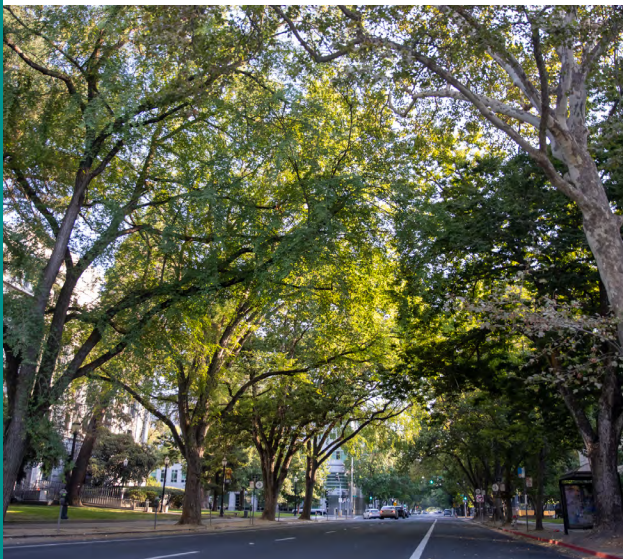




**Urban Land
Institute**

BUILDING RESILIENCE ACROSS THE REGION

Lessons from California and Nevada Communities



About

Urban Land Institute

Urban Land Institute is a global, member-driven organization comprising more than 48,000 real estate and urban development professionals dedicated to advancing the Institute's mission of shaping the future of the built environment for transformative impact in communities worldwide. ULI's interdisciplinary membership represents all aspects of the industry, including developers, property owners, investors, architects, urban planners, public officials, real estate brokers, appraisers, attorneys, engineers, financiers, and academics. Established in 1936, the Institute has a presence in the Americas, Europe, and Asia Pacific regions, with members in 84 countries.

Cover photos (clockwise from top left): Henderson, Nevada; Long Beach, California; Needles, California; San José, California; San Diego, California; and Sacramento, California. (ULI)

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ULI Impact Lab

ULI's Impact Lab is a global execution platform, launched in 2025, that coordinates ULI's deep institutional capabilities into a unified strategy for market transformation across four interconnected challenges: global climate action, housing supply and affordability, health in the built environment, and housing-climate integration.

The ULI Impact Lab operates through three levers:

1. Applied analysis — identifying what blocks climate-aligned, affordable development in markets, and what moves it.
2. Convening market actors — aligning developers, capital, utilities, and governments around shared solutions that none can achieve alone.
3. Demonstration pilots — proving new models in real projects that create the evidence base for replication at scale.

The Impact Lab connects ULI's signature programs and platforms—the Terwilliger Center for Housing, the Randall Lewis Center for Sustainability in Real Estate, the Center for Real Estate Economics and Capital Markets (REEcap), Advisory Services Panels and technical assistance programs, and UrbanPlan—so that the Institute can help turn practitioner expertise into broad market change.

Acknowledgments

ULI is grateful to longtime member and Governor of the ULI Foundation, Randall Lewis, who provided funding for the California-Nevada Technical Assistance Leadership Exchange. A special provision in [Lewis' historic \\$10 million gift to ULI](#) set aside funds for District Council projects advancing sustainable and resilient land use in California and Nevada. Randall Lewis is an Executive Vice President and Principal of the Lewis Management Corp., a southern California-based developer of master plan communities, shopping centers, apartment complexes, and industrial and residential projects in California and Nevada.

ULI would also like to thank the seven agencies that participated in this program, including the City of Long Beach, the City of Needles, the City of San Diego, the City of San José, Nevada State University, the City of Sacramento, and Sacramento County.

Finally, ULI is grateful to the individuals who served as volunteer panelists on the Technical Assistance Panels, providing their time, talent, and energy to advance resilient communities across the region.

A full list of program contributors, TAP panelists, and public agency representatives is included at the end of this report.



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Introduction

Over the last decade, climate-driven hazards and other environmental stressors have resulted in tens of billions of dollars in economic losses, drastic environmental damage, and hundreds of deaths, displacement, and insurance issues across California and Nevada.

As communities navigate this new reality, the ability of the built environment to both adapt to—and protect people from—the impacts of climate change has become a top priority for leaders across the public and private sectors. Thoughtful building design and land use policy can mitigate the impacts of extreme weather and other environmental risks, allow flexibility as conditions change, and promote community health. Although climate hazards are worldwide issues that transcend geographic boundaries, localized strategies can help ensure adaptation addresses unique community needs.

Public agencies, their staff and partners, are on the front lines in addressing climate hazards through policy. The private sector and those leading work in the built environment will also impact how people live in a changing climate in practice—either helping people thrive in the face of these changes or greatly exacerbating existing and future threats. Working together, public and private sector partners can advance key resilience measures across communities, making cities more comfortable, livable places for all.

Program Overview

Launched in Spring 2025, the **California-Nevada Technical Assistance Leadership Exchange** set out to advance innovative solutions to issues at the intersection of climate resilience and land use through collaboration between local governments, public sector leaders, and the real estate industry. The program sought to facilitate connections, dialogue, and exchange of professional expertise to explore strategies for creating resilient and sustainable communities through land use and real estate interventions.

Through a competitive process, ULI selected seven public agencies to participate and receive access to technical assistance, peer networks, and other resources to meaningfully address a pressing local issue of their choosing related to resilience and land use.

As part of the year-long program, selected agencies received a discounted ULI Technical Assistance Panel (TAP), ULI memberships, and support to attend the ULI Fall and Spring Meetings to facilitate ongoing knowledge sharing and collaboration. The goals for the program included the following:

1. Support local governments in identifying practical solutions to land use challenges focused on climate risk and resilience.
2. Foster stronger connections among California- and Nevada-based governments and land use professionals, demonstrating how cross-sector and

What is a Technical Assistance Panel?

TAPs provide expert advice to local governments, public agencies, and nonprofit organizations facing complex land use and real estate issues.

Multidisciplinary teams of 5–10 real estate professionals tour the area under review, interview local stakeholders, and meet to develop recommendations that are presented publicly at the end of the session and in a follow-up report. Panelists volunteer their time to participate and are screened for potential conflicts of interest to ensure recommendations are objective and impartial.

ULI serves as the “honest broker,” bringing all stakeholders together in an environment free of politics and preconceptions.

cross-regional partnerships can advance innovative ideas and community success.

3. Distill key lessons, policy approaches, and strategies that other communities can adopt locally and nationally.

In addition, ULI convened members of the cohort regularly throughout the program to share project updates, discuss best practices, and learn from practitioners in the field. These virtual and in-person gatherings helped broaden participant knowledge of climate resilience strategies and policies, amplify lessons learned from local efforts, and inform implementation and next steps.

The Projects at a Glance

Seven agencies across six localities challenged ULI to help address local issues at the intersection of resilience and land use.



Sacramento, California

Advance community-wide heat resilience in the built environment—including design, regulation, and an explicit equity focus—in partnership with the City of Sacramento and Sacramento County.



San José, California

Implement San José's new Climate Adaptation and Resilience Plan (CARP) through governance, design standards, and community partnerships.



Long Beach, California

Reposition the largely City-owned waterfront into an inclusive, resilient oceanfront destination through smarter leasing, targeted redevelopment, and coastal resilience.



Nevada State University, Henderson, Nevada

Guide the resilient expansion of a fast-growing university campus across 452 undeveloped acres while managing extreme heat and water constraints in a desert ecosystem.



Needles, California

Attract attainable, heat-adapted housing development in the hottest U.S. city by building the economic case and cooling the public realm.



San Diego, California

Stimulate sustainable, low-embodied-carbon, climate-resilient "missing middle" housing.



Project Summaries

Long Beach, California

Building and Redeveloping with Resilience

In Long Beach, California, roughly 75 percent of the city's waterfront district is owned by the City of Long Beach. Decades ago, the City entered into long-term leases with private enterprises for a significant portion of its waterfront holdings, some of which have succeeded while others have languished, leaving portions of this valuable and civically important waterfront district underutilized and underdeveloped. Just prior to this TAP, the City released a draft [Vision Plan](#), which was anticipated to overhaul the waterfront's outdated land use and zoning regulations and form the foundation for a new specific plan to guide development going forward.

The Long Beach TAP was tasked with providing insights into potential development and investment along the waterfront, activation and programming, connectivity and mobility, and advice on the waterfront district's resilience in the face of rising sea levels. The panel's recommendations fell into the following categories: waterfront leasing and redevelopment strategy, mobility and connectivity, branding and activation, and ecology and resilience.

Revisit the waterfront leasing and rental strategy. The City was encouraged to review all its long-term leases to identify those that could be adjusted or terminated early, thereby freeing those sites for redevelopment. Beyond real estate

decisions, the City's actions regarding its waterfront holdings have economic development and community benefit implications that should be factored into decision-making going forward.

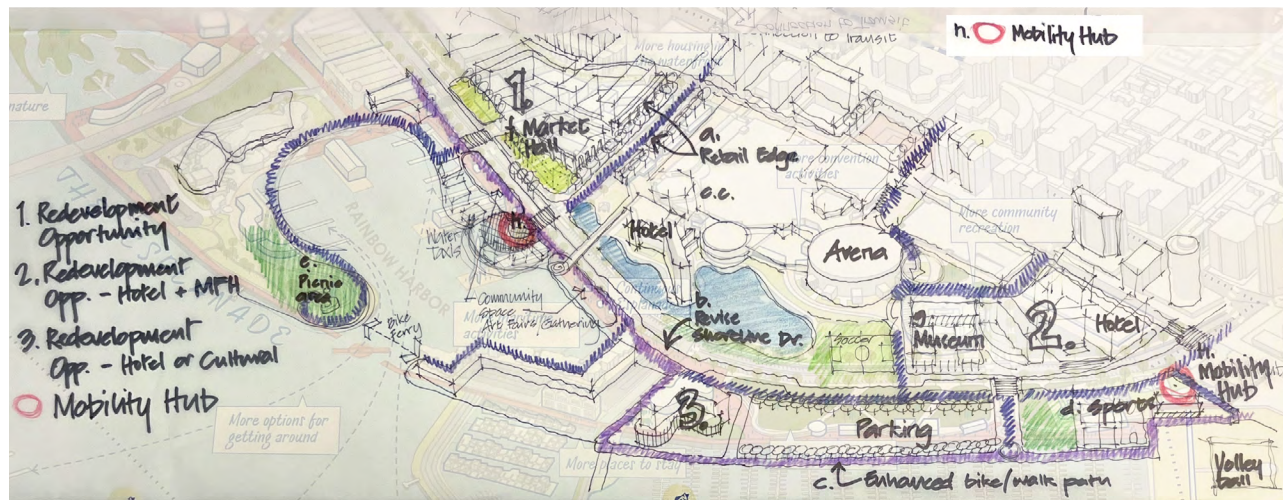
Pursue waterfront redevelopment. To help the City create an "[inclusive oceanfront destination for the community and the world](#)," TAP recommendations included redevelopment of an enclosed mall site, redevelopment of a large surface parking lot (after the 2028 Olympic Games), and a new approach to running the City-owned marina. The panel also pointed to the need for more amenities and experiences to extend the district's appeal beyond a single destination.

Facilitate connections and mobility. The panel recognized the value that multi-mobility options bring to the waterfront, facilitating travel between destinations and reducing car miles. Recommended

strategies included adding shuttles or circulators and a bike ferry, and re-envisioning roadways to become narrower and safer for pedestrians and bicyclists.

Improve programming, branding, and district activation. A cohesive district branding strategy, attention-grabbing activations, and physical and ideological connections to the waterfront can enhance the district's appeal. A "Feels Like Long Beach" branding approach, additional wayfinding, and messaging that features stories from people who love Long Beach were also recommended.

Elevate ecology and resilience. Coastal resilience recommendations led with a nature-everywhere approach to development, incorporating habitat preservation, water quality management, and environmental education into processes and project outcomes. Stormwater capture and filtration



The panel pointed to three critical real estate redevelopment opportunities, as well as areas for improved mobility and connectivity.

mechanisms were recommended for areas undergoing repaving to reduce pollutants entering the water, and the addition of native plants to assist with rainfall absorption and evapotranspiration. The panel also suggested piloting a floating, tethered wetland to increase native plant populations and provide habitats for animals and sea life. Finally, the City was encouraged to capture baseline data and measurements over time to help maintain the waterfront's ecological health and support district-wide resilience.

Fund resilience improvements with a Climate Resilience District. To support resilience improvements, the City may consider establishing a Climate Resilience District (CRD). This designated funding and planning mechanism mobilizes district funding, aligns planning efforts, and enhances community and economic resilience, protecting neighborhoods, critical infrastructure, and the waterfront economy while reducing climate-

related risks. A CRD for the Long Beach waterfront can help address sea-level rise, mitigate heat, and provide funding to improve coastal infrastructure.

Finally, the panel provided an implementation outline that began with a review of the waterfront leases, key mobility improvements, new branding and wayfinding initiatives, and the formation of a CRD. In the longer term, redevelopment of roadways and site redevelopment can take place. Additional wetlands construction is a longer-term endeavor that can begin now but will take years to complete. With the reconfiguration of the City's waterfront leases, it can begin to use the enhanced lease revenue to fund additional improvements and key resilience measures, positioning the waterfront as a first-class, resilient, and thriving district that Long Beach residents love and that others love to visit.



Stopping to discuss the current urban design of the waterfront, the Long Beach panel found refuge in a shaded area.



The Golden Shores Reserve is a protected wetland along the Long Beach waterfront. The connection between the Los Angeles River and the wetlands features a boom that traps downstream debris and protects the sensitive wetlands and ocean ecosystems beyond.

Henderson, Nevada

Nevada State University: Resilient Campus Expansion

Located in the Mojave Desert, Nevada State University (NSU) is considering how to best leverage its 452 acres of expansion land to serve its growing student population. Adding complexity to the development equation are the extreme desert heat, needed water purveyance improvements, and a goal of shifting more completely to renewable energy sources. To assist NSU with its development objectives and resilience goals, the ULI panel identified four key actions: set a vision for development; shift development governance to a development corporation; simplify the campus expansion site plan and pursue early improvements; and foster resilience in new construction projects.

Set a vision for development. NSU has the opportunity to become a destination campus that leverages its desert location to its benefit. Working in partnership with the City of Henderson, a redesigned streetscape approach will more actively signal arrival at NSU and serve as the initial spark of that destination experience. Embracing the desert landscape as a key element of NSU's brand will further distinguish the campus.

Shift development responsibilities and leadership to a development corporation. Current campus expansion efforts are led by the Nevada State Campus Lands Corporation (Lands Corp), which operates under the Board of Regents and has a complicated structure that creates a passive approach to campus development. By shifting real estate



The windows of this Nevada State University building allow natural light throughout the interior spaces, while the deep roof overhangs help protect building occupants from the intensity and heat of direct sunlight.



Panelists enjoyed a birds-eye-view of NSU's campus, the desert, and the mountains beyond.



The southern Nevada desert landscape is a distinguishing feature of NSU's campus and one that the panel believes could be elevated further.

development to a new development corporation, NSU can more aggressively pursue opportunities and leverage professional staff to guide the work. The panel also recommended extending NSU's ground leases from its current 50-year terms to 99 years to better match market norms and attract private development partners to build out the campus.

Facilitate development with infrastructure and site design improvements. NSU's detailed [master plan](#) could be simplified down to a small number of key elements, which would help clarify NSU's goals and opportunities to the market. A development timeline, identifying early infrastructure improvements, and due diligence, identifying current campus conditions, will also facilitate development interest on campus. Summing these elements in a developer prospectus can also facilitate development interest.

Incorporate sustainability and resilience into existing spaces and require it in new development. Specific recommendations included:

- Improve comfort with shading devices, building orientation, and wind protection in new construction projects.
- Include water security measures, such as on-site water treatment for irrigation, low-impact development for stormwater management, high-efficiency fixtures, leak detection, and irrigation submeters.
- Create a sustainable development and operations plan, and set campus-wide decarbonization goals.

- Explore utility-scale renewable energy, power purchase agreements, and infrastructure-as-a-service agreements.
- Incorporate energy conservation, above-code building performance targets, energy modeling, and electrification into all new construction.
- Consider a district-wide geothermal heat exchange system alongside central plant expansion.

To help reduce the urban heat island effect, the panel recommended cool, reflective roofing; covered garages pre-wired for future solar PV installation; and deep shade at building entrances, along all primary walkways, and in public spaces.

Seek partnerships and co-benefits.

The intersection of NSU's programs, the community's needs, and campus land use can reveal co-benefits that can spark development opportunities and potential financing streams. Public-private partnerships (P3s) can help NSU attract development attention and institutional-quality partners and leverage its land resources to generate income.

A warming climate and NSU's desert location create sizable challenges with managing water resources and mitigating heat. With careful planning, it is possible to create a future campus environment that is vibrant, welcoming, and a beacon of learning and workforce development across the state of Nevada and beyond.

Needles, California

Heat and Housing

Needles, California, needs more housing, particularly attainable and middle-market homes. This desert city's housing challenge is compounded by a relatively flat economy and extreme heat year-round. Needles ranks as the hottest city in the United States by average monthly temperature. With just under 5,000 residents, Needles is also challenged by competition from Arizona communities, and their lighter regulatory requirements, on the other side of the Colorado River.

The City of Needles asked the TAP to make recommendations that would help address the city's housing and heat mitigation challenges in light of the economic and market forces that are potentially curbing new housing development and resilience improvements. The panel's recommendations centered on the role the public sector can play in stimulating housing development, cultivating economic development, and providing access to cool spaces.

Strengthen the City's role in attracting and facilitating development. There is a mismatch between jobs and housing in Needles—the available housing is not the move-up or middle-market housing that is needed. To more actively attract new home builders to Needles, the panel recommended revising permitting processes to clarify the development path and reduce developer uncertainty. The city's economy plays an important role in its attractiveness to new home builders, and a stronger City-led

economic development framework would support legacy businesses, recruit new ventures, and strengthen the prospect of building in Needles. A new comprehensive branding and marketing campaign would support the economic development message and could broaden Needles' appeal to new markets.

Focus on core urban design principles. A fresh approach to the city's urban fabric, including improved gateways, circulation, and connections across the community, can encourage new residential interest in Needles. New planning areas should be

viewed as potential sites for commerce or residential use. For those residential sites, the panel sketched design concepts that could encourage middle-market housing at a density that would be complementary to the existing built environment and attractive to builders seeking opportunities to scale their operations. The panel noted that new approaches to historic uses, including reconfiguring the city's municipal golf course, could boost Needles' tourism while freeing valuable riverfront land for economic development opportunities.



The Colorado River is an important natural and economic development asset for Needles. It supports the city's water supply, generates hydroelectric power for the community, and serves as a draw to new full- and part-time residents and visitors who spend their money at local businesses.

Use placemaking to support businesses and attract visitors. The City was encouraged to leverage Needles' assets in its placemaking efforts to support economic and real estate development efforts. The city's transportation connectivity, distinct residential districts, and access to the Colorado River were of particular note, and placemaking can use these assets to create destinations that are uniquely Needles. A new brand identity, rolled out in wayfinding and marketing, will support the work.

Support community resilience. Heat mitigation strategies and resilience are priorities for Needles, and the City should incorporate both into public realm improvements while also encouraging the same in private development.

- Public realm improvements should include additional shade structures,

climate-adaptive trees, and accessible water features. Cool building materials and green infrastructure can also help cool public spaces.

- Private developers should be encouraged to use passive cooling measures, context-sensitive site design, energy-efficient materials, and other building features that support occupant comfort.
- Community resilience centers (CRCs) can support community cooling and resilience. A CRC provides a range of resilience services for the community, such as charging stations, refrigeration services, programming, and more.

The panel's recommendations support the business case for new housing development in Needles and incorporate critical cooling and resilience measures into the work. In

addition to incorporating resilience into new private sector projects, improving the comfort and resilience of Needles' public spaces will make year-round outdoor activity more possible, supporting economic development, attracting private investment, and bolstering the case for additional housing.



New signage, installed by the Chamber of Commerce, will soon highlight Needles' businesses.



The city's waterfront park has a number of shade trees, shade structures, and benefits from breezes cooled by the Colorado River. While this is a good foundation, additional cooling mechanisms, such as misting stations or splash pads, could encourage more resident and visitor use even in the hot summer months.

Sacramento, California

One Heat: Advancing Heat Resilience in Partnership with the City of Sacramento and Sacramento County

The City of Sacramento and Sacramento County joined forces with ULI to explore design and development strategies that mitigate heat, policies and incentives that encourage new approaches to heat mitigation, and the impact heat has on underserved communities.

A key recommendation from the TAP was the concept that "shade is shade." Trees are critical green infrastructure, providing shade and so many other benefits, but shade provided by other means—roof overhangs, awnings, sails, and others—can be just as beneficial in community cooling, and often more feasible to implement for resource-constrained communities.

Use design and development strategies to further leverage existing efforts. Spaces that support resilience are important in creating a welcoming and comfortable public realm. Green infrastructure, including trees, should be reclassified as critical public infrastructure. Depaving, planting microforests, and using climate-responsive and site-responsive design should be used to reduce the urban heat island effect in the public realm, and pilots on public land can be scaled and incentivized to promote adoption in private development.



Public sector leaders in City of Sacramento and Sacramento County recognize the disparities that exist between well-resourced neighborhoods and neighborhoods that have been historically under resourced. This gap is often illustrated by the differences in tree canopy, with well-resourced neighborhoods (right photo) better able to help manage the canopy, support tree health, and address associated leaf debris. To help address this disparity and improve lower-income residents' access to shade, the public sector is encouraging developers, particularly those building multifamily buildings, to incorporate additional opportunities for shade in individual units as well as shade and trees around the development site (top photo).



Adopt policies that encourage and selectively mandate heat mitigation and resilience measures. Regulatory updates should follow best practices in resilience, consider neighborhood context, use outcome-based measurements, and be incorporated into area plans. The public sector can help by resolving conflicts between policies and goals; for example, tree standards should align with missing middle housing goals to reduce conflicts between density pursuits and urban forestry. Performance standards can increase adoption of resilience measures, and regulation enforcement can increase accountability and community trust.

Provide additional support for underserved neighborhoods. Historically under-resourced neighborhoods will need more support, but the public sector does not have to do it all. Community-led organizations are already

at work and can help deepen community resilience. Public realm cooling can be supported by shading public play structures and ensuring access to community cooling centers beyond emergencies. Relaxed noise ordinances can allow laborers to work earlier and avoid peak heat hours. In the longer term, leaf removal services, support for workforce development in tree maintenance, a shade master plan for public transit, and expanded clean energy and efficiency programs can also help accelerate resilience measures in underserved communities.

Pursue collaborations and joint funding opportunities. The collaboration that brought Sacramento agencies together for the TAP should continue, both in this work and in other community-wide initiatives. A memorandum of understanding can memorialize the partnership, which may create a nexus for new funding pathways,

and a joint powers authority can help align non-profit partners to operate over the long term. A Climate Resilience District can provide organizational engagement with constituents and also take the lead on infrastructure improvements, promoting sustainability, and pursuing financing initiatives. Building and scaling broader capacity through partnerships, particularly with private sector developers, can encourage private sector participation in existing programs, expand the efficacy of efforts, and deepen impact.

As Sacramento's days become hotter and hotter days become more frequent, the public sector can lead the way in the pursuit of an environment in which everyone can find shade and cooling. Working together, public and private sectors can accelerate the work and meaningfully mitigate the impacts of extreme heat.



The Sacramento panel met under a pavilion in a North Sacramento park, learning from City and County leaders of the initiatives underway and touring nearby neighborhoods that are wrestling with maintaining tree health in limited planting areas.

San Diego, California

Sustainable and Resilient: The Future of Middle Market Housing in San Diego

Since adopting its [Climate Action Plan](#) in 2015, the City of San Diego has focused increased attention on the role of the built environment in either exacerbating or helping mitigate extreme weather and challenges related to carbon and greenhouse gas (GHG) emissions. For its TAP, the City asked ULI to identify how passive cooling strategies, sustainable materials, and climate-adaptive features could be integrated into development projects and missing-middle housing developments, which represent an important factor in San Diego's affordability pursuits.

The ULI panel provided the following recommendations to the City to encourage more sustainable and resilient missing-middle housing production by the private sector working in Southern California.

Promote the use of sustainable building materials. Innovations in building materials are expanding the options for sustainable construction. In addition to traditional wood construction, low-carbon concrete, and mass timber, other materials like stucco, insulated composite concrete block, recycled materials, and alternative roofing materials can make a measurable difference in a structure's carbon emissions. Concrete and mass timber also perform well under stress from fire, which is an increasingly critical consideration as wildfires increase in

frequency and intensity. The panel also recognized that some building materials with a higher embodied carbon (EC) value can still provide a high degree of energy efficiency over time, and an evaluation can help developers strike a balance between a project's EC goals and material options.

Understand the early cost, availability, and scalability challenges. At the time of this study, the panel estimated a ten to thirty percent cost premium on sustainable materials. As these materials become more readily available and their use more common, costs should become more competitive with conventional materials. The public sector should remain aware of these cost differences when considering regulations or incentives to encourage adoption.

Promote sustainability and resilience in missing middle housing production. The City can promote lower EC materials in missing middle housing and promote the use of light-colored materials, particularly for roofs and paving, across all development types. Minimizing paved areas and encouraging drought-tolerant plantings can help reduce ambient temperatures while also absorbing carbon dioxide and stormwater runoff.

Promote passive cooling strategies to support occupant resilience. The efficacy of passive cooling relies on site context, which makes one-size-fits-all policies challenging. Designers and developers should maximize airflow and fire-smart shade—shade using low- or non-combustible material—to optimize passive cooling for occupants.



The panel in San Diego met with developers and architects who are experimenting with sustainable materials and processes in new multifamily housing projects.

Building placement and design to improve solar access and capture breezes can help leverage natural heating and cooling opportunities.

A note on assumptions for housing production. As the panel worked through its recommendations, it noted a number of assumptions that needed to be made in order to answer the City's questions. In particular, the panel stressed that cost premiums will remain a factor and must be mitigated to support missing middle housing development as a financially viable pursuit in San Diego. Insurance, operating costs, lifecycle costs, and the benefits of lower-EC materials will also need to be evaluated more completely before blanket policies are crafted.

Create a demonstration project. The panel recommended that the City collaborate with the private sector to develop a demonstration project on publicly-owned land. The project should showcase the desired approaches and use low-carbon building materials, climate adaptive design, and passive cooling measures.

Additional opportunities. The panel also identified several opportunities to further the City's housing and sustainability pursuits.

- Promote "Sustainable [Complete Communities](#)" with tax incentives, grants, and land and cost incentives.
- Advocate for localizing materials production to reduce GHG emissions from related transportation.

- Revise permitting processes to prioritize sustainable and affordable projects.
- Conduct a tree canopy study to identify gaps in canopy or other shade.

The City's work to incentivize missing-middle housing could serve as a good model for similar ordinances and incentives to promote more energy-efficient and climate-resilient building materials and processes. Piloting will show proof of concept and convince developers that these units can be brought to market without incurring premium costs, and better design ensures that these units will hold value over time.



The stairwell in this building is designed to draw cooling breezes into interior spaces while the lightweight curtains provide privacy and shade when needed.



This building features a combination of mass timber construction for the structure and recycled material for the cladding around the units' balconies.

San José, California

Advancing San José's Climate Adaptation and Resilience Plan

The City of San José's [Climate Adaptation and Resilience Plan](#) (CARP) is the roadmap for increasing the adaptive capacity of San José's built and natural systems and creating a more resilient community. With 19 measures detailed in the CARP, the City asked ULI to explore four key measures and make recommendations for implementing those measures throughout the community.

Measure 1: Site- and System-Specific Vulnerability Studies

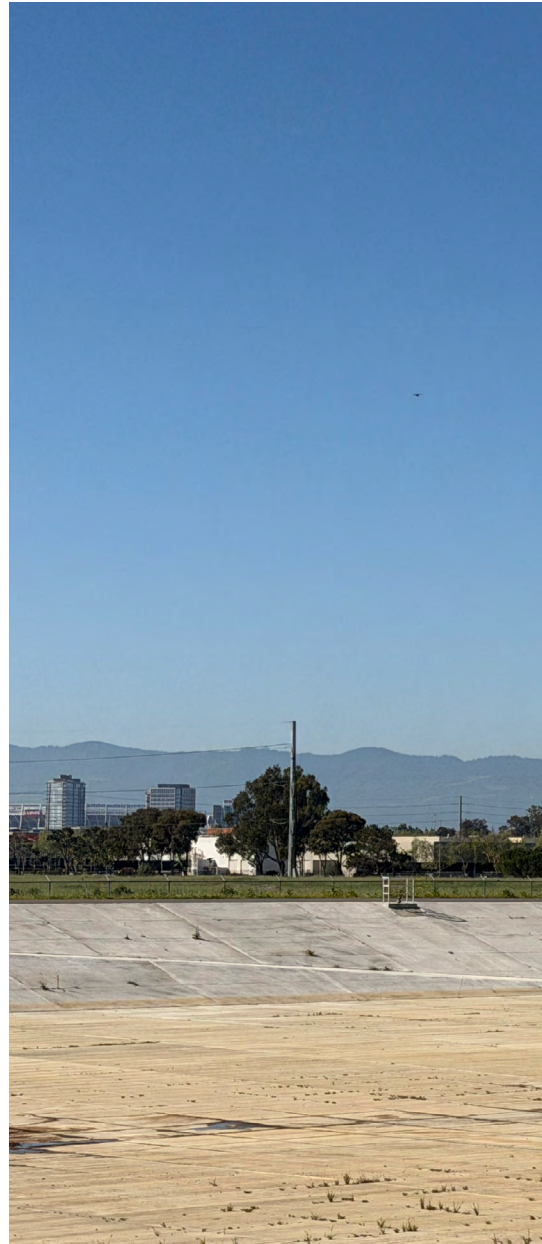
Measure 2: Climate Resilience and Adaptation Funding

Measure 9: Resilient City Infrastructure Design Standards

Measure 13: Community-Serving Facility Upgrades and Resilience Hubs

The panel's recommendations focus on providing the City with best practices and tools for grounded, community-led, and data-informed decisions that can help align key partners and the layers of leaders and jurisdictions involved in this broad and impactful work.

Leverage research and best practices. The first two CARP measures relate to site- and system-specific vulnerability studies and climate resilience and adaptation funding. Site- and system-specific vulnerability



The panel in San José toured the San José-Santa Clara Regional Wastewater Facility, which was originally built to leverage gravity from land sloping to the Bay, yet today, this same position puts the facility at risk of near-term flooding and future sea level rise. The improvements made to the facility to date—integrating new, resilient designs, creating redundancy, and planning for emergency response—serve as excellent examples of public-sector resilience improvements.

studies can help set a prioritization framework to guide resource allocation, reduce citywide climate risks, and support the case for proactive investments to deepen community resilience. Mapping climate resilience and adaptation funding can help identify staffing needs and align funding needs with resources. By establishing a governance structure for the broader CARP work, leadership demonstrates readiness to champion the work ahead and support decision-making.

Use a risk matrix to inform decision-making and develop design standards.

The panel encouraged the City to establish risk evaluation and design standards to incorporate climate change projections

and climate hazards into design and siting decisions for city infrastructure. The standards should be embedded into the process, and community co-benefits should be leveraged and prioritized across all efforts and through nature-based solutions. The City was encouraged to convert its deep data resources into standards, solutions, and adaptation options that are right-sized and match the risk magnitude, benefits, and process trade-offs. Solutions could include green infrastructure, nature-based solutions, grey infrastructure, and hybrid solutions, as well as shade, expanded urban forestry, and thoughtful placemaking that features trees, shade, water, and airflow. The panel also noted the importance of addressing wildfire and smoke risks in the design standards

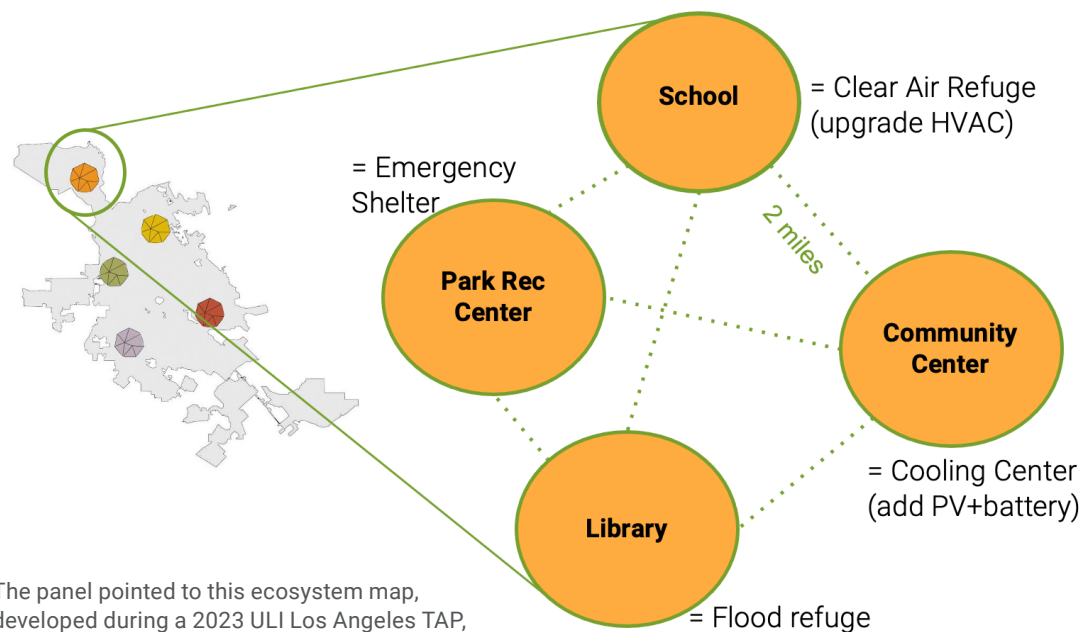
and including Electric Vehicle (EV) fleet infrastructure, risks, and needs in a response operations plan.

Create equitable and effective structures and governance. The design and siting of community-serving facilities and resilience hubs require a co-designed approach, wherein community plays a key role and partners—the City, the community, businesses, and regional entities—provide complementary resources. The broader resilience hub ecosystem, including spaces where the community already convenes, should be identified and mapped to leverage existing resources for dual purposes. Any new resilience hubs should be co-created with the community to support social resilience and deliver tangible, relevant action.

Use effective communications to connect departments, teams, the community, and partners to the work and to one another.

Ongoing effective communications are critical to include and activate throughout all steps associated with implementation of the CARP. Effective communication can help build trust with community members, engage partners in the work, and share tools for building personal resilience while also supporting broader community resilience.

Building upon the City's CARP work, the TAP recommendations should help the City further support individuals, neighborhoods, and broader communities, protecting the people, buildings, and natural assets that make San José special to those who call it home.



The panel pointed to this ecosystem map, developed during a 2023 ULI Los Angeles TAP, as a tool for helping communities envision how existing buildings can act as resilience hubs.



Cross-Cutting Themes and Recommended Strategies

Through the studies in each of the six communities and during the cohort convenings, several cross-cutting themes and key strategies found resonance in multiple markets. These resilience and land use insights pointed to policy and advocacy alignments and highlighted potential collaborations among markets, public sector professionals, and real estate practitioners working in those cities. The six cross-cutting themes are as follows: Heat is the front-line challenge; resilience as economic strategy; meet the market; housing affordability and resilience; identity, placemaking, and community; and nature as critical infrastructure.

Scorched: Extreme Heat and Real Estate

This 2019 ULI report outlines how extreme heat will affect the real estate and land use sectors and highlights the potential positive impact of the real estate sector in implementing heat-resilient building designs and land uses. Through case studies and project profiles, the report explores heat mitigation and adaptation strategies related to building design, building materials, green infrastructure, and public space design. These strategies can future-proof real estate in vulnerable markets; lower operations and management costs; improve tenant and occupant experience; and otherwise differentiate a real estate project.

Heat is the Front-Line Challenge. "Shade is shade."

Extreme heat is the most widely shared resilience challenge across the region, with five of the six panels addressing it as a primary or co-equal concern alongside other challenges.

- Needles is the hottest city in the United States by monthly average temperature.
- Sacramento expects its annual extreme-heat days to rise roughly tenfold this century.
- Nevada State University, San Diego, and San José all framed heat as a public-health and infrastructure threat.

In a number of cases, heat was considered a threat and, more specifically, a threat that interacts with and exacerbates other pressing issues in the built environment. Housing affordability, building materials, the public realm, economic development, and more are each made more complex in an environment where extreme heat is a frequent and persistent threat. As the number of extreme heat days steadily increases, the adverse impacts of extreme heat are also likely to increase, become more severe, and affect wider populations in the coming years.

Mitigating extreme heat and improving community resilience and adaptation should be at the top of the priority list. The TAP projects identified a number of key recommendations for better understanding and addressing extreme heat. While not a comprehensive list, the following strategies offer a starting point for public and private sector professionals looking to integrate heat resilience into their planning and development decisions.

Key Recommendations

- Conduct tree canopy and extreme heat studies to identify the hottest, least-shaded areas and prioritize interventions and investments in those areas.
- Cool the public realm with tree canopy and shade structures—"shade is shade." (It is worth noting that different public agencies may perceive shade structures differently. For example, sidewalk shade structures may be viewed by transportation staff and engineers as obstacles to be removed for future road work. This presents an opportunity for collaboration across departments and discussions around city resilience goals.)
- Incorporate cool roofs and cool pavement to lower the urban heat island effect and cool spaces within buildings.
- Depave vacant or underused parking lots to reduce UHI and provide increased rainwater absorption.
- Invest in microforests and green infrastructure to cool the environment, and use structural soils and products like Silva Cells to provide room for street tree root growth while keeping roads and sidewalks structurally sound.
- Use passive cooling strategies, including building orientation, natural ventilation, and deep shade, to minimize heat gain.
- Help the public stay cool with misting and hydration stations, splash pads, and other water features. These elements also serve as destinations, providing recreation and community gathering space and facilitating economic activity when visitors shop or dine nearby.

Resilience as Economic Strategy, Embedded from the Start

Resilience works best when it is framed as an economic strategy and incorporated at the outset of a project rather than retrofitted at a later date. Unshaded, intemperate, and vulnerable places lose tenants, visitors, and value over time.

Incorporating resilience should be treated as a foundational real estate best practice in all markets, regardless of the number of extreme weather days or public pressure surrounding climate challenges. Resilient places are market-competitive places, standing the test of time as assets that attract investment, hold value, and have lower operational (e.g., utility) budgets. Additionally, an economically resilient, diversified economy is better able to absorb current and future economic and climate shocks.

For example, extreme heat in Needles, California, is creating a competitiveness challenge for the community, limiting the outdoor activities that should attract residents and visitors to this Colorado River community. This reduced economic activity, in combination with regulatory pressures, is pushing regional housing growth into neighboring Arizona communities.

Key Recommendations

- Tie resilience to local assets through economic development and urban design strategies. For example, Needles' investments in the riverfront and NSU's blending of desert and trails on campus are turning natural assets into a resilience advantage.
- Monetize resilience benefits to help fund the work. The improved lease structures along the Long Beach waterfront and enhanced tourism sparked by the wetlands and research area can fund the floating wetland pilot and improved waterfront trails.
- Invest public dollars in high-profile capital projects that improve resilience in order to attract private investment. Investments of this nature could include new community cooling centers and resilience hubs that also serve as community gathering spaces and support commercial activities.
- Pursue economic development activities that attract sustainable and low-EC products and processes to the community. As recommended in San Diego, recruiting new building material manufacturers to a community can lower the EC associated with the materials transportation while bolstering the local economy and workforce.

Providing ample shade in public spaces, such as this plaza outside the Long Beach Aquarium of the Pacific, encourages people to linger in the area and support local businesses.





The City of Long Beach is considering how it can better utilize its significant waterfront lease holdings to advance the City's resilience pursuits.

Meet the Market

Projects that do not pencil do not get built. That adage applies to resilient development projects as well. Public incentives can be designed to fill funding gaps, and public-private partnerships can deliver public resources, like land offered at a discount, to reduce capital needs.

Regardless of the deal structure—P3, lease, or other—governance and financing must be aligned to meet market needs and work "at the pace of the market." The market is both the revenue engine, determining which types of projects gain access to funding and where, and can become the limiting factor for implementing resilient solutions at scale. For communities seeking to incorporate resilience hubs, pursuing the conversion of existing community assets into climate-adaptive stations for cooling, battery charging, medicine storage and more can be the most cost-effective solution, over building a new facility, and allow a greater number of community members to access resilience resources.

Leasing also entered the discussion in multiple communities, with the public sector in Long Beach and NSU recognizing its leaseholds as powerful market tools. Incorporating resilience measures and requirements into lease provisions can help ensure that the public lands are being used to further community resilience and support improved economic development. This is especially relevant for agencies that own underleveraged land or hope to engage in P3s for development.

Key Recommendations

- Reduce complexity. When appropriate, equip governance structures with decision-making and transacting capability to advance projects. This applies to the development corporation proposed for Nevada State University as well as the decision-making embedded in the public sector in San José. A trusted and empowered staff can deliver an efficient process attractive to developers.
- Attracting new development may require early public sector investments, such as due diligence work or installing early infrastructure. Certain early investments may also reduce future environmental risks and thereby decrease developer risk—NSU's early investment in new water infrastructure will reduce future development costs for individual parcels.
- Simplify dense master plans into legible plans of action to attract the market. In a crowded marketplace, complicated messages are ignored. Clear, consistent communications, messaging, and plans can help the market quickly understand and respond to an opportunity.
- Leases should be treated as opportunities to pursue economic development goals and embed desired resilience measures. That said, ground lease terms should generally meet the market's expectations, with 99-year leases being the standard in most cases. The NSU panel recommended that the University convert 50-year leases to 99-year agreements for their developable parcels to better match market expectations.

Housing Affordability and Resilience

Housing availability and affordability are issues challenging nearly every community across the United States. Housing affordability also surfaced in nearly every TAP in this program, pointing to the need for solutions that significantly increase housing supply while also delivering resilience benefits to residents and the surrounding community. While there is no single solution to the nation's housing crisis, housing can be a resilience intervention, providing cooling resources, mitigating neighborhood urban heat islands, assisting with stormwater management, and more.

In San Diego, the ULI panel evaluated the financial gap limiting developers' abilities to deliver sustainable and resilient missing middle housing. Missing middle housing is typically market-rate housing built for households earning between 80 and 120 percent of the area median income. As market-rate housing, missing-middle units must pencil on their own and are built without subsidy. At the time of this study, sustainable and low-EC materials carry a ten to thirty percent premium over traditional building products. Taken together, middle-market values and material cost premiums create a financial gap that requires incentives to fill.

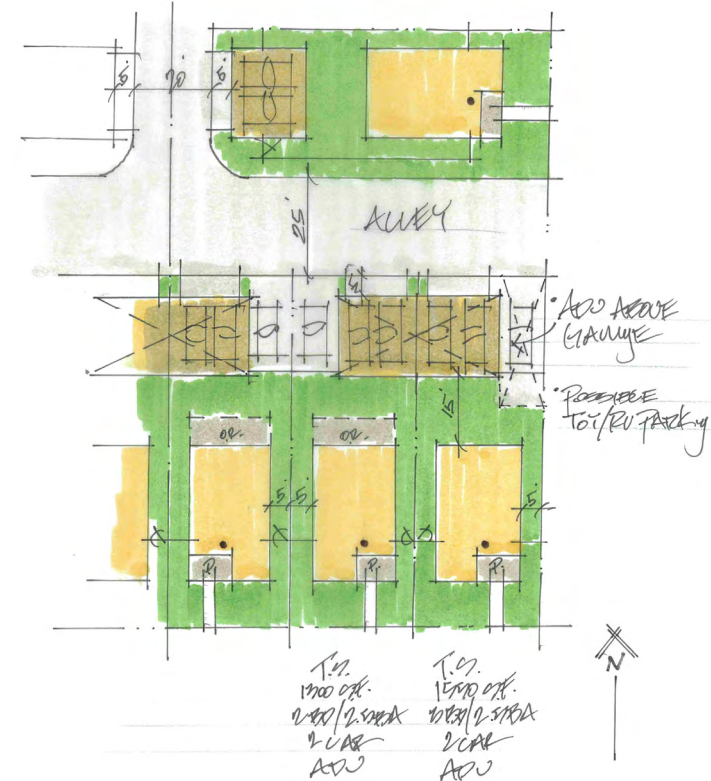
In San José, the panel identified the potential for dual benefits when pairing affordable housing with redundant power and a co-located cooling center. This scenario would

improve the resilience of the residents and the surrounding community.

Key Recommendations

- Improve project feasibility by reducing impact fees* and offering reduced land costs on publicly-owned parcels.
- Streamline permitting or offer tiered review, self-certification for pre-approved typologies, and expedited and pre-application review for buildings meeting sustainability or resilient criteria.
- Create pre-approved plans for new home construction and offer design and siting alternatives that leverage passive building principles. Allow for building siting and placement that leverages passive cooling opportunities.
- Layer incentives onto existing programs, such as San Diego's [Neighborhood Homes for All of Us](#), and consider relaxing municipal requirements, such as parking minimums, for developments featuring resilient design measures.
- Explore tax incentives, grants, and other funding tools to help developers close the financing gap created by using resilient and sustainable materials.
- Use RFPs to require above-code building delivery and incorporate resilience measures.

** Impact fees are one-time charges levied by local governments on property developers to help fund the public infrastructure and services required by new developments.*



The panel in Needles experimented with missing-middle housing designs that could expand the number of homes built on available single-family parcels, thereby decreasing the land price and thus the overall price associated with each unit.



This home, which features a garage accessed off an alley behind the home, makes efficient use of the lot's buildable area and creates a more financially feasible project.

Identity, Placemaking, and Community

Over the course of completing each study and being immersed in each location, nearly every panel worked to elevate the unique attributes that made the place special. To that end, placemaking and identity played a role in most of the TAP recommendations.



Each of the participating communities would benefit from additional focus on branding, identity, and placemaking. For Needles, the connection to historic Route 66 has been highlighted over the years and the associated nostalgia is something the community can leverage further in its placemaking efforts.

Resilience can be embedded into the story that a community tells about itself, leveraging unique history, assets, and characteristics to differentiate it from other places, attract private investment, and build civic pride. For example, the Long Beach TAP suggested that the City integrate coastal resilience into the identity of its waterfront and communicate that story through signage, a living waterfront, and a "nature everywhere" approach. In addition, investments in spaces that foster social cohesion and community well-being (also known as social infrastructure) play a key role in building urban resilience. The more connected people feel to each other and to a place partially determines the long-term ability of that place to withstand climate shocks and stresses.

Community residents and leaders should remain the driving force in this work, setting priorities, identifying desired benefits, and helping raise the visibility of climate adaptation and resilience investments. Similarly, "expanding the tent" and coordinating across jurisdictions can help ensure broader alignment that can stretch across a region and garner stronger and deeper support for agencies with thin resources.

Key Recommendations

- Explore opportunities to connect a community's identity or brand to resilience, shifting public sentiment from a defensive position to a position of empowerment. A place known for heat,

flooding, or other hazards can either be defined those vulnerabilities or by how it responds to them.

- Showcase the brand through unique visual elements—including signage, wayfinding, gateways, collateral, and more—to communicate the story and support wayfinding.
- Co-design with the community, ensuring that the work and results reflect the community's goals. Building and maintaining trust with the community can be supported by compensating them for their investment of time.
- Create an ecosystem map that identifies existing community assets and seek stronger connections to and between those assets before building new ones.
- Seek improved multimodal mobility and connectivity to reduce reliance on personal automobiles and increase access across the community.
- Prioritize dual-benefit projects, such as affordable housing paired with a cooling center, in order to maximize the benefits associated with each investment.
- Establish community resilience centers that can be accessed year-round, not just in times of need or extreme weather. These can become valuable community resource centers, elevating resilience into a daily occurrence. Resilience hubs are most valuable and effective when properly resourced and tailored to specific community needs.

Nature as Critical Infrastructure

Green infrastructure should be treated as critical infrastructure, elevated in importance and funded and maintained like roads and utilities. Using green infrastructure—such as rain gardens, planter boxes, green roofs, and permeable pavements—can help reduce and treat stormwater where it falls, mitigate the urban heat island effect, reduce the volume of stormwater that a city's grey infrastructure must manage, and reduce the reliance on potable water for irrigation.

Other nature-based systems—including microforests, tethered wetlands, bioswales, and more—embrace the power of the natural environment, putting natural engineering to work cleaning, managing, and protecting the systems humans live in today.

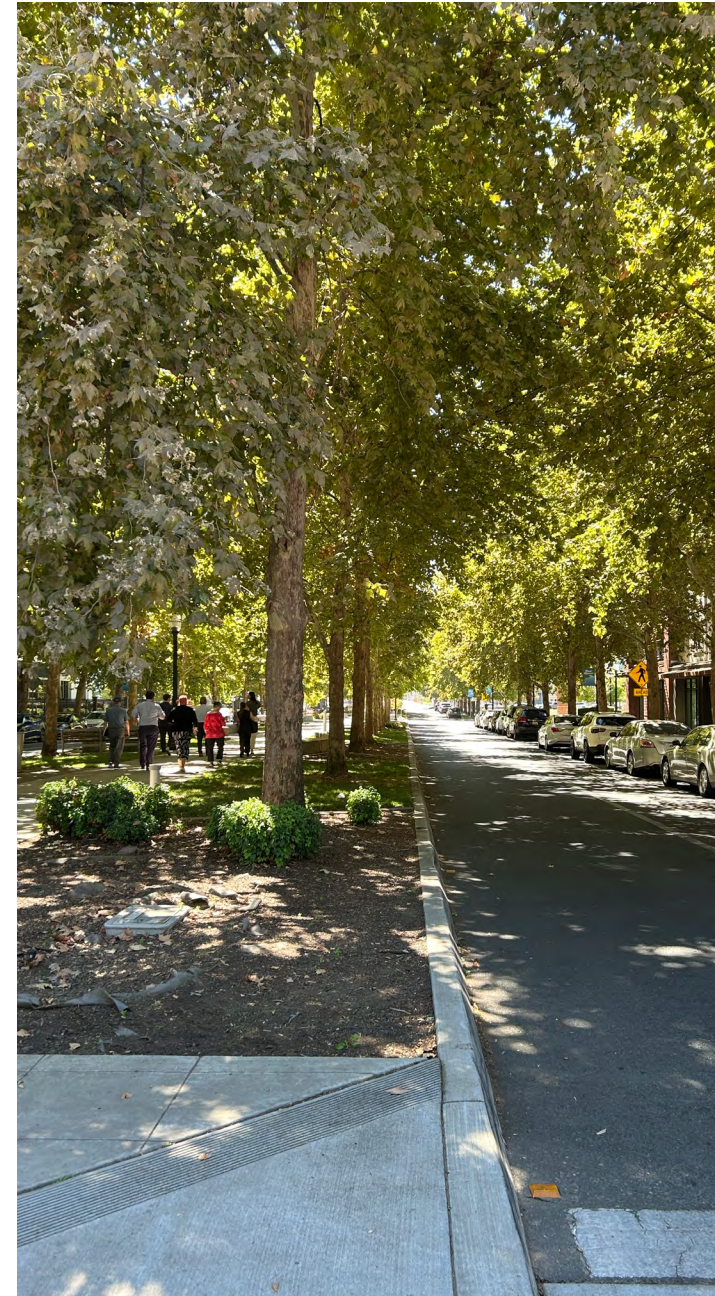
- In Sacramento, the panel recommended treating and maintaining the tree canopy as critical infrastructure and suggested adding microforests and depaving underused parking lots to bring permeable, green surfaces back to urban environments.
- In Long Beach, the panel's "nature everywhere" recommendation proposed new floating wetlands that could provide space for more wetland plants and native vegetation along the waterfront.
- In Henderson, Nevada State University was encouraged to embrace adaptive plants across campus. Native plants may no longer be as resilient following

decades of change to the natural environment. Instead, adaptive species, those that are better able to survive and thrive in today's landscapes, may now be the preferred strategy.

Reclassifying nature as critical infrastructure is a mindset shift any community can adopt, and performance standards, rather than one-size-fits-all mandates, help ensure impact.

Key Recommendations

- Pursue a nature everywhere approach to urban design and public realm improvements, and explore hybrid green-grey infrastructure solutions to maximize the benefits of each.
- Classify green infrastructure as critical infrastructure to ensure funding, staffing, and maintenance resources will be in place to support its operation and maintenance.
- Embrace performance-based design and nuanced, outcome-based goals rather than relying solely on building codes and static standards applied to broad geographies or building types.
- In desert climates, create a water-security toolkit for developers and building owners, featuring guidance for on-site treatment, low-impact development, high-efficiency fixtures, swales, and more.
- In coastal or waterfront areas, explore a tethered floating wetland pilot in bodies of water to support native plant species and more robust aquatic habitats for fish and birds.



This boulevard in Sacramento makes good use of street trees, positioning the public walkway through the center of the plantings, thereby maximizing shade throughout the day.



Governance, Financing, and Funding Mechanisms

Without the right governance structures and financing tools in place, even the best resilience ideas stall before they reach the ground. The panels recognized the critical structural support that both governance and funding provide and sought to advise how those structures could be developed to support the work over time.

Governance

A clear and thoughtful approach to governance of community-wide climate adaptation and mitigation is needed to ensure a consistent effort and impacts that will benefit the neighborhood, the broader community or organization, the region, and beyond. Creating a model that can flex and grow as the work expands will provide leaders with the foundation needed to underpin the efforts while also making room for new tools.

Consider adopting a governance board.

As recommended in the San José TAP, a standing climate governance board can help. This leadership board should provide a 30,000-foot perspective on the work while empowering municipal departments to work collaboratively and cross-departmentally to tackle the relevant policies. A formal cross-departmental working group can support the effort through consistent communications, data delivery, and resource sharing.

Use a risk matrix to identify budgeting priorities. A weighted prioritization framework and a risk matrix, such as those referenced in the San José TAP and included on page 26, can provide valuable guidance in

decision-making. Incorporating these tools into capital improvement planning can help ensure that identified priorities are properly resourced.

Incorporate resilient city design

standards. The San José TAP suggested that municipalities can lead by example, incorporating resilient design standards into public real estate projects. These efforts demonstrate the resilient approaches while also doing the resilient work (reducing the impacts of heat, mitigating stormwater, etc.). Municipal EV fleets and EV-ready mandates

Putting Resilience into Action

To help bring municipal resilience projects to life, moving from insight to action, the San José panel recommended the following design process steps:

1. Develop the project scope.
2. Analyze hazards and establish resilience factors.
3. Analyze vulnerabilities, risks, and conduct a cost-benefit analysis.
4. Identify risk mitigation and adaptation strategies.
5. Implement and adapt, normalizing strategies, embedding performance criteria, phasing, and funding into a practical, long-term system.

are additional areas in which the city can lead by example.

Formalize collaborations. What may have started as an informal meeting of the minds on resilient practices may have evolved into a powerful inter-jurisdictional collaboration, as was the case between the City of Sacramento and Sacramento County in their efforts addressing heat resilience. Detailing the collaboration in a memorandum of understanding or through a joint powers authority can provide the formal organization needed to support the work over the long term.

Use data and analysis to calibrate

incentives. Incentives can play an important role in the adoption of resilience measures. Calibrating those incentives with workforce development and economic analysis tools, such as those recommended in the Sacramento TAP, can help ensure that resilience efforts support or advance broader city goals, create opportunities within the community, and strengthen the business case for resilience.

Financing and Funding

Financial support for resilience work can be found at the local, state, and federal levels. However, with state and federal funding streams becoming more unpredictable, many of the panels focused on avenues that local jurisdictions can take to cover the costs of resilience improvements. The TAPs identified the following financing and funding opportunities.

- **[Climate Resilience District \(CRD\)](#) and [Enhanced Infrastructure Financing District \(EIFD\)](#).** Recommended in the Sacramento and Long Beach TAPs, CRDs and EIFDs are state-enabled special districts that help local jurisdictions in California access the funding and financing needed to make their communities more resilient. CRDs can leverage a wide variety of mechanisms such as tax increment financing, special taxes, and more to raise funds that can be used to address climate risks in a specific geography. EIFDs leverage tax increment financing to fund a wide range of capital projects that support economic development and climate adaptation measures.
- **Taxes and fees.** New taxing initiatives typically require public approval but could include tax increments and taxes on property, sales, gas, insurance, carbon, or tourism. Jurisdictions can also impose fees to support resilience measures, such as development impact fees or fees levied on users, like utility ratepayer fees for publicly-owned utilities.
- **P3 financing options.** At a basic level, a P3 can allow a public entity to leverage its land resources by leasing parcels to developers and receiving income from those leases. Other P3 tools include tax credit bond financing, HUD financing, new markets tax credits, C-PACE, and leases to governmental or institutional tenants.

See the appendix for partial list of funding sources that can support P3s.

- **State and federal economic development tools.** [U.S. Economic Development Administration grants](#), [USDA Community](#)

[Facilities loans for rural-adjacent development](#), [state infrastructure banks](#), and state workforce development grants may each provide financial resources and are worth exploring further. See the

Leverage P3s to Drive Resilience

Public-private partnerships are often formed to develop or redevelop an area or a site in a community. P3s can also be used as a tool to develop public infrastructure or as a method for a public body to realize the monetary value of an asset and apply the funds to a public use, such as advancing resilience priorities for the city. The public partner may be any of a number of governmental entities, including municipalities, special districts, counties, states, and authorities.

In San Diego, the ULI panel encouraged the City to consider using a P3 and land it owns to further resilience goals and catalyze missing middle housing production by unlocking additional public financing assistance or providing developers with an opportunity to use publicly-owned land at a discounted rate. The panel recommended that P3 benefits be provided in exchange for programming requirements, such as building or material performance, or material requirements, such as using low EC materials. The savings in land cost could

reduce the impact of the potential cost premiums associated with lower-EC products, mitigating some of the development risk while providing economic incentives to the private sector partners.

In the case of Nevada State University, the panel suggested NSU leverage its land resources by leasing parcels to developers and receiving income from those leases to further its resilience goals. The panel further recommended that the requests for proposals for development of those parcels and subsequent new construction of on-campus buildings include resilience and sustainability requirements and performance targets to help advance NSU's and the broader community's resilience.

P3s provide local governments with the ability to leverage their publicly-held assets to fund initiatives in the face of unpredictable state or federal funding streams. P3s also allow communities to become more creative with financing and have become an important tool in the financing toolbox.

appendix for list of California state grants to support resilience work.

- **Grants for community resilience centers.** Communities in California may be able to access grant funding to establish and support the operations of CRCs. The [California Strategic Growth Council Community Resilience Centers Program](#) can provide up to \$3 million in grant funding per project. The panel in Needles also noted that there may be

opportunities to form partnerships to pursue other grant funding, as pooling resources, aligning missions, and expanding impact may elevate a grant application's visibility and likelihood of receiving funding.

- **Power purchase agreements and infrastructure-as-a-service.** Tools like power purchase agreements, infrastructure-as-a-service agreements, and agreements with energy service

companies can help entities install and maintain renewable energy infrastructure by folding upfront capital costs into monthly payments made over time.

- **Asset-based revenue.** Other creative funding sources could include asset-based revenue that leverages a jurisdiction's real estate, commercial properties (e.g., intellectual property), or other assets to generate commercial or other lease revenue.

Sample Risk Matrix

		Consequence [Downtime]				
		< 1 hour (Negligible)	1 hour – 1 day (Minor)	1 day – 1 week (Significant / Moderate)	1 week – 1 month (Major)	> 1 month (Severe / Catastrophic)
Likelihood [Return period]	< 11 years (99% - 100% in 50 years)	Low-Medium	Medium-High	High-Very High	Extremely High	Extremely High
	11 - 22 years (90% - 99% in 50 years)	Low	Medium	High	Very High	Extremely High
	22 - 46 years (66% - 90% in 50 years)	Very Low	Low-Medium	Medium-High	High-Very High	Very High
	46 - 125 years (33% - 66% in 50 years)	Very Low	Low	Medium	High	High-Very High
	125 - 224 years (20% - 33% in 50 years)	Very Low	Very Low	Low-Medium	Medium-High	High
	224 - 391 years (12% - 20% in 50 years)	Very Low	Very Low	Low	Medium	Medium-High
	391 - 808 years (6% - 12% in 50 years)	Very Low	Very Low	Very Low	Low-Medium	Medium
	808 - 1,642 years (3% - 6% in 50 years)	Very Low	Very Low	Very Low	Low	Low-Medium
	1,642 - 3,308 years (1.5% - 3% in 50 years)	Very Low	Very Low	Very Low	Very Low	Low
	> 3,308 years (0% - 1.5% in 50 years)	Very Low	Very Low	Very Low	Very Low	Very Low

A risk matrix like this one, referenced by the San José TAP, can aid in decision making by aligning the likelihood of a potential event occurring with the potential downtime associated with the event. This alignment can help determine the level and urgency of related investments.



Best Practices: Moving from Plan to Action

In nearly every one of these TAP studies, there were already thoughtful planning documents in hand. The cities had spent considerable time analyzing their resilience challenges and were putting tools in place. In just as many cases, including at Nevada State University, the challenge lay in prioritizing the resilience measures and charting a path ahead that leveraged both public and private resources to the communities' benefit.

As each panel delivered its set of recommendations to respective partners, actionable strategies and best practices in implementation took center stage.

The following best practices can help communities move resilience work out of the planning stage and into action and impact.

Use Pilots to Show Proof-of-Concept

As communities consider new projects or applying resilience measures, a test project can be a good first step. Starting with a test on a small scale—for example, depaving a section of a parking lot or planting a microforest in a hard-to-program section of a public park—can allow all parties to test the idea, refine the materials and processes, regroup and adjust, and then spread the application more broadly across the geography. Piloting projects can reduce the risks associated with the new approach or material and can help build the case for more resilience projects elsewhere.

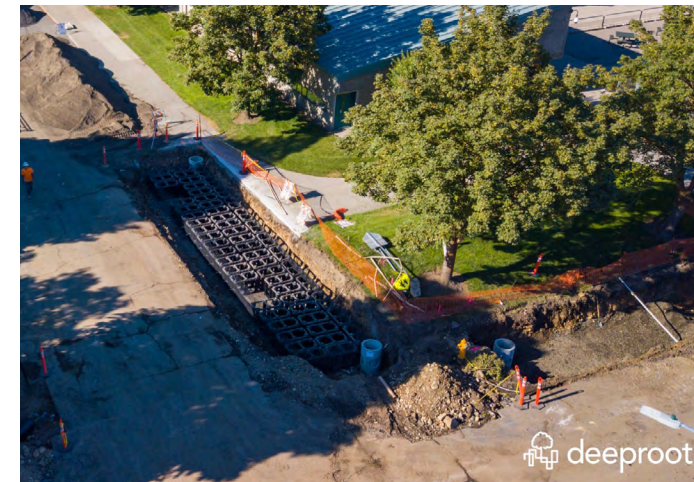
- In Sacramento, the panel recommended the City and County pilot a modular soil cell system or use sand-based structural soils, as each is a proven, successful method for supporting long-term tree planting within the built environment. These solutions increase access to soil volume and stormwater capacity compared to traditional streetscape parkway design standards, which typically have limited available space for root growth.
- In San Diego, the panel outlined a process for developing early demonstration projects to show how low-carbon missing-middle housing can pencil. From selecting a developer with a proven track record to identifying and deploying incentives to exploring other measures, such as self-certification, the City can help the private sector deliver a

demonstration project that everyone—the development community, funders, residents, and more—can see, tour, and evaluate, further supporting viability and partners' understanding of sustainable and resilient development practices and products.

- As both an economic development and real estate initiative, the panel in Needles recommended that the City reward (1) developers who take the risk to adopt new resilient building practices and products, and (2) business owners who bring a new business or industry to the community. This reward could take the form of a reduction in development fees or assistance with initial capital improvements. A successful pilot is often the most effective way to demonstrate success and unlock larger follow-on investments.



Silva cells are installed under other infrastructure and support the paved surfaces while providing space for planted trees' roots to grow and expand.



Implement Performance-Based Standards"

Cities have become accustomed to relying on building codes to encourage or discourage development actions. Rather than relying so heavily on prescriptive rules to guide building design and practices, the panels often pointed to performance-based standards instead. A performance-based approach shifts the focus to the outcomes of the building or development, using measures to track factors—such as energy usage and water conservation—and helping communities right-size the development project to the potential climate risk (or risk of not doing anything) involved.

By using performance-based design measures instead and embedding them in area plans and site-specific plans, designers and developers can begin to leverage each site's unique characteristics to maximize potential climate- and heat-island-responsive strategies. Through this reorientation of design review processes and standards, the development focus can be placed on creating more consistently high-performing, climate-responsive sites that will better serve the community in the years ahead, rather than checking boxes that prescribe setbacks, lot coverage, tree placement, and more.

The Green Factor approach utilized by [Seattle](#), [Washington](#), and [Cambridge, Massachusetts](#), could be a helpful resource. These cities use score-based code requirements to increase the amount and improve the quality of landscaping in new developments.

- In Sacramento, the panel recommended the City and County shift to using site-responsive, performance-based design to allow designers and developers to leverage each site's unique characteristics to maximize potential climate- and heat-island-responsive strategies. In the public realm, the panel



In the top photo, prescriptive measures dictate tree planting on the development site, which in this case were planted on the west side of the pedestrian zone, casting little pedestrian shade while shading buildings. Below, a different design approach positioned trees closer to the walking path, providing ample shade along the entire walkway.



suggested using performance standards to encourage shade along pedestrian walkways, community spaces, and in public places with seating.

- In San José, the panel pointed to the importance of including performance measures in implementation and adaptation steps. Embedding performance criteria into a practical, long-term resilience roadmap and implementation plan, based on risk and funding availability, helps ensure that the work is proactive where possible and responsive to the changing environment.
- At Nevada State University, the panel reminded NSU of the importance of tracking building performance. Recommendations included incorporating energy conservation measures and above-code building performance targets into requests for proposals for new construction, energy retrofit, and electrification projects. Requiring energy modeling for all new construction projects to optimize performance and incorporating retro-commissioning for optimizing energy and water use were also suggested.

Embed Resilience in Existing Budgets and Cycles

When resilience and sustainability practices become a matter of course, and just another part of daily operations, financial support of the work embeds into budgets, and the efforts are less susceptible to funding cuts

or similar threats. Embedding resilience can help ensure the work has the support it needs.

Similarly, folding resilience into existing processes and departments can help spread the work, putting everyone in charge of advancing resilience rather than relying on a standalone department to carry the load. In San José, the panel recommended adding resilience projects to the existing capital improvement plan without requiring a separate process.

Green infrastructure elements, such as urban forestry, tree canopy measures, and shade standards, can be embedded into a city's general plan, treating them as critical infrastructure. This approach can result in better outcomes, including safer communities and stronger power grids.

New development projects represent an important opportunity to embed resilience from the start. At NSU, the panel advised requiring above-code sustainability and resilience in new developments on campus and memorializing those requirements in requests for proposals.

There is also power in integrating resilience into current priorities like housing, which may already benefit from staffing resources, public visibility, and political support. In San Diego, the panel recommended layering sustainability incentives onto the City's existing and successful affordable housing incentives.

Look for Co-Benefits

Co-benefits can be powerful tools for expanding the reach of resilience efforts, attracting new partners to initiatives, and deepening the impact of financial investments in resilience-related projects.

Resilience investments can address multiple problems with one intervention. For example, green infrastructure can help mitigate extreme heat through evapotranspiration and assist in managing stormwater runoff through absorption.

- The San José panel recognized the challenges of operating in a polycrisis, where multiple stressors are significantly impacting the community. While some may worry about competing priorities between housing, climate, and economic stressors, the panel identified an exciting opportunity to align priorities where feasible, maximizing investment and community impact.
- There is a complementary opportunity to improve building resilience across schools, libraries, and civic centers to serve as cooling and clean-air centers and provide refuge during emergency events. Other co-benefit initiatives could include new affordable housing developments that feature a community center that also acts as a cooling center and resilience hub.
- In Long Beach, the 150-foot-wide expanse of Shoreline Drive roadway could be

reduced in each direction, making room for new uses that could support a more enjoyable pedestrian and bicycling experience. Wider sidewalks and trails could be added to the streetscape, as could additional trees and landscaping buffers to shield pedestrians from the traffic and create welcome shade and cooling opportunities along the way.

- In Sacramento, where the panel stressed the "shade is shade" approach, using solar canopies to shade parking areas can generate energy for neighboring homes and buildings while keeping vehicles cooler for occupant use.
- Also in Sacramento, the panel recommended tying shade and tree preservation and planting to missing middle housing innovation. Developers may seek relief from certain code elements, and if that relief results in greater canopy or tree preservation, everyone benefits. A potential local design competition focused on missing middle housing and an alignment with the tree canopy could begin to elevate new design ideas that meet all of the goals.

Within the public realm, by designing streets, parks, and civic spaces to support cooling and year-round use, a city can lower ambient temperatures, improve personal comfort, and create healthier, more resilient spaces during extreme weather events—all while enhancing daily life and civic engagement.

Use Maps to Prioritize Investments

Each of the cities and organizations participating in these studies was already hard at work collecting and analyzing data to illuminate resilience needs in their communities. Identifying the spaces at most risk is an important first step. From there, the city and its partners can begin to prioritize where to act first and what existing resources may already be in place and able to serve as a foundation for additional resilience measures.

- In Sacramento, public sector partners mapped urban heat islands against the existing canopy to target the hottest, least-shaded areas. Working with community partners in those areas, the public sector

can then establish specific goals for each neighborhood based on measured temperatures, existing tree canopy, and development context to determine what actions would most effectively meet the neighborhood targets.

- Leveraging the resilience ecosystem model developed for a [ULI Los Angeles TAP](#), the Long Beach panel stressed the benefits of using existing buildings and resources that can be connected and activated first, rather than building new ones.
- In San José, the City is working to provide community-serving facilities and resilience hubs, upgrading community-serving municipal facilities to ensure functionality during climate hazard

events. The panel recommended the work be prioritized and supported with three primary values in mind:

- » Equity. Prioritize action where the need is greatest.
- » Efficiency. Boost resilience capacity by aligning existing resource investments with goals.
- » Expansion. Build broad relationships with potential partners to maximize impact and accelerate the timeline.

Mapping makes prioritization visible to the community and all partners involved. It also helps distribute the responsibilities and can identify assets already in place that could be leveraged further or more effectively to support the community.

County (Zoom-In)
Select an option

Candidate Resilience Hubs Filters

Select at least one for each category below

Building Type

- ☒ Community Centers
- ☒ Places of Worship
- ☒ Community Colleges
- ☒ Schools

Electric Utility

- All (10)

Building Square Footage

- All (4)

Rooftop Solar Capacity (kW)

- All (4)

Upfront Solar & Storage Cost per Seat

- All (3)

Lifetime Solar & Storage Value per Seat
Net present value of the investment

- All (4)

Underserved & Overburdened Populations

Rank Census Tracts Based On:

Climate Vulnerability Index

Select Census Tracts Designated Disadvantaged Communities in:

- ☐ California SB 535
- ☐ Justice 40
- ☐ California SB 535 & Justice 40
- ☒ Map All Census Tracts

Climate Hazards Data Filters

Projected Extreme Heat Days (2030-2050)
Days above highest average historical local temperatures (RCP 4.5 climate scenario)

2 30

Average Wildfire PM_{2.5} (ug/m³)
Wildfire-related PM_{2.5} annual average from 2006-2020

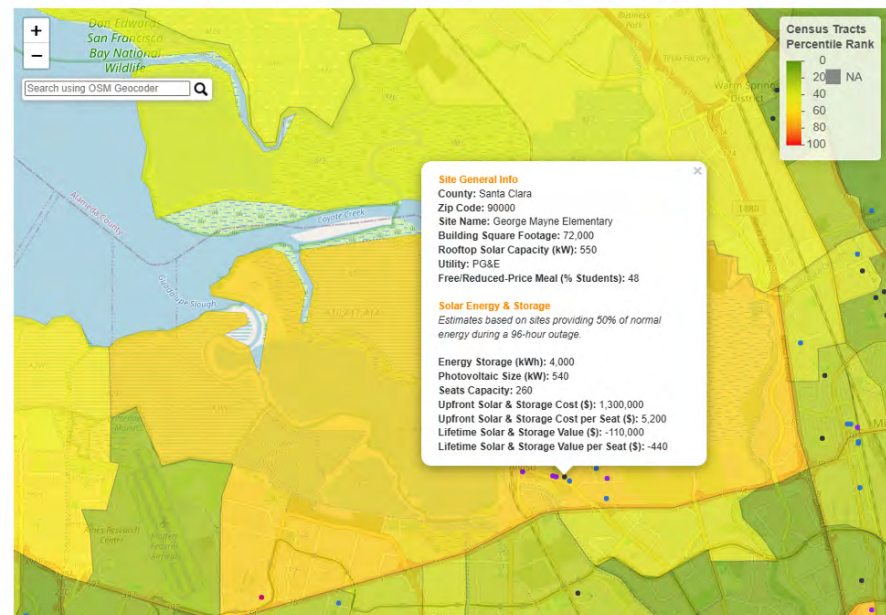
0.1 0.8

Ozone Exceedance Areas
8hr National Standard (>0.070 ppm)

All (5)

PM_{2.5} Exceedance Areas
Annual National Standard (> 12.0 ug/m³)

Click on a census tract to learn more about it and on the points on the map to learn more about each potential resilience hub site.



This resilience hub mapping tool can help communities identify potential locations for resilience hubs based on the inventory of existing buildings and a number of key risk factors.

[Explore the tool here.](#)



Prioritization Under Constraints

Jurisdictions, agencies, and other public institutions are facing significant resource pressures as well as increasing expectations from communities to deliver resilience at scale. As funding, staffing capacity, and time are all finite resources, each panel wrestled with this challenge and offered recommendations for prioritizing resilience under constrained capacity.

Use a Prioritization Framework

Decisions around where to begin and which community or neighborhood receives funding first can be fraught. A prioritization framework can assist with decision-making, guide resource allocation, reduce citywide climate risks, and support the case for proactive investments. The framework should include risk reduction, asset criticality, equity and community benefit, cost-effectiveness, co-benefits, readiness and feasibility, and policy priorities.

Using a prioritization framework can improve transparency and accountability within public sector departments and with the broader community, creating an unbiased and defensible prioritization process that can be repeated across a geography.

The San José panel recommended a process for scoring potential projects against weighted resilience factors. Weighted scores are based on resilience priorities, with projects added as updates to the City's existing capital improvement plan, ensuring that resilience is woven into existing processes.

Prioritize readiness and impact. The prioritization process should elevate high-impact projects that are also actionable now. These projects have cleared barriers and are awaiting the green light (e.g., directed funding). Directing resources to these efforts and prioritizing their delivery can jumpstart efforts, create early impact, and help build the case for additional work. The San José panel recommended adding readiness and feasibility to the prioritization scale, and the NSU panel suggested that parcels needing only a single known intervention (e.g., a water pump) should be addressed first and added to the list of the University's development-ready opportunities.

Consider a Phased Approach

Nearly every panel recommended a phased approach for the work ahead, dividing the efforts into near-, medium-, and longer-term endeavors. Phasing the work can help align all partners around a timeline that is manageable and feasible and divide the work across departments and entities.

Many of the panels also noted that by tackling the near-term recommendations early, the public sector could begin to build momentum around the efforts, achieving "quick wins" to help with community and partner buy-in and elevating the work more visibly across all constituencies.



Shade, provided in a variety of spaces, can allow residents and visitors to find the space that is most comfortable for them.

Invest in De-Risking

Efforts that deepen community understanding, support project and partner alignment, and reduce development risk are worth the early investment of time and resources from the public sector. This work can reduce developer uncertainty, elevate the visibility of the opportunities, and engender early community support for needed improvements.

- In Needles, the public sector was encouraged to deepen community engagement as a means to spur support for the economic development efforts ahead. A clearly articulated vision for the community and an inventory of parcels and development opportunities could also catalyze needed real estate and economic development conversations.
- For the Long Beach waterfront, the public sector was encouraged to invest in a thorough lease review to fully understand the City's current position and potential avenues of opportunity, and then approach the development community. Branding, wayfinding, and community engagement activities were also noted as early investments that would help set the stage for further private sector investments in the area.
- The panel at Nevada State University recognized the value of parcel information and suggested that NSU bring clarity to potential development conversations through key due diligence

The Costs of Inaction

In the ULI publication [The Business Case for Neighborhood-Scale Resilience Strategies](#), report authors point to the issues communities face when heat mitigation steps are ignored.

"Benefits may be even greater when the full cost of inaction is taken into consideration. It is far more effective to make investments proactively, rather than waiting for disaster to strike. For example, [an analysis](#) in Phoenix found that extreme heat costs the population \$7.3 million each year in emergency room visits and hospitalizations and costs transportation agencies \$100 million for fixing roads that buckle, crack, and rot.

"However, a single mitigation measure, such as adding 25 percent more urban tree canopy, would [yield \\$15 billion in benefits](#), almost four times as much as the cost. Furthermore, localities that do not take action on climate risk may face disinvestment in the future and risk a depleted tax base if and when a climate disaster strikes."



efforts. The needed studies would clarify the outlook for potential developers and likely de-risk later, costlier spending.

Build in Equity

It is generally understood that vulnerable communities experience disproportionate impacts from climate hazards and have fewer resources with which to mitigate their impacts. As a result, any resilience work should begin with an understanding of which areas are most severely impacted today. As one panelist noted, "where public funds are spent first is itself a resilience decision."

- In Sacramento, the City and County have proactively prioritized historically underserved (and hotter) neighborhoods in resilience investments. The panel further suggested supporting community-led organizations in providing wraparound services, providing regular access to community cooling centers, and ensuring all play structures have shade.
- In addition to scoring projects based on readiness and impact, the San José panel recommended building equity directly into its scoring weights. Questions evaluating potential equity and community benefit might explore benefits to disadvantaged or climate-vulnerable populations, or ask how the intervention could reduce disproportionate impacts on the community.

Stretch the Rest

It could prove challenging to fund all of the initiatives on the table at once. Even phasing over time may leave some initiatives in a holding pattern until supportive resources are identified.

In making the financial case for the public sector's investment in resilience work, a narrative on the cost of inaction can be a powerful component. Without accessible opportunities for cooling, residents will experience more heat-related health events, driving up emergency room visits and health care costs. Paving more and more pervious spaces will exacerbate the urban heat island while also increasing pressures on stormwater management infrastructure. Efforts to quantify the cost of inaction should prove valuable.

Where possible, the public sector should consider leveraging opportunities to monetize publicly-owned assets to help fund resilience efforts. Tax revenue generated by a Climate Resilience District can fund green infrastructure improvements in the public realm, grants to support energy efficiency upgrades in buildings, and other measures that improve the district's resilience.

Some communities have leveraged economic assessment studies to help identify resilience-related efforts, resources, and workstreams. As recommended by the Sacramento panel, this type of evaluation can identify the nexus between existing municipal efforts and proposed resilience operations and can also help quantify the financial implications, cost of inaction, and potential return on investment from the proposed actions and layered benefits.

Stacking co-benefits and using ecosystem mapping, both of which are detailed as best practices on pages 26 and 27, are additional ways for municipal leaders and related agencies to make the most of constrained budget environments.



The depaving process removes impervious surface and, ideally, replaces it with plant material that will further assist the now exposed pervious surface with water absorption and cooling through evapotranspiration.



Green infrastructure can replace typical concrete stormwater basins with plants that will make good use of the excess water while helping to reduce the urban heat island effect.



Conclusion

The studies conducted through this program posed very different challenges to their respective panels. While each panel was asked to focus on climate resilience, the scale differed from individual homes to university campuses to neighborhoods to entire cities and a county. Regardless of those differences, important themes emerged, and each location identified additional challenges that are exacerbating or being further impacted by the changes to climate and the need for enhanced and expanded resilience.

Whether environmental and resilience-related or extremes in public finance, capacity, housing, or pro formas, communities, developers, and public sector leaders are facing more extreme challenges on a regular basis than ever before. Mitigating today's challenges can play an important role in mitigating the extremes of tomorrow.

The information gathered across the six communities has coalesced into a playbook that can be shared across California and Nevada. These same resources and recommendations can also be applied to nearly any U.S. community interested in advancing planning and initiatives to help residents and communities not only survive in a warmer and more unpredictable climate, but hopefully thrive.

Each of the studies pointed to the need to treat resilience as core practice, incorporated into mainstream real estate and land-use work and across public

“

Everything is moving
toward extremes.

—ULI PANELIST



In addition to shade trees, this civic plaza in Henderson, Nevada, features man-made shade structures that can also house lighting fixtures, speakers, wifi, and other assets for public use.

infrastructure and planning efforts. As an everyday practice, it should be woven into budgets, planning, execution, and review.

Community involvement is also a core feature of effective resilience measures. Designing systems that reach deep into communities—supporting residents in the places where they live, work, and play—allows community members to find resilient spaces no matter where they spend their time. Designing resources to support resilience should also be a practice aligned closely with the community it is meant to serve, delivering the resources they require in the spaces they already visit, with additional support that is relevant to them. Community engagement and a co-design approach should lead the way.

Resilience requires information, planning, and resolve. In each of these instances, these public sector agencies and institutions are leading the way toward a more resilient future for their residents, constituents, partners, and investors—a future where development happens with the environment, rather than in spite of it. Collaboration across sectors and geographic regions is essential for addressing resilience issues, as many climate hazards do not stop at jurisdictional boundaries. As the six TAPs in this program demonstrate, relationships, shared knowledge, and formal partnerships are how communities find new ways of working and the solutions today's climate challenges demand.



Appendices

Public-Private Partnership Financing Options

The panel at Nevada State University provided the tables below, outlining initial funding sources the public sector might pursue to help fund resilient development on campus.

P3 Financing Options		
Tool	Best Use Case	Key Advantage
Tax Credit Bond Financing	Any capital project via non-profit entity	Reduces borrowing cost through the sale of federal tax credits
HUD Financing	Micro/senior housing (post-graduation)	Long-term, low-rate — structured per unit, not per bed
New Markets Tax Credits	Projects in qualifying census tracts	Significant gap financing tool for mixed-use development
C-PACE	Sustainability features in new construction	Covers meaningful percent of project cost; no upfront capital required
Tenant Credit	Federal institutional tenants (e.g., FBI, federal agencies)	Tenant's federal credit rating enables significantly below-market financing rates

State & Federal Economic Development Tools		
Tool	Best Use Case	Key Advantage
SNPLMA	Parks, trails, public infrastructure	City can lease NSU land to access dedicated federal funding
EDA Grants	Tech commercialization, entrepreneurship infrastructure	Ongoing federal program — NSU-eligible and currently underutilized
USDA Community Facilities Loans	Rural-adjacent education, medical, and public safety facilities	Confirm eligibility — Henderson's growth may affect rural classification
State Infrastructure Bank (SIB)	Roads, utilities, infrastructure improvements	Subordinated debt and credit enhancement lower financing costs
State Workforce Development Grants	Academic programs and research hospital concepts	Directly aligned with NSU's workforce mission and P3 partnerships

Note: Tool applicability depends on project type and site eligibility. The University will need to confirm USDA and SNPLMA qualification given Henderson's urbanization trajectory before including in developer materials.

Climate Adaptation Funding Options

In considering potential grants to support CARP implementation in San José, the panel provided the following range of state-level grants that may be available in California for adaptation work.

- [California State Coastal Conservancy](#) provides funding for projects that restore and protect the California coast, San Francisco Bay, and coastal watersheds to increase the availability of beaches, parks, and trails for the public, protect and restore natural lands and wildlife habitat, preserve working lands, and increase community resilience to the impacts of climate change.
- [California Energy Commission's Building Initiative for Low Emission Development Program](#) provides incentives and no-cost technical assistance to develop new all-electric, low-income residential buildings that reduce California's GHG emissions.
- [California Wildlife Conservation Board](#) supports projects that protect or restore biodiversity, provide climate change action, and/or expand public access to nature. Additional State-level priorities include expanding nature-based climate solutions and conserving 30 percent of California's lands and coastal waters by 2030.
- [State Water Resources Control Board: Drinking Water Grants and Prop 1 Grants](#) provide loan and grant funding for construction of drinking water treatment and distribution systems, municipal sewage conveyance and treatment systems, water recycling facilities, drought support for individual households, and more.
- [Land Use and Climate Innovation: Extreme Heat and Community Resilience Program](#) funds and supports local, regional, and tribal efforts to reduce the impacts of extreme heat, such as creating extreme heat action plans, providing mechanical or natural shade, increasing building and surface reflectance, and more.
- [Strategic Growth Council Transformative Climate Communities](#) empowers the communities most impacted by pollution to choose their own goals, strategies, and projects to reduce greenhouse gas emissions and local air pollution by funding community-led projects, such as energy efficiency upgrades, solar installation, urban greening, community microgrids, and more.
- [California Department of Fish and Wildlife's Watershed Restoration Grants](#) fund restoration of ecological function and conservation. Grant programs include restoration programs funded through bonds, the Fisheries Restoration Grant Program, nature-based solutions, and water and habitat restoration and resilience.
- [California Natural Resources Agency Urban Greening Grants](#) fund projects using nature-based solutions to mitigate climate change impacts, such as the urban heat island effect, rising temperatures, and extreme heat.

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