ADAPTING TODAY



Energizing a More Resilient Tomorrow

September 2026

EDISON INTERNATIONAL®

EXECUTIVE SUMMARY

Climate change is already reshaping the conditions in which communities live, businesses operate and critical infrastructure is planned, maintained and operated. Over the last decade, climate-related disasters have resulted in more than $2 trillion in global economic losses,[1] underscoring the need to strengthen infrastructure and response systems designed for yesterday's conditions. For California, a robust electric system is foundational to community preparedness, since electricity supports many essential services that keep people safe, connected and able to recover.[2]

SCE's 2026 Climate Adaptation Vulnerability Assessment builds on prior work by using updated climate projections and improved analytical methods to provide more actionable insights into where climate hazards may affect specific assets, operations, services and communities. Improved data and analytical methods provide greater confidence in where and how vulnerabilities may emerge, including increased electrical load and heat stress on substation transformers, projected flood risks to direct-bury poles and sea level rise vulnerabilities on Catalina Island. These insights help SCE target adaptive investments and build infrastructure right the first time, reducing costly retrofits and avoiding premature replacements to support a more reliable and affordable electric system as California continues to electrify. For example, accounting for climate-driven temperature increases upfront could help avoid a projected 63% increase in the number of substation control buildings with protection relays that are vulnerable by 2050.

However, SCE cannot do this work alone. Utilities are critical partners, but building resilient communities requires collaboration, shared investment and widespread action across the whole economy, including government, emergency management, businesses, private investors, community organizations, residents and the research community. This paper is both a road map for resilience — outlining how climate-informed planning can strengthen reliability affordably — and a call to action.

KEY TAKEAWAYS

The climate change signal is clear: Intensifying hazards are increasing risks to communities, the electric grid and public safety.

SCE is strengthening its infrastructure for changing conditions through climate-informed planning.

Building climate resilience is a shared responsibility that requires coordinated action among utilities, governments, businesses and communities.



WHY ADAPTATION CANNOT WAIT

Climate hazards such as extreme heat, wildfires, flooding and sea level rise are increasingly threatening communities, public safety and critical infrastructure systems globally. Related events are already being observed across California and are projected to intensify in the decades ahead, increasing exposure to climate hazards across SCE's service area.[3]

Managing the impacts of evolving climate hazards has become a defining societal challenge for communities, governments and infrastructure operators. Global economic losses due to climate hazards are projected to rise to nearly 15% of gross domestic product by 2050, topping $40 trillion.[4] California and the West have already experienced hundreds of billions of dollars in losses due to weather and climate disasters since 1980,[5] with the 2025 Los Angeles area wildfires alone estimated to have caused over $130 billion in direct and indirect economic losses.[6] For the electric grid, climate change impacts are materializing at the same time as other significant changes, such as growing electricity demand driven by the electrification of vehicles and buildings, adoption of new technologies, data center development and the transition to a cleaner energy future.[7] Together, these trends highlight the need to evolve how critical infrastructure is planned, designed and operated.

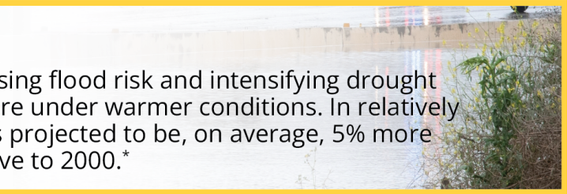
EXTREME HEAT

California has warmed by more than 2°F over the past century, with rapid increases in nighttime temperatures leading to additional heat stress on communities and critical infrastructure.[8] Daytime high temperatures across SCE's service area are projected to rise ~3°F by 2050 relative to 2000.*



EXTREME PRECIPITATION AND FLOODING

California is experiencing greater swings between wet and dry years, increasing flood risk and intensifying drought impacts.[9,10] Intense precipitation events are projected to become more severe under warmer conditions. In relatively wet regions of the SCE service area, the largest three-day storm each year is projected to be, on average, 5% more intense, with some regions becoming up to 13% more intense in 2050 relative to 2000.*



WILDFIRE CONDUCIVE CONDITIONS

California is experiencing more frequent and severe wildfires. Longer dry seasons and increasing heat have the potential to further increase wildfire risk.[11,12] Climate projections indicate a longer wildfire season across SCE's service area, with the greatest increases in fire-conductive weather occurring during spring and fall, and up to a 32% increase in fire weather days in coastal regions.*



SEA LEVEL RISE

California's sea level has risen by about 8 inches over the past century.[13] The Los Angeles region is projected to experience approximately 1 additional foot of rise by 2050 relative to 2000 under an intermediate-high emissions scenario, leading to additional risks of flooding, erosion and rising groundwater levels.[14]



*Calculations use the median change between Global Warming Levels of 0.8°C (approx. 2000) and 2.0°C (approx. 2050 under the SSP3-7.0 scenario) with the exception of wildfire which used the change in relevant climate metrics under 2.0°C applied to historical values.[15]

The supporting data came from the California Fifth Climate Change Assessment using the Cal-Adapt data access tool.[16]



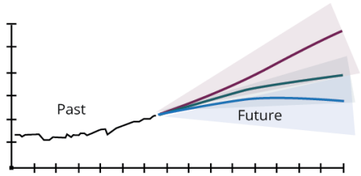
BUILDING ON OUR 2022 FOUNDATION

SCE started proactively hardening its infrastructure to reduce wildfire risk, its most consequential and near-term physical climate change impact, in 2018. SCE's 2022 Climate Adaptation and Vulnerability Assessment[17] and accompanying *Adapting for Tomorrow*[18] white paper established the case for proactive climate adaptation across other physical climate change risks. This work highlighted the growing need to integrate climate projections into planning, invest in resilient infrastructure and strengthen partnerships across government, industry and communities.

Since then, SCE has advanced from documenting climate hazards to taking concrete steps to harden vulnerable assets and embed climate information into planning and decision-making to improve long-term affordability and reliability. SCE's 2026 CAVA incorporates updated climate projections and improved analytical methods that support a more systematic and granular look at grid vulnerabilities, uncovering where climate hazards may intensify over time and which assets, operations, services and communities may be most affected. For example, by 2030, the assessment found three locations where underground conductors are at risk of overheating and causing outages under higher temperature and load conditions, more than 40 substations where protection equipment could be at risk of failure from inland flooding events and thousands of distribution poles with potentially high safety consequences from failure driven by inland flooding conditions.

Progress on understanding and preparing for climate-related hazards has been made possible through strong collaboration across California's climate and energy ecosystems, including state agencies, regulators, scientists, and SCE's ongoing efforts to improve climate planning and preparedness. To date, this work has resulted in actionable climate projections yielding targeted identification of vulnerable infrastructure to incorporate into utility investment plans. Maintaining a resilient and affordable energy system will require continued assessment and adaptation as climate conditions, modeling capabilities and grid needs evolve. Continued progress will depend on sustained investment in regional, decision-relevant climate science, coordinated action and ongoing collaboration to develop innovative and accessible data products.

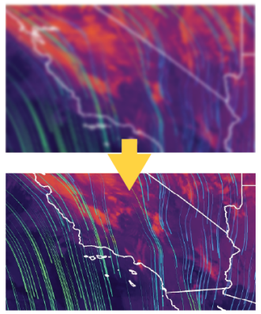
The 2026 CAVA incorporates updated climate projections associated with California's Fifth Climate Change Assessment,[19] which leverages prior energy-related climate research. These new projections:



Include updated simulations developed at higher resolution for California, improving confidence in the results.

+0.8˚C	Baseline Period ~2000
+1.5˚C	Near-term projected ~2030
+2.0˚C	Mid-term projected ~2050

Enable analysis of how regional climate conditions may change under different levels of global warming, helping translate climate science into planning decisions.[20]



Use improved downscaling techniques and higher spatial and temporal resolution, allowing for more localized assessments of climate hazards.[21,22,23]

JANUARY 2025 WILDFIRE EVENTS

The Eaton and Palisades fires occurred within a broader trend of increasing wildfire risk. These fires followed a sequence of cascading weather and climate conditions: Above-average precipitation during preceding years promoted abundant vegetation growth, subsequent hot and dry conditions reduced fuel moisture and increased fuel flammability, and an extreme offshore wind event created conditions that enabled rapid fire spread. The extreme winds affected emergency response and fire suppression efforts after the ignitions, contributing to some of the most destructive wildfires in Southern California history.

Winter 2022-23	Winter 2023-24	Summer-Fall 2024	Late 2024 - Early 2025	January 2025
Exceptionally wet winter, fuel growth	Second wet winter, more vegetation	Very hot and dry, curing of fuels	Delayed winter rains, fuels remain dry	Strong Santa Ana wind event, rapid fire spread

Early attribution studies suggest that climate change may have increased the intensity of some of the fire weather conditions present during the event.[24,25] Research suggests that the rapid transition from wet to dry conditions, known as "hydroclimate whiplash," may become more extreme under climate change,[26,27] and the overlap between the dry fuels season and the Santa Ana wind seasons may be expanding.[28] Additional research is needed to better understand climate change's role in this specific disaster.

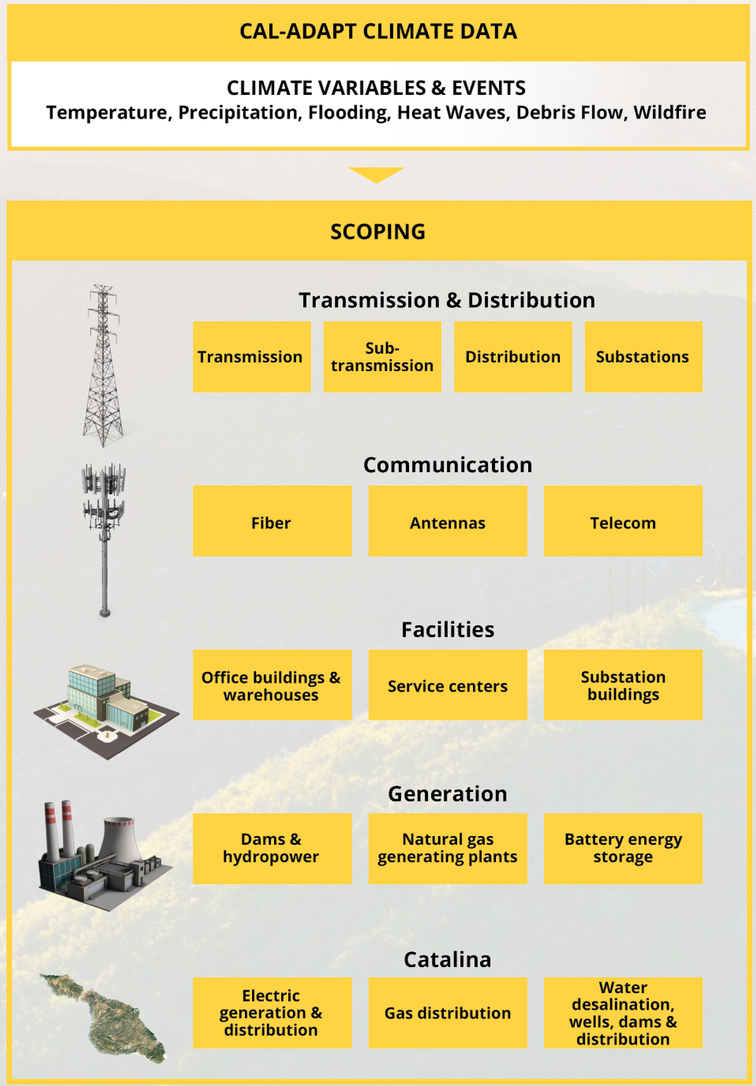
The January 2025 wildfires illustrate how compounding climate and weather conditions can challenge infrastructure, buildings, emergency management systems and communities in ways that exceed planning expectations. The experience demonstrated that disaster outcomes are impacted by emergency response capabilities and the resilience measures in place before an event occurs. Home hardening, defensible space, land-use decisions, building standards, infrastructure resilience and coordinated planning all influence how communities experience and recover from extreme events. Thus, utilizing and translating climate projections into proactive planning, resilience investments and targeted cross-sector hardening can reduce vulnerability before disasters occur. For SCE, this work includes ongoing wildfire mitigation efforts, grid hardening, investments in advanced technologies and the integration of climate science into risk assessment processes.

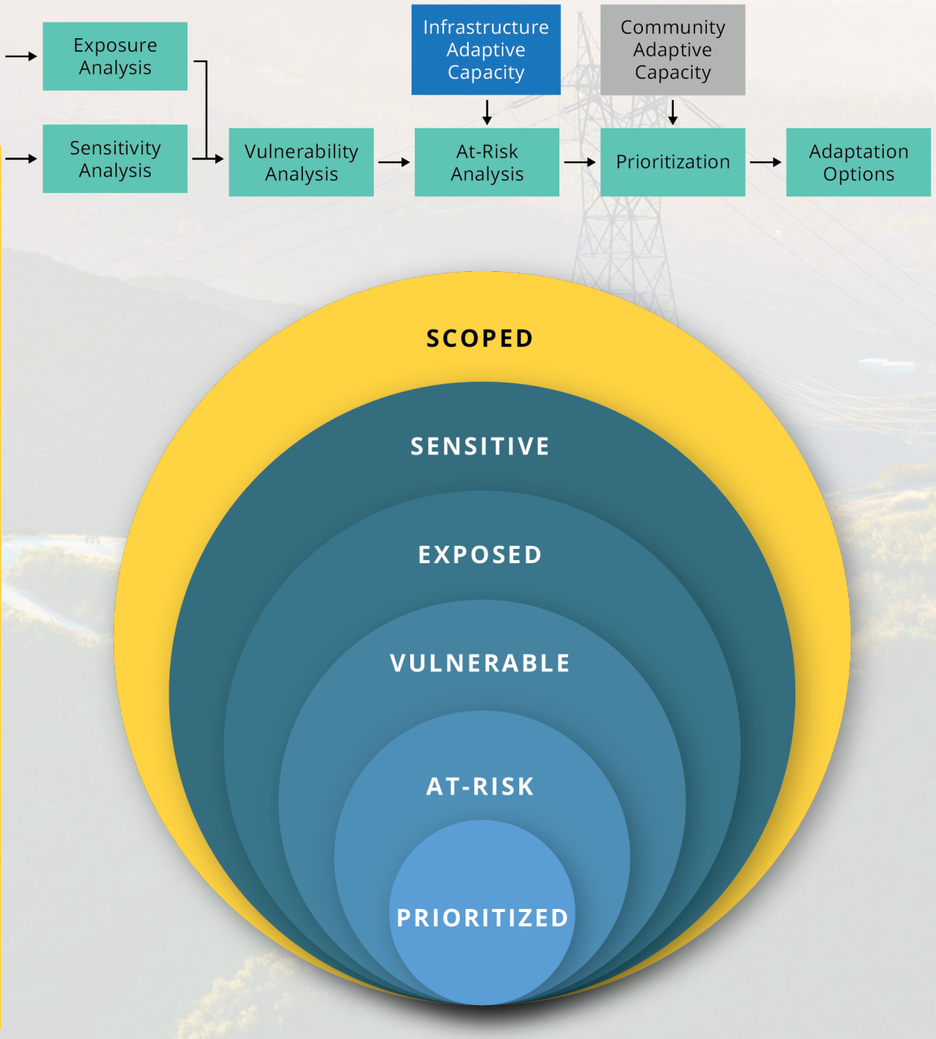
SCIENCE-BASED CLIMATE RESILIENCE

At the core of SCE's CAVA is a rigorous technical analysis that identifies and prioritizes potential vulnerabilities of critical assets, operations and services to climate hazards. The process combines climate science, hazard-specific models, asset expertise and a prioritization framework to:

- Assess the sensitivity of each asset, operation and service to climate change impacts.
- Identify which assets have increasing exposure and vulnerability to climate hazards.
- Evaluate the safety, financial and reliability consequences of asset failure from climate hazards.
- Identify adaptation options for prioritized at-risk assets.

The results help prioritize investments, inform planning decisions and support long-term resilience initiatives across the company.





DESIGNING TODAY FOR TOMORROW'S CONDITIONS

SCE has progressed since the 2022 assessment to integrate climate projections more consistently into planning, design and implementation. Climate projections are being used to inform asset management, infrastructure hardening and core planning processes (Table 1). Near-term climate projections can help identify where hardening actions may be needed today (e.g., substations at risk of flooding). Midcentury projections help identify where future conditions should be considered in design for long-lasting infrastructure (e.g., projecting future loads to account for high heat). Additional work is needed to understand how evolving climate patterns and compounding hazards will affect equipment and operating conditions.

Climate conditions can also affect how much electricity customers need, how well the infrastructure performs and the availability of energy during periods of extreme weather.[29] Integrating climate projections into demand forecasts, resource planning, energy storage evaluation and advanced grid management can improve system flexibility and help maintain reliability under a broader range of future climate conditions. For example, the California Energy Commission's 2025 Integrated Energy Policy Report incorporated temperature projections into its load forecast, resulting in an additional 3,000 gigawatt-hours of annual energy need in 2045, equivalent to powering half a million homes annually.[30]

The integration of climate projections into load forecasts helps planners better understand future electricity needs and informs decisions about infrastructure, resources and the capacity required to reliably serve customers. Given the state's projected electricity consumption growth of almost 40% over the next decade as transportation, buildings and other sectors increasingly electrify,[31] the grid will play an even more important role in supporting the clean energy transition.[32] Climate-informed grid investments may help address multiple challenges simultaneously: adapting to changing climate conditions, expanding capacity to support increasing demand, and enabling electrification and the emissions reductions needed to mitigate long-term climate impacts.

Table 1: *From CAVA Vulnerability Findings to Hardening Responses*

HIGHER TEMPERATURES AND MORE FREQUENT EXTREME HEAT

VULNERABILITY IMPLICATION
0.%1-1% of protection control devices and underground circuits are at-risk, while 34% of substation transformers studied may exceed expected degradation rates due to thermal stress.

HARDENING RESPONSE
Incorporate prioritized at-risk control devices, circuits and transformers into infrastructure replacement plans

INLAND AND COASTAL FLOODING

VULNERABILITY IMPLICATION
Up to 26% of low-lying electrical substations and about 1% of communications sites are at risk for water intrusion, structural damage or access limitations, while about 1% (approx. 10,000) of direct-bury poles are at risk for failure.

HARDENING RESPONSE
Localized hydrologic studies for selected sites to guide stormwater management plans

SEA LEVEL RISE

VULNERABILITY IMPLICATION
Coastal infrastructure, primarily on Catalina Island and in Long Beach, is vulnerable to inundation and corrosion.

HARDENING RESPONSE
Reinforce Catalina Island coastal flood protection infrastructure

WILDFIRE-CONDUCIVE CONDITIONS

VULNERABILITY IMPLICATION
Assets located primarily in coastal areas are projected to see increased risk of fire-conducive conditions, while 3% of telecom sites are vulnerable and pose risk for communications disruptions.

HARDENING RESPONSE
Redundancy studies for communications sites, along with continued vegetation management, equipment inspections and monitoring

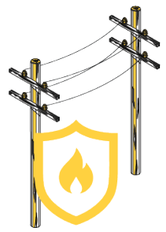
Planning Implications:

- Update equipment sizing to account for higher temperatures and refine design standards to account for potential future inland and coastal flooding conditions.
- Integrate climate projections in wildfire modeling to guide risk assessments, grid hardening and targeted undergrounding.
- Integrate climate projections into load forecasts and generation resource efficiency.

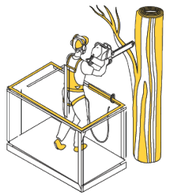
MITIGATING FUTURE WILDFIRES

Wildfire risk remains one of the most immediate climate-related challenges facing California. Reducing wildfire risk requires both near-term mitigation and long-term adaptation. SCE is advancing wildfire adaptation strategies by enhancing vegetation management to reduce the risk of fire spread, implementing new technologies and advanced monitoring systems to enable faster response in fire conditions, building greater grid flexibility through new circuit ties to better isolate potential outages, and reinforcing power and communications systems to improve coordination and restoration times. Following the January 2025 Eaton and Palisades wildfires, SCE is supporting recovery efforts while rebuilding infrastructure to address future reliability and wildfire risks. SCE will continue to invest in near-term wildfire mitigation activities through its Wildfire Mitigation Plan[33] and incorporate climate projections into planning to inform risk-based investment decisions and improve long-term resilience.

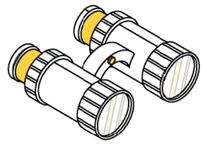
From 2018 through mid-2026, SCE advanced wildfire mitigation efforts through:



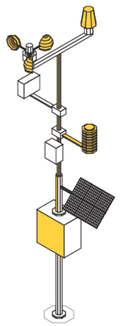
7,170+
circuit miles hardened with covered conductor



2.3 MILLION+
tree trims and removals in high fire risk areas, partially enabled by the March 2025 State of Emergency Proclamation streamlining permitting

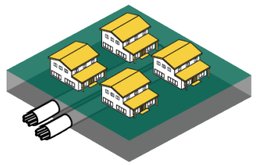


1.9 MILLION+
inspections conducted in high fire risk areas



2,000+
weather stations installed to monitor conditions and provide more granular weather data

200
wildfire detection cameras installed to support situational awareness



100+
miles of targeted undergrounding since 2021



$100 MILLION
invested in a partnership with county fire agencies to support state-of-the-art Quick Reaction Force helitankers and reconnaissance aircraft deployed over 800 times in the last three years[34]



BUILDING RESILIENCE BEYOND THE GRID

Reliable electric infrastructure is only one component of resilience. Communities must also be prepared for other impacts of extreme weather, such as road closures and other climate-related disruptions. Since launching its climate adaptation efforts, SCE has continued to work alongside the communities it serves to support resilience. These efforts range from directly assisting communities when electric service is disrupted to supporting community-led, proactive resilience efforts.

Preparing communities for disruptions requires investments in resilient infrastructure and support for essential services when outages occur. SCE's Community Resiliency Grant pilot provides up to $5 million to help local public recreational spaces in outage-prone areas install backup power, enabling them to serve as community resource centers during power disruptions. Additional programs provide permanent and portable backup power to homes, senior centers, schools and other community facilities. Together, these efforts help strengthen preparedness in communities that may face greater climate-related hazards.

SCE is also strengthening long-term energy resilience by awarding over $83 million in state funding for community microgrids that improve reliability and resilience in vulnerable communities. As an administrator of the Self-Generation Incentive Program, SCE is facilitating the deployment of customer-owned battery systems, with over $75 million in incentives paid since 2022 and an additional $202 million reserved for future deployments. Batteries allow households to maintain power during outages while also collectively serving as virtual power plants, providing hundreds of megawatts of capacity[35] to the grid during periods of peak energy demand, such as extreme heat events. Together, these distributed energy resources help improve customer resilience and overall grid reliability.

Building resilience also requires long-term partnerships that help communities prepare for, respond to and recover from disruptions. Through their philanthropic partnerships, Edison International and the Edison International Foundation support a range of locally-led efforts across Southern California that strengthen community resilience and recovery capacity. Some examples include:

- **Climate Adaptation Funding:** As founding sponsor of Climate Resolve's Ready for Tomorrow no-cost grant and technical assistance program, Edison has helped frontline communities secure over $28 million in grant awards since 2018.
- **Wildfire Resilience Partnerships:** Since 2019, Edison has provided more than $29 million to support community-led wildfire preparedness, recovery and resilience efforts across local communities facing elevated risk.
- **Urban Greening and Reforestation:** Since 2018, philanthropic partnerships have helped plant more than 61,000 trees and native plants while distributing over 13,000 additional trees and plants to help strengthen local ecosystems and community resilience.
- **Community Recovery:** As of mid-September 2026, Edison has distributed over $6 million in philanthropic support to assist Eaton Fire recovery efforts. SCE has also offered nearly $950 million through its Wildfire Recovery Compensation Program to eligible community members, using updated compensation benchmarks in line with settlement values for similar claims in past wildfire lawsuits.

Collectively, these partnerships expand access to resilience resources and support communities that may face greater exposure to climate-related risks. However, meeting societal challenges associated with a changing climate will require significant and sustained investment across sectors beyond the capacity of any single program, organization or funding source.

COMMUNITY-CENTERED RESILIENCE

Building resilience requires more than understanding climate hazards — it also requires understanding how those hazards impact communities. As part of the 2026 CAVA, SCE partnered with the Climate Resilience Leadership Group, a network of community leaders serving Southern California's most climate-vulnerable populations.

The leadership group led outreach efforts to raise awareness of climate-related risks, identify community and grid vulnerabilities and assess local resilience, providing valuable insights into local resilience challenges and priorities. The outreach findings helped SCE validate its Community Resilience Metric, an internal tool that evaluates community preparedness for climate-related power disruptions. The Community Resilience Metric helps prioritize comparable climate-driven investments and identify where resources may be most needed.

Beyond SCE's 2026 assessment, SCE continues to work alongside the leadership group members to strengthen organizational capacity, expand climate adaptation awareness and support community-led resilience efforts.



Community Environmental Council's Kat Orellana conducts outreach on climate-related risks at the 2026 Vietnamese New Year Festival in Oxnard, California, in support of SCE's Climate Resilience Leadership Group.

Image Courtesy of Ana Rico

WHAT IT TAKES TO BUILD RESILIENCE AT SCALE

Building communities that are resilient to projected climate conditions is a shared responsibility requiring societal investment. The need for action is becoming more urgent as climate hazards intensify and the costs of disruption grow.[36] As uninsured losses outpace expanding coverage, households, businesses, government and utilities are absorbing a growing share of these costs. Home displacement, lower tax bases, rising borrowing costs and financial stress are among the impacts that follow increasingly costly disasters.[37]

These interconnected impacts extend beyond disaster-prone communities, imposing estimated annual costs of $900 to $1,300 on the average American household.[38] Resilience investments in one sector often generate benefits far beyond their immediate area of focus. These interconnected impacts suggest resilience may be most effectively addressed as a systems challenge, requiring cross-sector coordination rather than a collection of independent projects.

COLLABORATION IS THE FORCE MULTIPLIER

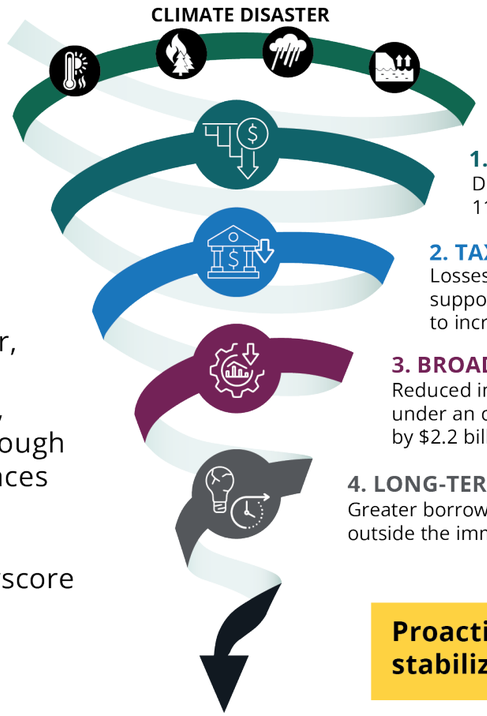
The scale and complexity of climate-related risk exceed the capacity and scope for any single actor to address alone. Regional resilience depends on institutions working together to identify risks, align investments and coordinate action. Collaboration can amplify the impact of resilience investments by improving planning, reducing duplication and translating climate insight into practical action that advances a more cohesive, adaptive and inclusive system of resilience, as the risks themselves don't stop at political borders.

Without shared ownership of both climate risk and solutions, gaps in preparedness and recovery will persist, limiting adaptation effectiveness. In contrast, collaborative adaptation investments can generate economic and resilience benefits. Every $1 invested in disaster preparedness avoids $6 in post-disaster cleanup and $7 in broader economic losses.[39] These investments support more stable insurance and housing markets, while also helping protect California's long-term economic competitiveness.[40] Ultimately, a shared understanding of climate risks and collective accountability can help maximize the benefits of cross-sector collaboration to build resilience at a scale no single sector can achieve alone.

THE HIDDEN COSTS OF CLIMATE DISASTERS

When climate disasters occur, beyond the human toll and associated safety challenges, recovery costs can ripple through local economies, public finances and financial markets.

These spiraling effects underscore why resilience is a shared responsibility.



1.REDUCED LOCAL REVENUE

Disasters weaken local government finances when resources are needed most. On average, disasters are associated with an almost 11% decline in per-capita revenues relative to expected levels and a 25% increase in the likelihood of a budget deficit.[41]

2. TAX BASE EROSION AND HIGHER BORROWING COSTS

Losses in assessed home values and other economic losses lead to reductions in revenue for a municipality just as they are struggling to support a community from tragic losses and provide critical recovery resources. Depending on municipality size, the revenue loss leads to increased borrowing costs, which can result in higher overall costs borne by the community.

3. BROADER ECONOMIC IMPACTS

Reduced investment, job losses, business closures and service disruptions slow economic recovery and weaken local economies. For example, under an optimistic recovery scenario, the Los Angeles area fires are expected to generate $5 billion in economic losses, reduce labor income by $2.2 billion and diminish tax revenues by $900 million over five years.[42]

4. LONG-TERM CONSEQUENCES

Greater borrowing costs can delay infrastructure investments, resulting in a community facing greater vulnerability to physical risks. Those outside the immediately impacted community also potentially face higher insurance premiums, taxes and utility bills.

Proactive resilience investments can help protect communities, stabilize local government finances and preserve economic stability.

SUCCESS IN ACTION: TURNING CLIMATE RISK INTO COMMUNITY VALUE

Communities across the country are demonstrating that proactive, collaborative resilience investments can deliver measurable economic and societal benefits. While local risks vary, successful initiatives often share common elements, including data-driven planning, broad stakeholder alignment and sustained investments in resilience.

BIG BEAR: PARTNERSHIPS FOR LANDSCAPE-SCALE WILDFIRE RESILIENCE

In Southern California's Big Bear Valley, a conservation finance initiative[43] is being developed to support collaborative, landscape-scale action that reduces wildfire risk[44] while protecting water supplies serving more than 6 million residents in San Bernardino, Riverside and Orange counties. Partners including Blue Forest, Inland Empire Resource Conservation District, National Forest Foundation (with funding provided by Edison International and the Edison International Foundation), the U.S. Forest Service and World Resources Institute are working to accelerate the North Big Bear Landscape Restoration Project, which aims to restore up to 13,000 acres of forest land shaped by more than a century of fire suppression.[45] Preliminary modeling suggests the project could reduce flame length by 77% and fire spread by 85%, while protecting infrastructure, habitat and the region's $505 million tourism economy.[46]



Image courtesy of Sabrina Claros

VIRGINIA BEACH: ALIGNING RESILIENCE AND ECONOMIC SECURITY

Facing some of the fastest rates of relative sea level rise on the U.S. Atlantic coast, Virginia Beach brought together local leaders, researchers, residents and military stakeholders to develop a flood resilience strategy focused on vulnerable neighborhoods, essential infrastructure and mission-critical assets. This early alignment helped build support for a $567.5 million bond to fund coordinated flood protection projects.[47] This effort highlights how linking resilience to economic security and national defense priorities can unlock financing, accelerate implementation, protect communities and reduce future economic losses.[48]



Image courtesy of the City of Virginia Beach

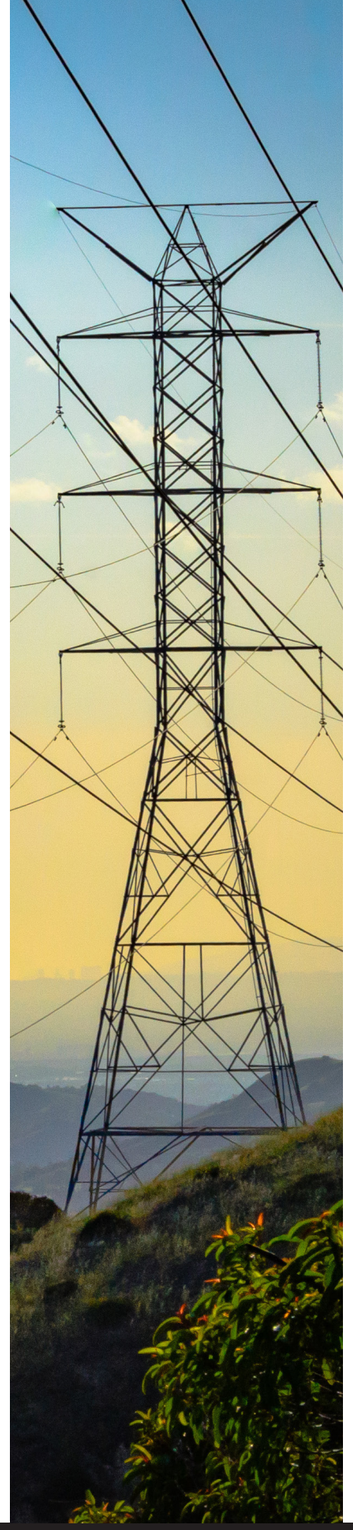
STRENGTHENING THE SCIENCE-TO-ACTION PIPELINE

Advances in climate science provide critical insight into how climate hazards may evolve, but projections must be translated into decision-relevant information that can guide policy, investment and preparedness. Sustained progress depends on continued investment in the scientific ecosystem that produces actionable information to shape climate adaptation solutions.[49] Realizing this potential depends not only on continued advances in climate science, but also on collaboration that makes those advancements more accessible and actionable for real-world decisions.

Key opportunities include:

- Improving the applicability of key variables, such as wind and relative humidity, to strengthen wildfire risk modeling and operational planning.[50] Current wind projections are limited by the spatial and temporal resolution of the downscaled simulations as well as the limited observational data to inform models.
- Developing advanced tools to analyze coincident and compounding hazards, including low-probability, high-impact scenarios, like extreme wildfire conditions, storm surge and coastal erosion conditions with sea level rise and precipitation-induced flooding or debris flow events, to better plan under uncertainty.[51] For example, SCE utilized precipitation projections and a debris flow tool for a pilot analysis of Catalina's Pebbly Beach site.
- Strengthening collaboration among utilities, researchers and academic institutions to develop tailored climate data products that better support planning needs, facilitate cross-sector integration of climate considerations and translate climate science into practical, cost-effective resilience strategies. For example, SCE is currently working with researchers to refine methods for analyzing extreme heat events to inform its distribution planning process.
- Advancing research on how changing climate conditions affect electric infrastructure performance over time. Historical assumptions about asset lifetimes, degradation rates and failure modes may need to be reassessed as assets face cumulative stress from more frequent and severe climate conditions and increased loading. Failure models for asset classes that can incorporate multiple variables and capture the impact of increased frequency and severity of those variables can inform targeted proactive replacement.
- Enhancing economic and risk modeling to better account for probabilistic risk, tail events, compounding hazards and avoided losses when evaluating investments. Understanding the downstream costs and benefits of planning for extreme events and their potential cascading impacts could help inform decisions to better justify proactive action.

More decision-ready climate information and understanding of the related downstream impacts can support selection of adaptation projects that deliver the greatest long-term reliability and affordability benefits. These efforts can help accelerate the transition from reactive disaster recovery to a proactive resilience economy that rewards risk reduction, supports innovation and creates new markets for resilience planning, technology, financing and infrastructure solutions.



CALIFORNIA'S ROLE IN RESILIENCE

Sustained state leadership is essential to address climate-related risks and protect California's economic prosperity and public safety. As climate-related extreme hazards become more frequent and severe, preparing communities and infrastructure for future conditions is increasingly a matter of risk management, affordability and economic resilience.

Climate adaptation should be viewed not simply as a cost, but as a long-term investment in affordability, reliability and economic stability. By reducing future losses and damage, resilience investments can protect communities from costly future disruptions, reduce the economic impacts of future climate-related disasters and create lasting economic value for residents, businesses and taxpayers.

STRENGTHEN CLIMATE DATA, RESEARCH AND DECISION SUPPORT

Continued investment in energy-related climate science, research and actionable data is foundational to effective resilience planning. State-led efforts, such as California's climate change assessments[52] and other programs that fund development of the climate data relevant for California, provide a common scientific basis for utilities, local and tribal governments, infrastructure operators and communities to evaluate and prepare for climate risks.

Key opportunities include:

- Sustaining and expanding programs that develop publicly available climate data and related data platforms.
- Improving access to actionable, decision-ready climate information for public and private sector practitioners.
- Supporting partnerships with academic and research institutions to advance resilience tools, modeling capabilities and applied expertise.

MODERNIZE PERMIT PLANNING AND RESILIENCE STANDARDS

California can accelerate resilience by standardizing the incorporation of forward-looking climate information into infrastructure planning and design, permitting processes and regulations. Infrastructure design and community planning should account for projected future climate conditions.

Priority actions include:

- Developing guidance that can inform long-term infrastructure and building decisions with climate projections to reduce future costs by minimizing the need for retrofits.
- Establishing resilience planning guidelines and integrating resilience objectives into building and infrastructure standards, including enhanced

fire resistance, passive survivability and distributed energy integration, to improve safety and insurability. Building code improvements and hazard mitigation can generate benefit-cost returns ranging from approximately $6 to $11 for every $1 invested.[53]
- Coordinating federal land management efforts with those at the state level, plus continuing targeted permit streamlining, to drive immediate wildfire risk reduction for communities and utilities while maintaining watershed and habitat health.
- Aligning policy, planning and permitting frameworks to support large-scale grid modernization, electrification and climate adaptation investments at the pace necessary to meet demand while avoiding costly overbuild or inadvertent redundancy.

SCALE FUNDING AND FINANCING FOR RESILIENCE INVESTMENTS

Durable funding and financing mechanisms will be critical to moving from reactive recovery to proactive resilience. Future resilience needs will require an optimized mix of taxpayer, ratepayer, philanthropic and private sector funding, recognizing that proactive investments can often reduce the larger economic and recovery costs associated with future disasters. In particular, strategic public investments can help communities prepare for future hazards, attract private sector participation and reduce the reliance on post-disaster recovery spending.

Priority actions include:
- Expanding multiyear funding tools that support and enable large-scale coordinated investments in resilience projects.
- Leveraging public funding to attract additional private sector capital and partnerships alongside flexible philanthropic funding.
- Prioritizing investments in both the most vulnerable and highest-risk communities.
- Helping local and tribal governments translate climate preparedness planning into sustained resilience action through funding, technical assistance and implementation support.

Together, these actions support a proactive, systems-based approach to reducing climate risk, minimizing future losses and maintaining California's leadership in resilience amid increasingly severe weather-related challenges.

ADAPTATION AS A CORE LOCAL GOVERNANCE PRIORITY

Local and tribal leadership plays a central role in translating statewide climate projections into actionable local resilience strategies. Many of the most consequential resilience decisions — from where communities grow to how infrastructure is maintained and financed — occur at the local level. Decisions regarding development patterns, building standards, transportation networks, emergency planning, flood management and resilience investments directly affect not only residents, but also the utilities, businesses, insurers and public agencies that serve those communities.

The benefits of local resilience investments often extend far beyond municipal boundaries or responsibilities. For example, actions that reduce flooding, strengthen transportation access or improve emergency preparedness can simultaneously protect homes and businesses, preserve access to critical facilities, reduce economic disruption and lower risks to utility assets and services. Because local decisions influence the resilience of interconnected systems, local jurisdictions' adaptation actions can produce cascading benefits across entire regions. Establishing physical climate risk management as a governance priority is therefore a critical next step as climate impacts intensify.

Over 65% of California jurisdictions have self-reported taking actions to meet state climate adaptation and planning requirements,[54] demonstrating growing recognition of climate risk. However, significant challenges remain in moving from planning to implementation. Many communities lack the financial, technical and institutional capacity necessary to deliver resilience projects at scale,[55] creating a statewide implementation gap between planning and action.

The consequences of inaction extend beyond local jurisdictions. Delayed resilience investments can increase costs for residents, businesses, utilities, insurers and taxpayers while exposing communities to greater disruption from future climate hazards. As climate risks increase, adaptation planning can no longer be treated as an optional exercise or compliance requirement; it must become a core function of local governance and long-term capital planning, yielding tangible adaptation investments by local governments.



Local leaders can accelerate resilience by:

- Integrating climate change projections into land use, infrastructure, emergency management and capital planning decisions to reduce future risk and avoid creating new vulnerabilities.
- Strengthening coordination across utilities, public works departments, emergency managers and community organizations (and their tribal equivalents) to better understand vulnerabilities and opportunities for coordinated preparedness.
- Prioritizing proactive resilience investments by identifying critical facilities, aligning resilience hubs with outage-prone areas[56] and pursuing state, federal and innovative financing opportunities for adaptation projects.

By advancing these targeted, actionable strategies, local leaders can shift from reactive response to proactive action, protecting residents, stabilizing local economies and positioning their communities for a more climate-resilient future.

COMMUNITY AS ESSENTIAL INFRASTRUCTURE

Just as physical infrastructure requires ongoing maintenance and investment, social infrastructure must be continuously strengthened to remain effective under changing conditions. Community leaders, neighborhood organizations, faith-based institutions, schools, nonprofits and other local entities are trusted advisors who are often the first to identify emerging challenges and the last to leave when recovery efforts are underway.

Philanthropic, public and private investment in community leadership remains essential to making sure that investments and programs are responsive to local needs, accessible to vulnerable populations and community-informed or community-led where possible. Priority areas for strengthening capacity include:

- Education about local climate hazards and their potential impacts.
- Technical assistance for identifying adaptation pathways and accessing funding.
- Resources to build public awareness, successfully participate in implementation where feasible and sustain long-term partnerships.

Stronger social infrastructure helps communities withstand disruptions and recover more quickly by strengthening connectedness, trust and civic engagement.[57] Ultimately, readiness and resilience are not delivered to a community; they are built with a community.



BUILDING RESILIENCE, TOGETHER

Climate adaptation is increasingly becoming a defining challenge for infrastructure systems, communities and economies. As climate conditions continue to evolve, resilience will depend on society's ability to incorporate forward-looking information into decisions, investments and planning processes before risks become more costly and disruptive. California has repeatedly demonstrated its ability to solve complex infrastructure challenges through long-term investment, innovation and collaboration.

Climate resilience is the next great challenge. The experiences and examples highlighted throughout this report demonstrate that resilience is strengthened when science informs action, investments are made with future climate conditions in mind and organizations work together around shared risks and solutions. No single action or organization can fully address the challenge alone, but through sustained collaboration, innovation and informed decision-making, California can build communities, and the infrastructure that supports them, to be safer, more resilient and better prepared for the decades ahead.



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