



THE UNITED STATES
CONFERENCE OF MAYORS



Investing in Resilient and Equitable Neighborhoods

How multisector efforts can reduce emissions and prepare communities for future risks

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The United States Conference of Mayors is the official non-partisan organization of cities with a population of 30,000 or larger. Each city is represented by its chief elected official, the mayor.

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Foreword

In January 2022, [The United States Conference of Mayors \(USCM\)](#) commenced a project sponsored by Wells Fargo to assess the barriers and opportunities that cities face in achieving their climate and resilience goals, and how local elected officials and the private sector could work together to reach those goals. Throughout 2022, the project brought together city leaders and staff, Wells Fargo representatives, subject matter experts, and nonprofits to consider potential future climate impacts, identify the challenges to implementing mitigation and resilience measures, discuss innovative financing mechanisms, share best practices, and outline potential solutions. Ultimately, the information and findings from these convenings and conversations helped inform the focus areas, proposals for best practices, and strategies included in this report.

The collaboration launched this effort at USCM's 2022 Winter Leadership Meeting. Joined by the National Oceanic and Atmospheric Administration (NOAA), mayors and business leaders learned about future climate impacts and risks to their communities. Although coastal cities such as Miami, New Orleans, and Charleston are undoubtedly on the frontlines of climate change impacts, cities in noncoastal geographies from Madison to Albuquerque are reckoning with the consequences of a rapidly changing climate, as well. The project considered the role of cities' resilience strategies, alongside increasingly ambitious goals to reduce greenhouse gas emissions. From raising streets in Miami Beach, to revising zoning codes to consider stormwater

in Charleston, and improving the levee system in Des Moines, mayors stand at the forefront of efforts to adapt to a changing climate.

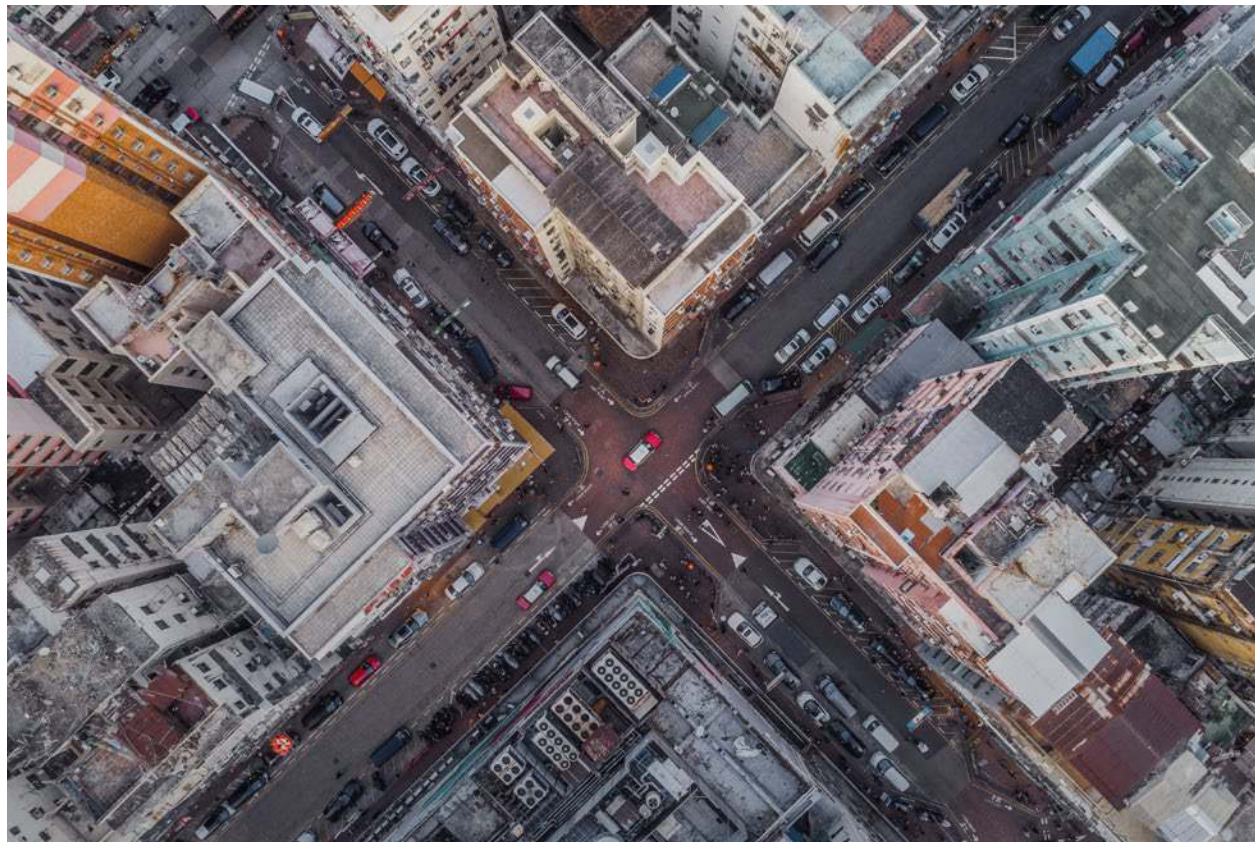
Despite these efforts, local governments still face significant challenges in implementing their plans and achieving their climate and resilience goals. Mayors have been honest about barriers that impede their mitigation and resilience efforts. These include exclusive planning processes, state policies preempting local action, outdated land development and building codes, high upfront technology costs, and stretched staff capacity. Further, continued development in coastal, low-lying areas exacerbate efforts to curtail flood risk and building into and on the edge of the [wildland-urban interface](#) increases fire risk.

At the same time, financial institutions like Wells Fargo seek opportunities to provide sustainable financing to support cities. Wells Fargo has committed to deploy \$500 billion in sustainable financing by 2030. This decade is a critical time to invest in proven and emerging solutions to address impacts of climate change in neighborhoods across America, while supporting those who are most vulnerable.

Recognizing the initiative's emphasis on bringing local and business leaders to the table, the participants, in collaboration with RMI (Rocky Mountain Institute), then explored the significant opportunity for public-private collaboration to enhance resilience in existing neighborhoods. The project hosted a virtual workshop to inform the content of this report.

RMI hosted elected officials, city staff, Wells Fargo representatives, and nonprofit organizations to explore how the public and private sectors can better work together to enhance the resilience of our housing, transportation, and community infrastructure. RMI authored this white paper. As the climate change crisis accelerates, every community in America will be affected by its consequences. Regardless of where these impacts occur, the severity of the impacts are not evenly distributed, and all conversations emphasized that equity should be at the forefront of both plans and action.

The U.S. Conference of Mayors' hope is that the principles, strategies, and examples outlined in this report can serve as a roadmap for public and private sector leaders as well as other community stakeholders, as we work towards investing in and fostering equitable and resilient neighborhoods. While not every strategy may apply to every community, the aim of this report is to not only highlight which strategies may be relevant to consider in different communities, markets, and geographies, but also to foster a pragmatic dialogue on policy and financing solutions to accelerate the deployment of cutting-edge resilience strategies.



Acknowledgements

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Please note that the views expressed in the report do not necessarily reflect the views or policies of any named organization, and should not be considered as an endorsement of any stated recommendations. The aim of the report is to encourage ongoing dialogue on sustainable climate mitigation and resiliency strategies.



Introduction

Climate change has fueled increasingly intense extreme weather events that threaten U.S. communities. Hurricanes are getting stronger resulting in greater damage to people and property; winter storms are hitting communities with deadly and costly consequences; wildfires are destroying and displacing communities in Western states and smoke is choking communities; extreme rain events and flash floods are damaging and drowning communities across the Midwest; and more frequent, prolonged heat waves are endangering lives and deteriorating infrastructure. From individual homeowners to local businesses to municipalities, extreme weather exacerbated by climate change is already costing cities billions, and NOAA estimates that weather and climate-related disasters [cost more than \\$150 billion in 2021](#). As the frequency and intensity of extreme weather events increase, so does the cost to communities and the costs of inaction.

Investing in resilient and equitable neighborhoods helps prepare communities for future risks to make how we live and how we adapt more affordable.

Resilience is the ability of people and communities to anticipate, accommodate, and positively adapt to or thrive amidst changing conditions and related risks. When facing extreme weather and natural disasters, resilience also includes the ability for a community to absorb such disturbances and disruptions and still retain the ability to function — and preserve what people value most about where they live. Community resilience is also closely linked to other societal goals, including climate mitigation, wealth creation, and diversity. Neighborhoods

that are less dependent on fossil fuels reduce emissions; neighborhoods that are better insured with greater financial capacity to rebuild help create and sustain wealth; and neighborhoods less reliant on a single industry, fuel, or transportation mode offer more flexible options.

Equity, in the context of this report, is defined as equal outcomes for all, recognizing this may require different levels of resources to create the same opportunities across different communities and people. Put simply, an equitable neighborhood is less vulnerable to risks.

Equitable resilience is not a “one-size-fits-all” approach. Communities face different vulnerabilities based on where they are located, who lives there, how they live, what systems and infrastructure they manage, and what threats are most likely to occur. A suburban community in central Missouri will have different needs and objectives than urban neighborhoods in downtown Miami.

Three broad principles can guide equitable deployment of resilience strategies:

1. **Engaging and Empowering Communities**
One step increasingly being embraced by leaders and project managers to center equity is to engage communities — especially lower income, historically disadvantaged neighborhoods and households who are typically on the frontlines — not solely to get their support or feedback, but to actively understand what challenges need to be overcome for projects to be successful. The second step is to set up convening structures that empower communities to co-create solutions that make sense for them.

2. *Driving Multisector Collaboration*

Cities can design projects and programs that leverage the competitive strengths of the public, private, and philanthropic sectors with local leaders, community groups, and other nonprofits. Collaboration at this scale will necessarily involve blending public and private resources as well as multiagency and multisector cooperation.

3. *Taking a Whole Systems Approach*

At the intersections of land use, transportation, buildings, energy, and nature, leaders can work together to identify ways to implement strategies holistically to prevent unintended consequences.

These principles should guide how all sectors thoughtfully invest in resilience and equitable communities and the people, processes, and systems that must be considered along the way. Where there is no resilience, there are fewer, less reliable opportunities with greater shocks to local economies when disaster and disruption strike. Where there is inequity, there is less economic opportunity, mobility,

and productivity. Accordingly, investing in resilience not only mitigates financial and economic risk but also may attract further investment. Resilience enhances credit quality by increasing repayment options, increasing collateral, lowering insurance premiums, and reducing system shocks for investors and assets. Furthermore, resilience is sound investment with [research from the World Bank and Global Facility for Disaster Reduction and Recovery](#) estimating \$4 in benefit for every \$1 invested in resilient infrastructure.

This report offers a menu of proven and emerging best practices that can help communities reinvest resiliently and equitably in land use, transportation, buildings, energy, and nature. Each section outlines potential opportunities for and examples of multisector collaboration (or where one sector can enable others). Finally, the report offers structural, anti-displacement, partnership building, and funding considerations that can increase the efficacy and equity of the best practices highlighted and best position communities for success.

“The COVID-19 crisis has shown how extreme shocks can upend governments, firms, and society. It has also heightened awareness of vulnerabilities related to climate change. Prompt action to reduce, prepare for, and better manage risks is economically imperative, and there are immediate opportunities to do so.”

– [World Bank & Global Facility for Disaster Reduction and Recovery, 2021](#)

Strategies for Resilient Neighborhoods

This section outlines five overarching strategies that support a more resilient neighborhood. The specific best practices within are not a prescription, but rather a menu of options for decision-makers to consider that may better prepare communities for future risks. The role of each sector (i.e., public, private, nonprofit, etc.) may vary by community in planning, designing, implementing, funding, and financing each strategy.

1. Reimagining growth with inclusive, smart land use

For over half a century, land use and housing policies were oriented around unchecked growth – with major consequences for neighborhood designs and municipal budgets. As neighborhoods grew further apart, urban and suburban sprawl increased the cost of community services and fundamental infrastructure maintenance because there is more of it – from streets and sidewalks to pipes and wires to emergency services. Cities are now reimagining what it means for a city to grow. Investing within neighborhoods, not expanding them further, is ultimately not just smart land use, but community-wide efficiency. As we highlight throughout this report, efficiency is one of the most cost-effective approaches to boost resilience – on municipal and household budgets, transportation networks, electric grids, as well as community systems and services.





Encouraging Infill Development: Focusing investment and development (or redevelopment) within existing communities brings people, goods, and services closer together. The goal is not density for the sake of density; rather, the goal is improved accessibility, more cost-effective services, more active, healthier communities, and a more prosperous local economy. Below are five ways to encourage infill development:

- ***Upzoning***
Amending comprehensive plans and zoning requirements shifts where development can occur and what gets built where. [Upzoning](#) refers to increasing the density of land parcels that have previously been zoned for lower density development. Single-family homes comprise the default zoning in many communities, which has encouraged sprawl. Accordingly, ending zoning practices where only single-family detached homes are permitted is a form of upzoning. Upzoning shifts this default to accommodate more types and greater density of housing. When combined with other measures, upzoning can increase the housing supply, reduce the competition and demand for housing, and ultimately make housing more affordable.
- ***Deregulating Parking***
When land is specifically allocated for parking, it detracts from other potential uses, such as housing and retail. Minimum parking requirements in cities have led to the creation of large surface parking lots and garages. Such requirements mandate that residential and commercial developers provide a minimum amount of off-street parking. This restricts the potential for upzoned multifamily or mixed-use developments because space for parking is required. And due to the high cost of parking, the cost of development and housing is higher. By deregulating parking, developers can let the market determine if and how much parking they need to provide for future tenants.
- ***Redeveloping Underutilized Lots***
Another strategy is to rezone existing land from single-use to mixed-use. Specific labels may vary by city, but the principle is the same: redeveloping underutilized or vacant properties to offer a diversity of uses focuses economic growth on existing parcels and concentrates residential and commercial activity.
- ***Transit-Oriented Development (TOD)***
Growth around existing transit stations or corridors offers residents and commuters greater access and connectivity throughout the region. [TOD](#) reduces dependence on cars, encourages more active, healthier lifestyles, and reduces the need for expanding transportation infrastructure. Equity should be baked into this shift as well. Cities like [Seattle](#) and [Chicago](#) have partnered with community-based organizations to prioritize equitable transit-oriented development (eTOD) to ensure new transit investments are inclusive of different incomes, people, and communities.
- ***Investing in Green and Blue Infrastructure***
Compact development includes far more than buildings, roads, and sidewalks. As the above strategies shift housing and commercial activity inwards, parks and natural spaces can complement and encourage active, healthy, and connected communities by leveraging the [inherent resilience benefits of nature](#).

Cities across America are changing policy to enable market-based approaches to housing, infill development, and parking. In May 2021, Minneapolis, Minnesota [eliminated parking minimums](#) for all buildings less than fifty units within a half-mile of a transit station. This policy change, in combination with an end to exclusively single-family lots, helped homeowners and developers assess new opportunities for multifamily housing. In 2017, Buffalo, New York [deregulated parking](#) to support more mixed-use, transit-oriented developments with far less parking than was previously required. [Research on new developments constructed post-reforms](#) revealed a 21 percent decline in parking spaces across 36 new developments and that 14 mixed-use developments built 813 fewer parking spaces than would have been required – a 53 percent decrease. In 2015, Fayetteville, Arkansas [deregulated parking](#) and allowed businesses to build the parking they determined was needed. Many commercial buildings previously sitting empty because of limited area available for parking were then able to be redeveloped, bolstering infill development.

These reforms shift development towards the core of communities and encourage more walkable, people-centered neighborhoods, increasing accessibility, affordability, economic opportunity, and resilience. While the ultimate authority may fall to local governments, the responsibility is on developers, investors, financial institutions, landowners, and community-based organizations to align on the community's priority objectives (i.e., increasing the affordability of housing) and then work in tandem with local policymakers to advance the above best practices.

Walking in Memphis

In November 2021, the City of Memphis, Tennessee [reformed its zoning](#) to support more compact, accessible neighborhoods. With this change, the City enabled three- to six-unit residential structures to be built under the residential building code, instead of the commercial code. Memphis also amended use and lot sizes regulated by the zoning code, street widths and curb radii regulated by the Fire Code, and building types regulated by the construction codes. Moreover, the City streamlined approvals for infill housing throughout the urban core and in neighborhoods around key community “anchors,” centers of activity where increasing density encourages walking and supports existing businesses. Memphis' reforms stemmed from the City's [3.0 Comprehensive Plan](#), intended to remove restrictions on the development and redevelopment of more walkable communities. These changes are grounded in advancing equity and redirecting resources to more marginalized communities.



2. Reducing dependence on cars – and increasing energy independence

Increasing options for mobility increases resilience and equity in communities. Shifting infrastructure investments away from car-oriented infrastructure toward public transit and “[first- and last-mile connectivity](#)” helps everyone directly or indirectly. This is not just a need in large urban areas. While cities like Chicago, New York, and Washington, DC may stand out, small towns like Hopewell, Virginia are also embracing and investing in multimodal paths, riverfront boardwalks, and complete street improvements to create “[active connections](#)” to parks, the city’s riverfront and historical assets, and its downtown corridor.

This section focuses first on how investing in [micromobility](#) can both complement transit and pedestrian infrastructure and directly connect communities, people to services, and increase the resilience of neighborhoods. The second part of this section highlights the future of electric vehicles and related infrastructure that increases energy independence.

Expanding Micromobility Options: Micromobility is a mode of transportation that is small, lower-speed, and typically electric or human-powered. Micromobility is a “catch-all” that includes, but is not limited to, bicycles, electric-assist bicycles or “e-bikes”, and scooters. Because people drive less, key benefits include improved health through more active mobility, increased regional accessibility, reduced traffic, lower emissions and improved air quality, and reduced noise pollution. The flexibility of micromobility supports a wide range of use cases and offers credible commuting options when transit disruptions or failures occur, including extreme weather and flooding, mechanical problems, power outages, and public health crises. For instance, during [Hurricane Ida and heat waves during summer 2022](#), New York City’s Citi Bike bikeshare program saw record number of users who were unable to use the subway but needed to be able to get to their destination. Similarly, during summer 2020, bikeshares in New York City, Chicago, and Honolulu [recorded their busiest seasons](#) as people were reluctant to use public transportation due to COVID-19 risks. In effect, bikeshares and other micromobility options – when designed and implemented effectively – create complementary networks to existing transit networks.

As options beyond cars and transit are increasingly called upon for enhancing community resilience and accessibility, planners, owners, and operators need to consider increased demand during acute and prolonged crises and design networks accordingly. Opportunities abound across sectors to invest in and incentivize micromobility infrastructure:

- ***Ownership and Operating Structures***

Micromobility ownership structures vary and may be able to leverage local competitive specializations among sectors. Shared multioption platforms, such as Lyft or Lime, are privately owned and operated. New York City's Citi Bike is privately owned, operated, and sponsored; Ann Arbor, Michigan's ArborBike is operated by a local nonprofit; Washington, D.C.'s Capital Bikeshare is publicly owned but operated by a private contractor.

- ***Incentives***

Banks and lending institutions can design and offer affordable loans and financing products to make quality models accessible for all who are interested, especially for ebikes and other more expensive technologies. Employers (public, private, nonprofit) can offer a commuter benefit related to employee micromobility use and promote use by making it convenient and safe for employees to park their own bikes and scooters. Cities and utilities can offer upfront rebates to purchase micromobility options or subscribe to shared systems.

- ***Supportive Infrastructure***

Cities can build (or expand) infrastructure, such as micromobility parking and docking options, safe storage, and off-road lanes, that increase the physical and perceived safety and convenience of micromobility without having bikes or scooters blocking sidewalks. Cities should [also partner with nonprofits, philanthropies, technology companies, utilities, and community-based organizations](#) to assess opportunities to expand and connect new service areas, reduce barriers to access, increase awareness of options, and develop clear guidance and programs for new micromobility providers that encourage safe, routine use.

Denver as a National Leader in E-Bike Rebates

In April 2022, Denver launched an e-bike rebate program funded by a city-approved tax. The program proved so successful that all vouchers were claimed within minutes and [over 4,400 vouchers](#) redeemed. Income-qualified participants are using their e-bikes to access education, work, and public transit at a higher rate than market-rate customers, [biking 32 miles per week](#) compared to 22 miles per week for market-rate customers. In addition, the e-bikes are replacing 3.4 car trips a week on average. Two strategies contributed to Denver's success. First, the program required vouchers to be used at participating bike stores located in and around the city (as opposed to online retailers). This both invested money into the local economy and ensured quality control and maintenance service for any e-bikes sold through the program. Secondly, regional financial institutions like Colorado's Clean Energy Credit Union [offer e-bike loan programs and financing](#), with loan terms between 36 to 60 months and fixed interest rates. Such loan programs can make higher quality or heavier duty e-bikes accessible to individuals who might not be able to afford upfront cost. Other cities are partnering [with their utility](#) to offer e-bike rebates.

Electric Vehicles (EVs) as Mobile Batteries: Bidirectional charging enables EVs to both charge from the grid and send electricity back to the grid or specific loads. This means EVs can function also as flexible, portable batteries that can power appliances at home or at work sites, bringing resilient power to where it is most needed when the grid is strained or disabled. For example, [estimates indicate](#) that a fully charged electric pickup truck like the F-150 Lightning could meet the electricity needs (i.e., lights, medical equipment, WiFi, and refrigerators) of an average American household for more than three days. Similarly, as municipalities invest in electric buses to support resilience by putting the buses to use as mobile cooling (or warming) shelters. This is not a new concept, as cities such as Chicago, New Orleans, and Philadelphia have been doing it for years with existing transit. As bus fleets electrify, there are even more opportunities for buses to serve as or support an emergency pop-up shelter as a mobile “resilience hub” or power critical community medical or emergency services during outages.

As EV adoption grows exponentially, communities are evaluating options to expand vehicle charging and ensure equity of charging locations. Access to charging is closely linked to how flexible EVs can be and how comfortable people and businesses are with embracing EVs. There are [proven strategies](#), including prioritizing charging infrastructure in neighborhoods with multifamily housing, ensuring EV ownership is coupled with the necessary charging investments in low-income communities, and providing charging at workplaces and popular local and regional destinations.

Purchasing new vehicles and building out the charging infrastructure of the future is essential. Billions in new federal funding will help, but leveraging existing assets and expanding existing financial mechanisms will require both public and private collaboration. Cities, local businesses, and property management companies can enhance existing, often underutilized assets such as parking lots and garages that can be used to host charging stations. The Electrification Coalition also highlights creative financing options to deploy EV infrastructure. For example, Colorado [statute](#) allows energy savings performance contracts (ESPCs) to include vehicle fleet operational and fuel cost savings within the definitions of energy cost savings. [EV charging infrastructure is also allowed in some utility on-bill financing programs](#) (discussed more in Section 3), including Holy Cross Energy in Colorado, City of Tallahassee Utilities, Idaho Falls Power, Washington’s OPALCO, and Seattle City Light. Integrating EV charging into ESPCs and on-bill financing programs, backed by financial institutions, does not inherently require new financing rates or grants; rather, this approach expands eligibility options for newer technologies that may not have been considered upon program creation.

3. Efficient, electric buildings provide a resilient shell



Two fundamental strategies – energy efficiency and electrification – form the basis of safe, healthy, and resilient structures. While the strategies below focus on opportunities for households, similar approaches apply to commercial buildings.

Energy Efficiency is Resilience: One of the most cost-effective resilience measures is energy efficiency. Efficient, weatherized buildings [increase the comfort, health, and “hours of safety”](#) for people and animals inside. Hours of safety refer to the duration that a building can maintain livable conditions without power. Efficient buildings reduce the amount of heat needed during cold weather and cooling needed during heat waves. In fact, when Winter Storm Uri hit Texas communities in February 2021, reports and reflections focused largely on the power supply failures. Yet, this [ignored the spiking electricity demand](#) due to the prolonged cold and the inefficient heating in the state’s older housing stock. Improvements such as insulating structures and sealing air leakages also reduce energy burdens year-round, saving households money on electric bills and reducing strain on the grid, by requiring lower peak demands (when power needs are greatest in aggregate). In other words, efficient buildings are resilient buildings.

- ***For Homeowners***

Many municipalities and utilities offer reduced cost or free energy efficiency audits to measure how efficient your home is and identify specific leakages and opportunities for improvements. That’s step one. Step two involves completing specific upgrades or improvements – from new insulation to inefficient windows. Some improvements, like using LED lightbulbs instead of incandescent bulbs, are simple, low-cost swaps. Others are more expensive and often require qualified contractors to perform the work. Because energy efficiency reduces energy costs, households can see savings immediately – but this does not mean everyone can afford the upfront investments. The public sector, financial institutions, and utilities can make energy efficiency more affordable. For example, in Colorado, the state offers a [residential loan fund](#) for energy upgrades in partnership with Colorado-based banks and credit unions.

- ***For Renters***

Homeowners are only part of the equation. As of 2021, renters comprised just [over one-third](#) of households in America with approximately 44 million households. Renters do have options, but lack the same ability as homeowners to improve the efficiency of their structures. This is where additional cooperation between landlords, utilities, local governments, and financial institutions may be particularly valuable. Some approaches, like the Institute for Market Transformation’s [green leases](#), may offer opportunities for voluntary collaboration for residential and commercial tenants and their landlords. In other cases, a deeper collaboration between local governments and landlords may be required. Fortunately, the American Council for an Energy Efficient Economy and Urban Sustainability Directors Network offer a [guide to local governments](#) for how market-based analysis, community engagement, and other partnerships can encourage rental efficiency and reduce energy burdens.

Electric Homes are Resilient Homes: [More than half](#) of all U.S. households rely on gas appliances, but natural gas is increasingly posing health and economic challenges. Fortunately, the core solution – electrifying existing buildings (primarily space and water heating and cooking) – offers opportunities to increase the resilience of homes, reduce energy burdens, and create local economic opportunities.

- ***Healthier Homes***

Electrifying homes and buildings improves indoor air quality by limiting exposure opportunities to pollution. More electric homes are healthier homes and can recover from or withstand environmental and economic crises more seamlessly. Burning natural gas in homes – typically for heating air and water and for stovetops and ovens – pollutes indoor environments and can cause negative health effects, often exacerbating respiratory conditions like asthma and allergies. For example, children living in homes with gas stoves are [42 percent more likely](#) to suffer asthma symptoms than those living in homes with electric stoves. These respiratory consequences and additional pollution exposure can increase likelihood of more severe health outcomes in broader health incidents, like COVID-19. Air pollution also [disproportionately impacts](#) lower income communities and communities of color.

- ***Economic Resilience from Electrification***

Both acute crises and longer-term trends signal that natural gas is susceptible to increasing costs. Winter Storm Uri and Russia's invasion of Ukraine prompted price spikes in the cost of natural gas, directly impacting individual households and consumers. Additionally, the cost of maintaining the country's aging gas infrastructure is [increasing dramatically](#) – costs that are also passed directly on to customers. Electric infrastructure, like heat pumps, will continue to decline in cost with the recent passage of the Inflation Reduction Act, with specific incentives for low- and moderate-income households in particular. As households reduce or even eliminate their dependence on gas, they become far less vulnerable to volatile markets from extreme weather and geopolitical conflict.

More equitable building efficiency and electrification increases resilience by making households safer and healthier while reducing energy burdens. And while people do use gas stoves during emergencies, this is only a viable option so long as 1) there is gas supply available and 2) the gas appliance (like water heaters and furnaces) does not require electricity to operate (which many modern systems do). Conversely, with just one fuel needed (electricity), electric homes are only connected to one energy infrastructure system and one that can be powered by local, distributed energy resources (as discussed in the next section).

Integrating Electrification with Existing Energy Efficiency Programs

Local governments can partner with utilities and regional efficiency programs to incorporate or allow electrification upgrades. This helps both increase awareness of electric appliances (i.e., heat pumps, water heaters, and stoves) and streamlines access to incentives. Financial institutions also offer and can expand “green” loan programs to include electrification upgrades as part of those programs to make it more straightforward for consumers to finance all energy retrofits projects in one place, reducing barriers to entry and loan application costs. For example, creating or expanding [on-bill financing](#) programs ([over 110 exist nationwide](#)) is another innovative option. With on-bill financing, customers borrow money for energy upgrades and repay the costs of the upgrade over time as part of their existing monthly utility bills. The U.S. Department of Energy highlights how on-bill financing creates a more streamlined process as utilities already have a direct billing relationship with customers, including access to energy consumption data and payment history. On-bill financing programs can be designed to increase access to energy upgrades by using bill payment history to qualify customers, rather than credit history or income, even though financing is typically provided by third-party financial institutions.



4. Flexible, local energy systems

Beyond the building itself, communities can create flexible energy systems that complement what their utility offers, including the following four strategies:

Resilience Hubs Serving Multiple Needs: As defined by the Urban Sustainability Directors Network, [resilience hubs](#) are community-serving facilities designed to support residents, distribute resources and supplies in emergencies, and provide clean, reliable power while offering safety and shelter during crises. While these hubs are specifically designed to bolster disaster response and recovery, they can also support everyday operations and community events. Multisector collaboration is necessary to create resilient structures, deploy backup power, increase accessibility, and provide safe and trusted facilities and services during extreme weather and other disasters. Some cities, like Minneapolis, have partnered with private companies to develop, own, operate, or enhance their resilience hubs. Minneapolis' utility, Xcel Energy, is funding the battery and solar systems. This model could be extended to other hub services and infrastructure needed to support resilient community operations.

Baltimore's Resilience Hubs

The City of Baltimore, Maryland is one of the leaders in planning and deploying resilience hubs to support lower-income, under-resourced, and vulnerable neighborhoods and residents. This cross-departmental collaboration involved the City's sustainability, planning, emergency management, and health departments; extensive partnerships with the community; and strategic use of funding and grants to invest in key infrastructure needs. In Baltimore, the hubs are owned by [local, service-based nonprofit community organizations](#) that have a record of strong leadership in under-resourced neighborhoods to provide community support and emergency response during disruptive events. Instead, the City provides support through grants, training, supplies, and assistance to set up solar and battery storage. Baltimore's hubs have also acted as cooling centers during heat waves, distributed water and fans for residents without air conditioning, and hosted vaccine and testing clinics during the COVID-19 pandemic.

Microgrids for Community Resilience: Microgrids are self-sufficient energy systems that serve a discrete, geographic footprint or loads such as a hospital, neighborhood, or military base. Typically, a microgrid is a smaller “grid” designed to operate both in concert with as well as be able to disconnect from or [“island” from the main electricity grid](#) during outages from extreme weather, routine maintenance, or even cyberattacks. Microgrids can include a range of technologies, with solar, energy storage, and fuel cells becoming increasingly common. Such systems enhance local grid resilience and help manage local power needs. According to the Center for Climate and Energy Solutions (C2ES), [over 160 microgrids are in operation across the U.S.](#), and multiple microgrids just proved their worth weathering Hurricane Ian in Florida.

Two examples highlight different potential microgrid structures to support resilient neighborhoods. First, the Town of Babcock Ranch, Florida, in partnership with utility Florida Power and Light (FPL), is exclusively powered by solar and battery storage and notably did not lose power when Hurricane Ian made landfall in September 2022 as a strong Category 4 storm. Babcock Ranch is home to over 50,000 people and boasts approximately [150 MW of solar](#) and [10 MW battery storage system](#), owned and operated by FPL. Second, after Hurricane Maria devastated Puerto Rico also as a strong Category 4 storm, philanthropies, national nonprofits, and Puerto Rican organizations joined forces to build community owned and operated microgrids at critical facilities. Local ownership models [enable and empower residents and businesses](#) to determine which equipment and operations should get priority during outages and crises. In this case, a combination of grant funding and flexible financing helped make Puerto Rico’s microgrids possible, including a [loan-loss reserve](#) to reduce the financial risk of lenders.

Solar and Storage for Critical Needs and Year-Round Resilience: For both households and community facilities, solar paired with battery storage (or EVs) provides rechargeable resilience not reliant on gas or diesel fuel generators. Solar and battery storage can be deployed at varying scales depending on need and can recharge over time regardless of fuel supply. This can be [critical for lower income and more vulnerable residents](#), especially during natural disasters when some may not be able to evacuate or even temporarily relocate and sheltering in place is needed. Plus, this directly supports financial resilience. Costs for [solar and storage continue to decline](#) as diesel fuel costs [rise in anticipation of hurricane seasons](#) and spiked at the end of 2022. Solar and storage can provide resilience year-round to rising electricity costs.

Thanks to the Inflation Reduction Act, there are [new and enhanced incentives](#) that can accelerate deployment. However, innovative financing mechanisms that defer upfront costs are still needed. Enabling more distributed solar and storage not only increases the resilience of those households and businesses directly, but it also reduces stress on the local distribution grid during heat waves, extreme cold spells, and other times of peak demand.

Community Solar+ Increases Access to Resilient Energy: Community solar offers opportunities for all residential customers — including renters, people living in multifamily residential buildings, and those without a viable rooftop for hosting solar — to buy clean energy and reduce their energy bills. Community solar projects are typically small to mid-size solar projects (500 kW – 10 MW) and connected into the distribution grid. Residents and even organizations or local businesses can then subscribe to a portion of the panels or electricity production and receive credits on their utility bill. [Community Solar+](#) takes this to the next level by scaling deployment of solar in concert with other resilience opportunities like deployment of EV charging, battery storage, and mitigating the urban heat island effect with solar canopies. For instance, projects located on or adjacent to community facilities, hospitals, or grocery stores could be structured where local residents purchase shares in the solar system’s output during routine operations while also investing in a microgrid with the ability to switch to powering critical loads during emergencies. Additionally, Community Solar+ can help bring solar and battery storage to multifamily housing, increasing health and safety during power outages.

One of Big Sun Solar’s 12 canopy sites across San Antonio. Photo courtesy of Big Sun Solar.



Expanding Access to Solar and Reducing Energy Bills in San Antonio

To advance Community Solar+ projects, cities, local businesses, and larger corporations can offer to host projects on their rooftop and parking facilities and can be [subscribers, anchor off-takers, or guarantors](#) for community solar subscriptions to help de-risk projects for solar developers. In San Antonio, the [Big Sun Community Solar Program](#) is a public-private partnership between the City’s municipal utility and local developer Big Sun Solar. The program consists of almost 5 MW of community solar across 12 privately-owned parking lots. The [program directly leveraged the additional value](#) provided by the EV-ready solar parking canopies. Plus, the developer partnered with local foundations and a bank to create a solar assistance program to increase lower-income participation. This multisector project offers four benefits: 1) greater access to clean energy for its customers; 2) covered parking vis-à-vis solar canopies to local businesses keep their employees’ vehicles cooler in San Antonio’s increasingly hotter summers; 3) the ability for the developer to capture additional revenue from these businesses by providing covered parking to make solar more affordable for subscribers; and 4) lower energy bills.

5. Nature-based solutions

One “[frequently overlooked strategy](#)” for mitigation and resilience is nature itself — urban forests, parks, tree canopies, green stormwater infrastructure, and bodies of water. Nature can enhance neighborhood resilience to heat waves, droughts, hurricanes, flooding, and other extreme weather. Leveraging nature-based strategies in cities can provide cooling, coastal protection, and stormwater management. The type of “nature” deployed may vary by region but implementing nature’s portfolio of solutions is both cost-effective and ripe with co-benefits. [Recent analysis](#) found that urban nature’s benefits are “nine times the costs.”

- ***Heat Mitigation***

Reducing exposure to extreme heat and urban heat islands is crucial for community resilience. The urban heat island effect refers to the higher [temperatures resulting from heat-retaining surfaces and other materials in the built environment](#). This temperature contrast can be particularly stark on dry, dark surfaces, such as pavement, where temperatures can be 50°F to 90°F hotter than the surrounding air. This then further warms the surrounding air. Urban heat islands [disproportionality impact marginalized and minority communities](#). It only takes a few degrees to shift from a hot day to a heat emergency. During periods of extreme heat, areas with more nature are cooler. Trees can mitigate the urban heat island effect and can even help manage building electricity needs by reducing the need for or degree of air conditioning.

- ***Protecting Coastal Communities***

Coastal and marine ecosystems offer coastal communities vital protection from extreme weather. Mangroves, coral reefs, and seagrass beds prevent erosion and can reduce the intensity of storm surges and tidal waves. Mangroves, for instance, are far more cost-effective at protecting coastlines from flooding and storms than human-built seawalls. For example, during Hurricane Irma in 2017, mangroves in Florida [prevented \\$1.5 billion in flood damages and protected over half a million](#) people.

- ***Managing Stormwater***

Conventional stormwater infrastructure, like concrete basins and pipes, are not only costly to build, but exclusively serve the purpose of capturing and controlling stormwater runoff. Instead, strategies like rain gardens, wetlands, and parks can capture stormwater while [also providing other co-benefits](#).

Nature-based strategies are often undervalued and considered nice-to-haves rather than critical parts of an effective resilient neighborhood. Below are six recommended strategies from [RMI's recent report](#) highlighting public and private sector opportunities:

1. *Adopt a “Green-First” Approach*

Because of the net benefits of nature-based solutions, cities may be overspending when green infrastructure is not used by default for new projects.

2. *Use Policy to Nudge Developers*

New policies, requirements, or incentives could shift costs and infrastructure deployment to developers and landowners. This could require including nature in new developments or imposing a fee on developers who opt-out of including nature-based solutions.

3. *Including Nature in Tax Increment Financing (TIF)*

Infrastructure upgrades are often financed through TIF, where a city makes an improvement in a defined district and the incremental increase in property taxes resulting from increased property values is used to sustain such infrastructure. Green infrastructure is no different. For instance, Chicago has used TIF revenue to subsidize green roofs and complete streets.

4. *Leveraging Insurance Incentives*

In addition, as extreme weather events [prompt increasing insurance claims](#), insurance companies can act at the customer and product levels. This includes offering discounts to incentivize customers and communities who protect themselves from climate impacts. For example, a Dutch insurer ran a [campaign](#) to increase green roof adoption. Insurance companies could have even more impact by supporting governments directly, subsidizing actions from which insurers will benefit.

5. *New Mechanisms Needed*

As the benefits of urban nature are increasingly recognized, financial institutions should work with cities to develop fit-for-purpose financing mechanisms to accelerate investments in nature-based solutions.

6. *Philanthropy as a Bridge*

As discussed more later, philanthropy can help spur innovation as a funder of partnerships among investors, experts, and municipalities to explore additional ways of accounting for and investing in green infrastructure.

The range of strategies above are necessary, as [neither the level of investment in nature nor progress to date has matched the need or potential](#). This is an under-tapped opportunity where multisector collaboration is essential to success.



Transforming Atlanta's Fourth Ward with Green Infrastructure

Once a former industrial and commercial property, [Atlanta's Fourth Ward Park](#) was transformed into a 17-acre urban park in 2008. The park is located in an area that historically has experienced flooding and sewer overflows during storms. Accordingly, the site was [designed](#) to include extensive green infrastructure to improve stormwater management (with the capacity to manage a 100-year storm), prevent sewer overflows to counteract the spread of waterborne diseases, reduce flooding in the surrounding neighborhoods, act as a water reserve during a drought, and mitigate extreme urban heat.

Organizing for Resilience

One of the challenges of achieving local resilience (and mitigating climate change) is that many of the strategies discussed previously transcend a single municipal department and are often impacted by multiple types of community services. Cross-departmental collaboration is necessary and often critical to saving lives during emergencies. It is also important for planning, designing, and implementing longer-term resilience strategies. For example, if electric buses are deployed as emergency cooling shelters during an intense heat wave, who ensures that the vehicles are charged? Who's responsible for supporting people suffering from heat-related illnesses? Who ensures the vehicles are being driven and deployed to serve the most vulnerable

parts of a community? And who worked upfront when initially purchasing these vehicles to specify that they be designed for these types of services? This answer is likely neither one person nor one department.

For example, in 2015, Boston's Planning and Development Agency (BPDA) launched its interdepartmental [Smart Utilities Vision](#), which has evolved into a program that develops "strategies for more efficient, equitable, sustainable, resilient, and innovative utility services and infrastructure." This program, and the Steering Committee that oversees implementation, includes seven municipal departments from Public Works to Information Technology to the Mayor's Office of New Urban Mechanics.

"Institutionalizing interdepartmental efforts is critical to addressing cross-cutting sustainability, technology, and resilience strategies. Silo-busting is tough and requires challenging longstanding norms and operations, but ultimately positions cities like Boston to be better able to develop innovative solutions in the modern world."

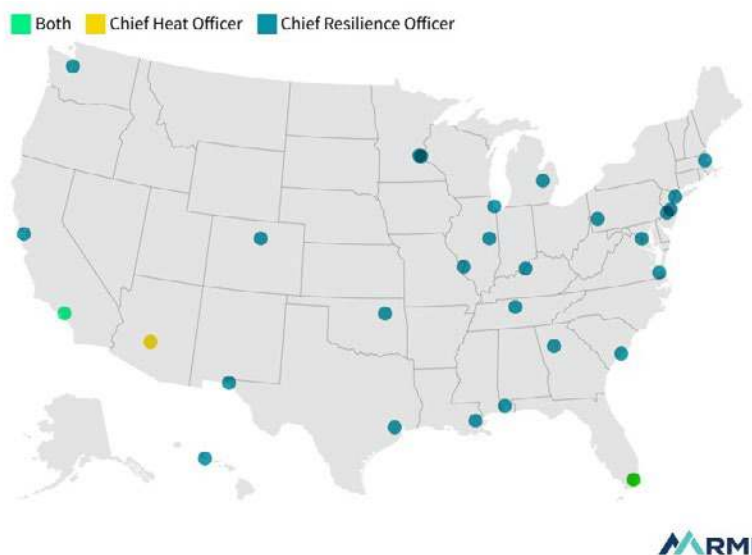
– Bradford Swing, Director of Energy Policy and Programs, City of Boston



Cities are recognizing that the types of services, programs, and needs are changing and are restructuring to manage complex challenges more effectively. Beyond interdepartmental task forces, cities are creating new senior leadership roles, such as Chief Resilience Officers and Chief Heat Officers, to focus explicitly on deploying resilience strategies. The map below highlights a snapshot of these roles in cities across the country – not just those in coastal or heat-prone areas – are creating new roles to tackle new challenges. (As a caveat, formal titles do vary and many other cities have designated roles within a mayor’s or city manager’s office responsible for managing resilience strategies and climate risk.) Title aside, for these roles to be effective, they need to be empowered to act across departments, operate in cross-functional ways, and challenge the status

quo of operations and services. These roles bring heightened attention to projects and programs that may not neatly fit within one department’s purview.

An understated benefit of this reorganization is that it offers private sector and other community partners clarity on the local process and points of contact necessary for project success. The very existence of these roles (and the political support for them to work across departments) encourages investment, collaboration, and partnerships for community and economic development because of the increased resilience that should stem from more efficient and clear cross-functional strategic efforts. Undoubtedly, managing an interdepartmental team does take more effort, but building such a team early is a longer-term investment in project success, efficacy, and equitable impact.



Preventing Displacement to Ensure Equitable Resilience

With any investment or infrastructure upgrade, there is a risk of reshaping communities and displacing people. This is not a reason to not reinvest; rather, it's a reason to be intentional and thoughtful about how and where we reinvest, redevelop, and revitalize – and who benefits. Major investments in communities need to be accompanied by anti-displacement measures. Without such measures, the community risks losing those residents who would benefit most and further increasing the vulnerability of already more marginalized or lower income populations.

Practices including infill development, micromobility, energy efficiency, Community Solar+, and urban nature reduce exposure of individuals of all income levels from market volatility to fuel price increases and reduce the energy burden – or the energy expenses

of relative to overall household income – of day-to-day living. Other strategies like resilience hubs, microgrids, and building and vehicle electrification reduce risk exposure to acute and prolonged crises that impact the supply of fossil fuels – from natural gas to gasoline – be it a winter storm, hurricane, or geopolitical crisis. Reducing energy burdens and risk exposure benefits everyone, but particularly protects those who can least afford price “shocks” in their daily lives. Avoiding or reducing these shocks helps keep people in their homes and neighborhoods, lowering the risk of being displaced due to circumstances beyond their control. While the strategies and best practices outlined above can be part of an equitable revitalization and may reduce energy burdens, they may also displace renters who are particularly vulnerable to increasing housing costs.



Beyond these practices, robust partnerships will be critical to reducing displacement and ensuring that who benefits from investments in resilience is top of mind:

- ***Empowering Communities Through “Backbone” Partnerships***
When designing processes for reinvestment and revitalization, public, private, and community leaders can partner with local nonprofits and philanthropies to focus on creating and enabling community power in decision-making. This enables communities to prioritize where anti-displacement measures are needed. For example, [SPARCC – the Strong, Prosperous, and Resilient Communities Challenge](#) – is a multiyear, philanthropy-funded partnership investing in and amplifying local efforts in six regions. This “backbone” structure helps ensure that public investments in the built environment reduce racial disparities, build a culture of health, and respond to the climate crisis. SPARCC [aims](#) to “change the way metropolitan regions grow, invest, and build through integrated, cross-sector approaches that benefit low-income people and communities of color.” Working across Atlanta, Chicago, Denver, Los Angeles, Memphis, and San Francisco, SPARCC is [amplifying efforts within communities](#) to make sure major new infrastructure investments – in housing, transit, health, energy, and nature – meet the challenges of climate change and lead to equitable, healthy impacts for all. Other similar types of partnerships include California’s Transforming Climate Communities initiative, where [Fresno](#) and [Watts](#) have explicit partnerships and resources dedicated to community-led development and infrastructure improvements.
- ***Community Land Trusts***
Another strategy to reshape real estate trends and slow displacement is the creation of a [community land trust](#) (CLT). CLTs are place-based nonprofit organizations that provide lasting shared assets and equity homeownership opportunities for lower and middle income families and communities. They are one of the most effective ways to slow displacement in areas facing rising costs of living. Beyond slowing new high-end market housing, CLTs can also alter development patterns and leverage new investment to realize resilient, sustainable, and accessible development in their neighborhoods. There are [over 225 CLTs in the country aiming to create homes and neighborhoods that are permanently affordable](#) with opportunities for generations to build wealth through home ownership. In short, a CLT retains ownership of land while selling the house to a new individual or family. The homeowners lease the land from the CLT in long-term, renewable leases in exchange for agreeing to sell the house, if or when that happens, at a nonmarket rate price to keep the neighborhood affordable while still accruing home equity.

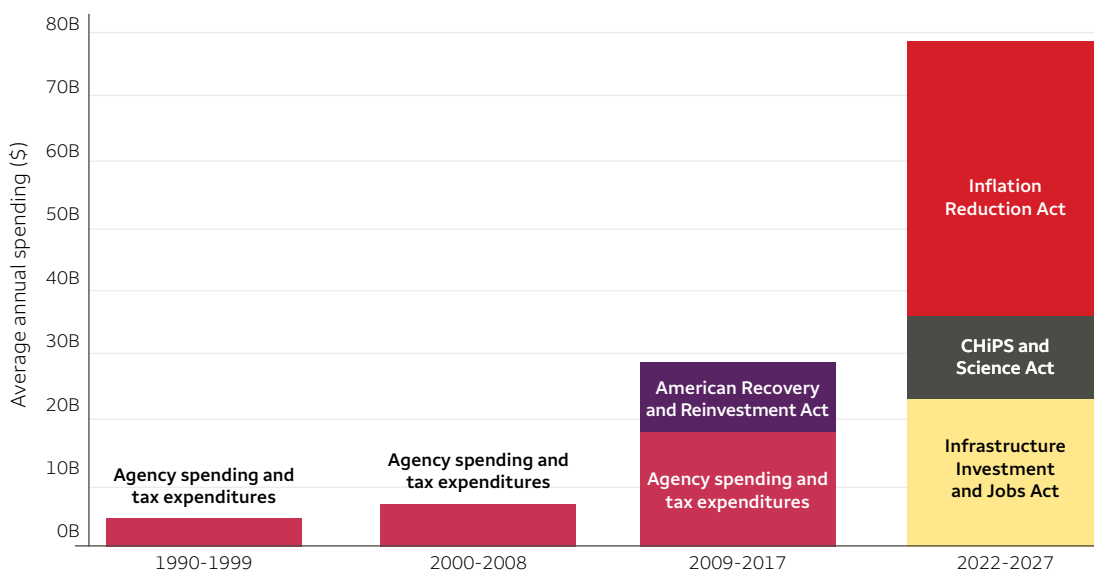
These are two strategies of many that can help ensure that investments in resilience and revitalization, ultimately, are investments in more equitable opportunities. Different housing markets may further merit stronger renter and lower income homeowner protections. When people are less susceptible to price “shocks”, they can increase their savings and build wealth. Investing in community resilience can reduce displacement, both literally from environmental and extreme weather risks, and indirectly from related economic and social pressures stemming from infrastructure investments.

New Federal Funding Can Accelerate Local Resilience But is Only Part of the Equation

Cities have an unprecedented opportunity to advance and fund projects that mitigate climate risks and enhance resilience. The passage of the Infrastructure Investment and Jobs Act (IIJA) in 2021 and Inflation Reduction Act (IRA) in 2022 created or expanded hundreds of billions of dollars' worth of grants, loans, rebates, and tax credits. The IRA even enabled tax-exempt entities like cities to be able to directly leverage many of the new or enhanced tax credits through mechanisms like direct pay and transferability. These programs can support – in part or in full – all of the resilient neighborhood strategies outlined above. Philanthropy-funded tools, such as the [Local Infrastructure Hub grant search](#) or [Federal Funding Opportunities for Local Decarbonization tool](#) can make it easier

to navigate and prioritize which federal programs to pursue.

However, challenges also exist that may hinder progress. Federal dollars can further exacerbate vulnerability if such investments support projects that are not planned with resilience in mind. This is why the Biden Administration's [Justice40 initiative](#) aims to ensure that at least 40 percent of the overall benefits from certain federal investments go to disadvantaged communities, and this can complement partnerships aimed at reducing displacement and achieving more equitable investments in community resilience discussed previously. Local leaders should keep in mind that [federal agencies and states may differ](#) in their implementation of some Justice40 requirements.



This chart highlights the unprecedented level of new federal funding for reinvesting in communities and infrastructure. [RMI 2022](#).

Cities have limited capacity to be able to leverage federal dollars for the projects that do enhance local resilience. While financial resources available have dramatically increased, the people and time to put these resources to use has not changed. Furthermore, the speed and scale necessary to deploy resilience strategies requires even greater assistance. In short, the public sector cannot and should not bear the full responsibility of funding and financing resilient communities.

The private sector – including banks like Wells Fargo – can partner with the public sector, philanthropy, community development financial institutions (CDFIs), and other community-based organizations to capture this moment and bring a wide

array of financing options and mechanisms beyond what the federal government can offer. Already cities have explored and continue to use public-private partnerships, general obligation bonds, revolving loan funds, performance contracting, and tax increment financing. Private financing partners will be all the more important as the new tax credit programs from the Inflation Reduction Act for clean energy, batteries, electric vehicles, building efficiency, and other technologies take effect.

Many have called the IIJA and IRA a “down payment” on a cleaner, more resilient future, but there are still much-needed investments and costs for the long journey ahead. As with any down payment, someone still must pay the mortgage.



Conclusion

Throughout this effort, cities acknowledged the role that they know they need to play in supporting the resilience of people and neighborhoods. Cities and their community partners should plan and deploy the proven and emerging strategies from this guide that make sense for them and the risks they specifically face. Examples highlighted in this report already indicate where multisector collaboration is occurring, demonstrating not only that this is necessary, but it is achievable. Together, the public and private sectors, combined with philanthropy, nonprofits, and community-based organizations can transform neighborhoods into more equitable and resilient places to live, work, and thrive. And as cities pursue resilience, they will also reduce emissions, build and sustain community wealth, and encourage more socially and economically diverse communities.

The best practices highlighted herein have been tested, and public, private, and community leaders can embrace the opportunity to confidently deploy such practices at-scale knowing that they are not the first to do so. As the report shows across numerous strategies, resilience at-scale is not inherently a larger, more centralized solution. Instead, resilience may also be scaled through networks and other decentralized yet aggregated systems.

However, city leaders repeatedly stressed that they cannot do this alone, even with increased federal funding, state funding, and technical assistance partnerships. The private sector – from developers to banks to local businesses – will need to be part of the solution and come to the table with pragmatism, innovation, and equity in mind to invest in and scale resilient infrastructure. Investing in resilient and equitable neighborhoods requires an all-hands-on-deck approach.

Supporting Resources

[Sustainable Affordable Housing: Strategies for Financing an Inclusive Energy Transition, Federal Reserve Bank of New York, 2022.](#)

[Housing Affordability and Climate Change Dialogues, Wells Fargo and RMI, 2022.](#)

[How to Amp Up the Transportation Transformation: A Guidebook for Funding and Financing Electrification, Electrification Coalition, 2021.](#)

[City Renewables Accelerator, RMI and WRI.](#)

[Resilience Hubs Resource Portal, USDN.](#)

[Growing to Its Potential: The Value of Urban Nature for Communities, Investors, and the Climate. RMI, 2022.](#)

[Cities Advancing Climate Action: Leveraging Federal Funds for Local Impact – A Resource Guide, The United States Conference of Mayors and Alliance for a Sustainable Future, January 2022.](#)

[Climate Action and the Inflation Reduction Act: A Guide for Local Government Leaders, C40, 2022.](#)

[A 50-State Survey of State Policies and Decision Makers to Help Ensure Federal Investments Go to “Disadvantaged Communities” Under Biden’s J40 Initiative, Lawyers for Good Government, 2022.](#)

[U.S. Climate Resilience Toolkit](#)

[Leed for Cities & Communities](#)

[LEED certification for neighborhood development | U.S. Green Building Council](#)

[Local Infrastructure Hub](#)