



RESILIENCE

# THE CLIMATE RESILIENCE-ECONOMY NEXUS: ADVANCING COMMON GOALS



by

Laura Brush, *Center for Climate and Energy Solutions*

April 2022





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## EXECUTIVE SUMMARY

Communities across the United States are experiencing increasingly severe and frequent floods, wildfires, extreme heat, and other hazards due to climate change. These hazards are impacting local economies by damaging critical infrastructure and commercial districts, disrupting business operations, shrinking municipal budgets, threatening worker safety, and reducing housing supply and affordability, among other impacts. Economic development strategies can help address these risks and create new economic opportunities, but to be effective over the long-term, they need to plan for a changing climate. Similarly, incorporating economic development considerations into climate resilience-focused efforts can unlock new benefits of resilience and meet emerging needs for it. However, prior C2ES research found that integrated planning between these two disciplines at the local and regional levels is uncommon.

This report seeks to address this gap by identifying areas where economic development and climate resilience can achieve common goals and by exploring on-the-ground projects where innovative actions at this nexus are already being taken. Common goals that advance both climate resilience and economic development include: creating climate resilient development and infrastructure projects, maximizing economic benefits in climate resilience initiatives, developing the climate-ready workforce, focusing climate resilience and economic development efforts on low-income communities and communities of color, and recruiting and developing a business community that offers climate resilience solutions, among others. A number of tools commonly used in both economic development and climate resilience, such as infrastructure investments, local policies, and public-private partnerships, can be used to work toward these outcomes. We explore these goals and strategies through case studies of seven cities around the United States (Figure ES-1) that are advancing this collaborative approach, serving as models for other communities experiencing similar climate impacts and risks. We spotlight two of these projects that are centering equity in broader resilience and economic development efforts. These case studies are summarized in the table below.

**TABLE ES-1: Project Locations**

PROJECT	LOCATION
Resilient Urban Revitalization	Baltimore, Maryland
Comprehensive Flood Risk Management	Cedar Rapids, Iowa
Business-Driven Climate Resilience Action	Ft. Lauderdale, Florida
Workforce Development for Climate Resilience Solutions	Sonoma County, California
Accelerating the Climate Resilience Services and Technologies Industry	Norfolk, Virginia
Spotlight on Equity: Building Thriving, Resilient Communities for All	Ithaca, New York; North Charleston, South Carolina



Finally, we provide recommendations to governments and the private sector to better support this type of action. These recommendations include:

**Federal Policy:**

1. The federal government should amend existing or create new funding and technical support resources that incentivize or directly support interdisciplinary collaboration on climate risk and economic challenges. The U.S. Department of Housing and Urban Development's Community Development Block Grants—Disaster Recovery program provides flexible funding that can be used in post-disaster contexts and would be well-suited to support ongoing collaboration and action across economic development and climate resilience.
2. The federal government should support the integration of economic development and climate resilience in planning efforts at the local and regional level. The U.S. Economic Development Administration (EDA), specifically, should amend its guidance for Comprehensive Economic Development Strategies (CEDS) to require more robust analysis of physical climate risks and how resilience opportunities can support local and regional economic growth. Though EDA currently requires regions to consider economic resilience in their CEDS, they do not specifically call for them to outline ways in which they will support climate risk mitigation. Doing so could help foster collaboration between economic development and climate resilience at the regional level.
3. Federal agencies should build on recent actions to increase the availability and usability of climate information for local decisionmakers<sup>1</sup> by creating more guidance and analysis tools that they can use to assess local economic risks and opportunities related to climate change. Having a better understanding of the costs of inaction and benefits of resilience-building can help achieve critical buy-in from local stakeholders and accelerate actions to increase resilience. These resources could be housed within the Climate Resilience Toolkit, maintained by the U.S. National Oceanic and Atmospheric Association.

**FIGURE ES-1: Map of project locations**





***Local and Regional Policy:***

1. Local governments and regional organizations should facilitate opportunities for convening and collaboration between climate resilience and economic development stakeholders, creating a space for learning about the linkages between climate resilience and economic development and for connections to be made. Communities of practice, for example, can foster collaboration between these two areas.
2. Local governments should lead with equity considerations when developing policy solutions and investment decisions. Doing so can make economic development and climate resilience solutions more robust and effective, positioning communities to thrive despite the changing climate. Tactics such as community visioning processes can help local leaders understand what communities want and need out of economic development and what they see as their most pressing climate risks.
3. Local and state governments should create climate resilience-focused positions, like Chief Resilience Officers, to foster innovative approaches to resilience that capitalize on economic opportunities. These positions can be supported by federal and state grants, which should be geared toward communities with fewer resources.

***Private Sector Leadership and Collaboration:***

1. Private sector stakeholders should engage in local climate and economic development planning efforts and advocate for increased climate resilience to help local leaders build the business case for climate resilience action.
2. The private sector should also collaborate with local entities, like non-profit organizations and community colleges, to develop and implement projects that support both economic development and climate resilience. These efforts could include programs that develop the future workforce for climate resilience solutions, creating a pipeline that can support current and future business offerings.



## INTRODUCTION

Economic vitality is inextricably linked to climate resilience and the future of cities and towns across the United States. Climate change-fueled extreme weather events are already impacting local economies, while climate resilience features can help communities not only avoid these costs but spur economic growth. At the same time, a strong local economy is needed for a community to be truly climate resilient, and economic development initiatives are at risk if they are not designed resiliently. As underscored in the latest reports from the Intergovernmental Panel on Climate Change, climate change-fueled extreme weather hazards are becoming more intense and frequent across the globe and causing significant impacts.<sup>2</sup> In the United States, communities are facing more severe floods, wildfires, drought, extreme heat, and sea level rise. These hazards are impacting key aspects of our communities—from public health, to homes and businesses, to local economies.

Collaboration between economic development and climate resilience practitioners at the local and regional levels can address these climate risks, achieve common objectives, and create new economic opportunities. However, integrated planning between these two disciplines is uncommon, as evidenced in C2ES's 2020 report *The Resilience Factor: A Competitive Edge for Climate-Ready Cities*, which explored connections between climate resilience and local economic competitiveness.<sup>3</sup> Notably, our research revealed a disconnect between local climate resilience planning activities and economic development efforts—public documents from the two planning streams rarely referenced the other, despite their linkages. We also found that the connections between climate resilience and local business sector growth and private sector investment, key elements of economic development, are not yet front-of-mind for many local leaders. In order to implement resilient economic development strategies and maximize benefits for climate resilience, collaboration between economic development and climate resilience must be enhanced.

This report aims to address this gap by identifying opportunities where local and regional leaders can advance resilient economic development and unlock economic benefits of and meet emerging needs for climate resilience. We describe strategies that local or

regional government or economic development entities can take to achieve these goals. The focus of the report is case studies where these strategies are already being used in the face of existing climate hazards including sea level rise, flooding, wildfires, and extreme heat. These seven case studies, gathered from communities across the country, showcase innovative and robust approaches grounded in best-practice economic development and climate resilience action. As part of these case studies, we highlight two efforts (in North Charleston, South Carolina, and Ithaca, New York) where equity and economic development for low-income communities and communities of color are the focus of climate resilience-related initiatives. We conclude by drawing out common themes among the featured efforts and provide recommendations for federal, state, regional and local government entities as well as private sector stakeholders to advance these types of projects in communities across the country.

The intended audience for this report includes the wide variety of stakeholders leading in both economic development and climate resilience at the local and regional levels who can play a part in cross-disciplinary, collaborative efforts. These include:

- **Stakeholders who lead local and regional economic development efforts**, including economic development staff within local governments, councils of government, chambers of commerce, and workforce development boards—to increase their awareness of climate risks and opportunities and help them integrate climate resilience into their economic development strategies.
- **Stakeholders who advance local and regional climate resilience efforts**, including public- and private-sector staff focused on climate change, sustainability, water and natural resources planning, among others—to help them advance increased action and collaboration on climate resilience across disciplines and stakeholder groups.
- **Federal and state-level decisionmakers** who create and manage economic development, commerce, and climate resilience policy—to provide them with models where objectives and solutions for these disciplines intersect.



## BACKGROUND

Communities and local economies are seeing impacts over both the short- and long-term. Climate hazards are damaging businesses and operations and interrupting supply chains. They are causing destruction to critical infrastructure like utility systems and transportation networks, as was the case in the February 2021 Texas winter storm which caused widespread power outages for days. Hazards like extreme heat that plagued the Pacific Northwest in June 2021 are also making conditions dangerous for workers to do their jobs. Small businesses, which are often the backbone of local economies, can permanently close or be slow to rebuild when damages are too costly to repair, like with 2021's Hurricane Ida's impacts in Louisiana and the Northeast. Climate hazards are also having significant impacts on local housing supply and affordability and subsequently the long-term livability of neighborhoods, like in areas at high-risk of wildfire in California. These changes are affecting low-income and socially vulnerable communities the most, as they are often located in neighborhoods with higher risks of hazards like flooding and extreme heat.<sup>4</sup>

In addition, municipal budgets, which support economic development activities, can be depleted by just one extreme event, let alone the repeated events that communities are experiencing as the climate changes. These costs are decreasing the amount of municipal funds available for future projects like infrastructure improvements—further exacerbating community vulnerabilities to climate change—and for development projects that can attract new businesses and residents. Climate hazards are also increasing local governments' needs for recovery funds from the federal government and subsequent costs to taxpayers.

Economic development strategies that aim to create jobs and businesses, diversify the economy, and revitalize business districts and communities can be used to address these risks and create new economic opportunities. To be effective in the long term, however, these strategies must integrate climate risk and resilience. For example, decisionmakers should consider

physical risks in economic development planning processes as well as the climate risks and opportunities related to various economic development initiatives like revitalization projects. The California Economic Summit, for example, has brought together climate adaptation and economic development leaders to outline ways in which climate resilience can be integrated into state economic development focus areas like housing, business and workforce development, and equity.<sup>5</sup> Economic development plans can also include strategies like supporting small businesses that face barriers to implementing resilience strategies or diversifying the economy in ways that make it less dependent on industries particularly vulnerable to climate hazards, like the tourism sector. Commercial and residential district redevelopment or brownfield revitalization projects should also take future climate risks into account and include resilience strategies to mitigate them.

Similarly, local decisionmakers can pursue strategies that unlock new benefits of climate resilience and meet emerging needs for resilience building. Resilience infrastructure can be tailored to maximize local economic and community benefits, for example by incorporating nature-based solutions or multi-purpose infrastructure assets that provide recreation opportunities, or by focusing resilience efforts on critical commercial districts or small businesses. Further, local leaders can tailor workforce development initiatives to support the skills needed for climate resilience projects. They can also support the development of local and regional business sectors that offer technologies and services to support climate risk assessment or resilience strategies.



## **ESSENTIAL GOALS: ADVANCING ECONOMIC DEVELOPMENT AND CLIMATE RESILIENCE TOGETHER**

There are many opportunities for communities and regions to advance resilient economic development, unlock new benefits of climate resilience strategies, and meet emerging local needs. Indeed, we anticipate these collaborative opportunities will become imperative best practices in the near future as climate impacts continue to worsen. These opportunities include:

### **Creating climate resilient development and infrastructure projects**

New development projects can be at risk if they are located in vulnerable areas and built without margins of safety for future climate risks. Existing infrastructure can also be vulnerable, especially if it is already in a state of disrepair. Conducting risk assessments and incorporating resilience strategies into development and infrastructure projects for commercial districts and housing can reduce future physical and economic impacts.

### **Maximizing economic benefits in climate resilience initiatives**

Local and regional initiatives focused on building climate resilience can be tailored to drive local economic and community benefits. For example, they can incorporate resilience features that also provide public amenities (e.g., green infrastructure); be focused on protecting and supporting resilient growth of key commercial districts or small businesses; and support the local business community by hiring them to design, construct, and maintain resilience infrastructure.

### **Retaining or growing the business community in the face of more frequent and intense climate hazards**

Extreme weather events impact businesses of all sizes, which can have implications for local economies over the short- and long-term. Small businesses especially can face resource and time constraints that prevent them from taking steps to become more climate resilient.

Initiatives that aim to increase awareness of climate risks and resilience options can support business continuity during and after extreme weather events, contributing to a thriving economy moving forward.

### **Diversifying the economy when primary sectors are at higher risk from climate hazards**

Vulnerable industries may include coastal tourism exposed to sea level rise and storm surge, farms and agricultural businesses at risk from increasingly severe droughts, and winter sport facilities facing shorter seasons due to increasing temperatures. Manufacturing companies can also be vulnerable to disruptions to their operations (e.g., physical damage to facilities from hurricanes, power outages during heat waves). Diversification can minimize economic shocks in cities and towns where these and other sectors are facing particularly high risks from extreme weather.

### **Developing the climate-ready workforce**

Workforce training can be focused on skills such as infrastructure development, energy efficiency and weatherization, and natural infrastructure management. These industries can offer services and expertise to support a range of activities critical to building climate resilience, including risk assessment and planning, design and construction, and project maintenance and monitoring. Economic development can include education and training initiatives to skill the current workforce and build a pipeline of future workers to provide necessary climate resilience services for the local community. Initiatives can be designed for individuals in low- and middle-income communities, supporting their economic resilience in the face of climate impacts.



### **Recruiting and developing a business community that offers resilience solutions for local governments, businesses, and households**

These solutions can include technologies or services such as planning, engineering, and construction. Solutions can meet specific needs of the local community and can also be deployed in other cities facing similar climate risks.

### **Focusing equitable economic development and climate resilience efforts on low-income communities and communities of color**

As previously mentioned, climate change is causing significant impacts on low-income communities and communities of color. To address these communities' vulnerabilities and support their resilience as the climate changes, climate resilience actions can be tailored toward their specific needs. For example, home energy efficiency and weatherization projects—which can provide thermal comfort during temperature extremes and reduce utility bills—can be focused on lower-income households. In some particularly economically distressed communities, economic development needs are so great that climate resilience continues to be a secondary priority, even if climate risks are high. In these places,

economic development is essentially a prerequisite for climate resilience action. These circumstances perpetuate inequities, as wealthier communities can afford to implement projects that increase their climate resilience. Efforts that prioritize economic development and support climate resilience simultaneously can have significant benefits for these communities.

### **Positioning climate resilience and resilience-related projects as local attributes to attract new businesses and residents**

Increased resilience in vulnerable communities can attract new businesses and residents. Additionally, projects used to increase climate resilience—like parks, street trees, and living shorelines—can serve as amenities that make communities more attractive places. Communities can market these features to new businesses and residents while avoiding displacement for existing residents in low-income communities and communities of color.



## SHARED ACTION: LEVERAGING MUTUAL STRATEGIES

Strategies and tools frequently used in economic development and climate resilience can be tailored to achieve the above goals and outcomes. These include:

- **Assessment and planning processes** that increase coordination to identify mutual goals and strategies between climate resilience planners, economic development stakeholders, and the private sector. Local or regional economic development plans focused on climate resilience could include a variety of the strategies discussed below. An example of this type of plan is Comprehensive Economic Development Strategies (CEDS), which the U.S. Economic Development Administration (EDA) requires for states and regions to receive grant funding. CEDS outline strategic actions and evaluation frameworks for regional economic development and require consideration of economic resilience to relevant hazards like extreme weather.
- **Infrastructure investments** funded by sources like municipal budgets and federal grants. Funding can support resilience strategies for infrastructure like raising roadways, hardening energy infrastructure, and installing nature-based solutions. These strategies can enhance the resilience of infrastructure assets themselves, thereby increasing the resilience of the communities and businesses that rely on them both during and after extreme weather events.
- **Local policies**, such as land-use requirements that guide development toward more resilient areas of a community. Building codes can also be used to encourage resilience strategies, such as elevating structures to prevent flood damage or creating defensible space around them to reduce wildfire risk. These policies can be used to support resilience in vulnerable commercial districts and neighborhoods, as well as facilitate future economic growth and development.
- **Public-private partnerships** on community development or redevelopment planning, funding for infrastructure projects, workforce training programs, and expertise sharing. These partnerships can have benefits for both businesses and communities: public investments in resilience planning and projects can ensure the infrastructure that businesses rely on and that communities in which their employees live are resilient, and leveraging private sector funding, resources, and expertise can support robust and expeditious resilience action for local governments.
- **Community and housing protections** to avoid displacement of low-income communities and communities of color (e.g., community benefits agreements), which can be paired with efforts to increase the resilience of such groups to climate impacts. These strategies can support the resilience of vulnerable neighborhoods and support their economic development.
- **Local hiring initiatives or requirements** that are applied to construction, operations, and maintenance of climate resilience projects. These requirements can help create new jobs and establish businesses in a community.
- **Workforce training programs** that develop the workforce needed to implement climate resilience solutions. These programs can benefit local workers by upskilling them and raising incomes while ensuring that local experts are available to address resilience challenges in a community.
- **Outreach and education to local businesses** that build awareness of climate-related risks and opportunities and foster the implementation of resilience strategies. These actions are especially important for small businesses.



- **Business development initiatives like incubators and accelerators**, which can support the growth of early-stage businesses that offer climate resilience services and technologies for the community. These initiatives can create local jobs when businesses test their solutions locally, helping to tailor them to the exact climate resilience needs of the community, or when they establish operations in the community after the program.
- **Marketing initiatives** that promote resilience features and amenities to prospective businesses and residents. Positioning climate resilience as an attractive feature for businesses and amenities will likely become more important as climate impacts worsen.



## STRATEGIES IN PRACTICE

The following case studies illustrate real-world examples where economic development efforts are incorporating climate risk mitigation and resilience into their strategies, and where climate change-focused initiatives are facilitating economic development in a climate-changed world and meeting new needs. Each case study provides an overview of the project, describes how the project links economic development and climate

resilience, how project leaders conducted stakeholder and community engagement to advance the project, key project outcomes and benefits, and lessons learned from designing and implementing the project. Additional resources are also provided for each case study. Table 1, below, provides an overview of the case study topics, locations, and strategies the initiatives are using.

**TABLE 1: Case Studies and Strategies at the Nexus of Economic Development and Climate Resilience**

CASE STUDY	STRATEGIES USED
Resilient Urban Revitalization <i>Baltimore, Maryland</i>	<ul style="list-style-type: none"> <li>• planning processes</li> <li>• public funding</li> <li>• public-private partnerships</li> <li>• community benefit agreements</li> <li>• local hiring</li> <li>• business engagement</li> </ul>
Comprehensive Flood Risk Management <i>Cedar Rapids, Iowa</i>	<ul style="list-style-type: none"> <li>• planning processes</li> <li>• public funding</li> <li>• public-private partnerships</li> <li>• local hiring</li> <li>• business engagement</li> <li>• marketing</li> </ul>
Business-Driven Climate Resilience Action <i>Ft. Lauderdale, Florida</i>	<ul style="list-style-type: none"> <li>• public-private partnerships</li> <li>• business engagement</li> <li>• planning processes</li> </ul>
Workforce Development for Climate Resilience Solutions <i>Sonoma County, California</i>	<ul style="list-style-type: none"> <li>• workforce development</li> <li>• business engagement</li> </ul>
Accelerating the Climate Resilience Services and Technologies Industry <i>Norfolk, Virginia</i>	<ul style="list-style-type: none"> <li>• business development</li> </ul>
Spotlight on Equity: Building Thriving, Resilient Communities for All <i>Ithaca, New York</i> <i>North Charleston, South Carolina</i>	<ul style="list-style-type: none"> <li>• planning processes</li> <li>• public-private partnerships</li> <li>• workforce development</li> <li>• local policies</li> </ul>



## RESILIENT URBAN REVITALIZATION

*Baltimore, Maryland*



**Project Name:** Port Covington

### Strategies Leveraged:

- planning processes
- public funding
- public-private partnerships
- community benefit agreements
- local hiring
- business engagement.

**Relevant Climate Hazards:** Flooding and Heat

### Key Stakeholders:

- **Port Covington Development Team (lead):** Weller Development Company, Sagamore Ventures, and Goldman Sachs Urban Investment Group are leading design and development.
- **SB7 Coalition:** A South Baltimore neighborhood consortium that ensures resident voices are continuously heard and administers Community Benefit Agreement benefits.
- **City of Baltimore:** Provides oversight to the overall development and community agreements.
- **Maryland Department of the Environment:** Assists with environmental compliance and integrating resilience.

### Project Overview

The Port Covington development in Baltimore, Maryland, is regarded as one of the largest urban revitalization projects in the country.<sup>6</sup> The \$5.5 billion project, anchored by Under Armour's new prospective

headquarters, is transforming an underused 235-acre industrial waterfront in South Baltimore into a new neighborhood and mixed-use community including office spaces, housing, retail, hospitality, marinas, parking, and over 40 acres of parks and green space.<sup>7</sup> A



priority of this redevelopment has been both expanding economic opportunities and implementing climate resilience measures to benefit the immediate community and the larger city of Baltimore. The Port Covington development builds on prior city planning initiatives concerned with increasing economic prosperity, open space, and climate resilience to flooding. These initiatives are outlined in the city's South Baltimore Gateway Master Plan and the Middle Branch Master Plan.<sup>8</sup>

Port Covington included a rigorous community engagement and visioning process to ensure the incorporation of local hiring and workforce development, affordable housing, climate resilience measures, and open and green spaces within the proposed development site. The provision of upward mobility via affordable housing and new jobs, coupled with urban heat reduction and coastal resilience, establishes a model development for other communities from which to learn.

As of March 2022, 440,000 square feet of office spaces, 586,000 square feet of residential units, including 89 affordable dwelling units, and 10 acres of parks and public space are being constructed at Port Covington.<sup>9</sup> Climate resilience measures installed to date include a bulkhead along the water's edge, elevating critical low points of the site, and sizing storm drain utilities for a 1,000-year rain event.

Port Covington is financed utilizing Tax Increment Financing (TIF) for infrastructure development, alongside private, local, state, and federal government contributions. TIF agreements allow for the capture of new tax revenues from new development to fund public benefits such as roadways, utilities, and green spaces.<sup>10</sup>

### ***Economic Development and Climate Resilience Connections***

The primary motivators for the development team and the surrounding communities are to bring long-term economic vitality and climate resilience to an expansive and underused brownfield through an equitable and collaborative process. Key elements that have supported the nexus of economic growth and climate resilience are:

- **Direct investment in climate resilience measures** ensuring that Port Covington will be resilient to precipitation-driven and coastal flooding, as well as extreme heat. While some climate resilience

measures are more costly (e.g., choosing to size storm drains for a larger, but less frequent event), the Port Covington team considered the value of long-term benefits and cost savings, such as maintaining quality of life for residents and patrons, minimizing disruptions to economic activities in the neighborhood, avoiding the cost of certain response measures (e.g., pumping and sandbagging), and protecting the land and infrastructure from repeat damage and repairs.

- **Creation of City Memorandum of Understanding (MOU) and local Community Benefit Agreements (CBA)** ensuring the project provides significant investment in and amenities for the immediate surrounding community, as well as the city of Baltimore. These community benefits focus on funding strategic initiatives to uplift Baltimore's economy and residents, for example by ensuring local hiring, building affordable housing, supporting school funding, and investing in workforce development.
- **Deliberate collaboration** between the Port Covington development team and the city, environmental agencies, and community groups allowed for targeted engagement opportunities and a holistic visioning process with all stakeholders.

### ***Stakeholder and Community Engagement***

The Port Covington development team worked with the city and the surrounding communities to negotiate the MOU and the CBA, respectively, which integrate a community-wide vision for the area.<sup>11</sup> Initially, the project received some pushback from the community and other stakeholders in part due to the size, cost, and the complexities of financing and legal mechanisms like TIF. The CBA with the local communities and MOU with the city established a framework for how successful redevelopment of Port Covington may benefit the surrounding communities and city as a whole. Today, the Port Covington development team continues to foster a collaborative relationship with the community, including directly liaising with community members, holding seats on the SB7 Coalition executive board, providing technical assistance, and demonstrating progress and execution toward the goals and initiatives outlined in the MOU and CBA.



### **Key Outcomes and Benefits**

- Port Covington is projected to create 54,000 construction jobs and 25,000 operational jobs at full buildout.
- More than 30 percent of all on-site jobs are allocated to Baltimore residents. A commitment to employ local & minority-owned businesses and workers has resulted in \$125 million in contracts awarded to minority- and women-owned firms to date.
- The project will include 40 acres of parks, publicly available green space and right-of-way, flood resilience measures to establish habitable spaces at least three feet above the 100- and 500-year flood levels, shoreline and aquatic habitat restoration along the Patapsco River, native plantings, cool and green roofs, and microbioretenion features for runoff filtration and stormwater management.<sup>12</sup>
- Port Covington includes a commitment to inclusionary housing. 20 percent of all residential dwelling units will be affordable housing units.<sup>13</sup>
- The MOU and CBA established nearly \$100 million in benefits to Baltimore and surrounding communities, including \$39 million in direct benefits to six communities adjacent to the Port Covington project and \$55 million in direct citywide benefits.<sup>14</sup>



Rendering for Port Covington development project.

### **Lessons Learned**

Members of the Port Covington development team reflected on the following lessons learned for other communities that may be interested in undertaking a similar project:<sup>15</sup>

- Intentional and comprehensive strategic planning, including extensive community visioning and engagement, is key to meaningfully shaping the direction and outcomes of a large revitalization project. The Port Covington development team's engagement with South Baltimore neighborhoods at the inception of the project strengthened their collective voice as a community, and ultimately shaped the elements of the MOU and CBA.
- To build trust with a community that has historically been underserved and underrepresented, it was imperative for the development team to have trusted representatives interacting with the community to understand mutual interests and desires and to advocate for incorporation of community benefits into the project. It is critical to deliver results and meet and exceed commitments.
- Transforming this vacant, former industrial site into an attractive and resilient space for businesses and community members ultimately gives back to the city, attracts new residents and patrons to the area, and provides long-term benefits to the area like protection from flooding.

### **Additional Resources**

- Port Covington development project [website](#)



## COMPREHENSIVE FLOOD RISK MANAGEMENT

*Cedar Rapids, Iowa*



**Project Name:** Cedar Rapids Flood Control System

### Strategies Leveraged:

- planning processes
- public funding (e.g., property tax levy)
- public-private partnerships
- local hiring
- business engagement
- marketing.

**Relevant Climate Hazard:** Flooding

### Key Stakeholders

- **City of Cedar Rapids (lead):** Spearheaded development of the plan, worked with consultants and engineering teams to design it, and led the public outreach process.
- **Cedar Rapids community members:** Have been involved at every stage of the project, articulating their desired resilience strategies and framing a community vision.
- **Downtown property owners:** Major employers Quaker Oats and Cargill have acted as cooperative partners since the inception of the project.

### Project Overview

The Cedar River cuts through the middle of the city of Cedar Rapids, Iowa. In 2008, the city had just begun preparing a riverfront master plan when the river rose to 31.12 feet, its highest level in history. The massive flood—caused largely by record rainfall in the weeks and months prior—inundated over ten square miles of

the city, including its downtown and commercial center, and caused an estimated \$4.5 billion in damages.<sup>16</sup> More than 561 city blocks were severely damaged, 10,000 residents were displaced from their homes, and 7,749 properties had to be evacuated. Over 300 city facilities and 700 businesses were damaged, including the fire station, public library, city hall, jail, and courthouse.



Following the flood, the city developed a community-driven flood management strategy that aims to enhance safety, economic security, and quality of life for the city's residents. The strategy includes flood protection infrastructure that is designed with local economic and community benefits in mind. For example, it includes an amphitheater that doubles as a levee and open spaces and trails for recreational activities and outdoor gatherings. The \$750 million plan, termed the Flood Control System, is expected to be completed by 2034 and will be able to convey the same water volume as the 2008 flood. Several pieces are complete, including a removable flood gate, an underground stormwater gate, and several levees.<sup>17</sup> An additional 20 different projects are underway to elevate roadways, create detention basins, improve the stormwater system, and build flood gates and walls.<sup>18</sup> In addition to public investment, the city has engaged private companies to build resilience features on their properties that also have community resilience benefits. The city's actions to build resilience have been critical in reducing impacts and helping the community recover from two extreme weather events since the 2008 flood: another significant flood in 2016 and a derecho in 2020 that destroyed 60 percent of the city's tree canopy.<sup>19</sup>

Cedar Rapids is funding the Flood Control System through several mechanisms. This includes \$117 million from the U.S. Army Corps of Engineers, \$267 million from the State of Iowa Flood Mitigation Board, and \$15.2 million in federal and state grants. The city will provide \$264 million in local funding, which includes \$20 million in bonds issued by the City Council in fiscal year 2020 that will result in a property tax levy increase of 22 cents per \$1,000 in property value.

### ***Economic Development and Climate Resilience Connections***

Cedar Rapids made a collective decision to not only recover from the 2008 flood, but to become more resilient and thrive in the changing climate. In doing so, they are working to protect the commercial districts and neighborhoods within the flood impacted area, positioning the city for investment and growth moving forward. Some key elements that have supported the nexus of flood resilience and economic growth are:

- **Wide recognition in Cedar Rapids that flood resilience is economic resilience.** Investor concerns are being addressed by the city taking measures to protect the community from future flooding.<sup>20</sup>

Cedar Rapids businesses have similarly recognized that revitalization and flood protection will benefit both their operations and the broader community, and are financing their own flood resilience measures that benefit both.

- **Coupled investments in flood-resilience with public amenity development and economic growth.** The city prioritized green infrastructure and artfully integrating flood resilience measures into the community (e.g., building an amphitheater that doubles as a levee) to maintain an inviting and vibrant downtown rather than create walled-in communities on either side of the river.
- **Public acknowledgement that climate impacts will only become more severe in the future.** The public has been very supportive of the need for a Flood Control System, recognizing the benefits it can provide for community well-being and the local economy.

### ***Stakeholder and Community Engagement***

Community engagement from residents and businesses has been essential to the success of the Flood Management Strategy. Four days after the flood, the city held a series of open houses that were attended by 2,680 residents to develop an equitable flood management strategy. In addition to flood protection measures, the city created a Neighborhood Reinvestment Plan for neighborhoods affected by the flood. Over 1,400 residents provided input during community meetings on this plan.<sup>21</sup> These workshops were also critical in facilitating community healing and acted as forums for residents to share their stories from the flood. In 2014, after funding had been secured and the details of the 2008 plan were ironed out, the city led another public outreach campaign to engage residents on the formal flood mitigation system plan and design. This outreach took place in work sessions and open houses, online discussion boards and social media, and formal presentations. Most recently, citizens have been supportive of the 10-year property tax increase (2020–29) that will finance the flood control system.<sup>22</sup>

The city has also engaged the private sector extensively. Large downtown businesses have worked closely with the city to upgrade their infrastructure and build new resilience features. For example, Quaker Oats used a combination of local and federal funding to build a 2,500-foot-long flood wall around their facility,



which lies on the edge of the river.<sup>23</sup> Other businesses have allowed the city to build pump stations in their parking lots and flood barriers around their properties. To ensure continued economic growth, the city provided \$3 million to the Chamber of Commerce to fund small business recovery grants for companies with under 50 employees. These funds were used to rebuild or relocate within the city.

### Key Outcomes and Benefits

- The flood protection measures protect against the 2008 flood volume while creating 220 acres of green space, 12 miles of trails along the river's edge, 15 acres of playing fields, and 8 acres of wetlands.
- A flood the size of the 2008 event would cost the city an estimated \$25 million in economic losses when businesses get shut down and \$10 million on temporary flood protection.<sup>24</sup> With long-term flood protection, the city avoids these costs.
- Districts on the riverfront saw property valuation rise from \$29 million to \$46 million between 2008 and 2016.<sup>25</sup>
- Because local contractors have been employed to work on flood infrastructure projects, the wholesale industry saw employment increase 13.6 percent compared to statewide growth of 0.78 percent from 2014 to 2019.<sup>26</sup>

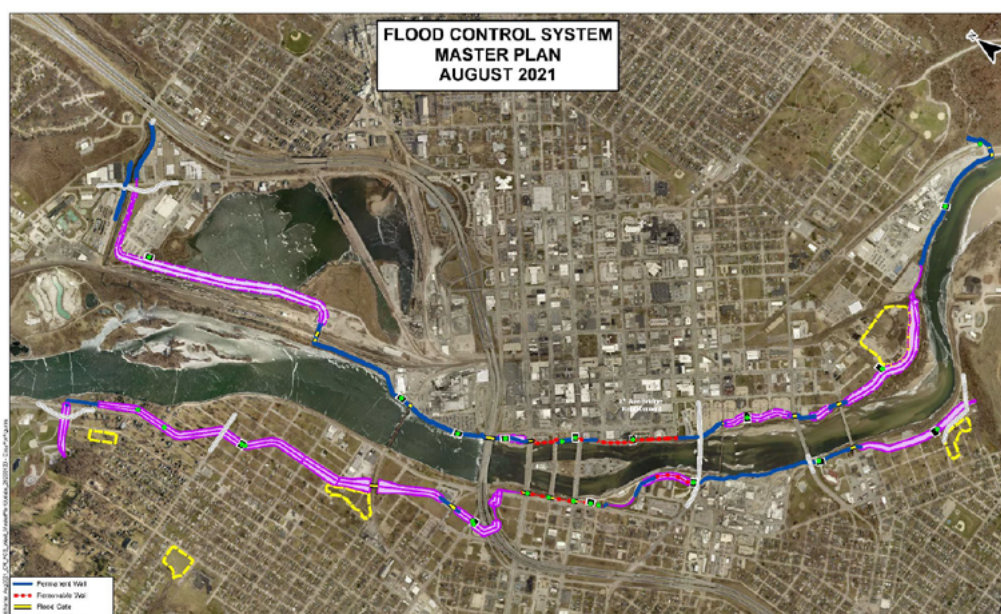
### Lessons Learned

Project stakeholders from Cedar Rapids reflected on the following lessons learned for other communities that may be interested in undertaking a similar project:<sup>27</sup>

- Engaging stakeholders is most effective when people can have one-on-one conversations with each other, which the city facilitated through its public meetings that featured city leaders.
- Focusing on creating a vision for flood resilience immediately after the 2008 flood galvanized the community and motivated residents and business owners to reinvest in a more resilient future and build back better rather than return to “normal.”
- Building relationships with other municipalities, county governments, etc. under “blue sky” conditions is important so that when a disaster strikes, those connections are already formed and can facilitate resilience-building efficiently and effectively. This relationship-building was not a focus for the city before the flood; they plan to prioritize this moving forward.

### Additional Resources

- Cedar Rapids River Flood Control System [project website](#)
- Cedar Rapids Flood Control System [Master Plan](#)



Cedar Rapids Flood Control System Master Plan.



## A Template for Success: Another approach for comprehensive flood risk management

The \$130 million *Strategy to Advance Flood protection, Ecosystems, and Recreation along the San Francisco Bay (SAFER) project* aims to protect communities, infrastructure, ecosystems, and recreational areas from tidal flooding and sea level rise using both grey and green infrastructure solutions. A critical piece of the project is focused on increasing the resilience of a 3.7-mile section of the Peninsula shoreline and Bayfront Expressway in Menlo Park and East Palo Alto using a series of levees built with nature-based solutions, as well as habitat restoration. This effort is led by a public-private partnership between the city of Menlo Park, Pacific Gas & Electric (PG&E), the San Francisquito Creek Joint Powers Authority, and Meta. Together, these groups applied for and received \$50 million in funding from the U.S. Federal Emergency Management Agency's (FEMA) Building Resilience Infrastructure and Communities (BRIC) program, which provides pre-disaster mitigation funding for local resilience projects.

The project, which is expected to take about five years to complete, will provide resilience benefits to multiple stakeholders. It will support the resilience of critical commercial infrastructure, including Facebook's Classic Campus and PG&E's Ravenswood substation, which provides power to residents from San Mateo to Palo Alto. It will also increase the resilience of low-income neighborhoods and communities of color in the nearby Belle Haven neighborhood. PG&E and Meta are providing funding and support as part of this partnership.



## BUSINESS-DRIVEN CLIMATE RESILIENCE ACTION

Greater Fort Lauderdale, Florida



**Project name:** Southeast Florida Resilience Action by Local Chamber of Commerce

**Strategies Leveraged:**

- public-private partnerships
- business engagement
- planning processes.

**Relevant Climate Hazards:** Sea Level Rise and Flooding

**Key Stakeholders**

- **Greater Fort Lauderdale Chamber of Commerce (lead):** Works to advance resilience across the wider region and connects businesses with resilience solutions
- **City of Ft. Lauderdale and Broward County officials:** Work with the chamber to create opportunities that encourage business resilience.
- **Tribal governments:** Offer input on resilience practices on tribal lands.
- **Neighboring chambers of commerce:** Work with Fort Lauderdale to identify best practices and encourage business resilience.
- **Southeast Florida Regional Climate Change Compact:** Organize collaboration across county lines on resilience efforts.

### ***Project Overview***

In response to ongoing sea level rise and climate change, Southeast Florida is taking active measures to enhance climate resilience and protect economic growth and development. This is happening at the city, county, and regional levels, and through partnerships that bridge county lines and bring together diverse stakeholders.

The Greater Fort Lauderdale Chamber of Commerce is a vital part of this network, connecting businesses that are the bedrock of the county's economy with resilience solutions to ensure stable and thriving economic growth in the future. Recognizing the need to prepare for future sea level rise and flooding, the chamber is working toward making the Greater Fort Lauderdale



region an epicenter for resilience solutions locally and internationally.

At a local level, the chamber's Economic Resilience Council is engaged in county coastal resilience efforts across the region to maximize resilience and ensure continued economic growth and prosperity. The chamber supports city, county, and regional economic resilience projects and partners with local universities, the county, schools, and the private sector to increase educational opportunities for others to understand how to address climate change and sea level rise challenges. They developed resilience action groups that advocate for the resilience needs of the community and created a 5-year vision for the business community with actionable goals.<sup>28</sup> In 2017, a delegation of 75 chamber members lobbied lawmakers in Washington, D.C., on eight different topics, one of them being community resiliency and sea level rise.<sup>29</sup> They encouraged representatives to become active members of the bi-partisan Climate Solutions Caucus in the U.S. House of Representatives, prioritize sea level rise infrastructure projects, and direct disaster relief funding for resilient planning and design to South Florida following hurricanes or other natural disasters.

In 2018, the Chamber joined the Southeast Florida Regional Climate Change Compact—a partnership between Broward, Miami-Dade, Monroe, and Palm Beach counties and the first county-level coalition created to advance climate mitigation and adaptation strategies.<sup>30</sup> Representatives from the Seminole Tribe of Florida are key stakeholders in the compact; the chamber has engaged with them to gather input on climate resilience practices on tribal lands. The chamber also sponsored a study led by the compact on the business case for resilience. The goal of this study was to quantify the cost of adaptation by modeling Southeast Florida's economic growth with and without implementation of coastal resilience strategies.

The chamber also helped create the International Resiliency Conference and Convention, which was intended to be held in-person in 2021 prior to the COVID-19 pandemic. It would bring together leaders in resiliency from around the world to provide examples of resilience innovation and funding solutions.<sup>31</sup>

### ***Economic Development and Climate Resilience Connections***

Chamber of Commerce leadership and members recognize that sea level rise resilience is fundamental to business and economic resilience in Southeast Florida. The Chamber of Commerce is actively engaged in efforts to combat climate change. Businesses understand that by supporting resilience measures, they protect their livelihoods. The business case for resilience analysis conducted by the Urban Lands Institute and Southeast Florida Regional Climate Change Compact found that community and building level adaptation actions will lead to significant return on investment for the region and protect jobs, homes, and communities.<sup>32</sup> Without these investments, the region will experience:

- up to \$4.2 billion lost in property value due to daily tidal inundation by 2040
- up to \$28 million lost in sale, property, and tourism taxes by 2040;
- increased cost and/or barriers to access insurance coverage and mortgage financing
- downgrades to municipal bond ratings.

### ***Stakeholder and Community Engagement***

The Fort Lauderdale Chamber of Commerce has been successful due to strong county leadership and stakeholder engagement.

The president of the chamber heads the Resilience Pillar of the Prosperity Partnership, an initiative of the Greater Fort Lauderdale Alliance Foundation that brings together Broward County business, civic, and community leaders to better prepare for anticipated hazards and adapt to changing environmental conditions.<sup>33</sup> The Resilience Pillar is headed by a county commissioner, the county chief resilience officer, and the president of the Chamber of Commerce. The pillar works toward getting funding for resilience studies, implementing the Broward County Resiliency Study, advancing the 2020 Climate Change Action Plan, educating the public, and engaging with external stakeholders.

The chamber worked closely with the county to create a Climate Action Plan and build out Broward County's Resilience Dashboard, which includes an interactive map of all ongoing and completed resilience projects, a greenhouse gas emissions inventory, data related to sea level rise and flooding, and more.<sup>34</sup>



### ***Key Outcomes and Benefits***

Governments, businesses, and residents in Southeast Florida are supportive of coastal resilience measures to mitigate the impacts of flooding and storm surge. The business community understands that they are essential to South Florida's economy and that preparing for sea level rise and climate change is necessary to ensure continued economic growth in the future.

The business case analysis study mentioned above shows that investing in resilience and adaptation would pay off in the long term. The study estimates that:

- Community wide adaptation could provide up to \$37.9 billion in economic benefits for the region and creating thousands of jobs.
- Every one dollar invested in building level adaptation would result in four dollars in economic benefits for the region.

### ***Lessons Learned***

The Greater Fort Lauderdale Chamber of Commerce reflected on the following lessons learned for other communities that may be interested in undertaking a similar project:<sup>35</sup>

- It is valuable for the business community to be engaged in local government resilience efforts and will yield benefits for business operations and assets moving forward.
- Finding champions to marshal the cause is critical. Experts who are good public speakers can connect with other stakeholders and convince them to act or lend support.

### ***Additional Resources***

- Fort Lauderdale Chamber of Commerce Economic Resiliency *webpage*
- The Prosperity Project *website*
- Broward County Resilience *Dashboard*
- Southeast Florida Regional Climate Change Compact *website*
- *Southeast Florida Regional Climate Action Plan*



### **A Template for Success: Additional tools for business leadership in climate resilience**

The *U.S. Chamber of Commerce Resilience in a Box Toolkit* is a website with tools, training, and resources to help small businesses become resilient to hazards. The toolkit helps businesses understand resilience concepts and how to implement risk reduction measures.



## WORKFORCE DEVELOPMENT FOR CLIMATE RESILIENCE SOLUTIONS

*Sonoma County, California*



**Project Name:** Wildfire Resilience Program

**Strategies Leveraged:**

- workforce development
- business engagement.

**Relevant Climate Hazard:** Wildfire

**Key Stakeholders:**

- **Santa Rosa Junior College administration and faculty (lead):** Designed, established, and oversees the program.
- **The Sonoma County Board of Supervisors:** Supported the establishment of the program and stewards funding for it.
- **Local businesses:** Includes those already focused on wildfire resilience and others in related fields; they are being engaged as potential employers of program graduates.

### ***Project Overview***

Sonoma County, California, and its surrounding areas have experienced devastating wildfires in recent years, worsened by severe drought and periods of extreme heat that are expected to accelerate in a changing climate. Various forest management and structural adaptation strategies can be used to increase community resilience to wildfires, but these activities require skilled and

licensed professionals to design, implement, maintain, and monitor them. Currently, Sonoma County's workforce of these professionals is not robust enough to meet the growing local need.

In response to this gap, in 2021 Santa Rosa Junior College (SRJC) established its wildfire resilience academic program, which seeks to prepare students for careers that support wildfire resilience. The program includes college coursework and hands-on training in



a variety of practices for wildfire resilience, including prescribed grazing, forest fuel reduction, defensible space, and post-fire restoration. Leveraging the college's existing academic programs in natural resources and agriculture—including hands-on learning opportunities at the college farm—the program prepares students for forestry and ecological management careers. In turn, the program is fostering the development of a local workforce capable of offering critical wildfire resilience services to Sonoma County and the wider region, yielding both climate resilience and economic benefits for the area.

Over 300 students are currently enrolled in the program for its first academic year (Fall 2021 – Fall 2022) and SRJC administrators are working to increase enrollment. They are focusing on recruiting students from communities that are traditionally under-represented in higher education programs, creating pathways to service in well-paid jobs in the future. To facilitate students' successful transitions to jobs, SRJC administrators are also building a local network of potential employers for program graduates. These employers include companies specializing in wildfire risk mitigation services, as well as those that are well-suited to expand their offerings to include these services, such as landscaping companies. Through this employer engagement, SRJC is effectively helping educate local businesses on potential growth opportunities that could meet local needs for wildfire resilience and yield further economic development for the county.

The wildfire resilience program is supported by funding that the Sonoma County Board of Supervisors received from the PG&E wildfire settlement, which will fund the program for three years. College administrators are exploring financing mechanisms to support the program into the future. These include federal and state

infrastructure grants, as well as additional funding from Sonoma County. College administrators are also focusing on increasing student enrollment in the program so that it can become eligible for longer-term community college funding from the state.

### ***Economic Development and Climate Resilience Connections***

SRJC administrators and faculty saw a clear opportunity to connect their programming and students with the local need for an enhanced wildfire resilience workforce, given that wildfire risk mitigation projects require specialized knowledge and skills, are labor-intensive, cannot be automated, and must happen locally. Further, the wildfire resilience workforce program was seen as a natural extension of the college's focus on local workforce training and its existing related academic programs. College administrators and faculty took initiative to collaborate with local elected officials to establish the program and secure funding. They have approached the program as a fortunate economic opportunity borne out of unfortunate previous wildfire disasters and predicted future risks.

### ***Stakeholder and Community Engagement***

To recruit students, SRJC is engaging with existing local organizations (e.g., Conservation Corps, Sonoma County Regional Parks youth crews) to increase awareness of and interest in the program among groups typically under-represented in higher education programs—offering a pathway to high-quality, well-paying local careers. SRJC administrators and faculty are also creating a local network of potential employers by engaging existing local working groups focused on wildfire resilience—which include local businesses that offer wildfire risk mitigation services—as well as companies directly. These

## **A Template for Success: Additional examples of workforce development for climate resilience**

- *Shasta College* offers a degree program in heavy equipment logging operations and maintenance—services that are critical to forest management for wildfires.
- *College of the Sequoias* offers a no-cost Utility Line Clearance Arborist Program through which trainees learn the necessary skills to support vegetation management programs for utilities as potential employers of program graduates.



companies include, for example, a large forestry business that has been contracted to do forest and vegetation management work in the area and is quickly growing and hiring.

### ***Key Outcomes and Benefits***

Training young professionals for careers in an industry with increasing demand locally and regionally.

Developing the local workforce of wildfire resilience professionals that can meet community need for resilience practices, while keeping the economic benefits of paying for those services in the community.

Facilitating access to higher education and career training for groups historically underrepresented in college programs.

Educating the local business community that can offer wildfire resilience services and serve as places of employment for program graduates, potentially further growing the local wildfire resilience sector.

### ***Lessons Learned***

An SRJC administrator reflected on the following lessons learned for other communities that may be interested in establishing a similar program:<sup>36</sup>

- Engaging major community stakeholders (like the Sonoma County Board of Supervisors) and other organizations, such as environmental groups, has helped build the support needed to create the program.

Non-profit organizations focused on support, education, and training for low-income communities and communities of color can be critical partners in recruiting students from these communities.

- Engaging potential employers early in the process of developing such programs—to build the demand for program graduates—is critical to the success of the program and its graduates. This employer engagement has the added benefit of educating local businesses on how they may tailor their services to offer wildfire resilience support to the community.

### ***Additional Resources***

- Santa Rosa Junior College *wildfire resilience program*



Santa Rosa Junior College wildfire resilience program students at a forest management training session.



## ACCELERATING THE CLIMATE RESILIENCE SERVICES AND TECHNOLOGIES INDUSTRY

Norfolk, Virginia



**Project Name:** RISE

**Strategies Leveraged:**

- business development

**Relevant Climate Hazard:** Sea Level Rise, Storm Surge, and Flooding

### Key Stakeholders

- **RISE (lead):** Provides business development expertise, catalytic funding, and real-world testing opportunities to companies.
- **Local governments, military installations, and utilities:** Offer advice in the design phase and test-drive solutions produced by companies.
- **Companies:** Participate in RISE challenges and bring new solutions to increasingly important issues regarding flooding and sea level rise.

### Project Overview

With hundreds of miles of shoreline along rivers, lakes, the Chesapeake Bay, and the Atlantic Ocean, coastal Virginia is particularly vulnerable to flooding.<sup>37</sup> The area also experiences one of the highest rates of sea level rise in the country due to subsidence, compaction from groundwater withdrawals, and post-glaciation settling.<sup>38</sup>

In 2017, the city of Norfolk and other local stakeholders in the Hampton Roads region partnered with the Commonwealth of Virginia to create RISE, a

non-profit organization that supports the development of novel technological solutions to sea level rise and flooding.

RISE is funded with \$5.25 million of a \$1 billion grant that the U.S. Department of Housing and Urban Development (HUD) granted to the state through its National Disaster Resilience Competition (NDRC) in 2017, with additional matching funds from the state. The NDRC was established after Hurricane Sandy in 2012 using HUD Community Development Block



Grant—Disaster Recovery appropriations, and funded resilience activities including risk assessment, planning, and project implementation. This was the first time HUD disaster recovery funding was used to support the creation of a new coastal resilience industry cluster and serves as a model for other communities that want to accelerate businesses and innovation in the climate resilience field.

The intention in creating RISE was to rethink the way climate resilience is approached in the region by incentivizing the development of products and services that mitigate flooding and sea level rise. RISE is moving the region away from a primary focus on long-term gray infrastructure (e.g., flood walls, pumps) that take years and millions of dollars to build and maintain, to include more innovative solutions that can be implemented over shorter time scales. This approach is guided by the city of Norfolk's Resilience Strategy, which emphasizes creating economic opportunity as critical to resilience building.<sup>39</sup>

RISE sources resilience solutions by issuing a series of challenges—or innovation competitions—based on needs in both urban and rural areas in the region, such as protection of buildings and property, or coastal flood management. In these challenges, entrepreneurs and businesses from around the globe compete to join RISE's year-long comprehensive program and win a funded pilot project using coastal Virginia as a living laboratory. In this program RISE acts as a “one-stop shop” for resilience solutions by identifying pilot sites, coordinating installation, developing an evaluation plan, and facilitating business development.

RISE awards funds in the form of grants and as revenue-based loans, which companies pay back out of gross revenues. RISE's model relies heavily on partnerships with local governments, such as the city of Norfolk, and other stakeholders in the Hampton Roads region, which provide important data resources and “testbeds” for RISE-funded businesses' technologies and solutions. To date, RISE has initiated more than 20 novel pilot projects including tools to estimate flood damage potential for properties, improve stormwater systems, provide resilience training to landscape and building professionals, and more.

### **A Template for Success: Additional examples of private sector incubation for resilience**

- *BlueTech Maryland* incentivizes technological innovations in aquaculture; offshore wind; sustainable maritime, stormwater and flooding management; harbor, bay and ocean restoration; living ocean; urban waterfront, and more.
- *Bethesda Green's* Be Green Business program cultivates “eco-entrepreneurs” and incubates green business development to ensure compatibility between economic development and environmental protection. Local businesses can receive advice on best practices for sustainability, sound governance, and employee support.

### ***Economic Development and Climate Resilience Connections***

RISE-funded solutions mitigate the costly impacts of flooding and sea level rise, leading to near-term risk reduction and long-term economic savings in infrastructure repair. The program is a win-win for end users and companies: cities help test and can later use technologies and solutions that reduce maintenance and disaster recovery costs, while companies collect data and refine their products with direct input from their end users. Requiring businesses to pilot their projects in the Hampton Roads region yields an added bonus for the region's economic base, since some business teams choose to open new operations in the area after the program is complete. Others hire local workers during and after their pilot project.

RISE-funded novel solutions piloted in coastal Virginia include:

- Incorporating flood modeling technology from RISE-funded company FloodMapp into the Waze navigation app and, for the first time, offering drivers real-time alerts to navigate flooded roads.<sup>40</sup>



- Developing the nation's first Home Raising Academy workforce training and certification program.
- Deploying mobile manufacturing units that produce shoreline protection structures that mitigate flooding faster, safer, and more affordably.

### ***Stakeholder Engagement***

Companies apply to RISE through a rigorous application process in which they demonstrate that their product adds substantial new value and is marketable and scalable. They are required to have a business plan that illustrates the issue their product addresses and how they will grow their company. After a company is selected, RISE funds their work plan. Success is measured based on how well the company meets their goals, addresses resilience, and creates economic benefits.

RISE has collaborated closely with end users to learn what pain points they face and if technologies would help address them. For example, one company's engineers collaborated directly with municipal stormwater managers to understand the need for reliable stormwater data during a flood event. They designed sensors that were installed in pipes that track the depth and velocity of stormwater flows in real time. This helped the city prioritize maintenance, plan future installations, and reduce flood risk.

### ***Key Outcomes and Benefits***

Since 2018, RISE has:

- established coastal Virginia as the national leader in coastal resilience innovation
- vetted more than 300 next-generation coastal resilience solutions
- initiated and de-risked more than 35 pilot projects in the region
- awarded over \$6 million in catalytic funding and support to small businesses
- created, retained, or upskilled more than 120 jobs
- trained nearly 200 individuals or businesses in resilience-related industries
- provided support for RISE-funded businesses to raise \$32 million in follow-on investment.

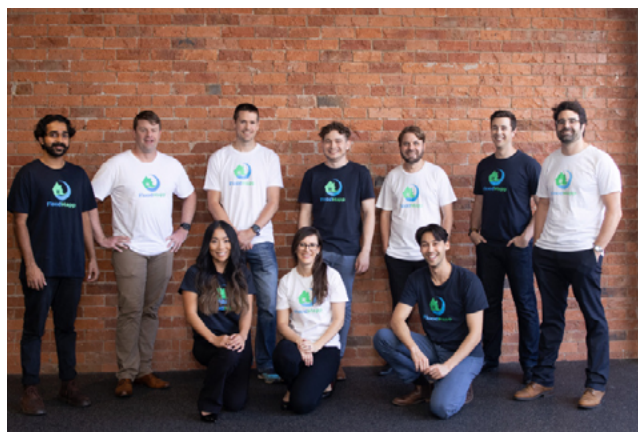
### ***Lessons Learned***

RISE reflected on the following lessons learned for other communities that may be interested in undertaking a similar project:<sup>41</sup>

- Having RISE serve as an intermediary between companies and end users—from the challenge definition through the piloting phase—accelerates innovation in resilience and leads to a greater likelihood of success for resilience businesses. RISE reduces various barriers in the process and connects companies to the resources and training they need for their product and startup to be successful.
- Leveraging federal grant funding creatively can lead to new benefits of its investments. RISE makes federal dollars go further by catalyzing resilience solutions that can be applied to other regions with similar challenges and by reducing the cost of recovery in the Hampton Roads region.
- Partnerships with innovative and forward-looking champions of resilience can rapidly advance the development of creative resilience solutions. The Norfolk Resilience Office was able to support RISE and had more flexibility in their approach to risk and resilience solutions than staff in other municipal departments. Partnership with the city has also helped RISE access resources and forge new partnerships between its businesses and local leaders.

### ***Additional Resources***

- RISE Resilience Innovations [website](#)



RISE-funded business leaders at a convening.



## SPOTLIGHT ON EQUITY

*Building Thriving, Resilient Communities for All*

Equity considerations are essential to building thriving and resilient communities and local economies. The following projects highlight how equity, economic resilience, and climate resilience action can go hand-in-hand.

## EQUITY AT CENTER OF ENERGY EFFICIENCY RETROFIT AND ELECTRIFICATION PROGRAM

*Ithaca, New York*



The City Council in Ithaca, New York, voted to retrofit and decarbonize all existing residential and commercial buildings (roughly 6,000 total) by the end of the decade, becoming the first city in the United States to commit to fully decarbonizing its building stock.<sup>42</sup> In recognition that communities of color have historically borne a disproportionate share of environmental damage, a key objective of the retrofit and electrification program is to redirect 50 percent of the economic, social, and environmental benefits to them. This means prioritizing work on buildings in historically underserved neighborhoods, where gentrification has already forced low-income communities and communities of color out of the city and into rural areas, and where standards for weatherization are less stringent. The objectives of the retrofit and electrification program are to reduce

carbon emissions from energy use inside buildings and to maximize energy efficiency. This is expected to lead to improvements in indoor air quality and thermal comfort during periods of extreme temperatures, as well as a reduction in electricity costs. Increased energy efficiency will also help lower energy costs in the face of rising and more extreme temperature variability. The program, which is expected to create more than 1,000 jobs in the community by 2030, will leverage private capital to create zero to low-cost lending and leasing programs, while redirecting state and federal dollars to reduce the cost of capital, eliminate energy poverty, and provide credit enhancements to guarantee full financial inclusion.<sup>43</sup>

The city selected Brooklyn-based company BlocPower as program manager for the retrofit and electrification program, based on their experience with similar



projects and their commitment to advancing equity.<sup>44</sup> BlocPower will manage relations with investors, local companies, and community-based organizations. It will also collaborate with the city in workforce development and community outreach programs and will oversee the proper implementation of the city's Justice 50 program, which mandates the concurrent retrofitting and electrification of buildings to always include at least 50 percent of low- and moderate-income households. To identify which buildings should be prioritized, the city created an index that ranks buildings based on diverse socio-economic and environmental parameters, energy profile, and location in the city. Among the first buildings to participate in the program is the Southside Community Center, a building greatly symbolic to the African American community in Ithaca. This project will be followed by retrofits of affordable housing buildings, mostly in the southside, west, and south hills neighborhoods, where communities of color are currently being priced out.<sup>45</sup> These upgrades are intended to provide valuable cost-savings for residents.

The retrofit and electrification program is a multi-part process that takes advantage of the economic benefits of co-deploying distributed energy resources, including solar panels and onsite energy storage and electric vehicle charging stations. To address energy efficiency, the work will focus on air sealing and insulation, the installation of high-performance windows, and ventilation systems. The replacement of thermal loads (i.e., electrification) will consider replacing space heating, water heating systems, and clothes dryers with

air- and ground-source heat pumps, as well as replacing cooktops with induction ranges.

The overall cost of the city decarbonization project is estimated at \$2 billion, which includes approximately \$600 million for the retrofit and electrification program, excluding upgrades to the electrical distribution and transmission infrastructure in the city. It is expected to be financed through a variety of creative financing solutions that include private equity, state and federal funding, philanthropic contributions, and community investment. It will require the implementation of financial risk mitigation measures, as well as credit enhancements to guarantee financial inclusion. Through the program, building owners will take out zero- to low-cost loans to finance upgrades, with a repayment plan capped at 80 percent of the estimated energy cost savings. The pilot phase of the project, which aims to retrofit roughly 1,600 buildings, is scheduled to be completed by the end of 2025.

Community engagement also played a large role in shaping the program, which is part of Ithaca's Green New Deal.<sup>46</sup> The city engages regularly with residents to understand their building needs and ensure that local culture is preserved.<sup>47</sup> For example, Ithaca's Director of Sustainability gives biweekly talks to members of communities of color. The city also started a program called "1000 Conversations" as a way of promoting the democratic engagement of the community, and where residents from all backgrounds are invited to have conversations about the future, including the retrofit and electrification program.<sup>48</sup>

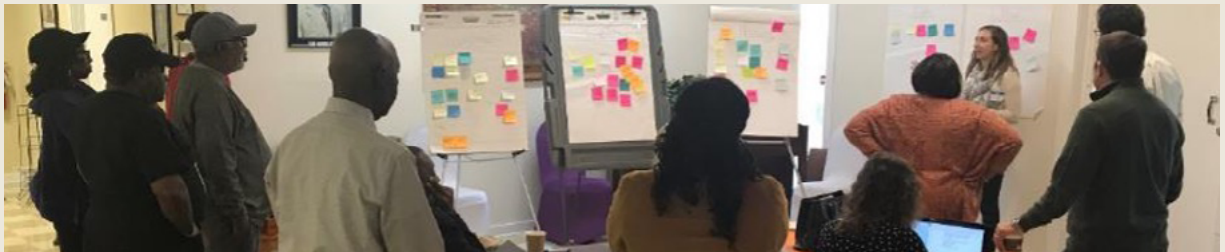


South Side Community Center, one of the first buildings slated for retrofits in Ithaca.



## ECONOMIC DEVELOPMENT CRITICAL TO RESILIENCE PLANNING IN COMMUNITIES OF COLOR

*North Charleston, South Carolina*



Participants at the North Charleston Community Resilience workshop discuss resilience objectives.



Workshop participants conduct a community walk-through field exercise.

The Lowcountry Alliance for Model Communities (LAMC) is a non-profit organization championing economic and community development, environmental justice, affordable housing, and community resilience in select neighborhoods of North Charleston, South Carolina.<sup>49</sup> These neighborhoods—where community members are predominantly people of color, have low-incomes, and are elderly—are environmentally overburdened due to both legacy pollution and continuing heavy industrial activity. LAMC has been a critical advocate for this community.

In 2018–19, the U.S. Environmental Protection Agency (EPA) and LAMC organized two community climate resilience workshops in these neighborhoods to develop a shared understanding of community resilience goals and objectives, articulate community

resilience challenges and opportunities, identify potential resilience strategies to pursue, and share key resources with the community. During the workshops, it became apparent that community and economic resilience issues to improve quality of life for residents had to be addressed first or else in tandem with climate resilience considerations. The community was not yet ready to focus solely on climate resilience while other pressing issues are affecting them. Participants ultimately developed a set of resilience objectives focused broadly on environment, health, housing, transportation, economic opportunity, and community partnerships (*see textbox on the following page*).

EPA and LAMC then developed a Collaborative Community Vulnerability Assessment for these North Charleston neighborhoods, which captured the



resilience objectives, challenges, and opportunities outlined at the workshop. The plan also solidified resilience strategies for the community to actively pursue by identifying relevant community partners, timeframes for implementation, points of contact to lead implementation, and prioritization of strategies.

In the years since receiving this resilience planning support from EPA, LAMC continues to capitalize on the outputs from that work. They are currently implementing many of the priority strategies, including

better understanding water quality concerns, surface water movement, and pollution risks from flooding; and actively engaging in other planned climate resilience efforts in the region. For example, LAMC used the information gained from the workshops to design a training program called EJSTRONG.<sup>50</sup> EJSTRONG provides training and support for North Charleston residents to develop community-based resilience programs to help prepare for, respond to, and recover from disasters like hurricanes and flooding.

## North Charleston Community Resilience Objectives

Community members developed the below objectives during the climate resilience workshops.

### Environment:

- Maintain and enhance the environmental quality of the community, including ensuring clean air and effective flood management by using environmental best practices.

### Health:

- Improve the health of the community by improving access to healthy affordable food options.
- Enhance individual wellness through the availability of preventative and proactive health care.
- Enhance community wellness and networks through physical spaces and wellness programs.

### Housing:

- Ensure a holistic approach to housing to ensure a full set of housing options and ownership types are considered including attainable housing, transitional housing, and emergency housing.
- Create decent, safe, healthy, and affordable housing.
- Provide pathways to ownership.

### Transportation:

- Improve safe transportation across all modes, by infrastructure improvements that cover roads, sidewalks, crossing.
- Maintain access to clean affordable transportation options.
- Enhance mobility for continued economic opportunities to allow access to employment for the community members and to ensure connectivity.
- Improve internal connectedness and external connectedness to other communities and other modes of transportation.

### Economic opportunity:

- Enhance economic opportunities for the community and community members through job skills training and economic development.

### Community partnerships:

- Maintain and enhance partnerships with other community organizations and advocacy groups to improve the quality of life for the community.



## COMMON THEMES

Though the initiatives described in the case studies above have different goals, approaches, and areas of focus, there are several common themes that emerged on the nexus of economic development and climate resilience:

1. Engaging the existing local private sector in a community is critical to advancing initiatives that aim to support economic development and climate resilience because businesses are key stakeholders in economic growth. Their recognition that climate resilience is fundamental to economic development, or that economic development or a strong local economy should be priorities for climate resilience action, can help advance common strategies and goals, evidenced especially by the Cedar Rapids and Fort Lauderdale initiatives. A strong understanding on the part of the business community on both the costs of inaction and the return on investment of these projects can support their buy-in.
2. Engaging community members and gaining their support is critical to ensuring that projects focused on economic development and climate resilience comprehensively address local risks and avoid exacerbating existing inequities—creating the thriving, resilient communities that residents want and need. This is particularly important for initiatives that involve low-income communities and communities of color, like in the Ithaca, North Charleston, and Baltimore efforts.
3. Infrastructure-based initiatives focused primarily on mitigating physical climate risks, like Cedar Rapids' flood risk management efforts, can maximize benefits for local economies and communities especially when the community is actively engaged in the design process. With community input on wants and needs, decisionmakers can preference green infrastructure or tailor grey infrastructure to provide benefits like public green spaces or recreation. They can also hire local contractors to design, build, and maintain resilience assets.
4. Local government stakeholders focused on climate resilience can facilitate innovative approaches to climate risk mitigation that maximize benefits for local economies. These stakeholders can foster forward thinking and creative solutions to climate resilience challenges—as was the case with Norfolk's RISE—in some cases more so than local government stakeholders in more traditional functions (e.g., stormwater and sewer authorities, parks departments, community relations).
5. Workforce development is as important to economic development as infrastructure-based projects. There are opportunities for communities and regions to develop their workforce in a way that also allows them to better manage increasing climate risks (i.e., areas where adaptation may be an industry in and of itself, like in Sonoma County).



## RECOMMENDATIONS

We have identified the following steps that federal, state, local and private-sector stakeholders can take to support economic development and climate resilience simultaneously. These actions can advance a variety of activities including collaboration, planning, community engagement, and project implementation.

### ***Federal Policy:***

1. The federal government should amend existing or create new funding and technical support resources that incentivize or directly support interdisciplinary collaboration on climate risk and economic challenges. The U.S. Department of Housing and Urban Development's Community Development Block Grants—Disaster Recovery program provides flexible funding that can be used in post-disaster contexts and would be well-suited to support ongoing collaboration and action across economic development and climate resilience, as it has with RISE.
2. The federal government should support the integration of economic development and climate resilience in planning efforts at the local level. The U.S. EDA, specifically, should amend its guidance for CEDS to require more robust analysis of physical climate risks and how resilience opportunities can support local and regional economic growth. Though EDA currently requires regions to consider economic resilience in their CEDS, they does not specifically call for them to outline ways in which they will support climate risk mitigation. Doing so could help foster collaboration between economic development and climate resilience at the regional level.
3. Federal agencies should build on recent actions to increase the availability and usability of climate information for local decisionmakers<sup>51</sup> by creating more guidance and analysis tools that they can use

to assess local economic risks and opportunities related to climate change. Having a better understanding of the costs of inaction and benefits of resilience-building can help achieve critical buy-in from local stakeholders and accelerate actions to increase resilience. These resources could be housed within the Climate Resilience Toolkit, maintained by the U.S. National Oceanic and Atmospheric Association.

### ***Local and Regional Policy:***

1. Local governments and regional organizations should facilitate opportunities for convening and collaboration between climate resilience and economic development stakeholders, creating a space for learning about the linkages between climate resilience and economic development and for connections to be made. Communities of practice, for example, can foster collaboration between these two areas.
2. Local governments should lead with equity considerations when developing policy solutions and investment decisions. Doing so can make economic development and climate resilience solutions more robust and effective, positioning communities to thrive despite the changing climate. Tactics such as community visioning processes can help local leaders understand what communities want and need out of economic development and what they see as their most pressing climate risks.
3. Local and state governments should create climate resilience-focused positions, like Chief Resilience Officers, to foster innovative approaches to resilience that capitalize on economic opportunities. These positions can be supported by federal and state grants, which should be geared toward communities with fewer resources.



***Private Sector Leadership and Collaboration:***

1. Private sector stakeholders should engage in local climate and economic development planning efforts and advocate for increased climate resilience to help local leaders build the business case for climate resilience action.
2. The private sector should also collaborate with local entities like non-profit organizations and community colleges to develop and implement projects that support both economic development and climate resilience. These efforts could include programs that develop the future workforce for climate resilience solutions, creating a pipeline that can support current and future business offerings.



## CONCLUSION

As illustrated in the above case studies, initiatives that work at the nexus of climate resilience and economic development can take a variety of forms and address different climate hazards. However, the featured projects are similar in that they represent innovative, cross-disciplinary ways of addressing communities' mounting climate risks and the economic impacts that will result from repeated extreme weather events. Public and private sector action, like the above recommendations, will be needed to advance projects at this intersection in additional communities across the United States. Such collaboration is necessary to ensure that economic development is climate resilient, and that new benefits can be created out of climate resilience initiatives, maximizing benefits for local economies and communities overall.



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The Center for Climate and Energy Solutions (C2ES) is an independent, nonpartisan, nonprofit organization working to forge practical solutions to climate change. We advance strong policy and action to reduce greenhouse gas emissions, promote clean energy, and strengthen resilience to climate impacts.



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