBA Reviews *(Includes Annual Amount, Cumulative Amount, and Annual Cost Per Mitigation Component)*
of Trees Trimmed
of Hazard Trees Removed
Miles of Conductor Undergrounded
of Reclosers Installed
of Grid Hardening Projects Completed

Rate impacts occur differently across customer classes



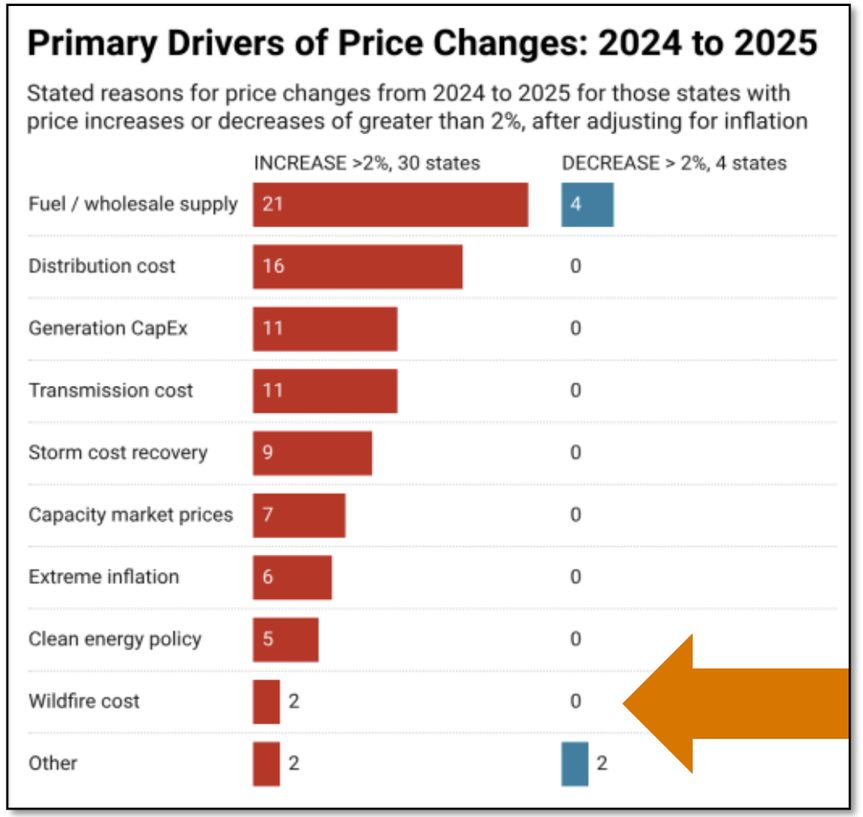
Where utilities publish explicit schedules for wildfire mitigation costs, **data shows that small commercial and residential customers pay higher charges on average than large commercial customers**, but the allocation varies by utility.



For detailed information see: [PNNL, Cost Recovery Mechanisms for Utility Wildfire Mitigation, 2026](#).

Wildfire shows up in national studies on retail electricity rates and drivers

- National studies provide important context on retail rates but recognize wildfire can be a “primary driver” of overall rate increases.
- Wildfire costs were the primary driver of rate increases in two states (Retail Electricity Price Trends and Drivers, Lawrence Berkeley National Laboratory, The Brattle Group, April 2026).
- An EEI-funded study agreed that in California, which represents the highest growth rate in retail electricity rates of all U.S. states, the primary driver is wildfire and wildfire mitigation (Retail rate trends in the U.S., Charles River Associates, 2026).



Information Sourced From Weiser, 2026

Wildfire rate impact summary

While wildfire mitigation costs are not yet a driver for increasing electricity rates for most states, the ratepayer impact is still measurable.

Among utilities with explicit wildfire mitigation charges, impacts vary by customer class, at 0.11¢–0.60¢/kWh, with an average near 0.30¢/kWh.

Beyond mitigation costs there are several additional costs that impact rates:

- Indirect costs, such as increased insurance and cost of capital costs.
- Where states require ratepayer contributions to wildfire damage funds this is typically a charge on top of wildfire mitigation costs.
- Exposure to potential future costs from wildfire damage to infrastructure or other liabilities.

Estimated monthly cost of wildfire on households with average electricity use

Cost Type	Low Range Estimate	High Range Estimate
Mitigation	*$.99	*$5.40
Increased Insurance Premiums	$.33	$10.66
Increased Cost of Capital	~$3.00*	~$5.00*
Total non-CA IOU Customer:	**$4.32**	**$21.06**
Wildfire Fund (CA IOUs only)	**$2.50	*$5.35
Total CA IOU Customers:	**$6.82**	**$26.41**

*Based on a national average of 900 kWh/ month per residential household
** Based on a CA estimate of 420 kWh/ month per residential household
Insurance premium and capital costs are extrapolated based on highly variable information

Proactive de-energization measures (PSPS) reduce wildfire risk, but have social and economic costs

What is PSPS?

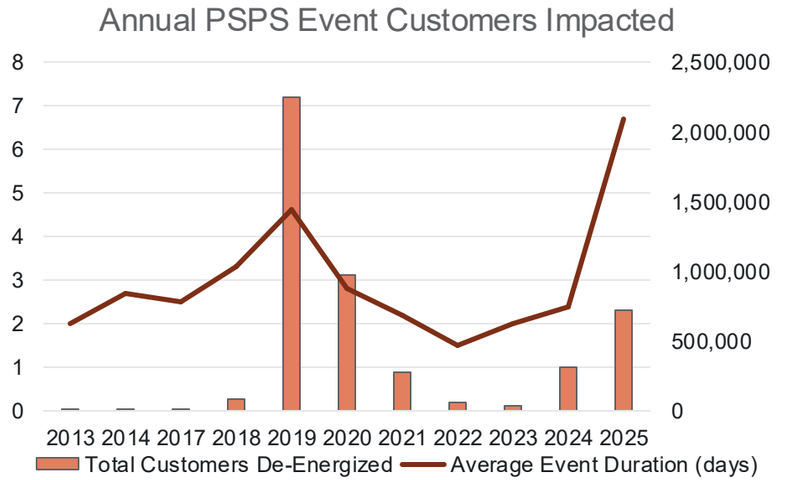
In addition to direct mitigation efforts, utilities implement grid operational strategies to reduce wildfire risks.

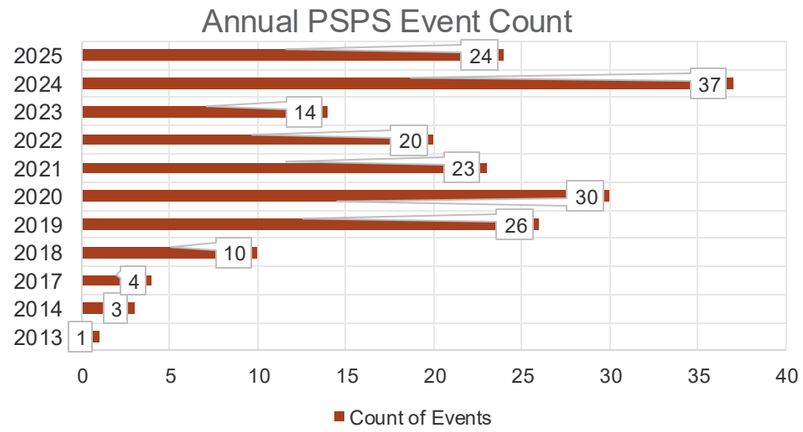
Utilities may **proactively de-energize certain powerlines before a wildfire** under acute fire risk conditions. The purpose of de-energizing lines is to prevent a utility-ignited wildfire. This practice is called public safety power shutoffs (PSPS).

- **As a mitigation approach, PSPS involves tradeoffs.** While PSPS eliminates wildfire ignition risk – and the potential for extensive damage to utility equipment and third-party property – turning off power burdens customers with the economic and social costs of sudden and long outages. (Macmillan et al. 2023, Babrauskas 2024).
- Due to the impact to customers from power outages, **the practice is widely described by utilities in WMPs and other documentation as a wildfire mitigation measure of last resort or "last line of defense"** (Hawaiian Electric 2024, Portland General Electric n.d., California Public Utilities Commission n.d.-b).
- Though PSPS has been proposed or used by utilities since 2008, there are no definitive guidelines on its implementation (California Public Utilities Commission 2009, Babrauskas 2024). Utilities in Oregon and Hawaii have been sued for not implementing PSPS in wildfire conditions (Chappell and Koenig 2023, PacifiCorp 2025).

Frequency and effects of proactive de-energization (PSPS) to prevent a wildfire

- PSPS has economic costs, and its use has expanded since its inception, evolving from isolated early events into a more routinized wildfire mitigation tool used by a growing number of utilities.
  - Event durations had a notable uptick in 2025, likely driven by more cautious decision-making under heightened regulatory/public scrutiny and system redundancy implementations.
  - 2019 represented a clear inflection point driven primarily by Kincade Fire in October in PG&E's territory, as the cause was directly linked to transmission infrastructure.
- At least 192 PSPS events occurred between 2013 and 2025, with the vast majority (165) by California IOUs.



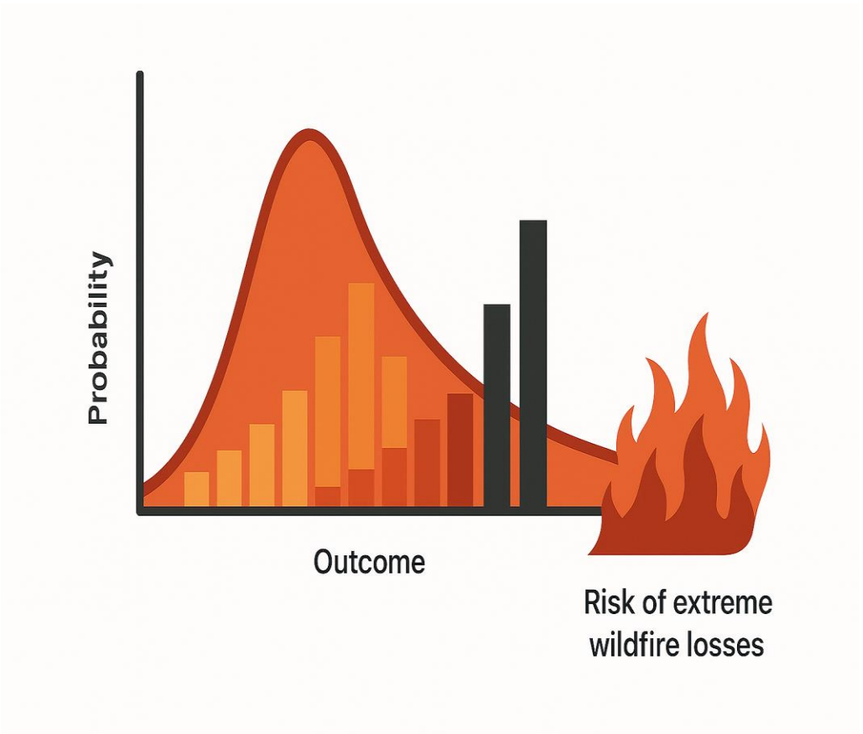


PSPS Known Events Tracker - PNNL-SA-220252.xlsx

There are tradeoff dynamics in who pays utility wildfire costs

- Allowance of recovery for wildfire costs directly impacts customers, but limits on cost recovery and return on investment may compromise utilities' ability to increase spending on wildfire mitigation and other objectives.
- In the event of a wildfire and resulting lawsuits, additional cost dynamics and tradeoffs occur, especially with regard to findings of negligence (ID SB 1183 2025, MT HB 490 2025, SD SB 36 2026, TX HB 145 2025).
- **Additional dynamics:**
  - Expanding ratepayer value from wildfire mitigation investments
  - Risk mitigation design and cumulative effects
  - Restoration of market forces and shared risk

Visualization of probability versus risk



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State Policy Solutions to Utility Wildfire Mitigation

Example policies:

- Wildfire Mitigation Plan requirements
- Damage caps
- Wildfire funds

As the number of wildfires increased in the last decade, several states adopted legislation to clarify expectations for mitigation and establish the boundaries of risk. A significant increase in legislation targeting utility wildfire risks occurred during calendar year 2025.

In addition to recommending or requiring Wildfire Mitigation Plans, states are using budgets to direct new governance structures and agency collaborations as well as considering a range of measures to reduce liability exposure with the goal of cost containment and reducing volatility in commercial markets.

For detailed information on current best practices for wildfire planning, prevention, response, and recovery, see PNNL's Current Best Practices on Wildfire Risk Reduction for Electric Transmission and Distribution Systems report.

Legislation types and costs they mitigate

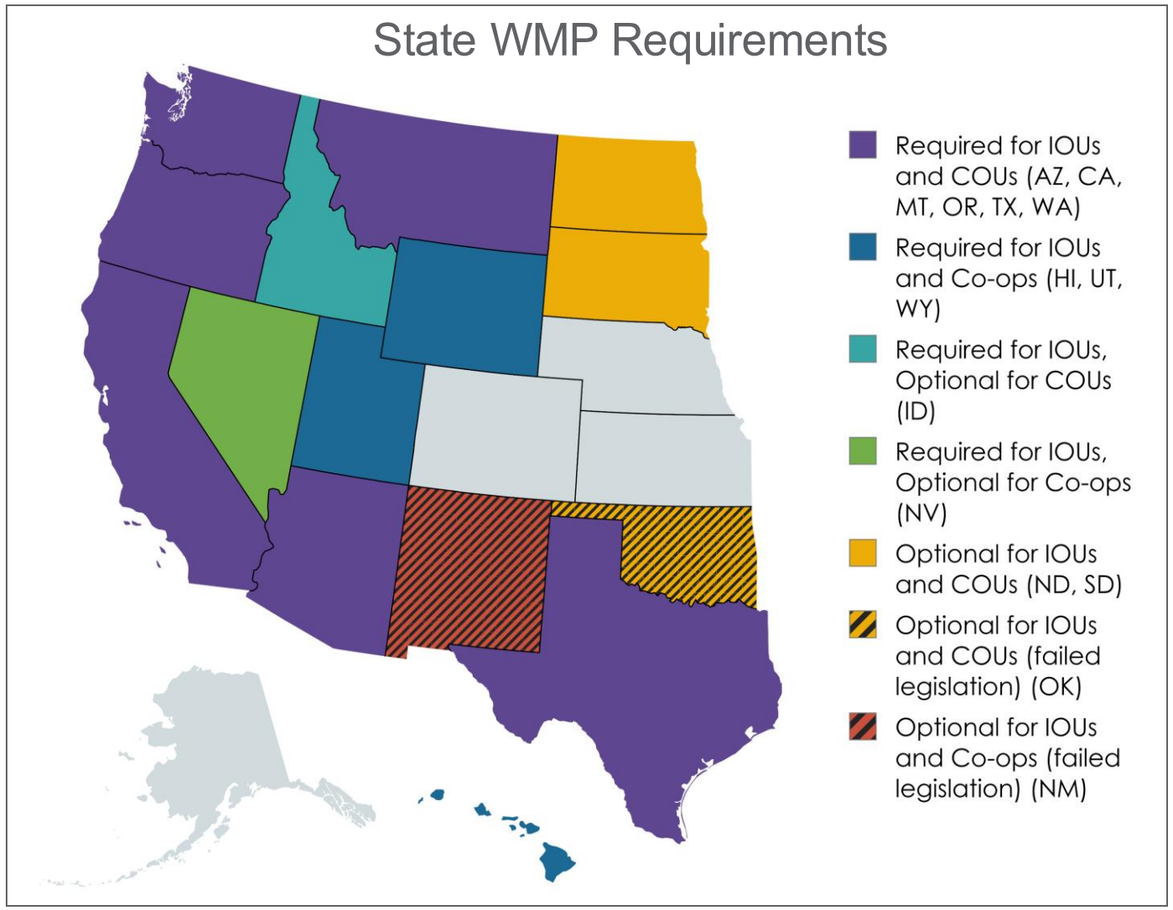
Multiple states have implemented legislation to reduce the cost of and damage from utility ignited wildfires. This legislation is often in reaction to real or perceived risk. The approaches taken include requirements for WMPs, requirements for WMP approvals, liability limitations, damage caps, creation of wildfire funds, and authorization of wildfire self-insurance funds.

Each legislative approach seeks to provide cost certainty or constraints for certain damage types including utility infrastructure damage, economic damage from outages, and third-party liability. There is increasing awareness that convergence of policy may be necessary.

Legislative Approaches to Mitigating Wildfire Damages and the Type of Cost it Attempts to Mitigate

Damage or Cost Type	Wildfire Mitigation Plans (WMPs)	Authority to Approve WMPs	Modified Liability	Modified Damages	Wildfire Funds	Self-Insurance Funds
Damage to Utility Infrastructure	X	X				X
Economic Damage from Outages	X	X	X	X		X
Third Party Liability from Fires			X	X	X	X

Wildfire risk reduction through elevating the significance of WMPs

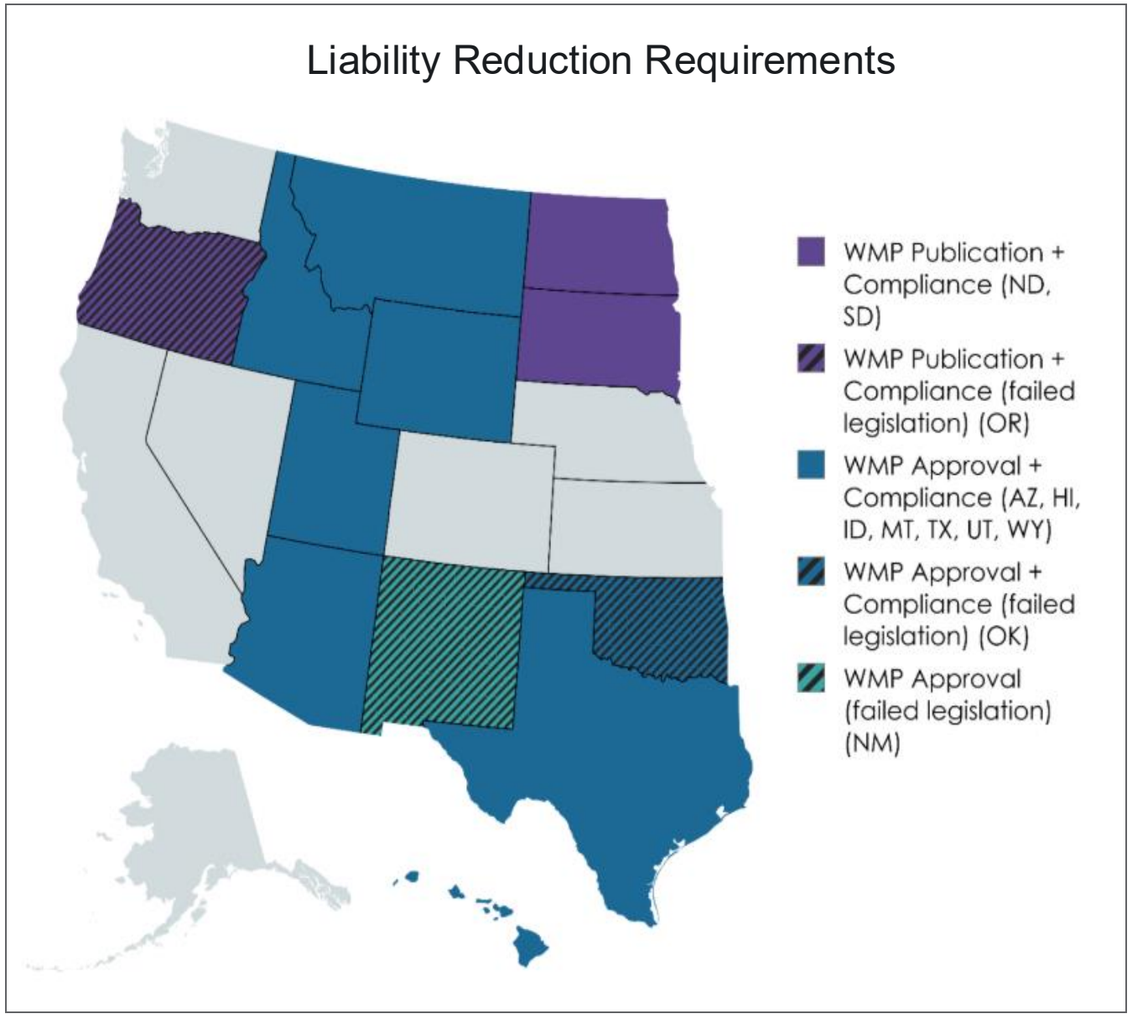


States have considered how WMPs can provide protections from liability risks, including:

- Requiring third party approval of WMPs,
- Associating WMP compliance with negligence immunity,
- Associating WMP compliance with damage caps, and
- Associating WMP compliance with payment funds or bonds.

States also intend to provide certainty of cost recovery for regulated utilities through WMP requirements. [See section above on Wildfire Mitigation Plans proceedings.]

Legislative action to reduce utility litigation exposure



The scale of litigation following a utility-ignited wildfire has the potential to impose substantial costs, credit downgrades, and bankruptcy on utilities. In recognition of this risk, state legislatures reduce liability through several provisions:

- Moving from strict liability to negligence law for wildfire claims
- Establishing that the standard of care has been met through compliance with a WMP

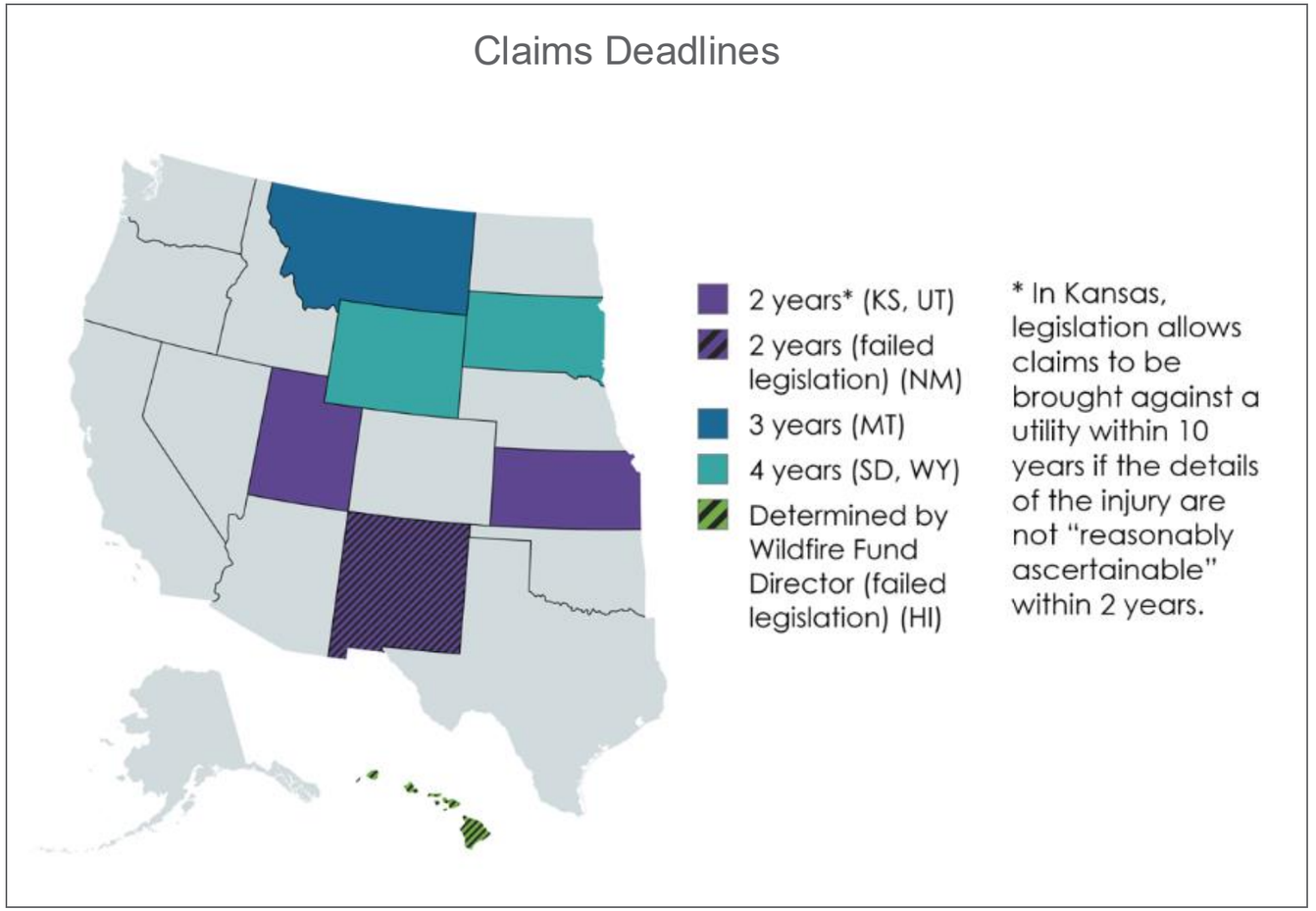
In most states, these liability protections are contingent on meeting a standard of care through ***approval*** of a utility's WMP by state regulators and ***compliance*** with the WMP by the utility up to and during the ignition event. In the Dakotas, utilities can be granted liability protections through compliance alone, without needing approval from a PUC or other government body.

Utility Wildfire Risk and Liability Legislation Tracker - PNNL-SA-216556.xlsx

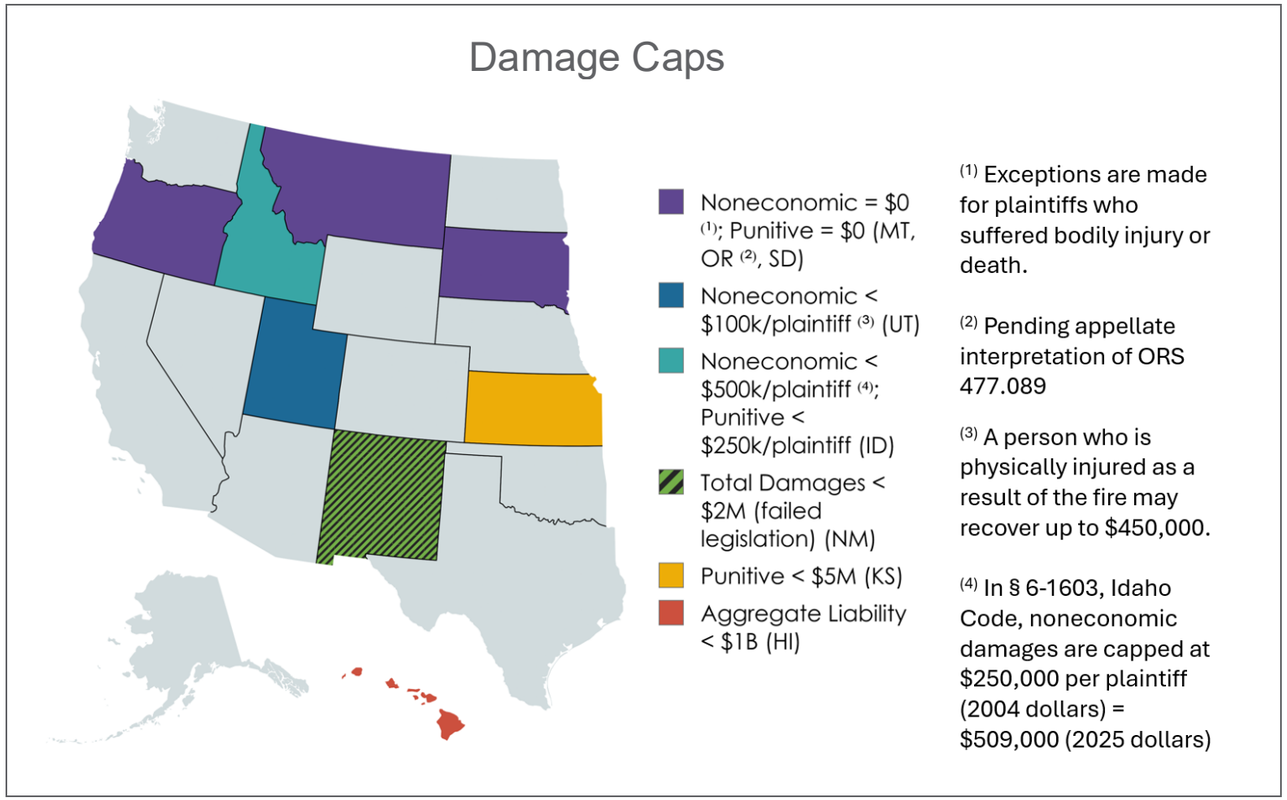
Deadlines to file claims against utilities after a wildfire

In addition to liability standards, state legislatures have established statutes of limitations for bringing a claim against a utility in litigation.

These limits are established on a spectrum ranging from two to four years following the initial ignition of the wildfire. Like modified liability standards, claims deadlines are typically contingent on and passed in the same law as requirements for WMPs.



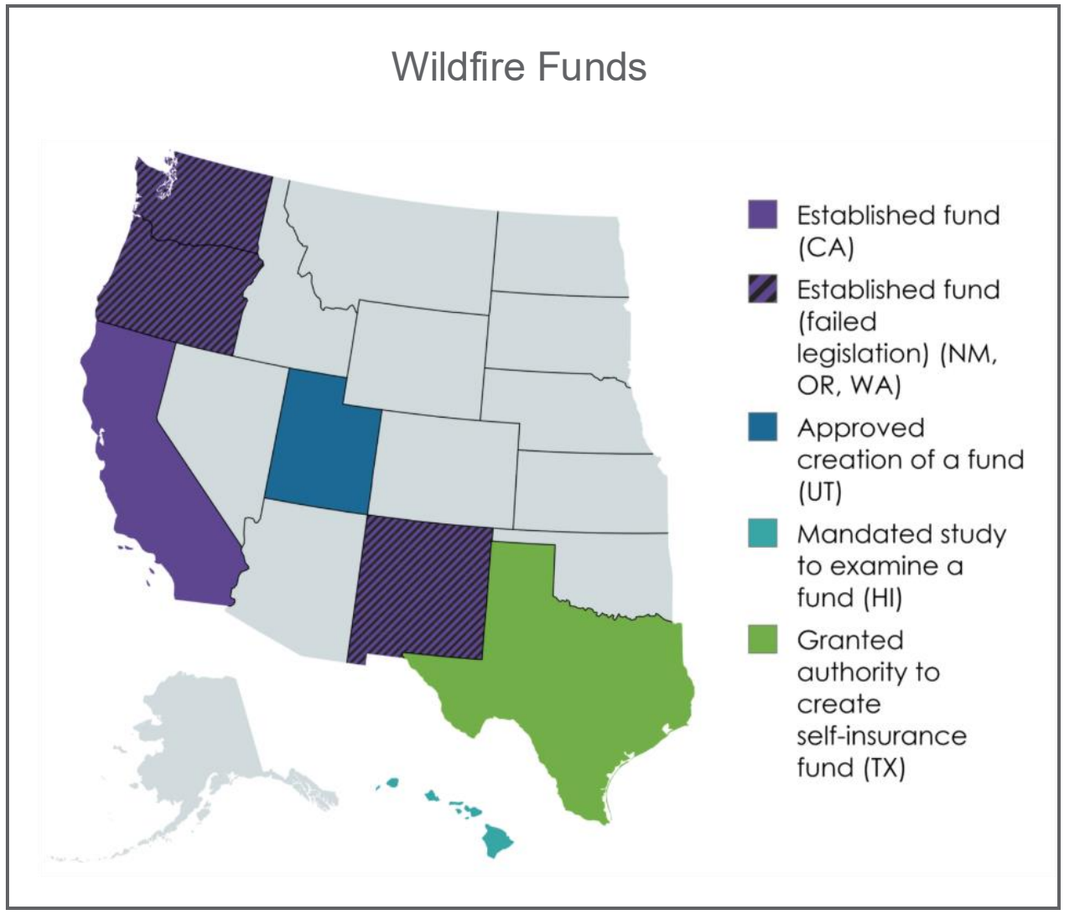
Limits on noneconomic and punitive damages



Like legislation establishing liability protections and claims deadlines, laws setting damage caps are more common in the Interior West than the West Coast.

These laws set limits on noneconomic, punitive, and total damages that plaintiffs can seek in litigation claims against a utility. They can be set on the aggregate scale, like in Hawaii and Kansas, or on a per-plaintiff basis, like in Oregon, Idaho, and Utah. Economic damages are typically set according to a formula based on the assessed value of lost property rather than explicit limits set by law.

Establishment and exploration of financial backstops for utilities paying claims



The most consequential wildfire legislation involves the creation of wildfire funds.

With the passage of AB 1054 in 2019, California became the first state to establish a financial backstop for utilities that ignite wildfires, and the California Wildfire Fund remains the only fully capitalized and accessible pool for utilities to support litigation claims following a utility-ignited wildfire.

Other funds are in various stages of maturity in Utah, Hawaii, and Texas. Funds can be capitalized through a combination of ratepayer and shareholder contributions, as in California, or exclusively by ratepayers, as in Utah.

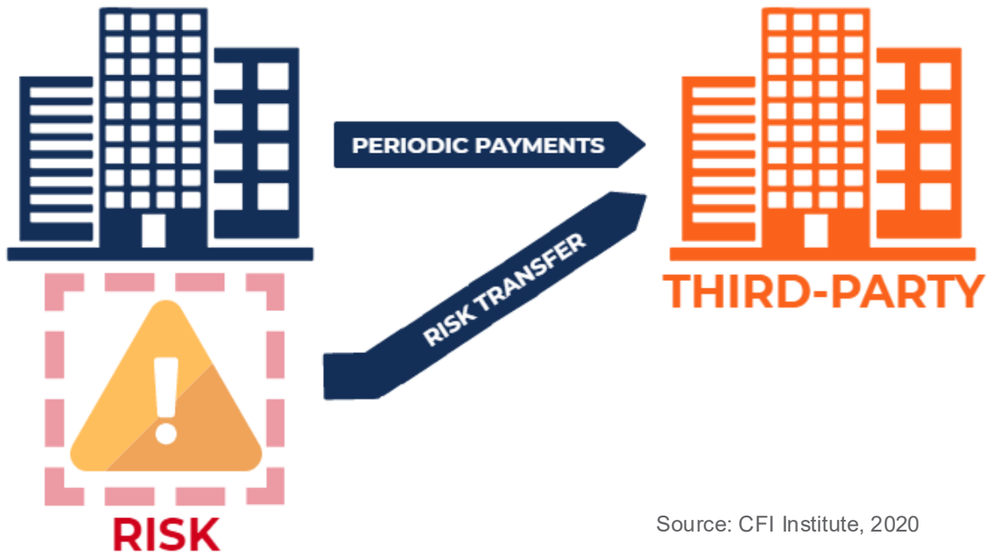
Legislative approaches by state

Cumulatively, fourteen states have addressed utility wildfire risk through successful legislation as of March 2026.

State	Create WMPs	Formalized WMP Approval Process	Liability Limits	Damage Caps	Claims Deadline	Wildfire Fund
Arizona	Yes	Yes	Yes, with WMP approval and compliance	No	No	No
California	Yes	Yes	No	No	No	Yes
Hawaii	Yes	Yes	Yes, with WMP approval and compliance	Yes, for aggregate liability	No	In study phase
Idaho	Yes	Yes	Yes, with WMP approval and compliance	Yes, for non-economic, punitive damages	No	No
Kansas	No	No	No	Yes, for punitive damages	Yes	No
Montana	Yes	Yes	Yes, with WMP approval and compliance	Yes, for non-economic, punitive damages	Yes	No
Nevada	Yes	Yes	No	No	No	No
North Dakota	Yes	No	Yes, with WMP publication and compliance	No	No	No
Oregon	Yes	Yes	No	No	No	No
South Dakota	Yes	No	Yes, with WMP publication and compliance	Yes, for non-economic, punitive damages	Yes	No
Texas	Yes	Yes	Yes, with WMP approval and compliance	No	No	No
Utah	Yes	Yes	Yes, with WMP approval and compliance	No	No	No
Washington	Yes	Yes	No	No	No	No
Wyoming	Yes	Yes	Yes, with WMP approval and compliance	No	No	No

Financial Transfers of Risk

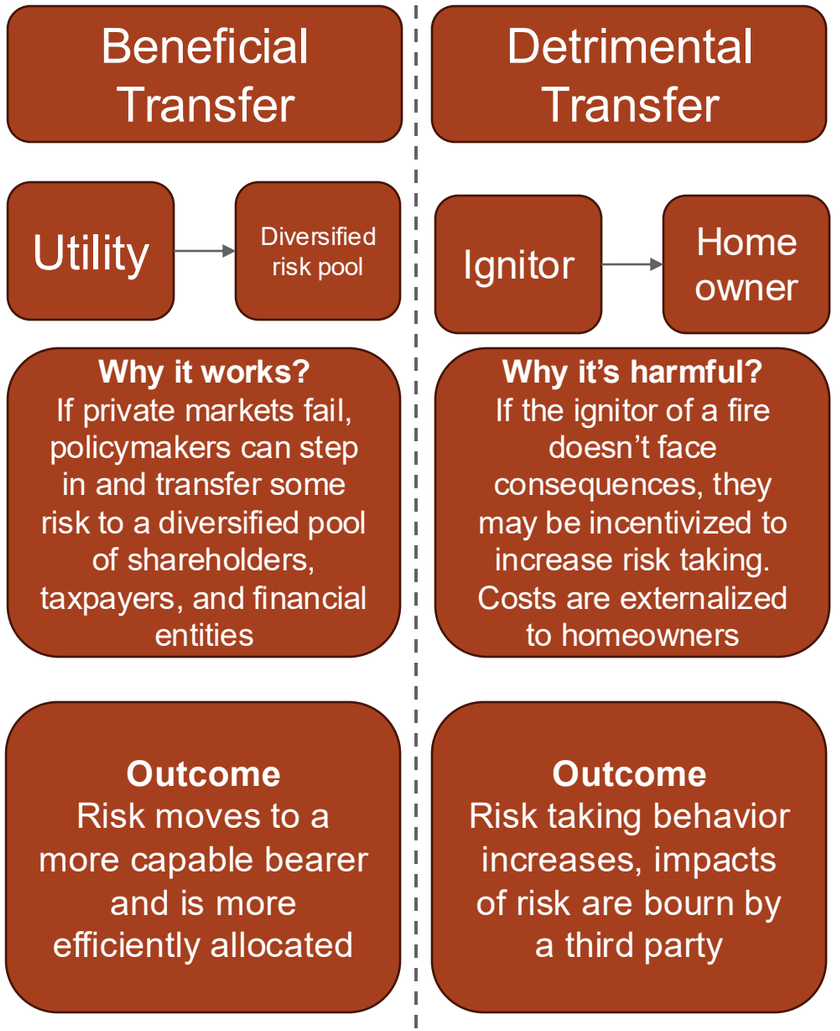
- Wildfire **policies primarily aim to reduce risk overall, but transferring risk to other entities can also be an effective strategies**
- It is common for many industries commonly transfer risk using financial mechanisms
  - **Insurance** is the most common example of this, but other mechanisms including **securitization** can move risk to different parties
- Third parties can be better positioned to manage the financial impacts of risk
  - These entities can **limit their exposure to a single risk event by diversifying** their holdings
- Transfers of risk often require ongoing payments
- Not all types of risk may be transferable, **and transferring risk my not always be cost effective**
  - Risk mitigation may be necessary in these scenarios
  - There is growing evidence that wildfire is making financial risk transfer more difficult due by creating instability in the insurance market (Thompson, et al. 2025)



Source: CFI Institute, 2020

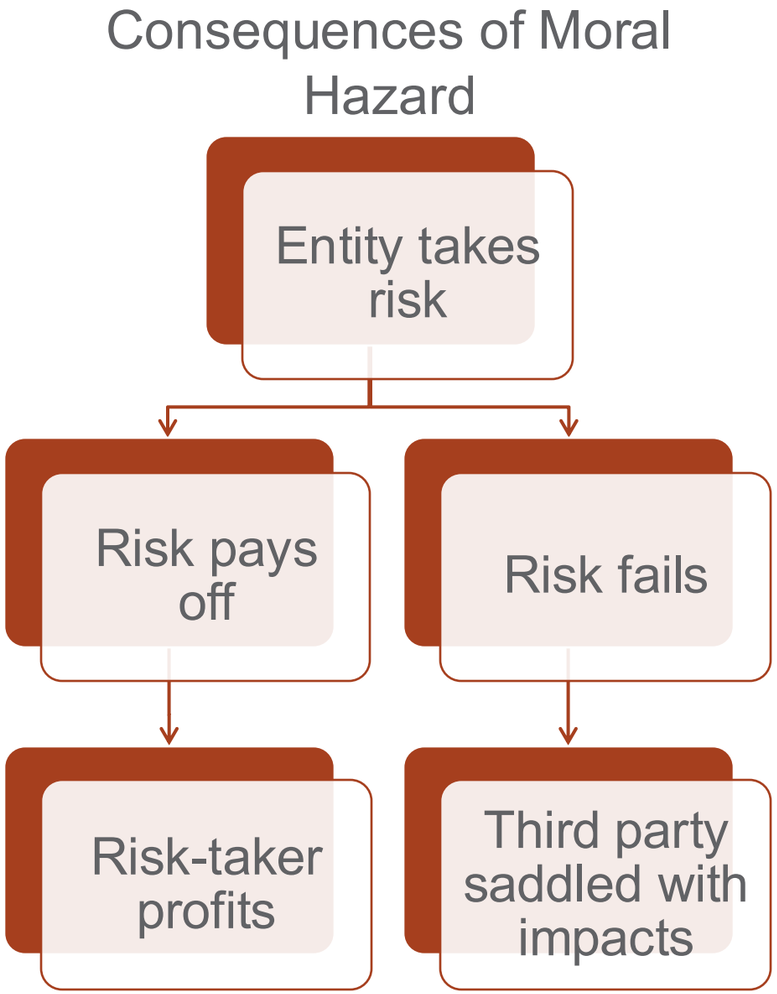
Policy driven transfers of risk

- Risk can also be transferred through policy mechanisms, but these can often have unintended consequences. In the effort to maintain affordability, **proposals many end up moving risks, and costs,** rather than reducing them.
- It can be appropriate for policymakers to step in when risks exceed the private sectors capacity to absorb them
  - Policy has successfully been used to mitigate risks associated with things like nuclear disaster and threats from terrorism
- Policies that limit utility liability risk without managing the underlying wildfire risk could simply shift costs from the rate base to property insurance premiums, leaving ratepayers no better off.
  - Tools like liability caps do not reduce risks in and of themselves
    - ✓ Policymakers have often tied liability limits to risk mitigating activities to encourage risk reduction, while also reducing liability



Moral Hazard

- When risk is allocated inefficiently market failures called moral hazard can occur
  - Moral hazard may occur when an actor is able to pass the consequences of a risk onto other entities. If there is no longer enough “skin in the game,” the risk imbalance swings to encourage excessive risk taking.
  - Information asymmetry and regulatory capture are common causes of moral hazard
- When designed appropriately financial products like insurance are designed to limit potential moral hazard
  - Deductibles, as an example, discourage “overuse” of insurance policies



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Multi-Benefit Technology Solutions

Example multi-benefit technology solutions:

- Dynamic Line Ratings
- Advanced Power Flow Controls
- Topology Optimization
- Advanced Conductors

A wide range of technologies and engineering solutions can be deployed to reduce wildfire risk. These solutions range from grid hardening to situational awareness sensors, and they are often documented in wildfire mitigation plans.

Yet some of these investments have benefits beyond reduction in wildfire risk: they create “blue sky” day-to-day benefits that enhance reliable service for customers and/or reduce risks to other hazards and disruptions. Cost-benefit analyses for investments should show these wider benefits, beyond wildfire risk reduction. Customers then not only receive more benefits for the investment, but they receive benefits every day.

Multi-Benefit Solution: Advanced Transmission Technologies (ATTs)

In addition to technologies that are specifically for wildfire mitigation, ATTs are a class of technologies that are primarily implemented for blue-sky conditions, but which also have potential wildfire benefits.

Technology	Primary (Operational) Benefits	Secondary (Wildfire) Benefits
Dynamic Line Rating (DLR)	Reduced congestion and increased transfer capacity; Improved cost efficiency and grid utilization.	Reduced risk of thermal overload; Lower sag and contact-related ignition risk; Alternative to de-energization.
Advanced Power Flow Controls (APFC)	Improved performance under contingency conditions; Increased usable transfer capacity on existing lines; Reduced renewable curtailment.	Reduced overload risk; Mitigation of thermal and mechanical stress on transmission equipment.
Transmission Topology Optimization (TTO)	Reduced congestion; Improved robustness to single-element outages; Enhanced integration of new generation and load.	Reduced overload risk; Mitigation of thermal and mechanical stress on high-risk corridors and feeders; Shifted flow from fire-prone areas.
Advanced Conductors	Higher utilization of current infrastructure; Smaller cost and environmental impact compared to building new lines.	Higher clearances under load; Lower likelihood of conductor contact with vegetation.
Distributed Energy Resources (DER)	Backup power to critical loads; Smoother restoration and cold-load pickup; Reduced feeder stress during contingency conditions.	Smaller emergency de-energization footprint; Service continuity to critical loads via local supply; Lower operating stress on high-risk circuits.
Line Sensors & Conductor Monitoring	Improved reliability and situational awareness; Reduced outage duration; Proactive condition-based asset management and maintenance strategies.	Earlier detection and faster isolation of abnormal conditions; Lower risk of overheating, arcing, and ignition.

(PNNL, Wildfire Benefits of Advanced Grid Technologies, 2025; PNNL and UC Davis, Wildfire Co-Benefits of ATTs, 2026)

Multi-Benefit Solution: ATTs (cont.)

Already in use for wildfire mitigation:

- **Dynamic Line Rating (DLR):** Under evaluation by **PGE** (OR) (p. 4, 2025 report) to dynamically adjust line capacity based on real-time weather and conductor conditions to avoid overloads during high-risk periods.
- **Topology Optimization and Improvements:** Integrated into **PG&E's** analytical tools for design and operation, which evaluates configurations to maintain service while minimizing wildfire risk (p. 460 – 463). PG&E has been installing sectionalizing devices on the transmission system to segment transmission circuits traversing the HFTD (high fire threat districts).

Potential future applications:

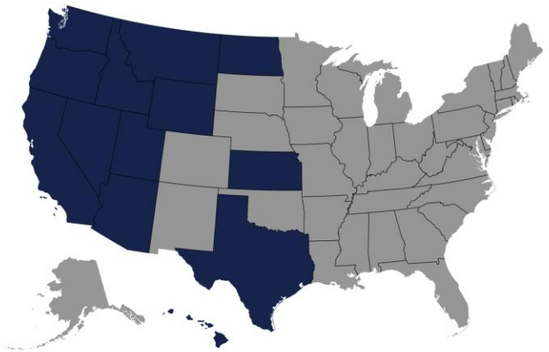
These technologies do not directly appear in reviewed WMPs, but they are used for other operational purposes and have the potential to mitigate ignition risk.

- **Advanced Power Flow Controls:** Utilities can deploy advanced power flow to reroute power away from high fire-threat areas during red flag warnings or other times of high wildfire risk.
- **Reactive Power Compensation** – Utilities can optimize reactive power devices like capacitor banks and FACTS devices to maintain voltage stability during wildfire threats, reducing long-distance power transfers and mitigating service interruptions.

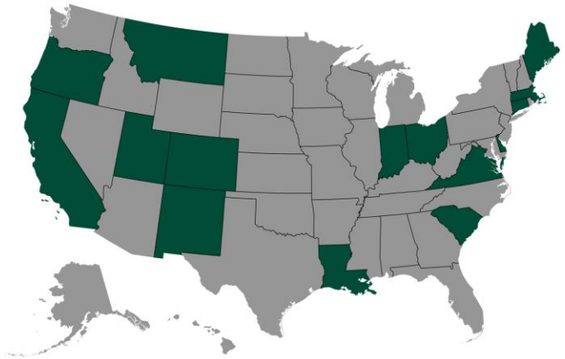
Access the PNNL Wildfire Mitigation Plan Database

Converging State Policy for Wildfire and Advanced Transmission Technologies (ATTs)

States with Wildfire Legislation



States with ATTs Legislation



State legislatures are increasingly linking wildfire risk and grid modernization policy. In recent years, states have enacted legislation addressing both utility wildfire risk management and the evaluation or deployment of ATTs, offering an opportunity to advance two policy objectives with one set of investments.

ATTs offer (1) direct ignition risk reduction through reduced current and/or conductor temperature and reduced line sag, and (2) indirect wildfire benefits through reduced scale of emergency de-energizations.

- Ignition probability increases with available fault current and temperature, which can be reduced through ATTs (Powerline Bushfire Safety Program 2013).
- Several ATTs can reduce line sag, which is correlated with ignition risk through vegetation contact (Wang & Bocchini 2023).
- ATTs can reduce necessary load shedding by over 20% while maintaining a fire-safe state during high-risk conditions (Zhou et al. 2024; Tandon et al. 2021).

The potential cost reduction impact is unknown

Rigorous comparative cost-benefit analysis of the wildfire co-benefits of ATTs is a current research gap, but preliminary analysis shows a potential substantial reduction in costs when compared to conventional system hardening. For example, per-mile cost estimates of undergrounding ($2.6M) are over twice the cost of advanced reconductoring (< $1M), and depending on local topographic conditions and fire risk, may offer similar benefits (SDG&E 2022).

Further analysis is needed to determine specific cost reduction benefits of co-benefit technologies.

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Leveraging Utility Programs

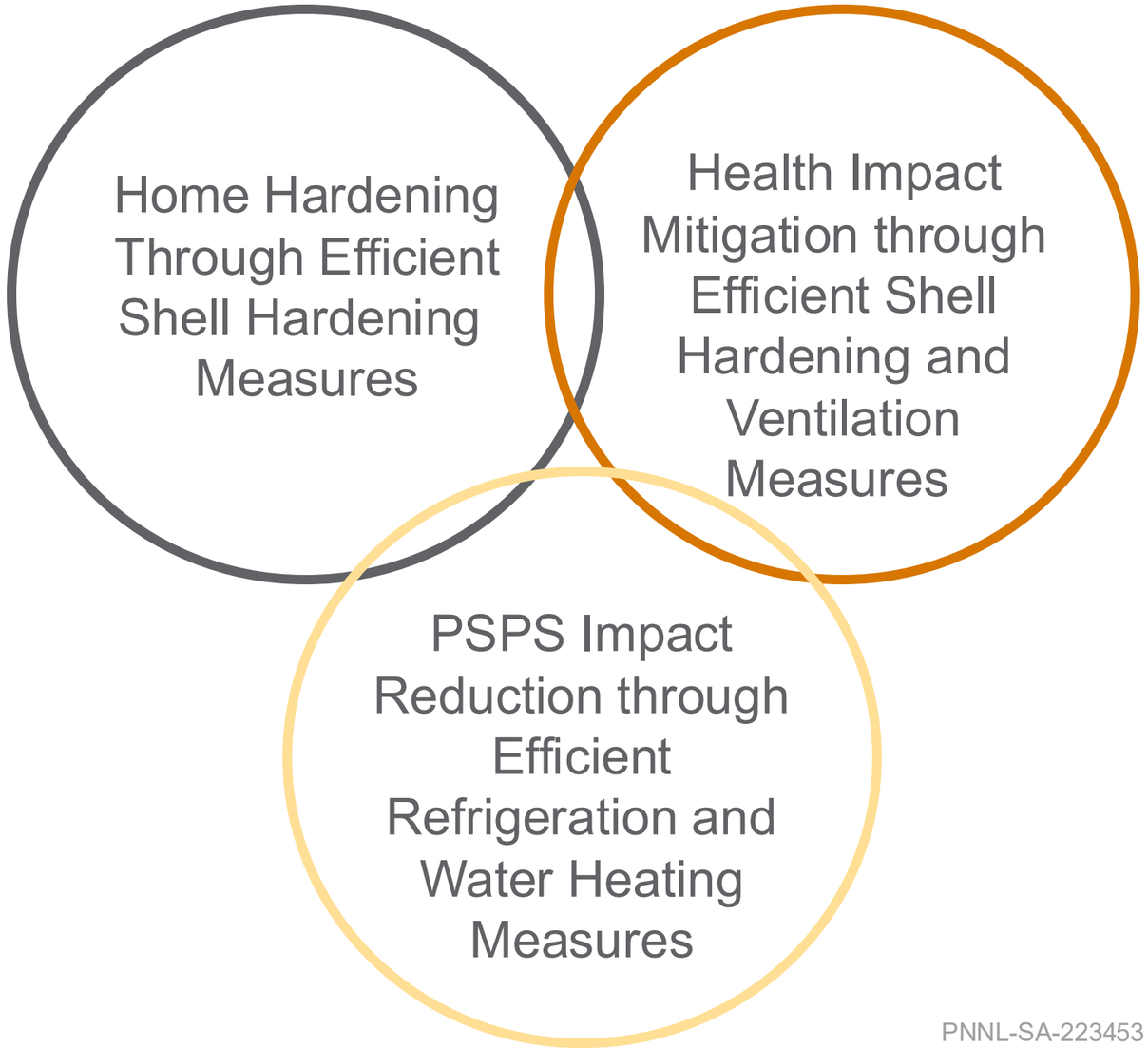
Example solutions include:

- Load reduction programs
- Mobile energy storage
- Landscape-level vegetation management

Existing technologies can help mitigate the damage caused by wildfire by hardening buildings against potential damage, improving indoor air quality during events, and providing backup power during outages or ensuring that equipment can function during periods without electricity.

These technologies are already implemented through other utility programs, and it is only necessary to recognize, and document, the cross benefits.

Leveraging utility programs across load reduction and wildfire mitigation

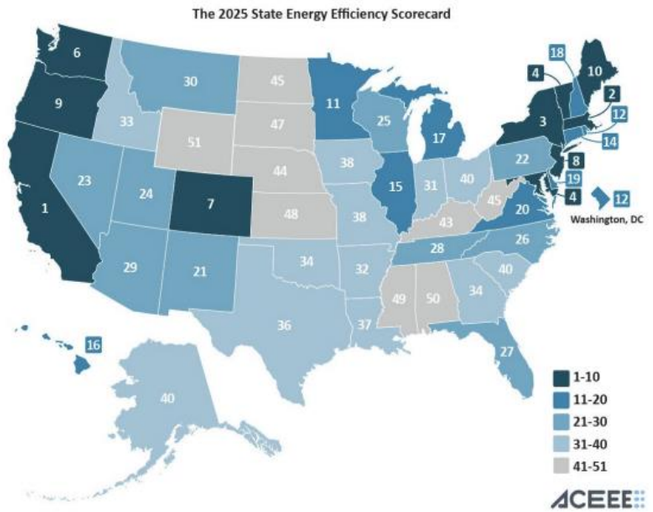


1. Inclusion of home and business hardening measures in wildfire mitigation plans
2. Combined energy and fire safety audits
3. Valuing health benefits of wildfire mitigation in load reduction programs
4. Promoting load reduction measures that mitigate wildfire risks through community outreach and reduce impacts of PSPS

Potential co-benefits exist between load reduction and wildfire mitigation benefits

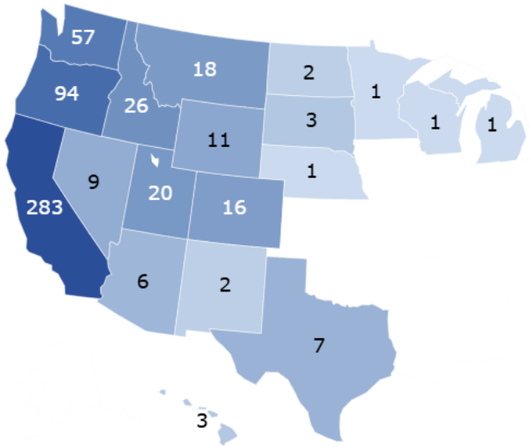
Some utilities and states that have significant investments in load reduction programs (also known as energy efficiency) also have significant risks and investments in wildfire mitigation.

ACEEE 2025 State Ranking for efforts to advance energy efficiency



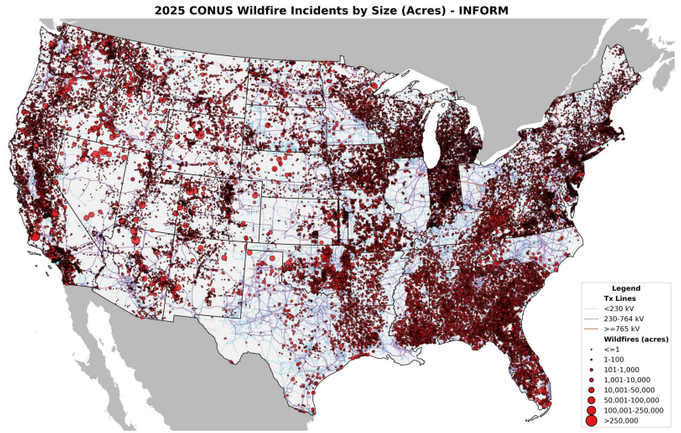
(Kresowik et al. 2025: ACEEE 2025 State Energy Efficiency Scorecard)

Wildfire Mitigation Plans by State



(Statistics on Wildfire Mitigation Plans)

2025 Wildfire Events, by Scale

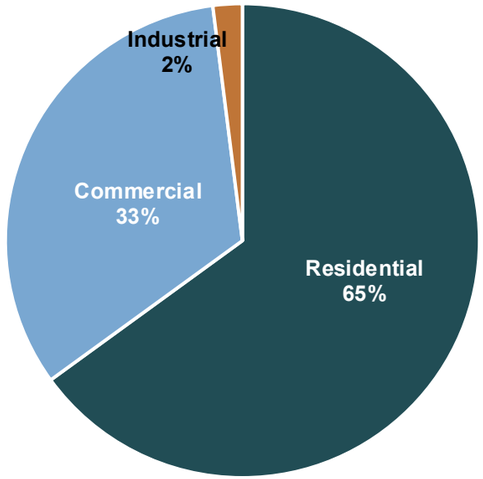


(Source: InFORM, Map Credit: PNNL)

Potential cost reduction impact

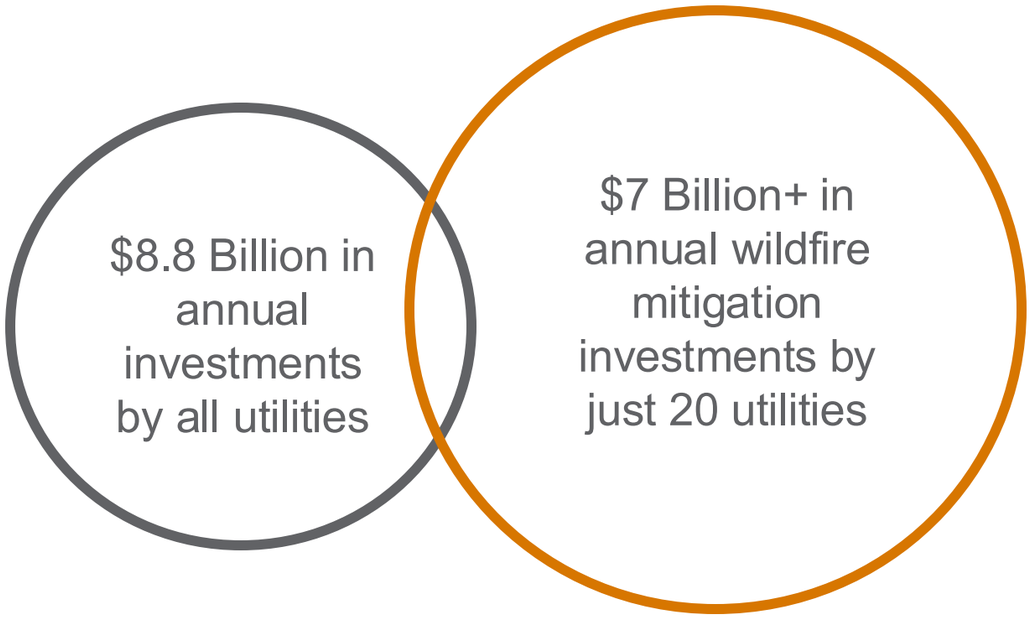
By prioritizing load reduction measures that reduce wildfire damage, utilities can support community resilience to wildfire through programs many already operate. This can result in a cost savings by utilizing load management programs to reduce wildfire damage and utilizing wildfire mitigation programs to reduce load.

Load Reduction Program Breakout by Sector

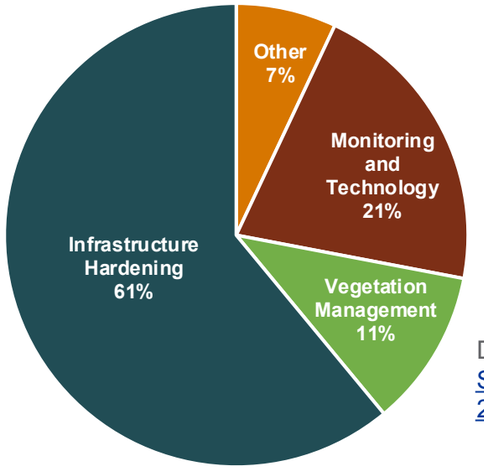


Most load reduction investment is to reduce the cost of residential energy bills.

Data from ACEEE 2025 State Energy Efficiency Scorecard



Wildfire Investment Breakout



Data from SDG&E 2020-2022

Significant wildfire mitigation investment is to prevent utility caused ignition. Hardening homes *could* reduce the scale of liability and cost if ignition occurs.

Accounting for benefits across programs

To connect load reduction and wildfire mitigation programs, we propose a multistep process to target coordination:

- Utilize existing data to **determine areas at greatest risk of weather driven and PSPS events** and apply synergistic treatment to them (example Wildfire Risk Evaluation of the System Tool (WREST) | PNNL)
- **Include fire safety audits in energy audits, and energy audits in wildfire safety audits**
- **Highlight** the wildfire mitigation impacts of appropriate load reduction measures **in measure promotion activities**
- **Include wildfire co-benefits in appropriate load reduction program cost-benefit calculations**:
  - Include wildfire health impacts in participant health impacts and resilience benefit calculations in load reduction measures now
  - Monitor data for potential inclusion of benefits in environmental compliance costs, societal benefit, societal health calculations and measure life in the future
  - Include load reduction measure-based damage mitigation practices such as building hardening, reduction of indoor air quality impacts, and PSPS durability in utility wildfire mitigation plans

This multistep process can increase the effectiveness of utility wildfire mitigation efforts while offsetting increased electric costs by reducing electric use for participating customers.

Detailed information including methodology and tools, will be available in the forthcoming publication (projected August 2026): Kincaid J.B., and K.G. Abernethy-Cannella. 2026. "Load Reduction and Wildfire Mitigation: Surprise Synergy." PNNL-SA-220702. *ACEEE Summer Study*.

Mobile energy storage solutions can support local loads during de-energization

- Public Safety Power Shutoffs (PSPS) reduce the risk of wildfire ignition from power lines but can leave communities and critical infrastructure without electricity for extended periods.
- Mobile energy storage systems could help mitigate economic damage by ensuring that communities have access to power during extended outages, reducing tradeoffs and costs to customers.

Case Study: San Diego Gas and Electric

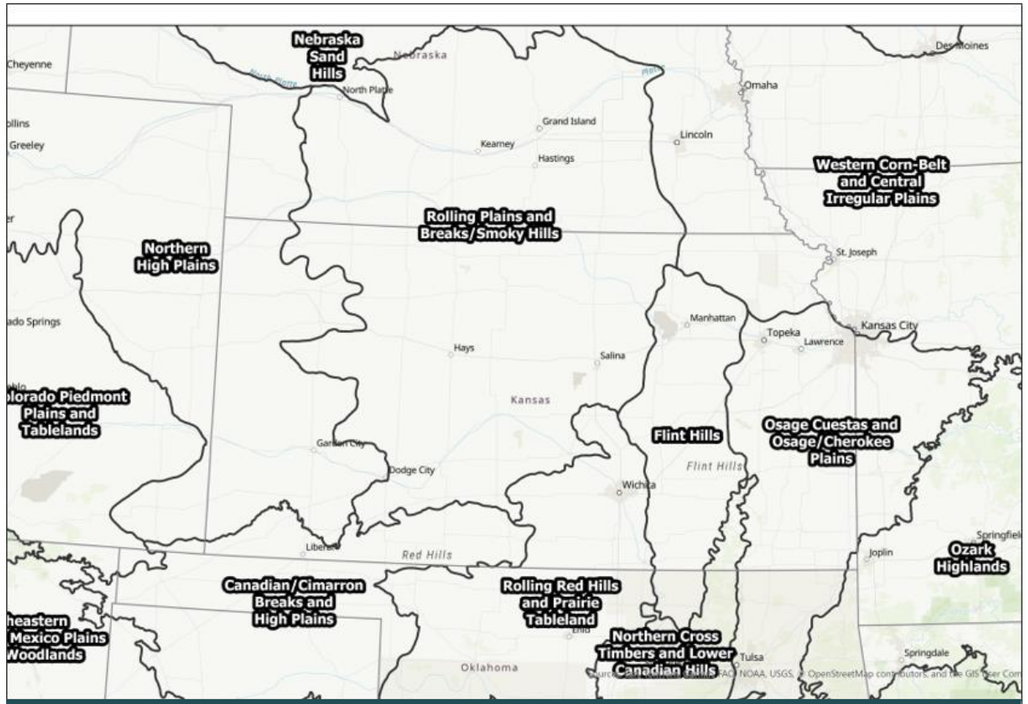
San Diego Gas and Electric (SDG&E) demonstrated the use of Mobile Energy Storage Systems (MESS) during PSPS conditions.

- The MESS, a 362 kW / 1,499 kWh trailer-mounted lithium-ion battery, was deployed to the Cameron Corners Microgrid in a High Fire Threat District (HFTD).
- Operators simulated a PSPS event by isolating downstream loads from the main distribution system.
- The MESS black-started the circuit and energized critical community loads.
- It also demonstrated the ability operate with other generation sources, such as diesel generators to maintain power to the loads.

San Diego Gas & Electric (n.d.)

Wildfire mitigation solutions may be easier and more cost-effective beyond the corridor

- Utilities are traditionally limited to activities within a powerline right-of-way. Corridor spaces may be owned but may also occur on easements, further limiting activities to avoid conflicts with landowners.
- Wildfire is a landscape-level phenomenon, and confining mitigation to the right-of-way misses opportunities for lower cost, more effective outcomes.
- Utility customer relations and real estate offices can be leveraged to connect with adjoining landowners. Partnerships may lead to win-win activities such as:
  - Wide-area wildfire mitigation vegetation management
  - Cooperative fuel and danger tree removal
  - Shared insight into local weather conditions and on-the-ground fuel conditions
  - Local economies, such as forest products and debris/fuel management



Pyromes are geo-spatially-defined landscapes with common wildfire attributes, spanning state lines. (Kansas-area pyromes, Credit: PNNL)

- Connection to local firefighting capabilities
- Multi-value sensor capability (drone utilization, shared remote camera feeds, monitoring systems)

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Managing Financial Risk

Financial risk can be managed through:

- Securitization
- Insurance backstop funds

There are several tools to potentially reduce the financial risk of wildfire. Above we discuss state-specific legislation that sets boundaries for financial risk.

Tools such as securitization and insurance backstop funds may also be used to temporarily defray risk or manage price shocks. These strategies have been useful in other contexts to address unanticipated costs, legacy infrastructure, and commercial market deficiencies.

Purpose and volume of utility securitization

- Securitization is a mechanism to fund extraordinary, one-time costs via utility-issued, ratepayer-backed financing bonds.
  - Past uses have included early power plant retirement, storm recovery, and debt restructuring
  - Current trend to use for wildfire

Over $16 billion

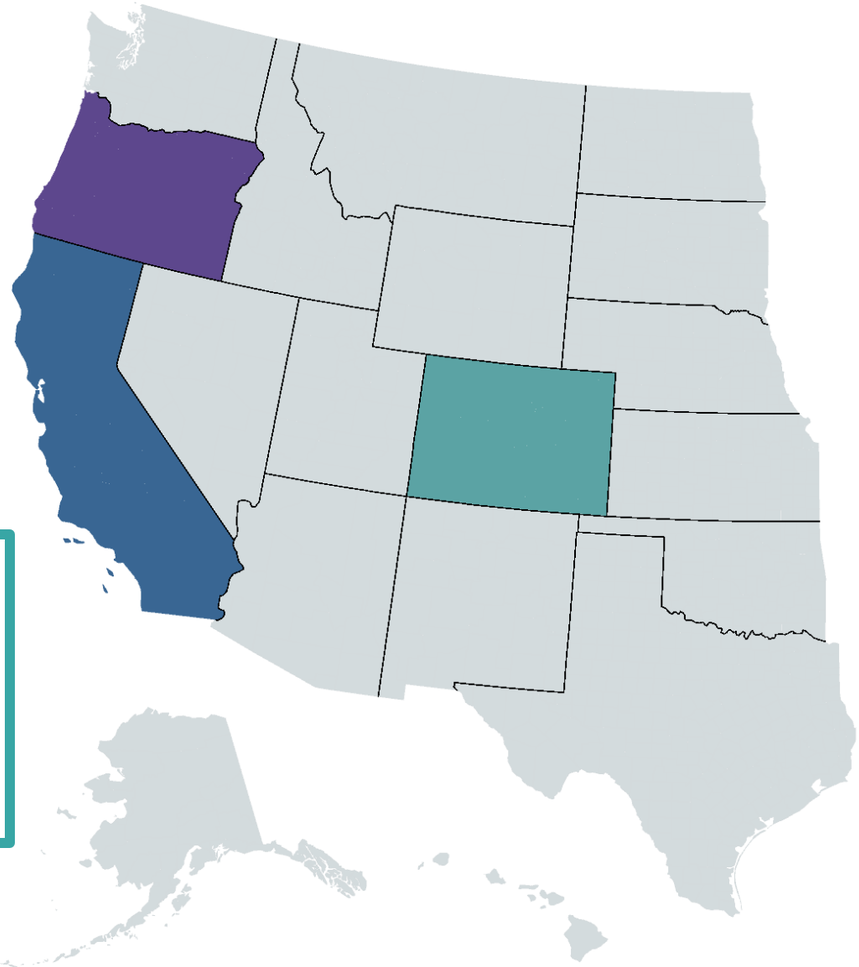
A 2022 spike in amount for all utility-related securitization issuances, in only 13 deals

Source: "Credit FAQ: The Rationale Behind U.S. Utility Securitization And Reasons For Recent Growth." March 2024. *S&P Global 2024*

Self-insurance for liability costs (e.g., Oregon in 2026)

Post-fire recovery (e.g., California)

Proactive wildfire mitigation capital expenditures (e.g., Colorado in 2025)



States Authorizing Wildfire-Related Securitization Measures

Source for figure: S&P Global 2024

Utility securitization of wildfire costs

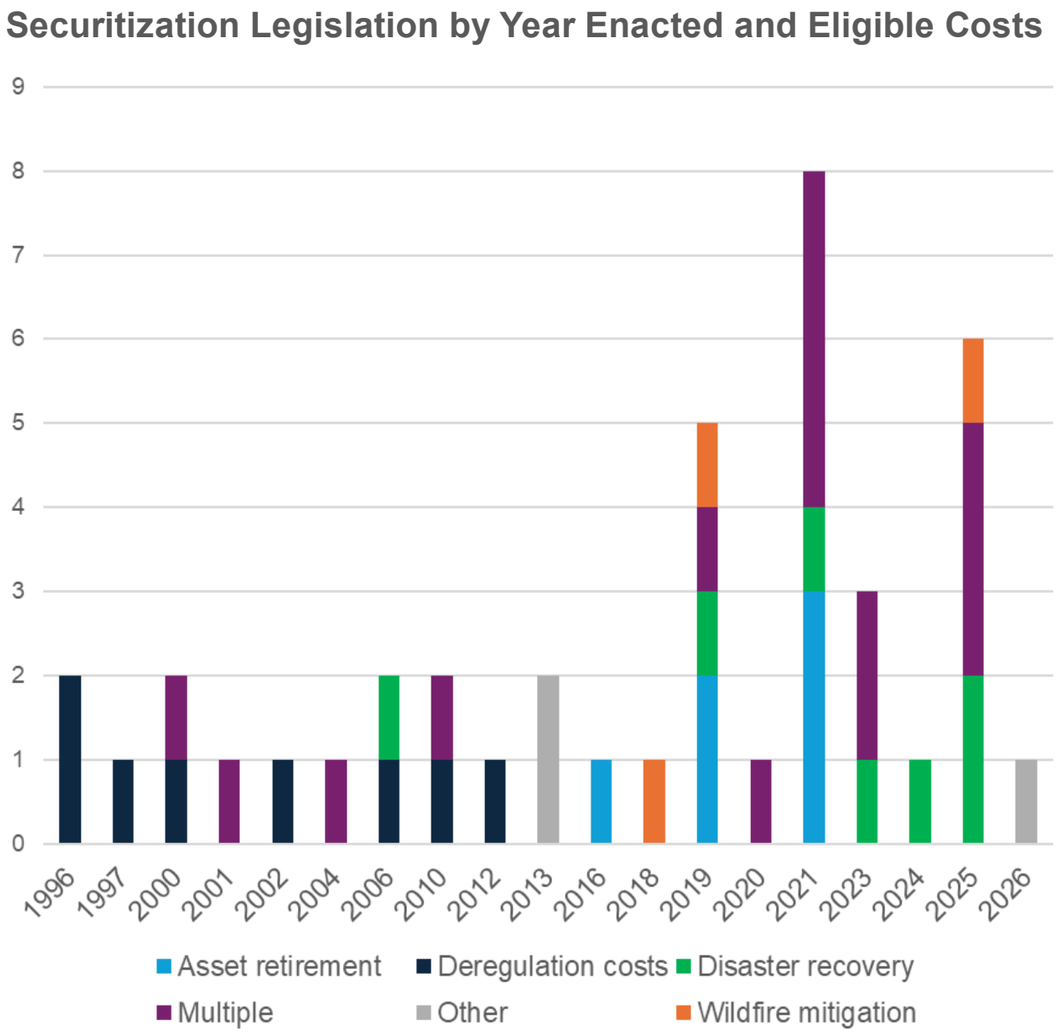
- Use of bonds for wildfire expenses is increasing
- Benefits of securitization: often credit-positive for utilities, may be more affordable for ratepayers
- **Key considerations:**
  - Requires enabling legislation to define eligible costs
  - Comparative evaluation is necessary to determine ratepayer impacts vs. alternative methods
  - Financing orders separate from standard rate cases; requires mechanisms for oversight and prudence review
  - Once issued, financing orders are irrevocable

46%

Percentage of proceeds from all utility-related securitizations dedicated to wildfire costs (2022-2023)

Source: "Credit FAQ: The Rationale Behind U.S. Utility Securitization And Reasons For Recent Growth." March 2024. *S&P Global 2024*

State Authorization of Utility Securitization

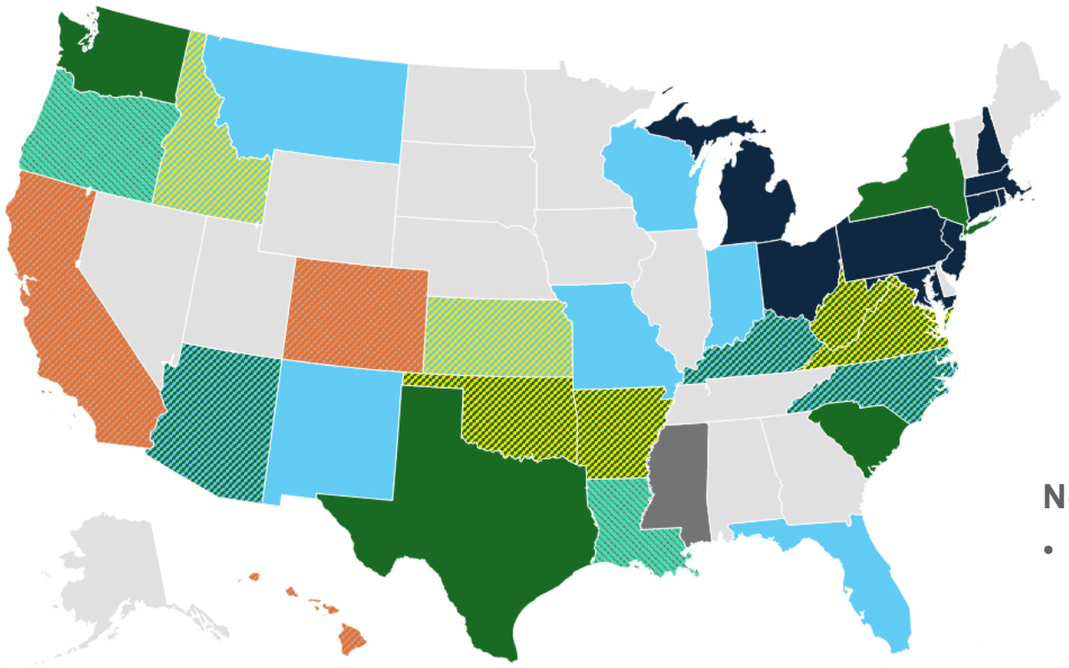


State legislation enabling securitization has increased and expanded to new uses, including wildfire and other disaster recovery costs. Costs that states have made eligible for securitization include:

- **Deregulation:** Initially most common use. Permits utilities to securitize recovery of stranded costs resulting from sale of generation assets.
- **Asset retirement:** Became common in 2010s. Allows recovery of costs from early retirement or cancelled construction of certain generating assets (some legislation specifies type, e.g. coal or nuclear).
- **Fuel costs:** Certain extreme fuel costs (e.g. as result of supply shocks) can be securitized in some states.
- **Disaster recovery:** Costs associated with repairing damage to utility assets from extreme weather or natural disasters. Wildfire often included explicitly or implicitly, though some states limit to storm costs.
- **Wildfire mitigation:** Legislation permits (or requires) securitization of costs of certain investments in grid hardening and other capital expenses for wildfire mitigation.
- **Other:** Less common authorizations include specific categories of construction costs, program costs, COVID-19 costs, or self-insurance funds (2026 Oregon legislation, HB 4077).

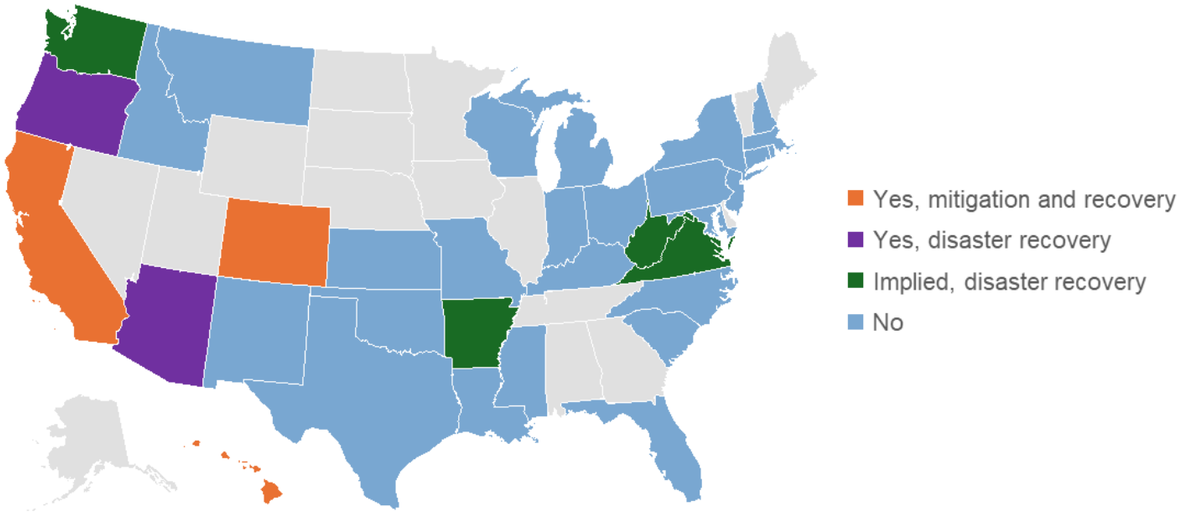
State Authorization of Utility Securitization

Costs Eligible for Securitization by State



- Asset retirement
- Asset retirement, disaster recovery
- Asset retirement, disaster recovery, other
- Asset retirement, fuel costs
- Deregulation costs
- Disaster recovery
- Disaster recovery, fuel costs
- Wildfire mitigation, other
- Other

Eligibility of Wildfire Costs for Securitization by State



Notes on specific state authorizations:

- Arizona (HB 2679) and Oregon (HB 3143) specifically name wildfire as example of type of disaster eligible for cost recovery via securitization. Other states use general language about natural disasters without naming wildfire. State or federal emergency declaration may be required.
- Oregon recently authorized securitization for utility self-insurance, a response to insurance challenges driven by wildfire risk (HB 4077).
- California (AB 1054) and Hawaii (SB 897) require utilities to securitize an initial portion of wildfire mitigation plan capital investments.

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When do insurance backstops make sense?

- Public backstops can add a layer of coverage and help stabilize commercial insurance markets for high-risk sectors.
- A federal or multistate backstop fund may be one solution to the rising cost of wildfire liability insurance.

PROGRAM	PURPOSE
National Flood Insurance Program (NFIP)	Public insurance created to fill limited commercial flood insurance for high-risk homeowners. Has faced some criticism for low premiums leading to adverse incentives.
Price-Anderson Nuclear Industries Indemnity Act (PAA)	Federal backstop created in response to lack of sufficient commercial insurance to cover potential catastrophic risk of nuclear accidents. Supplements commercial insurance.
Terrorism Risk Insurance Act (TRIA)	After September 11, 2001, commercial insurers limited terrorism coverage, creating need for backstop coverage for catastrophic risk. Operates as reinsurance.
Municipal risk pools	Municipalities pool funds as alternative or supplement to commercial insurance. Pools are operated collectively as nonprofit entities.

Existing programs and approaches offer potential models and key lessons for a multistate fund for utility wildfire liability

Considerations for a federal or multistate wildfire insurance backstop

- Compared to state or utility-level backstop funds, **a larger, more diversified risk pool** operated at a federal or multistate level could offer more market stability and affordability benefits.
- Consumer- and investor-owned utilities have similar demand for improved insurance.
  - Shared participation may require participating states to determine whether any statutory limits exist on risk pooling between different utility types.
  - Consider options to ensure fair capitalization approaches if IOUs and COUs both contribute.
- Key questions for design and operation include:
  - Risk mitigation activities required for fund access
  - Capitalization mechanisms and approach (e.g. balance of ratepayer and shareholder contributions, any other sources of funding)
  - Approach to attachment point (deductible) and exhaustion point (payout limit) for participants
  - Operational and oversight body, which could be federal or multi-state, and could be organized to offer additional benefits to participants (e.g. capacity, expertise)
  - Role of liability reform, and whether standardization is needed or beneficial

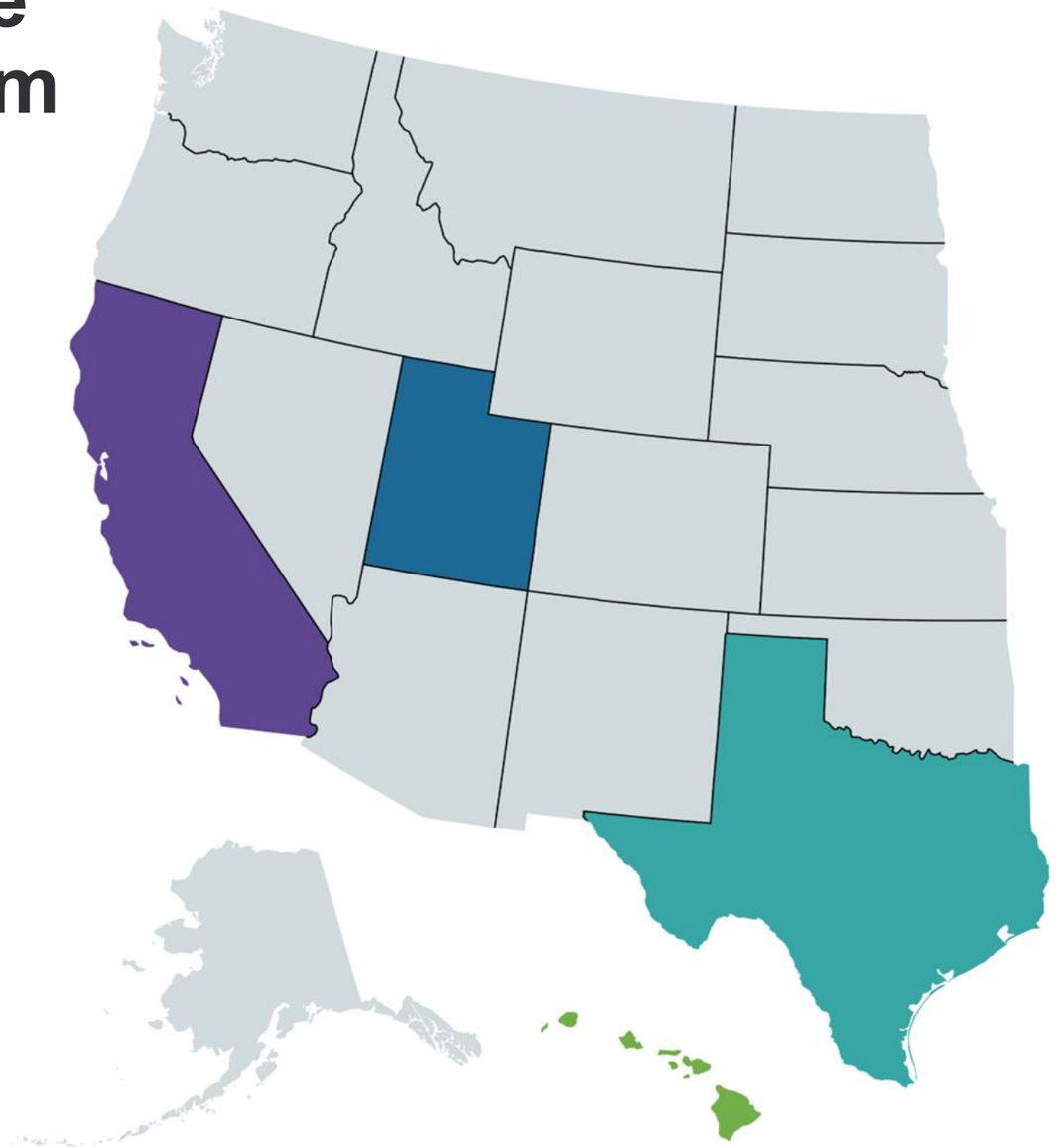
State actions on wildfire liability insurance reform

California: State fund for utility wildfire liability created in 2019 (AB 1054). Investor-owned utility ratepayers and shareholders contribute equally. Access requires approved WMP and no negligence finding.

Utah: 2024 legislation (SB 224) allows utilities to create ratepayer-funded self-insurance fund for wildfire liability as supplement to commercial insurance. Legislation also established liability caps.

Texas: 2025 legislation (HB 145) allows utilities to create self-insurance fund as supplement or alternative to commercial insurance if less costly to ratepayers. Requires approved WMP and no negligence finding.

Hawaii: Law passed in 2025 (SB 897) directs PUC to study options for state wildfire fund. Study concluded that fund should not be established without liability reform and additional analysis.



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Legal and legislative terms and definitions

Term	Definition
Commission Order (Regulatory)	A formal directive issued by a public utility commission. These orders can include rules for pricing, service standards, and operational procedures.
Law	Used here to describe legislation that has passed and been signed by the State Governor.
Legislation	Used here to describe legislation that has not passed and/ or been signed by the State Governor.
Negligent Conduct (Legal)	The failure to behave with the level of care that a reasonable person would have exercised under the same circumstances. Either a person's actions or omissions of actions can be found negligent. Additional Information can be found here.
Prudence of Costs (Regulatory)	Requires that a utility must follow a course of conduct that a capably managed utility would have followed in light of reasonably knowable circumstances. Purchases "prudently" made may be included in rate base. Additional information can be found here and here.
Rate Base (Regulatory)	The investor supplied facilities and investments required in supplying utility service to customers. Additional information on the role in ratemaking and rate of return here.
Reckless Conduct (Legal)	Behavior that is so careless that it is considered an extreme departure from the care a reasonable person would exercise in similar circumstances. Additional information can be found here.
Standard of Care (Legal)	An essential concept in determining whether a person was negligent and potentially liable for a tort. If a person breaches the standard that applies to them and their actions cause harm to another person, they will be liable for negligence. Additional information can be found here.
Strict Liability	Liability for committing an action regardless of intent or mental state. Additional information can be found here.
Tort (Legal)	An act or omission that gives rise to injury or harm to another and amounts to a civil wrong for which courts impose liability. Additional information can be found here.

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Thank you

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